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PROCEEDINGS OF

19th World Congress on

MATERIALS SCIENCE AND ENGINEERING

JUNE 11-13, 2018

BARCELONA, SPAIN



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Scientific Program

Materials Congress 2018

Day 1 June 11, 2018

08:30-09:00 Registrations

Meeting Room: Linate

conferenceseries.com **09:00-09:25** **Opening Ceremony**

Keynote Forum

09:25-09:30 **Introduction**

09:30-09:55 **Title: Encoded SERS plasmonic NPs in nanomedicine**
Nekane Guarrotxena, Spanish National Research Council, Spain

09:55-10:20 **Title: Biodegradable magnesium implant materials – state of the art**
Karl Ulrich Kainer, Helmholtz-Zentrum Geesthacht, Germany

Sessions: Electronic, Optical and Magnetic Materials | Polymer Science and Technology
Session Chair: Alberto Jiménez Suárez, Universidad Rey Juan Carlos, Spain
Session Co-Chair: Michael Kaplan, Simmons College, USA

Session Introduction

10:20-10:40 **Title: Material Science and Optics: Applications from Spectroscopy to Metrology, from Fundamental Physics to Space**
Simone Borri, Istituto Nazionale di Ottica, Italy

Group Photo

Networking & Refreshment Break: 10:40-10:55 @ Lobby

10:55-11:15 **Title: First-principles design of low-dimensional quantum materials with nontrivial band topology**
Mina Yoon, University of Tennessee, USA

11:15-11:35 **Title: Role of Lamb and Horizontal Acoustic Waves in Microscopic Mechanism of Structural Phase Transitions in Crystal Plates**
Michael Kaplan, Simmons College, USA

11:35-11:55 **Title: Coherent Phenomena in Multi-functional Materials**
Giti Khodaparast, Virginia Tech, USA

11:55-12:15 **Title: High sensitivity metamaterial heterodyne detectors at $\lambda = 9\mu m$ operating room temperature**
Carlo Sirtori, Universite Paris Diderot, France

12:15-12:35 **Title: Sandwich method to grow high quality AlN by MOCVD**
Ilkay Demir, Cumhuriyet University, Turkey

12:35-12:55 **Title: Magnetic skyrmions: Spin torque induced motion and electrical detection at room temperature in metallic multilayers**
Nicolas Reyren, Unité Mixte de Physique, France

12:55-13:15 **Title: Spinorbitronics at Interfaces for THz Emission**
Henri Jaffrès, Unité Mixte de Physique, France

Lunch Break: 13:15-14:00 @ Mediterráneo Restaurants

14:00-14:20 **Title: Zinc nitride material for the development of novel electronic sensors and flexible electronics**
Jose Luis Pau, Universidad Autónoma de Madrid, Spain

14:20-14:40 **Title: Segmental dynamics in a polymer material studied by single molecule imaging**
Hiroyuki Aoki, Japan Atomic Energy Agency, Japan

14:40-15:00 **Title: Atomic force microscopy of butadiene-nitrile rubber composites deformation**
Nikolay Shadrinov, Institute of Oil and Gas Problems SB RAS, Russia

15:00-15:20	**Title: Conductivity Studies of Methyl Cellulose/Chitosan/1-butyl-3-methyl imidazolium bis(trifluoro sulfonyl) imide Doped With Ammonium Triflate Based Polymer Electrolyte** **Azwani Sofia Ahmad Khiar,** Universiti Sains Islam, Malaysia
15:20-15:35	**YRF: Transport properties of a two-dimensional PbSe square superstructure in an electrolyte-gated transistor** **Maryam Alimoradi Jazi,** University of Utrecht, Netherlands
Sessions: Biomaterials and Medical Devices | Ceramics and Composite Materials	
Session Chair: Lay Poh Tan, Nanyang Technological University, Singapore **Session Co-Chair: Guy Antou,** University of Limoges, France	
	Session Introduction
15:35-15:55	**Title: Modulation of Cellular Differentiation and Behavior via Engineering Cell Microenvironment** **Lay Poh Tan,** Nanyang Technological University, Singapore
15:55-16:15	**Title: Instrumentation and numerical modeling of the Spark Plasma Sintering process – Application to scale-up** **G Antou ,** University of Limoges, France
	Network & Refreshment Break 16:15-16:30 @ Lobby
16:30-16:45	**YRF: Elaboration of Ti based biocompatible alloys using Nb, Fe and Zr as alloying elements** **Cristian Pantilimon,** University Politehnica of Bucharest, Romania
16:45-17:00	**YRF: Synthetization and characterization of natural biocompatible composite having sustained drug release mechanism for topical and subcutaneous applications** **Bakhtawar Ghafoor,** National University of Sciences and Technology, Pakistan
17:00-17:15	**YRF: Designing and fabrication of anisotropic stent for the treatment of coronary heart disease** **Hafsa Inam,** National University of Sciences and Technology, Pakistan
17:15-17:30	**YRF: Design and fabrication of a hydrogel based ph sensor array for physiological applications** **Mariam Mir,** National University of Sciences and Technology, Pakistan
	Panel Discussion

Day 2 June 12, 2018

Meeting Room: Linate

Keynote Forum

	Introduction
09:00-09:25	**Title: New concept of bioresorbable polymer-based ceramic hybrids for cardiovascular stent applications** **Xiang Zhang,** University of Cambridge, UK
09:25-09:50	**Title: Multifunctional materials stemming out of coordination compounds** **Nick Gerasimchuk ,** Missouri State University, USA
09:50-10:15	**Title: Multiscale 3D printing with polymers** **Geoffrey Mitchell,** CDRSP-IPLeiria, Portugal
Sessions: Materials Science and Engineering | Metals, Mining, Metallurgy and Materials	
Session Chair: Floricica Barvinschi, Politehnica University Timisoara, Romania **Session Chair: Arnaud Caron,** KoreaTech, Republic of Korea **Session Co-Chair: Nobufumi Ueshima,** Tohoku University, Japan	
	Session Introduction
10:15-10:35	**Title: Thermodynamic effects on metals tribology at the nanometer scale** **Arnaud Caron,** KoreaTech, Republic of Korea
	Network & Refreshment Break 10:35-10:50 @ Lobby

10:50-11:10	**Title: Relationship between grain distribution and strain localization in Cu-Al alloys** **Nobufumi Ueshima,** Tohoku University, Japan
11:10-11:30	**Title: Numerical modeling of transport phenomena during the solidification of materials** **Floricica Barvinschi,** Politehnica University Timisoara, Romania
11:30-11:50	**Title: Influence of temperature on mechanical properties of a Fe-22Mn-0,6C TWIP steel** **Alberto Monsalve,** Universidad de Santiago de Chile, Chile
11:50-12:10	**Title: Atomic defect-engineering at complex oxide surfaces and interfaces for electrolysis, sensing, and electronics applications** **Felix Gunkel,** RWTH Aachen University, Germany
12:10-12:30	**Title: Deformation microstructure of surface layers of Ag, Cu, Ni and Al under friction in lubricant conditions** **Lev Rapoport,** Holon Institute of Technology, Israel
12:30-12:50	**Title: Flaxseed mucilage as an eco-friendly inhibitor for ASTM A335 P11 steel in HCl** **Luis Manuel Angelats Silva,** Universidad Antenor Orrego, Peru
12:50-13:10	**Title: InGaAs/InAlAs SLs via MOCVD for QCL Applications** **Sezai Elagoz,** Cumhuriyet University, Turkey
	Lunch Break 13:10-13:55 @ Mediterráneo Restaurants
	Sessions: Nanomaterials and Nanotechnology | Graphene and 2D Materials
	Session Chair: Hajo Dieringa, Helmholtz-Zentrum Geesthacht, Germany **Session Co-Chair: Gennady N Panin,** Gennady N Panin, IMT RAS, Russia
	Session Introduction
13:55-14:15	**Title: Magnesium based Nanocomposites – Challenges and Potential** **Hajo Dieringa,** Helmholtz-Zentrum Geesthacht, Germany
14:15-14:35	**Title: Phonons and their interaction with electrons in layered nanomaterials** **Sergiu Cojocaru,** NIPNE, Romania
14:35-14:55	**Title: Solid Lipid nanoparticles for brain delivery of Paliperidone: Drug Release Kinetics, Therapeutic efficacy and Cyto-toxicity studies** **Jaspreet Kaur Randhawa,** Indian Institute of Technology Mandi, India
14:55-15:15	**Title: High-contrast monolithic photonic nanostructures in the AlGaAs-on-insulator platform** **Valerio F Gili ,** Paris Diderot University, France
15:15-15:35	**Title: Ferroelectricity in $BaTiO_3$ nanocrystals: towards future applications** **Xiaohui Wang,** Tsinghua University, China
	Network & Refreshment Break 15:35-15:50 @ Lobby
15:50-16:10	**Title: First-principles study of optoelectronic, transport and ionic sieving properties of Ti3C2X2 (X=O, OH and F) Mxene** **Golibjon R. Berdiyorov,** Hamad bin Khalifa University, Qatar
16:10-16:30	**Title: Memristive nanostructures based on 2D crystals** **Gennady N Panin,** IMT RAS, Russia
	Poster Presentations 16:30-18:00 @ Foyer
	Poster Judge: Volodkin Dmitry, Nottingham Trent University, UK
MSE01	**Title: Electrospraying of active carrier matrix systems with varying hydrophobicities** **Aliyah S. Zaman,** De Montfort University, UK
MSE02	**Title: Hot corrosion behavior of 4.5 wt. % YSZ coatings elaborated by suspension plasma spraying** **Andrés González-Hernández,** Universidad Industrial de Santander, Colombia

MSE03 **Title: First-principles study on the crystal structure of $ZrTi_2$ under pressure**
Andrés González-Hernández, Universidad Industrial de Santander, Colombia

MSE04 **Title: Lightweight filler for EMI shielding: carbon materials decorated with silvernanoparticle**
Chae Lin Kim, Inha University Republic of Korea

MSE05 **Title: Protein loading into vaterite $CaCO_3$ crystals by co-synthesis**
Volodkin Dmitry, Nottingham Trent University, UK

MSE06 **Title: Multilayer biopolymer-based capsules made using vaterite $CaCO_3$ crystals**
Volodkin Dmitry, Nottingham Trent University, UK

MSE07 **Title: Synthesis and properties of porous carbon derived from coffee waste as a supercapacitor electrode**
Eunbeen Na, Inha university, Republic of Korea

MSE08 **Title: Facile synthesis of oxygen defective yolk-shell BiO_{2-x} for visible light-driven photocatalytic inactivation of Escherichia coli**
Hongli Sun, The Chinese University of Hong Kong, Hong Kong

MSE09 **Title: Cost-effective polyaminal polymer for the heavy metal removal**
Jihyeong Ryu, Inha University, Republic of Korea

MSE10 **Title: Fibrous NSAID Buccal films**
Kazem Nazari, De Montfort University, UK

MSE11 **Title: Ceramic/camphene based three-dimensional co-extrusion for biomimetic structure**
Jong Woo Kim, Korea University, Korea

MSE12 **Title: Effect of carbon-based nanomaterials on flexible polyurethane foaming process and foam fire behavior**
Mª del Pilar Muñoz, CETEM, Spain

MSE13 **Title: Observations on the effect of forging temperature on the microstructure of super-duplex stainless steel UNS S32760**
Mariana Lucia Angelescu, University Politehnica of Bucharest, Romania

MSE14 **Title: Development of more sustainable viscoelastic polyurethane foam**
Marta Muñoz Martí, CETEM, Spain

MSE15 **Title: Effect of surface treatment on wettability of tetragonal zirconia polycrystals (TZP)**
Masao Yoshinari, Tokyo Dental College, Japan

MSE16 **Title: Synthesis via hydrothermal route, morphology control, and luminescent properties of rare-earth doped GdPo4 particles**
Matas Janulevicius, Vilnius University, Lithuania

MSE17 **Title: Gradually porous bio ceramic scaffolds using ceramic/camphene-based three-dimensional co-extrusion**
Min-Kyung Ahn, Korea University, Korea

MSE18 **Title: Stretchable and flexible thermoelectric polymer composites for self-powered volatile organic compound vapors detection**
Petr Slobodian, Tomas Bata University in Zlin, Czech Republic

MSE19 **Title: Self-sensing of strain in a fiber glass/epoxy composite by built-in stripe of carbon nanotubes with Ag nanoparticles**
Petr Slobodian, Tomas Bata University in Zlin, Czech Republic

MSE20 **Title: Development of electrospun timolol maleate-loaded fibrous nanocoatings for ocular lenses**
Prina Mehta, De Montfort University, UK

MSE21 **Title: Electrospun coatings for micron scaled medical devices**
Radeyah Ali, De Montfort University, UK

MSE22 **Title: Sonicated decellularised xenograft – a perfect scaffold for cell adhesion**
Swathy R, Frontier Lifeline & KM Cherian Heart Foundation Hospital, India

MSE23 **Title: Facile biosensor for detecting norovirus using specific binding probes**
Tae Jung Park, Chung-Ang University, Republic of Korea

MSE24 **Title: Manufacturing of gasket sheet using paper manufacturing process without organic solvent**
Yoonjong Yoo, Korea Institute of Energy Research, Republic of Korea

MSE25	**Title: Pickering emulsion droplets for thermally expandable microcapsule with core-shell structure using β-cyclodextrin** **Ji-Young Jung,** Inha University, Republic of Korea

Panel Discussion

Day 3 June 13, 2018

Meeting Room: Linate

Keynote Forum

	Introduction
09:00-09:25	**Title: A framework of materials for 4d printing** **Saba Abdulghani Oliveira da Silva,** CDRSP-IPLeiria, Portugal
09:25-09:50	**Title: Development of biopolymers and biomaterials from lipids** **Aman Ullah,** University of Alberta, Canada
09:50-10:15	**Title: Two- and three-dimensional multilayer bio-coatings as novel drug delivery systems. From nano to micro** **Dmitry Volodkin,** Nottingham Trent University, United Kingdom
10:15-10:40	**Title: Optimising the acceleration of cell proliferation in a bioreactor for scaffold-based tissue engineering** **Nuno Alves,** CDRSP-IPLeiria, Portugal

Sessions: Materials for Energy and Environmental Sustainability | Emerging Smart Materials | Nanomaterials and Nanotechnology | Graphene and 2D Materials

Session Chair: Takashi Tokumasu, Tohoku University, Japan
Session Co-Chair: Alberto Jimenez Suarez, Universidad Rey Juan Carlos, Spain

	Session Introduction
10:40-11:00	**Title: Stacking Fault Energies for fcc Co-based Binary Alloys: A first principles study** **Raquel Lizárraga,** Royal Institute of Technology, Sweden
	Network & Refreshment Break 11:00-11:15 @ Lobby
11:15-11:35	**Title: Nanoscale transport phenomena of reaction materials in polymer electrolyte fuel cell** **Takashi Tokumasu,** Tohoku University, Japan
11:35-11:55	**Title: Development of nanoreinforced resins with self-heating capabilities for 3D printing technologies** **Alberto Jiménez Suárez,** Universidad Rey Juan Carlos, Spain
11:55-12:10	**YRF: Manganese acetylacetonate as the precursor of high capacitance manganese oxides nanoparticles – the only active component in the supercapacitor electrode** **Alice W M Chan,** The Chinese University of Hong Kong, Hong Kong
12:10-12:25	**YRF: Highly charge polarized elemental phosphorus microbelt photocatalyst growing on liquid bismuth substrate** **Yang Liu,** The Chinese University of Hong Kong, China
12:25-12:40	**YRF: Microstructure evolution of A356 aluminum alloy reinforced with Si3N4 particles during mechanical milling** **Heydi Fernandez,** Universidad de Santiago de Chile, Chile
	Lunch Break: 12:40-13:25 @ Mediterráneo Restaurants
13:25-13:40	**YRF: Defect States in Hexagonal Boron Nitride: Assignments of Observed Properties and Prediction of Properties relevant to Quantum Computation** **A Sajid,** University of Technology Sydney, Australia
13:40-13:55	**YRF: Isolation of 2D Material by sand paper abrasion** **Peetam Mandal,** National Institute of Technology Agartala, India

Sessions: Physics and Chemistry of Materials | Mechanics, Characterization Techniques and Equipments | Materials Science and Engineering | Metals, Mining, Metallurgy and Materials	
Session Chair: Richard Weihrich, University of Augsburg, Germany	
	Session Introduction
13:55-14:15	**Title: Preparation and Characterization of Novel NLO Solids in As-O-Mo, As(P)-O-Mo(W) and As(P)-O-Nb(W) systems** **Nick Gerasimchuk,** Missouri State University, USA
14:15-14:35	**Title: Combining computational design and soft synthesis to a resource efficient green chemistry of novel functional materials** **Richard Weihrich,** University of Augsburg, Germany
14:35-14:55	**Title: Ultra-low energy SEM/STEM of graphene** **Ludek Frank,** Czech Academy of Sciences, Czech Republic
14:55-15:15	**Title: Prediction of intermetallic phase layer thickness in laser assisted hybrid friction stir welding of aluminium to steel** **Hee Seon Bang,** Chosun University, Korea
15:15-15:30	**YRF: Correlation between magnetic saturation and component in WC-Ni85Fe15 alloys** **Ruiwen Xie,** Royal Institute of Technology, Sweden
	Network & Refreshment Break 15:30-15:45 @ Lobby
15:45-16:00	**YRF: Analysis of strengthening mechanisms in nano-ODS Steel depending on preparation route** **Alessandra Fava,** University of Rome "Tor Vergata", Italy
16:00-16:15	**YRF: Development of CNT-reinforced ceramic matrix composites for wear-resistance application and light- weight high strength CNT-reinforced epoxy composite** **Dipanjana De,** National Institute of Technology Agartala, India
16:15-16:30	**YRF: Study of a Fluidized Bed Reactor to Produce Green-Carbon Nanotubes at Pilot Scale** **Andrés Muñoz,** University of Antioquia, Colombia
16:30-16:45	**YRF: Compherensive comparison of epitaxially grown gan layer grown on conventional sapphire and patterned sapphire substrates** **Ismail ALTUNTAS,** Cumhuriyet University, Turkey
16:45-17:00	**YRF: On the efficiency of Cyclodextrin Inclusion complexes with Ibuprofen and Naproxen** **Stiliyana Pereva,** Sofia University, Bulgaria
17:00-17:15	**YRF: The influence of Nb content on the mechanical properties of micro alloyed low carbon steels** **Tamara Aleksandrov Fabijanic,** University of Zagreb, Croatia
	Panel Discussion

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Metabonomics & Metabolites	2325-9736
Microbial & Biochemical Technology	1948-5948
Microbial Methods & Assays Open Access	-
Molecular and Genetic Medicine	1747-0862
Molecular Biology	2168-9547
Molecular Biomarkers & Diagnosis	2155-9929
Molecular Cloning & Genetic Recombination	2325-9787
Nanomedicine & Biotherapeutic Discovery	2155-983X
Next Generation: Sequencing & Applications	-
Phylogenetics & Evolutionary Biology	2329-9002

Physiobiochemical Metabolism	2324-8793
Plant Biochemistry & Physiology	2329-9029
Proteomics & Enzymology	-
Single Cell Biology	2168-9431
Tissue Science & Engineering	2157-7552
Transcriptomics: Open Access	2329-8936
Translational Biomedicine	2172-0479

Health Care

Diversity and Equality and Health and Care	2049-5471
Health Care: Current Reviews	2375-4273
Health Science Journal	1791-809X
Pregnancy & Child Health	2376-127X
Primary Health Care	2167-1079
Quality in Primary Care	1479-1072
Tropical Diseases & Public Health	2329-891X
Women'S Health, Issues & Care	2325-9795

Immunology

Advances in Antibiotics & Antibodies	-
Allergy & Therapy	2155-6121
Autoimmune Diseases: Open Access	-
Clinical & Cellular Immunology	2155-9899
Cytokine Biology	-
Immunobiology	-
Immunogenetics: Open Access	-
Immunome Research	1745-7580
Immunotherapy: Open Access	-
Infectious Diseases & Immunological Techniques	2325-9752
Inflammatory Bowel Diseases & Disorders	-
Innate Immunity & Immunological Disorders	-
Interdisciplinary Journal of Microinflammation	-
Lupus: Open Access	-
Molecular Immunology	-
Osteoarthritis	-
Reproductive Immunology	-
Rheumatology: Current Research	2161-1149
Sarcoidosis	-
Vaccines & Vaccination	2157-7560

Informatics

Data Mining in Genomics & Proteomics	2153-0602
Glycomics and Lipidomics	2153-0637
Health & Medical Informatics	2157-7420
Proteomics & Bioinformatics	0974-276X
Theoretical and Computational Science	2376-130X

Materials Science

Bioceramics Developments and Applications	2090-5025
Material Sciences & Engineering	2169-0022
Nano Research & Applications	-
Nanomaterials & Molecular Nanotechnology	2324-8777
Nanomedicine & Nanotechnology	2157-7439
Plastic & Polymer Sciences	-
Powder Metallurgy & Mining	2168-9806
Research & Reviews: Journal of Material Sciences	2321-6212

Mathematics

Applied & Computational Mathematics	2168-9679
Biometrics & Biostatistics	2155-6180
Generalized Lie Theory and Applications	1736-4337
Physical Mathematics	2090-0902
Research & Reviews: Journal of Statistics and Mathematical Sciences	-

Medical

Abnormal and Behavioural Psychology	-
Acta Psychopathologica	-
Acta Rheumatologica	-
Addictive Behaviors , Therapy & Rehabilitation	2324-9005
Adenocarcinoma	-
Advances in Cancer Prevention	-
Advances in Genetic Engineering & Biotechnology	-
Advances in Weight Loss Management & Medical Devices	-
Aerobics & Fitness	-
Aesthetic & Reconstructive Surgery	-
Aids & Clinical Research	2155-6113
Air and Water Borne Diseases	2167-7719
Alternative & Integrative Medicine	2327-5162
Analgesia & Resuscitation : Current Research	2324-903X
Anaplastology	2161-1173
Anatomy & Physiology: Current Research	2161-0940
Andrology & Gynecology: Current Research	2327-4360
Andrology	2167-0250
Angiology: Open Access	2329-9495
Annals of Behavioural Science	-
Applied and Rehabilitation Psychology: Open Access	-
Archives in Cancer Research	2254-6081
Archives of Medicine	1989-5216
Archives of Surgical Oncology	-
Archivos De Medicina	1698-9465
Arthritis	2167-7921
Asthma and Bronchitis	-
Athletic Enhancement	2324-9080
Autacoids & Hormones	2161-0479
Biology and Medicine	0974-8369
Biomedical Engineering & Medical Devices	-
Biomedical Sciences	2254-609X
Bioterrorism & Biodefense	2157-2526
Blood	-
Blood & Lymph	2165-7831
Blood Disorders & Transfusion	2155-9864
Blood Pressure: Open Access	-
Bone Marrow Research	2329-8820
Bone Reports & Recommendations	-
Brain Tumors	-
Breast Cancer: Current Research	-
Cancer Biomarkers	-
Cancer Clinical Trials	-
Cancer Diagnosis	-
Cancer Medicine & Anticancer Drugs	-
Cancer Science & Therapy	1948-5956
Cancer Surgery	-
Carcinogenesis & Mutagenesis	2157-2518
Cardiovascular Diseases & Diagnosis	2329-9517
Cardiovascular Pathology: Open Access	-
Celiac Disease: Open Access	-
Cervical Cancer: Open Access	-
Chemotherapy	2167-7700
Chest Diseases	-
Childhood & Developmental Disorders	-
Childhood Obesity	-
Chronic Obstructive Pulmonary Disease: Open Access	-
Colorectal Cancer: Open Access	-
Communication Disorders, Deaf Studies & Hearing Aids	2375-4427
Community Medicine & Health Education	2161-0711
Complex Diseases and Treatment	-
Contraceptive Studies	-
Critical Care Obstetrics & Gynecology	-
Current Trends in Gynecologic Oncology	-
Dental Health: Current Research	-
Dental Implants and Dentures: Open Access	-
Dentistry	2161-1122
Depression and Anxiety	2167-1044
Dermatology Case Reports	-
Diabetes & Metabolism	2155-6156
Diabetes Medication and Care	-
Diabetic Complications and Medicine	-
Drug Abuse	-
Emergency Medicine	2165-7548
Endocrinology & Diabetes Research	-
Endocrinology & Metabolic Syndrome	2161-1017
Epidemiology: Open Access	2161-1165
Evidence based Medicine and Practice	-
Family Medicine & Medical Science Research	2327-4972
Forensic Biomechanics	2090-2697
Forensic Medicine	-

Forensic Nursing: Open Access	-
Forensic Odontology	-
Forensic Psychology	-
Forensic Research	2157-7145
Gastrointestinal & Digestive System	2161-069x
Gastrointestinal Cancer and Stromal Tumors	-
General Medicine	2327-5146
General Practice	2329-9126
Genetic Disorders & Genetic Reports	2327-5790
Genital System & Disorders	2325-9728
Geriatric Psychiatry	-
Gerontology & Geriatric Research	2167-7182
Gynecology & Obstetrics	2161-0932
Gynecology & Obstetrics- Case Report	-
Haematology & Thromboembolic Diseases	2329-8790
Hair: Therapy & Transplantation	2167-0951
Head and Neck Cancer Research	-
Health & Medical Economics	-
Health Care Communications	-
Health Economics & Outcome Research: Open Access	-
Health Education Research & Development (Biosafety & Health Education: Open Access-2332-0893)	-
Health Systems and Policy Research	2254-9137
Heart Transplant and Surgery	-
Heavy Metal & Chelation Therapy	-
Hepatology and Gastrointestinal Disorders	-
Hospital & Medical Management	-
Hypertension- Open Access	2167-1095
Hypo & Hyperglycemia	2327-4700
Imaging and Interventional Radiology	-
Medical Implants & Surgery	-
Informatics and Data Mining	-
Insights in Biomedicine	-
Insights in Medical Physics	-
Integrative Oncology	2329-6771
Internal Medicine	2165-8048
International Journal of Clinical & Medical Imaging	2376-0249
International Journal of Collaborative Research on Internal Medicine & Public Health	-
International Journal of Emergency Mental Health and Human Resilience	1522-4821
International Journal of Mental Health & Psychiatry	2327-4654
International Journal of Pediatric Neurosciences	-
International Journal of Physical Medicine & Rehabilitation	2329-9096
International Journal of Public Health and Safety	-
International Journal of School and Cognitive Psychology	-
Interventional Pediatrics	-
Invasive Cardiology Future Medicine	-
JBR Journal of Interdisciplinary Medicine and Dental Sciences	2376-032X
Kidney	-
Kidney Transplant	-
La Prensa Medica	0032-745X
Laser Surgery and Therapy	-
Leukemia	2329-6917
Liposuction	-
Liver	2167-0889
Liver: Disease & Transplantation	2325-9612
Lung Cancer Diagnosis & Treatment	-
Lung Diseases & Treatment	-
Malaria Control & Elimination	2090-2778
Maternal and Pediatric Nutrition	-
Medical & Surgical Pathology	-
Medical & Surgical Urology	2168-9857
Medical and Clinical Reviews	-
Medical Case Reports	-
Medical Diagnostic Methods	2168-9784
Medical Toxicology and Clinical Forensic Medicine	-
Melanoma and Skin Diseases	-
Mental Health in Family Medicine	2327-4972
Mental Illness and Treatment	-
Metabolic Syndrome	2167-0943
Molecular & Medical Histology	-
Molecular Medicine & Therapeutics	2324-8769
Neonatal Biology	2167-0897
Neonatal Studies	-
Neonatal Medicine	-
Neoplasm	-
Nephrology & Therapeutics	2161-0959
Neurobiotechnology	-
Neuroinfectious Diseases	2314-7326
Neurooncology: Open Access	-
Neurosurgery & Cardiac Surgery	-
Novel Physiotherapies	2165-7025
Nuclear Medicine & Radiation Therapy	2155-9619
Nutritional Disorders & Therapy	2161-0509
Obesity & Eating Disorders	-
Obesity & Weight Loss Therapy	2165-7904
Occupational Medicine Health Affairs	2329-6879
Omics Journal of Radiology	2167-7964
Oncology & Cancer Case Reports	-
Oncology Translational Research	-
Oral Health and Dental Management	2247-2452
Oral Health Case Reports	-
Oral Hygiene & Health	2332-0702
Orthodontics & Endodontics	-
Orthopedic & Muscular System: Current Research	2161-0533
Orthopedic Oncology	-
Osteoporosis & Physical Activity	2329-9509
Otolaryngology:Open Access	2161-119X
Otology & Rhinology	2324-8785
Pain & Relief	2167-0846
Pain Management & Medicine	-
Palliative Care & Medicine	2165-7386
Pancreatic Disorders & Therapy	2165-7092
Pediatric Care	-
Pediatric Dental Care	-
Pediatric Emergency Care and Medicine- Open Access	-
Pediatric Nephrology Practice	-
Pediatric Neurology and Medicine	-
Pediatric Nursing: Open Access	-
Pediatric Oncology: Open Access	-
Pediatric Physiotherapy	-
Pediatric Psychology and Psychiatry	-
Pediatrics & Therapeutics	2161-0665
Periodontics and Prosthodontics: Open Access	-
Pigmentary Disorders	2376-0427
Prevention Infection Control: Open Access	-
Preventive Medicine	-
Primary & Acquired Immunodeficiency Research	2324-853X
Prostate Cancer	-
Psoriasis & Rosacea Open Access	-
Psychiatry	2378-5756
Psychological Abnormalities in Children	2329-9525
Psychology & Psychotherapy	2161-0487
Pulmonary & Respiratory Medicine	2161-105x
Rare Disorders & Diseases	-
Regenerative Medicine	2325-9620
Reproductive Endocrinology & Infertility	-
Reproductive System & Sexual Disorders	2161-038x
Research & Reviews: Journal of Dental Sciences	2320-7949
Research & Reviews: Journal of Medical and Health Sciences	2319-9865
Research Journal of Biology	2322-0066
Sleep Disorders & Therapy	2167-0277
Sleep Disorders : Treatment & Care	2325-9639
Spine	2165-7939
Spine & Neurosurgery	2325-9701
Spine Research	-
Sports Medicine & Doping Studies	2161-0673
Sports Nutrition and Therapy	-
Steroids & Hormonal Science	2157-7536
Stroke Research & Therapy	-
Journal of Surgery [Jurnalul de Chirurgie]	1584-9341
Surgery: Current Research	2161-1076
The Headache Journal	-
The International Journal of Apitherapy	-
The Pancreas	1590-8577
Therapeutic Care and Physical Rehabilitation	-

Thrombosis and Circulation	-
Thyroid Disorders & Therapy	2167-7948
Translational Medicine	2161-1025
Transplant Reports : Open Access	-
Transplantation Technologies & Research	2161-0991
Trauma & Acute Care	-
Trauma & Treatment	2167-1222
Traumatic Stress Disorders & Treatment	2324-8947
Tropical Medicine & Surgery	2329-9088
Tumor Diagnostics and Reports	-
Universal Surgery	2254-6758
Vascular Medicine & Surgery	2329-6925
Vitiligo & Dermatomyositis	-
Voice Medicine & Surgery	-
Women's Health Care	2167-0420
Wound Medicine and Tissue Repair	-
Yoga & Physical Therapy	2157-7595

Microbiology

Advances in Influenza Research	-
Antimicrobial Agents	-
Antivirals & Antiretrovirals	1948-5964
Applied Microbiology: Open Access	-
Archives of Clinical Microbiology	1989-8436
Bacteriology and Parasitology	2155-9597
Clinical Infectious Diseases & Practice	-
Clinical Microbiology: Open Access	2327-5073
Colitis & Diverticulitis	-
Emerging Infectious Diseases	-
Fermentation Technology	2167-7972
Fibromyalgia: Open Access	-
Forensic Pathology	-
Hepatitis	-
Human Papillomavirus	-
Infectious Diseases and Diagnosis	-
Infectious Diseases and Therapy	2332-0877
Medical Microbiology & Diagnosis	2161-0703
Medical Mycology: Open Access	-
Meningitis	-
Mycobacterial Diseases	2161-1068
Pediatric Infectious Diseases: Open Access	-
Research & Reviews: Journal of Microbiology and Biotechnology	2320-3528
Research & Reviews: Journal of Inflammation	-
Research & Reviews: Journal of Pathology & Epidemiology	-
Virology & Mycology	2161-0517

Neuroscience

Addiction Research & Therapy	2155-6105
Alzheimers Disease & Parkinsonism	2161-0460
Autism-Open Access	2165-7890
Brain Disorders & Therapy	2168-975X
Child & Adolescent Behavior	2375-4494
Clinical & Experimental Neuroimmunology	-
Dementia & Mental Health	-
Epilepsy Journal	-
Insights in Clinical Neurology	-
International Journal of Neurorehabilitation	2376-0281
Multiple Sclerosis	2376-0389
Neurological Disorders	2329-6895
Neurology & Neurophysiology	2155-9562
Neurology and Neuroscience	2171-6625
Neuropsychiatry	-
Neuroscience & Clinical Research	-
Schizophrenia Journal	-

Health Care & Nursing

Advanced Practices in Nursing	-
Community & Public Health Nursing	-
Nursing & Care	2167-1168
Nursing & Clinical Research	-
Patient Care	-
Perioperative & Critical Intensive Care Nursing	-
Research & Reviews: Journal of Nursing and Health Sciences	-

Pharmaceutical Sciences

Advances in Pharmacoepidemiology & Drug Safety	2167-1052
Alcoholism & Drug Dependence	2329-6488
Bioanalysis & Biomedicine	1948-593X
Biochemistry & Pharmacology: Open Access Journal	2167-0501
Bioequivalence & Bioavailability	0975-0851
Biomarkers in Drug Development	2327-4441
Biomarkers Journal	-
Biomolecular Research & Therapeutics	2167-7956
Cardiovascular Pharmacology: Open Access	2329-6607
Clinical & Experimental Pharmacology	2161-1459
Clinical Pharmacology and Biopharmaceutics	2167-065X
Current Trends in Nutraceuticals	-
Developing Drugs	2329-6631
Diagnostic Techniques & Biomedical Analysis	-
Drug Designing: Open Access	2169-0138
Drug Metabolism & Toxicology	2157-7609
in Silico & in Vitro Pharmacology	-
Molecular Enzymology and Drug Targets	-
Molecular Pharmaceutics & Organic Process Research	2329-9053
Pharmaceutica Analytica Acta	2153-2435
Pharmaceutical Care & Health Systems	2376-0419
Pharmaceutical Microbiology	-
Pharmaceutical Regulatory Affairs: Open Access	2167-7689
Pharmaceutical Sciences & Emerging Drugs	-
Pharmaceutics & Drug Delivery Research	2325-9604
Pharmacoeconomics: Open Access	-
Pharmacogenomics and Pharmacoproteomics	2153-0645
Pharmacognosy & Natural Products	-
Pharmacokinetics & Experimental Therapeutics	-
Pharmacological Reports	-
Pharmacovigilance	2329-6887
Research & Reviews: Journal of Hospital and Clinical Pharmacy	-
Research & Reviews: Journal of Pharmaceutical Analysis	2320-0812
Research & Reviews: Journal of Pharmaceutical Quality Assurance	-
Research & Reviews: Journal of Pharmaceutics and Nanotechnology	2347-7857
Research & Reviews: Journal of Pharmacognosy and Phytochemistry	2321-6182
Research & Reviews: Journal of Pharmacy and Pharmaceutical Sciences	2320-1215
Virology & Antiviral Research	2324-8955

Physics

Astrophysics & Aerospace Technology	2329-6542
Research & Reviews: Journal of Pure and Applied Physics	2320-2459
Vortex Science and Technology	2090-8369

Social & Political Sciences

Anthropology	2332-0915
Arts and Social Sciences Journal	2151-6200
Civil & Legal Sciences	2169-0170
Forensic Anthropology	-
Global Media Journal	1550-7521
Intellectual Property Rights: Open Access	2375-4516
Mass Communication & Journalism	2165-7912
Political Science & Public Affairs	2332-0761
Research & Reviews: Journal of Educational Studies	-
Research & Reviews: Journal of Social Sciences	-
Socialomics	2167-0358
Sociology & Criminology	2375-4435

Veterinary Sciences

Animal Nutrition	-
Primatology	2167-6801
Research & Reviews: Journal of Veterinary Sciences	-
Research & Reviews: Journal of Zoological Sciences	2321-6190
Veterinary Science & Medical Diagnosis	2325-9590
Veterinary Science & Technology	2157-7579

Impact Factors* (IF)

Journal Name	Pubmed Short Name	Impact Factor
Biological Systems: Open Access	Biol Syst Open Access	0.76
Journal of Biotechnology & Biomaterials	J Biotechnol Biomater	1.94
Journal of Psychology & Psychotherapy	J Psychol Psychother	1.3
Advanced Techniques in Biology & Medicine	Adv Tech Biol Med	1.08
AIDS & Clinical Research	J AIDS Clin Res	2.7
Autism Open Access	Autism Open Access	3.52
Biochemistry & Physiology: Open Access	Biochem Physiol	1.03
Diversity Equality in Health & Care	Divers Equal Health Care	2.49
Drug Designing: Open Access	Drug Des	6
Fungal Genomics & Biology	Fungal Genom Biol	1.15
International Journal of Genomic Medicine	Int J Genomic Med	0.67
Journal of Addiction Research & Therapy	J Addict Res Ther	2.86
Journal of Alzheimers Disease & Parkinsonism	J Alzheimers Dis Parkinsonism	1.18
Journal of Fertilization: In Vitro	JFIV Reprod Med Genet	1
Journal of Genetic Syndromes & Gene therapy	J Genet Syndr Gene Ther	2.34
Journal of Microbial & Biochemical Technology	J Microb Biochem Technol	2.5
Journal of Nursing & Care	J Nurs Care	1.6
Journal of Osteoporosis and Physical Activity	J Osteopor Phys Act	0.66
Journal of Yoga & Physical Therapy	J Yoga Phys Ther	1.17
Molecular Biology	Mol Biol	1.85
Neurology & Neurophysiology	J Neurol Neurophysiol	0.77
Primary health care	Prim Health Care	1
Quality in Primary Care	Qual Prim Care	3.88
Tissue Science & Engineering	J Tissue Sci Eng	2.72
Biochemistry & Analytical Biochemistry	Biochem Anal Biochem	2.6
Molecular and Genetic Medicine	J Mol Genet Med	2.89
Advancements in Genetic Engineering	Adv Genet Eng	1
Enzyme Engineering	Enz Eng	2.3
Depression and Anxiety	J Depress Anxiety	1
Human Genetics & Embryology	Human Genet Embryol	1.2
Current Synthetic and Systems Biology	Curr Synthetic Sys Biol	0.8
Hereditary Genetics: Current Research	Hereditary Genet	1.2
International Journal of Emergency Mental Health and Human Resilience	Int J Emerg Ment Health	6.5
Spine	J Spine	1.9
Cloning & Transgenesis	Clon Transgen	1.5
Journal of Medical Microbiology & Diagnosis	J Med Microb Diagn	1.9
Biosensors Journal	Biosens J	0.33
Defense Management	J Def Manag	0.5
Review of Public Administration and Management	Review Pub Administration Manag	0.2
Single cell biology	Single Cell Biol	1
Gerontology & Geriatric Research	J Gerontol Geriatr Res	1
Neuroinfectious Diseases	J Neuroinfect Dis	2.4
Cell Science & Therapy	J Cell Sci Ther	1.37
Molecular Biomarkers & Diagnosis	J Mol Biomark Diagn	2.1
Brain Disorders & Therapy	Brain Disord Ther	1.6
Clinical Case Reports	J Clin Case Rep	1.2
Gene Technology	Gene Technol	0.83
Socialomics	J Socialomics	2.3
Journal of Trauma and Treatment	J Trauma Treat	0.6
Translational Biomedicine	Transl Biomed	1.06
Journal of Neurology and Neuroscience	J Neurol Neurosci	0.88
Research & Reviews: Journal of Botanical Sciences	J Bot Sci	0.33
Journal of Psychiatry	J Psychiatry	2.32
Anaplastology	Anaplastology	0.73
Tropical Medicine & Surgery	Trop Med Surg	0.4
Orthopedic & Muscular System: Current Research	Orthop Muscular Syst	0.32
Pediatrics & Therapeutics	Pediat Therapeut	1.32
Sports Medicine & Doping Studies	J Sports Med Doping Stud	1.45
Journal of Oral Hygiene & Health	J Oral Hyg Health	0.52
Emergency Medicine	Emerg Med (Los Angel)	0.875
Journal of Transplantation Technologies & Research	J Transplant Technol Res	1.39
Journal of Hypertension: Open Access	J Hypertens (Los Angel)	0.92
International Journal of Waste Resources	Int J Waste Resour	1.95
Surgery: Current research	Surgery Curr Re	0.587
Oral Health and Dental Management	Oral Health Dent Manag	1.23
International Journal of Advancement technology	Int J Adv Tech	5.08
Translational Medicine	Transl Med (Sunnyvale)	1.312
Air and Water Borne Diseases	Air Water Borne Diseases	0.6
Journal of Coastal Zone Management	J Coast Zone Manag	0.54
Biology and Medicine	Biol Med (Aligarh)	3.07
Journal of Bioterrorism and Biodefense	J Bioterror Biodef	0.38
Journal of Tropical Diseases & Public Health	J Trop Dis	0.83
Journal of Surgery	Journal of Surgery [Jurnalul de chirurgie]	0.08
Nephrology & Therapeutics	J Nephrol Ther	0.318
Journal of Fundamentals of Renewable Energy and Applications	J Fundam Renewable Energy Appl	1.41
Advances in Pharmacoepidemiology & Drug Safety	Adv Pharmacoepidemiol Drug Saf	1.37
Bioanalysis & Biomedicine	J Bioanal Biomed	1.67
Biochemistry & Pharmacology: Open Access	Biochem Pharmacol (Los Angel)	2.09
Bioequivalence & Bioavailability	J Bioequiv Availab	1.88
Biomolecular Research & Therapeutics	J Biomol Res Ther	1.67
Cardiovascular Pharmacology: Open Access	Cardiol Pharmacol	1.77
Clinical & Experimental Pharmacology	Clin Exp Pharmacol	1.83
Clinical Pharmacology & Biopharmaceutics	Clin Pharmacol Biopharm	1.69
Data Mining in Genomics & Proteomics	J Data Mining Genomics Proteomics	2
Drug Metabolism & Toxicology	J Drug Metab Toxicol	1.37
Ergonomics	J Ergonomics	1.38
Glycomics & Lipidomics	J Glycomics Lipidomics	1.82
Health & Medical Informatics	J Health Med Inform	1.98
Metabolomics: Open Access	Metabolomics (Los Angel)	3.03
Nanomedicine & Biotherapeutic Discovery	J Nanomedine Biotherapeutic Discov	2.69
OMICS Journal of Radiology	OMICS J Radiol	0.54
Pharmaceutica Analytica Acta	Pharm Anal Acta	1.83
Pharmaceutical Regulatory Affairs: Open Access	Pharm Regul Aff	1.88
Pharmacogenomics & Pharmacoproteomics	J Pharmacogenomics Pharmacoproteomics	1.69
Pharmacovigilance	J Pharmacovigil	2.65
Phylogenetics & Evolutionary Biology	J Phylogenetics Evol Biol	2.76
Proteomics & Bioinformatics	J Proteomics Bioinform	2.55
Advances in Automobile Engineering	Adv Automob Eng	1.750
Advances in Robotics & Automation	Adv Robot Autom	0.813
Arts and Social Sciences Journal	Arts Social Sci J	1.231
Bioceramics Developments and Applications	Bioceram Dev Appl	0.958
Business & Financial Affairs	J Bus & Fin Aff	2.000
Generalized Lie Theory and Applications	J Generalized Lie Theory Appl	1.750
Irrigation & Drainage Systems Engineering	Irrigat Drainage Sys Eng	4.286
Industrial Engineering & Management	Ind Eng Manage	0.474
Aeronautics & Aerospace Engineering	J Aeronaut Aerospace Eng	1.407
Applied & Computational Mathematics	J Appl Computat Math	0.581
Architectural Engineering Technology	J Archit Eng Tech	1.071
Accounting & Marketing	J Account Mark	0.500
Aquaculture Research & Development	J Aquac Res Development	1.272
Bioengineering & Biomedical Science	J Bioeng Biomed Sci	1.235
Biometrics & Biostatistics	J Biomet Biostat	1.272
Biosensors & Bioelectronics	J Biosens Bioelectron	2.137
Civil & Environmental Engineering	J Civil Environ Eng	1.294
Cytology & Histology	J Cytol Histol	0.569
Civil & Legal Sciences	J Civil Legal Sci	0.286
Ecosystem & Ecography	J Ecosyst Ecogr	1.806
Electrical & Electronic Systems	J Elec Electron Syst	0.533
Earth Science & Climatic Change	J Earth Sci Clim Change	2.082
Geography & Natural Disasters	J Geogr Nat Disast	0.800
Hotel & Business Management	J Hotel Bus Manage	1.600
Information Technology & Software Engineering	J Inform Tech Soft Engg	2.789
Molecular Imaging & Dynamics	J Mol Imaging Dynam	2.091

Earth Science & Climatic Change	J Earth Sci Clim Change	2.082
Geography & Natural Disasters	J Geogr Nat Disast	0.800
Hotel & Business Management	J Hotel Bus Manage	1.600
Information Technology & Software Engineering	J Inform Tech Soft Engg	2.789
Molecular Imaging & Dynamics	J Mol Imaging Dynam	2.091
Petroleum & Environmental Engineering	J Pet Environ Biotechnol	2.839
Stock & Forex Trading	J Stock Forex Trad	0.300
Textile Science & Engineering	J Textile Sci Eng	0.667
Tourism & Hospitality	J Tourism Hospit	1.190
Telecommunications System & Management	J Telecommun Syst Manage	0.800
Physical Mathematics	J Phys Math	4.500
Nanomedicine & Nanotechnology	J Nanomed Nanotechnol	4.68
Arabian Journal of Business and Management Review	Arab J Bus Manage Rev	1.42
Research and Reviews: Journal of Engineering and Technology	Engineering and Technology	0.14
Journal of Material Sciences & Engineering	J Material Sci Eng	1.31
Journal of Mass Communication & Journalism	J Mass Communicat Journalism	0.62
Journal of Powder Metallurgy & Mining	J Powder Metall Min	0.71
Journal of Applied Mechanical Engineering	J Appl Mech Eng	1.65
Archives of Clinical Microbiology		0.35
Dentistry	Dentistry	1.22
Journal of Diabetes & Metabolism	J Diabetes Metab	1.77
Otolaryngology: Current Research	Otolaryngol (Sunnyvale)	0.22
Journal of Metabolic Syndrome	J Metabolic Synd	1.27
Journal of Primatology	J Primatol	0.53
Journal of Thyroid Disorders & Therapy	Thyroid Disorders Ther	0.43
Jounal of Novel Physiotherapies	J Nov Physiother	1.24
Journal of Stem Cell Research & Therapy	J Stem Cell Res Ther	2.78
Anatomy & Physiology: Current Research	Anat Physiol	1
Pancreatic Disorders & Therapy	Pancreat Disord Ther	0.54
Journal of Cancer Science & Therapy	J Cancer Sci Ther	4.203
Journal of Biomedical Sciences		0.2
Journal of Nutritional Disorders & Therapy	J Nutr Disord Ther	1.46
Medical & Surgical Urology	Med Surg Urol	0.3
Journal of Biochips & Tissue Chips	J Biochip Tissue Chip	1.7
Journal of Liver	J Liver	0.08
Journal of Family Medicine and Medical Research	Fam Med Med Sci Res	0.78
Gynecology & Obstetrics	Gynecol Obstet (Sunnyvale)	0.52
Journal of Integrative Oncology	J Integr Oncol	1.67
Journal of Neonatal Biology	J Neonatal Biol	0.55
Journal of Glycobiology	J Glycobiology	0.8
Journal of Blood & Lymph	J Blood Lymph	0.12
Journal of Arthritis	J Arthritis	1.87
Journal of Membrane Science & Technology	J Membra Sci Technol	1.18
Medicinal Chemistry	Med Chem (Los Angeles)	2.64
Journal of Physical Chemistry & Biophysics	J Phys Chem Biophys	0.75
Organic Chemistry: Current Research	Organic Chem Curr Res	1.94
Journal of Bioprocessing & Biotechniques	J Bioprocess Biotech	1.74
Journal of Environmental & Analytical Toxicology	J Environ Anal Toxicol	2.58
Journal of Chemical Engineering & Process Technology	J Chem Eng Process Technol	1.21
Journal of Computer Science & Systems Biology	J Comput Sci Syst Biol	1.62
Journal of Analytical & Bioanalytical Techniques	J Anal Bioanal Tech	2.16
Journal of Plant Biochemistry & Physiology	J Plant Biochem Physiol	2.28
Journal of Chromatography & Separation Techniques	J Chromatogr Sep Tech	1.78
Journal of Thermodynamics & Catalysis		0.91
Community Medicine & Health Education	J Community Med Health Educ	1.27
Epidemiology: Open Access	Epidemiology (Sunnyvale)	1.35
Obesity & Weight Loss Therapy	J Obes Weight Loss Ther	0.94
Pain & Relief	J Pain Relief	1.14
Palliative Care & Medicine	J Palliat Care Med	0.88
Steroids & Hormonal Science	J Steroids Horm Sci	0.65
Gastrointestinal & Digestive System	J Gastrointest Dig Syst	0.43
Hair: Therapy & Transplantation		0.6
Andrology	Andrology (Los Angel)	1.16
Endocrinology & Metabolic Syndrome	Endocrinol Metab Syndr	1.12
Internal Medicine		2.48
Sleep Disorders & Therapy	J Sleep Disord Ther	0.5
Nuclear Medicine & Radiation Therapy	J Nucl Med Radiat Ther	0.88
Alternative & Integrative Medicine	Altern Integr Med	1.11
Pulmonary & Respiratory Medicine	J Pulm Respir Med	1.01
Occupational Medicine Health Affairs	Occup Med Health Aff	0.85
Reproductive System & Sexual Disorders	Reprod Syst Sex Disord	1.25
Medical Diagnostic Methods		0.29
Blood Disorders & Transfusion	J Blood Disord Transfus	0.5
General Medicine	Gen Med (Los Angel)	0.86
Bioenergetics: Open Access	Bioenergetics	3.1
Chemotherapy: Open Access	Chemotherapy (Los Angel)	1.8
Clinical & Experimental Pathology	J Clin Exp Pathol	1.54
Carcinogenesis & Mutagenesis	J Carcinog Mutagen	1.9
Clinical Research & Bioethics	J Clinic Res Bioeth	0.95
Vaccines & Vaccination	J Vaccines Vaccin	1.8
Immunome Research	Immunome Res	7.1
Clinical & Experimental Ophthalmology	J Clin Exp Ophthalmol	1.11
Clinical & Experimental Dermotology Research	J Clin Exp Dermatol Res	0.5
Clinical & Experimental Cardiology	J Clin Exp Cardiolog	1.33
Clinical Microbiology: Open Access	Clin Microbiol	0.7
Anesthesia & Clinical research	J Anesth Clin Res	0.7
Mycobacterial Diseases	Mycobact Dis	0.9
Clinical Toxicology	J Clin Toxicol	1.39
Clinical Trials & Research	J Clin Trials	1.33
Antivirals & Antiretrovirals	J Antivir Antiretrovir	1.27
Fermentation Technology	Ferment Technol	3.44
Clinical & Cellular immunology	J Clin Cell Immunol	2.019
Allergy & Therapy	J Allergy Ther	0.762
Bacteriology & Parasitology	J Bacteriol Parasitol	2.025
Rheumatology: Current Research	Rheumatology (Sunnyvale)	1.522
Virology & Mycology	Virol Mycol	0.69
Clinics in Mother and Child Health	Clinics Mother Child Health	0.432
Womens Health Care	J Womens Health Care	0.79
Marine Science: Research & Development	J Marine Sci Res Dev	0.45
Plant Pathology & Microbiology	J Plant Pathol Microbiol	1.75
Geology & Geophysics	J Geol Geophys	0.91
FisheriesSciences	J Fisheries Sci	0.51
Fisheries and Aquaculture Journal	Fish Aquac J	0.69
Bioremediation & Biodegradation	J Bioremediat Biodegrad	2.1
Advances in Crop Science and Technology	Adv Crop Sci Tech	0.39
Journal of Remote Sensing & GIS	J Geophys Remote Sens	0.77
Biofertilizers & Biopesticides	J Biofertil Biopestic.	1.19
Hydrology: Current Research	Hydrol Current Res	1.12
Probiotics & Health	J Prob Health	0.69
Veterinary Science & Technology	J Veterinar Sci Technolo	2.5
Medicinal & Aromatic Plants	Med Aromat Plants	2.02
Forest Research	Forest Res	1.69
International Journal of Sensor Networks and Data Communications	Sensor Netw Data Commun	1.66
Innovative Energy Policies	Innov Energ Policies	0.88
Biodiversity & Endangered Species	J Biodivers Endanger Species	0.25
Biosafety	Biosafety	0.49
Agrotechnology	Agrotechnol	0.69
Journal of Traditional Medicine and Clinical Naturopathy	J Tradition Med Clin Naturopth	0.49
Nutrition & Food Sciences	J Nutr Food Sci	1.14
Entomology, Ornithology & Herpetology	Entomol Ornithol Herpetol	1.26

Impact Factor Calculation:

Impact Factor was established by dividing the number of articles published in 2012 and 2013 with the number of times they are cited in 2014 based on Google search and the Scholar Citation Index database. If 'X' is the total number of articles published in 2012 and 2013, and 'Y' is the number of times these articles were cited in indexed journals during 2014 than, impact factor = Y/X







19th World Congress on

Materials Science and Engineering

June 11-13, 2018 | Barcelona, Spain

Supporting Journals

Materials Congress 2018

Supporting Journals

Journal of Material Sciences & Engineering
https://www.omicsonline.org/material-sciences-engineering.php

Journal of Material Sciences
http://www.rroij.com/material-sciences.php

Journal of Powder Metallurgy & Mining
https://www.omicsonline.org/powder-metallurgy-mining.php

Agri, Food, Aqua & Veterinary





21st Euro-Global Summit on Food and Beverages
March 08-10, 2018 Berlin, Germany
E: eurofood@foodtechconferences.com
W: food.global-summit.com/europe

10th Euro-Global Summit on Aquaculture & Fisheries
May 28-29, 2018 London, UK
E: aquaeurope@aquaconferences.com
W: aquaculture-fisheries.conferenceseries.com/europe

8th International Conference on
Food Safety & Regulatory Measures
June 11-12, 2018 Barcelona, Spain
foodsafety@foodtechconferences.com
W: foodsafety-hygiene.conferenceseries.com

11th International Veterinary Congress
July 02-03, 2018 Berlin, Germany
E: veterinary@veterinaryseries.com
W: veterinary.conferenceseries.com

3rd International Conference on
Food and Beverage Packaging
July 16-18, 2018 Rome, Italy
E: foodpackaging@foodtechconferences.com
W: foodpackaging.conferenceseries.com

5th Annual Congress on
Plant & Soil Science
August 16-17, 2018 London, UK
E: plant-soil@plantscienceconferences.com
W: plantscience-biology.agriconferences.com

13th International Conference on
Agriculture & Horticulture
September 10-12, 2018 Zurich, Switzerland
E: agri@foodtechconferences.com
W: agriculture-horticulture.conferenceseries.com

21st International Conference on
Food Technology & Processing
October 02-04, 2018 London, UK
E: foodtechnology@foodtechconferences.com
W: foodtechnology.conferenceseries.com

22nd International Conference on
Food Processing & Analysis
October 11-13, 2018 Moscow, Russia
E: eurofoodprocessing@foodtechconferences.com
W: foodprocessing.foodtechconferences.org

6th Global Summit on Plant Science
October 29-30, 2018 Valencia, Spain
E: plantscience@plantscienceconferences.com
W: plantscience.global-summit.com

9th European Food Safety & Standards Conference
November 29-30, 2018 Dublin, Ireland
E: eurofoodsafety@foodtechconferences.com
W: foodsafety-hygiene.conferenceseries.com/europe

3rd International Conference on Food Microbiology
November 26-28, 2018 Dublin, Ireland
E: foodmicrobiology@foodtechconferences.com
W: foodmicrobiology.conferenceseries.com

Alternative Healthcare





9th International Conference and Exhibition on
Chinese Medicine, Ayurveda & Acupuncture
March 12-13, 2018 Barcelona, Spain
E: chinesemedicine@healthconferences.org
W: chinesemedicine.conferenceseries.com

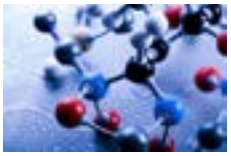
5th International Conference and Exhibition on
Herbal and Traditional Medicine
June 14-15, 2018 Rome, Italy
E: herbalmedicine@annualconferences.org
W: herbalconference.annualcongress.com

8th International Conference & Exhibition on
Traditional & Alternative Medicine
November 01-03, 2018 Valencia, Spain
E: traditionalmedicine@healthconferences.org
W: traditionalmedicine.conferenceseries.com






Biochemistry





3rd International Conference on
Enzymology and Molecular Biology
March 05-06, 2018 London, UK
E: enzymology@annualconferences.org
W: enzymology.conferenceseries.com

13th International Conference on
Metabolomics and Systems Biology
June 11-12, 2018 London, UK
E: eurometabolomics@annualconferences.org
W: europe.metabolomicsconference.com

4th International Conference on
Lipid Science & Technology
July 23-24, 2018 Birmingham, UK
E: lipids@biochemconferences.org
W: lipids.conferenceseries.com

4th Glycobiology World Congress
September 17-19, 2018 Rome, Italy
E: glycobiology@annualconferences.org
W: glycobiology.conferenceseries.com

14th International Conference on Structural Biology
September 24-26, 2018 Berlin, Germany
E: structuralbiology@biochemconferences.org
W: structuralbiology.conferenceseries.com

12th International Conference on
Advancements in Bioinformatics and Drug Discovery
November 29-30, 2018 Dublin, Ireland
E: bioinformatics@annualconferences.org
W: bioinformatics.conferenceseries.com

12th International Conference and Expo on
Proteomics and Molecular Medicine
November 26-28, 2018 Dublin, Ireland
E: proteomics@annualconferences.org
W: www.proteomicsconference.com

Cardiology





24th Annual Cardiologists Conference
June 11-13, 2018 Barcelona, Spain
E: cardiologists@cardiologyconference.org
W: annualmeeting.conferenceseries.com/cardiologists

26th Annual Conference on
Clinical & Medical Case Reports in Cardiology
July 05-06, 2018 Berlin, Germany
E: cardiologycasereports@annualconferences.org
W: casereports.cardiologymeeting.com

3rd International Conference on
Cardiovascular Medicine and Cardiac Surgery
July 05-06, 2018 Berlin, Germany
E: cardiovascular@cardiologyconference.org
W: cardiovascular.conferenceseries.com

4th International Conference on
Hypertension & Healthcare
September 10-11, 2018 Zurich, Switzerland
E: hypertension@cardiologymeetings.com
W: hypertension.conferenceseries.com

27th European Cardiology Conference
October 22-24, 2018 Rome, Italy
E: eurocardiology@cardiologyconference.org
W: cardiology.conferenceseries.com/europe

29th World Cardiology Conference
November 19-20, 2018 Edinburg, Scotland
E: worldcardiology@annualconferences.org
W: worldcardiology.conferenceseries.com






Chemical Engineering





8th International Conference on
Petroleum Engineering
May 17-18, 2018 Rome, Italy
E: petroleumengineering@chemseries.com
W: petroleumengineering.conferenceseries.com

8th World Congress on
Biopolymers
June 28-30, 2018 Berlin, Germany
E: biopolymercongress@chemseries.com
W: biopolymers.conferenceseries.com

11th World Bioenergy Congress and Expo
July 02-04, 2018 Berlin, Germany
E: bioenergy@chemseries.com
W: bioenergy.conferenceseries.com

12th Global Summit and Expo on
Biomass and Bioenergy
September 04-05, 2018 Zurich, Switzerland
E: eurobiomass@chemseries.com
W: materials.conferenceseries.com

13th World Congress on
Biofuels and Bioenergy
September 04-06, 2018 Zurich, Switzerland
E: biofuelscongress@chemseries.com
W: biofuels-bioenergy.conferenceseries.com/europe

5th International Conference on
Advances in Chemical Engineering & Technology
October 04-05, 2018 London, UK
E: eurochemengineering@chemseries.com
W: chemicalengineering.conferenceseries.com/europe

Chemistry





4th European Organic Chemistry Congress
March 01-03, 2018 London, UK
E: euroorganicchemistry@chemistryconference.org
W: organicchemistry.conferenceseries.com/europe

6th International Conference and Exhibition on
Materials Science and Chemistry
May 17-18, 2018 Rome, Italy
E: materialschemistry@chemistryconference.org
W: materialschemistry.conferenceseries.com

4th International Conference on
Electrochemistry
June 11-12, 2018 Rome, Italy
E: electrochemistry@chemistryconference.org
W: electrochemistry.conferenceseries.com

10th World Congress on
Medicinal Chemistry and Drug Design
June 14-15, 2018 Barcelona, Spain
E: medicinalchemistry@chemistryconference.org
W: medicinalchemistry.pharmaceuticalconferences.com/europe

7th World Congress on
Mass Spectrometry
June 20-22, 2018 Rome, Italy
E: euromassspectrometry@chemistryconference.org
W: massspectra.com/europe

8th European Chemistry Congress
June 21-23, 2018 Paris, France
E: eurochemistry@conferenceseries.net
W: chemistry.conferenceseries.com/europe

6th International Conference and Exhibition on
Advances in Chromatography & HPLC Techniques
August 02-03, 2018 Barcelona, Spain
E: hplc@chemistryconference.org
W: hplc.conferenceseries.com






7th International Conference and Exhibition on
Pain Research and Management
September 04-05, 2018 Zurich, Switzerland
E: painmanagement@chemistryconference.org
W: painmanagement.conferenceseries.com

9th International Conference and Expo on
Separation Techniques
September 13-14, 2018 Zurich, Switzerland
E: separationtechniques@chemistryconference.org
W: separationtechniques.conferenceseries.com

8th International Conference on
Environmental Chemistry and Engineering
September 20-22, 2018 Berlin, Germany
E: environmentalchemistry@chemistryconference.org
W: environmentalchemistry.conferenceseries.com

5th International Conference on
Physical and Theoretical Chemistry
October 11-13, 2018 Edinburgh, Scotland
E: physicalchemistry@chemistryconference.org
W: physicalchemistry.conferenceseries.com

3rd International Conference on
Pharmaceutical Chemistry
October 29-31, 2018 Brussels, Belgium
E: pharmaceuticalchemistry@pharmaceuticalconferences.org
W: pharmaceuticalchemistry.conferenceseries.com

Dentistry





21st Annual World Denal Summit
February 26-28, 2018 Paris, France
E: dentalworld@dentalcongress.com
W: worlddental.conferenceseries.com

25th International Conference on
Dental Education
April 9-10,2018 Amsterdam, Netherlands
E: dentaleducation@annualconferences.org
W: dentaleducation.dentalcongress.com

24th Global Dentists and Pediatric Dentistry Annual Meeting
June 11-12, 2018 London, UK
E: dentists@dentalcongress.com
W: annualmeeting.conferenceseries.com/dentists/

25th World Congress on
Dentistry and Oral Health
July 09-10, 2018 Berlin, Germany
E: dentistrycongress@dentistryconferences.com
W: dentalevent.conferenceseries.com

23rd International Conference on
Dentistry and Dental Materials
July 19-20, 2018 Rome, Italy
E: dentalmaterials@dentalcongress.com
W: dentalmaterials.dentistryconferences.com

4th International Conference on
Dental and Clinical Dentistry
September 10-11, 2018 Copenhagen, Denmark
E: clinicaldentistry@dentistryconferences.com
W: clinicaldentistry.dentistryconferences.com

3rd International Conference on
Advanced Dental Education
November 15-16, 2018 Edinburgh, Scotland
E: advdentaleducation@annualconferences.org
W: advanced-dental-education.dentistryconferences.com

26th Euro Congress and Expo on
Dental and Oral Health
December 10-11, 2018 Rome, Italy
E: eurodentalcongress@dentistryconferences.com
W: www.dentalcongress.com/europe

Dermatology





17th European Dermatology Congress
March 01-03, 2018 Paris, France
E: dermatologycongress@dermatologyconference.org
d W: ermatology.conferenceseries.com/europe






13th Global Dermatologists Congress
July 23-24, 2018 Moscow, Russia
E: dermatologists@dermatologyconference.org
W: annualmeeting.conferenceseries.com/dermatologists

14th International Conference and Exhibition on
Cosmetic Dermatology and Hair Care
August 13-14, 2018 Madrid, Spain
E: cosmeticdermatology@dermatologyconference.org
W: cosmeticdermatology.conferenceseries.com

Diabetes







17th Global Diabetes Conference & Nursing Care
March 08-09, 2018 Paris, France
E: globaldiabetes@conferenceseries.net
W: globaldiabetes.conferenceseries.com

27th European Diabetes Congress
June 20-21, 2018 Rome, Italy
E: eurodiabetes@endocrineconferences.com
W: www.diabetesexpo.com/europe

3rd International Conference on
Metabolic Syndrome & Clinical Management
June 18-19 , 2018 Dublin, Ireland
E: metabolicsyndrome@endocrineconferences.com
W: metabolicsyndromes.conferenceseries.com

29th International Congress on
Prevention of Diabetes and Complications
September 27-28, 2018 Berlin, Germany
E: diabetesmeeting@endocrineconferences.org
W: diabetesmeeting.conferenceseries.com

13th European Diabetes and Endocrinology Congress
November 26-27, 2018 Dublin, Ireland
E: euroendocrinology@endocrineconferences.com
W: europe.endocrineconferences.com

Engineering





2nd International Conference on
3D Printing Technology and Innovations
March 19-20, 2018 London, UK
E: 3dprinting@conferenceseries.net
W: 3dprinting.conferenceseries.com

4th International Conference and Business Expo on
Wireless, Telecommunication & IoT
May 28-29 2018 London, UK
E: wireless@enggconferences.com
W: wirelesscommunication.conferenceseries.com

2nd World Congress on
Wind and Renewable Energy
June 14-15, 2018 London, UK
E: windenergy@enggconferences.com
W: winenergy.conferenceseries.com

3rd International Conference on
Power and Energy Engineering
June 18-19, 2018 Rome, Italy
E: powerengineering@annualconferences.org
W: power-energy.conferenceseries.com

4th International Conference and Exhibition on
Satellite & Space Missions
June 18-20, 2018 Rome, Italy
E: satellite@annualconferences.org
W: satellite.conferenceseries.com

5th International Conference on
Big Data Analysis and Data Mining
June 20-21, 2018 Rome, Italy
E: bigdata@enggconferences.com
W: datamining.conferenceseries.com

4th Global Summit and Expo on
Multimedia & Artificial Intelligence
July 19-21,2018 Rome, Italy
E: multimedia@enggconferences.com
W: multimedia.global-summit.com






International Conference on
Aerospace and Aerodynamics
August 02-03, 2018 Barcelona, Spain
E: aerospace@annualconferences.org
W: aerospace-engineering.conferenceseries.com

9th Euro Biosensors and Bioelectronics conference
September 13-14, 2018 London, UK
E: eurobiosensors@conferenceseries.net
W: biosensors.conferenceseries.com/europe

5th International Conference and Exhibition on
Automobile Engineering
September 20-21, 2018 Rome, Italy
E: automobile@enggconferences.com
W: automobile.conferenceseries.com/europe

International Conference on
Cloud Computing and Data Analysis
September 06-07, 2018 London, UK
E: cloudcomputing@annualconferences.org
W: cloud-computing.conferenceseries.com

3rd International Conference on
Battery and Fuel Cell Technology
September 10-11, 2018 London, UK
E: batterytech@enggconferences.com
W: batterytech.conferenceseries.com

2nd International Conference on
Membrane Science and Technology
September 13-14, 2018 London, UK
E: membranescience@annualconferences.org
W: membranescience.conferenceseries.com

2nd International Conference on
Mechatronics, Automation and Control Systems
September, 17-18, 2018 Berlin, Germany
E: mechatronics@enggconferences.com
W: mechatronics.conferenceseries.com

3rd International Conference on
Fluid Dynamics & Aerodynamics
October 25-26, 2018 Berlin, Germany
E: fluiddynamics@enggconferences.com
W: fluid-aerodynamics.global-summit.com

International Conference on
Agricultural Engineering and Food Security
November 12-13,2018 Frankfurt, Germany
E: foodsecurity@annualconferences.com
W: agri-foodsecurity.agriconferences.com

3rd International Conference on
Design and Production Engineering
December 03-04, Valencia, Spain
E: productionengineering@annualconferences.org
W: design-production.conferenceseries.com

Environmental Sciences





World Conference on Ecology
March 19-20, 2018 Berlin, Germany
E: ecology@annualconferences.org
W: ecology.conferenceseries.com

8th World Congress and Expo on
Recycling
June 25-26, 2018 Berlin, Germany
E: recyclingexpo@conferenceseries.net
W: recycling.conferenceseries.com

5th World Congress and Expo on
Green Energy
June 14-16 ,2018 London, UK
E: greenenergycongress@earthscienceconferences.com
W: greenenergy.conferenceseries.com/europe

4th International Conference on
Pollution Control and Sustainable Environment
July 26-28, 2018 Rome, Italy
E: pollutioncontrol@conferenceseries.net
W: pollutioncontrol.conferenceseries.com

5th World Conference on
Climate Change
October 04-06, 2018 London, UK
E: climatechange@annualconferences.org
W: climatechange.conferenceseries.com






Gastroenterology



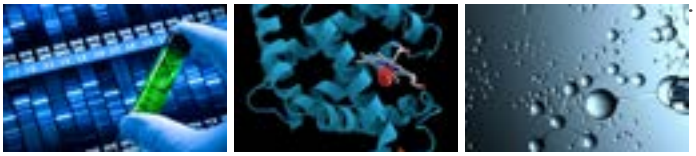
12th Global Gastroenterologists Meeting
March 15-16, 2018 Barcelona, Spain
E: gastro@gastroconferences.org
W: gastro.conferenceseries.com

6th World Congress on
Hepatitis & Liver Diseases
June 18-20, 2018 Dublin, Ireland
E: hepatitis@gastroconferences.com
W: hepatitis.conferenceseries.com

13th Euro-Global Gastroenterology Conference
August 20-21, 2018 Rome, Italy
E: gastrocongress@gastroconferences.com
W: gastroenterology.conferenceseries.com/europe

3rd International conference on
Digestive Diseases
October 22-24, 2018 Berlin, Germany
E: digestivediseases@gastroconferences.com
W: digestivediseases.conferenceseries.com

Genetics and Molecular Biology



7th International Conference and Exhibition on
Cell and Gene Therapy
March 15-17, 2018 London,UK
E: celltherapy@conferenceseries.net
W: cellgenetherapy.conferenceseries.com

20th Global Congress on
Biotechnology
March 05-07, 2018 London, UK
E: biotechcongress@geneticconferences.com
W: biotechnology.conferenceseries.com

6th International Conference on
Integrative Biology
May 21-23, 2018 Barcelona, Spain
E: integrativebiology@conferenceseries.net
W: integrativebiology.conferenceseries.com

10th International Conference on
Genomics and Molecular Biology
May 21-23, 2018 Barcelona, Spain
E: genomics@conferenceseries.net |
W: genomics.conferenceseries.com

4th International Conference on
Synthetic Biology and Tissue Engineering
June 11-12, 2018 Rome, Italy
E: syntheticbiology@conferenceseries.net
W: syntheticbiology.conferenceseries.com

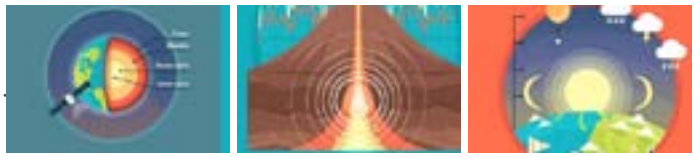
4th International Conference on
Bioscience
July 02-03, 2018 Vienna, Austria
E: bioscience@conferenceseries.net
W: bioscience.conferenceseries.com

10th Annual Conference on
Stem Cell and Regenerative Medicine
August 13-14, 2018 London, UK
E: stemcellcongress@conferenceseries.net
W: stemcell-regenerativemedicine.conferenceseries.com

21st Euro Biotechnology Congress
October 11-12, 2018 Moscow, Russia
E: eurobiotechnology@geneticconferences.com
W: www.biotechnologycongress.com/europe

11th International Conference on
Tissue Engineering & Regenerative Medicine
October 18-20, 2018 Rome, Italy
E: regenerativemedicine@geneticconferences.com
W: tissuescience-regenerativemedicine

Geology and Earth Sciences



2nd Annual Congress on
Soil and Water Sciences
June 14-15, 2018 Dublin, Ireland
E: soilscience@annualconferences.org
W: soilscience.conferenceseries.com



4th International Conference on
GIS and Remote Sensing
September 27-28, 2018 Berlin, Germany
E: giscongress@earthscienceconferences.com
W: gis-remotesensing.conferenceseries.com/europe

Healthcare





3rd World Congress on
Public Health & Nutrition
February 26-28, 2018 London, UK
E: publichealthcongress@healthconferences.org
W: publichealth.global-summit.com

3rd World Congress on
Health Economics & Patient Safety
April 12-13, 2018 Amsterdam, Netherlands
E: healtheconomics@healthconferences.org
W: healtheconomics.global-summit.com

5th International Conference on
Tropical Medicine & Infectious Diseases
May 21-22, 2018 Barcelona, Spain
E: tropicalmedicine@healthconferences.org
W: tropicalmedicine.annualcongress.com

13th World Congress on
Healthcare & Technologies
June 14-15, 2018 Dublin, Ireland
E: healthcaresummit@healthconferences.org
W: healthcare.global-summit.com/europe

2nd International Conference on
Social Sciences & Interdisciplinary Studies
June 18-19, 2018 Rome, Italy
E: socialsciences@healthconferences.org
W: socialsciences.conferenceseries.com

6th International Conference on
Medical Informatics & Telemedicine
July 05-06, 2018 Berlin, Germany
E: medicalinformatics@healthconferences.org
W: medicalinformatics.conferenceseries.com

8th International Conference on
Geriatrics Gerontology & Palliative Nursing
July 30-31, 2018 Barcelona, Spain
E: geriatrics@healthconferences.org
W: geriatrics-gerontology.conferenceseries.com

3rd Internationl Conference on
General Practice & Primary Care
August 16-17, 2018 Madrid, Spain
E: generalpractice@healthconferences.org
W: generalpractice.conferenceseries.com

4th World Congress on Health Economics, Health Policy and Healthcare Management
September 13-14, 2018 Zurich, Switzerland
E: health-economics@healthconferences.org
W: healtheconomics.healthconferences.org

7th International Conference on
Epidemiology & Public Health
September 17-19, 2018 Rome, Italy
E: epidemiology@healthconferences.org
W: epidemiology.conferenceseries.com

3rd International Conference on
Environmental Health & Preventive Medicine
October 15-16, 2018 Warsaw, Poland
E: environmentalhealth@healthconferences.org
W: environmentalhealth.conferenceseries.com

3rd International Conference on
Advances in Skin, Wound Care and Tissue Science
October 18-19, 2018 Rome, Itlay
E: woundcongress@healthcarevents.com
W: woundcare.conferenceseries.com/europe

3rd International Conference on
Healthcare & Hospital Management
October 25-26, 2018 Athens, Greece
E: hospitalmanagement@healthcareevents.com
W: hospitalmanagement.conferenceseries.com

7th International Conference on
Medical & Nursing Education
October 29-30, 2018 Brussels, Belgium
E: medicaleducation@healthconferences.org
W: medicaleducation.conferenceseries.com



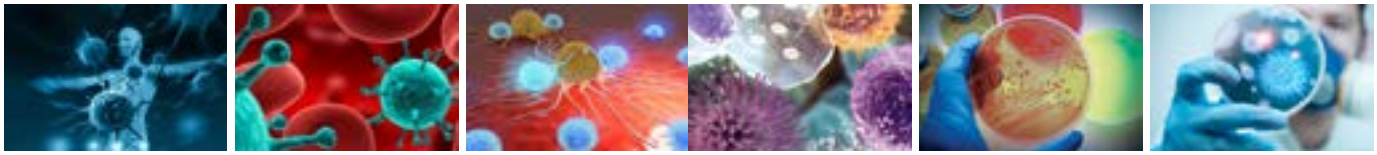



5th International Conference on
Healthcare and Hospital Management
December 03-05, 2018 Rome, Italy
E: hospitalmanagement@healthconferences.org
W: hospital-management.healthconferences.org

3rd International Conference on
Autoimmunity
November 26-27, 2018 Dublin, Ireland
E: autoimmunity@immunologyconferences.org
W: autoimmunity.conferenceseries.com

Immunology

Infectious Diseases



9th Molecular Immunology & Immunogenetics Congress
March 08-09, 2018 London, UK
E: molecularimmunology@immunologyconferences.org
W: molecularimmunology.conferenceseries.com

5th International Congress on
Infectious Diseases
March 01-02, 2018 Berlin, Germany
E: infectioncongress@infectiousconferences.com
W: infectioncongress.conferenceseries.com

9th European Immunology Conference
June 14-16, 2018 Rome, Italy
E: euroimmunology@conferenceseries.net
W: immunology.conferenceseries.com/europe

4th World Congress on
Rare Diseases and Orphan Drugs
June 11-12, 2018 Dublin, Ireland
E: rarediseasecongress@infectiousconferences.com
W: rarediseases.conferenceseries.com/europe

5th International Conference on
Parasitology
July 12-13, 2018 Paris, France
E: parasitology@immunologyconferences.org
W: parasitology.conferenceseries.com

4th International Conference on
Influenza and Zoonotic Diseases
July 02-03, 2018 Vienna, Austria
E: influenza@infectiousconferences.com
W: influenza.conferenceseries.com

10th International Conference on
Clinical and Cellular Immunology
August 06-07, 2018 Madrid, Spain
E: immunologyworld@annualconferences.org
W: immunology.immunologyconferences.org

9th International Conference on
Emerging Infectious Diseases
August 27-28, 2018 Zurich, Switzerland
E: emerginginfections@annualconferences.org
W: emerging-diseases.infectiousconferences.com

11th Annual Congress on
Immunology & Immunotechnology
September 13-14, 2018 Zurich, Swtizerland
E: immunologycongress@annualconferences.org
W: immunologycongress.immunologyconferences.org

6th World Congress on
Control and Prevention of HIV/AIDS, STDs & STIs
August 27-29, 2018 Zurich, Switzerland
E: std@infectiousconferences.com
W: globalhiv-aids-std.infectiousconferences.com

12th International Conference on
Allergy, Asthma & Clinical Immunology
October 01-02, 2018 Moscow, Russia
E: allergy@immunologyconferences.org
W: allergy.conferenceseries.com

10th Euro-Global Conference on Infectious Diseases
September 27-29, 2018 Rome, Italy
E: europe@infectiousconferences.com
W: infection.conferenceseries.com/europe



13th World Congress on
Infection Prevention and Control
October 11-12, 2018 Moscow, Russia
E: ipcc@infectiousconferences.com
W: infectionprevention.conferenceseries.com

7th International Chronic Obstructive Pulmonary Disease Conference
October 22-23, 2018 Rome, Italy
E: copdconferences@annualconferences.org
W: copd.conferenceseries.com/europe

Materials Science





3rd Annual Conference and Expo on
Biomaterials
March 05-06, 2018 Berlin, Germany
E: biomaterials@materialsconferences.org
W: biomaterials.conferenceseries.com

16th International Conference on
Emerging Materials and Nanotechnology
March 22-23, 2018 London, UK
E: emergingmaterialscongress@materialsconferences.org
W: emergingmaterials.materialsconferences.com

4th International Conference and Expo on
Ceramics and Composite Materials
May 14-15, 2018 Rome, Italy
E: ceramics@materialsconferences.org
W: ceramics.conferenceseries.com

19th World Congress on
Materials Science and Engineering
June 11-13, 2018 Barcelona, Spain
E: materialscongress@materialsconferences.org
W: materialsscience.conferenceseries.com/europe

7th International conference on
Smart Materials and Structures
July 02-03, 2018 Vienna, Austria
E: smartmaterialscongress@annualconferences.org
W: smartmaterials.materialsconferences.com

20th International Conference on
Advanced Energy Materials and research
August 13-14, 2018 Dublin, Ireland
E: advancedenergymaterials@annualconferences.org
W: energymaterials.materialsconferences.com

21st International Conference on
Advanced Materials & Nanotechnology
September 04-06, 2018 Zurich, Switzerland
E: materials@materialsconferences.org
W: materials.conferenceseries.com

International Conference on
Advanced Materials and Simulations
September 11-12, 2018 University of Derby, UK
E: materialssimulation@materialsconferences.org
W: advanced-materials-simulation.materialsconferences.com

3rd International Conference on
Graphene, Carbon Nanotubes, and Nanostructures
September 17-18, 2018 Berlin, Germany
E: carboncongress@materialsconferences.org
W: carbon.materialsconferences.com

Microbiology





16th International Pharmaceutical Microbiology and Biotechnology Conference
May 21-23, 2018 Vienna, Austria
E: pharmaceutical@microbiologyconferences.org
W: pharmaceuticalmicrobiology.conferenceseries.com/europe

10th International Virology Congress and Expo
July 02-04, 2018 Vienna, Austria
E: eurovirology@microbiologyconferences.org
W: virology.conferenceseries.com/europe

13th International Congress on
Microbial Interactions and Microbial Ecology
July 19-20, 2018 Rome, Italy
E: microbialinteraction@microbiologyconferences.org
W: microbialinteraction.conferenceseries.com

47th World Congress on Microbiology
September 10-11, 2018 London, UK
E: microbiology@microbiologyconferences.org
W: microbiology.conferenceseries.com/europe

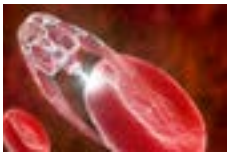





9th international summit on
Clinical Microbiology
October 08-09, 2018 Zurich, Switzerland
E: microbiologysummit@microbiologyconferences.org
W: clinicalmicrobiology.conferenceseries.com/europe

5th World Congress and Expo on
Applied Microbiology
November 15-16, 2018 Frankfurt, Germany
E: appliedmicrobiology@microbiologyconferences.org
W: microbiology.conferenceseries.com

Nanotechnology


23rd International Conference on
Nanomaterials and Nanotechnology
March 15-16, 2018 London, UK
E: nanomaterials@nanotechconferences.org
W: nanomaterials.conferenceseries.com

24th World Nano Conference
May 07-08 | 2018 Rome, Italy
E: nano@nanotechconferences.org
W: nano.conferenceseries.com

25th Nano Congress for Future Advancements
August 16-17, 2018 Dublin, Ireland
E: nanocongress@nanotechconferences.org
W: nanocongress.conferenceseries.com

26th International Conference on
Advanced Nanotechnology
October 04-05, 2018 Moscow Russia
E: advancednano@nanotechconferences.org
W: advancednano.nanotechconferences.org

3rd World Congress and Expo on
Graphene and 2D Materials
November 26-28, 2018 Barcelona, Spain
E: graphene@nanotechconferences.org
W: graphene.conferenceseries.com/europe

28th International Conference on
Nanosciences and Nanotechnology
November 26-28, 2018 Barcelona, Spain
E: nanoscience@nanotechconferences.org
W: nanotechnology.conferenceseries.com

Nephrology





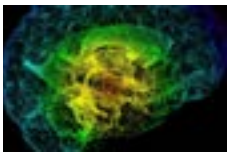
17th International Conference on
Nephrology & Urology
March 12-13, 2018 London, UK
E: nephrology-urology@annualconferences.org
W: nephrology-urology.nephroconferences.com

19th Global Nephrologists Annual Meeting
May 14-15, 2018 Rome, Italy
E: nephrologists@nephroconferences.com
W: annualmeeting.conferenceseries.com/nephrologists/

22nd European Nephrology Conference
October 15-16, 2018 Warsaw, Poland
E: euronephrology@nephroconferences.com
W: nephrology.conferenceseries.com/europe

Neuroscience





21st World Congress on Neurology and Therapeutics
March 15-17, 2018 London, UK
E: neurology@neuroconferences.com
W: neurologyconference.com






22nd International Conference on
Neurology & Neurophysiology
April 23-24, 2018 Rome, Italy
E: neurophysiology@neuroconferences.com
W: neurophysiology.conferenceseries.com

23rd International Conference on
Neurology and Neurosurgery
April 23-24, 2018 Rome, Italy
E: neurosurgery@neuroconferences.org
W: neurosurgery.conferenceseries.com

24th International Conference on
Neuroscience and Neurochemistry
May 21-22, 2018 Birmingham, UK
E: neurochemistry@neuroconferences.com
W: neurochemistry.conferenceseries.com

11th International Conference on
Alzheimers Disease & Dementia
May 24-25, 2018 Vienna, Austria
E: dementiacongress@neuroconferences.com
W: alzheimers-dementia.neurologyconference.com

3rd International Conference on Spine and Spinal Disorders
June 11-12, 2018 London, UK
E: spine@neuroconferences.com
W: spine.conferenceseries.com

25th World Congress on Neurology & Neuroscience
June 18-19, 2018 Dublin, Ireland
E: neurosciencecongress@neuroconferences.com
W: neuroscience.neurologyconference.com

27th Euro-Global Neurologists Meeting
July 23-25, 2018 Moscow, Russia
E: neurologistsconference@neuroconferences.com
W: neurologists.neurologyconference.com

11th International Conference on Vascular Dementia
July 23-25, 2018 Moscow, Russia
E: vasculardementiacongress@neuroconferences.com
W: vasculardementia.neurologyconference.com

7th World Congress on
Addictive Disorders & Addiction Therapy
July 16-18, 2018 London, UK
E: addiction@neuroconferences.com
W: addictiontherapy.conferenceseries.com/europe

26th European Neurology Congress
August 6-8, 2018 Madrid, Spain
E: neurologycongress@neuroconferences.com
W: neurologyconference.com/europe

4th International Conference on Epilepsy & Treatment
August 29-30, 2018 Zurich, Swtizerland
E: epilepsy@neuroconferences.com
W: epilepsytreatment.conferenceseries.com

4th World Congress on Parkinsons & Huntington Disease
August 29-30, 2018 Zurich, Swtizerland
E: parkinson@neuroconferences.com
W: parkinsons.neurologyconference.com

6th International Conference on
Brain Disorders and Therapeutics
September13-15, 2018 Copenhagen, Denmark
E: braindisorders@neuroconferences.com
W: braindisorders.conferenceseries.com

7th International Conference on Neurological Disorders & Stroke
September 20-21, 2018 Rome, Italy
E: strokecongress@neuroconferences.com
W: stroke.neurologyconference.com

27th International Conference on
Neurology and Cognitive Neuroscience
October 18-19, 2018 Warsaw, Poland
E: neurocognitive@neuroconferences.com
W: neurocognitivedisorders.conferenceseries.com

12th International Conference on
Alzheimer's Disease & Dementia
October 29-31, 2018 Valencia, Spain
E: dementia@neuroconferences.com
W: alzheimers-dementia.conferenceseries.com

4th International Conference on Spine Surgery
November 1-2, 2018 Brussels, Belgium
E: spinesurgeryconference@neuroconferences.com
W: spinalsurgery.neurologyconference.com

28th Global Neurologists Annual Meeting on
Neurology and Neurosurgery
November 1-3, 2018 Brussels, Belgium
E: neurologists@neuroconferences.com
W: annualmeeting.conferenceseries.com/neurologists






4th International Conference on Spine and Spinal Disorders
November 12-13, 2018 Frankfurt, Germany
E: spinecongress@neuroconferences.com
W: spine.conferenceseries.com/europe

4th International Conference on
Central Nervous System Disorders & Therapeutics
November 12-14, 2018 Edinburgh, Scotland
E: cns@neuroconferences.com
W: cns.conferenceseries.com

Nursing





47th Global Nursing & Healthcare Conference
March 01-03, 2018 London, UK
E: nursingglobal@nursingconference.com
W: global.nursingconference.com/europe

7th World Congress on Breast Cancer
May 10-11, 2018 Frankfurt, Germany
E: breastcancer@conferenceseries.net
W: breastcancer.conferenceseries.com

3rd International Conference on
Reproductive Health and Medicine
May 21-22, 2018 Vienna, Austria
E: reproductivemedicine@healthconferences.org
W: reproductivehealth.conferenceseries.com/europe

48th World Congress on
Advanced Nursing Research
June 14-15, 2018 Dublin, Ireland
E: nursingresearch@annualconferences.org
W: nursingresearch.nursingmeetings.com

2nd World Congress on
Patient Safety & Quality Healthcare
June 21-22, 2018 Dublin, Ireland
E: patientsafety@healthconferences.org
W: patientsafety.conferenceseries.com

49th International Congress on
Nursing Care Plan and Health
16 -18 July 2018 Rome, Italy
E: nursingcareplan@annualconferences.org
W: nursingcareplan.nursingmeetings.com

50th World Congress On Men in Nursing
July 16-17, 2018 Rome, Italy
mennursing@annualconferences.org
W: men.nursingmeetings.com

5th Annual Congress on
Emergency Nursing & Critical Care
July 16-17, 2018 London, UK
E: emergencynursing@annualconferences.org
W: emergency.nursingmeetings.com

26th Cancer Nursing & Nurse Practitioners Conference
July 16-17, 2018 London, UK
E: cancernursing@nursingconference.com
W: cancernursing.nursingconference.com

31st World Congress on
Advanced Nursing Practice
August 16-18, 2018 Madrid, Spain
E: nursingpractice@nursingconference.com
W: nursingpractice.nursingconference.com

29th International Conference on
Pediatric Nursing & Healthcare
August 16-17, 2018 Madrid, Spain
E: pediatricnursing@nursingconference.com
W: pediatric.nursingconference.com

17th World Congress on
Clinical Nursing and Practice
August 29-30, 2018 Zurich, Swtizerland
E: clinicalnursing@annualconferences.org
W: clinical.nursingmeetings.com

5th World Congress on
Midwifery & Women's Health
September 13-14, 2018 Frankfurt, Germany
E: euromidwifery@nursingconference.com
W: midwifery.conferenceseries.com/europe

24th World Nursing and Healthcare Conference
September 13-15, 2018 Copenhagen, Denmark
E: worldnursing@annualconferences.org
W: world.nursingconference.com






51st World Nursing Leadership & Management Conference
October 04-05, 2018 Moscow, Russia
E: nursingleadership@annualconferences.org
W: nursingleadership.nursingmeetings.com

5th International Conference on
Gynecology and Obstetrics
October 8-10, 2018- Zurich, Switzerland
E: gynecology@nursingconference.com
W: gynecology.conferenceseries.com

33rd Euro Nursing & Medicare Summit
October 8-10, 2018 Edinburgh, Scotland
E: euronursing@nursingconference.com
W: europe.nursingconference.com

27th World Nursing Education Conference
November 12-14, 2018 Frankfurt, Germany
E: nursingeducation@nursingconference.com
W: nursingeducation.nursingconference.com

Nutrition





15th International Conference on Clinical Nutrition
May 24-26, 2018 Vienna, Austria
E: clinicalnutrition@nutritionalconference.com
W: clinicalnutrition.conferenceseries.com

21st European Nutrition and Dietetics Conference
June 11-13, 2018 Dublin, Ireland
E: nutritioncongress@nutritionalconference.com
W: nutritionalconference.com/europe

14th International Congress on Advances in Natural Medicines, Nutraceuticals & Neurocognition
July 19-20, 2018 London, UK
E: nutraceuticals@nutritionalconference.com
W: nutraceuticals.pharmaceuticalconferences.com

6th International Conference on
Sports Nutrition & Fitness
August 16-17, 2018 Dublin, Ireland
E: sports-nutrition@annualconferences.org
W: sportsnutrition.nutritionalconference.com

17th World Congress on
Nutrition and Food Chemistry
September 13-15, 2018 London, UK
E: nutri-foodchemistry@nutritionalconference.com
W: nutrition-foodchemistry.conferenceseries.com

22nd European Nutritional Science Congress
November 26-27, 2018 Barcelona, Spain
E: nutritionalscience@nutritionalconference.com
W: nutritionalscience.nutritionalconference.com

Obesity





11th International Conference on
Childhood Obesity and Nutrition
March 15-16, 2018 Barcelona, Spain
E: childhoodobesity@annualconferences.org
W: childhoodobesity.conferenceseries.com

14th Euro Obesity and Endocrinology Congress
September 13-14, 2018 London, UK
E: euroobesity@obesityconference.org
W: obesity.nutritionalconference.com

Oncology & Cancer





12th World Hematologists Congress
March 15-16, 2018 London, UK
E: hematologists@oncologymeet.com
W: hematology.conferenceseries.com/europe

6th International Congress on
Gynecology & Gynecologic Oncology
July 23-24, 2018 Rome, Italy
E: gynecologyconference@annualconferences.org
W: gynecologyconference.annualcongress.com






29th Euro-Global Summit on
Cancer Therapy & Radiation Oncology
July 23-25, 2018 Rome, Italy
E: eurocancer@oncologyseries.com
W: cancer-radiationoncology.conferenceseries.com

28th Euro Congress on Cancer Science & Therapy
August 09-10, 2018 Madrid, Spain
E: cancerscience@oncologyseries.com
W: cancerscience.conferenceseries.com

4th World Congress on
Medical Imaging and Clinical Research
September 03-04, 2018 London, UK
E: medicalimaging@oncologyseries.com
W: clinical-medicalimaging.conferenceseries.com

4th International Congress on
Epigenetics and Chromatin
September 03-04, 2018 London, UK
E: epigenetics@oncologyseries.com
W: epigenetics.conferenceseries.com

3rd Cancer Diagnostics Conference & Expo
September 20-21, 2018 Berlin, Germany
E: cancerdiagnotics@oncologyseries.com
W: cancerdiagnostics.conferenceseries.com

36th World Cancer Conference
October 11-13, 2018 Zurich, Switzerland
E: worldcancer@annualconferences.org
W: cancer.global-summit.com

13th World Biomarkers Congress
November 29-30, 2018 Dublin, Ireland
E: worldbiomarkers@oncologyseries.com
W: molecular-cancer-biomarkers.conferenceseries.com

Ophthalmology





19th Ophthalmology Summit
Feb 26-27, 2018 Berlin Germany
E: ophthalmologysummit@ophthalmologyconferences.com
W: ophthalmologysummit.conferenceseries.com

3rd Global Pediatric Ophthalmology Congress
March 22-23, 2018 London, UK
E: pediatricophthalmology@ophthalmologyconferences.com
W: pediatricophthalmology.conferenceseries.com

2nd International Conference on
Cataract and Advanced Eye Care
June 14-16, 2018 Rome, Italy
E: cataract@ophthalmologyconferences.com
W: cataract.conferenceseries.com

2nd Global Meeting and Expo on
Vision Science & Eye
August 29-30, 2018 Zurich, Swizeland
E: visionscience@ophthalmologyconferences.com
W: visionscience.conferenceseries.com

3rd International Conference and Expo on
Optometry and Vision Science
October 8-9, 2018 Edinburg, Scotland
E: optometry@ophthalmologyconferences.com
W: optometry.conferenceseries.com

17th International Conference on
Clinical & Experimental Ophthalmology
October 1-3, 2018 Moscow, Russia
E: ophthalmology@ophthalmologyconferences.org
W: ophthalmology.conferenceseries.com

28th European Ophthalmology Congress
November 26-28, 2018 Dublin, Ireland
E: ophthalmologycongress@ophthalmologyconferences.com
W: ophthalmology.conferenceseries.com/europe

Pathology





13th International Conference on
Laboratory Medicine and Pathology
June 25-26, 2018 Berlin, Germany
E: laboratorymedicine@pathologyconferences.org
W: laboratorymedicine.conferenceseries.com

14th International Conference on
Surgical Pathology & Cancer Diagnosis
May 17-18, 2018 Rome, Italy
E: surgicalpathology@annualconferences.org
W: surgicalpathology.conferenceseries.com






8th European Conference on Predictive, Preventive, Personalized Medicine & Molecular Diagnostics
August 20-21, 2018 Rome, Italy
E: europersonalizedmedicine@confernceseries.net
W: personalizedmedicine.conferenceseries.com/europe

Pediatrics





3rd International Conference on Pediatric Surgery
May 7-8, 2018 Frankfurt, Germany
E: pediatricsurgery@annualconferences.org
W: pediatricsurgery.conferenceseries.com

17th International Conference on Clinical Pediatrics
June 14-16, 2018 Rome, Italy
E: clinicalpediatrics@pediatricsconferences.org
W: clinicalpediatrics.conferenceseries.com

Advances in Neonatal and Pediatric Nutrition
July 19-21, 2018 London, UK
E: neonatalnutrition@annualconferences.org
W: pediatricnutrition.pediatricsconference.com

20th International Conference on
Pediatrics Primary Care
September 03-04 2018 Zurich, Switzerland
E: pediatricprimarycare@annualconferences.org
W: primarycare.pediatricsconferences.com

18th International Conference on
Pediatrics Health
August 06-07, 2018 Madrid, Spain
E: pediatricshealth@annualconferences.org
W: health.pediatricsconferences.com

24th European Pediatrics Conference
September 10-12, 2018 Copenhagen, Denmark
E: europediatrics@pediatricsconferences.org
W: pediatrics.conferenceseries.com/europe

24th World Pediatrics Conference
October 18-20, 2018 Warsaw, Poland
E: worldpediatrics@annualconferences.org
W: worldpediatrics.pediatricsconferences.org




26th International Conference on
Neonatology and Perinatology
November 15-17 2018 Edinburgh, Scotland
E: neonatology@pediatricsconferences.com
W: neonatology.conferenceseries.com

Petroleum





9th International Conference and Expo on
Oil and Gas
August 9-10, 2018 Madrid, Spain
E: petroleum@oilgasconferences.org
W: oil-gas.conferenceseries.com

Physical Therapy & Rehabilitation

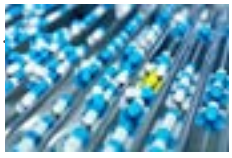




5th International Conference and Expo on
Novel Physiotherapies
March 19-20, 2018 Berlin, Germany
E: novelphysiotherapies@annualconferences.org
W: novelphysiotherapies.conferenceseries.com

6th International Conference & Exhibition on
Physiotherapy & Physical Rehabilitation
August 13-14, 2018 London, UK
E: physiotherapy@annualconferences.org
W: physiotherapy.annualcongress.com

Pharma





12th World Congress on
Pharmaceutical Sciences and Innovations in Pharma Industry
February 26- 27, 2018 London, UK
E: pharmaindustry@pharmaceuticalconferences.org
W: industry.pharmaceuticalconferences.com




16th International Conference and Exhibition on
Pharmaceutics & Novel Drug Delivery Systems
March 19-21, 2018 Berlin, Germany
E: pharmaceutica@pharmaceuticalconferences.org
W: novel-drugdelivery-systems.pharmaceuticalconferences.com

11th European Biosimilars Congress
April 26-27, 2018 Rome, Italy
E: eurobiosimilars@pharmaceuticalconferences.org
W: biosimilars-biologics.pharmaceuticalconferences.com/europe

15th Annual European Pharma Congress
May 07-09, 2018 Frankfurt, Germany
E: pharmaeurope@pharmaceuticalconferences.org
W: europe.pharmaceuticalconferences.com

4th World Congress and Exhibition on
Antibiotics and Antibiotic Resistance
June 14-15, 2018 Barcelona, Spain
E: antibiotics@pharmaceuticalconferences.org
W: antibiotics.pharmaceuticalconferences.com

9th International Conference and Exhibition on
Pharmacovigilance
June 21-22, 2018 London, UK
E: pharmacovigilance@pharmaceuticalconferences.org
W: pharmacovigilance.pharmaceuticalconferences.com

4th International Conference and Exhibition on
Natural Products, Medicinal Plants & Marine Drugs
June 11-12, 2018 Rome, Italy
E: naturalproducts@pharmaceuticalconferences.org
W: naturalproducts.pharmaceuticalconferences.com

16th International Conference and Exhibition on
Pharmaceutical Formulations
July 26-27, 2018 Rome, Italy
E: formulations@pharmaceuticalconferences.org
W: formulation.pharmaceuticalconferences.com

10th World Congress on Pharmacology
July 30-Aug 01, 2018 Barcelona, Spain
E: pharmacology@pharmaceuticalconferences.org
W: pharmacology.pharmaceuticalconferences.com

4th International Conference and Expo on
Drug Discovery, Designing & Development
September 06-07, 2018 London, UK
E: drugdiscovery@pharmaceuticalconferences.org
W: drug-discovery.pharmaceuticalconferences.com

6th International Conference on
Advanced Clinical Research and Clinical Trials
September 10-11, 2018 Zurich, Switzerland
E: clinicalresearch@pharmaceuticalconferences.org
W: clinicalresearch.pharmaceuticalconferences.com

18th World Pharma Congress
October 18-19, 2018 Warsaw, Poland
E: pharmacongress@pharmaceuticalconferences.org
W: world.pharmaceuticalconferences.com

18th Annual Pharmaceutical and Chemical Analysis Congress
November 05-06, 2018 Madrid, Spain
E: analysis@pharmaceuticalconferences.org
W: analysis.pharmaceuticalconferences.com

3rd International Conference on
Generics Drugs and Biosimilars
November 15-17, 2018 Frankfurt, Germany
E: genericpharma@pharmaceuticalconferences.org
W: generic-market.pharmaceuticalconferences.com

9th Global Experts Meeting on
Neuropharmacology
November 15-16, 2018 Frankfurt, Germany
E: neuro@pharmaceuticalconferences.org
W: neuro.pharmaceuticalconferences.com

23rd International Conference on
Pharmaceutical Biotechnology
December 10-11, 2018 Rome, Italy
E: pharmabiotech@pharmaceuticalconferences.org
W: biotech.pharmaceuticalconferences.com

Physics



3rd International Conference on Nuclear and Plasma Physics
June 07-08, 2018 London, UK
E: plasmaphysics@annualconferences.org
W: plasmaphysics.physicsmeeting.com

5th International Conference on
Theoretical and Applied Physics
July 02-03, 2018 Vienna, Austria
E: appliedphysics@annualconferences.org
W: appliedphysics.physicsmeeting.com



9th International Conference on
Optics, Photonics & Lasers
July 02-04, 2018 Berlin, Germany
E: eurooptics@annualconferences.org
W: optics.physicsmeeting.com

4th International Conference on
Condensed Matter and Materials Physics
August 16-17, 2018 London, UK
E: materialsphysics@annualconferences.org
W: materialsphysics.physicsmeeting.com

3rd International Conference on
Quantum Optics and Quantum Computing
September 10-11, 2018 London, UK
E: quantumoptics@annualconferences.org
W: quantumoptics.physicsmeeting.com

4th International Conference on Physics
September 17-18, 2018 Berlin, Germany
E: physics@physicsconferences.org
W: physics.conferenceseries.com

4th International Conference on
Quantum Physics and Quantum Technology
October 18-19, 2018 Rome, Italy
E: quantumphysics@physicsconferences.org
W: quantumphysics.conferenceseries.com

3rd International Conference on
Astronomy and Space Science
October 18-19, 2018 Rome, Italy
E: astrospace@physicsconferences.org
W: astronomy-space.physicsmeeting.com

3rd International Conference on
Magnetism and Magnetic Materials
October 22-23, 2018 Rome, Italy
E: magneticmaterials@annualconferences.org
W: magneticmaterials.physicsmeeting.com

4th International Conference on
High Energy & Particle Physics
December 03-04, 2018 Valencia, Spain
E: highenergy@physicsconferences.org
W: highenergyphysics.conferenceseries.com

Psychiatry





4th International Conference on
Mental Health & Human Resilience
April 26-27, 2018 Rome, Italy
E: mentalhealth@conferenceseries.net
W: mentalhealth.conferenceseries.com

4th International Conference on
Depression, Anxiety and Stress Management
May 10-11, 2018 Frankfurt, Germany
E: stress@psychiatrycongress.com
W: stressmanagement.global-summit.com

27th World Congress on
Psychiatry & Psychological Syndromes
June 21-23, 2018 London, UK
E: psychiatrycongress.com

28th Euro Congress on
Psychiatrists and Psychologists
July 05-06, 2018 Vienna, Austria
E: europsychiatry@psychiatrycongress.com
W: psychiatry.global-summit.com/europe

29th International Conference on
Psychiatry & Psychology Health
July 09-10, 2018 Paris, France
E: psychologyhealth@annualconferences.org
W: psychologyhealth.conferenceseries.com

33rd International Conference on
Adolescent Medicine & Child Psychology
Sep 04-05, 2018 Zurich, Switzerland
E: childpsychology@conferenceseries.net
W: childpsychology.conferenceseries.com

3rd International Congress on
Forensic Science and Psychology
October 22-23, 2018 Athens, Greece
E: forensiccongress@psychiatrycongress.com
W: forensic.conferenceseries.com






35th International Conference on
Psychiatry & Psychosomatic Medicine
November 01-03, 2018 Brussels, Belgium
E: psychosomaticmedicine@psychiatrycongress.com
W: psychosomatic.conferenceseries.com

Surgery





3rd International Conference on
Metabolic and Bariatric Surgery
March 15-16, 2018 Barcelona, Spain
E: bariatricsurgery@annualconferences.org
W: bariatricsurgery.conferenceseries.com

7th International Conference and Exhibition on Surgery
June 21-23, 2018 Dublin, Ireland
E: surgery@surgeryconferences.org
W: sugery.conferenceseries.com

3rd International Conference on Anesthesia
June 21-22, 2018 Dublin, Ireland
E: anesthesia@annualconferences.org
W: anesthesia.conferenceseries.com

13th International Conference on
Arthroplasty and Orthopedics
August 08-09, 2018 Rome, Italy
E: arthroplasty@annualconferences.org
W: orthopedics.surgeryconferences.com

8th International Conference and Expo on
Cosmetology, Trichology & Aesthetic Practices
August 13-14, 2018 Madrid, Spain
E: cosmetologycongress@surgeryconferences.org
W: cosmetology.surgeryconferences.com

World Congress on
Neurology and Neuromuscular Disorders
September 13-14, 2018 Frankfurt, Germany
E: neuromuscular@annualconferences.org
W: neuromuscular.neuroconferences.com

3rd European Otolaryngology-ENT Surgery Conference
October 08-10, 2018 London, UK
E: ent@surgeryconferences.org
W: ent.conferenceseries.com

2nd International Conference on
Craniofacial Surgery
October 08-09, 2018 London, UK
E: craniofacial@annualconferences.org
W: craniofacial.surgeryconferences.com

9th European Congress of Rheumatology,
Autoimmunity and Orthopedics
October 16-17, 2018 Warsaw, Poland
E: rheumatology@annualconferences.org
W: rheumatology.conferenceseries.com

Toxicology





15th Euro-Global Summit on
Toxicology and Applied Pharmacology
July 02-04, 2018 Berlin, Germany
E: eurotoxicology@annualconferences.org
W: toxicology.global-summit.com/europe

16th Annual Meeting on
Environmental Toxicology and Life Sciences
August 13-14, 2018 London, UK
E: euroenvitox@annualconferences.org
W: environmentaltoxicology.toxicologyconferences.com

Vaccines





29th International Conference on
Vaccines and Immunization
March 19-20, 2018 London, UK
E: vaccinessummit@immunologyconferences.org
W: vaccines-immunization.conferenceseries.com

31st Euro Global Summit and Expo on
Vaccines & Vaccination
June 14-16, 2018 Barcelona, Spain
E: eurovaccines@vaccineconference.com
W: europe.vaccineconferences.com












19th World Congress on

Materials Science and Engineering

June 11-13, 2018 | Barcelona, Spain

Keynote Forum

Day 1

Nekane Guarrotxena, J Material Sci Eng 2018, Volume 7
DOI: 10.4172/2169-0022-C8-112

19th World Congress on

Materials Science and Engineering

June 11-13, 2018 | Barcelona, Spain



Nekane Guarrotxena

Institute of Polymer Science and Technology - (CSIC), Spain

Encoded SERS plasmonic NPs in nanomedicine

Single-molecule sensitivity of SERS has brought to prominence the special role played by so called SERS hotspots. Given that nanometer-scale junctions between nanoparticles produce significant electric field enhancement, the use of SERS-active dimers provides a suitable platform for developing effective sensing, imaging and therapy methodologies. Moreover, the relevant implementation of SERS active species design has opened new pathways and strategies for the SERS application in the clinical and medical field. Herein, I will present how encoded SERS metal NPs result promising multifunctional nanomaterials for biomedical applications. Particularly, SERS tag-synthesis, assembly and optical features will be stated and several examples of their use in detection, imaging, drug loading and therapy will be provided in order to show the remarkable and potential applicability in nanomedicine on the basis of their unique physicochemical features, sensitivity, selectivity and multiplexing capabilities.

Biography

Nekane Guarrotxena was a PhD in chemistry from the University of Complutense, Madrid-Spain (1994). She held post-doctoral research positions at ENSAM, Paris-France (1994-1995) and University of Montpellier-France (1995-1997). She was the Vice-Director of ICTP-CSIC (2001-2005) and visiting-professor at UCSB and at UCI, California-USA (2008-2011). She is currently Research Scientist at the ICTP-CSIC-Spain. She has published more than 60 peer-reviewed publications, 4 books (also co-editor), more than 24 book chapters and 1 patent; and serves as an Editorial Board member of several journals, organizing committee member of scientific-technological events and External Expertise Consultant on I+D+i for National and International Agencies. Her studies focuse on the synthesis and assembly of hybrid-nanomaterials, nanoplasmonics, smart nanomaterials and their nanobiotechnology applications (bioimaging, drug delivery, therapy and biosensing).

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Karl Ulrich Kainer, J Material Sci Eng 2018, Volume 7
DOI: 10.4172/2169-0022-C8-112



Karl Ulrich Kainer

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Biodegradable magnesium implant materials – state of the art

Corrosion behavior of Magnesium and its alloys are normally crucial for nu¬merous applications and hinder often its use. But this disadvantage turns into a tremendous benefit in the area of degradable implants. Here, Magnesium alloys gained interest as biocompatible, degradable im¬plant materials. Magnesium is an essential element for the human body and therefore the body owns a regulating system that balances intake and excretion of Magnesium. Therefore a toxic accumulation can be avoi¬ded. Additionally Magnesium alloys are showing better mechanical pro-perties compared to polymers, titanium, stainless steels or cobalt-chromium alloys as their strength and stiffness is much closer to human bone. Besides applications in the musculo-skeletal system they are also suitable as stent materials in the cardiovascular system. And again they offer advantages compared to other stent materials like polymers, stainless steels and titanium. One advantage of Magnesium based implant materials is that it can be resorbed by the human body after a given time. This is of benefit e.g. for stents as well as for implants that are used in children traumatology. In the first case there is still a risk of restenosis which requires now a coronary bypass surgery. In the case of bone implants for children a removal of permanent implants would be necessary in any case due to still growing bone of children. However, the requirements for stents or bone implants are different. To adjust processability as well as properties alloying and process optimization are necessary. We will report the state of the art in the area of rare earth containing Magnesium alloys and the developments at the Magnesium Innovation Centre.

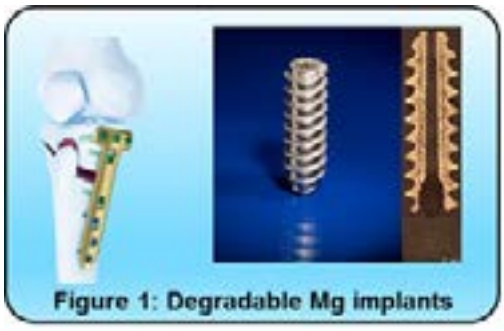


Figure 1: Degradable Mg implants

Recent Publications

1. N. Hort, Y. Huang, D. Fechner, M. Störmer, C. Blawert, F. Witte, C. Vogt, H. Drücker, R. Willumeit, K. U. Kainer, F. Feyerabend, Magnesium alloys as implant materials - Principles of property design for Mg-RE alloys, Acta Biomaterialia 6 (2010) 1714-1725
2. L. Yang, N. Hort, D. Laipple, D. Höche, Y. Huang, K. U. Kainer, R. Willumeit, F. Feyerabend, Element distribution in the corrosion layer and cytotoxicity of alloy Mg–10Dy during in vitro biodegradation, Acta Biomaterialia 9 (2013) 8475-8487
3. A. Srinivasan, C. Blawert, Y. Huang, C. L. Mendis, K. U. Kainer, N. Hort, Corrosion behaviour of Mg-Gd-Zn- based alloys in aqueous NaCl solution, Journal of Magnesium Alloys 2 (2014) 245-256

4. L.-L. Shi, Y. Huang, L. Yang, F. Feyerabend, C. L. Mendis, R. Willumeit, K. U. Kainer, N. Hort, Mechanical properties and corrosion behavior of Mg–Gd–Ca–Zr alloys for medical applications, Journal of the Mechanical Behavior of Biomedical Materials 47 (2015) 38-48.
5. O. Charyeva, F. Feyerabend, R. Willumeit, D. Zukowski, C. Gasqueres, G. Szakács, N. A. Agha, N. Hort, F. Gensch, F. Cecchinato, R. Jimbo, A. Wennerberg, K. S. Lips, In Vitro Resorption of Magnesium Materials and its Effect on Surface and Surrounding Environment, MOJ Toxicol 2015, 1(1): 00004.
6. M. Vlcek, F. Lukac, H. Kudrnová, B. Smola, I. Stulíková, M. Luczak, G. Szakács, N. Hort, Regine Willumeit-Römer, Microhardness and In Vitro Corrosion of Heat-Treated Mg–Y–Ag Biodegradable Alloy Materials 10 (1) (2017) 55-66
7. L. Yang, L. Ma, Y. Huang, F. Feyerabend, C. Blawert, D. Höche, R. Willumeit-Römer, E. Zhang, K. U. Kainer, N. Hort, Influence of Dy in solid solution on the degradation behaviour of binary Mg-Dy alloys in cell culture medium, Materials Science & Engineering C 75 (2017) 1351–1358.
8. M. Bartosch, H. Peters, A. Koerner, B. Schmitt, F. Berger, N. Hort, F. Witte, New methods for in vivo degradation testing of future stent materials, Materials and Corrosion (2017) 1-11

Biography

Karl Ulrich Kainer is the director of the Magnesium Innovation Centre (MagIC) at the Helmholtz Centre Geesthacht. The main focus of the research in MagIC, headed by Prof. Karl Ulrich Kainer, is the development of magnesium-based materials for diverse applications, for example in the transport and medical sectors. Special emphasis is placed on alloy development and on the optimization of existing and new processing technologies. Scientific fundamental research and application-oriented investigations are necessary in order to produce magnesium materials with the optimum spectrum of properties for specific service applications. MagIC has established capabilities and the appropriate equipment for this purpose.

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Notes:







19th World Congress on

Materials Science and Engineering

June 11-13, 2018 | Barcelona, Spain

Scientific Tracks & Abstracts

Day 1

Materials Congress 2018

Sessions:

Electronic, Optical and Magnetic Materials | Polymer Science and Technology

Session Chair
Alberto Jiménez Suárez
Universidad Rey Juan Carlos, Spain

Session Co-Chair
Michael Kaplan
Simmons College, USA

Session Introduction

Title: **Material Science and Optics: Applications from Spectroscopy to Metrology, from Fundamental Physics to Space**
Simone Borri, Istituto Nazionale di Ottica, Italy

Title: **First-principles design of low-dimensional quantum materials with nontrivial band topology**
Mina Yoon, University of Tennessee, USA

Title: **Role of Lamb and Horizontal Acoustic Waves in Microscopic Mechanism of Structural Phase Transitions in Crystal Plates**
Michael Kaplan, Simmons College, USA

Title: **High sensitivity metamaterial heterodyne detectors at λ = 9µm operating room temperature**
Carlo Sirtori, Universite Paris Diderot, France

Title: **Sandwich method to grow high quality AlN by MOCVD**
Ilkay Demir, Cumhuriyet University, Turkey

Title: **Magnetic skyrmions: Spin torque induced motion and electrical detection at room temperature in metallic multilayers**
Nicolas Reyren, Unité Mixte de Physique, France

Title: **Spinorbitronics at Interfaces for THz Emission**
Henri Jaffrès, Unité Mixte de Physique, France

Title: **Zinc nitride material for the development of novel electronic sensors and flexible electronics**
Jose Luis Pau, Universidad Autónoma de Madrid, Spain

Title: **Segmental dynamics in a polymer material studied by single molecule imaging**
Hiroyuki Aoki, Japan Atomic Energy Agency, Japan

Title: **Atomic force microscopy of butadiene-nitrile rubber composites deformation**
Nikolay Shadrinov, Institute of Oil and Gas Problems SB RAS, Russia

Title: **Conductivity Studies of Methyl Cellulose/Chitosan/1-butyl-3-methyl imidazolium bis(trifluoro sulfonyl) imide Doped With Ammonium Triflate Based Polymer Electrolyte**
Azwani Sofia Ahmad Khiar, Universiti Sains Islam, Malaysia

YRF: **Transport properties of a two-dimensional PbSe square superstructure in an electrolyte-gated transistor**
Maryam Alimoradi Jazi, University of Utrecht, Netherlands

Simone Borri et al., J Material Sci Eng 2018, Volume 7
DOI: 10.4172/2169-0022-C8-113

Material science and optics: applications from spectroscopy to metrology, from fundamental physics to space

Simone Borri[1], **Paolo De Natale**[1], **Mario Siciliani de Cumis**[2], **Antonio Giorgini**[1], **Saverio Avino**[1], **Pietro Malara**[1] and **Gianluca Gagliardi**[1]
[1]Istituto Nazionale di Ottica, Italy
[2]Agenzia Spaziale Italiana, Italy

Material Science and Optics are intrinsically related from the earlier study on radiation-matter interaction. Over the last years, photonics has rapidly evolved towards more compact and sophisticated devices from the visible-near infrared (VIS-NIR) towards Mid and Far Infrared (MIR and THz). The challenge is the realization of integrated structures as a powerful technology for "packing" sources, detectors, electronics and optics into single and low costs platforms. In particular MIR and THz spectral region are very attractive for scientific and applicative reasons:this spectral zone is the "so-called" fingerprint region in which many substances exhibitvery strong characteristic absorptions: simple molecules (CO_2, H_2O, H_2S, etc.), complex molecules (dioxins, explosives, organic fluids, etc.). Key light sources for mid infrared sensing and spectroscopy are coming from Material Science Research:Interbandand Quantum Cascade Lasers.For spectroscopic and metrology it is very important to have stable sources with narrow linewidth. In this view, a new class of materials (nonlinear crystals) and devices enable frequency conversion,in order to realize optical referencesusing VIS-NIR sources or Laser Frequency Combs. A new Physics and new classes of devices are coming from research in crystalline Whispering Gallery Mode Resonators (WGMRs). These devices enable nonlinear generation of optical frequency combs, recently exploited in the Telecom region (making use of micro-resonators where light is coupled in and out by opticalfibers). Such WGMRs are also providing outstanding performance in laser stabilization, even in the mid infrared-MIR spectral range. They can also be used for direct sensing in gaseous or liquid compounds, with innovative applications in the field of medicine, human health and study of capillarity phenomena and viscous-elastic properties of fluids. Here, we report our recent researchactivity on crystalline and liquid WGMRs, used as powerful tool for nonlinear optics, bio-chemical sensing and mid-IR laser frequency stabilization,passive and active optical cavity-assisted surface-plasmon-resonance sensors as well ason nonlinear crystals for generation of metrological mid-IR coherent light. These results open the way to new classes of compact MIR sources with a number of applications in Space missions, Metrology, Chemistryand Fundamental Physics.

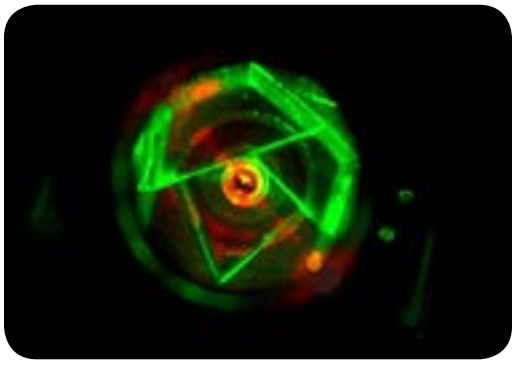


Figure 1: High-Q crystalline Whispering Gallery Mode Resonators have undergone an impressive development in the last years, demonstrating ultimate performance in laser stabilization from UV to MIR spectral range.

Recent Publications

1. G. Insero, C. Clivati, D. D'Ambrosio, P. De Natale, G. Santambrogio, P. Schunemann, J.-J. Zondy, and S. Borri, "Difference frequency generation in the mid-infrared with orientation-patterned gallium phosphide crystals", Opt. Lett. 41 (2016), 5114

2. M. Siciliani de Cumis, S. Borri, G. Insero, I. Galli, A. Savchenkov, D. Eliyahu, V. Ilchenko, N. Akikusa, A. Matsko, L. Maleki, and P. De Natale, "Microcavity-Stabilized Quantum Cascade Laser", Laser Photon. Rev. 10, 153 (2016).
3. S. Borri, M. Siciliani de Cumis, G. Insero, S. Bartalini, P. CancioPastor, D. Mazzotti, I. Galli, G. Giusfredi, G. Santambrogio, A. Savchenkov, D. Eliyahu, V. Ilchenko, N. Akikusa, A. Matsko, L. Maleki, and P. De Natale, "Tunablemicrocavity-stabilized quantum cascade laser for mid-IR high-resolutionspectroscopy and sensing", Sensors 16, 238 (2016).
4. G. Gagliardi, M. Salza, S. Avino, P. Ferraro, P. De Natale, "Probing the Ultimate Limit of Fiber-opticStrainSensing", Science 330, 1081 (2010)
5. A. Giorgini, S. Avino, P. Malara, P. De Natale, G. Gagliardi, "Fundamentallimits in high-Q dropletmicroresonators", Sci. Rep. 7, 41997 (2017)
6. Consolino, A. Taschin, P. Bartolini, S. Bartalini, P. Cancio, A. Tredicucci, H.E. Beere, D.A. Ritchie, R. Torre, M.S.Vitiello, and P. De Natale, "Phase-locking to a free-space terahertz comb for metrological-grade terahertz lasers", Nature Communications 3, 1040 (2012).

Biography

Simone Borri has completed his PhD in 2007 from University of Firenze, Italy. He is researcher at CNR-National Institute of Optics since 2010. He worked as researcher for LENS, the European Laboratory for Nonlinear Spectroscopy, and IFN, the italian Institute for Photonics and Nanotechnologies. His main expertise is development of coherent sources and techniques for high-sensitivity and high-resolution molecular spectroscopy in the mid infrared. During his scientific activity he developed mid-IR and THz sources based on nonlinear frequency generation, and worked on trace-gas sensors based on cavity-enhanced absorption spectroscopy, photoacoustic sensing, Doppler-free spectroscopy, high-precision spectroscopy on molecular beams. He studied the noise properties of quantum cascade lasers, and developed locking techniques for linewidth narrowing, using also novel optical devices like crystalline whispering gallery mode resonators.

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Notes:

Mina Yoon, J Material Sci Eng 2018, Volume 7
DOI: 10.4172/2169-0022-C8-113

First-principles design of low-dimensional quantum materials with nontrivial band topology

Mina Yoon
University of Tennessee, USA

We discover new class of electrides [1,2], the first electride with nontrivial band topology, based on 1D building blocks by coupling materials database searches and first-principles-calculations-based analysis. This new class of electrides, composed of 1D nanorod building blocks, has crystal structures that mimic β-$TiCl_3$ with the position of anions and cations exchanged. Unlike the weakly coupled nanorods of β-$TiCl_3$, Cs_3O and Ba_3N retain 1D anionic electrons along the hollow inter-rod sites; additionally, strong inter-rod interaction in C_3O and Ba_3N induces band inversion in a 2D superatomic triangular lattice, resulting in nontrivial band topology of Dirac nodal lines [2]. This new material could be served as an ideal template to explore various quantum phases. Using a tight-binding Hamiltonian based on two-dimensional (2D) honeycomb lattices, we construct a phase diagram in terms of exchange coupling and spin-orbit coupling (SOC), which spans four different phases, such as topological insulator, large/small gap quantum anomalous Hall (QAH) insulator, and ferromagnetic semiconductor [3]. We reveal that 2D honeycomb lattices consisting of some post-transition metals, such as Sn, Pb, and Bi, undertake ferromagnetic transition as the lattice constant increases and significant changes in SOC strength, which makes them an ideal material to explore the versatile phases solely by changing lattice constants. First-principles density functional calculations demonstrate that 2D honeycomb SnF can show QAH effect with SOC gap of ~0.25eV and Curie temperature (T_c) of ~780K [3]. Our calculations propose a new avenue to the room-temperature QAH effect in realistic 2D materials systems.

Recent Publications

1. First-Principles Prediction of Themodynamically Stable Two-Dimensional Electrides, W. Ming, M. Yoon, M.-H. Du, F. Liu, K. Lee, and S. W. Kim, J. Am. Chem. Soc. 138, 15336 (2016).
2. First-Principles Prediction of New Electrides with Nontrivial Band Topology Based on One-Dimensional Building Blocks, Changwon Park, Sung Wng Kim, Mina Yoon, Phys. Rev. Lett. 120, 26401 (2018).
3. Quantum Phase Engineering of Two-Dimensional Post-Transition Metals: Toward a High-Temperature Quantum Anomalous Hall Insulators, L. Zhang, C. Park, and M. Yoon (2018, to be published)

Biography

Mina Yoon received her PhD degree in Theoretical Condensed Matter Physics in 2004, from Michigan State University. She is a Research Scientist at ORNL and a Joint Professor of Physics at University of Tennessee, Knoxville. The primary focus of her research lies in the fundamental understanding of growth mechanisms, novel properties, functionalization, and potential technological applications of surface-based and low-dimensional materials. Especially, her interest is in utilizing these materials as light, environmentally friendly, and efficient energy storage/generation and optoelectronic application by making use of their unique low-dimensional properties. Her theoretical approach ranges from atomistic modeling by first-principles quantum mechanical approaches and many-body potential approaches, to continuum elasticity theory and phenomenological modeling.

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Michael Kaplan, J Material Sci Eng 2018, Volume 7
DOI: 10.4172/2169-0022-C8-113

Role of lamb and horizontal acoustic waves in microscopic mechanism of structural phase transitions in crystal plates

Michael Kaplan
Simmons College, USA

Microscopic theory of structural phase transitions based on the cooperative Jahn-Teller effect is considered for finite size crystal samples in the shape of a plate. In these samples one size – thickness 2h – is significantly smaller than two others. In such crystal plate the electron and phonon spectra are different from ones of the regular 3-dimensional crystal. The vibrational spectrum difference is in the focus of attention in this presentation. This difference is especially big for the long wave acoustic vibrations with the wavelength $\lambda \geq 2h$. Structural phase transitions are caused by the intersite electron interactions mediated by the crystal acoustic and optical vibrations – virtual phonon exchange. If the major contribution to these interactions is related to the acoustic vibrations, the theory modifications caused by sample surfaces are especially significant. The theory peculiarities for crystal plates are connected with the existence of the Lamb (symmetric LS and antisymmetric LA) and horizontal (symmetric SH and antisymmetric AH) vibrational modes. The mutual orientation of the crystal symmetry axes and the crystal plate surface (crystal cut type) is of primary importance in defining the acoustic wave family most significant in the mechanism of structural phase transition. Thermodynamic and dynamic aspects of the cooperative Jahn-Teller effect in tetragonal symmetry crystal plates with the major role of the Lamb waves or horizontal waves in the mechanism of the ferroelastic phase transition are under discussion.

Biography

Michael Kaplan is a physics and chemistry researcher and educator. From 2005 he is a tenured professor of Simmons College (Boston, USA). His expertise is related to the structural phase transitions, acoustic and magnetic properties of materials, ferroelectricity, non-destructive testing of materials, ultrasound, multiferroics, smart materials. He is co-author (with Benjamin Vekhter) of a book Cooperative Phenomena in Jahn-Teller Crystals (Plenum Press, 1995), co-editor (with George Zimmerman) of a book Vibronic Interactions: Jahn-Teller Effect in Crystals and Molecules, NATO Science Series (Kluvers Academic Publishers, 2001), author and co-author of about 300 refereed articles and 40 patents registered in Germany, UK, France, Japan, USSR, USA.

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Notes:

Carlo Sirtori et al., J Material Sci Eng 2018, Volume 7
DOI: 10.4172/2169-0022-C8-113

High sensitivity metamaterial heterodyne detectors at $\lambda = 9\mu m$ operating room temperature

Carlo Sirtori, Daniele Palaferri, Yanko Todorov, Azzurra Bigioli, Djamal Gacemi, Angela Vasanelli and **Alireza Mottaghizadeh**
Universite Paris Diderot, France

Room temperature operation is mandatory for any optoelectronics technology which aims at low-cost and compact systems for widespread applications. In this work we present a 9μm photodetector and heterodyne receiver with enhanced performances up to room temperature, where we have estimate signal to noise ratio in the pW range. This has been realised by implementing a quantum well detector (QWIP) into a metamaterial made of subwavelength metallic resonators. Each resonator acts as an antenna and improves the photonic collection area, which is greatly increased with respect to the electrical area. Moreover the very short life-time of the excited carriers is a very important intrinsic property of QWIPs that have not been exploited for performances yet. Its typical value is in the order of a ps, which leads to two important consequences: the detector frequency response can be up to 100 GHz and its saturation intensity is extremely high in the in the order of 10^7 W/cm^2. These two figures are ideal for a heterodyne detection scheme, in which a powerful local oscillator (LO) can drive a strong photocurrent, higher than the detector dark current, that can coherently mix with a signal shifted in frequency with respect to the LO. Notably, these unique properties are unmatched in infrared interband detectors based on mercury-cadmium-telluride alloys, which have a much longer carrier lifetime and therefore intrinsic low-speed response. On the contrary the reduced physical area and the increased responsivity of our metamaterial devices allowed us to take full advantage of the intrinsic high frequency response of the quantum detector up to room temperature. By beating on it two quantum cascade lasers we have measured heterodyne signal at high frequencies up to 4.5GHz, with NEP in the pW range at 300K.

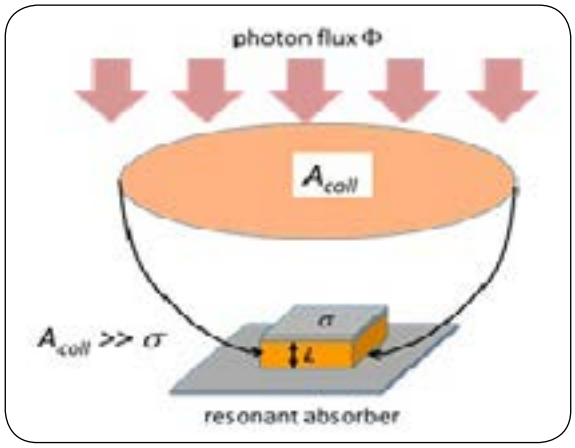


Figure 1: A general scheme of a detector which comprises a resonant absorber embedded in a metallic nanoresonator. Thanks to the antenna function of the resonator, photons are gathered on a collection area Acoll that can be much larger than the detector cross section σ

Recent Publications

1. Palaferri D, *et al.* (2016) Ultra-subwavelength resonators for high temperature high performance quantum detectors. New Journal of Physics. 18:113016.
2. Todorov Y, Desfond P, Belacel C, Becerra L, and Sirtori C (2015) Three-dimensional THz lumped-circuit resonators. Opt. Express 23:16838.
3. Palaferri D, *et al.* (2015) Patch antenna terahertz photodetectors. Appl. Phys. Lett. 106:161102.

4. Chen YN, *et al.* (2014) Antenna-Coupled Microcavities for Enhanced Infrared Photo-detection. Appl. Phys. Lett. 104:031113.
5. Todorov Y, *et al.* (2010) Optical properties of metal-dielectric-metal microcavities in the THz frequency range: Opt. Express 18:13886.

Biography

Carlo Sirtori received his PhD in physics from the University of Milan in 1990. The same year he joined Bell Labs where he started his research career on semiconductor quantum devices. In 1994 he was one of the co-inventor of the "Quantum Cascade Laser". In 1997, Carlo Sirtori joined the THALES Research & Technology (TRT) in France. Since 2002, he is Professor at the University Paris Diderot, and in 2010, he became Director of the MPQ laboratories of the University Paris Diderot. Carlo Sirtori is the author of more than 240 articles in peer reviewed journals and has given some 100 invited talks at international conferences. He has received several prestigious awards such as the Fresnel Prize (European Physical Society) and various prizes in the USA, such as the "quantum devices award". In 2010 he was awarded an ERC-advanced-grant for his pioneering research on quantum devices.

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I Demir et al., J Material Sci Eng 2018, Volume 7
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Sandwich method to grow high quality AlN by MOCVD

I Demir[1,2], H Li[3], Y Robin[4], R McClintock[1], S Elagoz[2], and **M Razeghi[1]**
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[2]Department of Nanotechnology Engineering, Nanophotonics Research and Application Center, Cumhuriyet University, Sivas 58140, Turkey
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The UV capabilities of III-nitride materials are of special interest for civilian applications such as air and water sterilization, efficient white lighting, high density optical data storage and military applications such as biological agent detection and non-line-of-sight communication etc. In recent years AlN has received a great deal of attention for use as a template layer for deep UV emitter and detector applications because of its promising features such as UV transparency, good thermal stability and high thermal conductivity. Generally, the surface morphology and defect density of AlGaN and the upper quantum-well active layer of DUV devices depend significantly on the crystalline quality of the underlying AlN template; therefore, obtaining AlN with a smooth surface and low threading dislocation (TD) density is critical to improve DUV device performance. In this study we report pulsed atomic layer epitaxy growth of high crystalline quality, thick (~2μm) and crack-free AlN material on c-sapphire substrates via a sandwich method using metal organic chemical vapor deposition. This method involves the introduction of a relatively low temperature (1050 °C) 1500 nm thick AlN layer between two 250 nm thick AlN layers which are grown at higher temperature (1170 °C). The surface morphology and crystalline quality remarkably improve using this sandwich method. A 2 μm thick AlN layer was realized with 33 arcsec and 136 arcsec FWHM values for symmetric (0002) and asymmetric (10-15) reflections of ω-scan, respectively, and it has an root-mean square surface roughness of ~0.71 nm for a 5 x 5 um^2 surface area.

Biography

I Demir received his PhD degree in Solid State Physics from the Cumhuriyet University, Turkey. During his PhD studies he worked at Center for Quantum Devices-Northwestern University USA under the supervision of Prof. Dr. Manijeh Razeghi. Currently, he is a research assistant at Nanophotonics Research and Application Center at Cumhuriyet University. His research interest covers high quality III-V semiconductor thin films (InGaAs, InAlAs, InP, AlN, AlGaN, GaN etc) growth by MOCVD and detailed characterization to produce electronic and optoelectronic devices.

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Nicolas Reyren et al., J Material Sci Eng 2018, Volume 7
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Magnetic skyrmions: spin torque induced motion and electrical detection at room temperature in metallic multilayers

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[2]CEA, France
[3]Synchrotron SOLEIL, France

Magnetic skyrmions are small whirling magnetic textures with non-trivial topology, which are usually stabilized by the Dzyaloshinskii-Moriya interaction (DMI). As they are potentially the smallest magnetic textures in magnetic thin films stable at room temperature, they attracted a lot of attention due to their potential applications for memory devices [1]. In 2016, we have shown that sub-100nm skyrmions can be stabilized at room temperature using Ir|Co|Pt-based in 10 repetition multilayers in order to increase the magnetic volume compared to single layer systems, while keeping large DMI (about 2 mJ/m^2) [2]. Moreover, we also demonstrated the possibility to nucleate them using current pulses [3-5], and to detect them using anomalous Hall effect [4,5]. In the studied geometry, the topological Hall effect is negligible compared to the anomalous Hall effect, which is sufficient to detect single skyrmions in 500-nm-wide tracks, as we could verify by simultaneous magnetic force microscopy (MFM) measurements (see Fig.1). Up to now, the spin torque induced skyrmion velocity remains low, partly due to the imperfect materials (with textured crystalline grains) [3]. We indeed also realized that the magnetic textures of the skyrmions along the thickness of the multilayers were more complex than initially thought, contrasting with most of the previous models considering 2D magnetic textures. The internal structure of the skyrmions can be refined using simulations and x-ray resonant magnetic scattering (XRMS) [4,6] at the L_3 Co edge. This new insights should allow us to better engineer the multilayer stacking sequence in order to achieve skyrmion motion at lower current densities and get closer to potential applications.

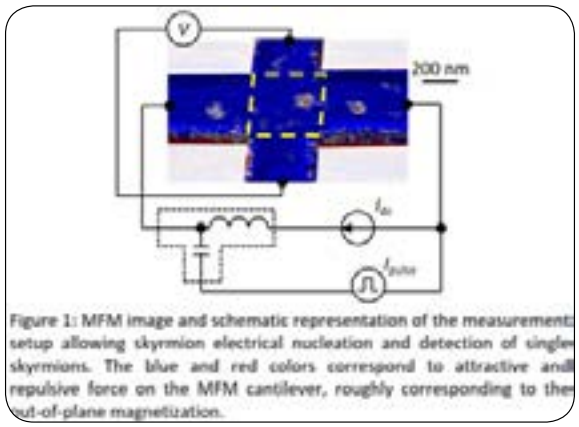


Figure 1: MFM image and schematic representation of the measurement setup allowing skyrmion electrical nucleation and detection of single skyrmions. The blue and red colors correspond to attractive and repulsive force on the MFM cantilever, roughly corresponding to the out-of-plane magnetization.

Recent Publications

1. Fert A, Reyren N, Cros V (2017) Magnetic skyrmions: advances in physics and potential applications. Nature Rev. Materials 2:17031-1-15.
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3. Legrand W, Maccariello D, Reyren N, et al. (2017) Room-Temperature Current-Induced Generation and Motion of sub-100 nm Skyrmions. Nano Letters 17:2703-2712.

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5. Maccariello D, Legrand W, Reyren N, et al. (2017) Electrical signature of individual magnetic skyrmions in multilayered systems. arXiv:1706.05809.
6. Chauleau J-Y, Legrand W, Reyren N, et al. (2017) Chirality in magnetic multilayers probed by the symmetry and the amplitude of dichroism in X-ray resonant magnetic scattering. arXiv:1709.08009

Biography

Nicolas Reyren got his PhD in 2009 at the University of Geneva (Switzerland). He joined the CNRS at the Unité Mixte de Physique CNRS/Thales (France) as a junior researcher in 2013. He is interested by spin-orbit related phenomena in the context of spintronics, such as Edelstein effect, Dzyaloshinskii-Moriya interaction and skyrmions.

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Notes:

H. Jaffrès et al., J Material Sci Eng 2018, Volume 7
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Spinorbitronics at Interfaces for THz Emission

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[4]Thales Research & Technology, France

Spin-Hall Effects at short lengthscale in bulk heavy metals like Pt or W [1] and spin-orbit related phenomena like Inverse-Edelstein Effect [2-3] at interfaces are presently at the basis of new spintronics functionalities. Combined with RF-spin-pumping Ferromagnetic Resonance (FMR) pumping, spin-orbit give rise to AC and DC spin-to-charge current conversion. Those combined techniques enable to probe the interface quality and physical properties. In the same way, in an extented description out-of FMR resonance, it was recently reported that THz emission of relatively high power may be realized in the same kind of heterostructures composed of ferromagnetic (FM) and non-FM metal films via dynamical spin-to charge conversion and time- dependent spectroscopy (TDS) [4-6]. In that mind, we will present our last results of THz emission provided by optimized growth bilayers composed of a high-spin orbit material in contact with a ferromagnetic layerCo/Pt, NiFe/Au:W). Those bilayers state-to-the art model systems in experiments combining RF-spin pumping and spin-to-charge conversion by ISHE [7-8]. Here, experiments consist in exciting magnetization and spin-currents within the FM layer via femtosecond laser excitation and measuring, in the picosecond timescale, the relaxation of the correlated spin and charge currents responsible for THz dipolar emission. The THz emission provided by these spintronics bilayers reaches the power of ZnTe semiconductor technology. We will display the first THz emission results obatined on α-Sn/InSb topological insulators. Moreover, in order to study the SHE spin-current profiles and address their properties in those [Co,Ni]N/Pt and [Co,Ni]N/Au:W multilayers, we have analyzed their Anomalous Hall effect (AHE) signals showing up a characteristic AHE spin-inversion from Pt to Au:W samples. We analyze our results in the series of samples: the exact conductivity profile across the multilayers via the 'extended' Camley-Barnas approach [9] and the spin current profile generated by spin-Hall effect. We will discuss the role of the generalized spin-mixing conductance on the spin-transport properties and spin-orbit torques.

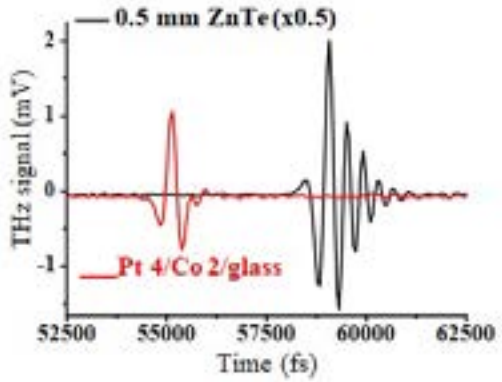


Figure 1 | Time-Domain-Spectroscopy (TDS) THz signals of Pt(4nm)/Co(2nm)/Quartz bilayer systems obtained by femtosecond (100 fs) laser excitation (400 mW). The fs laser exciation causes magnetization precession associated to a spin-current (spin displacement). This is transformed afterward to a lateral charge current responsible for dipole oscillations and THz emission. The signal is compared to a reference ZnTe characteristic THz emission (amplitude x 0.5).

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9. R. E. Camley, J. Barnas, Phys. Rev. Lett. 63, 664 (1989); J. Barnas, A. Fuss, R. E. Camley, P. Grünberg, and W. Zinn, Phys. Rev. B 42, 8110 (1990).

Biography

H. Jaffrès completed his Ph.D. at the Physics Department of the Institut National des Sciences Appliquées (INSA) - University Toulouse III, France, in 1999. Then he joined the Unité Mixte de Physique CNRS-Thales, Palaiseau, France as a postdoc (2000–2001) before joining the CNRS at the same institute. His work focuses on spintronics, spin injection, spin transport, and spin transfer in semiconductor spintronics devices with electrical and optical detection in III-V heterostructures, as well as spin-Hall effect and spin-pumping in group IV semiconductors.

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Notes:

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Zinc nitride material for the development of novel electronic sensors and flexible electronics

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Zinc nitride (Zn_3N_2) is a material with an antibixbyite structure in its crystal form and a band gap energy of 1.23 eV. It is deposited by radio frequency magnetron sputtering and molecular beam epitaxy (MBE) at low temperatures (T < 500 K) using reactive N_2 plasma and tends to form polycrystalline films. Despite its low temperature growth, it presents high mobilities (100 $cm^2/V{\cdot}s$, in sputtering samples, and 350 $cm^2/V{\cdot}s$, in MBE samples) and low resistivities (10^{-2}-10^{-3} Ω.cm). Those are attractive features for applications in flexible electronics for which common substrates do not often tolerate high temperature growth. An intrinsic property of the material is its metastability in ambient conditions. The as-grown material has a black appearance but, through the reaction with the water molecules in air, it oxidizes completely to produce a translucent whitish film of ZnO. As a result of the transformation, the material becomes electrically insulating. Through our extensive work on the material characteristics, a good correlation between the transformation span and the storage conditions was found. Thus, at a constant temperature, the lifetime of the nitride layer reduces as the relative humidity increases. The irreversible characteristic of the nitride degradation makes our devices suitable for potential applications in industry. In particular, the thickness of the Zn_3N_2 layer can be tuned to adapt the device lifetime to the degradation time of a perishable product in transit during long-distance transportation or long-time storage. These products suffer sudden changes on the ambient conditions that could spoil them or diminish their quality. The device is fabricated on polyethylene substrates and can be read out either optically or electronically. In order to further develop the technology, we investigated material passivation using a ZnO layer on top of the nitride. The results indicate that the cap layer improves the stability of the electrical characteristics, enabling the fabrication of thin film transistors, which deliver good output characteristics and field effect mobilities close to those achieved in amorphous Si technology.

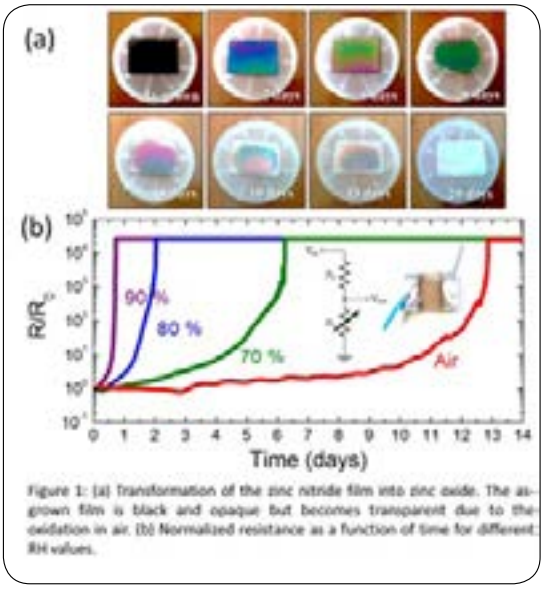


Figure 1: (a) Transformation of the zinc nitride film into zinc oxide. The as-grown film is black and opaque but becomes transparent due to the oxidation in air. (b) Normalized resistance as a function of time for different RH values.

Recent Publications

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Biography

Jose Luis Pau is an Associate Professor of the Applied Physics Department at Universidad Autónoma de Madrid, Spain. Currently, he is involved in the development of electronic devices based on novel materials, semiconductor nanostructures and bidimensional materials. The device technology developed at his group also exploits the properties of surface plasmons and polaritons in metal nanostructures and thin films to enhance device performance. Optoelectronic devices and (bio)sensors are the main targets as part of advanced technologies for future communications, food quality sensors and biomedical systems.

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Notes:

Hiroyuki Aoki, J Material Sci Eng 2018, Volume 7
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Segmental dynamics in a polymer material studied by single molecule imaging

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Polymer materials have been used widely in our daily life, and they are used often as an ultra thin film with a thickness less than 100 nm. Such the thickness is comparable to the size of a single polymer chain; therefore, the conformation and molecular motion in an ultra-thin film should be constrained. Becuase the unique properties of polymer materials originate from the large degree of freedom of a polymer chain, various properties of an ultra-thin film would be different from those in a bulk state. However, the details on the polymer dynamics in a confined space is still unclear because the limitation of experimental methods. In this work, the dynamics in polymer thin films was studied through single molecule observation. A fluorescent perylenediimide (PDI) molecule was incorporated at the center of a poly(alkyl methacrylate) chain for the selective observation of the segmental motion at the chain center. The emission from the PDI moiety was observed by fluorescence microscopy in a defocus condition, which probe the translational and orientational motion of a single fluorescent molecule in real time. The detailed analysis of the molecular motion revealed that the diffusion rate of the in-plane rotation was similar for the thin film and the bulk; on the other hand, the out-of-plane motion was restricted in a thin film. This result indicates that the spatial restriction in an ultra-thin film thinner than the unperturbed chain dimension alters the dynamics of individual molecules in a polymer system.

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3. Ube T, Aoki H, Ito S, Horinaka J, Takigawa T, Masuda T (2009) Affine deformation of single polymer chain in poly(methyl methacrylate) films under uniaxial extension observed by scanning near-field optical microscopy. Polymer 50: 3016–3021.
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Biography

Hiroyuki Aoki is a Senior Scientist in Materials and Life Science Division, J-PARC Center, Japan Atomic Energy Agency. He obtained his degrees of BE, ME, and PhD from Kyoto University in 1996, 1998, and 2001, respectively. He became an Assistant Professor of Department of Polymer Chemistry, Kyoto University in 2001 and promoted to an Associate Professor in 2006. In 2016, he moved to J-PARC as a Senior Scientist. His research interests are focused on structure and dynamics of polymer materials at the single molecule scale. He was awarded Inoue Research Award for Young Scientist from Inoue Foundation for Science (2002), Young Scientist Lectureship Award (2008), SPSJ Award for the Outstanding Paper in Polymer Journal (2008), and SPSJ Science Award from Society of Polymer Chemistry, Japan (2016).

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Nikolay Shadrinov, J Material Sci Eng 2018, Volume 7
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Atomic force microscopy of butadiene-nitrile rubber composites deformation

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Statement of the Problem: Rubber has an excellent sealing ability and can be successfully used as sealing elements of different systems. There are no fields of industry where the rubber is not used. But sometimes the use of rubber has limitations due to insufficient strength, resistance to wear and oil, etc. The application of the fillers into rubber mix is one of the usual ways to improve up of physical and mechanical properties of rubbers specifically hardness, tensile straight, modulus. The properties of filled rubbers strongly depend on the interaction between the filler particles and the polymer matrix. There is a close correlation between the structure of filler and the modulus of a rubber product compounded with that filler. But still the reinforcing mechanism of rubber with active fillers is not completely studied. The purpose of this study is to describe the mechanism of rubber reinforcement with the use of atomic force microscopy (AFM).

Methodology & Theoretical Orientation: AFM is perfect technique that allows us to see and measure surface structure with unprecedented resolution and accuracy. So, we employed AFM to study the surface properties of the supramolecular structure deformation of rubber composites under uniaxial stretching.

Findings: The influence of single-wall carbon nanotubes (SWCNT) on the properties of nitrile butadiene rubber (NBR). It was estimated that a small amount of SWCNT (less than 1 mass. part) into NBR does not lead to a change in the physical and mechanical and basic technical properties. A significant increase in strength characteristics is observed only at 2.5 and 5.0 mass. part of SWCNT. AFM allowed us to visualize of the deformation of the spatial grid structures formed by SWCNT, microcracks formation and to estimate the dependences of the Poisson's ratio and the surface roughness on the degree of uniaxial tension.

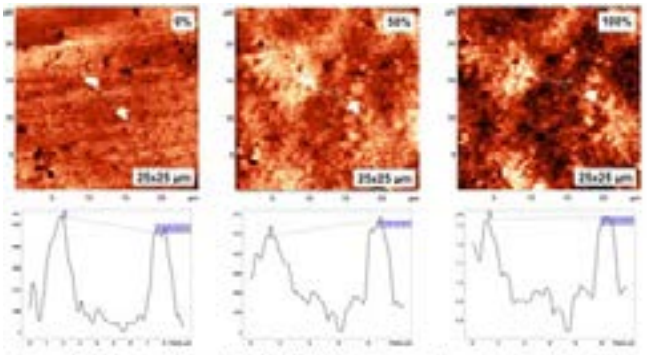


Figure 1: Deformation of NBR/SWCNT composite at uniaxial stretching

Recent Publications

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Biography

Nikolay Shadrinov completed his undergraduate studies at North-Eastern Federal University, Russia in 2007, and earned his Ph.D. from Institute of oil and Gas Problems of the Siberian Branch of the Russian Academy of Sciences (IOGP SB RAS), Russia in 2012. Nikolay is a senior researcher in the materials sciences laboratory at the IOGP SB RAS. His research interests lie in the area of rubber composites development and structural researches, ranging from theory to design to implementation.

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Notes:

A.S.A Khiar et al., J Material Sci Eng 2018, Volume 7
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Conductivity studies of methyl cellulose/chitosan/1-butyl-3-methyl imidazolium bis(trifluoro sulfonyl) imide doped with ammonium triflate based polymer electrolyte

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Statement of the Problem: Polymer electrolyte is an ionic conductor containing inorganic salt dissolved in polymer host. Among other, liquid-based electrolyte are commonly used in electrochemical devices due to its high conductivity. Nevertheless, some drawbacks of liquid electrolyte could cause safety and environmental issues. Hence, solid biopolymer electrolyte (SBE) are proposed to overcome the problems. However, one drawback is the low conductivity of SBE has hindered their applications. Thus, this work was carried out to enhance the conductivity of SBE based on methylcellulose/chitosan blend doped with 1-butyl-3-methyl imidazolium bis (trifluoro sulfonyl) imide (BMIMTFSI) ionic liquid and ammonium triflate (NH4TF) salt.

Material and Method: A mixture of MC/CS/45 wt% BMIMTFSI containing different weight percentage of NH4TF was prepared by using solution casting technique. Electrochemical Impedance Spectroscopy (EIS) was used to measure ionic conductivity over a wide range of frequency between 50Hz-1MHz and at temperatures between 298 K and 378 K. Findings: Maximum conductivity achieved is 7.67 x 10-^{4} Scm-^{1}with 25 wt% of NH_4TF at ambient temperature. Dielectric data shows that the increase in conductivity could be due to the increase in number of charge carriers while modulus study confirms the non-Debye behavior. Conductivity study at elevated temperatures suggest that samples are Arrhenius in nature.

Conclusion & Significance: MC/CS/45 wt% BMIMTFSI /25 wt% NH4TF polymer electrolyte was successfully prepared. The sample achieve a maximum conductivity of 7.67 x 10-^{4} Scm-^{1} at ambient. The increase in conductivity could be attributed to increase in mobile ions while the decrease could be attributed to ion association. Temperature helps to assist ion movement and provide alternative pathway for the cation hoping, hence boost the conductivity.

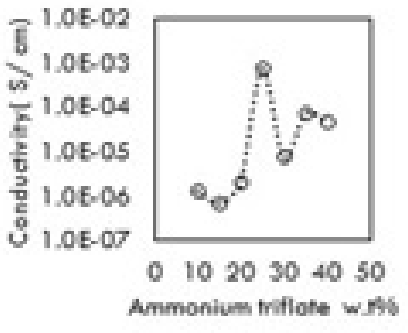


Figure 1: Conductivity plot as a function Versus of salt content

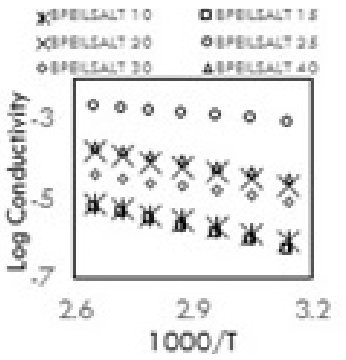


Figure 2: Log conductivity 1000/T

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Biography

A.S.A Khiar has her expertise in Solid State Ionics particularly in the development of solid biopolymer electrolytes. Her research focuses on the enhancement of conductivity of various SBE based on chitosan, methylcellulose and starch based electrolytes. A.S.A Khiar is currently a lecturer at the Faculty of Science and Technology, Universiti Sains Islam Malaysia.

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Notes:

M. Alimoradi Jazi et al., J Material Sci Eng 2018, Volume 7
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Transport properties of a two-dimensional PbSe square superstructure in an electrolyte-gated transistor

M. Alimoradi Jazi[a], V. Janssen[b], W. Evers[b,c], A. Tadjine[d], C. Delerue[d], L. Siebbeles[c], H. Van der Zant[b], A. Houtepen[c] and **D. Vanmaekelbergh[a]**
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[b]Kavli Institute of Nanoscience, Delft University of Technology, The Netherlands
[c]Optoelectronic Materials Section, Department of Chemical Engineering, Delft University of Technology, The Netherlands
[d]IEMN-Department of ISEN,Lille , France

Colloidal semiconductor nanocrystals have gained interest because their optical and electronic properties can be tuned by varying shape, size and composition. Recently, 2D square and honeycomb superstructure of lead- and cadmium-chalcogenide quantum dots (QDs) have been prepared. These superstructures are formed by assembling PbSe nanocrystals in a monolayer at the toluene suspension air/interface after which the nanocrystals attach via their four vertical {100} facets [1],[2]. Theoretical studies show that these 2-D systems have profoundly distinct band structures compared to other continious nanosheets with the appearance of Dirac cones in the case of the honeycomb [3],[4]. Strong electronic coupling via the atomic connections of the QDs in the superstructure may result in a higer mobility compared to the self-assembled lead chalcogenide QDs that are less strongly coupled due to the (in)organic ligands [5]. In our research, we use electrolyte-gated transistors (Figure 1a) to study the optoelectronic properties and transport characteristics of 2-D PbSe superstructures [6]. The potential of the gate electrode determines the Fermi level with respect to the conduction band (CB) or valance band (VB) of the superstructure. First, to monitor the stability of the superlattice under electron injection we measure the differential capacitance as a function of gate voltage. From the total injected charge and an estimation of the number of nanocrystal sites in the gated part of the PbSe superlattice we calculate charge density of the superstructure. Second, the conductivity of the network is measured as a function of the Fermi level position. Finally, the mobility of the system is calculated from conductivity and charge density. As an alternative methode to quantify electron injection into the PbSe superlattice, the optical absorbsion measurent is done while sweeping the potential. Furthermore, actual position of the Fermi level can also be obtained by measuring the inter-band light absorption quenching which monitors the precise occupation of the bands (Figure1b). In our recent work, we report the first study of electron transport in a 2-D system with a square geometry in which band occupation is assured by the high electron denity of 8 electron per nanocrystal site.The electron mobility between 5 and 18 cm^2/Vs is observed for these supersructures [7].

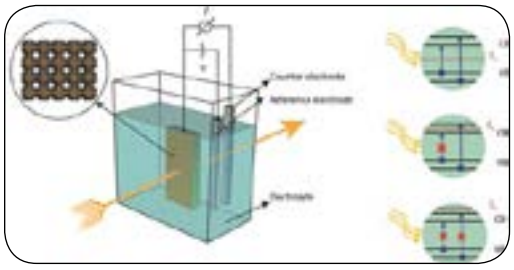


Figure. 1 a) electrolyte gated transistor, b) Interband light absorption quenching

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5. W.H. Evers et al., Nature Communications 6, 8195 (2015).
6. D. Vanmaekelbergh et al., Electrochemica Acta, 53, 1140-1149 (2007).
7. M.Alimoradi Jazi et al., Nano Lett., 17, 5238-5243 (2017).

Biography

Maryam Alimoradi Jazi is a PHD candidate at the University of Utrecht, Netherlands.

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Sessions:

Day 1 June 11, 2018

Biomaterials and Medical Devices | Ceramics and Composite Materials

Session Chair
Lay Poh Tan
Nanyang Technological University, Singapore

Session Co-Chair
Guy Antou
University of Limoges, France

Session Introduction

Title: **Modulation of Cellular Differentiation and Behavior via Engineering Cell Microenvironment**
Lay Poh Tan, Nanyang Technological University, Singapore

Title: **Instrumentation and numerical modeling of the Spark Plasma Sintering process – Application to scale-up**
G. Antou, University of Limoges, France

YRF: **Elaboration of Ti based biocompatible alloys using Nb, Fe and Zr as alloying elements**
Cristian Pantilimon, University Politehnica of Bucharest, Romania

YRF: **Synthetization and characterization of natural biocompatible composite having sustained drug release mechanism for topical and subcutaneous applications**
Bakhtawar Ghafoor, National University of Sciences and Technology, Pakistan

YRF: **Designing and fabrication of anisotropic stent for the treatment of coronary heart disease**
Hafsa Inam, National University of Sciences and Technology, Pakistan

YRF: **Design and fabrication of a hydrogel based ph sensor array for physiological applications**
Mariam Mir, National University of Sciences and Technology, Pakistan

Lay Poh TAN, J Material Sci Eng 2018, Volume 7
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19th World Congress on

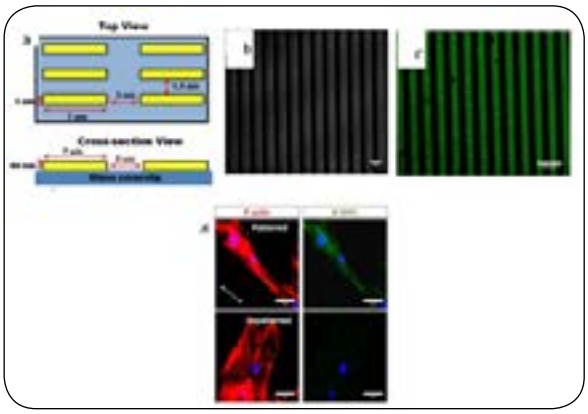
Materials Science and Engineering

June 11-13, 2018 | Barcelona, Spain

Modulation of cellular differentiation and behavior via engineering cell microenvironment

Lay Poh TAN
Nanyang Technological University, Singapore

Material surface is an important and versatile avenue for manipulation of cell-material interaction which eventually leads to modulation of cellular behavior. In our laboratory, we work on surface patterning to modulate cellular morphology with the hypothesis that cellular morphology has an intimate relationship with the cellular behavior. We also study the physical cues including physical stiffness, coupled with surface patterning in modulating stem cell differentiation. In particular, we found that micropatterning micro islets on polymeric substrate could directly modulate stem cell fate. Here we will show the stem cell differentiation into skeletal muscle lineage through micropatterning. We have designed patterns of 1 by 7 micron that are attached with ITG-β1 antibodies. hMSCs were then cultured on this biofunctionalized patterned substrate. After 2 weeks of culture, myotubes were observed and the relevant markers were positively exhibited. This micropatterning technique could also be adopted as a generic method to steer cellular behavior such as cell migration or polarization in wound healing applications.



(a) Schematic illustrating top- and cross-section view of micropatterned substrate.**(b)** Phase contrast image of fabricated gold micropatterned substrate (Scale bar: 10 μm). **(c)** Confocal image of PEG passivated gold micropatterned substrate displaying precise immobilization of ITG-β1 antibodies to the gold micropattern lanes (Scale bar: 20 μm). **(d)** Immunofluorescent staining of F-actin (red) and β-MHC (green) from both cell groups validated the myotubes formation on patterned substrate (Scale bar:100 μm).

Recent Publications

1. Li, Huaqiong; Wen, Feng; Chen, Huizhi; Tan LP (2016), Micropatterning Extracellular Matrix Proteins on Electrospun Fibrous Substrate Promote Human Mesenchymal Stem Cell Differentiation Toward Neurogenic Lineage; ACS Applied Materials & Interfaces Volume: 8 Issue: 1 Pages: 563-573
2. Tay, Chor Yong; Wu, Yun-Long; Cai, Pingqiang; Tan LP et al. (2015), Bio-inspired micropatterned hydrogel to direct and deconstruct hierarchical processing of geometry-force signals by human mesenchymal stem cells during smooth muscle cell differentiation, NPG Asia Materials Volume: 7

3. Tijore, Ajay; Cai, Pingqiang; Nai, Mui Hoon; Tan LP et al (2015); Role of Cytoskeletal Tension in the Induction of Cardiomyogenic Differentiation in Micropatterned Human Mesenchymal Stem Cell, Advanced Healthcare Materials Volume: 4 Issue: 9 Pages: 1399-1407.
4. Tijore, Ajay; Wen, Feng; Lam, Chee Ren Ivan; LP Tan (2014) Modulating Human Mesenchymal Stem Cell Plasticity Using Micropatterning Technique, PLOS ONE Volume: 9 Issue: 11 Article Number: e113043
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Biography

Lay Poh Tan is an Assoc Prof in the School of Materials Science and Engineering, NTU, Singapore. Her training is on Polymer Engineering and has been working on biodegradable polymers and biopolymers for the past decade. She has published extensively in the top journals of biomaterials and tissue engineering. Her research interest focuses on developing engineering platforms to investigate cell-material interactions that eventually guide the development of 3D scaffolds and cell culture platforms for soft tissue engineering. For 3D systems, we have developed highly porous fibrous scaffold that mimics ECM physical properties. Hydrogel is also a major focus of our group where we develop ECM bio-chemistry mimicking systems which could be applied individually or combined with the fibrous platform to form hybrid ECM mimicking systems.

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G. Antou et al., J Material Sci Eng 2018, Volume 7
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Instrumentation and numerical modeling of the spark plasma sintering process – application to scale-up

G. Antou, J. Diatta, N. Pradeilles and **A. Maître**
Univ. Limoges, France

The Spark Plasma Sintering (SPS) process can lead to significant temperature and stress gradients within the graphite tools and the powder bed during the densification treatment. The establishment of the temperature and stress fields depends on the geometry of the used tools, the applied uniaxial stress, the considered temperature range and the thermos-physical properties of the sample. The identification of these gradients and the determination of their amplitude are necessary to precisely know the experimental conditions applied to the powder and to evaluate the possible thermomechanical gradients that may appear within the sample, especially in the case of large parts. The thermomechanical conditions seen by the powder bed directly impact the densification mechanisms and, finally, the microstructure and working properties of the sintered bodies. In this context, the optimization and prediction of the thermo-physical properties of the SPS process depend on reliable numerical models that can simulate the consolidation process. An electro-thermo-mechanical numerical model of the SPS process has thus been developed [1]. Concerning the electrothermal part, the input electrical data of the model were measured experimentally thanks to the development of a specific instrumentation. The main operating characteristics of the pulse generator have been highlighted as well as the effect of pulsed current on Joule heating kinetics at the start of sintering [2]. From a thermomechanical point of view, based on a robust experimental approach to identify powder densification mechanisms [3-4], the constitutive law has been integrated into the numerical model [1]. This approach coupling experimentation and simulation has been applied to the study of scaling-up problems in SPS, considering for example alumina pellets with a diameter greater than 50 mm (Fig. 1). The results of the numerical model have been correlated with microstructural features of the sintered compounds, especially in terms of spatial distribution of relative density.

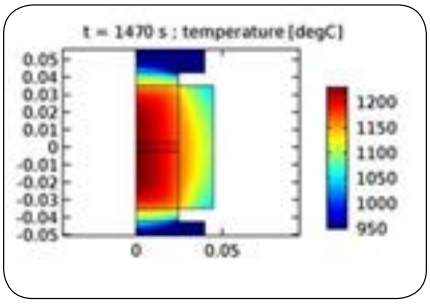


Fig. 1. Calculated temperature distribution throughout the complete die/punches/powder set-up at the end of the isothermal stage (t=1470s).

Recent Publications

1. Diatta J, Antou G, Pradeilles N, Maître A (2017) Numerical modeling of spark plasma sintering—Discussion on densification mechanism identification and generated porosity gradients. J Eur Ceram Soc 37:4849-4860.
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5. Kozak K, Dosi A, Bucko M, Chlubny L, Lis J, Antou G, Chotard T (2017) Investigation of the mechanical behavior of MAX phases by acoustic emission technique. Mater Sci Eng A 707:73-80.

Biography

G Antou, assistant professor since 2005 at IRCER institute (Univ. of Limoges), mainly deal with the experimental characterization, the modeling and the numerical simulation of the thermomechanical behavior (in particular viscoplastic) of ceramic materials during their elaboration by pressure-assisted sintering or in service (creep). His scientific production (h index: 10) is now composed of 29 publications in international journals, 4 invited conferences, 55 oral communications, 3 grants, etc. He was co-responsible of 5 national or international projects (ANR, French MOD, CEA, CNRS contract).

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Cristian Pantilimon et al., J Material Sci Eng 2018, Volume 7
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Elaboration of Ti based biocompatible alloys using Nb, Fe and Zr as alloying elements

Cristian Pantilimon, Andrei Berbecaru, George Coman, Catalin Gradinaru, Claudia Dragan, Sorin Ciuca, Sohaciu Mirela and **Cristian Predescu**
University Politehnica of Bucharest, Romania

Increasing biocompatibility of implant materials is an important factor in developing better and long-lasting implants that function in a very close manner to actual tissue and bone. Various alloys have been used due to their biocompatibility, such as: stainless steels, titanium based alloys and nickel or cobalt alloys. Depending on the alloying elements used it is possible to modify the material properties to fit into various niches of use such as pacemaker devices, stents, biosensors, dental or bone implants and others. Some alloying elements show higher biocompatibility than others and the commonly used alloys include elements that can be detrimental to human health such as Nickel, Vanadium and Cobalt. Using materials such as Nb, Fe and Zr in order to replace the commonly used metals reduces the risks of accumulation of various substances that can damage tissue and lead to health complications. The proposed alloys are elaborated in a Five Celles levitation melting furnace under argon atmosphere in order to create a more homogeneous material with reduced defects and inclusions. The cast alloys are then analyzed through modern methods such as SEM, XRD, EDS and their mechanical properties such as hardness and strength and these properties are compared to that of bone in order to determine mechanical reliability.

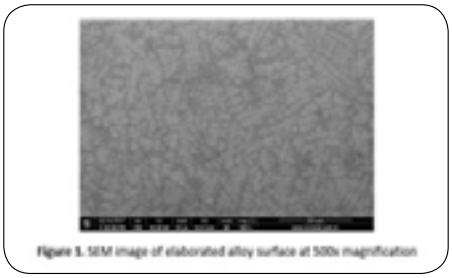


Figure 1. SEM image of elaborated alloy surface at 500x magnification

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2. Matei, E., A. Predescu, C. Drăgan, C. Pantilimon and C. Predescu (2017). "Characterization of Magnetic Nanoiron Oxides for the Removal of Metal Ions from Aqueous Solution." Analytical Letters 50(17): 2822-2838.
3. Matei, E., M. Rapa, A. A. Andras, A. M. Predescu, C. Pantilimon, A. Pica and C. Predescu (2017). "Recycled Polypropylene Improved with Thermoplastic Elastomers." International Journal of Polymer Science 2017: 10.
4. Pantilimon, M. C., T.-S. Kang and S.-J. Lee (2017). "Synthesis of Nano-Sized Tungsten Oxide (WO3) Powder by a Polymer Solution Route." Science of Advanced Materials 9(2): 280-284.
5. Pantilimon, M. C., T. S. Kang and S.-J. Lee (2016). "Synthesis of nano-sized indium oxide (In2O3) powder by a polymer solution route." Ceramics International 42(3): 3762-3768.

Biography

Cristian Pantilimon is an environmental and materials science engineer with an aim at research that can be introduced into the industrial sector. He has followed training and education during his undergraduate and graduate studies in foreign countries such as Italy and South Korea. The focus of his research is to develop better materials that can be used by the populace and that can have a very low impact on the wellbeing of both humanity and the environment.

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Bakhtawar Ghafoor et al., J Material Sci Eng 2018, Volume 7
DOI: 10.4172/2169-0022-C8-113

Synthetization and characterization of natural biocompatible composite having sustained drug release mechanism for topical and subcutaneous applications

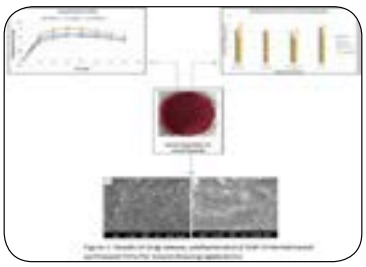
Bakhtawar Ghafoor[a], Aisha Tahir[a], Murtaza Najabat Ali[a], Mariam Mir[a], Hassan Ali[a] and **Hafsa Inam[a]**
[a]National University of Sciences and Technology NUST, Pakistan

Statement of the Problem: The integrity of injured tissue and prevention from microbes at the site of wound is important factor for healing the target site. Currently, the main aims of wound dressings are to come up with natural material based environment which will not only prevent environmental intervention but also help in reducing microbial attack along with accelerating wound healing. The aim of this study was the synthetization and characterization of natural composite films that possess natural antimicrobial agent and can release it in a sustained manner. In this study CMC (CarboxyMethyl Cellulose), PVA (Polyvinyl Alcohol) and Basil seed gum were used for the preparation of a nature composite and Hermal seed extract was added as an anti-microbial agent.

Methodology & Theoretical Orientation: For the fabrication of films, solvent casting method is used. The different ratios of PVA, CMC and basil gum is used to synthesis the films with constant amount of drug. Afterwards, films were subjected to drug release testing along with antimicrobial and SEM analysis.

Findings: The SEM analysis of successfully fabricated films showed accumulation of drug over the surface of the films which resulted in initial burst release of Hermal and later slow release. The films showed good results against various bacterial strains.

Conclusion & Significance: The intrinsic antibacterial property of Hermal extract is combined with swelling property of PVA, basil seed gum and CMC. The composite films were screened drug release and antibacterial activity against P. aeruginosa, E. coli, S. aureus and B. subtilis. According to the results obtained from antibacterial and drug release studies, the composition with the ratio of CMC/Gum 3:1 with Hermal extract is considered to be better among all other ratios used. Thus, this composition can be considered as a potent candidate for coatings and wound healing applications.



Recent Publications

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Biography

Bakhtawar Ghafoor has her expertise in biomaterials and medical implants coatings. She has done her MS in Biomedical Sciences and currently she is doing PhD in Biomedical Sciences from National University of Sciences and Technology, Pakistan. She has worked on coatings for medical implants, electrospun mats for wound healing and on the synthesis of films for different biomedical applications.

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Notes:

Hafsa Inama et al., J Material Sci Eng 2018, Volume 7
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Designing and fabrication of anisotropic stent for the treatment of coronary heart disease

Hafsa Inam[a], Murtaza Najabat Ali[a], Mariam Mir[a], Ammad Ahmed[a], Manal Fatima[a] and **Bakhtawar Ghafoor[a]**
[a]National University of Sciences and Technology NUST, Pakistan

Statement of the Problem: Coronary Heart Diseases lead towards the stenosis where the plaques are accumulated under coronary artery endothelium layer. This deposition blocks the coronary artery and does not allow smooth flow of blood to the walls of the heart. The design of stent has great influence on late lumen loss along with neointimal proliferation which affects the rate of restenosis. It is revealed that design of stent also affect the platelet activation and thrombogenesis. The purpose of this study is to design and fabricate a new coronary stent design with Auxetic geometry which will complement the body's vascular system anisotropic properties. Based on previous studies, we can hypothesize that the new Auxetic design of stent will allow good anchorage with arterial walls. When expanded through an inflated balloon, the special feature of this design allows maintaining vascular patency by expanding in two directions simultaneously.

Findings: During longitudinal expansion there is no foreshortening in the Auxetic stent. This is an advantage over existing coronary stents where foreshortening cause the problem of stent migration. The 3.3 % elastic recoil shows that the luminal patency will effectively be maintained by the coronary artery. Having no foreshortening and minimal recoiling in the present stent will might avert the stent from migration problem while being expanded in the coronary artery which will reduce the chances of thrombogenesis and restenosis.

Conclusion & Significance: Auxetic design the stent has anisotropic properties that make it a great match for coronary vessel anisotropic structural properties. When expanded radially through balloon catheter the auxetic stent size increases in both radial and longitudinal directions exhibiting no foreshortening. It is believed that auxetic stent will prevent stent migration and will effectively maintain the luminal patency of the coronary artery due to the auxetic property of the stent design.

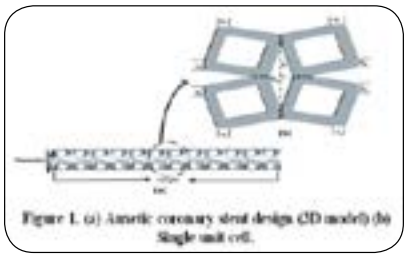


Figure 1. (a) Auxetic coronary stent design (3D model) (b) Single unit cell.

Recent Publications

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Biography

Hafsa Inam is a PhD student of Biomedical Engineering and Sciences at School of Mechanical and Manufacturing Engineering, NUST, H-12 Islamabad, Pakistan. She completed her Masters in Biomedical Sciences in 2017 from School of Mechanical and Manufacturing Engineering SMME, NUST, H-12 Islamabad Pakistan. As a part of her MS research program, she completed her research project entitled 'Magnetically Targeted Drug Delivery Approach using Imaging Technology and PID Feedback Loop System'. After completing her MS, she is working as a research associate on a project funded by Ignite. Pakistan.

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Notes:

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19th World Congress on

Materials Science and Engineering

June 11-13, 2018 | Barcelona, Spain

Design and fabrication of a hydrogel based pH sensor array for physiological applications

Mariam Mir[a], Murtaza Najabat Ali[a], Ayesha Gulzar[a], Afifa Barakullah[a], Munam Arshad[a], Bakhtawar Ghafoor[a] and **Hafsah Inam[a]**
[a]National University of Sciences and Technology NUST, Pakistan

Statement of the Problem: Changes in pH in the physiological environment are an important parameter in assessment of the normal functioning of the body. pH sensors such as pH glass electrodes, fiber optic pH sensors and sensors made from metal oxide have many limitations such as conformance to body contours and single point measurements. To address these limitations, there is a need for a planar, biocompatible and point of care pH sensor array that can conform with body contours and possibly provide a map of pH levels. This study focuses on the design and fabrication of a hydrogel based pH sensor array for physiological applications.

Methodology & Theoretical Orientation: The development of this conductometric pH sensor array has been carried out on the basis of measurement of the conductance of a pH-responsive composite (Chitosan/Gelatin) hydrogel. Since the sensitivity of a hydrogel based conductometric measurements can be dependent upon size and separation of the sensors, both these parameters have been investigated in detail. The design of the pH sensor array is dependent on the electrode density, which is a function of both the optimized size and separation of electrodes. The final electrode density was thus calculated and used for an optimized design of the pH sensor array. For fabrication, copper conductive layer tracts with pH sensitive gel casting, on a polyimide substrate have been used.

Conclusion & Significance: Conductometric tests carried out on the pH sensor array and results show good sensitivity and resolution in the physiological pH range (pH 4 - 10). The pH sensor array may be used for physiological mapping for both in vitro and in vivo measurements.



Recent Publications

1. Chen Y, Mun SC, Kim J. A wide range conductometric pH sensor made with titanium dioxide/multiwall carbon nanotube/cellulose hybrid nanocomposite. Sensors Journal, IEEE. 2013; 13(11):4157- 62.
2. Dhandayuthapani B, Krishnan UM, Sethuraman S. Fabrication and characterization of chitosan-gelatin blend nanofibers for skin tissue engineering. Journal of Biomedical Materials Research Part B: Applied Biomaterials. 2010; 94(1):264-72.
3. Vaughan SS, Patel MM. pH-sensitive hydrogels based on semi- interpenetrating network (semi-IPN) of chitosan and polyvinyl pyrrolidone for clarithromycin release. Drug development and industrial pharmacy. 2011; 37(10):1160-9.
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Biography

Mariam Mir has completed her MS in Biomedical Sciences from National University of Sciences and Technology and University of Engineering and Technology (NUST) and currently she is doing her PhD in Biomedical Sciences from NUST. She has a vast experience in research and her research interest includes biomedical implants, biomaterials and development of drug delivery mechanisms.

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Notes:







19th World Congress on

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June 11-13, 2018 | Barcelona, Spain

Keynote Forum

Day 2

Xiang Zhang, J Material Sci Eng 2018, Volume 7
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19th World Congress on

Materials Science and Engineering

June 11-13, 2018 | Barcelona, Spain



Xiang Zhang

University of Cambridge, UK

New concept of bioresorbable polymer-based ceramic hybrids for cardiovascular stent applications

This presentation will introduce new theories and industry practice for design and development of polymer-based ceramic hybrids. The evolution from pure polymer-based medical devices to polymer-based ceramic hybrids is to meet unmet market needs for better clinical performance over existing systems. There are many factors that can affect medical implant performance and, historically, most of them have been well studied, such as bioactivities and biocompatibility. In this presentation, new concept will be mainly addressing issue surround biomechanics, biofracture mechanucs and biofunctionality for design and development of new hybrid biomaterials for implant applications. It will report the principles on formulations for two type of the new systems. One family is of biodegradable and bioresorbable hybrids and 2nd is of non-biodegradable hybrids. It will be followed by design and development of medical devices in view of industry practice with clinical performance considerations of medical devices. The main topics covered in the presentation include: (a) New concepts and synthetic pathway of polymer-based ceramic hybrids; (b) Nano/Micro mechanics and nano/micro fracture mechanics; (c) Industry practice – two case studies will be used to demonstrate on how to design and develop polymer-based ceramic hybrid biomaterials and relevant processing technology for the applications of medical implants. Cardiovascular stent, as an example is traditionally made of metal such as Bare Metal Stents (BMS) or with drug coatings, i.e. Drug Eluting Stents (DES). There are, however, clinical complications associated with these technologies, such as, early stage restenosis, very late thrombosis and risk associated with revision surgery. In light of these challenges research focus has turned to the development of bioresorbable vascular scaffold (BVS) technologies. We have developed new bioresorbable polymer-based ceramic stent that has been reinforced resorbable therapeutic cardiovascular stent to address the known limitations of cardiovascular technologies. We have developed a bioresorbable stent with intrinsic toughness for handling and deployment via balloon angioplasty, radial strength, controlled drug-release technology to suppress restenosis and surface functionalisation to promote endothelialisation to reduce risk of thrombosis. We present the novel synthetic polymer-ceramic composites developed as candidate stent-core materials, both their preparation and the characterisation of their mechanical behaviour, in vitro degradation will be presented.

Acknowledgement

Thanks to Prof. Ruth Cameron of University of Cambridge for assistance for materials characterization and Prof. Wenxin Wang of Vornia Ltd for synthesis some of the polymers used in the research. Thanks also to Dr Chris Lovell and Dr Mark Cresswell of Lucideon who have done most of the work in this presentation

Recent Publications

1. Science and Principles of Biodegradable and Bioresorbable Medical Polymers - Materials and Properties, 2016 by Elsevier
2. Inorganic Controlled Release Technology, 1st Edition - Materials and Concepts for Advanced Drug Formulation, 2015 pub. by Elsevier
3. Inorganic Biomaterials: Structure, Properties and Applications, 2014 pub. By Smithers Rapra
4. Polymer, 41 (2000) 3797-3807, X C Zhang, M F Butler and R E Cameron, "The Ductile – Brittle Transition of Irradiated Isotactic Polypropylene Studies Using Small Angle X-ray Scattering and Tensile Deformation"
5. Advanced Materials, 12 December 2015, Yongjiu Lei, Ruize Sun, Xiangcheng Zhang, Xinjian Feng, Lei Jiang, "Oxygen-Rich Enzyme Biosensor Based on Superhydrophobic Electrode"

6. Polymer, 41 (2000) 3797-3807, X C Zhang, M F Butler and R E Cameron. "The Ductile – Brittle Transition of Irradiated Isotactic Polypropylene Studies Using Small Angle X-ray Scattering and Tensile Deformation"

Biography

Xiang Zhang, Royal Society Industry Fellow of University of Cambridge, has over 34 years combined academia (17 years) and industrial (17 years) experience in advanced materials science and technology, an expert in polymer and polymeric hybrid materials science and technology. Prof. Zhang is also Head of the Lucideon Cambridge School of Advanced Materials and Head of Medical Materials and Devices. He is the author of three books "Inorganic Biomaterials", "Inorganic Controlled Release Technology" and "Science and Principles of Biodegradable and Bioresorbable Medical Polymers - Materials and Properties". As a materials scientist, he is passionate on "Science for Industry "and believes fundamental but applied sciences are the keys to industry R&D and problem solving. Prof. Zhang undertook his PhD and postdoctoral research at Cranfield University where he studied materials physics and nano/micro-mechanics and nano/micro-fracture mechanics of polymeric hybrid (organic and inorganic) materials. After spending a further four years on research for industrial applications, he was awarded an industrial fellowship at the University of Cambridge in 1995, where he carried out research on fundamental nanomechanisms of polymeric ductile to brittle transitions, which is first time in the world ever employing synchrotron SAXS, WAXS (wide angle and small angel X-ray scattering) to study in situ deformation and fracture down to nanometre scales, the results of which lead to completion of ductile to brittle transition theories in view of nano-mechanics and nano-fracture mechanics. Prof. Zhang's industry experience was gained in leading international healthcare companies, where, as Principal Scientist/Technologist, his work covered almost all aspects of medical materials and devices from R&D and manufacturing support to failure analysis and QC. Prior to joining Lucideon, Prof. Zhang worked as Director of a technology company, in the field of nano-conductive materials and diagnostic medical devices.

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Nikolay Gerasimchuk, J Material Sci Eng 2018, Volume 7
DOI: 10.4172/2169-0022-C8-112

19th World Congress on

Materials Science and Engineering

June 11-13, 2018 | Barcelona, Spain



Nikolay Gerasimchuk

Missouri State University, USA

Multifunctional materials stemming out of coordination compounds

The definition is: "*materials science* is an interdisciplinary field concerned with the understanding and application of the properties of matter." This area is dedicated to study of connections between the underlying structure of a material, its properties, its processing methods, and its performance in intended applications. Classic understanding of materials traditionally limits them to metals and their alloys [uses in: construction, catalysis, electric/conductance, magnetism], a variety of oxides [refractory materials, catalysts, ceramics/cements, quartz, conductance/semiconductance], thermally stable salts [silicates (including glass), phosphates, binary halides and halcogenides [optical materials, semiconductors], etc. Typically those classic materials are produced in large quantities from thousands- to multi-tons quantities. However, during the last two decades a new type of chemical compounds vigorously claimed a well-deserved place in the vast world of materials. These are coordination compounds. There are two large sub-classes of the Werner-type complexes and organometallic compounds (Scheme 1) with principally very different chemical bonding in them. The first one adopts predominantly ionic/donor-acceptor type, while the latter represent covalently bonded species containing direct metal-carbon bond. Numerous *coordination compounds* of both types were employed as precursors for materials. Most common transformation of complexes includes their thermal decomposition leading to a product/material with desired properties for a specific application. However, only Werner-type complexes can be used as materials because of their stability at ambient conditions. Most of the organometallic species still are intrinsically unstable towards moisture and oxygen. Applications of numerous complexes as materials (and specifically those as multifunctional materials) are reviewed in current presentation. These applications include usage of numerous Werner- type complexes in a variety of MOFs (gas sorption, purification of compounds, delivery), non-linear optical materials (second harmonic generation and optical limiters), catalysts, sensors and indicators, functional supramolecular materials, light harvesting/converting materials, molecular electronics.



Recent Publications

Dr. Gerasimchuk authored and co-authored 112 publications and 7 patents on useful properties of a variety of the obtained compounds. Some representative works are shown below:

1. Cheadle C, Ratcliff J, Berezin M, Pal'shin V, Nemykin V.N., Gerasimchuk N. (2017) Shortwave infrared luminescent Pt-nanowires: a mechanistic study of emission in solution and in the solid state. Dalton Transactions: 46(39), 13562-13581.
2. He S, Toukrakis G, Berezin O, Gerasimchuk N, Zhang H, Zhou H, Izraely A, Akers W.J, Berezin M.Y. (2016) Temperature-dependent shape-responsive fluorescent nanospheres for image guided drug delivery." J. Mater. Chem. C, 4, 3028-3035.
3. Gerasimchuk N. (2014) Synthesis, Properties, and Applications of Light-Insensitive Silver(I) Cyanoximates. Eur. J. Inorg. Chem. 4518– 4531.
4. Gerasimchuk N, Berezin M. Near Infrared Emitters. US Patent Application No. 15/001,023; January 19, 2016.

Biography

Nikolay Gerasimchuk is a Full Professor of Inorganic Chemistry at Missouri State University (USA). His research interests and expertise lay in the following areas: 1) the 1D coordination polymers as cytotoxic NIR emitters for theranostic applications; 2) mixed valence compounds; 3) novel antimicrobials based on silver and antimony oximates; 4) physical methods of investigation of inorganic and coordination compounds, including small molecules crystallography of inorganic and coordination compounds; 5) equipment design for synthetic inorganic/materials chemistry.

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Notes:

Geoffrey Mitchell, J Material Sci Eng 2018, Volume 7
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19th World Congress on

Materials Science and Engineering

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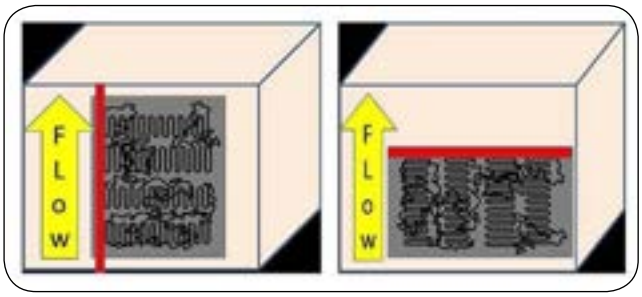
Geoffrey Mitchell

CDRSP-IPLeiria, Portugal

Multiscale 3D printing with polymers

3D printing is part of the family of Direct Digital Manufacturing processes in which a part is prepared with a particular external form defined in a digital manner without the use of complex tooling or moulds. Such an approach is revolutionising manufacturing. It creates a new paradigm for design and in aerospace, the concept is already in use to prepare parts such as turbine blades with shapes which hitherto were impossible. The fact that each part can have an individual design identifies that this technology has much to offer to medical devices. Now of course a part is not just defined by its external form but also by the microscale structure which develops in the part during the manufacturing process. In this presentation we review the materials and molecular mechanisms available to deliver controlled and defined morphology during 3D printing technology and how this influences properties. We present a novel methodology for delivering orthogonal control of the semi-crystalline morphology of poly(ε-caprolactone) in biomedical devices. We take examples from recent research at CDRSP and consider its impact on scaffolds for tissue engineering.

This work is supported by the Fundação para a Ciência e a Tecnologia (FCT) through the Project references: UID/Multi/04044/2013; PAMI - ROTEIRO/0328/2013 (Nº 022158), MATIS (CENTRO-01-0145-FEDER-000014 – 3362 and UC4EP PTDC/CTM-POL/7133/2014)



Recent Publications

1. G.R.Mitchell and Ana Tojeira editors "Controlling Controlling the Morphology of Polymers: Multiple Scales of Structure and Processing." Springer 2016 ISBN 978-3-319-39320-9
2. G.R.Mitchell, Donatella Duraccio, Imran Khan, Aurora Nogales, R.H.Olley 'Templated Crystallisation in Polymer Nanocomposites' in "Controlling the Morphology of Polymers: Multiple Scales of Structure and Processing." Springer 2016 ed G.R.Mitchell and A.Tojeira ISBN 978-3-319-39320-9
3. G.R.Mitchell, F.J.Davis, R.H.Olley and S.Wangsoub 'Directing the Crystallisation of Polymers using nanoparticles of sugar alcohol derivatives' in "Controlling Controlling the Morphology of Polymers: Multiple Scales of Structure and Processing." Springer 2016 eds G.R.Mitchell and A.Tojeira ISBN 978-3-319-39320-9

4. Geoffrey R Mitchell and Robert H Olley Orthogonal templating control of the crystallisation of poly(ε-caprolactone) Polymers, 2018, 10(3), 300; doi:10.3390/polym10030300

5. Ana Tojeira and G.R.Mitchell "Controlling Morphology in 3-D Printing" in "Controlling Controlling the Morphology of Polymers: Multiple Scales of Structure and Processing." Springer 2016 ISBN 978-3-319-39320-9

Biography

Geoffrey Mitchell is Professor and Vice-Director of the Centre for Rapid and Sustainable Product Develop at the Institute Polytechnic of Leiria. Geoffrey Mitchell is passionate about direct digital manufacturing (DDM) which enables products to be manufactured directly from a digital design without the need for specialist tooling or moulds and the development of novel materials to support the emerging technologies. He is fascinated by the opportunities that arise from merging electrospinning in to the family of DDM technologies. He brings a wealth of experience working with polymer based materials both natural and synthetic. He is particularly interested in the scales of structure present in all materials and especially biopolymers. He has developed and made extensive use of x-ray and neutron scattering methods coupled to computational molecular modelling and electron microscopy techniques.

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Notes:







19th World Congress on

Materials Science and Engineering

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Scientific Tracks & Abstracts

Day 2

Sessions:

Materials Science and Engineering | Metals, Mining, Metallurgy and Materials

Session Chair
Arnaud Caron
KoreaTech, Republic of Korea

Session Co-Chair
Nobufumi Ueshima
Tohoku University, Japan

Session Introduction

Title: **Thermodynamic effects on metals tribology at the nanometer scale**
Arnaud Caron, KoreaTech, Republic of Korea

Title: **Relationship between grain distribution and strain localization in Cu-Al alloys**
Nobufumi Ueshima, Tohoku University, Japan

Title: **Numerical modeling of transport phenomena during the solidification of materials**
Floricica Barvinschi, Politehnica University Timisoara, Romania

Title: **Influence of temperature on mechanical properties of a Fe-22Mn-0,6C TWIP steel**
Alberto Monsalve, Universidad de Santiago de Chile, Chile

Title: **Atomic defect-engineering at complex oxide surfaces and interfaces for electrolysis, sensing, and electronics applications**
Felix Gunkel, RWTH Aachen University, Germany

Title: **Deformation microstructure of surface layers of Ag, Cu, Ni and Al under friction in lubricant conditions**
Lev Rapoport, Holon Institute of Technology, Israel

Title: **Flaxseed mucilage as an eco-friendly inhibitor for ASTM A335 P11 steel in HCl**
Luis Manuel Angelats Silva, Universidad Antenor Orrego, Peru

Title: **InGaAs/InAlAs SLs via MOCVD for QCL Applications**
Sezai Elagoz, Cumhuriyet University, Turkey

Arnaud Caron, J Material Sci Eng 2018, Volume 7
DOI: 10.4172/2169-0022-C8-113

19th World Congress on

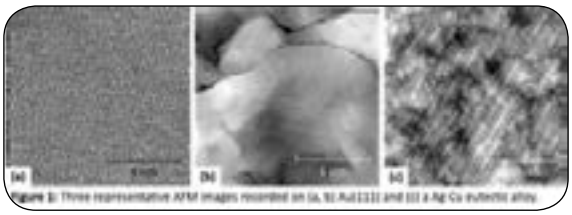
Materials Science and Engineering

June 11-13, 2018 | Barcelona, Spain

Thermodynamic effects on metals tribology at the nanometer scale

Arnaud Caron
KoreaTech, Republic of Korea

Understanding and controlling the surface mechanical behavior of materials is crucial for the development of new devices. We have investigated the effects of chemistry on the friction and wear behavior of face centered cubic metal and alloy surfaces in contact with a single asperity by friction force microscopy. In the low load regime below 10 nN, we show that sliding friction behaviors of different metallic couples is governed by their thermodynamic affinity. Comparing the friction behavior of miscible and immiscible couples we find that in the first case friction is governed by adhesion while the friction force is almost independent on the normal load. In the latter case of immiscible couples, adhesion is found to be low and the friction force increases with the normal load. At larger loads, friction and wear of pure fcc metals is found to scale with the ratio of the surface energy to the hardness, which describes both contributions involved into the ploughing process: the resistance of the material to flow ahead of a penetrating asperity and the formation of a fresh surface behind the asperity. Finally, we show how the tribological response of a Ag-Cu nano-eutectic alloy surface is affected to its solidification velocity. It is found that both the microstructural length-scale and the solubility of both elements into one another determine the wear response of this alloy.



Recent Publications:

1. Ko HE, Kwan SG, Park HW, Caron A (2017) Chemical effects on the sliding friction of Ag and Au(111). Friction; doi.org/10.1007/s40544-017-0167-5.
2. Kang SJ, Rittgen KT, Kwan SG, Park HW, Bennewitz R, Caron A (2017) Importance of surface oxide for the tribology of a Zr-based metallic glass. Friction 5: 115-122; doi.org/10.1007/s40544-017-0149-7.
3. Caron A (2016) Quantitative hardness measurement by instrumented AFM-indentation. Journal of Visualized Experiments 117; doi: 10.3791/54706.
4. Caron A, Bennewitz R (2015) Lower Nanometer-scale size limit for the deformation of a metallic glass by shear transformations revealed by quantitative AFM indentation. Beilstein journal of nanotechnology 6:1721-1732; doi: 10.3762/bjnano.6.176.
5. Caron A, Louzguine-Luzgin DV, Bennewitz R (2013) Structure vs chemistry: friction and wear of Pt-based metallic surfaces. ACS Applied materials and interfaces 13:11341-11347; doi:10.1021/am403564a.

Biography

Arnaud Caron is a materials scientist with expertise in the multi-scale mechanical behavior of materials, surfaces and micro-components. Since 2015 Arnaud Caron is Assistant Professor in the School of Energy, Materials and Chemical Engineering at KoreaTech, Republic of Korea. Arnaud Caron obtained his engineering degree in Materials Science in 2004 from the University of Saarland, Germany and was awarded with the Schiebold Medal. In 2009 he earned his doctoral degree in Materials Science from the University of Saarland, Germany. From 2006 to 2015 Arnaud Caron worked as a research associate at the Institute of Micro- and Nanomaterials of the University of Ulm, Germany, the WPI-Advanced Institute of Materials Research, Japan and the Leibniz – Institute for New Materials, Germany.

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Nobufumi Ueshima et al., J Material Sci Eng 2018, Volume 7
DOI: 10.4172/2169-0022-C8-113

Relationship between grain distribution and strain localization in Cu-Al alloys

Nobufumi Ueshima, Ryoga Mochizuki, Naoki Gorai and **Katsunari Oikawa**
Tohoku University, Japan

It has been highly demanded to miniaturize lead frames, sockets and any kind of connecting element made of copper or its alloys. Miniaturization increases the ratio of grain size to parts size. In such a case, individual grain size and orientation effect on the deformation behavior becomes significant, which causes ununiform deformation and decrease in formability. To understand the mechanism of the ununiform deformation in detail, strain localization during tensile test of oligo-crystalline Cu-Al plate has been investigated. Cu-Al alloys were melted by induction furnace and cast into stainless steel mold. Dog-bone specimens were cut from the cast alloys. The cooling rate after casting was controlled to obtain various grain sizes, which enables us to see the effect of grain distribution on strain localization in visible scale by optical microscopy. Crystal orientation of the grains was analyzed by EBSD. A random pattern was painted on the surface of the specimen and the painted surface was recorded during tensile test to analyze strain distribution by digital image correlation (DIC) method.

Figure 1 shows the equivalent strain distributions of the reduction section during tensile test. Nominal tensile strain calculated from DIC analysis was 0.1. Strain was localized in specific grains before reaching its highest strength. Schmid's factor of the grains was analyzed. We found that the strain does not always localize at high Schmid's factor grains. When high Schmid's factor grain is surrounded by low Schmid's factor grains, the high Schmid's factor grain cannot deform largely. In contrast, strain was localized relatively low Schimid's factor grains chained over the width of the specimen. In such a case, interlocking among grains seems to be relatively weak since the edge of the specimen can move freely, which may be the reason for the strain localization.

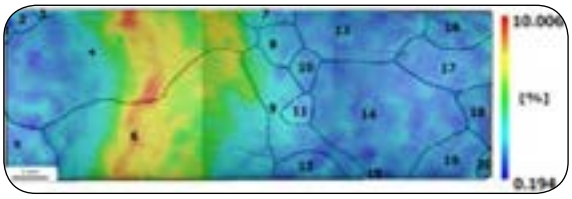


Figure 1: Strain Distribution of oligo-crystalline Cu plate at 0.1 of tensile strain. The black lines show the grain boundaries measured by EBSD. The numbers are grain index. We can see strain localization at grain 4 and 6.

Recent Publications:

1. Ueshima N, Maeda T, Oikawa K (2017) Effect of Cu addition on precipitation and growth behavior of MnS in silicon steel sheets. Metall. Mater. Trans. A 48:3843-3851.
2. Ueshima N, Liu XT, Utsumi H, Chiyokubo T, Horio K, Oikawa K (2017) Influence of Cu and Mg addition on age-related deterioration in strength and creep behavior of Zn-12Al die casting alloy, Int. J. Mater. Res. (formerly Z. Metallkd.) 108:151-154.
3. Ueshima N, Yoshiya M, Yasuda H, Fukuda T, Kakeshita T (2015) Numerically-quantified two dimensionality of microstructure evolution accompanying variant selection of FePd. Mater. Res. Exp. 2:076502(13pages).
4. Ueshima N, Yoshiya M, Yasuda H, Fukuda T, Kakeshita T (2014) Impact of interplay between magnetic field, transformation strain, and coarsening on variant selection in L10-type FePd. J. Appl. Phys. 115:073501(10pages).
5. Ueshima N, Shikatani T, Yoshiya M, Yasuda H (2013) Effect of Spatial Distribution of Local Magnetization on Microstructure Formation in L10-type Ferromagnetic Alloys under External Magnetic Field. Trans. Mater. Res. Soc. Jpn. 38:673-676.

Biography

Nobufumi Ueshima received his PhD from Osaka University in 2014. He subsequently joined the faculty of Department of Metallurgy, Tohoku University, as an assistant professor. He has his expertise in computational material science, and focuses on the application of Phase-Field Modeling and KWN modeling for simulating precipitation kinetics of second phase in metallic materials. He has expanded his expertise to plastic deformation of metals after years of experience in research in Tohoku University. He also focuses on relationship between microstructure and plastic deformation in metallic materials. He has developed a methodology to observe the relationship between grain distribution and strain distribution to investigate microstructure-deformation relationship.

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Notes:

Floricica Barvinschi et al., J Material Sci Eng 2018, Volume 7
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Numerical modeling of transport phenomena during the solidification of materials

Floricica Barvinschi[1] and **Paul Barvinschi**[2]
[1]Politehnica University Timisoara, Romania
[2]West University of Timisoara, Romania

Statement of the Problem: A method for the Vertical Bridgman (VB) solidification of InSb in a silica ampoule is modeled with COMSOL Multiphysics software, using time-dependent thermal conditions. Axial-symmetric numerical simulations of temperature, velocity field in the melt, under normal gravity, and capillarity at the melt-gas-crucible interface resemble those used in an induced pressure difference dewetting VB configuration. The VB technique has some drawbacks that are linked to the use of a crucible in intimate contact with the growing crystal.

Methodology & Theoretical Orientation: In order to avoid the sticking of the crystal on the crucible, which can result in crystal or crucible breakage, a pressure difference is built up inside a sealed growth ampoule by a temperature variation. Detached growth is a small gap between the growing crystal and the crucible wall. The contact-free growth reduces mechanical stress in the crystal, resulting in a reduction of the defect density.

Findings: In the present paper we extend our previous steady-state model by including the calculation of the energy, momentum and mass transport, plus the interfacial phenomena at the melt-gas-crucible interface, under normal gravity, while applying a time dependent step-type temperature distribution on the outer part of the crucible.

Conclusion & Significance: Several systematically studies on this subject have been reported during time, both experimental and numerical. In order to model the flow of two different, immiscible fluids, where the exact position of the interface is of interest, we have applied the phase-field method. The purpose of this study is to include in a single model the transport phenomena (energy, momentum, mass) and the interfacial phenomena at the melt-crystal-crucible and respectively melt-gas-crucible interfaces. All these new models were developed numerically. The validation of modeling was made by comparing Lamine Sylla`s results, reported in his PhD thesis.

Acknowledgments: This work was supported in part by the strategic grant POSDRU/21/1.5/G/13798, inside POSDRU Romania 2007-2013, co-financed by the European Fund-Investing in People.

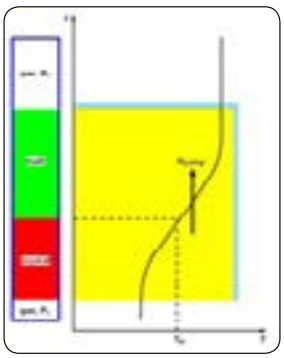


Figure 1: Vertical Bridgman model and transient boundary conditions..

Recent Publications:

1. Barvinschi P, Barvinschi F (2011) Coupled Heat Transfer and Fluid Dynamics Modeling of InSb Solidification. AIP Conference Proceedings 1387:190-197.
2. Sylla L (2008) Etude Experimentale et Thermodynamique du Procédé de Démouillage Appliqué aux Semiconducteurs. PhD Thesis INP Grenoble France.
3. Duffar T (Ed.) (2010) Crystal Growth Processes Based on Capillarity. Czochralski. Floating Zone. Shaping and Crucible Techniques J. Wiley & Sons Ltd. Chichester UK.
4. Barvinschi B, Barvinschi P (2015) Numerical investigation of crystal growth in a vertical Bridgman configuration using a mushy zone model. JOAM 17 (3-4): 431-438.
5. Gallien B, Sylla L, Bengulescu M, Barvinschi F, Duffar T (2013) Study of crystal-crucible detachment: GaSb in SiO2. CrystEngCom 15: 2329-2336.
6. Stelian C, Yeckel A, Derby J J (2009) Influence of thermal phenomena on crystal reattachment during dewetted Bridgman growth. J.Cryst.Growth 311: 2572-2579.

Biography

Floricica Barvinschi is Associate Professor at Politehnica University Timisoara, Romania. She has a PhD thesis in heat transport numerical modeling during the growth of CaF2 and BaF2 crystals by VB method. A part of her PhD thesis was conducted by Prof.dr. Thierry Duffar, INP Grenoble, at that time engineer at CEA Grenoble, France. Continuing a very good collaboration, Floricica .Barvinschi has been invited several times to the CEA Grenoble and INP Grenoble for scientific researches and/or for teaching.

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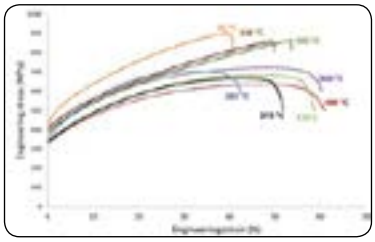
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Alberto Monsalve et al., J Material Sci Eng 2018, Volume 7
DOI: 10.4172/2169-0022-C8-113

Influence of temperature on mechanical properties of a Fe-22Mn-0,6C TWIP steel

Alberto Monsalve[1], **Flavio De Barbieri**[2], **Felipe Castro Cerda**[1], **Alfredo Artigas**[1] and **Juan Pérez-Ipiña**[3]
[1]Universidad de Santiago de Chile, Chile
[2]Universidad Técnica Federico Santa María, Chile
[3]Universidad del Comahue, Argentina

The objective of the present study is to analyze the microstructure and mechanical properties of a TWIP steel at different temperatures. For this purpose, tensile tests were performed in a Fe-22Mn-0.65C TWIP (Twinning-induced plasticity) steel in a temperature range between 25 °C and 400 °C. The microstructure after deformation was characterized via optical microscopy. It was observed that the microstructure consists of mainly deformation twins at low temperatures, whereas dislocation bands are the predominating feature at high temperatures. The yield stress, ultimate tensile strength, total elongation, strain hardening index and the area reduction were measured at different temperatures. The analysis of mechanical data suggests a transition of deformation mechanism from twinning at low temperature to dislocation slip at high temperatures. The work hardening rate and area reduction variations with temperature are discussed and correlated to the decrease of twinning contribution to the deformation mechanism. The role of other process, such as dynamic strain aging and precipitation hardening, are discussed. A thermodynamic-based description for the dependence of Yield stress with temperature was developed, suggesting two acting work hardening mechanisms. This is consistent with the computed activation energy for each mechanism. The stacking fault energy (SFE) was computed by means of Olson and Cohen model, at different temperatures finding that at temperatures higher than 325°C, dislocation glide was the predominant deformation mechanism, which is in accordance with experimental results. Twinning-volume fraction (TVF) in samples tested at different temperatures were computed, finding a decrease in TVF as testing temperatures increases, which in agreement with previous experimental features.



Recent Publications:

1. B. De Cooman, Y. Estrin, S. Kim (2018) Twinning-induced plasticity (TWIP) steels. Acta Materialia 142: 283-362.
2. A. Saleh, A. Gazder (2016) A re-evaluation of "The micromechanics of twinning in a TWIP steel". Materials Science and Engineering A 649:184-189.
3. E. Galindo-Nava, P. Rivera-Díaz-del-Castillo (2017) Understanding martensite and twin formation in austenitic steels: A model describing TRIP and TWIP effects. Acta Materialia 128:120-134.
4. B. De Cooman, O. Kwon, K. Chin (2012) State-of-the-knowledge on TWIP steel. Materials Science and Technology 28:513-527.
5. O. Bouaziz, S. Allain, C. Scott, P. Cugy, D. Barbier (2011) High manganese austenitic twinning induced plasticity steels: A review of the microstructure properties relationships. Current Opinion in Solid State and Materials Science 15:141-168.

Biography

Alberto Monsalve has his expertise in steel processing and materials characterization. He is a full time teacher in Metallurgical Department in Universidad de Santiago de Chile and part time teacher in Academia Poitécnica Aeronáutica and Universidad Técnica Federico Santa María, Chile. He works for local industry in the solution of failure problems and give supervision to different postgraduates' programs in Chile and other countries.

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Felix Gunkel, J Material Sci Eng 2018, Volume 7
DOI: 10.4172/2169-0022-C8-113

19th World Congress on

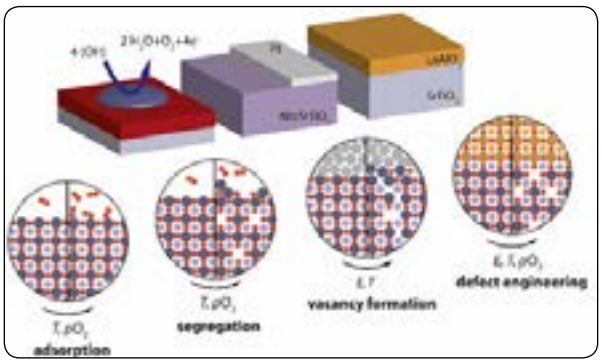
Materials Science and Engineering

June 11-13, 2018 | Barcelona, Spain

Atomic defect-engineering at complex oxide surfaces and interfaces for electrolysis, sensing, and electronics applications

Felix Gunkel
Aachen University, Germany

Perovskite oxides exhibit a plethora of fascinating electronic material properties covering an exceptionally wide range of phenomena in solid state and surface physics. This has led to tremendous efforts to functionalize these materials in applications for energy technology, gas sensing, and electronics. Layered in an atomically defined epitaxial heterostructures and superlattices, diverse properties of perovskites can be combined on the nanoscale level. In such structures, even new functionality can arise at interfaces of layered materials, exhibiting properties that are absent in the bare bulk materials. In our approach, we utilize atomically-defined layer growth to obtain desired material properties. However, on top of that, we employ **thermodynamic engineering** of crystal defects as a unique approach to functionalize material properties at surfaces and interfaces: Even at material synthesis conditions close to perfection, device properties are often determined by *imperfection*, hence, by lattice disorder and crystal defects. As we discuss, we can intentionally control defect structure in nanoscale devices, by developing and utilizing thermodynamic routes to trigger surface and interface reactions in confined systems. While historically defects were seen as something to be avoided, a change of paradigm is required in the field of complex oxides today: In these materials, we can promote functionality, such as metallicity in nominally insulating compounds, by atomic defect-management. Therefore, rather than avoiding defect formation, it is an essential necessity to control and to utilize defect formation in oxides on the nanoscale. Here, we discuss fundamental aspects of lattice disorder effects in bulk oxides, and elaborate the special character of defect formation in thin films, surfaces and interfaces. Focusing on $SrTiO_3$ as a perovskite model system, we will crosslink fundamental perspectives on lattice disorder to actual applications, addressing different examples, such as resistive switching memories, high-mobility electron gases and induced magnetism, oxygen sensors, and electro-catalysts.



Recent Publications:

1. F. Gunkel, et al., "Defect-control of anomalous and conventional electron transport in NdGaO3/SrTiO3 heterostructures", Physical Review X, 6, 031035 (2016)
2. F. Gunkel et al., "Ordering and phase control in epitaxial (Pr,Ba)CoO_3- catalysts for oxygen evolution reaction", ACS Catalysis 7 (10), 7029–7037 (2017)
3. M. Andrä et al., "Oxygen partial pressure dependence of space charge formation in donor doped SrTiO3", APL Materials 5, 056106 (2017)
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6. F. Gunkel et al., "Defect concentration profiles at complex oxide interfaces", Physical Review B 93, 245431 (2016).

Biography

Felix Gunkel is a young investigator based at Institute of Electronic Materials (IWE2) at RWTH Aachen University, Germany. His research interests comprise thermodynamics and solid state chemistry of complex oxides on the nanoscale. His current work addresses tailored functionality of crystal defects in oxides for nano-electronic devices, energy applications, and gas sensors. With background is fundamental and applied physics, Dr. Gunkel started his scientific career at Institute of Solid State Physics, Forschungszentrum Jülich, Jülich, Germany in 2010. He received his PhD from the faculty of electronic engineering at RWTH Aachen University in 2013. After continuing his scientific work in his postdoctoral career at Stanford University and Forschungszentrum Jülich, he is now leading a research team at RWTH Aachen University, Germany, with a research focus of thermodynamic engineering of device properties and material functionality on the nanoscale.

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Notes:

Lev Rapoport et al., J Material Sci Eng 2018, Volume 7
DOI: 10.4172/2169-0022-C8-113

Deformation microstructure of surface layers of Ag, Cu, Ni and Al under friction in lubricant conditions

Lev Rapoport[1] and **Inna Popov**[2]
[1]Holon Institute of Technology, Israel
[2]Hebrew University of Jerusalem, Israel

Friction and wear are the crucial problems affecting the life time of moving mechanical parts. The main goal of this work is to study: the evolution of the microstructure after friction with lubricant of four fcc metals (Ag, Cu, Ni and Al and the effect of stacking fault energy (γSFE) on grain size and wear loss. Friction surfaces were carefully examined with a field emission scanning electron microscope. The cross sectional TEM lamellae were prepared from the pins using a focused ion beam (FIB). Cross-sectioning of the specimens was done in the longitudinal and transverse directions (parallel and perpendicular to direction of friction).Deformation twinning followed by a limited recovery within a surface of Ag led to formation of relatively thick top layer of ultra-fine equiaxial grains. Surface regions of Cu and Ni samples consisted of inhomogeneous microstructure with wide range of grain sizes. With a depth lamellar structure was formed parallel to direction of friction for Ag, Cu and Ni. Subdivision of grains into subgrains with high dislocation density is clearly observed within a lamellar structure. Steady state values of grain size, ds and hardness, Hs after friction in lubricant conditions are explained by a balance between hardening and dynamic recovery in surface layers strongly depending on the γSFE and temperature.

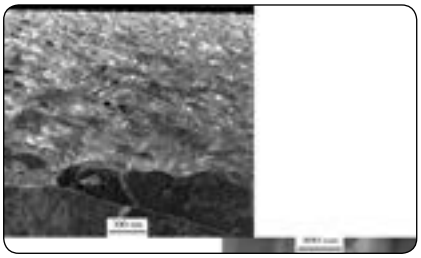


Figure 1: Typical HAADF STEM images of Ag presenting general view of deformation microstructure with a gradient of grain size. The white arrow shows direction of friction. Black arrows show the pores in top layers

Biography

Lev Rapoport is the Head of the Center for Materials Engineering and the Laboratory of Tribology at the Holon Institute of Technology. Friction and wear research of nanomaterials is known both nationally and internationally. Friction and wear properties of fullerene-like nanoparticles were studied at first in the laboratory of Prof. Rapoport. Prof. Rapoport is a principal investigator in several research grants sponsored by the Israel Ministry of Science, the Bi-national Israel- USA and Germany-Israel Funds. Prof. Rapoport is the author more than 100 publications. He is Vice-President of the Tribology Council in Israel.

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Luis M. Angelats Silva et al., J Material Sci Eng 2018, Volume 7
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Flaxseed mucilage as an eco-friendly inhibitor for ASTM A335 P11 steel in HCl

Luis M. Angelats Silva[1], Nilthon E. Zavaleta Gutierrez[2], Luis Aguilar Rodríguez[2], Raúl B. Siche Jara[2] and **Gustavo Duffó[3]**
[1]Universidad Antenor Orrego, Peru
[2]Universidad Nacional de Trujillo, Peru
[3]Univ. Nacional de Gral. San Martín, Argentina

Statement of the Problem: The high efficiency of corrosion inhibition of synthetic organic inhibitors in the industries of chemical cleaning, acid etching, acidification of oil wells and acid desalination is well recognized. However, most of these inhibitors are toxic to the environment and human health. This has forced to look for more secure corrosion inhibitors called "green corrosion inhibitors" due to its non-toxicity, biodegradability and low cost. In recent years, the use of natural polysaccharides as an environmentally safe corrosion inhibitor has received special attention. For this reason, the present study, evaluates the mucilage of Linum usitatissimum, which contains a high content of polysaccharides, as a corrosion inhibitor of ASTM A335 grade P11 steel in HCl -1.0 M.

Methodology & Theoretical Orientation: All the corrosion tests were carried out at least in triplicate to evaluate the reproducibility of the same, by means of the techniques of: weight loss tests, Tafel extrapolation, resistance to linear polarization, electrochemical impedance spectroscopy and electrochemical frequency modulation. For the electrochemical tests the Gamry Reference 3000 potentiostat was used. Figure 1 shows part of the tests carried out at 65°C.

Findings: Considering the five techniques, it was observed that the average inhibition efficiencies for a dosage of 0.5g/L of mucilage were 77.3%, 81.2% and 88.6% at temperatures of 25°C, 45°C and 65°C, respectively. Higher dosages only generated a slight increase in inhibition efficiency. Additionally, it was also found that an increase in temperature produced an increase in the adsorption constant and a decrease in the standard free energy of adsorption. The standard enthalpy of adsorption was positive and the apparent activation energy decreased with increasing mucilage concentration.

Conclusion & Significance: From the results, we conclude that the Linum mucilage acts as a good corrosion inhibitor of P11 steel in HCl-1.0 M. Its efficiency increased with the increase in temperature. Likewise, it was determined that the adsorption of mucilage on steel P11 occurs through a chemical adsorption, acting as a mixed type inhibitor.

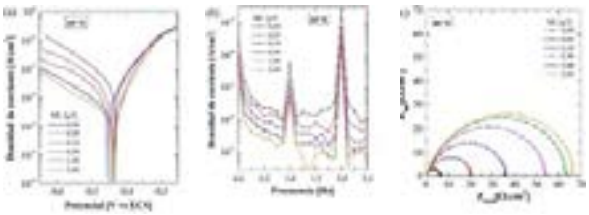


Figure 1:
Corrosion tests of P11 steel in HCl-1.0 M containing different concentrations of Linum mucilage (g/L) at 65°C.
(a) Potentiodynamic polarization curves,
(b) Intermodulation spectra and (c) Nyquist diagram

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Biography

Luis M. Angelats Silva has experience in electrochemical corrosion of metallic materials. Within its diverse research in materials science and technology, it is currently looking for alternatives to improve corrosion resistance by using natural polysaccharides as non-toxic inhibitors for human health and the environment. His experience in electrochemical studies has allowed him to develop diverse methods and/or techniques that allow him to evaluate, through accelerated corrosion tests, the efficiency of inhibition of these polysaccharides in alloy steels widely used in high temperature pipes.

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Notes:

Sezai Elagoz et al., J Material Sci Eng 2018, Volume 7
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InGaAs/InAlAs SLs via MOCVD for QCL applications

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InGaAs/InAlAs superlattices (SLs) are very attractive and suitable for QCL applications due to the availability of lattice matching on InP substrate and large conduction band offset. When InxGa1-xAs and InyAl1-yAs compounds are lattice matched to InP substrate, this allows fabricating QCL devices with an emission wavelength at λ>4μm. Similarly, to go larger wavelengths, the same materials can be used by utilizing a technique known as strain-balancing to overcome the difficulties arise from lattice mismatch. Precise thickness control, alloy composition control and repeatability of the SLs are the most critical issues to be dealt with in growth studies to obtain the desired device structures. The thinnest layer thickness is a few monolayers and the device performance is quite sensitive to interface roughness. Molecular beam epitaxy (MBE) is the generally preferred growth technique due to the requirement of having very thin layers with sharp interfaces. However, QCL also includes thick layers such as claddings for which MOCVD suits the best. For these reasons, it is worth efforts to find a way to grow the whole structure via MOCVD. Using special growth conditions and smaller mass flow controllers (MFCs) it is possible to precisely control the gas flow quantity dilution and injection of metalorganic sources. Transmission Electron Microscope (TEM), Scanning Tunneling Electron Microscope (STEM) and similar techniques are widely used to determine the exact thickness of epitaxially grown SLs. However, these techniques are destructive, relatively expensive, time consuming and require an elevated level of expertise for the sample preparations as well as the sample measurement. The high-resolution x-ray diffraction is a non-destructive, economic, quick and robust technique than electron microscopes and depending on the scan type it is quite sensitive to thickness change, alloy composition and interface quality and, as we demonstrate, it can be used to find the thicknesses for very thin layers.

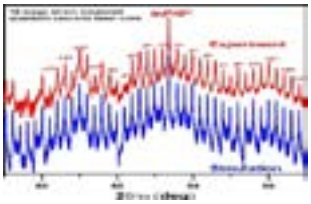


Figure 1: 10 stage strain balanced QCL structure grown by MOCVD

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Biography

Sezai Elagoz is currently a full Professor in the Department of Nanotechnology Engineering and the director of the Nanophotonics Research and Application Center at Cumhuriyet University, Turkey. He received his M.Sc and Ph.D. degrees from University of Michigan in 1993. He has published more than 60 peer-reviewed articles and his currently research interest includes semiconductor crystal growth for quantum cascade lasers, high brightness InGaN/GaN based light emitting diodes, high efficiency tandem solar cells and short wave infrared detectors.

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Sessions:

Nanomaterials and Nanotechnology | Graphene and 2D Materials

Session Chair
Hajo Dieringa
Helmholtz-Zentrum Geesthacht, Germany

Session Co-Chair
Gennady N Panin
Gennady N Panin, IMT RAS, Russia

Session Introduction

Title: **Magnesium based Nanocomposites – Challenges and Potential**
Hajo Dieringa, Helmholtz-Zentrum Geesthacht, Germany

Title: **Phonons and their interaction with electrons in layered nanomaterials**
Sergiu Cojocaru, NIPNE, Romania

Title: **Solid Lipid nanoparticles for brain delivery of Paliperidone: Drug Release Kinetics, Therapeutic efficacy and Cyto-toxicity studies**
Jaspreet Kaur Randhawa, Indian Institute of Technology Mandi, India

Title: **High-contrast monolithic photonic nanostructures in the AlGaAs-on-insulator platform**
Valerio F Gili, Paris Diderot University, France

Title: **Ferroelectricity in BaTiO3 nanocrystals: towards future applications**
Xiaohui Wang, Tsinghua University, China

Title: **First-principles study of optoelectronic, transport and ionic sieving properties of Ti3C2X2 (X=O, OH and F) Mxene**
Golibjon R. Berdiyorov, Hamad bin Khalifa University, Qatar

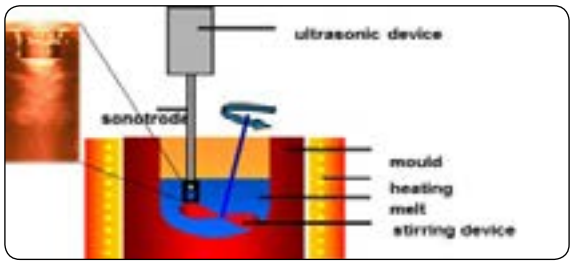
Title: **Memristive nanostructures based on 2D crystals**
Gennady N Panin, IMT RAS, Russia

Hajo Dieringa et al., J Material Sci Eng 2018, Volume 7
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Magnesium based Nanocomposites – Challenges and Potential

Hajo Dieringa and **Karl Ulrich Kainer**
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Magnesium-based metal matrix nanocomposites (MMNCs) are promising materials for small-series applications, for example in automotive engineering or the aviation industry. For some years now, ceramic nanoparticles have been so inexpensive that they only represent a negligible increase in the cost of a nanocomposite material. The magnesium sand casting alloy Elektron21 and the die-casting alloy AM60 were reinforced with AlN nanoparticles with a diameter of 80 nm. To break up particle clusters in the melt, an ultrasound assisted casting process was used. Cavitation and acoustic streaming are generated by ultrasound, and an indirect chill casting process in a permanent mould results in a microstructure free of pores. The grain size, tensile mechanical properties and compression creep resistance were investigated. We found that the nano-AlN addition refines the microstructure of AM60 significantly. Mechanical testing shows an outstanding increase in tensile yield strength, ultimate tensile strength and ductility of AM60+1AlN compared to the unreinforced AM60. By contrast we observed no grain refinement and no tensile strengthening of Elektron21, although the creep resistance was improved by one order of magnitude. This demonstrates how differently two magnesium alloys can respond to reinforcement with 1% AlN in their structures and properties. In case of AM60-MMNCs remelting trials were performed and showed that the nanoparticles remain in the melt with only a marginal loss of grain refinement and loss of strength occurring for each remelting.



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Biography

Hajo Dieringa has his expertise in developing magnesium alloys and magnesium based metal matrix composites. Since 2000 he is working at the Institute of Materials Science at GKSS Research Centre, now Helmholtz-Zentrum Geesthacht. He is deputy head of the department "Magnesium Processing" and coordinated the work package "Metal Matrix Nanoconposites" in the large scale EU project Exomet. In addition to composites, Hajo Dieringa also developed creep-resistant magnesium alloys.

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Notes:

Sergiu Cojocaru, J Material Sci Eng 2018, Volume 7
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Phonons and their interaction with electrons in layered nanomaterials

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Vibrational excitations in nanomaterials are very sensitive to confinement and boundary conditions since both the typical wavelengths and mean-free-paths may easily exceed the size of a nanodevice. Then multiple reflections from the surfaces drastically modify the vibration properties as compared to bulk materials. These have major implications for the broad range of devices [1-3]. Thus, in ultrahigh sensitivity radiation detectors, electronic microrefrigerators or microcalorimeters [4,5] an essential part of the design is the coupling and energy exchange between vibrational modes (or their quantum version, phonons) and electron excitations in ultrathin quasi-two-dimensional structures: It has been shown both experimentally and theoretically that in such devices the transfer of energy per unit time (or energy flux) between electrons and phonons (in a stationary case, for instance, electrons may thermalize at a higher effective temperature than phonons, or inverse) can be engineered to vary in orders of magnitudes depending on the specific requirements [6-8]. The problem becomes more complicated for a layered structure composed of materials with significantly different acoustic characteristics when the interface effects cannot be neglected (e.g., Copper film deposited on Silicon Nitride membrane). Unlike the composite materials with layer stacking along the direction of propagation of excitations, the "lateral" symmetry with respect to this direction in our case is absent. This difficulty, however, can be viewed as an opportunity for a new kind of behavior. For a better understanding of this situation a new theoretical approach is proposed that allows to substantially simplifying the description of the governing equations and in, some cases, to obtain analytical expressions for both the spectra and amplitudes of the normal modes. These are shown to become gapped when the system is sufficiently thin for the physically relevant wavelengths to reach the nanometer range. The only truly acoustic waves which account for the low energy – low temperature properties in a composite system are the Lamb compressional (dilatational) and flexural (bending) modes. These modes are described in an analytical form. An additional possibility to engineer the behavior of phonon modes and their coupling to electrons is revealed by the possibility to localize the vibration amplitudes in one or another layer, near to the surfaces or the interface, depending on the thickness of the layers and material parameters.



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Biography

Sergiu Cojocaru is a senior researcher at the Department of Theoretical Physics of the National Institute of Physics and Nuclear Engineering, Romania. He authors over 100 scientific publications in several areas of Condensed Matter Theory. His current interests are in Nanophysics and, in particular, the physical effects of confinement on the properties of nanomaterials, https://scholar.google.ro/citations?hl=en&user=BIRSbiwAAAAJ&view_op=list_works&sortby=pubdate.

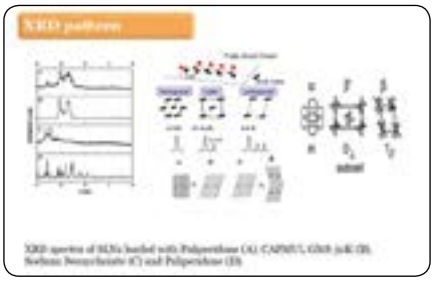
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Jaspreet Kaur Randhawa et al., J Material Sci Eng 2018, Volume 7
DOI: 10.4172/2169-0022-C8-113

Solid lipid nanoparticles for brain delivery of paliperidone: Drug release kinetics, therapeutic efficacy and cyto-toxicity studies

Jaspreet Kaur Randhawa and **Sacheen Kumar**
Indian Institute of Technology Mandi, India

Schizophrenia is a neurological disorder and Paliperidone the antipsychotic drug with poor water solubility is potent drug used for its treatment. Solid lipid nanoparticles (SLN) based drug delivery system offer the potential for encapsulating lipophilic drugs. Three different lipids and surfactants formulations were prepared by ultrasonic homogenization method. The selection of the lipids and surfactant was based on their proven compatibility to enhance their BBB permeability and their neuro protective behaviour. The release kinetics was based on dynamic dialysis method. Detailed release mechanism analysis and its relation to the properties of system is very important. Analysis of the release kinetic data with mathematical analysis could provide a great impact on the development of solid lipid nanoparticles drug delivery system. Paliperidone a newly developed antipsychotic, which was unexpored due to low bioavailability was formulated as nanoparticles in lipid matrix analyzed for drug release kinetics. To observe the best release kinetic model, the First order, Baker-Lonsdale, Hixson-Crowell, Korsmeyer-Peppas model, and Higuchi model were implemented. Korsmeyer-Peppas model given the best fit for the release kinetics of Paliperidone from the various solid lipid nanoparticles system prepared. The results express the Gelucire based SLNs principle suitability for a prolonged release formulation. The neuro protective effects of paliperidone, on the cell survival of human neuroblastoma SH-SY5Y and RAW 264.7 macrophages was also observed for various drug concentration. GSLNs based system show 85 % cell viability from lower to higher dose.



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4. Jaspreet Kaur Randhawa (2015) RSC Advances, , 5, 68743-68750.
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Biography

Jaspreet Kaur Randhawa research area includes drug delivery systems for CNS and cancers treatment: The main theme of our research includes drug delivery based on solid lipid nanoparticles (SLNs) for controlled drug release. The ability to incorporate drugs into nanocarriers offers a new prototype in drug delivery that could be used for secondary and tertiary levels of drug targeting. SLNs hold great promise for reaching the goal of controlled and site specific drug delivery. Similarly we are also working on stimuli responsive drug carrier for cancer and in the development of various nanostructures of metal oxides, and screen their glucose sensing activity to for low cost glucometer.

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Valerio F. Gili et al., J Material Sci Eng 2018, Volume 7
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High-contrast monolithic photonic nanostructures in the AlGaAs-on-insulator platform

Valerio F Gili, Natalia Morais, Iannis Roland, Marco Ravaro, Ivan Favero and **Giuseppe Leo**
Paris Diderot University, France

Aluminium gallium arsenide (AlGaAs) is a promising material for monolithic photonics. Besides having a high optical Kerr coefficient, this III-V semiconductor alloy has a high χ^((2)); it is a mature laser material; and its direct band-gap can be varied with the Al molar fraction, making it not only linearly transparent from 0.7 μm to 16 μm, but also two-photon-absorption free at 1.55 μm. Several types of AlGaAs high-contrast nonlinear integrated photonic structures have been demonstrated in the last years, spanning from nanowires [1,2] to high-Q resonators [3,4] and multi-pole nanoantennas [5]. To confine photons at sub-wavelength scales, such devices rely on a high-refractive-index core clad by a far lower index in two or three dimensions, and therefore they typically consist of semiconductor nanostructures that either lie on an oxide substrate or are suspended in air. Here we focus on the former case, which seems more promising because of its superior heat-sink behaviour and mechanical stability. Our devices, from the nano- to the micro-scale, share the same fabrication protocol: they are grown by molecular-beam-epitaxy on {100} non-intentionally doped GaAs wafer, with a few hundred nanometres layer of $Al_{0.18}Ga_{0.82}As$ on top of an aluminium-rich substrate, to be oxidized at a later stage (see Figure 1). In order to improve the eventual adhesion between AlOx and the adjacent crystalline layers, such substrate consists of AlAs layer of about 1μm of thickness sandwiched between proper matching layers. A number of nonlinear optics results have been allowed by this class of devices, ranging from second harmonic generation to down-conversion in optical nanoantennas, and from radiation pattern engineering with subwavelengths photonic molecules to frequency conversion in waveguides and resonators. We will provide an overview of this new and exciting research field, along with a few perspectives.

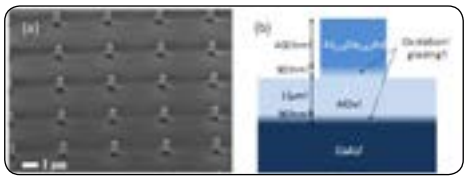


Figure 1: Monolithic AlGaAs-on-AlOx nanoantennas: (a) scanning-electron-microscope picture of a part of the array; (b) schematics of a single nanoantenna

Recent Publications:

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3. Mariani S et al. (2014) Second-harmonic generation in AlGaAs microdisks in the telecom range. Opt. Lett. 39: 3062-3065.
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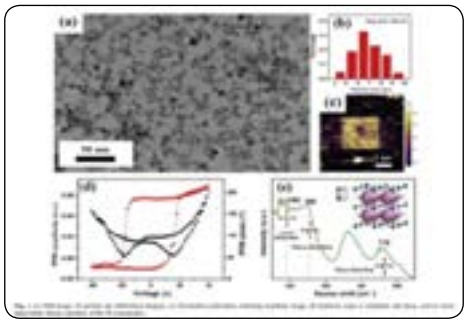
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Xiaohui Wang et al., J Material Sci Eng 2018, Volume 7
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Ferroelectricity in $BaTiO_3$ nanocrystals: towards future applications

Xiaohui Wang, Yanan Hao, and **Longtu Li**
Tsinghua University, China

Ferroelectric materials, which possess a spontaneous and switchable electric polarization below the Curie temperature Tc, are widely used in modern electronics, such as capacitors, nonvolotile memory devices, energy storage applications and nanoelectromechanical systems. As the continuous demand for device miniaturization as well as the rapid development of flexible devices, ferroelectric nanoparticles that served as source materials or fillers to realize energy storage, piezoelectric conversion or memory applications have attracted broad interests in recent years. Ferroelectricity in nanoscale materials is the basis for the design and fabrication of integrated ferroelectric devices. Although a critical ferroelectric size ~2.4 nm of BaTiO3 (BTO) material has been calculated by the first-principles method, no experimental proof of electric polarization has been reported for such small BTO yet. The BTO nanocrystals with particles size from 2.8 nm to 8 nm were prepared by a low-cost, green and scalable sol method. We show that, BTO nanocrystals as small as 2.8 nm are still ferroelectric. Especially, ferroelectric polarization switching image and hysteresis loop show direct evidence for the ferroelectricity of the BTO nanoparticle assembly. With the particle size decreasing from 8.0 to 2.8 nm, the increasing of ferroelectric phases coincides well with the "surface phase" increase from the X-ray photoelectron spectroscopy (XPS) data, showing that surface relaxation is the origin of most non-centrosymmetrical phases in these nanocrystals. Here, we also show high prospect of these soluble ferroelectric nanoparticles in the applications of nanocomposite devices. For instance, as these nanoparticles can achieve a high polarization, we made gradated BTO/PVDF nanocomposite films using the nanocrystal sol (with grain size of 8 nm) and achieved a discharged energy density as high as 19.37 J/cm-3.



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Biography

Xiaohui Wang is a Professor of Department of Materials Science & Engineering at Tsinghua University. She completed her PhD in Physical Chemistry from Jilin University in 1994 , China and her post doctoral work at University of Pennsylvania,USA. Her current research activities include the synthesis and characterization of nano-materials, sintering of nanoceramics and its applications. She has published more than 300 papers in reputed journals.

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Notes:

Golibjon R. Berdiyorov et al., J Material Sci Eng 2018, Volume 7
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First-principles study of optoelectronic, transport and ionic sieving properties of Ti3C2X2 (X=O, OH and F) MXene

Golibjon R. Berdiyorov, M. Madjet and **K. Mahmoud**
Hamad bin Khalifa University, Qatar

MXenes, a new family of low-dimensional materials, have received a lot of interest due to their unique physical, chemical, and mechanical properties [1]. MXenes have already shown a great potential in storage applications due to their impressive capacitive performance [2]. Here, we study the electronic and transport properties of Ti_3C_2 MXene using density-functional theory (DFT) in combination with the nonequilibrium Green's function formalism [3, 4]. Fluorinated, oxidized and hydroxylated surfaces are considered. We found that the surface termination has a considerable impact on the electronic transport [3]. For example, the fluorinated sample shows the largest transmission, whereas surface oxidation results in considerable reduction of the electronic transmission. Such enhanced transmission originates from the extended electronic states and smaller variations of the electrostatic potential profile. We also study the effect of lithium and sodium ion adsorption on the electronic transport properties of the MXene [4]. Optical properties of MXene are also affected bysurface functionalization [5]. For example, in the visible range of the spectrum, the oxidized sample shows larger absorption, whereas surface fluorination results in weaker absorption as compared to pristine MXene. Recently, MXene nanosheets have also emerged as ultrathin and high-flux sieving membranes [6]. In addition to ultrafast water flux, both hydration radius and charge dependent transport of ions have been observed. MXenes are also shown to be highly resistive to biofouling [7]. Here we present the results of our DFT calculations to explore the possible mechanisms for the charge-selective ionic transport through $Ti_3C_2X_2$ (X=O, OH or F) Mxene [8, 9]. We show that the charge selectivity originates from the charged nature of the MXene layers: the system shows dynamic response to the intercalating ions, even in their hydrated states, by changing the interlayer spacing. We also address the stability of MXene membranes and discuss the possibilities of enhancing their stability by molecular and nanoparticle intercalations. We present the results of our atomistic scale calculations for structural, electronic water sieving properties of hydrophobic graphene and hydrophilic MXene monolayers (see Fig. 1)..

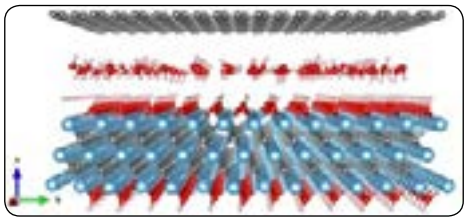


Figure 1: Atomistic structure of graphene (top) and Ti3C2(OH)2 MXene (bottom) bilayer with intercalating water molecules

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Biography

Golibjon R. Berdiyorov is a Scientist in Qatar Environment and Energy Research Institute, Hamad Bin Khalifa University. He has an experience in performing theoretical investigations on structural, optoelectronic and transport properties of molecular and low-dimensional systems. Currently, he is interested in conducting material science research with a focus on predicting novel materials for photovoltaics, energy storage applications and membranes materials for water treatment. In his studies he mostly uses first principles methods (such as Density Functional theory in combination with the non-equilibrium Green's function formalism) and other atomistic scale methods such as force field based molecular dynamics. He has published more than 100 research articles, which have already received more than 1600 citations. He was awarded for his research including the best research award at University of Antwerp.

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Notes:

Gennady N Panin, J Material Sci Eng 2018, Volume 7
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Memristive nanostructures based on 2D crystals

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Statement of the Problem: Memristive systems based on two-dimensional (2D) crystals such as graphene, graphene oxide, molybdenum disulphide, etc., 1-5, are considered as a new type of electronic elements with extremely low energy consumption and with ultra-high scalability for processing and storage of information. The unique electronic and optical properties of 2D crystals demonstrate the enormous potential for creating ultra-high density nano-and bioelectronics for innovative imaging systems. The purpose of this study is to develop memristors with a floating photogate so-called photomemristors2,3 based on graphene and nanocrystals.

Findings: A new concept of the formation of self-assembled nanoscale photomemristive heterojunctions of graphene, graphene oxide and zinc oxide in the form of two-terminal memristors with a floating photogate for bioelectronics and optoelectronics is demonstrated.

Methodology & Theoretical Orientation: Photocatalytic oxidation of graphene with nanocrystals of zinc oxide is proposed as an effective method of creating two-dimensional memristive systems with photoresistive switching for synaptic nonvolatile memory of ultrahigh density.

Conclusion & Significance: Two-dimensional photomemristive systems with a floating photogate exhibit multiple states controlled in a wide range of electromagnetic radiation, and can be used as neurohybrid systems for neuromorphological calculations, image processing, and pattern recognition needed to create artificial intelligence.

Acknowledgements: This work was supported by Basic Science Research Program through the NRF of Korea funded by the Ministry of Education (No. 2017R1D1A1B03035102).

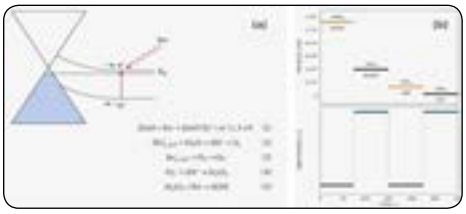


Figure 1: a - Schematic electronic diagram of the G/ZnO NP interface under UV irradiation. Electron-hole pairs generated in ZnO (3.3 eV) under UV irradiation (reaction 1) are separated by a built-in electric field at the G/ZnO NP interface, providing a flow of holes into the graphene; b - resistive states of the G/GO photomemristor, which are switched by the Set/Reset voltage of -3.8/3.3 V in the dark and -3.5/4 V with light pulses and read at 2.5 V.

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Biography

Gennady N. Panin (Ph.D.) is a professor at the Academy of Nanotechnologies (NITA), the Department of Physics at Dongguk University and a senior research fellow at the Institute of Microelectronic Technology of the Russian Academy of Sciences (IMT RAS). He graduated from the Moscow National University with a degree in Applied Physics and Electronics with honors and received his doctorate in physics of semiconductors and solid state electronics at the IMT RAS in 1994. He worked as a research fellow at the Institute of Solid State Physics, Halle, Germany, in 1986 and at the Faculty of Physics of Materials at the University of Complutense, Madrid, Spain, in 1994-1996 and as a research professor (2000-2008), Professor (2008-2017), Vice-Director (2012-2017) of QSRC at Dongguk University, Seoul. His research interests include the physics of quantum structures and multifunctional nanomaterials based on layered multiferroics and graphene to create new photonic and electronic devices for use in nano-information technologies.

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Notes:







19th World Congress on

Materials Science and Engineering

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Keynote Forum

Day 3

Saba Abdulghani Oliveira da Silva, J Material Sci Eng 2018, Volume 7
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Saba Abdulghani Oliveira da Silva

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A framework of materials for 4d printing

4D printing is a term used in additive or direct digital manufacturing to describe a process in which a part is prepared with a particular form and then when stimulated by changes in temperature, humidity, light and pH transforms in to another shape. Such an approach is a revolutionary idea in manufacturing. The opportunities are endless. Figure 1 shows an example from the literature. For example object can be prepared to make manufacturing facile, transport costs minimal and then converted in to the finished object at the point of use. Clearly this technology has much to offer to medical devices and we can envisage an object which is printed in a form to make it easy to insert in to the body by, for example a hypodermic needle, which then at body temperature opens up in to a 3d structure to close an internal injury, implant a tissue for regenerative purposes or to deliver some therapeutic agent. In this presentation we present a framework for 4d printing which enables us to classify different types of shape or form changes. We review the stimuli driven materials available and hence the molecular mechanisms available to deliver 4D printing technology with temperature and light activation. We take examples from the literature and identify the most promising molecular mechanisms and identify the potential for applications.

This work is supported by the Fundação para a Ciência e a Tecnologia (FCT) through the Project references: UID/Multi/04044/2013; PAMI - ROTEIRO/0328/2013 (Nº 022158) and MATIS (CENTRO-01-0145-FEDER-000014 - 3362).

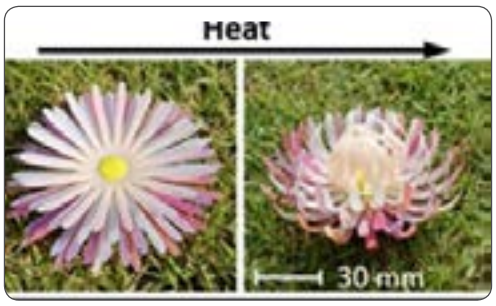


Figure 1: An example of a 4d printed structure which changes shape on heating. The flower is prepared from a shape memory polymer. Photo reproduced under a Creative Commons Attribution Non Commercial License 4.0 (CC BY-NC) from Zhen Ding, Chao Yuan, Xirui Peng, Tiejun Wang, H. Jerry Qi and Martin L. Dunn *Science Advances* 12 Apr 2017: Vol. 3, no. 4, e1602890 DOI: 10.1126/sciadv.1602890

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Biography

Saba Abdulghani Oliveira da Silva is a researcher at the Centre for Rapid and Sustainable Product Development at the Polytechnic Institute Leiria (IPL), Portugal. Saba carried out her Bachelor of Engineering degree (B.Eng) and Doctorate degree (PhD) at the Materials Department of Queen Mary University of London in Biomaterials under the supervision of Professor K.E. Tanner. Following her PhD, Saba was awarded a Marie Curie Intra-European Post-Doctoral Fellowship to work on the Biomechanics of cemented hip prostheses at the Biomaterials and Biomechanics Laboratory, Lund University Hospital, Sweden under the supervision of Professor Lars Lidgren. In 2008, Saba moved to Portugal to work at the Rheumatology research unit, *Instituto de Medicina Molecular* (IMM) on the mechanical properties of osteoporotic bone, for which she won a research award from the European Calcified Tissue Society (ECTS/ Servier International Award 2010). Saba´s research experience covers orthopaedic biomaterials and biomechanics as well as the mechanics of healthy and diseased bone. She has her work published in international journals and has presented her work at international conferences all over the world and is a reviewer for a number of International journals. Her current research interests are 3D and 4D scaffolds for tissue engineering, AM and biomechanics.

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Notes:

Aman Ullah, J Material Sci Eng 2018, Volume 7
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19th World Congress on

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June 11-13, 2018 | Barcelona, Spain



Aman Ullah

University of Alberta, Canada

Development of biopolymers and biomaterials from lipids

In recent years, the use of renewable natural resources have become the focus of research in supplementing and replacing traditional petrochemical products due to growing energy demands and environmental concerns. The utilization of lipids has been considered to play a primitive role towards sustainable development due to their large scale availability, built-in-functionality, biodegradability and no net CO2 production. In addition, a broad range of monomers can be obtained from lipids as a single feedstock. These attributes make lipids a good fit for the development of renewable biomaterials. This Presentation will focus on the conversion of lipids, from various sources including waste streams such as waste cooking oil and lipids extracted from spent foul, into monomers, biopolymers and bionanocomposites using our patented technology. The ability for complete conversion of oils in just few minutes under solvent free conditions into monomers, biopolymers and bio-nanocomposites is undoubtedly an attractive concept from both an academic and an industrial point of view.

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Biography

Aman Ullah received his PhD (with distinction) in Chemical Sciences and Technologies in 2010 at the University of Genova, Italy by working together at Southern Methodist University, USA. He worked as a postdoctoral fellow before accepting an Assistant Professor position at the University of Alberta. He has recently developed and is teaching a new graduate course entitled “Renewable Biomaterials”. This course deals with fundamentals in bio-based materials development, characterization, and various industrial applications. Current research, recent literature, and real-life applications of biomaterials/bionanomaterials in various industries are discussed throughout the course. Aman has published more than 45 papers in reputed journals and 3 patents/patent applications. He was named a Canadian Rising Star in Global Health by Grand Challenges Canada in 2012.

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Notes:

Dmitry Volodkin, J Material Sci Eng 2018, Volume 7
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Dmitry Volodkin

Nottingham Trent University, United Kingdom

Two- and three-dimensional multilayer bio-coatings as novel drug delivery systems. From nano to micro

Polymer multilayers first introduced about two decades ago are nowadays widely used towards bio-applications in tissue engineering and regenerative medicine. Our research is focused on active 2D and 3D multilayer structures (e.g. planar films, capsules, beads) with tailor-made properties. Such structures have a fine-tuned architecture, controlled thickness from nano to macro, adjusted softness from Pa to GPa, almost unlimited variety of functional components, and externally activatable drug release. In this talk I present our recent findings in mild and effective immobilization of biomolecules (proteins, nucleic acids, small drugs, etc) and approaches for release/delivery the biomolecules in a controlled manner. The externally triggered release on demand by IR-laser light and cell biology studies including extra- and intra-cellular delivery will be considered. The developed structures offering localized, remote, and non-invasive release of biomolecules are indispensable for applications in tissue engineering, and especially for single cell studies where high precision of delivery in space and time is highly desirable.



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Biography

Dmitry Volodkin is Associate Professor at Nottingham Trent University and heads the group “Active-Bio-Coatings”. He has studied Chemistry at the Lomonosov Moscow State University in Russia. Research stays brought him to France (University of Strasbourg) and Germany (Max-Planck Institute of Colloids and Interfaces, Technical University of Berlin, Fraunhofer Institute for Cell Therapy and Immunology). His research activities are focused on design of advanced stimuli-responsive biomaterials for applications in tissue engineering, diagnostics, toxicology, drug delivery. His group engineer self-assembled polymer-based 2D and 3D structures with tailor-made properties: multilayer films, microcapsules and beads, liposome-polymer composites, polymeric scaffolds, etc. Dmitry Volodkin has published more than 70 peer-reviewed articles/books and received a number of prestigious scientific awards such as Sofja Kovalevskaja Award of Alexander von Humboldt Foundation, Richard-Zsigmondy Price of German Colloid Society, Alexander von Humboldt Fellowship, Marie Skłodowska-Curie Fellowship.

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Optimising the acceleration of cell proliferation in a bioreactor for scaffold-based tissue engineering

One of the most exciting areas in recent years has been regenerative medicine in which failed or damaged body parts are grown from the patients own cells loaded in to a porous scaffold. The scaffold is placed in to a bioreactor to accelerate the proliferation of the cells and when the tissue is partly formed the complete assembly is implanted in to the patient. It is fair to say that apart from isolated cases the promise has not transformed in to reality as a consequence of the limited proliferation rates. In this work we explore the use of computer modelling to optimize the stimulation processes used in the bioreactor to deliver enhanced rates of proliferation. Currently, mechanical stimuli are used in most of the studies allowing to accelerate the growth of cells placed on the scaffold inside the bioreactor. Some in-vitro studies have shown promising results when mechanical, electrical and magnetic stimulation are used either isolated or combined. Therefore, it is important to understand the gain of using these three type of stimulation. In this talk we will present the work that has been done at the Center for Rapid and Sustainable Product Development, regarding new biomaterials and the development of 3D biofabrication equipment to produce and host these scaffolds. The main focus is on computer modelling. We introduce a finite element analysis approach used to optimise the design of a new bioreactor allowing mechanical stimulation. We present the numerical results of the application of electrical stimulation in a biocompatible scaffold. We have performed the optimisation of the application of electrical stimulation when different electrode montages are used.

The results have allowed us to gain a valuable insight on the influence of the different stimulation parameters involved. This work is supported by the Fundação para a Ciência e a Tecnologia (FCT) through the Project references: UID/Multi/04044/2013; PAMI - ROTEIRO/0328/2013 (Nº 022158) and MATIS (CENTRO-01-0145-FEDER-000014 - 3362).



Figure 1 Examples of highly porous scaffolds produced by direct digital manaufacturing for use in tissue engineering [5].

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Biography

Nuno Alves is the Director of the Centre for Rapid and Sustainable Product Development (CDRSP), which is dedicated to the transformation of the manufacturing industry through the development and implementation of novel Additive Manufacturing (AM)/three/four-dimensional (3D/4D) printing technology. He is an Associate Professor on Computer Modelling and Simulation at the Polytechnic Institute of Leiria (PIL). His research interests are based on the development and exploitation of novel direct digital manufacturing systems, contributing for the new paradigm of the industry 4.0 (as recently named new industrial and societal revolution), mainely based on additive manufacturing/printing techniques, including computer-aided modelling and fabrication of complex multi-material 3D and 4D structures (with spatio-temporal varying properties) for both industrial and biomedical applications; Computer vision and photogrammetry; Biomimetics and bioinspiration (learn from nature); Tissue engineering; Mould design and polymer injection moulding; Rapid product development; and Circular economy.

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Notes:







19th World Congress on

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Scientific Tracks & Abstracts

Day 3

Materials Congress 2018

Sessions:

Materials for Energy and Environmental Sustainability | Emerging Smart Materials | Nanomaterials and Nanotechnology | Graphene and 2D Materials

Session Chair
Takashi Tokumasu
Tohoku University, Japan

Session Co-Chair
Alberto Jimenez Suarez
Universidad Rey Juan Carlos, Spain

Session Introduction

Title: **Stacking Fault Energies for fcc Co-based Binary Alloys: A first principles study**
R Lizárraga, Royal Institute of Technology, Sweden

Title: **Nanoscale transport phenomena of reaction materials in polymer electrolyte fuel cell**
Takashi Tokumasu, Tohoku University, Japan

Title: **Development of nanoreinforced resins with self-heating capabilities for 3D printing technologies**
Alberto Jiménez Suárez, Universidad Rey Juan Carlos, Spain

YRF: **Manganese acetylacetonate as the precursor of high capacitance manganese oxides nanoparticles – the only active component in the supercapacitor electrode**
Alice W M Chan, The Chinese University of Hong Kong, Hong Kong

YRF: **Highly charge polarized elemental phosphorus microbelt photocatalyst growing on liquid bismuth substrate**
Yang Liu, The Chinese University of Hong Kong, China

YRF: **Microstructure evolution of A356 aluminum alloy reinforced with Si3N4 particles during mechanical milling**
Heydi Fernandez, Universidad de Santiago de Chile, Chile

YRF: **Defect States in Hexagonal Boron Nitride: Assignments of Observed Properties and Prediction of Properties relevant to Quantum Computation**
Sajid Ali, University of Technology Sydney, Australia

YRF: **Isolation of 2D Material by sand paper abrasion**
Peetam Mandal, National Institute of Technology Agartala, India

R. Lizárraga et al., J Material Sci Eng 2018, Volume 7
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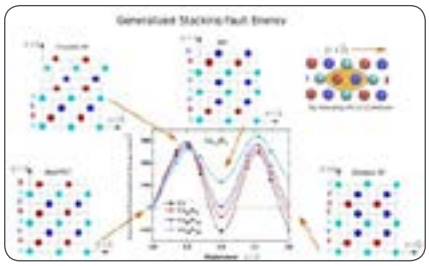
Materials Science and Engineering

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Stacking fault energies for fcc co-based binary alloys: a first principles study

R. Lizárraga[1], **L. Tian**[1], **H. Larsson**[1], **E. Holmström**[2] and **L. Vitos**[1]
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[2] Sandvik Coromant, Sweden

The stacking fault energy is closely related to structural phase transformations and can help to understand plastic deformation mechanisms in materials. Here we perform first principles calculations of the stacking fault energy in the face centered cubic (fcc) Cobalt-based binary alloys $Co_{1-x}M_x$, where M = Cr, Fe, Ni, Mo, Ru, Rh, Pd and W. We investigate the concentration range between 0 and 30 at. % of the alloying element. The results are discussed in connection to the phase transition between the low-temperature hexagonal close packed (hcp) and the fcc structures observed in Co and its alloys. By analyzing the stacking fault energies, we show that alloying Co with Cr, Ru, and Rh promotes the hcp phase formation while Fe, Ni and Pd favor the fcc phase instead. The effect of Mo and W on the phase transition differs from the other elements, that is, for concentrations below 10 % the intrinsic stacking fault energy is lower than that for pure fcc Co and the energy barrier is higher, whereas above 10\% the situation reverses. We carry out also thermodynamic calculations using the Calphad method. The trends of the ab initio stacking fault energy are found to agree well with those of the molar Gibbs energy differences and the phase transition temperature in the binary phase diagrams and give a solid support for the phase stability of these alloys.



Recent Publications

1. L. Tian, R. Lizárraga et al. (2017) A First Principles Study of the Stacking Fault Energies for fcc Co-based Binary Alloys. Acta Materialia 136:215-223.
2. R. Lizárraga et al. (2017) First Principles Theory of the hcp-fcc Phase Transition in Cobalt. Scientifc Reports 7:3778
3. R. Lizárraga (2016) Structural and magnetic properties of the Gd-based bulk metallic glasses GdFe2, GdCo2, and GdNi2 from first principles. Phys. Rev. B 94:174201.
4. M. Araujo et al. (2014) Disorder-induced room temperature Ferromagnetism in Glassy Chromite. Scientific Reports 4:4686.
5. A. Lindmaa, R. Lizárraga et al. (2013) Exchange interactions in paramagnetic amorphous and disordered crystalline CrN-based systems. Phys. Rev. B 88:054414

Biography

R. Lizárraga is a researcher at the department of Materials Science and Engineering at the Royal Institute of Tecknology in Seden. She has large expertise in ab initio calculations. She has great knowledge on magnetism of transition metals and rare earth systems. She has also studied materials with lack of periodic order, such as glassy systems. She has used an ab-initio method, the stochastic quenching method to study the amorphous structure of glassy materials. Recently she has studied the problem of Co substitution in cemented carbides. By studying stacking fault energies she has been able to identified possible alternative substitutions for Co, which is an important industry problem..

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Takashi Tokumasu, J Material Sci Eng 2018, Volume 7
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Nanoscale transport phenomena of reaction materials in polymer electrolyte fuel cell

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Polymer Electrolyte Fuel Cells (PEFC) are expected to be as one of next-generation power supply systems due to its low environmental damage, high efficiency, and availability for dispersed power systems and emergency use. Transport resistance of reactant and product materials such as proton, oxygen and water is the determining factor of its efficiency and therefore it is necessary to analyze the transport phenomena of proton, oxygen and water in PEFC as fast as possible to increase its performance and efficiency. Computational Fluid Dynamics (CFD) based on macroscopic transport equations is often used as a conventional numerical analysis. A Membrane Electrode Assembly (MEA) of PEFC, however, consists of Gas Diffusion Layers (GDL), Micro Porous Layers (MPL), Catalyst Layers (CL), and a Polymer Electrolyte Membrane (PEM), where many nanoscale structures are constructed. In such flow fields, the characteristics of transport phenomena in MEA cannot be analyzed at the macroscopic point of view. Molecular simulation is a powerful tool to analyze these phenomena. In this study these nanoscale transport phenomena are analyzed by large scale Molecular Dynamics (MD) simulations and the relation between the nanoscale structures and the transport phenomena is analyzed in detail (Figure 1). Especially, the transport phenomena of proton in PEM which has highly anisotropic water structures, oxygen permeability, oxygen scattering and proton diffusivity of ionomer in CL, and the transport phenomena of nanoscale water droplet in MPL were simulated. In the analysis of proton transfer in PEM and ionomer, we considered not only Vehicle mechanism but also Grotthus mechanism and the diffusivity of proton at various water contents was estimated. This information leads to a new design concept of materials for next generation polymer electrolyte fuel cells.

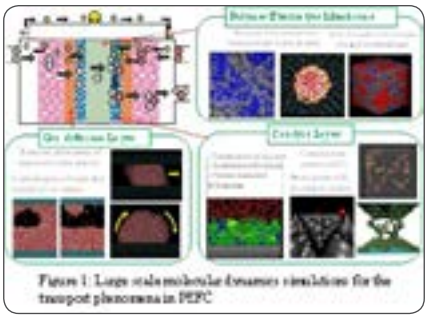


Figure 1: Large scale molecular dynamics simulations for the transport phenomena in PEFC

Recent Publications

1. Kurihara Y, Mabuchi T, Tokumasu T (2017) Molecular Analysis of Structural Effect of Ionomer on Oxygen Permeation Properties in PEFC. J. Electrochem. Soc. 164: F628-F637.
2. Mashio T, Ohma A, Tokumasu T (2016) Molecular Dynamics Study of Ionomer Adsorption at a Carbon Surface in Catalyst Ink. Electrochimica Acta 202: 14-23.
3. Fukushima A, Mima T, Kinefuchi I, Tokumasu T (2015) Molecular Dynamics Simulation of Channel Size Dependence of the Friction Coefficient between a Water Droplet and a Nanochannel Wall. J. Phys. Chem. C 119: 28396-28404
4. Mabuchi T, Fukushima A, Tokumasu T (2015) A Modified Two-state Empirical Valence Bond Model for Proton Transport in Aqueous Solutions. J. Chem. Phys. 143: 014501.
5. Sakai H, Tokumasu T (2015) Quantum Chemical Analysis of the Deprotonation of Sulfonic Acid in a Hydrocarbon Membrane Model at Low Hydration Levels. Solid State Ionics 274: 94-99.

Biography

Takashi Tokumasu is a professor of Institute of Fluid Science, Tohoku University. He has his expertise in analyzing nanoscale flow phenomena. Especially, he is focusing on the effect of quantum characteristics of molecules on macroscopic flow and thermodynamic phenomena. Moreover, he applies this technique and knowledge to the development of materials for next generation fuel cells. He performs large scale molecular dynamics simulations to analyze such nanoscale flow phenomena. He developed a molecular model which can treat proton hopping by classical molecular dynamics method (Mabuchi, Fukushima and Tokumasu, 2015). By using this model the relation between nanoscale structures of material and nanoscale flow phenomena of reactant and product materials can be analyzed. He also analyzes the transport mechanism of ions in solid materials.

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Notes:

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Development of nanoreinforced resins with self-heating capabilities for 3D printing technologies

A. Jiménez-Suárez, A. Cortés, M. Campo and **A. Ureña**
Universidad Rey Juan Carlos, Spain

The use of 3D printing technologies has attracted the interest of the industrial and scientific community during last decades. The possibility of quick and non-costly redesign can be used also for repairing and easy replacement structures after in service wear. Present work used Direct Write technology to print nanoreinforced resin circuits on continuous fiber reinforced polymers (CFRPs). The use of a carbon nanostructure resin would allow electrical conductivity through the resin circuit which could be used for structural health monitoring (SHM) and/or self-heating by Joule effect. This last effect could be used to create the first layer of a multilayer coating with anti-icing purposes taking advantage of the self-heating capability of this coatings by Joule effect. Previous research has allow the selection of graphene nanoparticles (GNP) and carbon nanotubes (CNT) as nanoreinforcements to modify the epoxy resin and allow Joule effect heating. Nevertheless, the characteristics of Direct Write 3D printing technology as well as morphology of the printed lines, do not allow the direct extrapolation of results obtained in bulk nanocomposites to the printed circuits. Thus, it requires an optimization of the carbon nanostructures contents to allow resin flow through the injector as well as the formation of conductive nanoparticle networks. The morphology of the printed circuit, the voltage applied and the type and content of carbon nanoparticles need to be tuned in order to improve the anti-icing purpose. The study has determined that the greatest influence is the carbon nanotube content followed by the voltage and circuit morphology. The selected conditions allowed to melt the frozen distilled water built-up on a fiber reinforced polymer composite similar to those that could be find in wind turbine blades.



Fig. 1. Image of the 3D printed circuits based on nanoreinforced epoxy resin with carbon nanostructures

Recent Publications

1. Moriche R, Jiménez-Suárez A, Sánchez M, Prolongo S.G, Ureña A. (2018) Sensitivity, influence of the strain rate and reversibility of GNPs based multiscale composite materials for high sensitive strain sensors. Compos Sci Tech 155:100-107.
2. Fernandez Sanchez-Romate X.X, Molinero J, Jiménez-Suárez A, et al. (2017) Carbon nanotube-doped adhesive films for detecting crack propagation on bonded joints: A deeper understanding of anomalous behaviors. ACS Applied Materals and Interfaces 9:43267-43274.
3. Moriche R, Jiménez-Suárez A, Sánchez M, Prolongo S.G, Ureña A. (2017) Graphene Nanoplatelets coated lass fibre fabrics as strain sensors. Compos Sci Tech 146:59-64.
4. Prolongo S.G, Moriche R, Del Rosario G, Jiménez-Suárez A et al. (2016). Joule effect self-heating of epoxy composites reinforced with graphitic nanofillers. Journal of Polymer Research 23:189.
5. Jiménez-Suárez A, Campo M, Prolongo. S.G et al. (2016). Effect of filtration in functionalized and non-functionalized CNTs and surface modification of fibers as an effective alternative approach. Composites Part B: Engineering 94:286:291.

Biography

A. Jiménez-Suárez has his expertise in the optimization of manufacturing processes of nanoreinforced matrices and multiscale reinforced composites with multifunctional capabilities. His research started with optimization of mechanical routes of dispersion for carbon nanofibers and carbon nanotubes with improved electrical and mechanical conductivities as well as better barrier properties. Afterwards this research is translated into graphene nanoparticles based nanocomposites and the use of these nanoreinforced matrices to manufacture multiscale reinforced composites. These multifunctional composites showed improved interlaminar shear strength and self-sensing capabilities for structural health monitoring (SHM). Finally, recent publications are related to parametric modeling of properties as a function of morphological aspects of nanoreinforcements and manufacturing processing parameters and the introduction of carbon nanostructures in polymer matrices to be used in 3D printing technologies to obtain multifunctional materials with SHM, anti-icing, de-icing capabilities among others.

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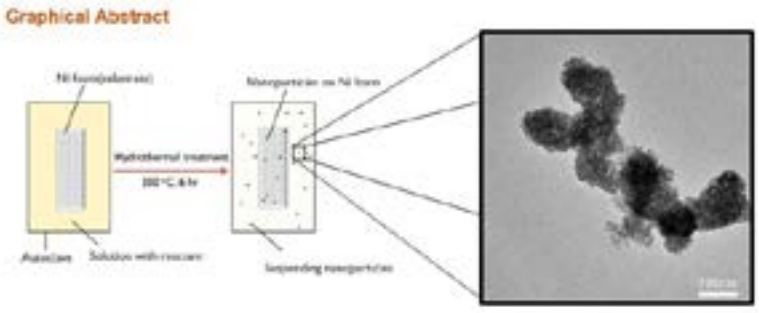
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Alice W M Chan, J Material Sci Eng 2018, Volume 7
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Manganese acetylacetonate as the precursor of high capacitance manganese oxides nanoparticles – the only active component in the supercapacitor electrode

Alice W M Chan
The Chinese University of Hong Kong, Hong Kong

Supercapacitors are of attractive for energy storage applications, such as back-up power supplies for batteries and boosting power for vehicle acceleration. Researchers are seeking for materials which outperform the high-capacitance ruthenium oxide in terms of its cost and abundance cost effective application in the reality. One of the suitable materials is manganese dioxide, which theoretical capacitance is as high as 1370 F/g. However, the experimental capacitances of the synthesized manganese oxides were usually below 500 F/g even if the material was fabricated with other materials (e.g. gold, graphene oxide, etc.) for property enhancement. In this research, manganese oxides nanoparticles (~10nm) are synthesized by hydrothermal treatment of manganese (II) acetylacetonate in ethanol. The electrode for measurement is prepared in a similar way by putting a piece of nickel foam in the reaction mixture. Although the particles are of low crystallinity, its capacitance is over 700 F/g at 18 A/g as confirmed by the measurement in galvanostatic charge/discharge method. Other analyses and characterizations of the pseudocapacitor are done by including CV, ICP, TEM and XRD etc.



Biography

Alice W M Chan received her Bachelor Degree in Chemistry from the Chinese University in Hong Kong in 2016. She is now a postgraduate student with the supervision of Prof. Jimmy C Yu in the same institution. Her main research interest is in Environmental Chemistry, focusing on photocatalysis and supercapacitor.

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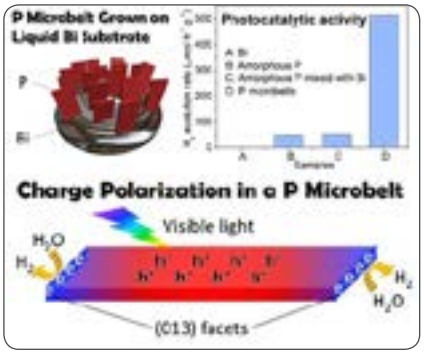
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Yang Liu et al., J Material Sci Eng 2018, Volume 7
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Highly charge polarized elemental phosphorus microbelt photocatalyst growing on liquid bismuth substrate

Yang Liu, Zhuofeng Hu and **Jimmy C. Yu**
The Chinese University of Hong Kong, China

Charge polarization is an interesting phenomenon. We have observed this effect in crystalline red phosphorus (P). A relatively large-scale (up to 100×10×0.3 μm^3) single crystal red P microbelts were prepared on liquid bismuth (Bi) substrate via a thermal vaporization method. Under visible light illumination, the P microbelts become highly charge polarized. Electrons accumulate on the two ends which become negatively charged, while the middle of the microbelts becomes positive. Water can be reduced to hydrogen on the two ends with higher electrons density. Such polarization can suppress the charge recombination and thus enhances charge transfer efficiency. Compared with amorphous P where charge carriers are randomly distributed, the photocatalytic efficiency of P microbelts exhibits a 10 times enhancement. The polarization property of P microbelts is confirmed by facet-selective photo-reduction of platinum (Pt) and theoretical calculations.



Recent Publications

1. Y. Q. Chen, C. Q. Yang, T. Li, M. Zhang, Y. Liu, M. A. Gauthier, Y. B. Zhao and C. L. Wu* (2015) The Interplay of Disulfide Bonds, α-Helicity, and Hydrophobic Interactions Leads to Ultrahigh Proteolytic Stability of Peptides. 16 (8) 2347–2355.

Biography

Yang Liu received her B,Sc. Degree from Xiamen University in 2019, She is currently pursuing her PhD degree in the Department of Chemistry, The Chinese University of Hong Kong. Her research interests primarily focuse on photocatalytic hydrogen evolution, removal of organic pollutants and nitrogen fixation over phosphorus-based photocatalysts.

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Notes:

Heydi Fernandez et al., J Material Sci Eng 2018, Volume 7
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Microstructure evolution of A356 aluminum alloy reinforced with Si_3N_4 particles during mechanical milling

Heydi Fernandez[1], **Matteo Leoni**[2] and **Stella Ordoñez**[1]
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[2]Universita degli Studi di Trento, Italia

Nano-composite A356-Si_3N_4 alloys were obtained by co-milling aluminium alloy A356 with different mass fractions (10, 20 and 30%) of Si_3N_4 in a planetary mill. The structural and microstructural modifications at different stages of the mechanical milling were investigated using Scherrer formula and Whole Powder Pattern Modeling (WPPM) of the X-ray powder diffraction (XRPD) pattern. Due to the inhomogeneity of the microstructure of the starting powder and of the milling process, the WPPM of XRPD data required the hypothesis of a multimodal distribution and the coexistence of multiple Al alloy fractions with different Si content. By increasing the milling time and the amount of reinforcing particles, the inhomogeneity decreases and a single lognormal distribution is enough to model the data. The dependence of lattice parameters on the coherent domain (crystallite) size during milling has been investigated. The lattice parameters were calculated in view of the non-equilibrium grain boundary structure that evolved during milling using excess free volume and the interfacial stresses at the grain boundaries.

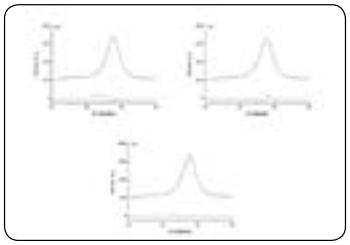


Figure 1: Experimental pattern of A356-10%Si3N4 composite at 3h of milling (black line), WPPM result (red line) and residual (blue line) of 200 reflection. The analysis using a lognormal distribution (a), using a free form size distribution (b) and using a bimodal lognormal distribution (c).

Recent Publications:

1. H. Arik, Production and characterization of in situ Al4C3reinforced aluminum-based composite produced by mechanical alloying technique, Mater. Des. 25 (2004) 31–40.
2. P. Scardi, M. Leoni, Whole powder pattern modelling, Acta Crystallogr. Sect. A Found. Crystallogr. 58 (2002) 190–200. doi:10.1107/S0108767301021298.
3. S. Ordóñez, O. Bustos, R. Colás, Thermal and microstructural analysis of an a356 aluminium alloy solidified under the effect of magnetic stirring, Int. J. Met. 3 (2009) 37–41.
4. J. Chevrier, D. Pavuna, F. Cyrot-Lackmann, Electronic properties and superconductivity of rapidly quenched Al-Si alloys, Phys. Rev. B. 36 (1987) 9115–9121. doi:10.1103/PhysRevB.36.9115.
5. A.K. Srivastav, N. Chawake, B.S. Murty, Grain-size-dependent non-monotonic lattice parameter variation in nanocrystalline W: The role of non-equilibrium grain boundary structure, Scr. Mater. 98 (2015) 20–23. doi:10.1016/j.scriptamat.2014.11.005.

Biography

Heydi Fernandez has her expertise in physico-chemical and structural characterization of materials. She is a regular student of the Science and Engineering Materials PhD program at University of Santiago de Chile (USACH), granted with the National Doctorate Scholarship CONICYT. She is developing her thesis in the area of powder metallurgy, specifically studying the microstructural and mechanical evolution of composites of aluminum alloy A356 reinforced with Si3N4. Her has worked with Nanomaterials as sorbent of divalent metal ions and dyes, also in the use of X-ray diffraction techniques and specifically in the microstructural refinement and texture analysis with the PM2K code for WPPM.

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A. Sajid et al., J Material Sci Eng 2018, Volume 7
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Defect states in hexagonal boron nitride: Assignments of observed properties and prediction of properties relevant to quantum computation

A. Sajid[2], **Jeffrey R. Reimers**[1] and **Michael J. Ford**[1]
[1]University of Technology Sydney, Australia
[2]GC University, Pakistan

Hexagonal boron nitride (h-BN) is a wide band gap (~6 eV) 2-dimensional (2-D) material with the potential to host many such colour centres [1-8] that are promising candidates for quantum applications. Defects can dramatically alter the electronic and magnetic properties of the host Semiconductor. While both nitrogen (Nv) and boron (Bv) vacancies can act as paramagnetic centres in h-BN [9], electron paramagnetic resonance (EPR) studies indicate that Nv are more important [10-15]. Two types of paramagnetic centres have been identified: (i) three-boron centres (TBC) in which an unpaired electron interacts with three equivalent boron (B^{11}) nuclei, producing 10-line EPR spectra, and (ii) one-boron centres (OBC) in which an unpaired electron interact with only a single B^{11}, producing 4-line EPR spectra. A-priori calculations using density-functional theory (DFT) can provide useful tools for the interpretation of EPR by comparing the experimental and calculated hyperfine constants [16-20]. We consider detailed models of the TBC and OBC defects in h-BN, as well as proposing many new defect centres, particularly defects involving introduced carbon impurity atoms one's which are thought of being responsible for single photon emission in hBN. We do Group-theoretical analysis to suggest new directions for experimental studies. Key properties of 9 possible defect sites in hexagonal boronitride (h-BN), V_N, V_N-1, C_N, V_NO_{2B}, V_NN_B, V_NC_B, V_BC_N, $V_BC_NSi_N$, and $V_NC_BSi_B$, are predicted using density-functional theory (DFT) that are corrected by applying results from high-level ab initio calculations. Detailed consideration of the available excited states, allowed spin-orbit couplings, zero-field splitting, and optical transitions is made for the two related defects V_NC_B(Fig.1.) and V_BC_N. We propose that ground-state spin polarization and long-lived quantum memory in h-BN can be achieved for V_BC_N and V_NC_B respectively.

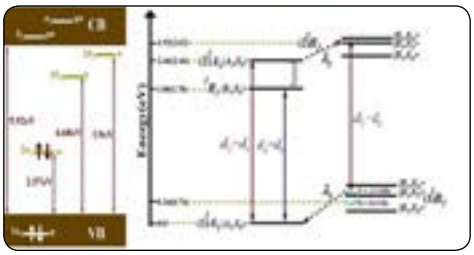


Figure 1: (a) Key DFT orbitals from the (1)1A1 closed-shell ground-state electronic structure of VNCB. The states are labelled according to the symmetry of Irreducible representation as per C2v point group. x(y,z)-axis are perpendicular(in the) to the plane of defect. (b) HSE06 adiabatic energies of low lying states of VNCB as calculated by DFT, with, in (), these energies corrected according to ab initio CCSD(T), EOMCCSD, and CASPT2 calculations for a model compound [23]. Allowed transition polarizations d, spin-orbit couplings driving non-radiative transitions and zero-field splittings are also indicated.

Recent Publications:

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2. J. Reimers, A. Sajid, R. Kobayashi, and M. Ford, Journal of chemical theory and computation (2018).
3. (A.Sajid, S. A. Tawfik)Equal Authors, M. Fronzi, M. Kianinia, T. T. Tran, C. Stampfl, I. Aharonovich, M. Toth, and M. J. Ford, Nanoscale (2017).
4. G. Grosso, H. Moon, B. Lienhard, A. Sajid, D. K. Efetov, M. M. Furchi, P. Jarillo-Herrero, M. J. Ford, I. Aharonovich, and D. Englund, Nature Communications 8, 705 (2017).
5. i. Zhu, L. L. C Lem, T. Nguyen, K. Fair, A. Sajid, M. J Ford1, M. R. Phillips1 and C. Ton-That Journal of Physics D: Applied Physics, 50(2017).

Biography

A. Sajid Ali has his expertise in DFT and quantum chemistry approaches for simulating the material properties. He also uses group theory analysis to study the defect induced properties of Materials. His recent(PhD) work is majorly focused on studying the mechanism of Quantum Emsission from Defects in Hexagonal Boron Nitride. He is currently a final year PhD student at University of Technology Sydney Australia. and has already published a number of papers in high quality journals.

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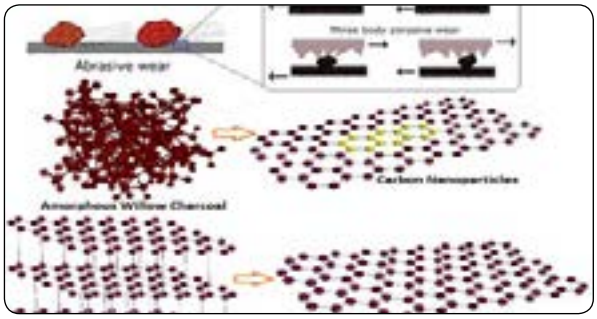
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Isolation of 2D Material by sand paper abrasion

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National Institute of Technology Agartala, India

The research on nanocarbons has expanded over the past 20 years, including the structures viz. zero dimensional (fullerenes)1, one-dimensional (nanotubes)2, and two dimensional (graphene)3, where the properties are mainly governed by a set of parameters including their size, morphology and structure. The preparation process largely involves arc-discharge, laser ablation, gas-phase catalytic growth from carbon monoxide and chemical vapor deposition (CVD) from hydrocarbons, involving a lot of energy and industrial preparation becomes onerous. The controlled synthesis of nanocarbons is the key factor to manipulate and tailor their characteristics4. The realm of carbonaceous materials in their nano form have a diverse applications and at the same time fabricating high quality of such materials is quite challenging. In this article, we have used an ultra-fine silicon carbide sandpaper for chiseling willow charcoal and graphite rods for the isolation of nanocarbons viz. Carbon Nanoparticles and Graphene. This fabrication process produced value added products from the precursor materials in large quantity. The probable abrasive wear mechanism was elucidated and the final products were characterized using SEM, Raman spectroscopy, TEM and XRD.



Recent Publications:

1. H. W. Kroto, J. R. Heath, S. C. O'Brien, R. F. Curl and R. E. Smalley, (1985) This Week's Citation Classic® Nature, 318, 162.
2. S. Iijima, Helical microtubules of graphitic carbon. Nature. (1991) 354(6348):56.
3. KS Novoselov, AK Geim, SV Morozov, D. Jiang, Y. Zhang, SV Dubonos, IV Grigorieva, AA Firsov, (2004) Electric field effect in atomically thin carbon films, Science 306, 666
4. P. Mandal, M. J. P. Naik, M. Saha, (2018) Room temperature synthesis of Graphene, Crystal Research and Technology Doi: 10.1002/crat.201700250

Biography

Peetam Mandal has completed his 5 years integrated M.Sc with a First Division in Applied Chemistry from Central University of Jharkhand, Ranchi, India . He has joined the Department of Chemistry, NIT Agartala as regular PhD student. His research area includes the synthesis of carbon nanoparticles/ graphene/ graphene oxide/ nanocomposites and their application in solar cell.

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Sessions:

Physics and Chemistry of Materials | Mechanics, Characterization Techniques and Equipments Materials Science and Engineering | Metals, Mining, Metallurgy and Materials

Session Chair
Richard Weihrich
University of Augsburg, Germany

Session Introduction

Title: **Preparation and Characterization of Novel NLO Solids in As-O-Mo, As(P)-O-Mo(W) and As(P)-O-Nb(W) systems**
Nick Gerasimchuk, Missouri State University, USA

Title: **Combining computational design and soft synthesis to a resource efficient green chemistry of novel functional materials**
Richard Weihrich, University of Augsburg, Germany

Title: **Ultra-low energy SEM/STEM of graphene**
Ludek Frank, Czech Academy of Sciences, Czech Republic

Title: **Prediction of intermetallic phase layer thickness in laser assisted hybrid friction stir welding of aluminium to steel**
Hee Seon Bang, Chosun University, Korea

YRF: **Correlation between magnetic saturation and component in WC-Ni85Fe15 alloys**
Ruiwen Xie, Royal Institute of Technology, Sweden

YRF: **Analysis of strengthening mechanisms in nano-ODS Steel depending on preparation route**
Alessandra Fava, University of Rome "Tor Vergata", Italy

YRF: **Development of CNT-reinforced ceramic matrix composites for wear-resistance application and light- weight high strength CNT-reinforced epoxy composite**
Dipanjana De, National Institute of Technology Agartala, India

YRF: **Study of a Fluidized Bed Reactor to Produce Green-Carbon Nanotubes at Pilot Scale**
Andrés Muñoz, University of Antioquia, Colombia

YRF: **Compherensive comparison of epitaxially grown gan layer grown on conventional sapphire and patterned sapphire substrates**
Ismail ALTUNTAS, Cumhuriyet University, Turkey

YRF: **On the efficiency of Cyclodextrin Inclusion complexes with Ibuprofen and Naproxen**
Stiliyana Pereva, Sofia University, Bulgaria

YRF: **The influence of Nb content on the mechanical properties of micro alloyed low carbon steels**
Tamara Aleksandrov Fabijanic, University of Zagreb, Croatia

Nick Gerasimchuk et al., J Material Sci Eng 2018, Volume 7
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Preparation and Characterization of Novel NLO Solids in As-O-Mo, As(P)-O-Mo(W) and As(P)-O-Nb(W) systems

Nick Gerasimchuk[1], Frank Romindger[2], Soma Ghosh[3], Yu Ping[3], Meriem Goudjil[4]
[1]Missouri State University, USA
[2]Heidelberg University, Germany
[3]University of Missouri-Columbia, USA
[4]Université d'Alger, Alger

Mixed valence solids such as oxides based on molybdenum blues and tungsten bronzes recently found useful applications as semiconductors and catalysts. Despite some considerable efforts in the past, many of these interesting systems were not sufficiently investigated. We attempted systematic studies in this area of solid state chemistry and prepared several new systems for their subsequent investigations and evaluation of practical applications in the outlined above fields. Thus, interactions between well mixed fine powders of As_2O_3, P_2O_5, MoO_3, WO_3 and Nb_2O_5 at different stoichiometry in quartz ampoules under vacuum at ~1000oC in the presence of metallic molybdenum (or niobium) within several weeks lead to shiny dichroic crystalline materials formed in cooler parts of the reaction vessel. An addition of small quantities of metals – Mo or Nb – was done with the aim of partial reduction of their highly oxidized Mo(VI), W(VI) or Nb(V) species to corresponding Mo(V), W(V) and Nb(IV) centers in order to form mixed valence solids. Sublimed crystals were investigated using a variety of techniques including XRD methods (powder, single crystals), spectroscopy (visible diffusion reflectance, IR, Raman and EPR), second harmonic generation (SHG), TG/DSC under N_2 and air atmosphere, and electrical conductivity studies. Results evidenced the formation of new, complex solids of previously unknown compositions that all crystallized in non-centrosymmetric, polar space groups. There were Mo(V) and Nb(IV) species detected in lattices by the EPR spectroscopy (Figure 1) both in coupled state, and as isolated centers of slightly different symmetry. Thermogravimetric data and careful ICP analyses studies allowed accurate determination of content of solids and % of reduced metal ions. All new solids exhibit strong SHG effect based on YAG 1064 nm tests. Structures of new solids and aspects of their practical usefulness are discussed.

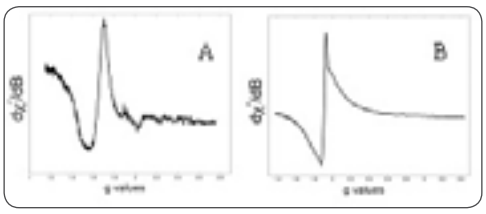


Figure 1. The EPR spectra of Nb(IV) species in crystalline Nb5P3O18 (A) and Mo12P4O45 powder at 80K showing both Mo(V) and trapped oxygen radical in the lattice (B).

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Biography

Nick Gerasimchuk is Full Professor of Inorganic Chemistry at Missouri State University (USA). His research interests and expertise lay in the following areas: 1) the 1D coordination polymers as cytotoxic NIR emitters for theranostic applications; 2) mixed valence compounds; 3) novel antimicrobials based on silver and antimony oximates; 4) physical methods of investigation of inorganic and coordination compounds, including small molecules crystallography of inorganic and coordination compounds; 5) equipment design for synthetic inorganic/materials chemistry.

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Notes:

Richard Weihrich, J Material Sci Eng 2018, Volume 7
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19th World Congress on

Materials Science and Engineering

June 11-13, 2018 | Barcelona, Spain

Combining computational design and soft synthesis to a resource efficient green chemistry of novel functional materials

Richard Weihrich
University of Augsburg, Germany

Statement of the Problem: Megatrend developments from digitalisation to environmental challenges and the scarcity of resources drive an increasing need for new materials. They should be smart, low dimensional (from 3D to 2D and nano size) and highly functional – Phosphorene is a good example. Materials and their processing should also be "green" and resource efficient. This causes a still puzzling question to find the "right" material within the large number of possible combinations of chemical elements from a systematic approach.

Methodology & Theoretical Orientation: We report on the combination of soft experimental chemistry and computational materials design within the phase diagram A-M-Ch. First, we focus on main group metals A like Phosphorous (P) [1, 2] and Phosphorene allotropes with a systematical understanding of structures and properties. Next we ask for the understanding and design of ternary materials like helical SnIP [3], pyrites MACh, and half perovskites $AM_{3/2}X$ [4,5].

Findings: From our cooperative work phosphorene like P_xA_{1-x} and helical SnIP were recently described as smart 2D and 1D semiconductors with tunable band gaps. Within ternary A-M-X compounds superconducting parkerites and shandite like $Sn_2Co_3S_2$ and became a highly fascinating 2D system for spintronic, thermodynamic and skyrmionic properties. From computational chemistry and experiment a rational design to tune specific properties upon substitution could be reached. Further a guided synthesis could be reached by predicting stable and metastable compositions and structures. With the scheme of energy diagrams formation and decay of compositions as well as the formation of competing products are predicted. Novel results on new 3D and 2D materials are presented, that are reached by novel soft and conversion synthesis.

Conclusion & Significance: the combination of modern computational and synthetic inorganic chemistry leads an efficient way to green materials design.

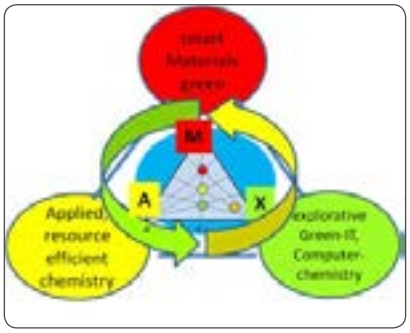


Figure 1. Combination of green and applied ressource efficient computer and experimental chemistry.

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Biography

Richard Weihrich is professor for chemistry of materials and resources (CMR) at the institute of materials resource management (MRM) of the University of Augsburg, Germany. He studied chemistry in Regensburg with Diploma, PhD and habilitation thesis. Therein he developed the combined use of methods of experimental and theoretical chemistry to discover and to exploit novel materials.

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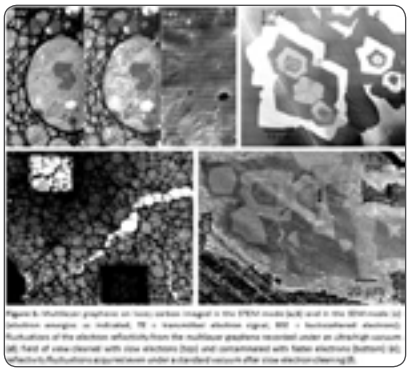
Notes:

Ludek Frank et al., J Material Sci Eng 2018, Volume 7
DOI: 10.4172/2169-0022-C8-113

Ultra-low energy SEM/STEM of graphene

Ludek Frank and **Eliska Mikmekova**
Czech Academy of Sciences, Czech Republic

Graphene sheets, including multilevel stacks, are nearly fully transparent for electrons at energies standard in electron microscopes. Graphene has even been considered an ideal substrate for the deposition of, for example, organic macromolecules for their observation in a scanning (transmission) electron microscope (SEM/STEM). The cathode lens principle with a negatively biased sample in the SEM/STEM enables one to obtain an arbitrarily low energy of electrons securing an ultimately reduced interaction volume providing the image information. The image contrast has been found to be sufficient for distinguishing graphene flakes at tens and units of eV in the STEM, and the electron transmissivity surprisingly showed values in units of percent only in this energy range. Expectations based on the usual extension of the inelastic mean free path of electrons below some 50 eV have not been confirmed. The electron transmissivity at tens of eV has proven a reliable tool for counting the graphene layers as an alternative to Raman spectroscopy providing much enhanced lateral resolution. Graphene layers grown by the CVD method on substrates exhibit contrasts connected with electron reflectivity fluctuations below about 8 eV and also in a second band around 15 eV in the ultra-low-energy SEM. This phenomenon can also be employed for counting the graphene layers because we get n-1 minima of reflectivity on n graphene layers. Observation at ultra-low electron energies, in particular under standard high-vacuum conditions, faces surface contamination owing to the electron-beam-induced deposition of carbon from spontaneously adsorbed hydrocarbon precursors. This fatal phenomenon mostly prevents us from performing true surface studies under the standard high vacuum (10-6 to 10-7 mbar). However, electrons bombarding surfaces at tens of eV have proven themselves to release hydrocarbon molecules instead of decomposing them, so ultimately cleaned surfaces are obtained.



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Biography

Ludek Frank is a senior researcher at the Institute of Scientific Instruments of the Czech Academy of Sciences. He has expertise in the methodology of electron microscopy and spectroscopy with an emphasis on low-energy electron applications. Currently he is studying the scanning transmission electron energy at near-zero energies of electrons and its application in material as well as biomedical sciences. Eliska Mikmekova is a staff researcher at the same Institute and head of the Group of Microscopy and Spectroscopy of Surfaces. She has expertise in the generation and diagnostics of ultrafine layers and 2D crystals. She is also developing and promoting the method of electron-stimulated desorption of adsorbed hydrocarbons.

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Notes:

Hee Seon Bang et al., J Material Sci Eng 2018, Volume 7
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Prediction of intermetallic phase layer thickness in laser assisted hybrid friction stir welding of aluminium to steel

Hee Seon Bang[2], Seong Min Hong[1], Atanu Das[2] and **Han Sur Bang[2]**
[1,2]Chosun University, Korea

Hybrid friction stir welding (HFSW) is an advanced solid-state welding process that can produce sound joint in between dissimilar materials possess different thermo-physical properties such as aluminium and steel. The crucial problem in joining of aluminium to steel is the low solubility of aluminium in iron leads to form brittle intermetallic phase layer. The existence of intermetallic phase layer is desirable for suitable joint quality; however, excessive growth of the phase layer deteriorate the joint strength. Conventional friction stir welding successfully joins aluminium to steel with controlling the growth of phase layer thickness, however, excessive tool wear and forming defects are the significant limitations of this process. These drawbacks may be overcome in HFSW process by introducing an additional heat source to pre-heat the harder material like steel and at the same time placing the tool in an optimal location for sufficient material flow around the tool. In the published literature, little efforts are available to understand the influence of joining conditions on growth of the phase layer thickness in hybrid friction stir welding of aluminium to steel. In the present study, an attempt is undertaken to estimate the growth of the intermetallic phase layer in laser-assisted hybrid friction stir butt welding of 2.5 mm thick AA5052 alloy to 1.4 mm thick ultrahigh strength steel DP590 through numerical analysis. A 3-dimensional conduction heat transfer based model using finite element method is developed to simulate the HFSW process. The estimated thermal cycles and peak temperatures at the joint interface from the numerical model are used to estimate the phase layer thickness. Further, the impact of the distance between the tool and laser on the growth of layer thickness is studied.

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Biography

Hee Seon Bang is working as a chair professor in Welding and Joining Science Engineering department at Chosun University. Her main research interest area in the area of joining science and technology, conventional and hybrid friction stir welding, laser beam processing and process modelling.

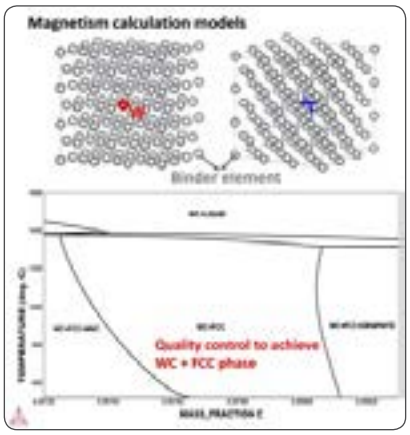
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Ruiwen Xie, J Material Sci Eng 2018, Volume 7
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Correlation between magnetic saturation and component in WC-$Ni_{85}Fe_{15}$ alloys

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Royal Institute of Technology, Sweden

The measurement of the magnetic saturation in reference to the pure Co is utilized for quality control in cemented carbides. This measurement is an estimation of binder phase components. WC-Co cemented carbides, in which Co is chosen as a binder, are relatively tough and fatigue-resistant composite materials used widely for cutting tools and rock drilling inserts. However, a substitution for Co as a binder is in urgent demand due to its health threat and fluctuating price. This work aims to investigate the correlation between the COM value and binder phase components for a new binder $Ni_{85}Fe_{15}$ (at. %) through first principles calculations. The magnetic behavior of Ni/WC interface and the binder segregation are also studied. The equation for calculating the COM value of WC-Ni85Fe15 cemented carbides is constructed. The COM value is decreased by W and C compositions dissolved into the binder phase. We further compare theoretically predicted COM values with experimental measurements for several cemented carbides. And theoretical results agree well with experimental values. The interface investigation shows that spin polarized Ni atoms around the Ni(111)/WC(0001) interface possess lower magnetic moments than bulk Ni atoms. The segregation near the impurity W in the binder phase indicates that the W prefers Fe instead of Ni. Factors that would affect the magnetic behavior of WC-$Ni_{85}Fe_{15}$ alloys are analyzed.



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Biography

Ruiwen Xie has her expertise in first principles calculations. She is now a PhD student in Royal Institute of Technology, Sweden. She has a great knowledge of mechanical properties of stainless steels. She is also working in collaboration with Sandvik Coromant which is a world's leading supplier of tools and tooling solutions. Her calculations with the ab-initio method will help optimize the process of quality control for industrial products.

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Alessandra Fava et al., J Material Sci Eng 2018, Volume 7
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Analysis of strengthening mechanisms in nano-ODS steel depending on preparation route

Alessandra Fava[1], **Roberto Montanari**[1], **Maria Richetta**[1], **Claudio Testani**[2] and **Alessandra Varone**[1]
[1]University of Rome "Tor Vergata", Italy
[2]CALEF-ENEA, Italy

Oxide dispersion strengthened (ODS) steels are promising materials for high temperature applications, in particular in fission and fusion nuclear reactors. In comparison to common reduced activation ferritic/martensitic steels they exhibit better resistance to neutron irradiation and creep owing to an uniform dispersion of nano-oxides particles (~ 5 nm) and a very fine grain structure (~ 500 nm). These features are shown in Figure 1. ODS steels are commonly prepared by high-energy mechanical alloying (HEMA) of a mixture of steel powder and Y_2O_3 particles followed by a consolidation stage consisting of hot extrusion (HE) or hot isostatic pressing (HIP). The samples are then submitted to annealing around 1100 °C for 1-2 hours. Recently, the present authors proposed a novel method based on low-energy mechanical alloying (LEMA). In general ODS microstructure is quite complex and several mechanisms contribute to the mechanical strengthening with different effects depending on the temperature. The present work analyses the role played by each single mechanism at increasing temperature by considering the specific microstructural features. ODS steels prepared through different routes and process parameters display different grain size distribution and homogeneity of particles dispersion, factors which strongly affect the mechanical properties. Yield stress values measured in tensile tests performed at increasing temperature up to 700 °C, either from literature or achieved by us, have been examined and the following strengthening mechanisms have been taken into account to fit the experimental data: (i) solid solution; (ii) Bailey-Hirsch; (iii) Hall-Petch; (iv) Orowan; (v) Arzt-Rősler-Wilkinson and (vi) Coble creep. The analyses evidence advantages and drawbacks of different preparation routes and suggest some criteria for further improving the mechanical properties of these materials.

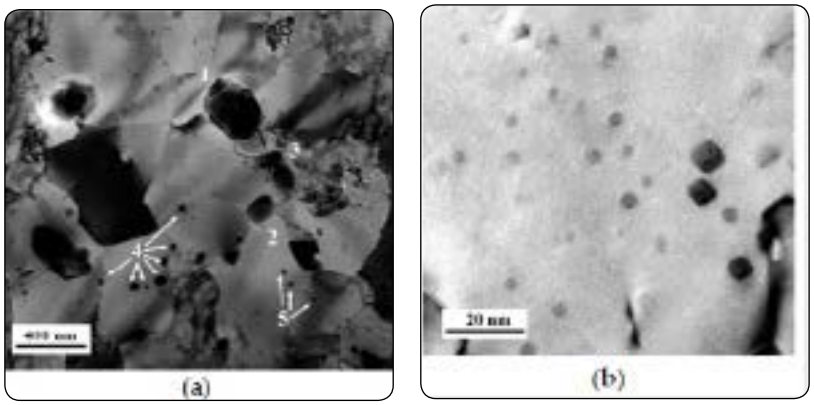


Figure 1: Fine grain structure (a) and nano-oxides particles (b).

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Biography

Alessandra Fava is graduated in "Materials Science" and in "Science and Technology of materials" at the University of Rome "Tor Vergata", Rome, Italy in 2014. Nowadays she is in third year of her PhD in Industrial Engineering at the University of Rome "Tor Vergata". Her current research focuses on a mechanical and a microstructural characterization of oxide dispersion strengthened (ODS) steel produced by low-energy mechanical alloying (LEMA) in order to study the effect of the LEMA on the ODS structure and the involved strengthening mechanisms.

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Dipanjana De, J Material Sci Eng 2018, Volume 7
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19th World Congress on

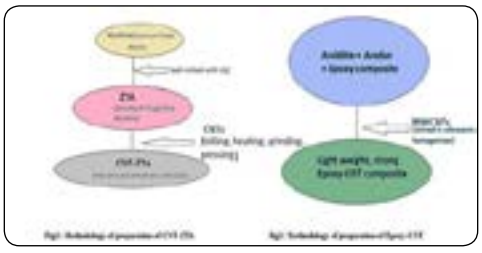
Materials Science and Engineering

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Development of CNT-reinforced ceramic matrix composites for wear-resistance application and light- weight high strength CNT-reinforced epoxy composite

Dipanjana De
National Institute of Technology Agartala, India

The use of carbon nanotubes (CNTs) in the Zirconium Toughened Alumina (ZTA) matrix composite results in enhanced mechanical properties. In this study, the ceramic matrix composites – ZTA (containing 80 vol% of pure Al2O3 and 20 vol% of yttria stabilized zirconia (YSZ)) is furthermore mixed with different proportions of MWCNTs. The addition of YSZ in monolithic ceramic results in the reinforcement of the pure alumina Al2O3, thus overcoming brittleness of monolithic ceramics. It, too, results in corrosion resistance and temperature stability. The resulting reinforced composite is ZTA. Our main aim is to improve the mechanical properties of ZTA such as fracture toughness and micro-hardness. It is observed that CNTs are better than SiC for reinforcement. Due to its large aspect ratio (diameter ~ 20-30 nm and length ~ 1-2μm) and tensile strength, CNTs are the most preferred reinforcing material used for binary composites. Carbon fiber-reinforced epoxy composites modified with carbon nanotubes (CNTs) were fabricated and characterized. Here, Araldite is mixed with Aradur (hardener) to create a strong epoxy composite. Furthermore, MWCNTs are added in the composite to produce a light-weight, strong composite. A process for preparing carbon nanotube (CNT) dispersions for reinforcement of CNT in epoxy resin for improved mechanical properties has been reported. Mechanical property evaluations were then performed for the cured CNT-epoxy nano-composites and compared to the base epoxy resin matrix. This research may help to propose a further positive solution for fabricating CNTs-epoxy reinforced nanocomposites.



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5. Popov Valentin N. (2004) Carbon nanotubes: properties and application. Materials Science and Engineering R 43: 61–102.

Biography

Dipanjana De has her focus on the advancement and enhancement of the mechanical and electrical properties of the nanocomposites. She has enhanced the mechanical properties of Zirconium toughened alumina (ZTA) by incorporating carbon nanotubes (CNT) and developed lightweight high-strength CNT-reinforced epoxy composite. Recently, she is working on the enhancement of the electrical properties of BFO-ZnO nanocomposite, with an aim to create nanomaterals with amplified magnetoelectric coupling. As a student, she is always looking forward for opportunities to enhance her knowledge and skills regarding nanomaterials/ nanophysics.

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Andrés Muñoz et al., J Material Sci Eng 2018, Volume 7
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Study of a fluidized bed reactor to produce green-carbon nanotubes at pilot scale

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[1]Universidad de Antioquia, Colombia
[2]Hatch Indisa S.A.S, Colombia

Carbon nanotubes are materials of great scientific and technological interest that has called attention of many scientists, since the discovery of them by Ijima in 1991[1]; This great interest due to their unique physical and chemical properties such as chemical corrosion resistance, thermal stability, high thermal and electrical conductivity, low density and high mechanical strength. The present work shows an experimental fluidized bed catalytic chemical vapor deposition reactor (see Figure), as the best technology to produce carbon nanotubes, using a clean process that allows the simultaneous production of hydrogen, based on catalytic decomposition of ethanol, which is a renewable carbon source, and a catalyst based on nickel. Operational parameters as initial catalyst amount, fluidization velocity, temperature and residence time, was analyzed and optimized for the experimental design, making the respective experiments to obtain a kinetic model of the reactor. As results was found that the granulometric distribution size of the catalyst have an impact in the yield of the reaction, being increased as the size down; the nature and behavior of the catalyst inside the reactor affect the requirements to keep the fluidization regimen, increasing the inlet flow of gases when agglomeration of catalyst is created with the increase of the temperature inside the reactor; the time of reaction, to obtain the same yield is decreased while the gas concentration of the ethanol is increased in the inlet gases; the outer diameter of the CNTs strongly depends on the reaction temperature; an increase of the reaction temperature leads to an increase in H2 production, this associated with the thermal decomposition of the ethanol and the CNT production; finally the TEM micrographs show that the nanotubes were multi-walled for the range of conditions studied. The production of carbonaceous materials (mainly carbon nanotubes) was between 1 g/g catalyst and 14 g/g catalyst. Materials, catalysts, and reaction products was characterized using analytical techniques such as XRD, TGA, SEM, TEM .

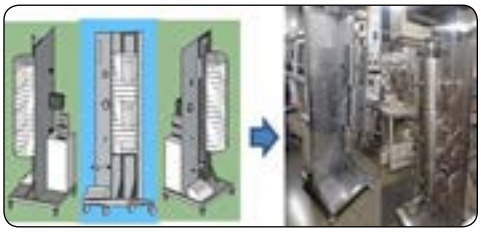


Figure 1: Design and laboratory experimental set up of the fluidized bed Reactor for the production of CNT

Recent Publications:

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Biography

Andrés Muñoz Chemical Engineering, Universidad Nacional de Colombia, Medellín, Colombia, 2010. Specialization on Integral Management, Politécnico Colombiano Jaime Isaza Cadavid, Colombia, 2014. MSc, Master in Chemical Engineering, Universidad de Antioquia, Colombia, In progress, throughout his career has developed skills to perform calculations and engineering reports, measurements and commissioning of thermal systems, field operation analysis, process and equipment measurements, specialized software CFD simulations (ANSYS), Development of calculation models in Visual Basic excel, analysis of energy consumption and balances of matter and energy. He has developed his experience in HATCH-NDISA in projects for companies in the food, paper, mining and cement sectors. He has also participated in research projects in university, company and state alliances in the development of prototypes in the field of nanotechnology, catalysis and environmental control.

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Ismail ALTUNTAS et al., J Material Sci Eng 2018, Volume 7
DOI: 10.4172/2169-0022-C8-113

Compherensive comparison of epitaxially grown gan layer grown on conventional sapphire and patterned sapphire substrates

Ismail ALTUNTAS[1], Ilkay DEMIR[1], A. Alev KIZILBULUT[2], Baris BULUT[2] and **Sezai ELAGOZ[1]**
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GaN based materials including light emitting diodes, blue laser diodes and high-power microwave transistors have received much attention over the past few years. An important problem of these structures is the high levels of structural defects, mostly dislocations, due to the lack of a suitable lattice-matched substrate So far, the substrate of choice has been mainly sapphire (Al2O3) substrates, which has a large lattice mismatch with GaN or AlN. As a result, (0001) GaN layers epitaxially grown on sapphire subtrates include high concentrations of misfit and threading dislocations. In this study, epitaxial GaN layers have been grown on both conventional sapphire and patterned sapphire substrates by using an MOCVD system and high resolution XRD scans and photoluminescence measurements are performed to compare the effect of patterned sapphire substrates on the dislocation density.

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1. V Sheremet, M Genç, M Elçi, N Sheremet, A Aydınlı, I Altuntaş, K Ding, V Avrutin, Ü Özgür, H Morkoç (2017) The role of ITO resistivity on current spreading and leakage in InGaN/GaN light emitting diodes. Superlattices and Microstructures (in press)
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Biography

Ismail ALTUNTAS has continued PhD in Solid State Physics in Cumhuriyet University, Turkey. During his PhD studies he worked at Microelectronic Materials and Device Laboratory-Virginia Commonwealth University USA under the supervision of Prof. Dr. Hadis Morkoç. Currently, he is a research assistant at Nanophotonics Research and Application Center at Cumhuriyet University. His research interest covers high quality III-V semiconductor thin films (InGaAs, InAlAs, InP, AlN, AlGaN, GaN etc) growth by MOCVD and detailed characterization to produce electronic and optoelectronic devices.

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Stiliyana Pereva et al., J Material Sci Eng 2018, Volume 7
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On the efficiency of cyclodextrin inclusion complexes with ibuprofen and naproxen

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Sofia University, Bulgaria

Cyclodextrin (CDs) have a vast and important applications in many fields of natural sciences – chemistry, pharmacy, gas storage, catalysis, foods, cosmetics. This interest and nearly 40 years of research on CDs is due to their structure – they have a hydrophobic cavity and a hydrophilic exterior, thus they can be hosts of molecules with proper size, which can be entrapped into their cavity. Ibuprofen and naproxen are non-steroidal anti-inflammatory drugs with high bioavailability and permeability, but low water solubility. Very few researches investigate the complex efficiency and how this can improve the solubility of the drugs in water, their properties and also shed a light to the mechanism of complex formation. We propose a modified ball milling method (with the use of a solvent), which is very effective, compared to the classical pharmaceutical methods – it's cheap, environmentally friendly and can be applied in an industrial scale. With the help of thermal analysis (Differential Scanning Calorimetry and Thermal Gravimetry), we were able for a first time to quantitatively determine how efficient is this modified synthetic method. We proved that for ibuprofen complexes 1 molecule ibuprofen, replaces 7 molecules water from the cavity of the cyclodextrin.

Authors are grateful to Operational programme "Science and Education for Smart Growth", project BG05M2OP001-2.009-0028

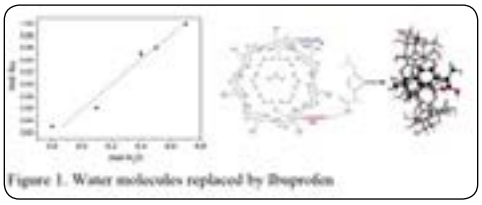


Figure 1. Water molecules replaced by Ibuprofen

Recent Publications:

1. Pereva, S., Himitliiska, T., Spassov, T., Stoyanov, S.D., Arnaudov, L.N., Dudev, T. (2015) Cyclodextrin-Based Solid-Gas Clathrates., Journal of Agricultural and Food Chemistry, 63, Issue 29, Pages 6603-6613.
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Biography

Stiliyana Pereva – graduated The National High-School of Mathematics and Sciences with profile in chemistry, biology and mathematics. This followed to a bachelor degree in Computational Chemistry at Sofia's University. Meanwhile I started to work in the group of prof. DSc Tony Spassov at the Department of Applied Inorganic Chemistry, which led me to obtaining my master degree in Materials Science with special interest in Cyclodextrins (CDs): their inclusion complexes, and especially their application in pharmaceutical industry. In April, 2017 I become a PhD in Solid State Chemistry, successfully defending my Thesis on "Inclusion compounds based on Cyclodextrins ". Now I'm working on new ways to improves the complex formation between cyclodextrins and some drugs, conducting experiments and applying the methods of Quantum-chemistry for a better understanding on the complex mechanism.

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Tamara Aleksandrov Fabijanic et al., J Material Sci Eng 2018, Volume 7
DOI: 10.4172/2169-0022-C8-113

The influence of Nb content on the mechanical properties of micro alloyed low carbon steels

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University of Zagreb, Croatia

Niobium Nb micro alloyed low carbon steel contains small amounts of Nb as an alloying element (0.02-0.1 wt%), which has a significant impact on many material properties. Niobium shows a strong affinity for nitrogen and carbon and causes the formation of niobium carbide and niobium nitride within the structure of the steel which improve the grain refining, retardation of recrystallization, and precipitation hardening [1-5]. Those precipitates are dispersed in the form of small Nb (CN) precipitates, which are arranged in fine lines [1, 4]. Consequently, the toughness, yield point and ultimate tensile strength, formability, and weldability of the micro alloyed steel are increased with small decrease in elongation and ductility [1-5]. The mechanical properties of Nb micro alloyed low carbon steel were researched in the paper. For the purpose of research the low alloyed steels with different Nb content; 0.035 wt. %Nb and 0.06 wt. %Nb were selected. The tensile test with the combination of digital image correlation (DIC) and thermography were used to study the thermomechanical behaviour of materials. The test pieces were cut from the hot rolling strip which were air cooled and thermomechanically treated. The test pieces of low carbon steel were tested for the comparison. The test pieces with the original gauge length L0 of 45 mm, original width b0 of 20 mm were prepared. The tensile test was performed in accordance with ISO 6892-1:2009 at room temperature. Two different strain rates; 5mm/min and 20 mm/min were applied in order to research the potential of Nb micro alloyed low carbon steels for improved energy absorption. The highest values of yield strength and tensile strength and the lowest values of elongation were measured for the test pieces with 0.06 wt. %Nb. The strength measured at different strain rates did not change for both Nb micro alloyed steels and low carbon steel indicating that materials do not show positive strain rate sensitivity.

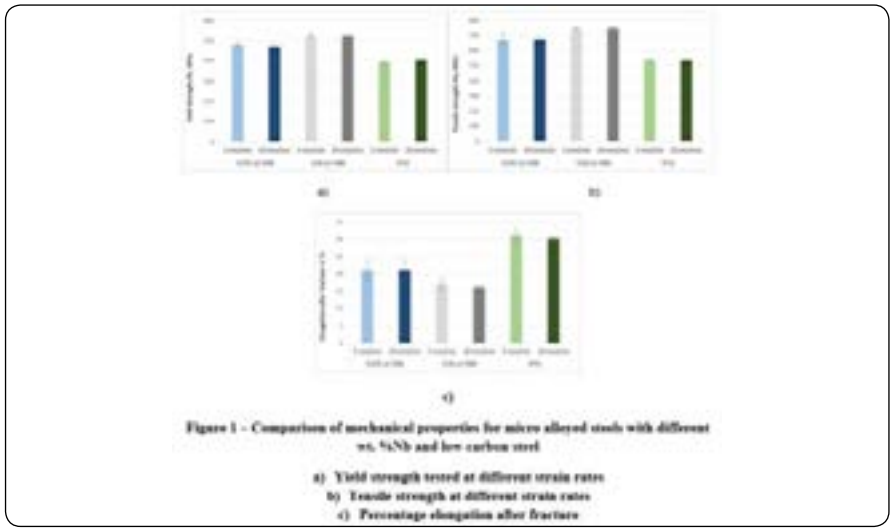


Figure 1 - Comparison of mechanical properties for micro alloyed steels with different wt. %Nb and low carbon steel

a) Yield strength tested at different strain rates
b) Tensile strength at different strain rates
c) Percentage elongation after fracture

Recent Publications:

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Biography

Tamara Aleksandrov Fabijanic is employed as a research assistant at the Laboratory for the Mechanical Properties of the Faculty of Mechanical Engineering and Naval Architecture. She gained PhD in 2014 by defending her dissertation titled "Development of Reference Vickers Hardness Blocks by Powder Metallurgy Process". In addition to teaching and scientific work in the field of materials, she also participates in the field of testing and calibration of force and hardness and testing of mechanical properties. In the area of scientific metrology as an employee of the Laboratory for Testing Mechanical Properties, a national standard for force and hardness, intensively cooperates with the most prestigious European institutes through various interlaboratory comparisons of force and hardness measurements. She has been trained scientifically and professionally in Croatia and abroad, the most important being Physikalische Technische Bundesanstalt, Braunschweig and Fraunhoffer IIKTS, Dresden.

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Notes:

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Posters

Aliyah S. Zaman et al., J Material Sci Eng 2018, Volume 7
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Electrospraying of active carrier matrix systems with varying hydrophobicities

Aliyah S Zaman and **Zeeshan Ahmad**
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The electrohydrodynamic atomisation (EHDA) technique is optimised for the production of uniform nanoparticles via the atomisation of liquids through the use of electrical forces (Haj-Ahmad et al., 2015). The EHDA technique is a single step process specifically used for the production of particles and fibers in the micro/nano range. It is possible to use this process for the encapsulation of drugs/actives within a polymeric matrix for release over time. The efficiency of particle engineering is affected by a number of factors namely the flow rate of polymeric solution, applied voltage and finally the distance between the nozzle and the collection plate. The electrospraying process gives rise to the production of nanoparticles (NPs) which can be used as particulate active matrix systems. The electrospraying process was deployed for polymers (PCL, PLGA and PMSQ) with varying hydrophobicities and was investigated to determine the impact of engineering parameters on the hydrophobic nature and outcome of polymer solutions. The physical properties of the polymeric solutions were characterised and these solutions were then sprayed using electrohydrodynamic atomisation (EHDA) and were analysed using optical and SEM. The spraying process was optimised using varying flow rates and applied voltages for each medium, these were found to be 80 µL/min and 13.2kV for PCL, 80 µL/min and 10.2kV for PLGA and 80 µL/min and 15.5kV for PMSQ. The process was observed using real time imaging (optical zoom camera and several jetting modes were observed). SEM showed the formation of spherical uniform particles for PCL, particles formed from PLGA also showed the formation of spherical particles however these had agglomerated appreciably and finally PMSQ displayed bowl shaped morphology after processing. It is possible to suggest both process parameters and the hydrophobic nature of the polymer play a part in topographical and morphological features of nanoparticles.

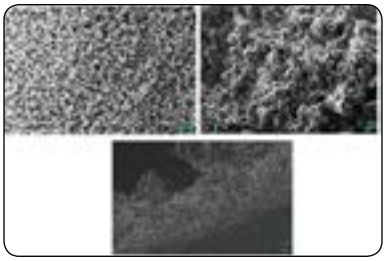


Figure 1. Electron Micrographs PMSQ, PCL and PLGA respectively at 1K magnification.

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1. Mehta, P., Haj-Ahmad, R., Rasekh, M., Arshad, M., Smith, A., van der Merwe, S., Li, X., Chang, M. and Ahmad, Z. (2017). Pharmaceutical and biomaterial engineering via electrohydrodynamic atomization technologies. Drug Discovery Today, 22(1), pp.157-165.
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5. Liu, Z., Zhang, Y., Yu, D., Wu, D. and Li, H. (2018). Fabrication of sustained-release zein nanoparticles via modified coaxial electrospraying. Chemical Engineering Journal, 334, pp.807-816.

Biography

Aliyah S Zaman is currently a PhD student starting my second year of my research working within the area of biomaterial engineering. I have progressed rapidly with my research through hard work and dedication, and I am currently undertaking experiments as part of my PhD whilst writing paper for publication specifically relevant to my research. I support first year pharmacy students within their practical classes assisting with relevant calculations and the process required to produce certain products, alongside which I also mark their work and provide feedback.

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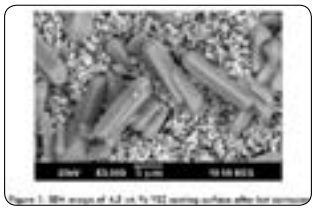
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Andrés González-Hernández et al., J Material Sci Eng 2018, Volume 7
DOI: 10.4172/2169-0022-C8-114

Hot corrosion behavior of 4.5 wt. % YSZ coatings elaborated by suspension plasma spraying

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[1]Universidad Industrial de Santander, Colombia
[2]Universidad de Antioquia, Colombia
[3]Université de Limoges, France

A high percentage of energy generation is made using gas turbines. These turbines have increased in efficiency due to protection systems such as thermal barrier coatings (TBCs). TBCs systems are widely used to provide thermal and corrosion protections for the metallic hot-section components to achieve extended the durability of a gas turbine. A typical TBC system is composed by MCrAlY (M=Ni and/or Co) metallic bond-coat as an oxidation resistant layer and the yttria stabilized zirconia (YSZ) topcoat as a thermal insulation layer. These coatings BCs are usually applied either by an atmospheric plasma spray (APS) or electron beam physical vapour deposition (EB-PVD). Suspension plasma spraying (SPS), as a newly emerged technique of thermal spraying processes, has been intensity investigated to elaborated ceramic coatings with bimodal structures (include nanostructures) obtained from its raw material. The hot corrosion behavior of 4.5 wt. % Yttria Stabilized Zirconia coatings was investigated in the presence of Na_2SO_4 and V_2O_5 and as corrosive molten salt for 40h at 1050ºC. The microstructure of the 4.5 YSZ coating showed that it was composed by a bimodal structure made of un-molten nanosized particles imbedded in a matrix of molten splats, which is a typical characteristic of this kind of coatings. The results of hot corrosion test showed that the molten salts at high temperature had a strong chemical reaction with the yttria (Y_2O_3) of the 4.5 YSZ coating generating its delamination. It was occurred in the ceramic layer due to the creation of stress resulting of these delamination. According to EDS- SEM analysis, the evaluation of surface of 4.5 YSZ coating showed mainly the formation of crystals composed by Y, V, O by interaction between of V_2O_5 of the salts and Y_2O_3 of the coating (Fig. 1).



Recent Publications:

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2. Tesar T, Musalek R, Medricky J, Kotlan J, et. al. (2017) Development of suspension plasma sprayed alumina coatings with high enthalpy plasma torch. Surface and Coatings Technology. 325: 277-288.
3. Loghman-Estarki M R, Nejati M, Edris H, et. al. (2015). Evaluation of hot corrosion behavior of plasma sprayed scandia and yttria co-stabilized nanostructured thermal barrier coatings in the presence of molten sulfate and vanadate salt. J. Euro. Cer. Soc. 35: 693-702.
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Biography

Andres Gonzalez-Hernandez has his expertise in material science. Ph.D, full time professor at the Metallurgical and Material Science at the Department at Universidad Industrial de Santander, Bucaramanga, Colombia. He received his B.Sc. in Metallurgical Engineering in the Universidad Pedagógica y Tecnológica de Colombia, Tunja, Colombia in 2004, his M.Sc. Engineering degree in 2008 and his Ph.D in Engineering at Universidad de Antioquia, in 2014 together with the degree Ph.D. in Ceramic Materials in Université de Limoges, France. His research interests include: thermal spraying coatings, thermal barrier coatings, plasma spraying coatings, microstructure, wear and flame spraying.

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Andres Gonzalez-Hernandez et al., J Material Sci Eng 2018, Volume 7
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First-principles study on the crystal structure of $ZrTi_2$ under pressure

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Group IV transition metals Ti and Zr are the most attractive metallic materials in aerospace and nuclear industries. They have high specific strength, good biocompatibility, excellent corrosion and oxidation resistance and low neutron-capture. Ti and Zr have three polymorphic modifications, including high pressure ω-phase with hexagonal structure. In this work, the high-pressure behavior in the crystal structure of $ZrTi_2$ have been systematically studied by using universal structure prediction method together with density functional theory. The structure prediction was carried out using USPEX (Universal Structure Predictor: Evolutionary Xtallography) code with the Vienna Ab-initio Simulation Package (VASP) code for 0, 25, 50, 75, and 100 GPa. Uspex was developed by Oganov, Glass, Lyakhov and Zhu, which allows one to predict the most stable crystal structure and a number of low-energy metastable structures for a chemical composition at any pressure conditions without requiring any experimental input. In this work, the pseudopotentials of Ti and Zr elements were treated their respective orbitals $3p^6 4s^2 3d^2$ and $4s^2 4p^6 5s^2 4d^2$ as valence electronic configurations. For USPEX, the maximum total numbers of atoms in the unit cell were limited to 6 (2 atoms of Zr and 4 atoms of Ti). According to the previous studies [6], three possible structures were chosen to study with USPEX: α-$ZrTi_2$ with hcp structure ($P6_3/mmc$, 194), α-ZrTi2 with hcp structure (P6/mmm, 191), and β-$ZrTi_2$ with bcc structure (Im3m, 229). Additionally, three structured obtained with same software were used to refine the search for stable structures: P6mm (183), P4mcm (127) and P-3m1(164). The results showed that the space groups 183, 164 and 194 are the most stable structures at zero temperature and pressure for ZrTi2. The structure α-ZrTi2 (194) is the most stable between 3 and 75 GPa. Finally, the space group 164 is the most stable between 75 and 100 GPa.

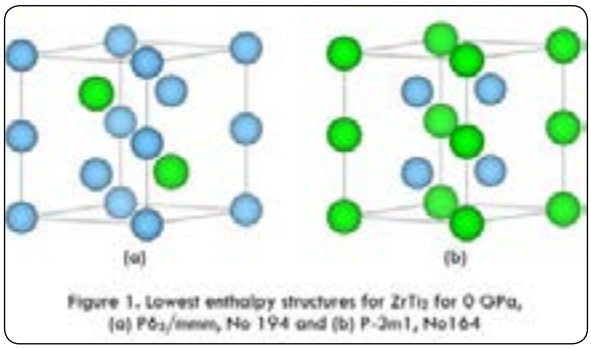


Figure 1. Lowest enthalpy structures for $ZrTi_2$ for 0 GPa, (a) $P6_3/mmm$, No 194 and (b) P-3m1, No164

Recent Publications:

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4. Zhang W.W., Oganov A.R., Goncharov A.F., et al. (2013). Unexpected stoichiometries of stable sodium chlorides. Science 342, 1502-1505.
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Biography

Andres Gonzalez-Hernandez has his expertise in material science. Ph.D, full time professor at the Metallurgical and Material Science at the Department at Universidad Industrial de Santander, Bucaramanga, Colombia. He received his B.Sc. in Metallurgical Engineering in the Universidad Pedagógica y Tecnológica de Colombia, Tunja, Colombia in 2004, his M.Sc. Engineering degree in 2008 and his Ph.D in Engineering at Universidad de Antioquia, in 2014 together with the degree Ph.D. in Ceramic Materials in Université de Limoges, France. His research interests include: thermal spraying coatings, thermal barrier coatings, crystal structure prediction, first-principles calculation, DFT, Uspex.

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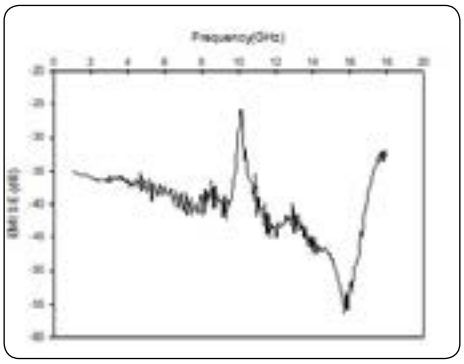
Notes:

Chae Lin Kim et al., J Material Sci Eng 2018, Volume 7
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Lightweight filler for EMI shielding: carbon materials decorated with silvernanoparticle

Chae Lin Kim and **Sang Eun Sim**
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This work is about electromagnetic interference shielding, its frequency range is 1-18 GHz. The wavelength is called centimeter wave, and we do not count the wave pass. So I tried to measure the shielding ability by putting a filler in the foam to try to cover a wider range of shielding while reducing the filler.The filler is some carbon materials that are decorated with increasing electrical conductivity. When the carbon materials are modified with acid and ultra sonicating powerfully, however, the carbon properties are decreasing generally, so I used amphiphiles to decorate metals. The electromagnetic waves are reflected and absorbed out of the pores. Transmission Electron Microscope (TEM) and Micro-CT show fillers network. The filler is well contact each others and enclose foam's pore in foam matrix. For Ag decorated on carbon materials, use SEM and Raman Spectrometer. Electromagnetic Interference shielding performance is tested with Vector Network Analysis as the 2mm thickness in 1-18GHz.



Recent Publications:

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Biography

Chae Lin Kim lin do work for EMI shielding and heat flow. She is the master's course since july 2017.

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Volodkin Dmitry et al., J Material Sci Eng 2018, Volume 7
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Protein loading into vaterite $CaCO_3$ crystals by co-synthesis

Volodkin Dmitry, Jacob Ward, Siani Kempster and **Vikulina Anna**
Nottingham Trent University, UK

$CaCO_3$-based co-synthesis (or co-precipitation) is actively used for encapsulation of fragile biomolecules, for instance encapsulation into multilayer capsules and other carriers to be used for drug delivery, tissue engineering, biotechnology.1,2 Molecules of interest can effectively be incorporated into the mesoporous vaterite $CaCO_3$ crystals (Fig. 1) by adding them during the crystal synthesis at mild conditions (principle of the co-synthesis).3-5 This work explores the ability of various proteins to be incorporated into the crystals. The following model proteins have been tested for their loading into the crystals by co-synthesis: bovine serum albumin, lysozyme, α-lactalbumin, catalase, cytochrome C, insulin. The proteins can be loaded inside the crystals at extremely high amounts (adsorption capacity of the crystals of up to 600 mg of protein per 1 g of crystals) and giving a value of Gibbs free energy of about -30 kJ/mol. The research here aims to identify a correlation between physical-chemical properties of the proteins (molecular mass, sign of charge) with the thermodynamic parameters of the protein loading such as equilibrium constant and Gibbs free energy. The findings of the study allow to understand the mechanism of the protein loading into the crystals.

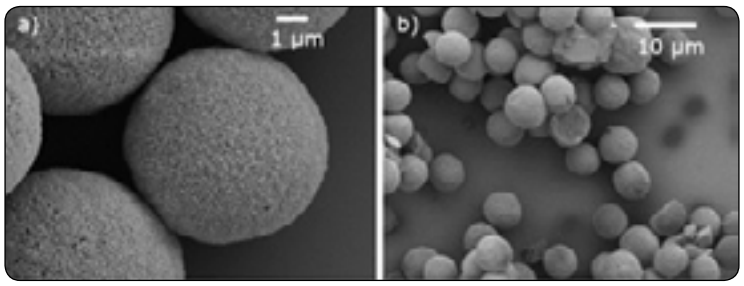


Fig. 1. Scanning electron microscopy images of vaterite $CaCO_3$ crystals at magnification x10,000 (a) and x2,000 (b).

Recent Publications:

1. Volodkin, D. $CaCO_3$ templated micro-beads and -capsules for bioapplications. Adv Colloid Interface Sci 2014, 206, 437-454.
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4. Balabushevich, N. G.; de Guerenu, A. V. L.; Feoktistova, N. A.; Volodkin, D. Protein loading into porous $CaCO_3$ microspheres: adsorption equilibrium and bioactivity retention. PCCP, 2015, 17 (4), 2523-2530.
5. 5. Vikulina, A. S.; Feoktistova, N. A.; Balabushevich, N. G.; Skirtach, A. G.; Volodkin, D., The mechanism of catalase loading into porous vaterite $CaCO_3$ crystals by co-synthesis. PCCP, 2018, 20, 8822-8831

Biography

Volodkin Dmitry is Associate Professor at Nottingham Trent University and heads the group "Active-Bio-Coatings". He has studied Chemistry at the Lomonosov Moscow State University in Russia. Research stays brought him to France (University of Strasbourg) and Germany (Max-Planck Institute of Colloids and Interfaces, Technical University of Berlin, Fraunhofer Institute for Cell Therapy and Immunology). His research activities are focused on design of advanced stimuli-responsive biomaterials for applications in tissue engineering, diagnostics, toxicology, drug delivery. His group engineer self-assembled polymer-based 2D and 3D structures with tailor-made properties: multilayer films, microcapsules and beads, liposome-polymer composites, polymeric scaffolds, etc. Dmitry Volodkin has published more than 70 peer-reviewed articles/books and received a number of prestigious scientific awards such as Sofja Kovalevskaja Award of Alexander von Humboldt Foundation, Richard-Zsigmondy Price of German Colloid Society, Alexander von Humboldt Fellowship, Marie Skłodowska-Curie Fellowship.

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Notes:

Volodkin Dmitry et al., J Material Sci Eng 2018, Volume 7
DOI: 10.4172/2169-0022-C8-114

Multilayer biopolymer-based capsules made using vaterite $CaCO_3$ crystals

Volodkin Dmitry, Jack Campbell and **Vikulina Anna**
Nottingham Trent University, UK

Polymer-based multilayer capsules are new types of effective drug delivery carriers. The capsules assembled using decomposable and porous $CaCO_3$ vaterite crystals can be loaded with biomolecules at mild conditions. These crystals can then effectively release biomolecules such as proteins and peptides, small drugs, like antibiotics, nucleic acids, etc.1-4 Protection and controlled release of the biomolecules are the main advantages of the capsules; this can be achieved by adjusting the capsule structure by a varying the number of layers deposited, and the appropriate choice of the chemical nature of the polymer used.2-4 Despite there being a number of synthetic polymers that have been employed to assemble the capsules, there is a gap in the understanding of the capsule assembly mechanism for biopolymers. This is indispensable for the formulation of capsules to be utilised for biologically relevant applications. This work aims to fabricate capsules from biopolymers typically used for bio-applications in drug delivery and tissue engineering. The examples of the utilised biopolymers include polyanions (chondroitin sulfate, hyaluronic acid, dextran sulfate, and heparin) and polycations (poly-L-lysine, dextran amine, collagen, and protamine). The following pairs of biopolymers are the most attractive in terms of capsule integrity: heparin/poly-L-lysine (Fig. 1) and heparin/protamine. Not only the stability, but also protein retention in the formed capsules, capsule shrinkage, and the fusion between capsules are investigated. Interestingly, the occupation of the vaterite crystal pores with polymer(s) during capsule fabrication is responsible for the observed capsule shrinkage and fusion phenomena. The findings of this study would open new routes for applications of multilayer capsules in the field of controlled drug delivery.

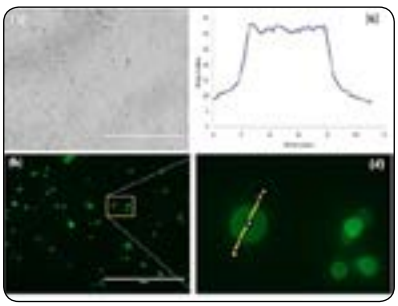


Fig. 1. Optical (a) and corresponding fluorescence (b) images, with the corresponding fluorescence profile (c) of BSA encapsulated within (heparin/poly-L-lysine)2/heparin capsules. (d) - enlarged area from the image (b). Scale bar is 100 μm.

Recent Publications:

1. Volodkin, D.; Skirtach, A.; Möhwald, H., Bioapplications of light-sensitive polymer films and capsules assembled using the layer-by-layer technique. Polym Int 2012, 61 (5), 673-679. Review
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3. Feoktistova, N., J. Rose, V.Z. Prokopović, A.S. Vikulina, A. Skirtach, and D. Volodkin, Controlling the Vaterite $CaCO_3$ Crystal Pores. Design of Tailor-Made Polymer Based Microcapsules by Hard Templating. Langmuir, 2016, 32(17), 4229-4238.
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Biography

Volodkin Dmitry is Associate Professor at Nottingham Trent University and heads the group “Active-Bio-Coatings”. He has studied Chemistry at the Lomonosov Moscow State University in Russia. Research stays brought him to France (University of Strasbourg) and Germany (Max-Planck Institute of Colloids and Interfaces, Technical University of Berlin, Fraunhofer Institute for Cell Therapy and Immunology). His research activities are focused on design of advanced stimuli-responsive biomaterials for applications in tissue engineering, diagnostics, toxicology, drug delivery. His group engineer self-assembled polymer-based 2D and 3D structures with tailor-made properties: multilayer films, microcapsules and beads, liposome-polymer composites, polymeric scaffolds, etc. Dmitry Volodkin has published more than 70 peer-reviewed articles/books and received a number of prestigious scientific awards such as Sofja Kovalevskaja Award of Alexander von Humboldt Foundation, Richard-Zsigmondy Price of German Colloid Society, Alexander von Humboldt Fellowship, Marie Skłodowska-Curie Fellowship.

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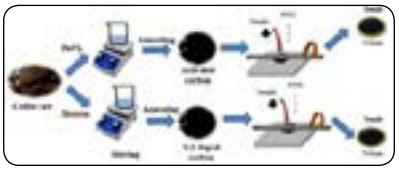
Eunbeen Na et al., J Material Sci Eng 2018, Volume 7
DOI: 10.4172/2169-0022-C8-114

Synthesis and properties of porous carbon derived from coffee waste as a supercapacitor electrode

Eunbeen Na, Minjae Kim, Seokhoon Jang and **Sang Eun Shim**
Inha university, Republic of Korea

In this study, we fabricated a series of porous carbon materials derived from coffee waste as a supercapacitor electrode. XPS identified 82.69 at% carbon, 13.97 at% oxygen and 8.5 at% nitrogen on the surface of Coffee grounds. Carbonization with nitrogen atmosphere was conducted at various temperatures (700, 800, and 900 oC) in a tubular furnace. Also, further chemical activation enhanced the surface properties of porous carbon such as surface area and pore volume. Electrochemical properties of prepared porous carbon electrode were investigated using three-electrode system in 6 M KOH electrolyte solution. The prepared porous carbon electrodes derived coffee waste represented unique surface properties and nitrogen functionalized structure, which lead to high performance supercapacitive behavior

Acknowledgement: This work was supported by the Basic Science Research Program through the National Research Foundation of Korea (NRF), funded by the Ministry of Education (grant number: NRF-2015R1A4A1042434).



Scheme 1. The synthesis procedure of porous carbon derived from coffee waste

Biography

Eunbeen Na majored in chemical engineering at university. After graduating from college, I went to graduate school and studied in polymer nanomaterials laboratory. My main research is material development for energy storage devices. Various functionalities are introduced into graphene to improve physical properties, and it is applied to gas sensor and battery for performance test.

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Notes:

Hongli Sun et al., J Material Sci Eng 2018, Volume 7
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Facile synthesis of oxygen defective yolk-shell BiO_{2-x} for visible light-driven photocatalytic inactivation of Escherichia coli

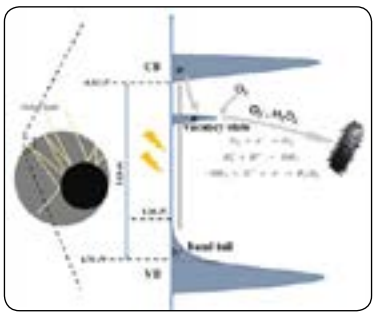
Hongli Sun, Zhifeng Jiang and **Po Keung Wong**
The Chinese University of Hong Kong, Hong Kong

Statement of the Problem: Engineering catalysts with optimal oxygen vacancies is quite significant, as oxygen vacancy sites are efficient electron capture centers. However, bismuth oxide with oxygen vacancy, a promising VLD catalyst, was rarely reported. Besides, morphology dependent photocatalysis has been intensively focused, as the morphology would directly influence the activities by tuning light utilization, electron transfer processes and interfacial reaction. Yolk-shelled materials are emerging as promising candidates, owing to their charming physicochemical properties like enhanced light absorption ability by multiple reflections of incident light within the interior cavities. However, reports towards oxygen defective BiO_{2-x} with various morphologies are limited, inhibiting in-depth studies of defects and morphology dependent activities.

Methodology & Theoretical Orientation: Facile solvothermal method was used to synthesize oxygen defective BiO_{2-x} with yolk-shell structure. Electron paramagnetic resonance and X-ray photoelectron spectral analyses were adopted to verify the existence of oxygen vacancy. Photocatalytic activity was evaluated by bacterial inactivation. Scavenger studies were utilized to find the key active species in the inactivation process.

Findings: Temperature gradient originating from the heating rate caused the variances between the diffusion rate of the core and the formation rate of the shell, resulting in the formation of BiO2-x spheres with different interior structures. Yolk-shell BiO_{2-x} can completely inactivate 7 log E. coli within 3 h, superior than core-shell BiO_{2-x} and commercial Bi_2O_3.

Conclusion & Significance: The oxygen vacancy with a high affinity for molecular oxygen, and the enhanced light absorption ability resulted from multireflection of incident light within the interior voids, contributed to the prominent bacterial inactivation performance. O_2- and H_2O_2 guaranteed the oxidation ability toward bacterial cells. This study would shed light on the design and application of efficient oxygen defective photocatalysts with intricate yolk-shell structures.



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1. Sun H, Li J, Zhang G, Li N (2016) Microtetrahedronal $Bi1_2TiO_20/g\text{-}C_3N_4$ composite with enhanced visible light photocatalytic activity toward gaseous formaldehyde degradation: Facet coupling effect and mechanism study. Journal of Molecular Catalysis A: Chemical 424:311-322.
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3. Wang T, Jiang Z, Chu K H, Wu D, Wang B, Sun H, Yip H Y, An T, Zhao H, Wong PK (2018) X-Structured α-FeOOH with enhanced charge Separation for visible-light-driven photocatalytic overall water splitting. ChemSusChem (Accepted).

Biography

Hongli Sun received her master's degree in 2016 from School of Resources and Environmental Engineering, Wuhan University of Technology. She is currently pursuing her Ph.D. in School of Life Science, The Chinese university of Hong Kong. Her research interests focus on photocatalysis research for energy conversion and environmental remediation, including the synthesis and hybridization of bismuth-based catalysts, and applications in CO_2 reduction, bacterial inactivation, hydrogen evolution, etc.

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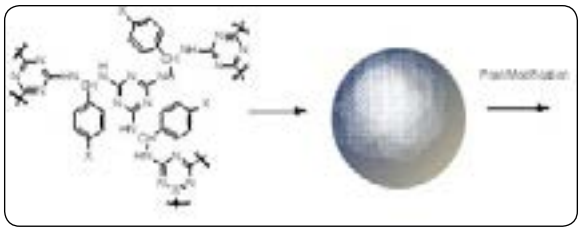
Jihyeong Ryu et al., J Material Sci Eng 2018, Volume 7
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Cost-effective polyaminal polymer for the heavy metal removal

Jihyeong Ryu, Hong-Gyu Seong and **Sang Eun Shim**
Inha University, Republic of Korea

Environmental pollution is one of growing worldwide problem, especially, drinkable water is threaten by heavy metals in process of industrial growth. To solve this issue, all technique including membrane filtration, chemical precipitation ion-exchange, has been tired, Among them, adsorption materials are very simple and cost-effective. The Mesoporous polymers with 2-50nm pore size are one of most promising subject in wastewater treatment. Because it provides not only low diffuse barrier for water but also possibility of post-modification. Herein, we synthesized polyaminal polymer with Melamine and monomer based on benzenealdehyde which have hierarchical structure with 400~650m2/g BET surface area. Then decoration of sulfur and nitrogen on designed polymer with thiol-yne click chemistry. Thiol yne click reaction is very reactive under UV lamp. In this study, designed MVP-SN investigated by BET,ICP-OES, Elemental analysis, SEM, EDAX for evaluating of heavy metal removal such as Cd(II), Pb(II),Hg(II) and Cu(II)

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Recent Publications:

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Biography

Jihyeong Ryu took BS in 2017. And he moved to Inha University for MS. He has studied Chemical Engineering, long been involved in heavy metal adsorbent for wastewater remediation. He is interested in Porous orgniac Polymer and Covalent organic frameworks which have large surface area.

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Kazem Nazari, J Material Sci Eng 2018, Volume 7
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Fibrous NSAID Buccal films

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The buccal route for drug administration has gained importance in the past years due to its accessibility and rapid onset of action. It is a reliable alternative to the oral route, both for local and for systemic delivery of drugs, overcoming some of the drawbacks existent in oral administration, avoids the first-pass effect, pre-systemic elimination by the gastrointestinal tract, and adverse drug reactions. Similarly, because buccal administration is easily achieved, it may be a good alternative to oral drug administration without compromising compliance with treatment, particularly, for young children and older adults. Thus, buccal permeability models are essential to determine important permeation parameters. In this experiment an ex vivo model of oral tissue from pigs was used for drug permeability studies because of resemblances with human oral mucosa. This study compared the ex vivo permeability parameters of PVP/NSAID (Non-steroidal anti-inflammatory drugs) through buccal mucosa using a diffusion cell system as detection method. Currently available rapid disintegrating buccal tablets have limitations relating to the short residence time at the absorption surface. Therefore, the development of drug-loaded nanofibers may be able to overcome this problem by enhancing the surface area for interaction based on grooves and total surface exposure. The object was to evaluate the film forming fibre in the preparation of mucoadhesive patches for the controlled release of NSAID drugs to treat inflammation and pain in the joints, using the electro spinning technique. Fibrous films containing NSAID for buccal drug delivery were prepared using a one-step electrospinning technique. The resulting structures possessed mean diameters between~10-1200 nm. NSAID was encapsulated in the amorphous state, with relatively high encapsulation efficiencies. FT-IR and Raman analysis show that NSAID, PVP and selected co-polymers were well incorporated into the fibre matrix. The XRD and DSC analysis results confirmed that raw NSAID (e.g. indomethacin) changed from the crystallised to amorphous state during electrospinning.

Notes/Comments: Kazem Nazari has his expertise in freeze drying process control and electrospinning. Using an in-line process analytical technology for freeze-drying and further work by developing a temperature map of the freeze-dryer shelf to predict the degree of temperature variation within the shelf. Also, electrospinning of NSAID drugs formulation for use at buccal mucosa area. This help to avoid the first-pass effect, pre-systemic elimination by the gastrointestinal tract, and adverse drug reactions. Correspondingly, because buccal administration is easily achieved, it may be a good alternative to oral drug administration without compromising compliance with treatment, particularly, for young children and older adults.

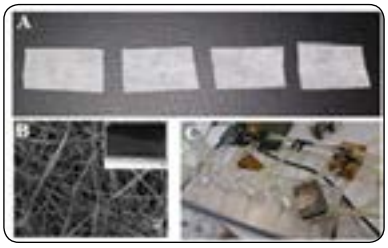


Fig.1. (a) A selection of base INDO/PVP fibrous films prepared using the electrospinning technique. Images of fibrous films using **(b)** scanning electron microscopy (SEM), with the inset showing film thickness through side-view and (c) ex-vivo studies

Recent Publications:

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2. 2. Marxen, E.; Axelsen, M;C.; Pedersen, A.M.L.; Jacobsen, J. Effect of cryoprotectants for maintaining drug permeability barriers in porcine buccal mucosa. Int J Pharm. 2016, 511, 599-605.
3. 3. Madhav, N.V.S.; Shakya, A.K.; Shakya, P; Singh, K. Orotransmucosal drug delivery systems: A review. J Controlled Release, 2009,140, 2-11.
4. 4. Amores, S.; Domenech, J.; Colom, H.; Calpena, A.C.; Clares, B.; Gimeno, Á.; et al. An improved cryopreservation method for porcine buccal mucosa in ex vivo drug permeation studies using Franz diffusion cells. Eur J Pharm Sci, 2014, 8, 49-54.
5. 5. Ribiro, S.D.; Rodrigues Filho, G.; Meneguin, A.B.; Prezotti, F.G.; Boni, F.I.; Cury B.S.F.; Gremiao, M.P.D. Cellulose triacetate films obtained from sugarcane bagasse: Evaluation as coating and mucoadhesive material for drug delivery systems. Carbohydrate Polymers, 2016,152, 764-77.

Biography

Kazem Nazari is in write up stage of his PhD studies, and his expertise is in nanotechnology; the creation of fibres using different materials. He obtained his BSc Honors in Pharmaceutical and Cosmetic Sciences and Mphil degree in Pharmaceutical Technology (freeze-drying process control) using in- line process analytical technology for freeze-drying and developing a temperature map of the freeze-dryer shelf to predict the degree of temperature variation within the shelf at De Montfort University before deciding to pursue a PhD in The Advanced Drug Delivery Group (specializing in EHDA systems) (led by Prof. Z Ahmad at De Montfort University, Leicester UK).

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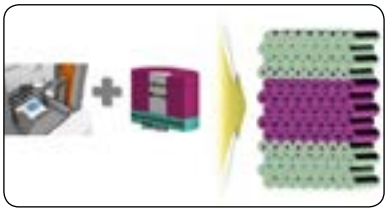
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Jong Woo Kim et al., J Material Sci Eng 2018, Volume 7
DOI: 10.4172/2169-0022-C8-114

Ceramic/camphene based three-dimensional co-extrusion for biomimetic structure

Jong Woo Kim and **Young Hak Koh**
Korea University, Korea

We report a novel ceramic scaffold structure with biomimetic dense/channel using ceramic/camphene based by extrusion. As you know porous structure can give good favorable environment for bone ingrowth and excellent permeability. Biphasic calcium phosphate (BCP) powder comprises of hydroxyapatite and tricalcium phosphate (TCP) has good biocompatibility and bioactivity. Therefore, in this study, we decide to use the camphene-based freeze casting method in order to produce biomimetic graded porous biphasic calcium phosphate (BCP) ceramic. This design consists of dual layer as mimicking core-shell structure of natural bone, which is relatively dense part as a shell structure of natural bone, and porous part as an inner section, which is a biomimectic structure of nature human bone. To accomplish this, biphasic calcium phosphate (BCP)/camphene slurry with two different contents of 15vol% and 40vol% is first frozen uni-directionally in a 20mm diameter mold with multi-layered extrusion through a reduction die with a cross section of 1mm diameter at room temperature. This simple processes enabled the formation of dense/channel scaffold with aligned pores by removing camphene dendrites in the biphasic calcium phosphate (BCP)/camphene region.



Recent Publications:

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2. Choi JW, Kim JW, Jo IH, Koh YH, Kim HE. Novel self-assembly-induced Gelation for Nanofibrous Collagen/Hydroxyapatite Composite Microspheres MDPI 2017 Sep 21;10(10)
3. Kwan-Ha Shin, Jong-Woo Kim, Young-Hag Koh, Hyoun-Ee Kim Novelself-assembly-induced3Dplottingformacro/nano-porous collagen scaffolds comprised of nanofibrous collagen filaments Materials Letters 143 (2015) 265-268.

Biography

Jong Woo Kim has extensive experience in the field of biomaterials. He has a lots of experience in bio materials research, evaluation, and operation in the lab. He has high passion for biomaterial development.

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Mª Pilar Muñoz et al., J Material Sci Eng 2018, Volume 7
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Effect of carbon-based nanomaterials on flexible polyurethane foaming process and foam fire behavior

Mª Pilar Muñoz, Almudena Muñoz and **Mª Virtudes Navarro**
CETEM, Spain

Statement of the Problem: Flexible polyurethane foams (FPUFs), due to their structure and unique properties, are widely used in several sectors such as building and construction, packaging, bedding and furniture, automotive, etc. The main disadvantage of this type of foams is their poor resistance against fire due to the oxygen entrapped in the structure, which means that FPUFs rapidly burn with a high release of toxic smokes. The most common way to solve this drawback is the addition of flame retardants into the foams formulation although the most effective additives are based on halogenated or nitrogenated compounds of considerable toxicity during handling and in case of fire where they give rise to the emission of highly toxic gases. Because of that, other ways to improve the fire behavior of FPUFs are being investigated. The purpose of this study is to analyze the fire behavior of flexible foams when different carbon based nanomaterials are incorporated into the formulation.

Methodology & Theoretical Orientation: FPUf incorporating different carbon derived nanomaterials (carbon nanofibers (CNF) and expandable graphite (ExG)) were synthesized by the one shot method allowing the material free rise in a squared box. Foaming reaction kinetic was followed by the cream and rise times. Foams obtained were chemically characterized by ATR-FTIR spectroscopy. Thermal properties were determined by TGA, and fire behavior was evaluated by internal horizontal burning test.

Findings: Chemical properties were not influenced by the carbon based nanomaterials, and the decomposition temperature was increased by 15ºC with 20 pph of ExG. Fire behavior was enhanced with both nanomaterials.

Conclusion & Significance: Improvements in the flame retardancy of FPUFs were achieved with both carbon based nanomaterials without worsening their physical-mechanical properties. Incorporation of 1% (w/w polyol) of CNF decreased the burning rate by almost 50% and 20% of ExG gave self-extinguish foam.



Recent Publications:

1. Wen-Hui Rao, Zai-Yin Hu (2017) Flame-Retardant flexible polyurethane foams with highly efficient melamine salt. Ind. Eng. Chem. Res 56 (25) pp 7712-7119
2. Xiangming Hu, Deming Wang, Shuailing Wang (2013) Synergistic effects of expandable graphite and dimethyl methyl phosphonate on the mechanical properties, fire behavior, and thermal stability of a polyisocyanurate-polyurethane foam. International Journal of Mining Science and Technology 23:13-20

3. Chao C, Gao M, Chen J (2018) Expanded graphite, Borax synergism in the flame-retardant flexible polyurethane foams. J Therm Anal Calorim 131:71
4. Zhao JJ, Chen S, Gao M (2016) Flame retardant properties of flexible polyurethane foams containing expanded graphite by Cone Calorimetry. 3th International Conference on Mechatronics and Information Technology
5. Zammarano M, Kraemer RH, Harris RH, Ohlemiller T, Shields JR, Rahatekar S, Gilman JW (2017) Effect of Carbon Nanofiber network formation on flammability of flexible polyurethane foams. National Institute of Standards and Technology.

Biography

Mª del Pilar Muñoz is a chemical engineer, she has been working in CETEM since 2013, she is in materials, adhesion and polymers department. She has experience in development & research project in different sectors such as coating, polyurethane foams or nanomaterials. She also has experience in syhtesis of prepolimers, modification chemical of nanoparticles and dispersions. She has participated in research national projects and European projects.She has built this study after years of experience in research and evaluation of test using a methodology applied modification the structure of flexible polyurethane foams using mainly nanotechnology. With the study of different properties have been investigated the behavior against the fire retardance of different carbon-base nanomaterials.

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Notes:

Mariana Lucia Angelescu et al., J Material Sci Eng 2018, Volume 7
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Observations on the effect of forging temperature on the microstructure of super-duplex stainless steel UNS S32760

Mariana Lucia Angelescu[1] **Vasile Dănuț Cojocaru**[1] **Nicolae Șerban**[1], **Doina Răducanu**[1], **Ion Cinca**[1], **Adrian Vintilă**[2] and **Elisabeta Mirela Cojocaru**[1]
[1]University Politehnica of Bucharest, Romania
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The hot deformability of super-duplex stainless steels is closely related to the deformation temperature, which induces structural transformations that sometimes result in fragile phases. UNS S 32760 is a corrosion resistant austenitic-ferritic super-duplex steel, used for applications where conventional duplex grades do not meet the corrosion requirements. The material is characterized by very good resistance in chloride containing media and by high mechanical strength and good ductility. However, hot formability may be adversely affected due to the formation of intermetallic phases, promoted by Cr and Mo in which ferrite is enriched, and due to the fall of element solubility in the ferrite with decreasing temperature, which increases the probability of precipitation during hot forming. Thus, to avoid cracking, it is essential to carefully control the temperature during plastic deformation. In the present paper, microstructural modifications occurring by varying the forging temperature of a super-duplex stainless steel UNS S 32760 are analyzed by SEM-EBSD technique. It is studied the appearance and evolution of different phases in the temperature range 800 - 1200°C, for a constant degree of deformation. Particular attention is given to the sigma and chi fragile phases. The observations resulted from the microstructural analysis allowed conclusions to be drawn on the optimal deformation temperature range for the super-duplex steel studied.

Biography

Mariana Lucia Angelescu is Associate Professor at the Faculty of Materials Science and Engineering of the University Politehnica of Bucharest, within the Department of Processing of Metallic Materials and Ecometalurgy, in the Deformable Medium Engineering team. She was born on 4 June 1963 and graduated in 1985 from the Faculty of Metallurgy at the Polytechnic Institute of Bucharest, the Metallurgical Department. She started his teaching career in higher education in 1990 and in 1998 she completed her doctoral studies at the University Politehnica of Bucharest, with the theme "Possibilities for induction of superplastic behavior in industrial alloys". She has published over 40 articles in specialized journals and has presented over 30 papers at various conferences. She is the author of many didactic works in the field of plastic deformation of metallic materials and has a rich experience both in fundamental and applied research and in the management of research projects.

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Notes:

Marta Muñoz Martí et al., J Material Sci Eng 2018, Volume 7
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Development of more sustainable viscoelastic polyurethane foam

Marta Muñoz Martí, Ana Belén Francés Bueno and **Virtudes Navarro Bañón**
CETEM, Spain

Statement of the Problem: Viscoelastic polyurethane foams are materials widely used in industry due to their specific properties. These materials offer unique properties in terms of comfort and provide great value to bedding products. Nowadays, with the growing concern for protection of environment and limitation of fossil products, there is a need to develop more sustainable alternatives. In this way, new raw materials of renewable origin are actually being developed with the aim of avoiding or decreasing the petroleum derivatives dependence. Obtaining of viscoelastic foams with a high percentage of eco-sustainable materials, without losing their performance, is a challenge nowadays. The objective of this work is to analyse the effect related with the replacement of synthetic polyol for a renewable polyol (biopolyol) on the foaming reaction experimental variables and final properties of viscoelastic foams.

Methodology and theoretical orientation: From a conventional formulation for viscoelastic foam, different percentages of polyol were replaced by Emerox 14050, a commercial biopolyol with 80% of bio-content. The characterization of raw materials was carried out and chemical reactions were controlled to establish the effect of the polyol replacement on kinetic experimental parameters. The foams were subjected to a complete characterization, analysing the differences in final properties of foamed materials for each biopolyol concentration added in the formulation.

Findings: The use of biopolyol affects foam mixture processability. The FTIR, TGA and DSC analysis indicate changes in chemical structure and thermal properties of foams as the concentration of biopolyol is increased. Physical and mechanical properties of foams can be adjusted by making changes in formulation.

Conclusion and meaning: Up to 50% of polyol of petrochemical origin has been replaced by a product of sustainable origin in viscoelastic polyurethane foams which maintains its viscoelastic properties and possesses appropriate properties for their use in bedding products.

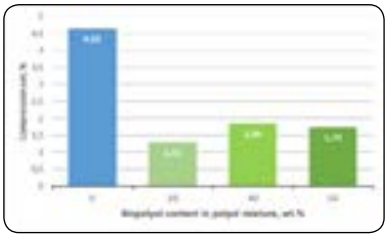


Figure 1. Compression set of viscoelastic polyurethane foams with different contents of biopolyol.

Recent Publications:

1. Ain NH, Maznee TTN, Norhayati MN, Noor MAM, Adnan S, Devi KPP; Mohd NS, Yeong SK, Haximah AH, Campara I, Sendijarevic V, Sendijarevic I (2016) Natural palm olein polyol as a replacement for polyether polyols in viscoelastic polyurethane foam. Journal of the American Oil Chemists' Society 93:983-993.
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Biography

Marta Muñoz Martí works in Materials, Adhesion and Polymers Area in CETEM (Technological Center of Furniture and Wood). After studying at University of Murcia and Polytechnic University of Valencia, she got a Biotechnology bachelor degree. She developed a project at Microbiology Department of School of Agricultural Engineering and Environment at Polytechnic University of Valencia, developing a PCR detection method for bacteria used in bioremediation. After three years working in a food company laboratory at Valencia, he joined the R&D department of Technological Center of Furniture and Wood of the Region of Murcia, a technology center dedicated to carry out innovative activities with the aim of encouraging the development and continuous improvement of wood and furniture companies.

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Notes:

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Effect of surface treatment on wettability of tetragonal zirconia polycrystals (TZP)

Masao Yoshinari
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Surface modification technologies are available for tetragonal zirconia polycrystal (TZP) to enhance its osseointegration and fibro-integration capability for biomedical fields. The surface wettability is one of the important factors in the process of osseointegration and fibro-integration, possibly regulating protein adsorption, and subsequent cell behavior. The aim of this study was to clarify the effect of topographical or physicochemical modification of TZP ceramics on wettability to determine the potential of such treatment in application to dental implants. Several types of surface topography were produced by alumina blasting and acid etching with hydrofluoric acid; surface physicochemistry was modified with oxygen (O2) plasma, ultraviolet (UV) irradiation, or hydrogen peroxide treatment. The obtained specimens were also subjected to storage under various conditions to evaluate their potential to maintain superhydrophilicity. The surface wettability was evaluated by measuring the contact angle against distilled water. The modified surfaces were also analyzed using an X-ray photoelectron spectroscopy (XPS). The results showed that surface modification of surface topography or physicochemistry, especially of blast/acid etching as well as O2 plasma and UV treatment, greatly increased the surface wettability, resulting in superhydrophilicity. XPS analyses revealed that a remarkable decrease in carbon content and the introduction of hydroxyl groups were responsible for the observed superhydrophilicity. Furthermore, superhydrophilicity was maintained, even after immersion in an aqueous solution. These results indicated that topographical and physicochemical modification with O2 plasma and UV treatment to TZP and subsequent immersion in aqueous solution is promising methods for creating superhydrophilicity, leading to important factors in osseointegration and fibro-integration for dental implants.

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Biography

Masao Yoshinari earned his Ph.D. in Dental Materials Science in 1986 from Tokyo Dental College. He is the director of Division of Oral Implants Research, Oral Health Science Center, Tokyo Dental College. He has published more than 200 articles in reputed journals and book chapters including surface modifications of titanium for implant use, fatigue properties of ceramics, and corrosion characteristics of dental alloys.

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Matas Janulevicius et al., J Material Sci Eng 2018, Volume 7
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Synthesis via hydrothermal route, morphology control, and luminescent properties of rare-earth doped $GdPO_4$ particles

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[2]University of Tartu, Estonia

Development and improvement of nano- and micro- sized particles and structures has caught focus of scientists in recent years. Rare-earth doped –nano and –micro orthophosphate particles are promising materials for their chemical and thermal stability, luminescence properties, and low toxicity. They have wide field of applications such as luminescent phosphors, electronics, drug delivery, down/up-conversion materials, catalysis and bio-applications[1-3].Controllable size and morphology is important aspect of this research area, responsible for unique luminescent and physical properties including density, specific area, solubility, stability, reactivity, and zeta-potential of sintered particles. Synthesis of various $LnPO_4$ particles has been studied extensively recently and various morphologies such as nanorods, nanowires, nanofibers, nanocubes, microspheres are reported. Yet, effectiveness in synthesis of $LnPO_4$ particles with an aim to obtain desired morphology, narrow size distribution, good dispersibility in various solvents is still to be improved[4,5]. Herein, we report hydrothermal synthesis route of $GdPO_4$ particles assisted by tartaric acid as a coordinating agent. Several different morphologies such as nanofiber, nanorods, nanoprisms, microspheres were synthesized. Obtained particles are uniform, well-shaped and comparatively small-sized (see Fig. 1). Dispersions of $GdPO_4$ samples remained stable for months. Some properties of sintered particles and the impact of synthesis conditions upon particle phase and morphology were investigated and is discussed in this work. Recently, particles were doped with Nd^{3+}, Dy^{3+}, Yb/Er ions. Investigation of PL properties is ongoing.

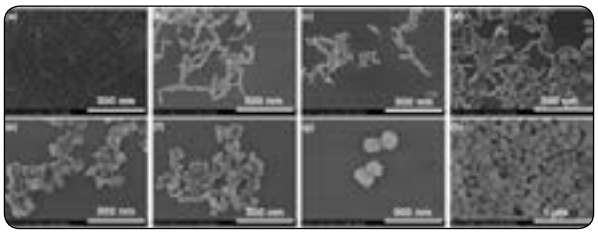


Fig. 1. SEM images of GdPO4 particles. Images represent NH4H2PO4/Gd3+ molar ratio impact upon particle morphology: (a) 1, (b) 4, (c) 7, (d) 10, (e) 20, (f) 50, (g) 75 and (h) 100 respectively.

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Biography

Matas Janulevicius has his expertise in both hydrothermal and solid-state synthesis of luminescent materials. He has experience in developing silicate, molybdate and phosphate based materials doped with rare-earth ions. He developed his skills after years of experience in research, synthesis and investigation of luminescent properties of materials in Vilnius University, Lithuania, as well as during his internships in Hasselt (Belgium) and Tartu (Estonia) universities. Matas Janulevicius has published several articles based on his sintered materials. He also has expertise in organic synthesis of luminescent compounds and is co-author of paper which investigates PL properties of his sintered naphtoquinoline based luminescent compounds.

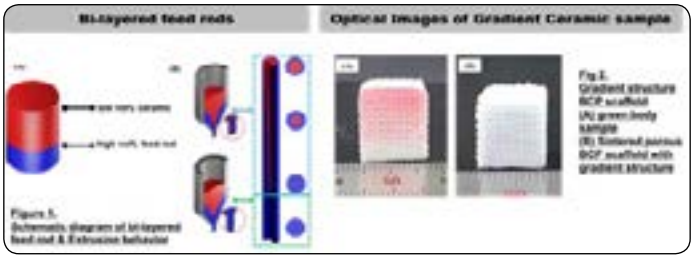
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Min-Kyung Ahn et al., J Material Sci Eng 2018, Volume 7
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Gradually porous bio ceramic scaffolds using ceramic/camphene-based three-dimensional co-extrusion

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Porous bio ceramics have been extensively used in diverse fields, for examples, as scaffolds for bone regeneration, components for thermal insulation and filters, and preforms for structural composites. Fundamentally, the functions of porous ceramics are strongly affected not only by their porous structure (e.g., overall porosity, pore size, pore geometry, and pore interconnectivity), but also by the distribution of those pores.We herein demonstrate a novel, versatile approach to produce biomimetic porous ceramics with a continuously gradient porous structure using three-dimensional extrusion of a bilayered ceramic-camphene mixture/pure camphene feedrod. In this study, bi-layered feed rod comprised of the ceramic/camphene mixtures and law contents of ceramic or pure camphene used as the lower and upper part feed rod. Bi-layered feed rod could be gradually extruded with core/shell structure because of the wall slip phenomenon. This enabled the formation of green filaments comprised of a camphene core surrounded by a ceramic/camphene shell, where the core/shell thickness ratio increased gradually as extrusion proceeded. Biphasic calcium phosphate (BCP) ceramics with a gradient porous structure could be successfully produced by three-dimensionally depositing the extruded filaments layer by-layer. We evaluated gradient micro structure with produced gradient porous BCP ceramic scaffold by scanning electron microscopy (SEM) and Micro CT.



Recent Publications:

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Biography

Min-Kyung Ahn has her extensive experience in the field of biomaterials. She has a lots of experience in bio materials research, evaluation, and operation in the lab. She has many papers and patents in this field and has high passion for biomaterial development.

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Petr Slobodian et al., J Material Sci Eng 2018, Volume 7
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Stretchable and flexible thermoelectric polymer composites for self-powered volatile organic compound vapors detection

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Tomas Bata University in Zlin, Czech Republic

Statement of the Problem: Thermoelectric devices generate an electrical current when there is a temperature gradient between the hot and cold junctions of two dissimilar conductive materials typically n-type and p-type semiconductors. Consequently, also the polymeric semiconductors composed of polymeric matrix filled by different forms of carbon nanotubes with proper structural hierarchy can have thermoelectric properties which temperature difference transfer into electricity. In spite of lower thermoelectric efficiency of polymeric thermoelectrics in terms of the figure of merit, the properties as stretchability, flexibility, light weight, low thermal conductivity, easy processing and low manufacturing cost are advantages in many technological and ecological applications. Methodology & Theoretical Orientation: Polyethylene-octene copolymer based highly elastic composites filled by multi-walled carbon nanotubes (MWCTs) were prepared by sonication of nanotube dispersion in a copolymer solution followed by their precipitation pouring into non-solvent. The electronic properties of MWCNTs were moderated by different treatment techniques such as chemical oxidation, decoration by Ag clusters or addition of low molecular dopants. In this concept, for example, the amounts of oxygenated functional groups attached on MWCNT surface by HNO3 oxidation increase p-type charge carriers. p-type of charge carriers can be further increased by doping with molecules of triphenylphosphine. For partial altering p-type MWCNTs into less p-type ones, Ag nanoparticles were deposited on MWCNT surface and then doped by 7,7,8,8-tetracyanoquino- dimethane. Both types of MWCNTs with the highest difference in generated thermoelectric power were combined to manufacture polymeric based thermoelectric module generating thermoelectric voltage when temperature difference is applied between hot and cold ends of the module. Moreover, it was found that the generated voltage by the thermoelectric module at constant temperature gradient was significantly affected when exposed to vapors of different volatile organic compounds representing then a self-powered thermoelectric sensor for chemical vapor detection.

Acknowledgement This work was supported by the Ministry of Education, Youth and Sports of the Czech Republic – Program NPU I (LO1504) and with the support of the Operational Program Research and Development for Innovations co-funded by the European Regional Development Fund (ERDF) and the national budget of the Czech Republic, within the framework of the project CPS-strengthening research capacity (reg. number: CZ.1.05/2.1.00/19.0409). This project was also supported by the internal grant of TBU in Zlin No. IGA/CPS/2017/002 funded from the resources of the Specific University Research. P. R. would like to acknowledge financial support from the Fund of the Institute of Hydrodynamics AV0Z20600510.

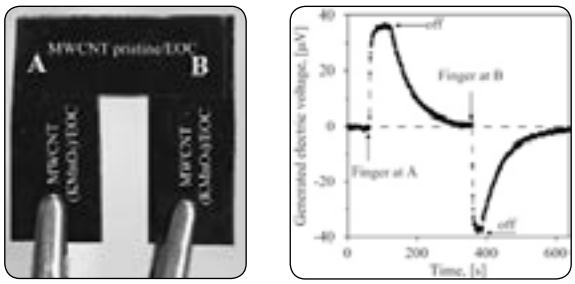


Figure 1: Energy harvesting button assembled from two kind of MWCNT/EOC composites. And time-dependent generation of voltage after finger touching

Recent Publications:

1. Cai L, Wang C (2015) Carbon nanotube flexible and stretchable electronics. Nanoscale Res. Lett. 10: 320-341.
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Biography

Petr Slobodian received the Ph.D. degree in polymer science from the Faculty of Technology, Tomas Bata University (TBU), Zlin, Czech Republic and the Ms. degree from the Brno University of Technology, Brno, Czech Republic. He is a Scientific Researcher at the Centre of Polymer Systems, TBU. He is the associate professor at the Faculty of Technology since 2008. He is author or co-author of 76 scientific articles all published in the impacted journals. His main interests are polymer composite materials, carbon nanotubes and their use in the organic vapor sensors, strain sensors and stretchable thermoelectric materials.

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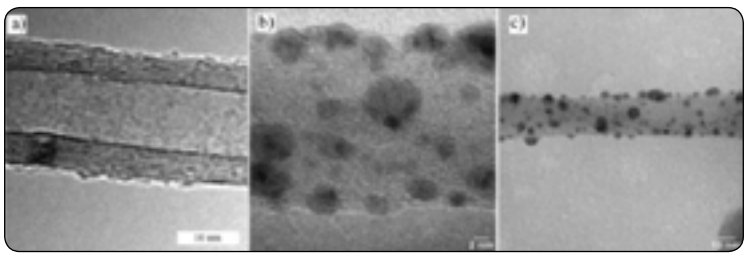
Petr Slobodian et al., J Material Sci Eng 2018, Volume 7
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Self-sensing of strain in a fiber glass/epoxy composite by built-in stripe of carbon nanotubes with Ag nanoparticles

[1]Petr Slobodian, [2]Pavel Rihaand [1]Robert Olejnik,[1]Jiri Matyas, [1]Romana Danova and [3]Ralf Schledjewski
[1]Tomas Bata University in Zlin, Czech Republic
[2]Academy of Sciences, Czech Republic
[3]Montan universitaet, Austria

Statement of the Problem: Strain sensing composite materials have attracted considerable attention for their unique characteristics exceeding conventionally applied materials. Between different solutions and various types of transducers available for these applications, piezo-resistive strain sensors are among the most investigated ones usually based on conductive polymer composites prepared by embedding of electrically conductive fillers as carbon nanotubes into a polymeric matrix. This principle can be used for monitoring of deformation or stress stimulus in elongation or compression. The responses are sensitive and reversible with sufficient durability in the dynamic loadings measured by a macroscopic electrical resistance change. Methodology & Theoretical Orientation: In our contribution we introduce a strain sensing composite material composed of electrically conductive entangled network of Ag decorated multiwalled carbon nanotubes (MWCNTs) integrated into the glass fiber/epoxy composite. A vacuum infusion technique was used for the composite fabrication. The experimental results revealed that an integrated strain sensing exhibit long term electromechanical stability which was linked to the level of strain in the host glass fiber/epoxy structure. It has been proven that modification of pristine MWCNTs with Ag nanoparticles increase the sensitivity to applied strain. Simultaneously pre-strain stimulation was also applied to further enhance detection ability. The resistance sensitivity, quantified by a gauge factor, increased more than hundredfold for a pre-strained sensor with Ag decorated nanotubes in comparison with the value of about 5 for sensor with pristine nanotubes. This is a substantial increase which ranks this new material among strain gauges with the highest electromechanical sensitivity. The obtained data indicated also a reasonable stability of the measurement with no effect of load alterations on the sensor resistance changes. Additionally, the thermoelectric properties, Joule heating and antennal signal reception by MWCNT stripe will be mentioned.

Acknowledgement This work was supported by the Ministry of Education, Youth and Sports of the Czech Republic – Program NPU I (LO1504) and with the support of the Operational Program Research and Development for Innovations co-funded by the European Regional Development Fund (ERDF) and the national budget of the Czech Republic, within the framework of the project CPS-strengthening research capacity (reg. number: CZ.1.05/2.1.00/19.0409). This project was also supported by the internal grant of TBU in Zlin No. IGA/CPS/2017/002 funded from the resources of the Specific University Research. P. R. would like to acknowledge financial support from the Fund of the Institute of Hydrodynamics AV0Z20600510.



HRTEM micrograph of the structure of individual nanotube; b) and c) TEM micrographs of individual nanotubes with deposited Ag clusters

Recent Publications:

1. Cai L, Wang C (2015) Carbon nanotube flexible and stretchable electronics. Nanoscale Res. Lett. 10: 320-341.
2. Kanoun O, Müller C, Benchirouf A, Sanli A, Dinh TN, Al-Hamry A, Bu L, Gerlach C (2014) Flexible carbon nanotube films for high performance strain sensors. Sensors (Basel) 14: 10042-10071.
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Biography

Petr Slobodian received the Ph.D. degree in polymer science from the Faculty of Technology, Tomas Bata University (TBU), Zlin, Czech Republic and the Ms. degree from the Brno University of Technology, Brno, Czech Republic. He is a Scientific Researcher at the Centre of Polymer Systems, TBU. He is the associate professor at the Faculty of Technology since 2008. He is author or co-author of 76 scientific articles all published in the impacted journals. His main interests are polymer composite materials, carbon nanotubes and their use in the organic vapor sensors, strain sensors and stretchable thermoelectric materials.

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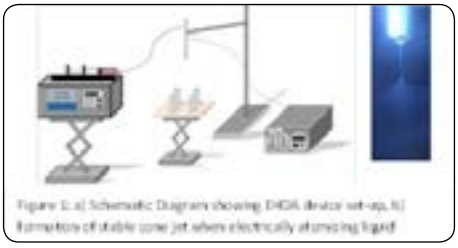
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Development of electrospun timolol maleate-loaded fibrous nanocoatings for ocular lenses

Prina Mehta[1], **Ali Al-Kinani**[2], **Raid Alany**[2] and **Zeeshan Ahmad**[1]
[1]De Montfort University, UK
[2]Kingston University, UK

The complexity of the structure of the eye, more specifically the cornea [1], poses a great challenge with respect to topical ocular drug delivery [2]. As a result, extensive research in this field has yielded an array of approaches to overcome these anatomical barriers; one of which is the use of PEs. In an attempt to utilise PEs to increase the corneal penetration of timolol maleate, electrohydrodynamic atomisation (EHDA) was employed to fabricate drug loaded polymeric fibers containing PEs. EHDA is an on-demand; simple, easily amendable process (figure 1) capable of producing uniform structures which can be utilised as coatings for ocular lenses for ocular drug delivery [3, 4]. The resulting fibrous coatings were characterised with respect to morphology, thermal behaviour, in vitro drug release, release kinetics and ocular biological tolerability. SEM analysis of the electrospun structures confirmed the presence of smooth nano-fibers; whist thermal analysis confirmed the stability of all formulations. In vitro release studies demonstrated a triphasic release; initial burst release with two subsequent sustained release phases with most of the drug being released after 24 hours (86.7%) Biological evaluation studies confirmed the tolerability of all formulations tested with release kinetics modelling results showing drug release was via quasi-Fickian or Fickian diffusion. There were evident significant differences ($p<0.05$) in TM release dependant on permeation enhancer. The use of electrospinning to produce contact lens coatings has not yet been scrutinised in the pharmaceutical research remit and has shown great potential here; proposing a novel formulation and ocular drug delivery device to enhance TM release.



Recent Publications:

1. Mehta P, Haj-Ahmad R, Al-Kinani A, et al (2017) Approaches in topical drug delivery and developments in the use of contact lenses as drug-delivery devices. Therapeutic Delivery. 8:521-541
2. Taska, P, Tatke A, Majumdar S, (2017). Advances in the use of prodrugs for drug delivery to the eye. Expert Opinon, Drug Delivery, 14: 49-63
3. Mehta P, Justo L, Walsh S, et al, (2015) New Platforms for multi-functional ocular lenses: Engineering double-sided functionalised nano-coatings. Journal of Drug Targeting, 23:305-310
4. Mehta P, Haj-Ahmad R, Raskeh M, et al (2017) Pharmaceutical and biomaterial engineering via electrohydrodynamic atomization technologies. Drug Discovery Today, 22:157-165
5. Morrison PWJ, Khutoryanskiy V.V, (2014) Enhancement of corneal permeability of riboflavin using calcium sequestering compounds. International Journal of Pharmaceuticals. 472:56-64.

Biography

Prina Mehta is a final year PhD student whose passion and research resides in the ocular drug delivery remit. I completed my BSc in Pharmaceutical and Cosmetic Sciences in 2014. My final year project used EHDA techniques for mart microneedle coatings and this propelled my interest in the various applications for which this technique could be used for. The concept behind the research for my PhD was to utilize the electrohydrodynamic process to fabricate multifunctional fibrous coatings on a nanoscale for soft contact lenses. The aim was to improve patient compliance, drug bioavailability and ultimately drug permeation through the cornea.

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Radeyah Ali et al., J Material Sci Eng 2018, Volume 7
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Electrospun coatings for micron scaled medical devices

Radeyah Ali and **Zeeshan Ahmad,**
De Montfort University, UK

The complexity of the structure of the skin poses a great challenge for transdermal drug delivery. One of the most recent developments in drug delivery devices in this remit are microneedles (MNs). Electrohydrodynamic Atomization (EHDA) can be used to produce nanoparticle or nanofibre MN coatings via electrospraying or electrospinning, respectively. As well as applications in drug delivery and vaccine delivery, coated MNs also have the potential to be utilised for biomedical and other analytical uses (e.g. allergies, sensors). Here, stainless steel MNs were coated using electrohydrodynamic atomisation (EHDA) by varying the setup (collection methodology and deposition distance) which led to optimisation of the process thus producing nano and micron sized particular and fibrous structures. The coating formulation consisted of a PVP matrix system, fluorescein dye (model active, disease state marker) with ethanol as vehicle. Using these excipients and manipulating EHDA process parameters, led to deposition of particles (100 nm to 3um) and fibres (400 nm to 1 um) onto MNs in a controlled manner (flow rate range of -5-50 uL/min, varied applied voltage 6-19 kV), confirmed with SEM analysis. This study displays the capability for targeting as well as analysis alongside potential for a novel medical device capable of delivering active therapeutic ingredients on a micron and even nano scale.

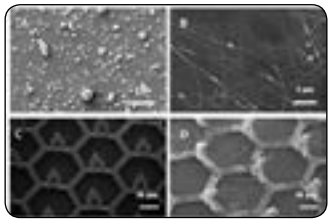


Figure 1: A) SEM low Mwt (4.4x104) PVP, B) high Mwt (1.3x106) PVP, C) uncoated microneedles, D) coated microneedle at 5000x magnification

Recent Publications:

1. Larrañeta, E., Lutton, R., Woolfson, A. and Donnelly, R. (2016). Microneedle arrays as transdermal and intradermal drug delivery systems: Materials science, manufacture and commercial development. Materials Science and Engineering: R: Reports, 104, pp.1-32.
2. Mehta, P., Haj-Ahmad, R., Rasekh, M., Arshad, M., Smith, A., van der Merwe, S., Li, X., Chang, M. and Ahmad, Z. (2017). Pharmaceutical and biomaterial engineering via electrohydrodynamic atomization technologies. Drug Discovery Today, 22(1), pp.157-165.
3. Dillon, C., Hughes, H., O'Reilly, N. and McLoughlin, P. (2017). Formulation and characterisation of dissolving microneedles for the transdermal delivery of therapeutic peptides. International Journal of Pharmaceutics, 526(1-2), pp.125-136.
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5. Ling, Ming-Hung, and Mei-Chin Chen. "Dissolving Polymer Microneedle Patches For Rapid And Efficient Transdermal Delivery Of Insulin To Diabetic Rats". Acta Biomaterialia 9.11 (2013): 8952-8961.

Biography

Radeyah Ali is a highly motivated PhD student in my second year of research working in drug delivery. I have made rapid progress in my research through hard work and determination. I have successfully completed a comprehensive literature review which will be written up for a publication specific to my research as well as carrying out experiments. I have carried out laboratory demonstrations aiding students in their practical and written work during a practical session.

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Swathy R et al., J Material Sci Eng 2018, Volume 7
DOI: 10.4172/2169-0022-C8-114

19th World Congress on

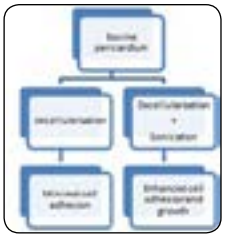
Materials Science and Engineering

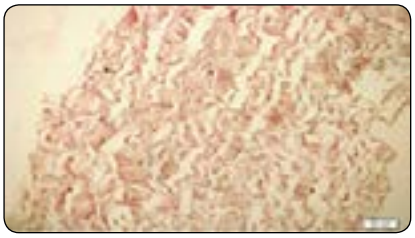
June 11-13, 2018 | Barcelona, Spain

Sonicated decellularised xenograft – a perfect scaffold for cell adhesion

Swathy R[1a], Sanjay Cherian[2], Soosai Manickam[1b] and **Kootturathu Mammen Cherian[2]**
[1a,2]Frontier Lifeline & KM Cherian Heart Foundation Hospital, India
[1b]CMC, India

Tissue engineering aims at integrating cells, growth factors, tissues, material engineering to produce the best substitutes for organ transplantation. When it comes to valve replacement surgeries, Mechanical heart valves had always been cost effective and commercially successful but they show complications like thromboembolism, hemorrhage, imperfect hemodynamic performance and prosthetic endocarditis. To overcome the complications, increasing number of devices is being designed from biological scaffolds, like Decellularized Bovine pericardium, porcine valves tissues. The most important part of using a Xenograft for surgery is the processing technique employed. There had been lot of failures so far in using the tissue engineered scaffolds, like Ionescu-Shiley valves due to the problem with the decellularisation and stabilization protocols. There are effective decellularisation protocol employing Detergents and enzymes. Though, decellularisation is carried out properly, cell attachment may be difficult many times due to intact collagen matrices and low cell adherence spaces. In this study, we try to find out the effects of mechanical forces on the decellularised scaffolds that cause minimal damage on the extracellular matrices and create gaps within adjacent collagen bundles for cell attachment. We have subjected the xenograft scaffold to waterbath sonicator for particular time at specific conditions. The resulting scaffold was thinner, easy to handle and the H&E staining showed the scaffolds to have enough spaces among large collagen bundle enabling easy cell adherence. This scaffold can enhance cell adhesion and growth, which has always been a challenging task in the field of regenerative studies.





Recent Publications:

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2. Escande Rémi1,3, Nizar Khelil1, Isabelle Di Centa2, Caroline Roques1, Maguette Ba1,3, Fatima Medjahed-Hamidi1(2013) Pericardial Processing: Challenges, Outcomes and Future Prospects: Biomaterials Science and Engineering
3. Azhim A1, Syazwani N2, Morimoto Y3, Furukawa KS4, Ushida T (2014) The use of sonication treatment to decellularize aortic tissues for preparation of bioscaffolds: Journal of Biomaterial Applications
4. N. Syazwani, A. Azhim, Y. Morimoto, K. Furukawa, T. Ushida (2014) Immune Response of Implanted Aortic Scaffolds Decellularized by Sonication Treatment: The 15th International Conference on Biomedical Engineering pp 275-278
5. Swathy Sajith (2017) Comparative Study of Two Decellularization Protocols on a Biomaterial for Tissue Engineering: International Journal of Clinical & Experimental Cardiology.

Biography

Swathy R, a well presented, self motivated researcher having excellent research potential and an ability to actively contribute to the research projects goals as well as a proven publication track record. Able to plan research and organise tasks effectively. Major interest areas being Tissue engineering of bioprosthetic materials, to be designed for clinical applications, have worked on decellularisation protocols, stem cell isolation from different sources, and animal implantation studies. Has teaching experience, which developed after the interest in sharing ideas with upcoming people.

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Tae Jung Park et al., J Material Sci Eng 2018, Volume 7
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Facile biosensor for detecting norovirus using specific binding probes

Tae Jung Park[1], **Jong Pil Park**[2], **Changsun Choi**[1] and **Sang Do Ha**[1]
[1]Chung-Ang University, Republic of Korea
[2]Daegu Haany University, Republic of Korea

Norovirus is one of the worldwide infectious diseases by eating raw foods which were infected by others, and there are many people could be infected to touch to be contaminated things by norovirus. It is a major cause of foodborne and nosocomial outbreaks. In this study, thoroughly and highly sensitive biosensors for detecting norovirus by applying a recognized affinity peptide as a platform were described. As this electrochemical and optical methods are cost-effective, fast responsive and easy to integrate information into miniaturized micro-devices like a portable biosensor device. The performance of the peptides has been studied with fluorescent optical assay, and gold-immobilized synthetic peptides has been studying cyclic voltammetry, impedance spectroscopy, and colorimetry analyses. We found that several kinds of peptides (Noro-BP, nonFoul, (FelxL)2, nonFoul(FlexL)2) are the efficient recognizers for norovirus screened by using the M13 phage display method. These peptides were effectively applied to the electrochemical and optical analysis methods to detect the real norovirus sample with rotavirus as a negative control. Among them, nonFoul(FlexL)2 shows the best sensitive performance as the lowest detection limit value of 1.7 copies/mL. In addition, the result could be expected to be useful into the peptide-based detection sensor for the norovirus by using nanoflowers with large surface area. These results suggest that the biosensor consists of specific binding peptide, has affinity to norovirus as a molecular binder and will be used to micro-device as a diagnostic tool. Moreover, the biosensor could be helped as a new biosensing platform for point-of-care testing by applying much more fields.



Figure 1: Schematic illustration for the electrochemical detection of norovirus.

Recent Publications:

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2. Lim JM, Ryu MY, Yun JW, Park TJ, Park JP (2017) Electrochemical peptide sensor for diagnosing adenoma-carcinoma transition in colon cancer. Biosens Bioelectron 98:330-337.
3. Lim JM, Oh SY, Heo NS, Ryu MY, Seo JH, Park TJ, Huh YS, Park JP (2018) Selection of affinity peptides for interference-free detection of cholera toxin. Biosens Bioelectron 99:289-296.
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5. Lee SW, Cheon SA, Kim MI, Park TJ (2015) Organic-inorganic hybrid nanoflowers: Types, characteristics, and future prospects. J Nanobiotechnol 13:54.

Biography

Tae Jung Park has completed his PhD from Korea Advanced Institute of Science and Technology in 2004. He is currently the professor of chemistry department in Chung-Ang University. He has published more than 125 papers in reputed journals and has been serving as an editorial board member within nanobiotechnology category of Bioprocess and Biosystems Engineering, and Biotechnology and Bioprocess Engineering.

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Yoonjong Yoo et al., J Material Sci Eng 2018, Volume 7
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Manufacturing of gasket sheet using paper manufacturing process without organic solvent

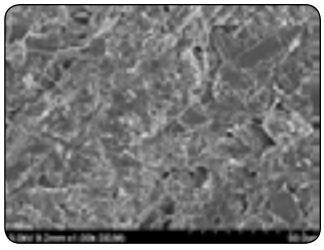
Yoonjong Yoo[1], **Hyejeong Lee**[2], **Seongmin Park**[2], **Seongki Kim**[2] and **Sanghoon Lee**[2]
[1]Korea Institute of Energy Research, Republic of Korea
[2]JEIL E&S Co.,Ltd, Republic of Korea

This paper is about ceramic gasket manufacturing technology that can be used the extreme temperatures. This gasket is manufactured using ceramic fiber and talc main raw materials, and inorganic content is about more than 95 percent. Therefore, gasket has thermal stability, chemical and corrosion resistance and superior properties. So the chemical plant, high pressure thermal processing, steam lines and can be used. In this study, paper manufacturing method applied for preparation of the ceramic gasket sheet and it's a new economic process will be. Inorganic fiber, talc and binders evenly distributed in the waters for manufacture the gasket. Then dehydration on the wire mesh by supplying the slurry, and compression, through drying process completed the gasket for extreme temperature. The characteristics of manufactured during the experiment are density 1.40g/cm3, tensile strength 13.7MPa, compressibility 19%, recovery 55 and ignition loss 33.4% at 650oC. And there was no pressure drop when 10 minutes in conditions of 150LB(two inch) 10kgf/cm2 nitrogen. All the additives are being evenly distributed to the surface of the gasket, and each other's bonds have been completed successfully, and the applicability by paper manufacturing process. It has been confirmed that enough.

Solvent free gasket manufacturing process:

1. All gasket materials such as water-based latex, mineral fiber and fillers are easily in water and evenly distributed.
2. Was dehydration a lot of influence on the size of the cohesion within the slurry in forming process.
3. An example a continuous process for a product is as follows : Mixture of raw materials -> forming and dehydration->third stage compression -> two stage drying -> third stage calendering -> rolling
4. New process is no odor is a clean work environment.

Acknowledgment This subject is supported by Korea of Environmental Industry & Technology Institute (KEITI), Korea Ministry of Environment (MOE) as "Advancement of Environmental Industry Technology Development Program" (PN : 1485013985)





Properties	Commercial Gasket	Paper making process		
		KGP-2, Standard method	JP2170530 Continuous production	Test method
Density, g/cc	1.55	1.3~1.4	1.4	
Compressibility, %	5~15	18~20	19	ASTM F36
Recovery, %	10	40~55	55	ASTM F36
Tensile strength, MPa	13.6	200~220	13.7	ASTM F152
IRM903 Oil resistance	Max.30	14.8	11.2	Change in weight(%)
Ignition loss @650C, %	34.33	32.95	33.4	
Gas-tight	very good	Very good	very good	

Recent Publications:

1. Interface Performance Materials, Inc. (2016) Composite sheet with embedded mesh layer. US Patent : US2016-0281852
2. Dipl.-Ing. C. Simader, Dipl.-Ing. L. Horl and Prof. Dr.-Ing. habil. W. Haas, Institut fur Maschinenelemente, Universitat Stuttgart, Germany. The development of design guidelines for the application of formed-in-place gaskets. Sealing Technology(2012)
3. New gasket is very flexible, Sealing Technology, Volume 2009, Issue 7, July 2009, Page 2.

Biography

Yoonjong Yoo Major Research Field are Honeycomb adsorbents for VOC, CO_2, humidity adsorption, Ceramic paper, Zeolite paper, Active carbon paper for adsorption materials, Carbon (chopped)fiber paper and mat for GDL and plane heater and Solvent free gasket manufacturing process for high temperature using. And working at Korea Institute of Energy Research (KIER).

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Ji-Young Jung et al., J Material Sci Eng 2018, Volume 7
DOI: 10.4172/2169-0022-C8-114

Pickering emulsion droplets for thermally expandable microcapsule with core-shell structure using β-cyclodextrin

Ji-Young Jung, Jae Il So and **Sang Eun Shim**
Inha University, Republic of Korea

Introduction: The automotive industry is applying enhanced legislation on environmental protection and CO_2 emissions regulations from exhaustion petroleum resources, and for this reason it is likely that the automotive industry will be able to improve its fuel efficiency. Various polymeric foam molding studies are being performed to achieve the additional light weight effects of polymeric materials to the extent allowed by mechanical properties. The use of three dimensional stabilizers or surfactant used in the manufacture of microcapsule for light-weight is used to prevent the liquid products from forming together during the polymerization process. However, the use of large quantities of surfactants exist results from the reaction, and the residual surfactant requires a post-reaction removal process. Accordingly, the purpose of this study is using a Pickering emulsifier without an surfactant, create a Pickering Emulsion which are slightly emulsified to a soluble solvent and manufacturing thermally expansion microcapsules that have a better size distribution.

Experimental : Steps to prepare a continuous phase, including antioxidant, inhibitor, salts, the Pickering emulsifier, and soluble solvents ; to prepare disperse phase that contain blowing agent with monomers and initiator; Microcapsule shells consist of acrylonitrile(AN) and methyl methacrylare(MMA). With aiming to prepare microcapsules having a particle size of 1000-200 μm. β-Cyclodextrin(β-CD) and poly(vinylpyrrolidone)(PVP) were used as Pickering emulsifier and stabilizer, respectively.

Characterization : The particle morphology was investigated by SEM, and OM. Particle size distribution was measured using coulter. Thermo-gravimetric analysis(TGA) was conducted to investigate the content of blowing agent.

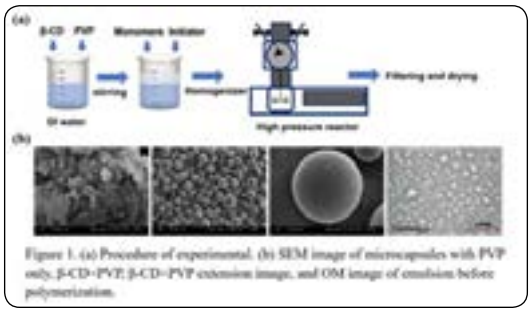


Figure 1. (a) Procedure of experimental. (b) SEM image of microcapsules with PVP only, β-CD+PVP, β-CD+PVP extension image, and OM image of emulsion before polymerization.

Recent Publications:

1. Kim, J. G., Ha, J. U., Jeoung, S. K., Lee, K., Baeck, S. H., & Shim, S. E. (2015). Halloysite nanotubes as a stabilizer: fabrication of thermally expandable microcapsules via Pickering suspension polymerization. Colloid and Polymer Science, 293(12), 3595-3602.
2. Li, X., Li, H., Xiao, Q., Wang, L., Wang, M., Lu, X., ... & Zhang, J. (2014). Two-way effects of surfactants on Pickering emulsions stabilized by the self-assembled microcrystals of α-cyclodextrin and oil. Physical Chemistry Chemical Physics, 16(27), 14059-14069.
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6. Mathapa, B. G., & Paunov, V. N. (2013). Self-assembly of cyclodextrin–oil inclusion complexes at the oil–water interface: a route to surfactant-free emulsions. *Journal of Materials Chemistry A, 1*(36), 10836-10846.

Biography

Ji-young Jung is graduate student of Department of Chemistry & Chemical Engineering in Inha University Republic of Korea. She research and study polymer in Polymer Nanomaterial Laboratory. There are two types of experiments under way. It is used for the manufacture of thermally expandable microcapsule for lightweight automotive materials and fabrication of hybrid polyurethane compounds for insulation.

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Notes:







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Giménez Martín Elena et al., J Material Sci Eng 2018, Volume 7
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Polyamide fibers coated with anti-inflammatory drugs

Giménez Martín Elena, Rodriguez-Babe Rocío, Campos-Jiménez Daniel and **López-Andrade Miguel**
University of Jaén

Textile industry is undergoing new challenges looking for a wider range of application in different fields, among which it is possible to emphasize the development of new biomaterials or compounds of pharmacological interest. Our current research is focused on coating fiber with antiseptics and anti-inflammatory in order to prevent from contamination or inflammation and to achieve controlled topical release. In previous research, adsorption of Chlorhexidine onto different fibers and in its posterior desorption, have been studied. In the present work a study of the possibility to obtain polyamide fibers, PA 6.6, coated with anti-inflammatory drugs as Diclofenac Sodium, DCF-Na, and Dexketoprofen has been carried out with the aim of getting gauzes that could allow topical application before or after oral surgeries and periodontal treatments. This new via for administration of anti-inflammatory compounds could be interesting to avoid side effects derived from oral administration, especially in child or geriatric dentistry treatments. For this goal, electrokinetic and thermodynamic analysis of the adsorption process as a function of concentration, temperature and pH of both anti-inflammatory solutions used has been performed. The results show that the adsorption process fits very well to Langmuir theoretical model, which suggests a monolayer coverage of the adsorbent. The analysis of the thermodynamic functions shows that the adsorbate/adsorbent interaction is spontaneous under the conditions tested. The kinetic study of the process indicates that the interaction follows first order model being the process very fast compared to others carried out using PA 6.6 as adsorbent. The fact that the zeta potential of the fiber is negative in the pH range at which the adsorption is maximum, besides that the reaction seems to be slightly exothermic, could indicate that the process is mainly governed by physicals interactions with low activation energy and therefore desorption in physiological conditions could be achieved.

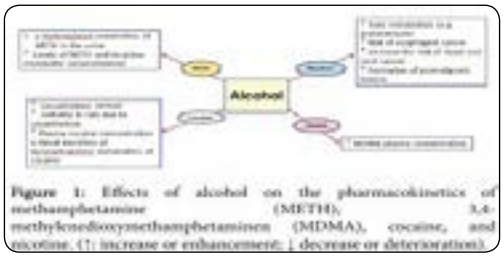


Figure 1: Effects of alcohol on the pharmacokinetics of methamphetamine (METH), 3,4-methylenedioxymethamphetamines (MDMA), cocaine, and nicotine. (↑: increase or enhancement; ↓ decrease or deterioration).

Recent Publications:

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5. Giménez-Martín, E., López-Andrade, M., Ontiveros-Ortega, A., & Espinosa-Jiménez, M. (2009). Adsorption of chlorhexidine onto cellulosic fibers. *Cellulose, 16*(3), 467-479.

Biography

Giménez Martín Elena is a has developed her researching work in the department of physiscs in Jaén University. The min objective of her investigation is to analize the evolution of kinetic, thermodynamic and electrokinetic properties of different textile fibers as function of its treatment with different cchemical compouns as dyes, susrfactants some pharmaceutical compounds and inorganic ones as Graphene is. Nowadays interest is focused in deptermination of the interaction responsible of adsorption of anti-inflammatory drugs onto synthetic fiberes with the aim.

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Notes:







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Accepted Abstracts

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Evolution of A201 alloys microstructure during thermal treatment: influence of Si, Ti and B

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Different metastable phases formed during thermal treatment of Al-Cu alloys were investigated by combination of HRTEM, TEM+EDS and HRSEM techniques. The based Al - 4.97 wt. % Cu - 0.56 wt. % Ag alloy (A201) was modified by different additions of Si, Ti and B. Microstructure and mechanical properties were studied in the as-cast, solution treated (at 550˚C for ~20 hours) and aged (at 170˚C up to 32 days) conditions. The precipitation sequence during aging was the following: supersaturated solid solution (SSSS) → GP zones → θ'' → θ' + Ω → θ. During the early stages of aging GP zones are nucleated as single layers of Cu parallel to {100} planes of the →-Al matrix. Then these GP zones are united and generate the metastable θ''-$CuAl_3$ phase consisting of several single atomic layers of Cu, each of them separated by three atomic layers of Al. The Ag, Ti and B additions resulted in nucleation of metastable semi-coherent θ phase formed at {111} α -Al planes. The Si addition increased nucleation of GP zones and inhibited Ω phase. The following aging resulted in θ'' transformation to semi-coherent metastable θ'-$CuAl_2$. The mechanism of this transformation is discussed. The next step of microstructure evolution is diffusional dissolution of θ'' precipitates in the presence of more stable θ' and Ω phases. The maximum microhardness corresponded to simultaneous formation of semi-coherent θ' and Ω precipitates. After extended aging, the θ' transforms to stable incoherent BCT θ-phase.

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Geoexchanger system for buildings heating and cooling

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Over the years, all parts of a commercial refrigerator, such as the compressor, heat exchangers, refrigerant, and packaging, have been improved considerably due to the extensive research and development efforts carried out by academia and industry. However, the achieved and anticipated improvement in conventional refrigeration technology are incremental since this technology is already nearing its fundamentals limit of energy efficiency is described is 'magnetic refrigeration' which is an evolving cooling technology. The word 'green' designates more than a color. It is a way of life, one that is becoming more and more common throughout the world. An interesting topic on 'sustainable technologies for a greener world' details about what each technology is and how it achieves green goals. Recently, conventional chillers using absorption technology consume energy for hot water generator but absorption chillers carry no energy saving. With the aim of providing a single point solution for this dual-purpose application, a product is launched but can provide simultaneous chilling and heating using its vapor absorption technology with 40% saving in heating energy. Using energy efficiency and managing customer energy use has become an integral and valuable exercise. The reason for this is green technology helps to sustain life on earth. This not only applies to humans but to plants, animals and the rest of the ecosystem. Energy prices and consumption will always be on an upward trajectory. In fact, energy costs have steadily risen over last decade and are expected to carry on doing so as consumption grows.

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Effect of varying La:S molar ratios in Eu_3^+activated La_2O_2S synthesized by sol-combustion method

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Nanopowders $La_2S_2O:Eu_3^+$ with different La(1:x):Sx molar ratios ($0.1<x<2.5$) has been synthesized by facile sol-combustion method. The crystal structure and optical properties were investigated by X-ray diffraction (XRD) patterns, Scanning electron microscope (SEM), Fourier transform infrared (FTIR), Ultra-violet visible (UV-Vis) spectroscopy and Photoluminescence (PL). As the ratio of La: S is varied (from 1.0 to 2.5), the $La_2S_2O:Eu_3^+$ nanopowder exhibits a body – centred cubic structure of La_2S_2O with formation of separated of EuO_2 and La_2O_2 phases which is confirmed by X-ray photoelectron spectroscopy (XPS). Fourier transform infrared also revealed the presence of La-S stretching mode, La – O and S-O vibration modes. UV-Vis reveals that the optical band gap of $La_2S_2O:Eu_3^+$ phosphors show red shift with increase in x. The PL spectra indicate several strong and narrow visible light emissions outspreading from 525 to 708 nm. The presence of Eu_3^+ impurities in the La_2S_2O structure induced the formation of recombination centres with lower emission energies and shows direct modulation of band gap. This method has proven to be ideal and simple to synthesize material for devices operating in the visible region as well as for developing heterojunction structures for optoelectronic device applications with desired efficiency.

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Optimization of nanostructured FeCrNb hardfacing alloy on stainless steel deposited by PTA process

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Weld deposition is commonly used to enhance the tribological properties of manufacturing components, for which the Plasma Transferred Arc (PTA) technique is increasingly demanded worldwide for enhancement of corrosion, heat and wear resistance. This demand has led to the need to optimize welding processes to reach appropriate weld bead properties. Therefore, in this research PTA process with a Fe-Cr-Nb nanostructured alloy was used with a robotic arm to achieve the optimum welding parameters, in a thin substrate that is highly demanded by the automotive industry. The aim of this study was to develop a mathematical model to predict the weld geometry: penetration, reinforcement and weld width by development of a Design of Experiment (DOE) of twenty-four samples (one block) with a central composite design varying the most important process parameters (current, travel speed, powder feeding rate and plasma gas pressure). Finally, a validation of the best weld bead was performed to corroborate the model results. This research will improve welding operations with a highly industrial potential application by remarking the correct parameters for 409 stainless steel.

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Development performance of turbine jet engine

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Jet engines are important equipment to be developed continuously. This engine consists of the following parts, compressor, combustion chamber, turbine and exhaust nozzle. Turbine jet engine operates at an open cycle called a jet propulsion cycle. Turbine jet engines are constructed mainly for air transportation while the turbine jet engines are developed for a wider purpose, ranging for research activity to hobbyist enthusiastic. Hence, this paper encompasses the design, fabrication, and testing a turbine jet engine. The temperature distribution was measured along the combustion chamber, in addition to the design of a diffuser inside the combustion chamber for purpose ideally mixing the reactors. This method is first used in this research. The design of the combustion chamber is developed to make primary and secondary air takes paths so as to allow a series of combustion processes that help to increase the speed of a jet engine. The engine is derived from an automobile turbocharger, which provided the turbine and compressor component. A combustion chamber is design and fabricated. Engine support system comprised of ignition, lubrication and fuel delivery system are installed at the engine. Thermocouple K-type are installed at four different stations on the engine flow path to measure the temperature. Fuel regulators are utilized to measure the fuel flow rate.

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Reinforcement of sand by plastic fibers

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Soil reinforcement is an efficient mechanical technique for soil stabilization. Soil reinforcement can be achieved by the inclusion of continuous strips or sheets within the soil mass (systematically reinforced soil) or by the inclusion of short discrete randomly distributed fibers. The initial stage of the experimental program includes the study of the effect of plastic fiber (as reinforcement material) with different size and contents. In this experimental study, raw plastic bottle fibers has been used in two different aspect ratio i.e. (size=1mm*12mm), (size=1mm*6mm) these different size of plastic fiber have been mixed with sand. The results provide that there is an increase in shear strength due to the fiber reinforcement. The initial value of shear strength developed from the results of shear strength was found to be increase after reinforced with fiber. Systematic reinforcement improves the strength in certain directions. Randomly distributed reinforcement, on the other side, provides an isotropic behavior and limits the development of weak plans. Reinforced sand construction is an efficient and reliable technique for improving the strength and stability of sands. The technique is used in a variety of applications, ranging from retaining structures and embankments to subgrade stabilization under footing and pavements. We can say that the waste plastic bottles can be successfully recycled to produce plastic-fibers that can be used to improve the strength of weak soils. The addition of plastic-fibers to the sand samples resulted in substantial increase in the measured values of the cohesion and friction angle.

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Smart &innovative antifouling coatings in industrial applications

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Biofouling, which can be described as the colonization of marine organisms such as microorganisms, barnacles and seaweeds on submerged surfaces, is the fundamental problem in Marine industry since it causes to increased hydrodynamic drag resulting in significantly increased fuel consumption and greenhouse gas emissions. In antifouling applications, the challenge is to develop cost-effective design approaches rely on the eco-friendly materials that should be highly efficient in various types of organisms. From a physical point of view, the trend is moving towards to understand the fundamental driving forces that are able to eliminate surface interaction between microorganisms and surface. On this basis, rational design of stimuli responsive polymeric materials is the key concept towards solving this problem since it enables us to create complex molecular assemblies and interfaces that can be controlled by an external stimuli within desired time scales in various environmental conditions. The main objective of this study is to reconcile the key parameters in antifouling applications and the smart coating solutions offered by stimuli responsive materials. Our design consists of complex surface chemistry by employing various grafted PEG chains with functional end chains. Thus, to forge micro-topographic structure primes unfavorable surfaces to microorganism. The resulting of multi- functional graft chains to avert attachment of protein, carbohydrate, lipids and any other living cells. We achieved to have contact angle 133oCto 144oCat the range of super hydrophobic surfaces and our polymer can repel death and living organisms as a ratio between 84-91 %. We consider that our project broadens new approach to marine coating industry..

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Effects of sintering temperature on microstructure and mechanical properties of nanostructured Ni-17Cr alloy

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Spark Plasma Sintering technique is a novel processing method that produces limited grain growth and highly dense variety of materials; alloys, superalloys, and carbides just to mention a few. However, initial particle size and spark plasma sintering parameters are factors which influence the grain growth and mechanical properties of sintered materials. Ni-Cr alloys are regarded as the most promising alloys for aerospace turbine blades, owing to the fact that they meet the basic requirements of desirable mechanical strength at high temperatures and good resistance to oxidation. The conventional method of producing this alloy often results in excessive grain growth and porosity levels that are detrimental to its mechanical properties. The effect of sintering temperature was evaluated on the microstructure and mechanical properties of the nanostructured Ni-17Cr alloy. Nickel and chromium powder were milled using high energy ball milling independently for 30 hours, milling speed of 400 revs/min and ball to powder ratio (BPR) of 10:1. The milled powders were mixed in the composition of Nickel having 83 wt % and chromium, 17 wt %. This was sintered at varied temperatures from 8000C, 9000C, 10000C, 11000C and 12000C. The structural characteristics such as porosity, grain size, fracture surface and hardness were analyzed by scan electron microscopy and X-ray diffraction, Archimedes densitometry, Micro-hardness tester. The corresponding results indicated an increase in the densification and hardness property of the alloy as the temperature increases. The residual porosity of the alloy reduces with respect to the sintering temperature and in contrast, the grain size was enhanced. The study of the mechanical properties, including hardness, densification shows that optimum properties were obtained for the sintering temperature of 11000C. The advantages of high sinterability of Ni-17Cr alloy using milled powders and microstructural details were discussed.

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Inclusion characterization for quality control in steelmaking

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Demand for clean steel has been increasing every year. The level required for clean steel varies with steel grade and downstream applications. Steel cleanness depends on the amount, morphology, and size distribution of non-metallic inclusions in steel. Cleanness level in the long and flat products vary dramatically and clearly differentiated based on the de-oxidation process used. In order to assist inclusions formation, samples from ladle furnaces and casting were collected and analysed using Scanning electron microscope (SEM) with an automated feature analysis in order to evaluate morphology, composition and distribution of inclusions. Thus, internal quality control of semi-finished products might be correlated to product defects and process abnormalities. Examples from Al-killed and Si-Killed steels are presented to understand the process conditions necessary for clean steel making and thus product quality improvement.

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Fabrication of high thermal conductive diamond/copper composites and their joining with substrates

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Diamond/Cu composites for the use of heat spreader were fabricated via pressureless liquid phase sintering process. Minor-addition of Zr was added into the matrix to improve the wettability between diamonds and Cu matrix. A high thermal conductivity of 716 W/m2K was obtained for the 50 vol% diamond/Cu composite. Composites fabricated by Cu/Zr flake method can reduce the surface roughness from 35 μm to 1.6 μm, which is suitable for joining with commercial substrates. AlN, Si, and Al_2O_3 substrates were joined with composites by commercial lead-free solder paste and liquid metal. Liquid metal joined packages had great performance opposite to the solder pasted ones with the highest thermal conductivity of 342 W/m2K in the couple of the Si substrate. For AlN, Si and Al_2O_3 substrate joined packages, average thermal conductivity were 299, 322 and 148 W/m2K, respectively. On the reliability of thermal cycle tests for joining packages, the lower thermal cycle (25-85OC) was to simulate the operating environment and the higher thermal cycle (25-200OC) for fabricating environment. It showed great reliability with above 78% residue thermal conductivity after lower temperature 1000 thermal cycles and 79% after higher temperature 5 thermal cycles.

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The synergistic effect of H_2O and DMF towards stable and 20% efficiency inverted perovskite solar cells

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High quality thick 500 nm $CH_3NH_3PbI_3$ perovskite absorber with the horizontal grain size up to 3 μm and the lateral size equal to the film thickness was prepared by the synergistic effect of H_2O additive and DMF vapor treatment. The inverted (p-i-n) cell based on this high-quality thick perovskite film achieves a high power conversion efficiency of 20.1%. The cell shows no current hysteresis and stable in the inert and ambient atmospheres. H_2O helps MAI to penetrate into the thick PbI2 to form thick film with pure MAPbI3 phase and produce bigger gains by slow down the perovskite crystallization rate. It can also cooperate with DMF to control the dissolving of perovskite grains during DMF vapor post treatment. As a result, large multi-crystalline perovskite grains without observable hole and crease are formed when DMF and H_2O were removed in the following heating. The synergistic effect of H_2O and DMF was evidenced by SEM images and GIWXRD patterns taken simultaneously. This synergistic strategy for preparing high-quality, thick perovskite film was extended to fabricate large-area MAPbI3 film for the mini-module with the active area of 11.25 cm2 to realize the efficiency of more than 15%.

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Microstructure and mechanical properties of Ti_6AI_4V /tin prepared by spark plasma sintering technique

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Failure in aerospace structural components has catastrophic consequences, which results in loss of lives and of the aircraft. Titanium alloys play an important role in the aerospace industry; however, this alloy's application is limited by the poor mechanical properties it exhibits. Researchers have reported that microstructure and mechanical properties of Titanium alloys can be improved by ceramic reinforcements, hence the purpose of this study is to study the microstructural evolution and mechanical properties of Ti6AI4V reinforced with varying TiN particulates prepared by SPS technique. Spark plasma sintered composites were produced from the admixed powders and the effect of TiN on the microstructure and mechanical properties of the composites were studied and analyzed. Scanning electron microscope (SEM-EDS) was used to study the bulk morphology of the resultant spark plasma sintered composites. The phases formed in the developed sintered composites were detected by energy dispersive X-ray diffraction spectrometer (XRD)Micro-hardness was explored by the means of a high impact diamond Dura scan micros hardness tester and a densimeter was used to measure the density. The electrochemical behavior of the composites were measurements by the help of PGSTAT101 using potentiodynamic polarization method Analysis of density and hardness values revealed that the effect of TiN was more evident in improving the microstructure and mechanical properties of Ti_6AI_4V alloy. Within the parameters used, the highest values of the characterized properties were achieved at 5wt% TiN with improved hardness and corrosion properties.

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Enhancing of the thermo-physical properties of the insulating non-woven using a polyurethane (PU) coating: An Experimental study of the effect of coating thickness.

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Based on their properties, nonwoven textile are promising insulation solution for buildings. However, the major disadvantage is their flammability and also their low mechanical property. The main purpose of this research, is to improve physical, thermal and fire properties of nonwoven made form reclaimed fibers, by using two types of polyurethane aqueous dispersion coating (paste and foam termed here as PUF and PUP). To achieve this, needle punched nonwoven (100% acrylic, 100% polyester) were used. The effect of type and thickness of coating on thermal conductivity, air permeability, tensile strength, elasticity, flammability test and sound absorption coefficient were analyzed. According to the experimental results, it can be concluded that the PU (PUF and PUP) coating enhanced the barrier and tensile properties of coated nonwoven. Moreover, the coating has a great effect on the thermal conductivity and the air permeability. It has been observed the thermal conductivity and the air permeability decreases with the increase in coating thickness of the nonwoven for both coating. On the basis of a detailed analysis, the relationships between the measured parameters and coating thickness were compiled. The results of this study provide an effective solution for buildings insulation, indeed, these alternative materials will contribute to the cost advantage as well as the green building initiative.

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Design and fabrication of portable induction heating

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Induction heat treating involves heating a work piece from room temperature to a higher temperature, such as is required for induction tempering or induction austenitizing. Induction heating is a heating method for electrically conductive materials that takes advantage of the heat generated by the eddy currents originated by means of a varying magnetic field. Inductive heating is a heating process of a conductive material, based on the electromagnetic Induction. Induction heating takes place without physical contact between the work piece and induction coil. This lends it to processes where a high degree of cleanliness is paramount. This section of induction heating using low-voltage DC power supply 12-48V Maximum current 20A, maximum power 1000W. It's a great method for increasing productivity and improved quality. Induction coil consists of (coils, transistors, diodes, thermal resistors, heat sink, and capacitors) Induction heating is a process which is used to bond, harden or soften metals or other conductive materials. For many modern manufacturing processes, induction heating offers an attractive combination of speed, consistency and control. When an alternating electrical current is applied to the primary of a transformer, an alternating magnetic field is created. According to Faraday's Law. In a basic induction heating setup shown in Fig-1-(The work piece) is placed inside the inductor. When a metal part is placed within the inductor and enters the magnetic field, circulating eddy currents are induced within the part. These eddy currents flow against the electrical resistivity of the metal, generating precise and localized heat without any direct contact between the part and the inductor, how? Magnetic materials naturally offer electrical resistance to the rapidly changing magnetic fields within the inductor. This resistance produces internal friction which in turn produces heat. Internal friction that is created when magnetic parts pass through the inductor.

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Magnetic uniformity of oxide based diluted magnetic semiconductors

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Diluted magnetic semiconductor is one of the materials for spintronic devices. Oxide based diluted magnetic semiconductors have attracted extensive interest due to its possible high Curie temperature. Intrinsic ferromagnetism is essential for the practical applications. However, currently, the intrinsic ferromagnetism in oxide diluted magnetic semiconductors is difficult to be determined. One of the popular ways is to use transmission electron microscopy, electron dispersive energy spectroscopy (EDS) and electron energy loss spectroscopy to identify the uniform distribution of dopants and whether there are no clusters. However, there is no direct evidence to show the magnetic uniformity in oxide based diluted magnetic semiconductors. Recently, we used low energy muon spin relaxation approach to identify the magnetic uniformity in Co doped TiO_2, Fe doped In_2O_3 and Co doped ZnO systems. Combined with other techniques, such as TEM EDS and measurement by magnetometer, we found that Co doped TiO_2 is intrinsic with magnetic uniformity when Co doped TiO_2 was deposited with relative high rate under an oxygen partial pressure of 10-6 torr. The uniformity will disappear if the deposition rate is relatively low. For Co doped ZnO, the samples deposited under different oxygen partial pressures does not induce clustering or secondary phase. Dopants are uniformly distribution in the ZnO host. However, muon spin relaxation measurement indicates that the samples do not show magnetic uniformity. Bound magnetic polarons formation is the origin of ferromagnetism, supported by resistance measurement. For Fe doped In_2O_3, clusters are observed in the sample deposited under an oxygen partial pressure of 10-7 torr. X-ray absorption spectroscopy indicate the clusters are Fe_3O_4, but on metallic Fe. In addition, muon spin relaxation and polarized neutron diffraction all indicate the Fe doped In_2O_3 via substitution dominates the contribution of ferromagnetism and the magnetization is higher than Fe_3O_4 clusters, suggesting that clustering is not the major origin of ferromagnetism. The work has shown that the mechanisms of different oxide based diluted magnetic semiconductor may be varied. We have to investigate one by one.

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Synthesis, investigation and toxicity of nanocrystalline pow-der of dysprosium oxide

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The starting chemicals for the synthesis of dysprosium oxide were dysprosium metal and commercially available reagent grade nitric acid. Immediately after the cleaning four grams of the as-pretreated dysprosium metal were dissolved in the nitric acid water solution, the amount of which was that the molar ratio of the reagents would be consistent with the stoichiometry of the following reaction:

$Dy + 6HNO_3 = Dy(NO_3)3 + 3NO_2 + 3H_2O$

which is commonly assumed to predominantly proceed when a metal reacts with 63%-concentrated nitric acid.

Highly dispersed powders of dysprosium sesquioxide Dy_2O_3 were synthesized by template added incipient wetness impregnation method. According to this method hydrated cellulose fibers (medical cotton) were impregnated with a dysprosium nitrate water solution of the concentration 10 times as less as it corresponds to the maximal stoichiometric value obtained when dysprosium metal is dissolved in 63% nitric acid. These wet fibers were air-dried at 80°C for 3 hours and subsequently air-calcined for 9 hours at 550°C. Here three different samples were synthesized. They differ by whether ammonia as a reducing agent was used during the synthesis. The choice of the calcination temperature value was due to a requirement that this value should be as low as possible, since at low synthesis temperatures the formation of nanostructured particles is highly favorable, and because of that the complete thermal decomposition of cellulose fibers processed at temperature well above 500°C Alternatively, the calcination temperature was raised up to 700°C. The composition and structure of the prepared oxides were studied by advanced methods. XRD analysis of dysprosia samples obtained by the thermal decomposition at 550°C and 700°C of dysprosium nitrate taken at low concentration evidences the presence of one crystal phase of Dy_2O_3 with the structural bixbyite type of α-Mn_2O_3. The pharmacological screening of nano Dy_2O_3 was investigated. Analysis of combined effect and acute toxicity of the studied compound was made on muscles.

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Efficient cathode oxygen reduction reaction of fuel cells

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The fuel cell is the only power unit that has both no pollution, high efficiency, wide application, no noise, and can work continuously. Therefore, it is currently receiving universal attention from all countries in the world and is considered as the most promising clean power generation technology with the most promising development in the 21st century. Fuel cells are attracting considerable interest as a means of producing electricity by direct electrochemical conversion of hydrogen and oxygen into water. The overpotential of cathode oxygen reduction in fuel cells is the main factor restricting its development. At present, platinum is the best cathode catalyst, but due to its high price, it has become a bottleneck restricting the large-scale commercial production of fuel cells. Now people are starting to pay attention to platinum alloys and non-precious metal catalysts such as perovskites, peptide phthalocyanines, metal oxides, etc. These catalysts also have good oxygen reduction catalytic performance. The mechanism of oxygen reduction reaction is very complicated and there is not a unified statement yet. By exploring the oxygen reduction mechanism, we have determined the excellent oxygen reduction catalytic performance of the selected catalyst. A number of research groups have started this research. I believe that it will have more space of development and benefit to human in the near future. As fuel cell technology continues to mature, its role in various fields will become more and more obvious, and its development potential is enormous.

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Surface plasmon effect of silver nanoparticles on optical and photovoltaic properties of silicon solar cells

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The surface Plasmon effect of silver nanoparticles on optical and photovoltaic properties of silicon solar cells was investigated. The Silver nanoparticles were deposited on the p-type silicon base of the n+/p junction using a thermal evaporation and electrochemical anodization method followed by a thermal treatment at 180 °C under nitrogen atmosphere. Chemical composition and surface morphology of the deposited Silver were examined by energy dispersive X-ray (EDX) spectroscopy and scanning electronic microscopy (SEM). The effect of the deposited nanoparticles on the electrical properties was evaluated by the internal quantum efficiency (IQE) and current-voltage (I-V) measurements. The results indicate that the formation of the metal nanoparticles is accompanied by an enhanced light absorption and improved photovoltaic parameters.

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Enhancing of the thermo-physical properties of the insulating non-woven using a polyurethane (PU) coating: An Experimental study of the effect of coating thickness

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Based on their properties, nonwoven textile are promising insulation solution for buildings. However, the major disadvantage is their flammability and also their low mechanical property. The main purpose of this research is to improve physical, thermal and fire properties of nonwoven made form reclaimed fibers, by using two types of polyurethane aqueous dispersion coating (paste and foam termed here as PUF and PUP). To achieve this, needle punched nonwoven (100% acrylic, 100% polyester) were used. The effect of type and thickness of coating on thermal conductivity, air permeability, tensile strength, elasticity, flammability test and sound absorption coefficient were analyzed. According to the experimental results, it can be concluded that the PU (PUF and PUP) coating enhanced the barrier and tensile properties of coated nonwoven. Moreover, the coating has a great effect on the thermal conductivity and the air permeability. It has been observed the thermal conductivity and the air permeability decreases with the increase in coating thickness of the nonwoven for both coating. On the basis of a detailed analysis, the relationships between the measured parameters and coating thickness were compiled. The results of this study provide an effective solution for buildings insulation; indeed, these alternative materials will contribute to the cost advantage as well as the green building initiative.

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Microstructure and electrochemical behaviour of ceramic reinforced titanium matrix composites fabricated by spark plasma sintering

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The human physiological fluids are composed of aggressive anions such as chlorides, sulphides, fluorides and phosphides, which cause dissolution of the Ti oxide layer. Corrosion attack of titanium-based implants has adverse effects on titanium's biocompatibility (Toptan et al. 2016:152). Spark plasma sintering (SPS) technique is a highly advantageous powder consolidation technique, that is pronounced to fabricate specimen that perform significantly better than products produced by traditional sintering and casting methods. This technique provides high grain-growth retention and significantly less energy intensive than other methods. The purpose of this study is to synthesize titanium matrix composites with improved anti-corrosion properties through the incorporation of TiB2 ceramics particulates. The composites will be fabricated with a state-of-the-art sintering technology. Ti and TiB2 powders were used as the feedstock materials. The powders were blended and mixed for 8 h to fabricate sets of binary composites; Three composites of Ti-TiB2 binary system were prepared. The ad-mixed powders were then densified at 1350 °C, at a holding time of 5 min, with a heating rate and applied pressure of 100 °C/min and 50 MPa respectively. The microstructure and phase evolution of sintered products were then characterized using the optical microscope (OM), scanning electron microscope equipped with an energy-dispersive X-ray spectroscopy (SEM/EDS), and X-ray diffractometer (XRD). The corrosion properties were analyzed using potentiostat using linear polarization and impedance spectroscopy methods. The OM micrographs showed that at high TiB2 compositions the microstructure was more refined with definite presence of needle-like whiskers uniformly dispersed throughout the matrix material. The XRD results also depicted significant formation of the TiB; this is an indication that the SPS conditions favoured the evolution of TiB2 to TiB and no other boron-based species were formed during processing at high temperatures. The high reinforcement composition depicted enhanced anti-corrosion performance.

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Wear behaviors of boron-bearing new hardfacing alloys

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High chromium cast irons (HCCIs) are excellent wear-resistant materials and have been widely used as a hard facing alloy for wear-affected equipment operated under extreme conditions, such as facilities in the slurry pumping systems used in the oil sands handling, mineral processing, coal and cement industries. In the previous research, we fabricate hard facing alloys AlCrFeMnNiMoBCNb with abrasive wear resistance of 12WWW.5 m/mm3, which beyond 6 times the abrasive wear resistance of HCCIs. In this study, based on the previous study AlCrFeMnNiMoBCNb alloy, we research the effect of each element of the AlCrFeMnNiMoBCNb alloy by eliminating each element independently. In addition, we utilize Taguchi methods by adjusting the content of Al, Mn, and Ni (by decreasing Cr) elements to further improve the wear resistance, which found that Cr was the key element to the wear characteristics of new hard facing alloys. Furthermore, by increasing Cr element, we significantly enhance the abrasive wear resistance of new hard facing alloys up to 24.5 m/mm3, which beyond 12 times of HCCIs.

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W: gynecologiccancer.conferenceseries.com

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E: std@infectiousconferences.com
W: globalhiv-aids-std.infectiousconferences.com

20th International Conference on
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graciejones033@gmail.com
W: primarycare.pediatricsconferences.com

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W: childpsychology.conferenceseries.com

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W: hypertension.conferenceseries.com

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europediatrics@annualconferences.org
W: pediatrics.conferenceseries.com/europe

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W: immunologycongress.immunologyconferences.org

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W: world.nursingconference.com

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W: braindisorders.conferenceseries.com

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W: stroke.neurologyconference.com

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W: diabetesmeeting.conferenceseries.com

13th World Conference on
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W: neuromuscular.neuroconferences.com

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W: ophthalmology.conferenceseries.com

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W: copd.conferenceseries.com/europe

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