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Research & Reviews: Journal of Material Sciences



Proceedings of

21st International Conference on

# ADVANCED MATERIALS & NANOTECHNOLOGY

September 04-06, 2018 Zurich, Switzerland

# Scientific Program

Advanced Materials 2018

# DAY-1

September 04, 2018

Meeting Hall: London B

08:00-8:30 Registrations

## Opening Ceremony ..... 08:30-08:55

## KEYNOTE FORUM

08:55-09:00 **Introduction**

09:00-09:40 **Title: Hybrid conversion Solar System (HYCSOS)**
**Dieter M Gruen,** Dimerond Technologies, USA

09:40-10:20 **Title: Semiconductors and semiconductor-ionic heterostructure composites for next generation energy conversion technology**
**Bin Zhu,** Hubei University, China

## SPECIAL SESSION

10:20-11:20 **Title: On the way to physically correct indentation analyses**
**Gerd Kaupp,** University of Oldenburg, Germany

Group Photo, Networking & Refreshments 11:20-11:40 @ Europa Foyer

**Sessions: Advanced Materials Engineering | Emerging Areas of Materials Science | Environmental and Green Materials | Carbon Based Materials | Advanced Bio-Materials and Bio-devices | Energy Materials and Harvesting**

**Chair: Roger Amade,** Universitat de Barcelona, Spain
**Chair: Toshihiro Miyata,** Kanazawa Institute of Technology, Japan

## INTRODUCTION

11:40-12:00 **Title: Adsorbent materials for desulfurization processes under supercritical water conditions**
**Florentina Maxim,** Paul Scherrer Institut, Swizerland

12:00-12:20 **Title: Realization of conductive aluminum nitride epitaxial layer on silicon substrate by forming spontaneous nano size via-holes**
**Noriko Kurose,** Ritsumeikan University, Japan

12:20-12:40 **Title: A new laser induced local material engineering to convert from n-type to p-type nitride semiconductor to fabricate high power vertical AlGaN/GaN devices on Si substrate**
**Yoshinobu Aoyagi,** Ritsumeikan University, Japan

12:40-13:00 **Title: Restoration of perovskite phase in the top layer of thin BTO film by plasma treatment and annealing**
**Ankita Ghatak,** S.N. Bose National Centre For Basic Sciences, India

13:00-13:20 **Title: Hybrid perovskite halide for detection of environmental pollutant in atmosphere**
**Barnali Ghosh (Saha),** S.N. Bose National Centre For Basic Sciences, India

**Lunch Break 13:20-14:00 @ La Place AB**

14:00-14:20 **Title: Comparative analysis on monolithic DeNOx catalysts**
**Giovanni Perillo,** Wessex Institute of Technology, UK

14:20:14:40 **Title: Growth and electrochemical characterization of graphene nano walls and carbon nanotubes**
**Roger Amade,** Universitat de Barcelona, Spain

14:40-15:00 **Title: Fine-controlled sub-nano metal particles in a dendrimer reactor**
**Kimihisa Yamamoto,** Tokyo Institute of Technology, Japan

15:00-15:20 **Title: Thermoelectricity enhanced catalysis**
**Tiva Sharifi,** Rice University, USA

15:20-15:40 **Title: P-type Cu2O-based heterojunction solar cells fabricated with n-type ZnO thin film prepared by electrochemical deposition method**
**Toshihiro Miyata,** Kanazawa Institute of Technology, Japan

15:40-16:00 **Title: Growth control of vertical nano graphene network in plasma enhanced chemical vapor deposition and its emerging applications**
**Keigo Takeda,** Meijo University, Japan

16:00-16:20 **Title: In silico study of the self-assembly and gelation of sugar derivatives**
**Dafna Knani,** ORT Braude College, Israel

**Networking & Refreshments 16:20-16:40 @ Europa Foyer**

16:40-17:00 **Title: Design and development of nanomaterials using induction plasma system and its application**
**Vignesh Nagarajan,** Matrix Nano, India

## YRF

**YRF Judge: Gerd Kaupp,** University of Oldenburg, Germany

17:00-17:15 **Title: Development of functionalized coating by sol-gel process on aluminium alloy**
**Clément Genet,** Université de Toulouse, France

17:15-17:30 **Title: Developing super hydrophobic copper/graphene nano-platelets coatings by plasma spraying**
**Tahmineh Forati,** Concordia University, Canada

17:30-17:45 **Title: Novel carbon nanomaterials coated with CuO particles via electroless plating for nonothermite applications**
**Amir Elsaidy,** Military Technical College, Egypt

17:45-18:00 **Title: Functionalized track-etched PVDF membrane electrodes for heavy metal analysis in water**
**Uliana Pinaeva,** Ecole Polytechnique, France

## Panel Discussion

# DAY-2

**September 05, 2018**

Meeting Hall: **London B**

## KEYNOTE FORUM

**09:00-09:40**
**Title: Driving flexible electronics by hybrid materials**
**Rodrigo Martins,** New University of Lisbon, Portugal

**09:40-10:20**
**Title: Switching iron-based superconductivity with spin current**
**Jhinhwan Lee,** Korea Advanced Institute of Science and Technology, South Korea

**Sessions: Advanced Functional Materials | Polymers Scicence and Engineering | Advanced Optical Materials | Advancement in Nanomaterials Science and Nanotechnology | Coating and Surface Engineering**

**Chair: Dieter M Gruen,** Dimerond Technologies, USA
**Chair: Yutaka Oyama,** Tohoku University, Japan

## INTRODUCTION

**10:20-10:40**
**Title: Relation between internal friction and fatigue**
**Wolfgang Gräfe,** Private Scholar, Germany

**10:40-11:00**
**Title: Improvement of CFRP electrical conductivity by applying nano enabled products containing carbon nanotubes**
**Anna Boczkowska,** Warsaw University of Technology, Poland

**11:00-11:20**
**Title: Boron carbide-based ceramics for thermostructural application: Sintering by SPS and mechanical performances**
**Alexandre Maître,** University of Limoges, France

**Networking & Refreshments 11:20-11:40 @ Europa Foyer**

**11:40-12:00**
**Title: Synthesis of 2D layered semiconductor GaSe for the application of Terahertz non-destructive inspection**
**Yutaka Oyama,** Tohoku University, Japan

**12:00-12:20**
**Title: Solution deposition of Cu doped Co3O4 for electrooxidation of glucose**
**Mahabubur Chowdhury,** Cape Peninsula University of Technology, South Africa

**12:20-12:40**
**Title: Cu metal/Mn phthalocyanine organic sprinter faces atop Co with high spin polarization at room temperature**
**Wolfgang Weber,** Université de Strasbourg, France

**12:40-13:00**
**Title: Producing of aluminium matrix composite wire**
**Janos Dobranszky,** Budapest University of Technology and Economics, Hungary

13:00-13:20 **Title: Chitosan asiaticoside nanoparticles synthesized from Centella asiatica for glioma therapy**
**V Gayathri,** Jawaharlal Nehru Tropical Botanic Garden and Research Institute, India

**Lunch Break 13:20-14:00 @ La Place AB**

14:00-14:20 **Title: Investigation on weldability behavior of chromium-free nickel filler with stainless steel AISI-304**
**Nataraj J.R,** R.V.College Of Engineering, India

14:20-14:40 **Title: Multiferroic Properties and Structural Characterizations in Mn and Cr Doped 0.9BiFeO3-0.1BaTiO3 Compositions**
**Ricardo A. M Gotardo,** Technological Federal University of Paraná, Brazil

14:40-15:00 **Title: Synthesis of Pt-WO3@W/GNs as a bifunctional electro-photo catalyst for catalyzing methanol oxidation and oxygen reduction reaction**
**Shen Lin,** Fujian Normal University, China

15:00-15:20 **Title: Low-cost printable hybrid hetero structures for energy harvesting and lighting**
**Sylvain G. Cloutier,** Ecole de Technologie Superieure, Canada

15:20-15:40 **Title: New generation of Colorcoat Prisma®**
**Anna Lewandowska,** Tata Steel UK Limited, United Kingdom

**Networking & Refreshments 15:40-16:00 @ Europa Foyer**

## YRF

**YRF Judge: Gerd Kaupp,** University of Oldenburg, Germany

16:00-16:15 **Title: FEM analysis for burring process of large diameter SUS304 tube**
**Junshi Ichikawa,** Gunma University, Japan

16:15-16:30 **Title: Horizontal twin roll casting of aluminum alloy A7075**
**Yuta Kashitani,** Gunma University, Japan

16:30-16:45 **Title: Cold plastic forming of ABS plastic pipe: ABS plastic pipe**
**Kentaro Tsunoda,** Gunma University, Japan

16:45-17:00 **Title: Engineering protein interfaces yields ferritin disassembly and reassembly under benign experimental conditions**
**Hai Chen,** China Agricultural University, China

17:00-17:15 **Title: Dynamic analyses of damping alloy sleeves for boring**
**Yuto Horigome,** Gunma University, Japan

17:15-17:30 **Title: Infrared spectra of aluminum fluorocarbon polymer compositions to thermal signature of jet engine**
**Amir Elsaidy,** Military Technical College, Egypt

17:30-17:45 **Title: Thermoelectric properties of ZnO-based ceramics prepared by spark plasma sintering technique**
**Radingoana Precious Manti,** Université de Toulouse, France

## POSTER PRESENTATIONS 17:45-18:30

**Poster Judge: Anna Boczkowska,** Warsaw University of Technology, Poland

AM-01 **Title: Fabrication of micro/nano-crystals of organic Dirac fermion system: nano-scale electro crystallization**
**Takako Konoike,** National Institute for Materials Science, Japan

AM-02 **Title: Synthesis by hydrogen reduction and characterization of CuNiCo with nanoparticles content**
**Eduardo Brocchi,** Pontifical Catholic University of Rio de Janeiro, Brazil

AM-03 **Title: One-pot synthesis of hybrid nano particles for catalytic applications**
**Heeyeon Kim,** Korea Institute of Energy Research, South Korea

AM-04 **Title: Chitosan delaying human fibroblast senescence through down regulation of TGF-β signaling pathway**
**Tai-Horng Young,** National Taiwan University, Taiwan

AM-05 **Title: Ag+ ion emission from a sharp tip of Ag+ ion conducting glass and Schottky-model analysis**
**Yusuke Daiko,** Nagoya Institute of Technology, Japan

AM-06 **Title: Effect of electrolyte aging on the morphology and mechanical properties of anodic titanium dioxide**
**Junzhe Dong,** The University of Auckland, New Zealand

AM-07 **Title: Magnetic carbon nano materials as matrices for the immobilization of cellulolytic enzymes**
**Athena Papadopoulou,** University of Ioannina, Greece

AM-08 **Title: Surface texturing with slanted silicon nano pillars to reduce its optical reflectivity**
**Jun-hyun Kim,** Ajou University, South Korea

AM-09 **Title: Simulation and development of counter weight casting**
**Koushik Kosanam,** R.V.College Of Engineering, India

AM-10 **Title: Study of fragmentation and ultrasonic flow impacts of several metal-based alloys**
**Abdulrahman Sumayli,** University of Hull, UK

AM-11 **Title: Effect of epoxidized cardanol on poly(vinyl chloride) as secondary plasticizer**
**Jie Chen,** Chinese Academy of Forestry, China

AM-12 **Title: Eu2+/Eu3+-activated nitride based red phosphors with narrow emission band for white light emitting diodes**
**Jianyan Ding,** Lanzhou University, China

AM-13 **Title: K4CaGe3O9:Mn2+, Yb3+: a novel orange-emitting long persistent luminescence phosphor with special nano structure**
**Xufeng Zhou,** Lanzhou University, China

AM-14 **Title: A composite of MnO2 coated with graphene by galvanostatic electrodeposition and its highly active and stable catalysis for oxygen reduction reaction**
**Xiaofeng Zhang,** Fujian Normal University, China

AM-15 **Title: Ni-based nanowire co-catalysts integrated with a Si photoanode for efficient water oxidation**
**Meshal S Aljohani,** King Abdulaziz City for Science and Technology, Saudi Arabia

AM-16 **Title: Facile synthesis of laminated porous WS2/C composite and its electrocatalysis for oxygen reduction reaction**
**Zhongshui Li,** Fujian Normal University, China

AM-17 **Title: Controlled antibiotic-loaded, drug-eluting implants for osteomyelitis**
**Daniel Li,** Northwestern University, USA

AM-18 **Title: Advances in 3D printing in biomaterials for orthopaedic applications**
**Daniel Li,** Northwestern University, USA

## Panel Discussion

# DAY-3

**September 06, 2018**

Meeting Hall: **B2B meetings**

**Panel discussion followed by networking & lunch**

## Awards & Closing Ceremony


## Bookmark your Dates

24th International Conference on

# Advanced Materials & Nanotechnology

**September 19-20, 2019 | Brussels, Belgium**

E: advancedmaterials@materialsconferences.org; advancedmaterials@materialsscienceexperts.org

Website: materials.conferenceseries.com

# List of Open Access Journals

## Agri, Food & Aqua

| | |
|---|---|
| Advances in Crop Science and Technology | 2329-8863 |
| Advances in Dairy Research | 2329-888X |
| Agrotechnology | 2168-9881 |
| Aquaculture Research & Development | 2155-9546 |
| Arabidopsis C. Elegans and Zebrafish | - |
| Biofertilizers & Biopesticides | 2155-6202 |
| Crop Research | 2454-1761 |
| Experimental Food Chemistry | - |
| Fisheries & Livestock Production | 2332-2608 |
| Fisheries and Aquaculture Journal | 2150-3508 |
| Fisheriessciences | 1307-234X |
| Food & Industrial Microbiology | - |
| Food & Nutritional Disorders | 2324-9323 |
| Food Processing & Technology | 2157-7110 |
| Food: Microbiology, Safety & Hygiene | - |
| Forest Research | 2168-9776 |
| Horticulture | 2376-0354 |
| International Biodiversity, Bioprospecting and Development | 2376-0214 |
| Marine Science: Research & Development | 2155-9910 |
| Medicinal & Aromatic Plants | 2167-0412 |
| Nutrition & Food Sciences | 2155-9600 |
| Plant Pathology & Microbiology | 2157-7471 |
| Poultry, Fisheries & Wildlife Sciences | 2375-446X |
| Probiotics & Health | 2329-8901 |
| Research & Reviews: Journal of Agriculture and Allied Sciences | 2347-226X |
| Research & Reviews: Journal of Food and Dairy Technology | 2321-6204 |
| Rice Research | 2375-4338 |
| Traditional Medicine and Clinical Naturopathy (Homeopathy & Ayurvedic Medicine-2167-1206) | - |

## Business & Management

| | |
|---|---|
| Accounting & Marketing | 2168-9601 |
| Arabian Journal of Business and Management Review | 2223-5833 |
| Business & Financial Affairs | 2167-0234 |
| Business & Hotel Management | 2324-9129 |
| Business and Economics Journal | 2151-6219 |
| Defense Studies & Resource Management | 2324-9314 |
| Entrepreneurship & Organization Management | 2169-026X |
| Global Economics | 2375-4389 |
| Hotel & Business Management | 2169-0286 |
| International Journal of Accounting Research | - |
| International Journal of Economics and Management Science | 2162-6359 |
| Internet Banking & Commerce | 1204-5357 |
| Review of Public Administration and Management | 2315-7844 |
| Stock & Forex Trading | 2168-9458 |
| Tourism & Hospitality | 2167-0269 |

## Chemical Engineering

| | |
|---|---|
| Advanced Chemical Engineering | 2090-4568 |
| Bioprocessing & Biotechniques | 2155-9821 |
| Chemical Engineering & Process Technology | 2157-7048 |
| Thermodynamics & Catalysis | 2157-7544 |

## Chemistry

| | |
|---|---|
| Analytical & Bioanalytical Techniques | 2155-9872 |
| Analytical & Electrochemical Insights | - |
| Bioenergetics: Open Access | 2167-7662 |
| Chemical Informatics | - |
| Chemical Sciences Journal | 2150-3494 |
| Chromatography & Separation Techniques | 2157-7064 |
| Clinical & Medical Biochemistry: Open Access | - |
| Clinical Chemistry: Open Access | - |
| Environmental & Analytical Toxicology | 2161-0525 |
| Environmental Analytical Chemistry | - |
| Glycobiology | 2168-958X |
| Herbal Medicine: Open Access | - |
| Immuno Chemistry: Open Access | - |
| Industrial Chemistry: Open Access | - |
| International Journal of Applied Biology and Pharmaceutical Technology | 0976-4550 |
| International Journal of Drug Development & Research | 0975-9344 |
| Mass Spectrometry: Open Access | - |
| Medicinal Chemistry | 2161-0444 |
| Modern Chemistry & Applications | 2329-6798 |
| Natural Products Chemistry & Research Journal | 2329-6836 |
| Neuro Chemistry: Open Access | - |
| Organic & Inorganic Chemistry | - |
| Organic Chemistry: Current Research | 2161-0401 |
| Pharmaceutical Analytical Chemistry: Open Access | - |
| Physical Chemistry & Biophysics | 2161-0398 |
| RROIJ: Medicinal Chemistry | - |
| Structural Chemsitry & Crystallography Communication | - |
| Trends in Green Chemistry | - |
| Vitamins & Minerals | 2376-1318 |

## Clinical

| | |
|---|---|
| Ageing Science | 2329-8847 |
| Ancient Diseases & Preventive Remedies | 2329-8731 |
| Anesthesia & Clinical Research | 2155-6148 |
| Annals of Clinical and Laboratory Research | 2386-5180 |
| Arrhythmia: Open Access | - |
| Atherosclerosis: Open Access | - |
| Cell Biology: Research & Therapy | 2324-9293 |
| Cellular & Molecular Pathology | - |
| Clinical & Experimental Cardiology | 2155-9880 |
| Clinical & Experimental Dermatology Research | 2155-9554 |
| Clinical & Experimental Nephrology | - |
| Clinical & Experimental Oncology | 2324-9110 |
| Clinical & Experimental Ophthalmology | 2155-9570 |
| Clinical & Experimental Orthopaedics | - |
| Clinical & Experimental Pathology | 2161-0681 |
| Clinical & Molecular Endocrinology | - |
| Clinical and Experimental Psychology | - |
| Clinical and Experimental Transplantation | - |
| Clinical Case Reports | 2165-7920 |
| Clinical Depression | - |
| Clinical Dermatology Research Journal | - |
| Clinical Diabetes & Practice | - |
| Clinical Nutrition & Dietetics | - |
| Clinical Oncology and Practice | - |
| Clinical Pediatrics | - |
| Clinical Pediatrics & Dermatology | - |
| Clinical Psychiatry | - |
| Clinical Research & Bioethics | 2155-9627 |
| Clinical Research On Foot & Ankle | 2329-910X |
| Clinical Respiratory: Open Access | - |
| Clinical Toxicology | 2161-0495 |
| Clinical Trials | 2167-0870 |
| Clinics in Mother and Child Health | 2090-7214 |
| Cosmetology & Orofacial Surgery | - |
| Cosmetology & Trichology | - |
| Dermatitis | - |
| Diabetes Case Reports | - |
| Dialysis and Clinical Practice | - |
| Drug Intoxication & Detoxification : Novel Approaches | 2327-4557 |
| Dual Diagnosis: Open Access | - |
| Eye & Cataract Refractive Surgery | - |
| Forensic Toxicology & Pharmacology | 2325-9841 |
| Glaucoma: Open Access | - |
| HIV & Retro Virus | - |
| Immunooncology | - |
| Insights in Pediatric Cardiology | - |

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|---|---|
| Intensive and Critical Care | - |
| International Journal of Anesthesiology & Pain Medicine | - |
| International Journal of Cardiovascular Research | 2324-8602 |
| International Journal of Digestive Diseases | - |
| International Journal of Ophthalmic Pathology | 2324-8599 |
| Interventional Cardiology: Open Access | - |
| JBR Journal of Clinical Diagnosis and Research | 2376-0311 |
| Optometry: Open Access | - |
| Phonetics & Audiology | - |
| Speech Pathology & Therapy | - |
| Stem Cell Research & Therapy | 2157-7633 |
| Toxicology: Open Access | - |
| Vasculitis | - |

## Earth & Environmental Sciences

| | |
|---|---|
| Advances in Recycling | - |
| Astrobiology & Outreach | 2332-2519 |
| Biodiversity & Endangered Species | 2332-2543 |
| Biodiversity Management & Forestry | 2327-4417 |
| Bioremediation & Biodegradation | 2155-6199 |
| Biosafety | 2167-0331 |
| Climatology & Weather Forecasting | 2332-2594 |
| Coastal Zone Management | - |
| Earth Science & Climatic Change | 2157-7617 |
| Ecosystem & Ecography | 2157-7625 |
| Entomology, Ornithology & Herpetology | 2161-0983 |
| Expert Opinion On Environmental Biology | 2325-9655 |
| Fundamentals of Renewable Energy and Applications | 2090-4541 |
| Geography & Natural Disasters | 2167-0587 |
| Geoinformatics & Geostatistics: An Overview | 2327-4581 |
| Geology & Geosciences | 2329-6577 |
| Geophysics & Remote Sensing | 2169-0049 |
| Hydrogeology & Hydrologic Engineering | 2325-9647 |
| Hydrology: Current Research | 2157-7587 |
| Industrial Pollution Control | - |
| Innovative Energy Policies | 2090-5009 |
| International Journal of Evolution | 2324-8548 |
| International Journal of Waste Resources | 2252-5211 |
| Marine Biology & Oceanography | 2324-8661 |
| Oceanography: Open Access | 2332-2632 |
| Oil & Gas: Open Access | - |
| Petroleum & Environmental Engineering | 2157-7463 |
| Plant Physiology & Pathology | 2329-955X |
| Pollution Effects & Control | 2375-4397 |
| Research & Reviews: Journal of Ecology and Environmental Sciences | - |

## EEE

| | |
|---|---|
| Electrical & Electronic Systems | 2332-0796 |
| Electrical Engineering & Electronic Technology | 2325-9833 |

## Engineering

| | |
|---|---|
| Advances in Automobile Engineering | 2167-7670 |
| Advances in Robotics & Automation | 2168-9695 |
| Aeronautics & Aerospace Engineering | 2168-9792 |
| Applied Bioinformatics & Computational Biology | 2329-9533 |
| Applied Mechanical Engineering | 2168-9873 |
| Architectural Engineering Technology | 2168-9717 |
| Automatic Control of Physiological State and Function | 2090-5092 |
| Biochips & Tissue Chips | 2153-0777 |
| Bioengineering & Biomedical Science | 2155-9538 |
| Biomusical Engineering | 2090-2719 |
| Biosensors & Bioelectronics | 2155-6210 |
| Biosensors Journal | 2090-4967 |
| Civil & Environmental Engineering | 2165-784X |
| Computer Engineering & Information Technology | 2324-9307 |
| Computer Engineering and Information Technology | 2324-9307 |
| Defense Management | 2167-0374 |
| Fashion Technology & Textile Engineering | 2329-9568 |
| Global Journal of Technology and Optimization | 2229-8711 |
| Global Research in Computer Science | 2229-371X |
| Industrial Engineering & Management | 2169-0316 |
| Information Technology & Software Engineering | 2165-7866 |
| International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering | 2278-8875 |
| International Journal of Advancements in Technology | 0976-4860 |
| International Journal of Biomedical Data Mining | 2090-4924 |
| International Journal of Innovative Research in Computer and Communication Engineering | 2278-1021 |
| International Journal of Innovative Research in Science, Engineering and Technology | 2319-8753 |
| International Journal of Sensor Networks and Data Communications | 2090-4886 |
| International Journal of Swarm Intelligence and Evolutionary Computation | 2090-4908 |
| Irrigation & Drainage Systems Engineering | 2168-9768 |
| Lasers, Optics & Photonics | - |
| Lovotics | 2090-9888 |
| Membrane Science & Technology | 2155-9589 |
| Molecular Imaging & Dynamics | 2155-9937 |
| Nuclear Energy Science & Power Generation Technology | 2325-9809 |
| Research & Reviews: Journal of Engineering and Technology | 2319-9873 |
| Steel Structures & Construction | - |
| Telecommunications System & Management | 2167-0919 |
| Textile Science & Engineering | 2165-8064 |

## General Science

| | |
|---|---|
| Computer Science & Systems Biology Journal | 0974-7230 |
| Ergonomics | 2165-7556 |
| Research and Development | - |
| International Journal of Advance Innovations, Thoughts & Ideas | 2277-1891 |
| Metrology | - |
| Research & Reviews: Journal of Botanical Sciences | 2320-0189 |
| Research & Reviews: Journal of Chemistry | 2319-9849 |
| Tomography | - |

## Genetics & Molecular Biology

| | |
|---|---|
| Advanced Techniques in Biology & Medicine | 2379-1764 |
| Advancements in Genetic Engineering | 2169-0111 |
| Advances in Molecular Diagnostics | - |
| Biochemistry & Analytical Biochemistry | 2161-1009 |
| Biochemistry & Molecular Biology Journal | - |
| Biochemistry & Physiology | 2329-9029 |
| Biological Systems | 2329-6577 |
| Biotechnology & Biomaterials | 2155-952X |
| Bipolar Disorder: Open Access | - |
| Cell & Developmental Biology | 2168-9296 |
| Cell Science & Therapy | 2157-7013 |
| Cell Signaling | - |
| Cellular & Molecular Medicine: Open Access | - |
| Chemical Biology & Therapeutics | - |
| Clinical Epigenetics | - |
| Cloning & Transgenesis | 2168-9849 |
| Current Synthetic and Systems Biology | 2332-0737 |
| Cytology & Histology | 2157-7099 |
| Down Syndrome & Chromosome Abnormalities | - |
| Electronic Journal of Biology | - |
| Enzyme Engineering | 2329-6674 |
| Fertilization: in Vitro | 2375-4508 |
| Fungal Genomics & Biology | 2165-8056 |
| Gene Technology | 2329-6682 |
| Genetic Syndromes & Gene Therapy | 2157-7412 |
| Hereditary Genetics: Current Research | 2161-1041 |
| Human Genetics & Embryology | 2161-0436 |
| Insights in Cell Science | - |
| Insights in Stem Cells | - |
| International Journal of Genomic Medicine | 2332-0672 |
| Metabolomics: Open Access | 2153-0769 |
| 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 |

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|---|---|
| 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 | - |

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|---|---|
| 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 | - |

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|---|---|
| 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 |

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| 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







21st International Conference on

## Advanced Materials & Nanotechnology

September 04-06, 2018 | Zürich, Switzerland

# Supporting Journals

Advanced Materials 2018

# Supporting Journals

Research & Reviews: Journal of Material Sciences
www.rroij.com/material-sciences.php

Journal of Material Sciences & Engineering
www.omicsgroup.org/journals/material-sciences-engineering.php

Journal of Powder Metallurgy & Mining
www.omicsgroup.org/journals/powder-metallurgy-mining.php

Bioceramics Development and Applications
www.omicsonline.com/open-access/bioceramics-development-applications.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

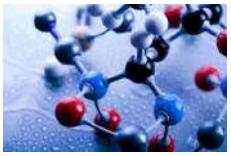
5th International Conference and Exhibition on
Herbal and Traditional Medicine
June 14-15, 2018 Rome, Italy
E: herbalmedicine@annualconferences.org
W: herbalconference.annualcongress.com

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

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





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





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







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

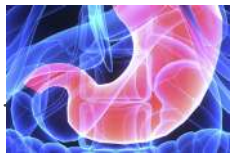
8th World Congress and Expo on
Recycling
June 25-26, 2018 Berlin, Germany
E: recyclingexpo@conferenceseries.net
W: recycling.conferenceseries.com

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

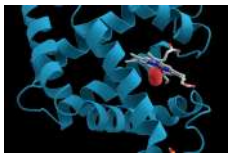
13th Euro-Global Gastroenterology Conference
August 20-21, 2018 Rome, Italy
E: gastrocongress@gastroconferences.com
W: gastroenterology.conferenceseries.com/europe

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

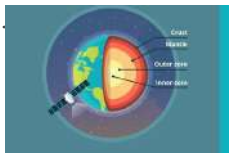
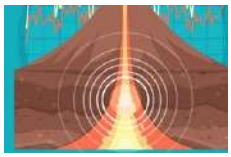
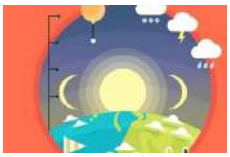
4th International Conference on
Bioscience
July 02-03, 2018 Vienna, Austria
E: bioscience@conferenceseries.net
W: bioscience.conferenceseries.com

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

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

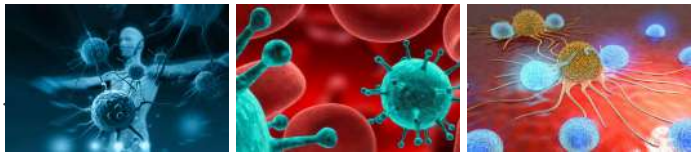
3rd International Conference on
Environmental Health & Preventive Medicine
October 15-16, 2018 Warsaw, Poland
E: environmentalhealth@healthconferences.org
W: environmentalhealth.conferenceseries.com

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

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

## Immunology



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

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

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

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

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






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

## Infectious Diseases





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

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

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

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

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

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





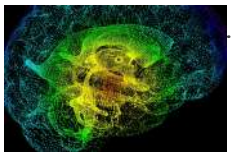
17th International Conference on
Nephrology & Urology
March 12-13, 2018 London, UK
E: nephrology-urology@annualconferences.org
W: nephrology-urology.nephroconferences.com

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

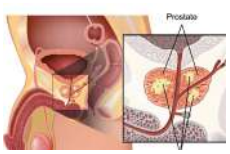




11th International Conference on
Childhood Obesity and Nutrition
March 15-16, 2018 Barcelona, Spain
E: childhoodobesity@annualconferences.org
W: childhoodobesity.conferenceseries.com

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@conferneceseries.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

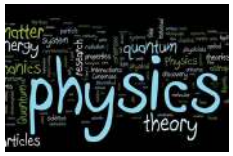
3rd International Conference on
Generics Drugs and Biosimilars
November 15-17, 2018 Frankfurt, Germany
E: genericpharma@pharmaceuticalconferences.org
W: generic-market.pharmaceuticalconferences.com

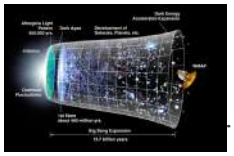
9th Global Experts Meeting on
Neuropharmacology
November 15-16, 2018 Frankfurt, Germany
E: neuro@pharmaceuticalconferences.org
W: neuro.pharmaceuticalconferences.com

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

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












21st International Conference on

# Advanced Materials & Nanotechnology

September 04-06, 2018 | Zürich, Switzerland

# Keynote Forum

## Day 1

Dieter M Gruen, Res. Rev. J Mat. Sci. 2018, Volume 6
DOI: 10.4172/2321-6212-C3-019

21st International Conference on

# Advanced Materials & Nanotechnology

September 04-06, 2018 | Zürich, Switzerland



## Dieter M Gruen

*Dimerond Technologies, USA*

## Hybrid conversion solar system (HYCSOS)

With increasing energy and environment concerns, how to efficiently convert and store energy has become a critical topic. Electrochemical energy storage devices, such as supercapacitors and batteries, have been proven to be the most effective energy conversion and storage technologies for practical application. Supercapacitors and lithium-based batteries are particularly promising because of their excellent power density and energy density. However, further development of these energy storage devices is hindered by their poor electrode performance. The carbon materials in supercapacitors and batteries, such as graphite, activated carbons and various nanostructured carbon materials (ordered porous carbon, CNT, graphene etc.), are often derived from nonrenewable resources under relatively harsh environments. Naturally abundant biomass with hierarchically porous architecture is a green, alternative carbon source with many desired properties for supercapacitors and lithium-based batteries. Recently, we converted cotton, banana peel, and recycled paper into highly porous, conductive activated carbon scaffolds for advanced energy storage applications via a low-cost and high throughput manufacturing process. The activated carbon scaffolds were further coated with active materials such as $NiCo_2O_4$, NiO, Co-Al layered double hydroxides (Co-Al LDHs), $Ni_2S$, sulfur nanoparticles, and graphene to enhance their electrochemical properties. The biomass-derived activated carbon materials are effective in improving supercapacitor's energy density and in blocking the dissolution of reaction intermediates in lithium sulfur batteries. Especially, the biomass-derived carbons provide scaffolds for hosting sulfur in lithium sulfur batteries to manipulate the "shuttle effects" of polysulfides and improve the utilization of sulfur. In particular, the activated carbon textiles (derived from cotton textiles) are flexible and conductive, and an ideal substrate for constructing flexible supercapacitors, batteries, and self-powered flexible solar cell/supercapacitor (or battery) systems. Using biomasses is definitely the right track towards making renewable carbon materials for future energy storage devices.

### Recent Publications

1. Mareš J J, Hubík P, Krištofik J, Kindl D, Fanta M, Nesládek M, Williams O and Gruen D M (2006) Weak localization in ultra-nano crystalline diamond. Applied Physics Letters. 88: (092107).
2. Auciello O, Krauss A R, Gruen D M, Meyer E M, Busmann H G, Tucek J, Sumant A, Jayatissa A, Moldovan N, Mancini D C and Gardos M N Two- and three-dimensional ultra-nano crystalline diamond (UNCD) structures for a high resolution diamond-based MEMS technology. Materials Research Society Symposium 605:73-78.
3. Dhote A M, Auciello O, Gruen D M and Ramesh R (2001) Studies of thin film growth and oxidation processes for conductive Ti-Al diffusion barrier layers via in situ surface sensitive analytical techniques. Applied Physics Letters 79:800-802.
4. Busmann H G, Pageler A, Brauneck U and Gruen D M (2000) Grain boundaries and mechanical properties of nanocrystalline diamond films. Journal of Metastable and Nanocrystalline Materials 8:255-260.
5. Auciello O, Krauss A R, Jaemo I M, Dhote A, Gruen D M, Aggarwal S, Ramesh R, Irene E A, Gao Y and Mueller A H (1999) Studies of ferroelectric heterostructure thin films, interfaces, and device-related processes via in situ analytical techniques. Integrated Ferroelectrics 27:103-118.

### Biograpy

Dieter M Gruen is an Argonne Distinguished Fellow, Emeritus and President of Dimerond Technologies, LLC's. He has completed his BS cum laude and MS degrees at Northwestern University and his PhD in Chemical Physics at University of Chicago. He had a distinguished research career involving several disciplines of material science relevant to fission and fusion energy.

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Bin Zhu, Res. Rev. J Mat. Sci. 2018, Volume 6
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*Bin Zhu*

*Hubei University, China*

## Semiconductors and semiconductor ionic hetero-structure composites for next generation energy conversion technology

Studies on ionic mobility in semiconductor lead to new generation electron and semiconductor devices, e.g., Displays, valve switches, new memory devices, superconducting devices, super magnetic devices, electro chemical transistors, low-power electronics and novel sensing energy devices etc., but ionic properties and transports missing that has the same or more important significance than ionic effects on electrons, because the electronic effect on ions and movement to be widely applied for new generation energy technologies. Over hundred years, people have designed and looked for ionic conductors and ionic conductivity only focusing on so called ionic materials or conductors, but challenge unsolved, typically, solid oxide fuel cell (SOFC), yttrium stabilized zirconia (YSZ), which needs high operational temperature in excess of 700°C to operate properly, dominated the SOFC technology over hundred years, not yet commercially. The traditional ionic electrolyte, e.g., YSZ can be now replaced by semiconductor and semiconductor ionic properties and materials we have developed to demonstrate higher device performance at temperatures well below 600°C and much simpler technology, e.g., single component fuel cell to replace traditional anode, electrolyte and catholic three components fuel cell technology. Turning to semiconductors, to develop semiconductor ionic property and conductivity, we can reach ever higher ion conductivity which has demonstrated better fuel cell performance and simpler technology. Semiconductor and semiconductor-ionic hetero structure composites are leading to next generation energy devices.

### Recent Publications

1. Zhu B, Raza R, Abbas G and Singh M (2011) An Electrolyte-Free Fuel Cell Constructed from One Homogenous Layer with Mixed Conductivity. Advanced Functional Materials 21:2465-2469
2. Zhu B, Raza R, Qin H, Liu Q and Fan L (2011) Fuel cells based on electrolyte and non-electrolyte separators. Energy & Environmental Science 4(8):42986-2992.
3. Zhu B, Qin H, Raza R, Liu Q, Fan L, Patakangas J and Lund P (2011) A single-component fuel cell reactor. International Journal of Hydrogen Energy 36:8536-8541.
4. Zhu B, Raza R, Qin H and Fan L (2011) Single-component and three-component fuel cells. Journal of Power Sources 196(15):6362-6365.
5. Zhu et al. (2013) A new energy conversion technology based on nano-redox and nano-device processes. Nano Energy 2(6):1179-1185.

### Biograpy

Bin Zhu received MSc degree from University of Science and Technology of China in 1987 and PhD from Chalmers University of Technology, Physics and Engineering Physics, Sweden in 1995. During October 1995 to December 1997, he worked as Postdoc at Uppsala University, Ångström Laboratory. Since 1998, he moved to KTH and in 1999 became Associate Professor in Department of Chemical Engineering and Technology, and now in Department of Energy Technology, KTH. He is a Visiting Professor at Aalto University and Nanyang Technological University as well as he acted as Guest Professor and Professor at several Chinese universities to co-supervise research projects and PhD students. From 2018, he has been appointed as Visiting Professor, an honorary appointment at Loughborough University, UK.

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21st International Conference on

# Advanced Materials & Nanotechnology

September 04-06, 2018 | Zürich, Switzerland

# Special Session

## Day 1

Gerd Kaupp, Res. Rev. J Mat. Sci. 2018, Volume 6
DOI: 10.4172/2321-6212-C3-020





*Gerd Kaupp*
*University of Oldenburg, Germany*

## On the way to physically correct indentation analyses

Common indentation analyses (ISO and ASTM standardized) suffer from iterations, polynomials and approximations. However, correct physics on the basis of elementary mathematics avoids iterations and violations of the energy law for hardness and modulus. The new physically founded laws $F_N$=0.8 $k$ $h^{3/2}$ and $W_{applied}/W_{indent}$ =5/4 apply to nano, micro and macro depth sensing indentations. Importantly, they detect phase changes under load and allow for the arithmetic treatment for single or successive phase transformations, surface layer effects and correct adsorption energies. Thus, the first physical hardness H, stiffness/indentation moduli (these are not "Young's moduli"), indentation works, activation energies and phase transformation energies are directly obtained, simply by application of the basic physically founded equations that avoid the unfortunate common energy law violations. Non-steadiness kinks (in the linear $h^{3/2}$ plots) and any deviations from the precise 5/4 ratio (integration of the smooth appearing loading curves over one or more phase transition onsets is not allowed) prove phase change (s) under load. For example, five successive phase changes to reveal six different polymorphs of NaCl up to 50 N load (corresponding to HV5) from depth-sensing indentations will be presented and analysed. In addition to fcc and bcc, theoretical predictions published three new polymorph structures and there is the possibility of twins and amorphous phases. The undeniable half-page physical deductions of the two basic formulas will be presented and discussed as the derived formulas for the mentioned and further mechanical applications. This is not only of academic interest, but materials' properties must be correctly and reliably described, and technical materials must withstand pressure upon use without failing. The latter are at risk when phase change onset pressures remain undetected, because of the formed interfaces between different polymorphs as sites for nucleation of cracks. Highly resolved (5000X) 3D-microscopy reveals details of crack nucleation. The non-detection of of phase changes is the main objection against the reliability of non-depth-sensing Vickers, Brinell, Rockwell, etc. hardness characterizations of daily life technical materials (not withstanding their always similar standard plates that equally undergo the undetected phase changes). The neglecting of always several undetected phase changes misses the most relevant properties with creation of high common risks. Furthermore, indentation measurements gain enormously in precision, because invalid single measurements can be directly excluded when they do not concur with the undeniable physical $F_N \propto h^{3/2}$ law's linear correlation with >3 or >4 nines, due to local imperfections, or skew, or too close to interface or to borderline indentations. The safety issues also for all the numerous applications that derive from ISO $H$ and $E_r$ are evident and largely unexplored.

### Biograpy

Gerd Kaupp has completed his PhD at Würzburg University and Postdoctoral studies from Iowa State University, Lausanne University and Freiburg University. He held a Full-Professorship till 2005 in Oldenburg, Germany and he privately continues his research on wasteless solid-state chemistry temperature-controlled with 100% yield since 1984, AFM on rough surfaces since 1988, the non-stochastic but versatile and better resolving sub-diffraction limit microscopy for unstained non-fluorescing materials of all types (resolution <10 nm, since 1995), and (nano) indentations (since 2000). In the latter field, he is still urging ISO (NIST) to correct their 50 years old standards for conformity with physics. He has published more than 300 papers in renowned journals and has been serving as an Editorial Board Member of several scientific journals.

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21st International Conference on

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September 04-06, 2018 | Zürich, Switzerland

# Scientific Tracks & Abstracts

# Day 1

# Day-1

## SESSIONS

**Advanced Materials Engineering | Emerging Areas of Materials Science | Environmental and Green Materials | Carbon Based Materials | Advanced Bio-Materials and Bio-devices | Energy Materials and Harvesting**

**Chair: Roger Amade,** Universitat de Barcelona, Spain
**Chair: Toshihiro Miyata,** Kanazawa Institute of Technology, Japan

## SESSION INTRODUCTION

**Title: Adsorbent materials for desulfurization processes under supercritical water conditions**
**Florentina Maxim,** Paul Scherrer Institut, Swizerland

**Title: Realization of conductive aluminum nitride epitaxial layer on silicon substrate by forming spontaneous nano size via-holes**
**Noriko Kurose,** Ritsumeikan University, Japan

**Title: A new laser induced local material engineering to convert from n-type to p-type nitride semiconductor to fabricate high power vertical AlGaN/GaN devices on Si substrate**
**Yoshinobu Aoyagi,** Ritsumeikan University, Japan

**Title: Restoration of perovskite phase in the top layer of thin BTO film by plasma treatment and annealing**
**Ankita Ghatak,** S.N. Bose National Centre For Basic Sciences, India

**Title: Hybrid perovskite halide for detection of environmental pollutant in atmosphere**
**Barnali Ghosh (Saha),** S.N. Bose National Centre For Basic Sciences, India

**Title: Comparative analysis on monolithic DeNOx catalysts**
**Giovanni Perillo,** Wessex Institute of Technology, UK

**Title: Growth and electrochemical characterization of graphene nano walls and carbon nanotubes**
**Roger Amade,** Universitat de Barcelona, Spain

**Title: Fine-controlled sub-nano metal particles in a dendrimer reactor**
**Kimihisa Yamamoto,** Tokyo Institute of Technology, Japan

**Title: Thermoelectricity enhanced catalysis**
**Tiva Sharifi,** Rice University, USA

**Title: P-type Cu2O-based heterojunction solar cells fabricated with n-type ZnO thin film prepared by electrochemical deposition method**
**Toshihiro Miyata,** Kanazawa Institute of Technology, Japan

**Title:** **Growth control of vertical nano graphene network in plasma enhanced chemical vapor deposition and its emerging applications**
**Keigo Takeda,** Meijo University, Japan

**Title:** **In silico study of the self-assembly and gelation of sugar derivatives**
**Dafna Knani,** ORT Braude College, Israel

**Title:** **Design and development of nanomaterials using induction plasma system and its application**
**Vignesh Nagarajan,** Matrix Nano, India

Florentina Maxim et al., Res. Rev. J Mat. Sci. 2018, Volume 6
DOI: 10.4172/2321-6212-C3-020



## Adsorbent materials for desulfurization processes under supercritical water conditions

**Florentina Maxim, Konstantinos Karalis, Bojan Niceno** and **Christian Ludwig**
Paul Scherrer Institut, Switzerland

**Statement of the Problem:** It is recognized that the great technological potential of the catalytic super critical water (SCW) gasification of biomass for biofuel production. However, an important issue related to the poisoning of the catalyst by sulfur (S) compounds remaining in the SCW phase is still to be solved. To design efficient S adsorbents at SCW conditions is a challenge since, the sorbent material, which is sought as metal oxide ($Me_xO_y$), must be structurally stable and in the same time to be able to capture S from both inorganic and organic sources under SCW conditions. The purpose of this work is to design and obtain supported nano $Me_xO_y$ adsorbent materials for efficient desulfurization in SCW. Our previous results reported on the impact of sorbent geometry on the S adsorption in SCW.

**Materials & Methodology:** SCW impregnation of $Me_xO_y$ (ZnO, CuO, $Mn_2O_4$, $Fe_2O_3$) on activated carbon was performed in a continuous flow tubular reactor (Figure), also used for S sorption experiments. In situ neutron imaging (NI), molecular dynamics (MD) and computational fluid dynamics (CFD) were the main techniques used to obtain fundamental knowledge on the phenomena taking place when different S species are adsorbed by $Me_xO_y$ in SCW.

**Findings:** The NI results, reporting on the S in SCW density profiles and flow patterns through the adsorbent were used for the validation of models applied in MD and CFD. The SCW desulfurization efficiency of different $Me_xO_y$ was established.

**Conclusion & Significance:** The findings of the present study are of great importance when the goal is to mitigate the deactivation of the catalyst by S from the foregoing biomass gasification by SCW.




Figure: Dedicated experimental setup for desulfurization under SCW conditions.

### Recent Publications

1. Lachos-Perez D, et al. (2017) Applications of subcritical and supercritical water conditions for extraction, hydrolysis, gasification, and carbonization of biomass: a critical review. Bio fuel Research Journal 4(2):611-626.
2. Stucki S, et al. (2009) Catalytic gasification of algae in supercritical water for biofuel production and carbon capture. Energy & Environmental Science 2(5):535-541.
3. Peng G, C Ludwig and F Vogel (2017) Catalytic supercritical water gasification: Interaction of sulfur with ZnO and the ruthenium catalyst. Applied Catalysis B-Environmental 202:262-268.
4. Ates A, et al. (2014) The role of catalyst in supercritical water desulfurization. Applied Catalysis B: Environmental 147:144-155.

5. Maxim F, et al. (2017) The impact of sorbent geometry on the sulphur adsorption under supercritical water conditions: a numerical study. Biomass Conversion and Biorefinery 7(4):479-485.

## Biography

Florentina Maxim has her expertise in the Hydrothermal Synthesis and the Characterization of Nano Metal Oxides. She has completed her Doctorate in the "Morphology control of nano ferroelectric metal oxides" work carried out in the group of Professor Paula Vilarinho at University of Aveiro, Portugal in 2010. After several research fellowships for Electron Microscopy, she was leading the project for Young Independent Research Team funded by the Romanian National Foundation UEFISCDI. Since 2015, she is working as a Postdoctoral Scientist at Paul Scherrer Institute, Switzerland and her major research activities are in the field of advanced materials for energy harvesting from biomass (algae) by supercritical water processes.

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**Notes:**

Noriko Kurose et al., Res. Rev. J Mat. Sci. 2018, Volume 6
DOI: 10.4172/2321-6212-C3-020



# Realization of conductive aluminum nitride epitaxial layer on silicon substrate by forming spontaneous nano size via-holes

**Noriko Kurose** and **Aoyagi Y**
Ritsumeikan University, Japan

**Statement of the Problem:** The n-type aluminum gallium nitride (n-AlGaN) vertical field effect transistors on a Si substrate are promising devices for future super high power devices beyond Si, SiC and GaN devices which are currently being developed. The AlN buffer layer is indispensable for the growth of AlGaN epitaxial layer on the Si substrate. However, the AlN is an insulating material and we could not flow current through the buffer layer. We report formation of the conductive AlN buffer layer (hereafter v-AlN) and details of the formation mechanism of the v-AlN.

**Methodology:** The v-AlN is grown on the Si substrate using metal organic chemical vapor deposition (MOCVD). Al metal dots are grown on the substrate to form Al-Si alloy dots with successive growth of AlN buffer layer. Spontaneous nano size via-holes (hereafter via-holes) are formed in AlN buffer layer due to the surface energy difference of Si and Si-Al alloy. The n-AlGaN is grown on it to fill out the via-holes. The conductive AlN buffer layer with via-holes is formed.

**Findings:** We have converted the insulating AlN buffer layer to conductive one by forming cluster of via-holes in the buffer layer filled with n-AlGaN during the crystal growth. The size of the cluster and the density are controlled and are 0.2~1μm$^{\Phi}$ and $10^7$~$10^8$/cm$^2$, respectively. The current flows through these clusters filled with n-AlGaN. The mirror like n-AlGaN epitaxial layer was successfully grown on it. It is confirmed that the vertical resistivity through the conductive AlN buffer layer was 0.2Ω/cm$^2$ which is about 104 times smaller than that of conventional AlN.

**Conclusion & Significance:** We have succeeded in growing the conductive AlN buffer layer on the Si substrate. Our technique and findings open a way to make vertical high power AlGaN FETs, UV-LEDs, UV sensors on the Si substrate and to realize Si on chip devices.

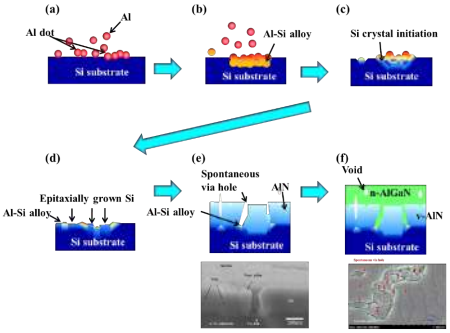



Figure: Steps of the formation of spontaneous via-holes. At the beginning stage of the growth, a small amount of Tri-methyl Aluminum (TMA) is fed on the Si substrate to form small size Al dots (a). The Al embedded on the Si substrate interacts with the Si substrate to generate Al-Si alloy dots (b) during the Al feeding time and during the increase of temperature. At a Si content of approximately 35% β solid phase Si recrystallization is initiated as understood from the phase diagram of Si-Al alloy(c) and Si is epitaxially grown in the Al-Si alloy dots as shown in (d). No AIN growth occurs on the Al-Si alloy surface because of the difference of surface energy of Si and Si-Al alloy. Thus, via-holes of AlN are formed in the area where the Al dots are formed (e). A scanning electron microscope (SEM) image of via-holes is shown underneath of (e). Conductive n-AlGaN is filled in these via-holes by successive growth of n-AlGaN as shown in (f). Nano cluster via-holes observed by SEM are shown underneath of (f)

**Recent Publications**

1. Kurose N, Matumato K, Yamada F, Roffi T M, Kamiya I, Iwata N and Aoyagi Y (2018) Laser induced local activation of Mg-doped GaN with high lateral resolution for high power vertical devices. AIP Advances 8: 015329-1-015329-5.
2. Kurose N and Aoyagi Y (2016) Development of high power, large area, deep ultraviolet light emitting devices using dynamic microplasma excitation (MIPE) of AlGaN multiple quantum wells. Electronics and Communications in Japan 99:3-11.
3. Kurose N, Iwata N, Kamiya I and Aoyagi Y (2014) Formation of conductive spontaneous via holes in AlN buffer layer on n+Si substrate by filling the vias with n-AlGaN by metal organic chemical vapor deposition and application to vertical deep ultraviolet photo-sensor. AIP Advances 4(12):123007.
4. Kurose N, Shibano K, Araki T and Aoyagi Y (2014) Development of substrate removal free vertical ultraviolet light-emitting diode (RefV-LED). AIP Advances 4:027122.
5. Aoyagi Y and Kurose N (2013) A 2-inch, large-size deep ultraviolet light-emitting device using dynamically controlled micro-plasma-excited AlGaN. Applied Physics Letters 102(4):041114.

**Biography**

Noriko Kurose has her expertise in "Crystal growth engineering of nitride semiconductor using metal organic chemical vapor deposition to control the material properties". She found an insulating material can be converted to conductive one by introducing nano via-holes spontaneously inside the insulator using a crystal growth technique and she has clarified the conversion mechanism. Her invention opens a way to fabricate various vertical devices on Si substrate and Si on chip devices. Actually, she has succeeded in fabricating a vertical UV-LED and a vertical UV sensor using her technology. In addition, she has succeeded in fabricating large area panel type micro plasma excited DUV light emitting devices with a size of more than two inches. She was invited to present her work in many international conferences.

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**Notes:**

Yoshinobu Aoyagi et al., Res. Rev. J Mat. Sci. 2018, Volume 6
DOI: 10.4172/2321-6212-C3-020



# A new laser induced local material engineering to convert from n-type to p-type nitride semiconductor to fabricate high power vertical AlGaN/GaN devices on Si substrate

**Yoshinobu Aoyagi[1], Kurose N[1], Matsumoto K[2], Iwata T[2]** and **Kamiya I[2]**
[1]Ritsumeikan University, Japan
[2]Toyota Technological Institute, Japan

**Statement of the Problem:** The n-type aluminum gallium nitride (n-AlGaN) vertical field effect transistors (FETs) are promising devices for future super high power FET electronics beyond Si, SiC and GaN devices. To realize n-AlGaN vertical FETs with carrier blocking layer to concentrate the current flow into the vertical channel region, the local p-type AlGaN formation is indispensable. So far, to realize this local p-type layer, crystal regrowth technique with lithography is carried out but this process is complicated and reduces the crystal quality. To precede local carrier type conversion from n-type to p-type without any crystal regrowth method, the carrier blocking layer can be easily produced without any crystal damages.

**Methodology:** We used an excimer laser (193 nm) as an irradiation source for material engineering. The irradiation system has a scanning system of the sample to control the irradiation area and an *in-situ* monitoring system to observe the material surface during the laser irradiation. The material characteristics are observed using Hall effects, Kelvin probe and optical microscope measurement.

**Findings:** We found the insulating or n-type as grown Mg-doped GaN (Mg: GaN) was converted to p-type GaN (p-GaN) under a proper laser irradiation condition only at the specific local area of the laser irradiation. The lateral resolution for transition from the Mg: GaN to p-type was about 1 μm. The surface has no damage under the irradiation.

**Conclusion & Significance:** A new technique has been established. This has achieved local activation of Mg: GaN to p-type GaN using the laser irradiation co-operated with *in-situ* observations of the surface during the laser processing. Using this method, local activation of carriers with the lateral resolution of about 1 μm is possible, thus establishing the potential for fabricating local p-GaN carrier blocking layer and vertical high power devices without using any other fabrication techniques such as crystal regrowth.

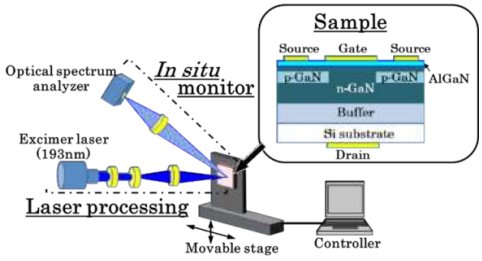



Figure: Experimental set up and sample to be converted locally from n-type to p-type GaN. The sample placed on the X–Y stage was scanned using a controller. The PL and scattered light from the processing region of the GaN were monitored *in-situ* to feed the actual irradiation conditions back to the laser. The inset shows a schematic view of a vertical FET with a p-GaN carrier-blocking layer which is locally converted from n-GaN by our method.

## Recent Publications

1. Tanaka S, Iwai S and Aoyagi Y (1996) Self-assembling GaN quantum dots on $Al_xGa1-_xN$ surfaces using a surfactant. Applied Physics Letters 69:4096-4098.
2. Tanaka S, Takeuchi M and Aoyagi Y (2000) Anti-surfactant in III-nitride epitaxy - Quantum dot formation and dislocation termination. Applied Physics Letters 39: L831-L834.

3. Aoki K, Miyazaki H T, Hirayama H, Inoshita K, Baba T, Sakoda K, Shinya N and Aoyagi Y (2003) Micro assembly of semiconductor three-dimensional photonic crystals. Nature Materials 2(2):117-121.
4. Matsuda K, Saiki T, Nomura S, Mihara M, Aoyagi Y, Nair S and Takagahara T (2003) Near-field optical mapping of exciton wave functions in a GaAs quantum dot. Physical *Review Letters* 91:177401-1-177401-4.
5. Aoyagi Y and Kurose N (2013) A 2-inch, large-size deep ultraviolet light-emitting device using dynamically controlled micro-plasma-excited AlGaN. Applied Physics Letters 102:041114.

**Biography**

Yoshinobu Aoyagi has his expertise in nano technology and creation of advanced materials for developing new devices. His recent work is a discovery of anti-surfactant phenomena to create spontaneously GaN quantum dots even on the lattice matched substrate, for example GaN quantum dots on a GaN substrate which is impossible under common crystal growth condition. He has also succeeded in developing a new technology to fabricate a 3D photonic crystal, DUV LED, a large scale DUV light emitter of more than 2 inches size. Laser processing is also another main work. He also succeeded in pioneer works on laser induced atomic layer deposition and atomic layer etching at the beginning stage of the research. He published more than 500 articles in scientific journals and presented a lot of invited talks.

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**Notes:**

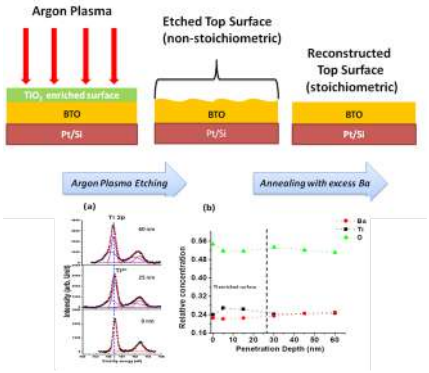
Ankita Ghatak, Res. Rev. J Mat. Sci. 2018, Volume 6
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## Restoration of perovskite phase in the top layer of thin BTO film by plasma treatment and annealing

**Ankita Ghatak**
S N Bose National Centre for Basic Sciences, India

Barium titanate ($BaTiO_3$) is a very attractive material in the field of electroceramics and microelectronics due to its good electrical properties. Its high dielectric constant and low loss characteristics make BTO an excellent choice for many applications, such as capacitors, multilayer capacitors (MLCs) and energy storage devices. In more recent activities, the focus has shifted on growth of thin BTO films with thickness ≤200 nm and preferably even thinner like 100 nm. It is desirable to have thin films of BTO grown on (Pt/Si) that can act as a super capacitor if the relative permittivity is more than 100. However, the growth of thin BTO film (~100 nm) with acceptable dielectric and ferroelectric properties has not been adequately addressed to and the method to grow such a film has not been standardized either. We report a simple method to restore the perovskite phase in the top surface/sub-surface region of a thin film (~100 nm) of barium titanate (BTO) fabricated by pulsed laser deposition on a platinized silicon (Pt/Si) surface and thus enhance its dielectric and ferroelectric properties. Phase evolution, surface morphology with local chemical composition of BTO films have been studied as a function of laser fluence. Investigations using X-ray diffraction (XRD), grazing-angle incidence X-ray diffraction (GIXRD) and depth resolved X-ray photoelectron spectroscopy (XPS) show that even after achieving a good phase formation there can be a presence of non-perovskite $TiO_2$ phase at the surface and subsurface in such films that degrades its dielectric and ferroelectric response. The restoration of the degraded top layer was done by a combination of low energy Ar plasma treatment followed by an annealing process that enhances Ba content.




### Biography

Ankita Ghatak is a Post-doctoral Fellow and has her expertise in growth of nanostructured binary as well as complex oxides. She has grown aligned 1-D nanostructured binary oxide which has a strong influence in the field of applications. She also has her on expertise on microstructural analysis of complex oxide nanostructures that has provided up a new field of research from technological point of view. Her interface analysis of complex materials with substrates has opened a challenging field in the device fabrication process. She in her publications has tremendously contributed about the benefit of creating atomically sharp interfaces that will enhance the future device performances.

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Barnali Ghosh (Saha), Res. Rev. J Mat. Sci. 2018, Volume 6
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## Hybrid perovskite halide for detection of environmental pollutant in atmosphere

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In recent years, the organic/inorganic halide perovskites are emerging material and have attracted significant attention because of its various important application potentials like solar cells and other optoelectronic applications. Sensors based on thin films of different materials are widely used for various hazardous gas detection. These sensors with proper electrical readout, if made sensitive enough can even be used for non-invasive diagnosis of disease using the technique of breath analysis. While there are many electrical readout sensors that can detect hazardous gas typically with concentration ≥10 ppm, there are not too many visual (color change type) sensors that can easily detect hazardous gas with comparable sensitivity. Very recent developments of a visual color change-based sensor made using hybrid perovskite halide as working material led to detection of hazardous gas like ammonia with concentration <5 ppm with very high selectivity in room temperature. The low cost of the synthesis and the fact that it is made on a paper makes the sensor disposable. It is a low cost portable sensor for rapid, easy and selective detection of the atmospheric ammonia in open or closed environment by a simple color change effect, without the need for any other instruments. This visual sensor will be useful in places that can produce and emit ammonia gas in the environment such as food grain storage facilities, waste disposal sites and perishable materials storage facilities.

### Biography

Dr. Barnali Ghosh Saha), is now a Scientist-E, (Associate Professor) in the Department fo Condensed Matter Physics and Material Sciences and Head of the department of Technical Research facility programme. She is a member of Indian Physics Association. She got Ph.D degree in Physic award in 1998. She got a research Award in Woman Scientist programme in 2003 and 2008 from "Department of Science and Technology, Government of India". Currently Dr. Barnali Ghosh (Saha)'s researches focus on experimental condensed matter Physics and Nano Science and nanotechnology, Physics of transition metal oxides mainly perovskite oxides. She is also working on fabrication of single nanowire based devices using different lithographic techniques like, e-beam and focused ion beam techniques and transport measurement on single nanowire. She also does cross sectional transmission electron microscopy related work using focused ion beam based techniques.

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**Notes:**

Giovanni Perillo, Res. Rev. J Mat. Sci. 2018, Volume 6
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## Comparative analysis on monolithic DeNOx catalysts

**Giovanni Perillo**
Wessex Institute of Technology, UK

Catalysts based on the vanadia-titania system are widely used for the abatement of pollutants, particularly nitrogen oxides (NOx), in the exhaust gases of industrial plants. Their mechanism of operation is based on the catalytic reduction reaction of nitrogen oxides with ammonia (SCR). In this paper, two commercial catalysts based on the V-W-Ti system of very similar nominal composition were compared. The two samples were analyzed in the fresh state and after a period of operation in a waste gas plant of a waste to energy plant. The materials were first characterized from the chemical structural point of view through instrumental techniques such as X-ray fluorescence (XRF), X-ray diffractometry (XRD), IR spectroscopy (FTIR), SEM scanning electron microscopy observations with analysis EDS, measurement of pore size and specific surface area through nitrogen adsorption/desorption and BET techniques. Subsequently, the catalytic properties of the new and used catalysts in the $NH_3$-SCR reaction were evaluated. The results of the analysis showed that the samples are both made of a titanium matrix in the form of anatase, reinforced with glass fibers used as a support for the active phases based on V and W. The percentages of vanadium are practically the same for both systems, while the tungsten percentage is very different. The specific surface also has very similar values for the two fresh catalysts. The tests of catalytic activity, on the other hand, have given very different results particularly, for one of the two catalysts the performance decays much faster than the other. The kinetic measurements show that the decay is not due to a specific surface decrease but due to the presence of precipitates, but to a difference in initial activity between the two catalysts, linked to the different tungsten content.

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### Biography

Giovanni Perillo has completed his Graduation in Civil Engineering at the University of Naples Federico II, Italy. He is a Professor at University of Naples Parthenope and Adjunct Professor at Wessex Institute of Technologies, New Forest (UK). He has been involved in several world-wide international research projects and he is an author of more than 100 scientific publications in varied fields of engineering. He is currently a member of several International Advisory and Scientific Committees. He is a Member of Editorial Board of the Journal of Energy Engineering Science and Journal of Hydrology Science from publishing group, New York, USA and Reviewer of Journal China-USA Business Review of Horizon Research Publishing. He also planned many high technical engineering projects. Since 1996, he is a member of National Geographic Society and a member of New York Academy of Sciences. He was also a Chairman of Italian National Environment Commission.

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Roger Amade et al., Res. Rev. J Mat. Sci. 2018, Volume 6
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## Growth and electrochemical characterization of graphene nano walls and carbon nanotubes

**Roger Amade[1], Arevik Musheghyan-Avetisyan[1], Joan Martí-González[1], Fernando Pantoja-Suárez[1,3], Islam Alshaikh[1], Shahzad Hussain[1], Jose Luís Andújar[1], Esther Pascual[1], Enric Bertran[1], Ángel Pérez del Pino[2]** and **Eniko György[2]**
[1]Universitat de Barcelona, Spain
[2]Institut de Ciència de Materials de Barcelona, Spain
[3]Escuela Politécnica Nacional, Ecuador

Electrochemical double layer capacitors (EDLC) or supercapacitors exhibit higher specific capacitance than conventional electrolytic capacitors due to their increased surface area and short distance between positive and negative charges at the electrode/electrolyte interface. Because of their high electric conductivity, chemical inertness, thermal and mechanical stability, carbon-based electrodes are the preferred material of choice in supercapacitor applications. In particular, carbon nanostructures such as carbon nanotubes (CNTs), with a high specific surface area may increase the capacitance upto about 100 F/g. Recently, graphene nanowalls (GNWs) are being the focus of research in different areas due to their outstanding properties. GNWs can be described as self-assembled, vertically-standing, few-layered graphene sheet nanostructures. The growth mechanism of these nanostructures is still not clear, but recent results indicate that they grow virtually on every substrate that withstand the synthesis temperature (around 600°C) without the need of a catalyst. Thus, this new material has promising features that may improve performance of energy storage devices like supercapacitors or lithium ion batteries. Surface functionalization of these nanostructures by means of plasma treatments or deposition of metal oxides may further improve their pseudo capacitance and electrochemical performance. This study explores the growth of GNWs and their super capacitive properties grown under different conditions, and compares the results with those obtained for CNTs.

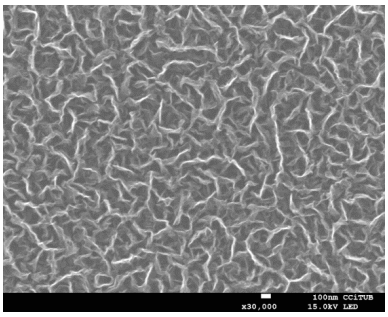



**Figure:** Top view of Graphene Nanowalls deposited on silicon wafer by means of ICP-CVD (Inductively Coupled Plasma-Chemical Vapor Deposition).

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1. Davami K, Shaygan M, Kheirabi K, Zhao J, Kovalenko D A, Rümmeli M H, Opitz J, Cuniberti G, Lee J S and Meyyappan M (2014) Synthesis and characterization of carbon nanowalls on different substrates by radio frequency plasma enhanced chemical vapor deposition. Carbon Journal 72:372-380.
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5. 5. Hussain S, Amade R, Moreno H and Bertran E (2014) RF-PECVD growth and nitrogen plasma functionalization of CNTs on copper foil for electrochemical applications. Diamond and Related Materials 49:55-61.

**Biography**

Roger Amade has his expertise in the synthesis of carbon nanostructures using chemical vapor deposition (CVD) and plasma enhanced chemical vapor deposition techniques on different substrates and their electrochemical characterization as electrodes for energy storage and production devices. In particular, his research is focused on the development of new nanostructures for supercapacitors, lithium-ion batteries and microbial fuel cells. He is currently an Associate Professor in the Department of Applied Physics from University of Barcelona.

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**Notes:**

Kimihisa Yamamoto, Res. Rev. J Mat. Sci. 2018, Volume 6
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## Fine-controlled sub-nano metal particle in a dendrimer reactor

**Kimihisa Yamamoto**
Tokyo Institute of Technology, Japan

We show that tin chlorides, $SnCl_2$ and $FeCl_3$ complexes to the imines groups of a spherical poly (phenyl azomethine) dendrimer in a stepwise fashion according to an electron gradient with complexation in a more peripheral generation proceeding only after complexation in generations closer to the core has been completed. The metal assembly in a discrete molecule can be converted to a size regulated metal cluster with a size smaller than 1 nm as a molecular reactor. Due to the well-defined number of metal clusters in the sub nanometer size region, its property is much different from that of bulk or general metal nanoparticles. Dendrimers are highly branched organic macromolecules with successive layers or generations of branch units surrounding a central core. Organic, inorganic hybrid versions have also been produced by trapping metal ions or metal clusters within the voids of the dendrimers. Their unusual, tree like topology endows these nano meter sized macromolecules with a gradient in branch density from the interior to the exterior, which can be exploited to direct the transfer of charge and energy from the dendrimer periphery to its core. Here, we show that tin ions, $Sn^{2+}$, complex to the imines groups of a spherical poly (phenyl azomethine) dendrimer in a stepwise fashion according to an electron gradient with complexation in a more peripheral generation proceeding only after complexation in generations closer to the core has been completed. By attaching an electron withdrawing group to the dendrimer core, we are able to change the complexation pattern, so that the core imines are complexed last. By further extending this strategy, it should be possible to control the number and location of metal ions incorporated into dendrimer structures, which might and uses as tailored catalysts or fine controlled clusters for advanced nano catalysts.

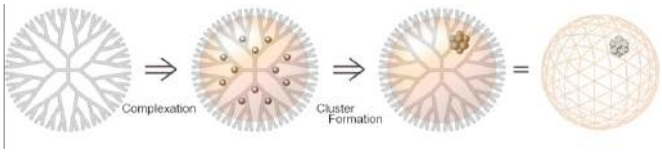



**Figure:** Precision synthesis of sub nanoparticles using dendrimers.

### Biography

Kimihisa Yamamoto has completed his PhD in Polymer Chemistry at Waseda University, 1990. He joined as Professor in Department of Chemistry at Keio University, 1997. Currently, he is a Professor in the Chemical Resources Laboratory at Tokyo Institute of Technology since 2010. His present research interests are in developing supra–metallo molecules for nano synthesizers involving nanoparticles, sub nanoparticles and super atoms..

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**Notes:**

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## Thermo electricity enhanced catalysis

**Tiva Sharifi**[1, 2]
[1]Rice University, USA
[2]Umeå University, Sweden

The voltage generated in thermoelectric materials can supply energy to any energy demanding system when there is a chance of either existence of temperature gradient or the possibility to generate it if it does not cause any malfunction for the system. Electro/photo catalytic reactions are good example of such systems. Thermoelectric materials can act as mini voltage generators to boost catalytic reactions and hence reduce/eliminate the external bias energy. In this case, thermoelectric material has a function similar to but conceptually different from the catalyst. As recently solar energy has been widely considered as a renewable energy resource to direct or indirectly power up the catalytic reactions, a temperature gradient could be naturally established and be utilized in the system. We have investigated the catalytic performance of nano structured tellurides (e.g., $Bi_2Te_3$ and $Sb_2Te_3$) which are among the most known thermoelectric materials. By optimizing the structure, morphology and size of thermoelectric materials, they are utilized in different catalytic reactions. We observe that with the effect of temperature gradient these catalytically inert materials will contribute to and facilitate the catalytic reactions including electrochemical water splitting and photocatalytic hydrogen desorption.

### Recent Publications

1. Sharifi T, Zhang X, Costin G, Yazdi S, Woellner C F, Liu Y, Tiwary C S and Ajayan P (2017) Thermoelectricity enhanced electro catalysis. Nano Letters 17(12):7908-7913.
2. Liu Y, Liang C, Wu J, Sharifi T, Xu H, Nakanishi Y, Yang Y, et al. (2018) Atomic layered titanium sulfide quantum dots as electro catalysts for enhanced hydrogen evolution reaction. Advanced Materials Interfaces 5(1):1700895.
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5. Pham T N, Sharifi T, Sandström R, Siljebo W, Shchukarev A, Kordas K, Wågberg T and Mikkola J P (2017) Robust hierarchical 3D carbon foam electrode for efficient water electrolysis. Scientific Reports 7(1):6112.

### Biography

Tiva Sharifi has completed her PhD in Material Science in Physics Department at Umeå University, Sweden. Her research has been mainly focused on the synthesis and understanding of the properties of doped carbon based materials for energy conversion reactions. She then moved to Ajayan Research Group at Rice University, Houston, TX and has completed her Post-doctoral research on the understanding and resolving of the properties of low-dimensional materials.

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Toshihiro Miyata et al., Res. Rev. J Mat. Sci. 2018, Volume 6
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# P-type $Cu_2O$-based heterojunction solar cells fabricated with n-type ZnO thin film prepared by electrochemical deposition method

**Toshihiro Miyata, Hiroki Tokunaga** and **Tadatsugu Minami**
Kanazawa Institute of Technology, Japan

Recently, substantially improved conversion efficiency has been reported in p-type $Cu_2O$ sheet-based heterojunction solar cells with n-type oxide semiconductor thin films prepared by the pulsed laser deposition (PLD) method. However, PLD has some disadvantages as a practical preparation method, such as low deposition rate, small deposition area and high cost. On the other hand, the electrochemical deposition (ECD) method is a deposition technique that has potential to solve these problems. This paper describes the fabrication of $Cu_2O$ based heterojunction solar cells using n-type ZnO thin film prepared by the ECD method. The n-type ZnO thin film layer was prepared on a p-type $Cu_2O$: Na sheet using the following ECD process. Initially, a zinc nitrate aqueous solution was prepared with 0.22 M zinc nitrate and de-ionized water; after that, a 0.3 M HCl or 0.1 M KOH aqueous solution was added to adjust the pH. Next, a p-$Cu_2O$: Na sheet was immersed in the above solution. The photovoltaic properties were strongly dependent on the fabrication conditions of n-type ZnO thin films. For example; the current density-voltage (J-V) characteristics of AZO/n-ZnO/p-$Cu_2O$: Na solar cells showed strong dependence on the pH of the zinc acetate aqueous solution, obtaining significant improvement with a pH value of 4.9 in Figure 1. Figure 2 shows typical J-V characteristics for AZO/n-ZnO/p-$Cu_2O$ solar cells prepared under optimized deposition conditions, such as film thickness of the n-ZnO thin film. The same structure of a $Cu_2O$ heterojunction solar cell using n-type ZnO thin films was prepared by PLD, and the J-V characteristics are also shown in Figure 2. It should be noted that the J-V characteristics of the AZO/n-ZnO/p-$Cu_2O$ solar cells were the same as those when using the PLD method.

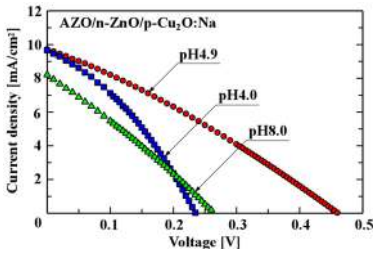



**Figure 1:** pH dependence of zinc acetate aqueous solution for J-V characteristics of AZO/n-ZnO/p-$Cu_2O$: Na solar cells

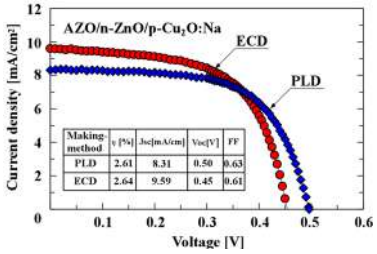



**Figure 2:** Typical J-V characteristics of AZO/n-ZnO /p-$Cu_2O$ heterojunction solar cell under optimized preparation conditions

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1. T Minami, J Yamazaki and T Miyata (2016) Efficiency enhanced solar cells with a $Cu_2O$ homojunction grown epitaxially on p-$Cu_2O$: Na sheets by electrochemical deposition. MRS Communications 6:416-420.

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5. T Minami, T Miyata and Y Nishi (2014) Efficiency improvement of $Cu_2O$-based heterojunction solar cells fabricated using thermally oxidized copper sheets. Thin Solid Films 559:105-111.

**Biography**

Toshihiro Miyata is a Professor at the Kanazawa Institute of Technology (KIT), Japan and a Researcher of the Optoelectronic Device System R&D Center at KIT. His interests focus on optoelectronic devices, especially solar cells using $Cu_2O$. He has completed his BE degree in Electronics Engineering at KIT, 1987 and ME and Doctor of Engineering degrees at KIT in 1989 and 1992 respectively. During the period 1992 to 1993, he was a Visiting Scientist at the Micro Systems Technology Laboratory at MIT, USA.

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**Notes:**

Keigo Takeda et al., Res. Rev. J Mat. Sci. 2018, Volume 6
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# Growth control of vertical nano graphene network in plasma enhanced chemical vapor deposition and its emerging applications

**Keigo Takeda[1], Takuya Suzuki[1], Hitoshi Nozaki[1], Mineo Hiramatsu[1], Hiroki Kondo[2]** and **Masaru Hori[2]**
[1]Meijo University, Japan
[2]Nagoya University, Japan

Carbon nanowalls (CNWs) composed of few layer graphenes standing vertically on the substrate have a maze like structure formed by a self-supporting network of wall structures. The 3-dimensional structure of CNWs would be useful as a nano platform for electrochemical applications such as sensing, energy conversion, etc., because of the conductive carbon structure with the large surface and the wide capability of surface modification including decoration with catalysts such as metal nanoparticles. For achieving the CNWs applications to such fields, control of CNWs morphologies including interspace between adjacent nano walls is crucial issue. In this study, we carried out the CNWs growth with plasma enhanced chemical vapor deposition (PECVD) using $CH_4/H_2/Ar$ mixture with emphasis on the surface morphology control of CNWs. The CNWs were grown on a SiO2 film synthesized on a Si substrate by PECVD using inductively coupled $CH_4/H_2/Ar$ plasma. Moreover, emission intensities of CH species (wavelength: 430 nm) and H atom (Balmer α line, wavelength: 656 nm) in the plasma were monitored by optical emission spectroscopy. To estimate the interspace between adjacent nanowalls, the average area surrounded by nanowalls was evaluated from the top view observation of grown CNWs observed by scanning electron microscope. From results, it is found that the behavior of average area change has a correlation with the [H]/[CH] emission intensity ratio in the CVD plasma with $Ar/CH_4/H_2$ mixture. It is considered that the balance between carbon precursors and etching radicals in the CVD plasma affect the nucleation in the initial growth stage of CNWs, therefore, the interspaces between adjacent walls changed as a function of the [H]/[CH] emission intensity which is relative density ratio of gas phase radicals. In our presentation, we report the effects of ion bombardment and catalytic metals on the nucleation of nano walls to achieve the control of space between adjacent walls.

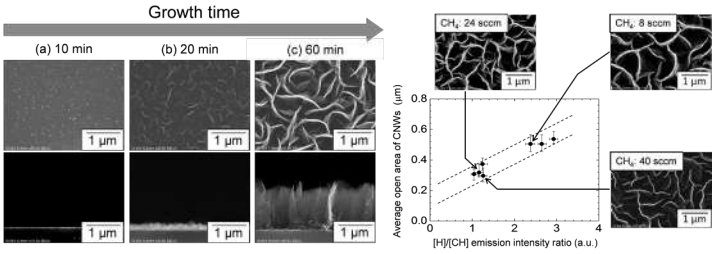



**Figure 1:** Average area surrounded by the grown nanowalls as a function of [H]/[CH] emission intensity ratio in the plasma

## Biography

Keigo Takeda has completed his PhD at Nagoya University and Postdoctoral studies at Graduate School of Engineering, Nagoya University. He is an Associate Professor at Meijo University since 2017. He has published more than 90 papers in reputed journals. His current research interests include Reaction mechanisms of reactive species in plasma processes for advanced materials synthesis, Fine Processing Technology and Biomedical Applications, etc.

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Dafna Knani, Res. Rev. J Mat. Sci. 2018, Volume 6
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## *In silico* study of the self-assembly and gelation of sugar derivatives

**Dafna Knani**
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Low molecular weight gelators are molecules capable of forming gels in which they are self-assembled into a physical 3D network of fibers, held together by non-covalent interactions like hydrogen bonds, Van der Waals forces and π–π-interactions. The organic gelator 1,3 (R):2,4(S)-dibenzylidene-D-sorbitol (DBS) self-organizes to form a 3-D network at relatively low concentrations in a variety of nonpolar organic solvents and polymer melt. DBS could be transformed into a hydrogelator by introduction of hydrophilic groups, which facilitate its self-assembly in aqueous medium. In this work, the self-assembly of DBS and its derivatives was investigated by molecular modeling. A dynamic molecular simulation was carried out using atomistic and quantum tools included in the Material Studio 8.0 (by Biovia) software. Various properties (cohesive energy density, mixing energy, radial distribution function) were calculated to illustrate the interactions that govern the self-assembly of the examined compounds. The results of the simulation indicate that the interaction between DBS-COOH molecules is stronger than DBS-$CONHNH_2$ and DBS and its water compatibility is highest. Therefore, DBS-COOH seems to be a better hydrogelator than DBS-$CONHNH_2$ and DBS. Intermolecular H-bonding interactions are formed between the three molecules as pure substances and they dramatically decrease in the presence of water. In contrast, the intra-molecular interactions increase in water. This result indicates that in aqueous environment the molecular structure tends to be more rigid and fixed in the preferred conformation. Due to H-bonds, DBS and its derivatives form a rigid structure which might explain their tendency to create nanofibrils. In order to obtain effective hydrogelators, fine-tuning of the balance between the hydrophilic (soluble) and hydrophobic (insoluble) parts is essential.

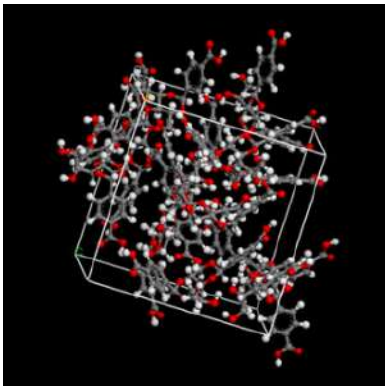


**Figure:** Periodic cubic cell of DBSCOOH, after 500ps dynamic simulation

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**Biography**

Dafna Knani is a Senior Lecturer in the Department of Biotechnology Engineering at ORT Braude College. Currently, she is the Head of MSc program in Biotechnology. She is an Organic Polymer Chemist. She has completed her Graduation in the Faculty of Chemistry at Technion-Israel Institute of Technology. In the past, she worked for surgical bio-polymeric materials start-up company (developing adhesives for hard tissues) and as a Research Chemist and Project Leader at Israel Chemicals Ltd. Her current research focuses on "Molecular modeling of materials and biomaterials, especially simulation of systems used for controlled drug release and tissue engineering".

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**Notes:**

Vignesh N et al., Res. Rev. J Mat. Sci. 2018, Volume 6
DOI: 10.4172/2321-6212-C3-020



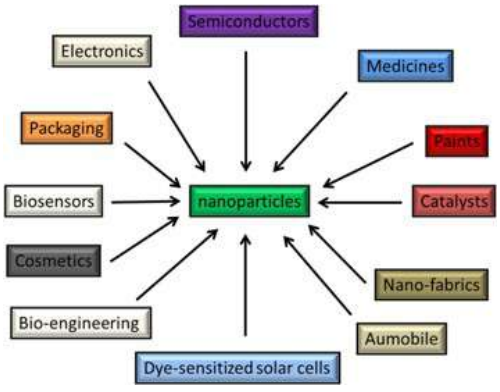
## Design and development of nanomaterials using induction plasma system and its application

**Vignesh N**[1] and **Justin C**[1]
[1]Matrix Nano, India

Induction plasma technology (IPS) is the new way of producing high purity nano-powders at an industrial scale, all this made possible by TEKNA Company, the leading producer of nanomaterial synthesizing machines. Not only being a means of producing high purity powders, IPS is known for having a clean heat source which lacks induced contaminants assuring high grade products. This complex technology is based on utilizing high voltage being passed through a coil with a conductor placed in between the coil to produce high amount of heat at the conductor due to the effect of electromagnetic induction. With flowing gas being used as the conductor, it will reach high temperature extremes due to ionization or the gas into a plasma. The most common gases used in this system include Argon, Hydrogen and Oxygen as carriers. The IPS machine uses micron sized powders as the feed which is then carried carried through the system by a carrier gas commonly being Argon which are then together heated up to extreme temperatures producing ionized metal oxides which are then subjected to a quenching gas which ensures homogenous nucleation. Several parameters are to be closely calculated and followed to ensure the desired nanoparticle size outcome. These include:

- Temperature
- Feed dispersion
- Gas composition
- Quenching gas
- Feed rate
- Carrier gas
- Feed rate
- Carrier gas temperature
- Torch temperature
- Raw material

Extensive research in induction plasma has made the technology better and more efficient than ever before in synthesis of nanomaterials.




### Recent Publications

1. D. Vollath, "Plasma synthesis of nanopowders," J. Nanopart. Res., 10, 39 (2008).
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3. M. Shigeta and A. B. Murphy, "Thermal plasmas for nanofabrication," J. Phys. D: Appl. Phys., 44, 174025 (2011)
4. B.M. Goortani, P. Proulx, S. Xue, and N.Y. Mendoza-Gonzalez, Controlling Nanostructure in Thermal Plasma Processing: Moving from Highly Aggregated Porous Structure to Spherical Silica Nanoparticles, Powder Technol., 2007, 175, p 22-32
5. B. Bora, B.J. Saikia, C. Borgohain, M. Kakati and A.K. Das, "Numerical investigation of nanoparticle synthesis in supersonic thermal plasma expansion," Vacuum, 85, 283 (2010)
6. Rycenga, M.; Cobley, C.M.; Zeng, J.; Li, W.Y.; Moran, C.H.; Zhang, Q.; Qin, D.; Xia, Y.N. Controlling the synthesis and assembly of silver nanostructures for plasmonic applications. Chem. Rev. 2011, 111, 3669–3712.

**Biography**

Vignesh N has majored in the field of nanotechnology specializing in design and development of nanomaterials. Based on this background he is now involved in the research and development work of multiple products which are based on nanotechnology. Backed by dozens of trials, his perseverance finally paid off as he was able to tailor specific experimental parameters for several nanomaterials which have already made their way to the market. With this research work, it is paving the way for a future with nanotechnology in it".

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**Notes:**







21st International Conference on

# Advanced Materials & Nanotechnology

September 04-06, 2018 | Zürich, Switzerland

# Young Researchers Forum Day 1

Clément Genet et al., Res. Rev. J Mat. Sci. 2018, Volume 6
DOI: 10.4172/2321-6212-C3-020



## Development of functionalized coating by sol-gel process on aluminium alloy

**Clément Genet**[1], **Marie-Joëlle Menu**[1], **Florence Ansart**[1], **Marie Gressier**[1] and **Olivier Gavard**[2]
[1]University of Toulouse, France
[2]Amphenol Socapex, France

The goal of this study is to develop an innovative coating in accordance with the environmental regulations REACH and RoHS. Innovation will consist in an original approach of the sol-gel process implementation. Compared to the current plating's, environmental unfriendly processes due to hazardous chemicals to health and environment, this innovative liquid process is very interesting to work on many different substrates. The formulation is designed according to the required properties of the coating, throughout an appropriate surface structuration. The originality of the approach is to develop a formulation with an adequate choice of precursors and fillers which bring simultaneously anticorrosion and electrical conductivity. The literature provides many sol-gel formulations, and the most suitable for complex shape parts are composed of both organic and inorganic precursors. They are named organic inorganic hybrid (OIH) sol-gel coating-1. Coating flexibility and anticorrosion properties are some of the properties provided by an OIH coating. In our study, organic and inorganic precursors are selected towards anticorrosion properties. Inhibitor is also added to sol-gel matrix-2 to improve the corrosion resistance. Some works have been performed on the influence of different fillers on the electrical properties of the polymer matrix-3, but the innovative study here is to combine the anticorrosion and electrical properties in a coating prepared by sol-gel route. To bring electrical properties to sol-gel coating, different fillers are taking on and studied. Influence of fillers natures, form factors and quantities are evaluated to find an optimum composition. Electrical, viscosity and hydrophobic characterization are accomplished to file fillers in function of their behavior in the sol-gel matrix. Structural and microstructural characterizations are performed by 3D optical microscopy and scanning electron microscopy. The chemical interaction between the sol-gel coating and the substrate is also deeply characterized and specially the durability of materials under corrosive conditions by coupling salt spray test, electrochemical impedance spectroscopy, nano scratch and nano indentation.

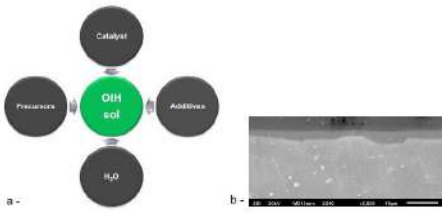



**Figure-1: (a)** OIH sol composition and (b) SEM micrography of OIH coatings on aluminium alloy substrate.

### Recent Publications

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2. Cambon J B, Esteban J, Ansart F, Bonino J P, Turq V, Santagneli S H, Santilli C V and Pulcinelli S H (2012) Effect of cerium on structure modifications of a hybrid sol-gel coating, its mechanical properties and anti-corrosion behavior. Materials Research Bulletin; 47(11): 3170-3176.
3. Zhang W, Blackburn R S and Dehghani-Sanij A A (2007) Effect of carbon black concentration on electrical conductivity of epoxy resin-carbon black-silica nanocomposites. Journal of Materials Science; 42(18): 7861-7865.

### Biography

Clément Genet is a PhD Student at University of Toulouse Paul Sabatier and Research Associate at CIRIMAT laboratory and Amphenol Socapex Company. He has obtained his Engineer's degree in Materials Science at ESIR, France and has a specialization with his Master's degree in Materials Science for Aeronautics and Aerospace at University of Toulouse, France. He has experience in the synthesis and characterization of nanostructured materials and coating for more particularly anticorrosion properties in aeronautic field.

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Tahmineh Forati et al., Res. Rev. J Mat. Sci. 2018, Volume 6
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## Developing super hydrophobic copper/graphene nano-platelets coatings by plasma spraying

**Tahmineh Forati[1], F Ben Ettouil[1], T Kaydanova[2], N Moghimian[2], C Moreau[1], M Pugh1** and **A Dolatabadi[1]**
[1]Concordia University, Canada
[2]Nanoxplore Inc., Canada

Water vapor condensation is frequently used as an effective method of transferring heat using drop-wise condensation on non-wetting surfaces demonstrating enhanced heat transfer when compared to film-wise condensation. The aim of this study is to develop hierarchical surface morphologies on superhydrophobic coatings with high water repellency and mobility using atmospheric plasma spraying (APS). The novelty of this work lies in the processing of the plasma sprayed copper/graphene nano-platelets (GNPs) composite coatings. Retention of the GNPs was made successful by controlling the plasma power and particle injection angle to minimize the temperature and consequently prevent the combustion of GNPs. Several coatings were developed with different surface morphologies. By isolating the effect of surface chemistry using a stearic acid treatment the significance and effect of the achieved morphologies on the wetting behavior of the coatings were investigated. Experimental results demonstrated that coatings produced by the APS process showed excellent water repellency and water mobility: water contact angles as high as 162° as well as water sliding angles less than 1° were achieved due to the hierarchical roughness attributed to the submicron size particles in the feedstock. Moreover, results indicated that Cu/GNPs is a promising surface coating to promote dropwise condensation of water in industrial conditions due to its robust chemical stability with the potential for scalable applications while maintaining low thermal resistance.

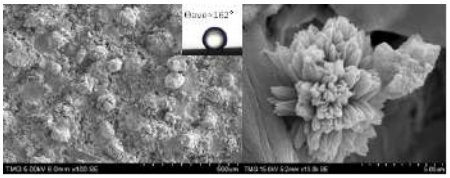


**Figure:** The SEM micrographs of the Cu-GNPs coating. Inset: a sessile drop of water on this surface

### Recent Publications

1. Daniel J Preston, Daniela L Mafra, Nenad Miljkovic, Jing Kong and Evelyn N Wang (2015) Scalable graphene coatings for enhanced condensation heat transfer. Nano Lett. 15(5):2902-2909.
2. Gun-Tae Kim, Su-Ji Gim, Seung-Min Cho, Nikhil Koratkar and Il-Kwon Oh (2014) Wetting-transparent graphene films for hydrophobic water-harvesting surfaces. Adv. Mater. 26(30):5166-5172.
3. Tong Y, Bohmb S and Song M (2013) Graphene-based materials and their composites as coatings. Austin J Nanomed Nanotechnol. 1(1):1-16.
4. Singh Raman R K, Chakraborty Banerjee P, Lobo DE, Gullapalli H, Sumandasa M, Kumar A, et al. (2012) Protecting copper from electrochemical degradation by graphene coating. Carbon N Y. 50(11):4040-40453.
5. David Ward, Ankur Gupta, Shashank Saraf, Cheng Zhang, Tamil Selvan Sakthivel, Swetha Barkam, Arvind Agarwal and Sudipta Seal (2016) Functional NiAl-graphene oxide composite as a model coating for aerospace component repair. Carbon 105:529-543.

### Biography

Tahmineh Forati has completed her PhD in Biomaterials Engineering at Islamic Azad University, Sciences and Research Branch, Tehran, Iran in 2014. She has completed her MSc in Biomaterials in 2009, followed by BSc in Material Science and Engineering at the same university. Currently, she is working as a Research Assistant at Concordia University, Canada. Her international experience includes various programs, contributions and participation in different countries for diverse fields of study. Her research interests reflect in her wide range of publications in various national and international journals.

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Amir Elsaidy et al., Res. Rev. J Mat. Sci. 2018, Volume 6
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# Novel carbon nanomaterials coated with CuO particles via electroless plating for nanothermite applications

**Amir Elsaidy[1], M. Gaber Zaky[1], Sherif Elbasuney[1], Ahmed M. Abdalla[2] , Rakesh P. Sahu[3], Ishwar K. Puri[2,3]** and **Mostafa Radwan[4]**
[1]School of Chemical Engineering, Military Technical College, Egypt
[2]Department of Engineering Physics, McMaster University, Canada
[3]Department of Mechanical Engineering, McMaster University, Canada
[4] British University in Egypt, Egypt

Carbon nanomaterials (CNMs), such as carbon nanotubes (CNTs) and carbon nanofibers (CNFs) can be employed as carriers for superthermite particles via coating or encapsulation. This study reports on the synthesis of copper oxide coated CNTs and CNFs via electroless plating which offer metallization with uniform distribution layer of copper. The copper coated CNTs and CNFs were annealed at 250°C to obtain copper oxide coated CNMs. The developed hybrid CNMs were characterised with TEM which demonstrated uniform coating with CuO particles. XRD diffractograms demonstrated highly crystalline CuO particles superimposed on the surface of CNMs. CuO coating can act as an effective oxidizer for aluminium particles in superthermite applications. The developed CuO-coated CNMs were effectively dispersed in isopropyl alcohol with aluminium particles (100 nm) using ultra sonic probe homogenizer. The developed hybrid nanothermite materials were effectively integrated and dispersed into molten TNT. Whereas CuO-coated CNFs/Al binary mixture demonstrated an increase in shock wave strength by 6.5% using kast test; CuO-coated CNTS/Al binary mixture demonstrated an increase in destructive effect of TNT by 15.5%. The superior performance of CuO-coated CNTs was ascribed to the fact that CNTs can offer extensive interfacial surface area of 700m$^2$/g. Consequently it could act as an ideal carrier for highly energetic particles.

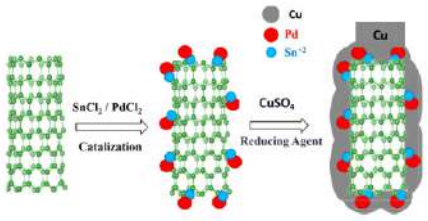



**Figure:** Schematic diagram of CNMs metallization with Copper

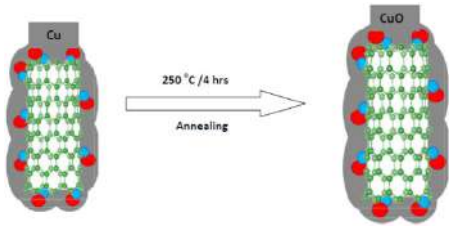



**Figure:** Schematic diagram of Copper oxide coated CNMs formation by annealing

## Recent Publications

1. X. Chen, J. Xia, J. Peng, W. Li, and S. Xie, "Carbon-nanotube metal-matrix composites prepared by electroless plating," Composites Science and Technology, vol. 60, pp. 301-306, 2000.
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3. Q.-L. Yan, M. Gozin, F.-Q. Zhao, A. Cohen, and S.-P. Pang, "Highly energetic compositions based on functionalized carbon nanomaterials," Nanoscale, vol. 8, pp. 4799-4851, 2016.
4. M. Keidar, Y. Raitses, A. Knapp, and A. Waas, "Current-driven ignition of single-wall carbon nanotubes," Carbon, vol. 44, pp. 1022-1024, 2006.
5. X. LIU, W.-l. HONG, F.-q. ZHAO, D.-y. TIAN, J.-x. ZHANG, and Q.-s. LI, "Synthesis of CuO/CNTs composites and its catalysis on thermal decomposition of FOX-12 [J]," Journal of Solid Rocket Technology, vol. 5, p. 019, 2008.

## Biography

Amir Elsaidy had graduated from military technical college, Egypt (chemical engineering branch). He has experience in preparations and developments in the field of chemical engineering and energetic materials by creating new pathways for improvements .My interesting's are in preparation and spectral performance evaluation of these materials. These materials were developed by granulation and subsequent pressing & their Spectral performance was conducted.

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Uliana Pinaeva et al., Res. Rev. J Mat. Sci. 2018, Volume 6
DOI: 10.4172/2321-6212-C3-020



## Functionalized track-etched PVDF membrane electrodes for heavy metal analysis in water

**Uliana Pinaeva[1], Marie-Claude Clochard[1], Emanuel Balanzat[2], Travis-Lee Wade[1], Travis-Cameron Dietz[3]** and **Mohamad Al-Sheikhly[3]**
[1]Ecole Polytechnique-Université Paris Saclay, France
[2]CIMAP, France
[3]University of Maryland, USA

Being a greatest earth's resource, water should be preserved. Its pollution effects on all living beings due to accumulation of toxic elements. Therefore, the needs of water quality monitoring are necessary to prevent potential contamination disasters. Currently, tolerable limits are in a few µg/L that requires sensitive, environmentally friendly, fast and on site instruments, which are able to analyze heavy metal concentrations in water. To fit the requirements, we are developing a portable electrochemical device based on the functionalized membrane electrodes. These membrane electrodes are made of track-etched functionalized nanoporous poly (vinylidene fluoride) (PVDF) membranes of 9 µm thickness covered with gold layers of 35 nm thickness on each side. To create nanoporous membranes, PVDF films were irradiated by swift heavy ions. Chemical etching reveals ion tracks into nanopores. For sub-micron pore diameters, the reactivity of remaining radicals formed during irradiation was found sufficient to initiate free-radical polymerization of vinyl (or allyl) monomers. This method allows any selective polymer issued from radical polymerization to be grafted onto pore walls of PVDF membranes. For instance, poly (acrylic acid) has shown a high selectivity toward $Pb^{2+}$ and $Cu^{2+}$ ions, poly (4-vinylpyridine) toward $Hg^{2+}$. Recently developed bis [2-(methacryloyloxy) ethyl] phosphate (B2MP) grafted inside the nanopores of PVDF membranes were found efficient for pre-concentration of $UO_2^{2+}$ from aqueous solutions. EPR, FESEM, FTIR were used to study radical content, morphology of the surface and presence of functional groups inside the nanopores. Voltammetry was used to demonstrate the sensitivity of such functionalized membrane electrodes in trace level. A first generation prototype exhibiting its own potentiostat, software and set of membrane electrode pads have been developed.

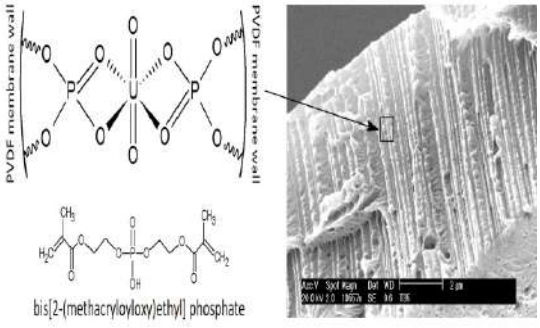



**Figure:** FESEM photo of cross section of B2MP functionalized track-etched PVDF membrane, fluence $10^9$ cm$^{-2}$ (right), and proposed configuration of $UO^{2+}$ trapping by phosphate groups of B2MP (left)

### Recent Publications

1. U Pinaeva, M C Clochard, E Balanzat, T L Wade, T C Dietz and M Al–Sheikhly Bis[2-(methacryloyloxy)ethyl] phosphate radiografted onto track-etched PVDF for uranium (VI) determination by means of cathodic stripping voltammetry Haz. Mat. 2018 (submitted) .

### Biography

Uliana Pinaeva has completed her Master's degree in Applied Physics at the ENS de Cachan. Currently, she is pursuing her PhD in the Laboratoire des Solides Irradiés at the Ecole Polytechnique. Her research interest focuses on "Functionalization of polymers by means of radiation grafting technique for heavy-metal ions extraction and their following analysis by voltammetry".

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21st International Conference on

# Advanced Materials & Nanotechnology

September 04-06, 2018 | Zürich, Switzerland

# Keynote Forum

## Day 2

Rodrigo Martins, Res. Rev. J Mat. Sci. 2018, Volume 6
DOI: 10.4172/2321-6212-C3-019

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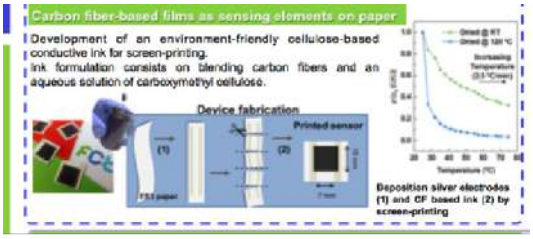


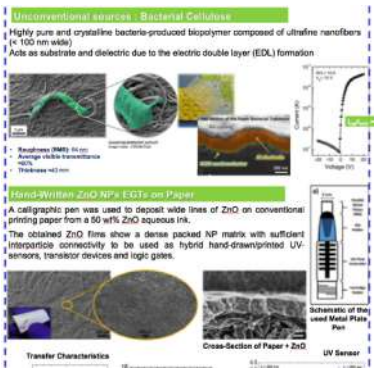
## Rodrigo Martins

*Universidade NOVA de Lisboa, Portugal*

## Driving flexible electronics by hybrid materials

Printable electronics and flexible electronics are the key areas of development world-wide once offer the potential to add functionality to everyday objects at very low costs that would be difficult with conventional technologies. This was pushed by the large success of organic electronics over the past few decades due to their attractive features such as low process temperatures, good mechanical flexibility, light weight and the possibility to use a wide range of substrates and being recyclable. Besides that we can prepare these devices using inexpensive solution processes over large areas. These benefits offered by printable and embedded electronics have been recognized in many sectors. Nevertheless the bottle neck here is the low electronic performances so far achieved. On the other hand, metal oxide electronic materials are quite attractive since they are reliable, able to be process at low temperature and present excellent electronic performance at 1-2D scales, providing so a large variety of different and possible applications, going from low costs to high complex systems able to compete with silicon in applications like transparent electronics, optoelectronics, magneto electronics, photonics, spintronics, thermo-electrics, piezoelectrics, power harvesting, hydrogen storage and environmental waste management. In terms of production techniques, RF magnetron sputtering has been well established and has demonstrated high performance devices, as ALD. However, these require complex equipment's, especially if we are targeting low cost applications. In contrast, the solution process has many advantages such as large-area deposition, roll-to-roll capability and easy control of composition, atmospheric processing and low cost. In parallel, we have been observing a rapid and growing interest concerning the utilization of biological materials for a wide range of applications. One of the most representative example is cellulose, not only in the form of raw material mainly for pulp and paper production, but also in the development of advanced materials/products with tailor-made properties, especially the ones based on nanostructures, for low cost and disposable applications. In this presentation, we will review the main applications of vegetal and bacterial cellulose in electronics, either as substrate (passive) or as a real electronic material (active), taking into account the expertise as well as the major developments already done at CENIMAT|i3N in the area of paper electronics.



## Recent Publications

1. António T Vicente, Andreia Araújo, Manuel J Mendes, Daniela Nunes, Maria J Oliveira, Olalla Sanchez-Sobrado, Marta P Ferreira, Hugo Águas, Elvira Fortunato and Rodrigo Martins (2018) Multifunctional cellulose-paper for light harvesting and smart sensing applications. Journal of Materials Chemistry C 6(13):3143-3181.
2. I Cunha, R Barras, P Grey, D Gaspar, E Fortunato, R Martins and L Pereira (2017) Reusable cellulose based hydrogel sticker film applied as gate dielectric in paper electrolyte gated transistors. Advanced Functional Materials 27(16):1606755.
3. A Araujo, A Pimentel, M J Oliveira, M J Mendes, R Franco, E Fortunato, H Águas and R Martins (2017) Direct growth of plasmonic nano rod forests on paper substrates for low-cost flexible 3D SERS platforms. Flexible and Printed Electronics 2(1):0140016.
4. R Barras, I Cunha, D Gaspar, E Fortunato, R Martins and L Pereira (2017) Printable cellulose-based electro conductive composites for sensing elements in paper electronics. Flexible and Printed Electronics 2(1):014006.
5. A Pimentel, A Araujo, B J Coelho, D Nunes, M J Oliveira, M J Mendes, H Aguas, R Martins and E Fortunato (2017) 3D ZnO/Ag surface-enhanced Raman scattering on disposable and flexible cardboard platforms. Materials 10(12):1351.

## Biography

Rodrigo Martins is a full time Professor and Head of Materials Science Department, Faculty of Science and Technology at New University of Lisbon. He is the Director of The Centre of Excellence in Microelectronics and Optoelectronics Processes of Institute of New Technologies; President of the European Academy of Science; Head of the Group of Materials for Electronics, Optoelectronics and Nanotechnologies of the Research Materials Center of the Institute for Nanostructures, Nano-modeling and Nanofabrication, CENIMAT/I3N; Chair of the European Committee Affairs of European Materials Research Society and the Global Leadership and Service Award Committee of the International Union of Materials Research Societies; Member of the Journal Management Committee for the *Journal NPJ 2D Materials and Applications*. His area of expertise is related to functional materials for electronics and energy applications. He pioneers worldwide work in the field of Transparent Electronics and is one of the Inventors of Paper Electronics.

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**Notes:**

Jhinhwan Lee, Res. Rev. J Mat. Sci. 2018, Volume 6
DOI: 10.4172/2321-6212-C3-019

21st International Conference on

# Advanced Materials & Nanotechnology

September 04-06, 2018 | Zürich, Switzerland



## *Jhinhwan Lee*

*KAIST, South Korea*

## Switching iron-based superconductivity with spin current

We have explored a new mechanism for switching magnetism and superconductivity in a magnetically frustrated iron-based superconductor using spin-polarized scanning tunneling microscopy (SPSTM). Our SPSTM study on single crystal $Sr_2VO_3FeAs$ is made up of alternating self-assembled FeAs monolayer and $Sr_2VO_3$ bilayers shows that a spin-polarized tunneling current can switch the FeAs-layer magnetism into a non-trivial C4 (2×2) order, which cannot be achieved by thermal excitation with unpolarized current. Our tunneling spectroscopy study shows that the induced C4 (2×2) order has characteristics of plaquette antiferromagnetic order in the Fe layer and strongly suppresses superconductivity. Also, thermal agitation beyond the bulk Fe spin ordering temperature erases the C4 state. These results suggest a new possibility of switching local superconductivity by changing the symmetry of magnetic order with spin-polarized and unpolarized tunneling currents in iron-based superconductors. We have also performed high-resolution quasiparticle interference (QPI) measurements, self-consistent BCS-theory-based QPI simulations and a detailed e-ph coupling analysis to provide direct atomic-scale proofs of enhancement of iron-based superconductivity due to the BCS mechanism based on forward-scattering interfacial phonons.

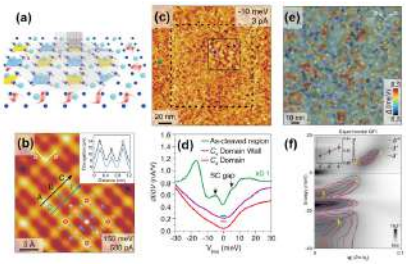



**Figure-1: (a), (b)** Atomic scale evidence of plaquette antiferromagnetic order induced in FeAs layer of $Sr_2VO_3FeAs$ by injection of spin-polarized tunneling current and (c), (d) resultant local switching-off of iron-based superconductivity. (e)-(f) Quasiparticle-interference signature of enhancement of iron-based superconductivity due to $C_2$ defects locally enhancing e-ph coupling with the forward-scattering interfacial phonons.

## Recent Publications

1. Jin-Oh Jung, Jhinhwan Lee, et al. (2017) Versatile variable temperature and magnetic field scanning probe microscope for advanced material research. *Review of Scientific Instruments;* 88: 103702.
2. Jhinhwan Lee (2017) Real-time digital signal recovery for a multi-pole low-pass transfer function system. *Review of Scientific Instruments;* 88: 085104.

## Biography

Jhinhwan Lee has completed his Bachelor's degree from Seoul National University (1995). After obtaining his PhD degree from the same institution, he joined Professor J C Davis' Laboratory at Cornell University as a Postdoctoral Associate and was appointed Research Associate in 2007. He went to Korea Advanced Institute of Science and Technology as Assistant Professor and began his life-long investigations on magnetism and unconventional superconductivity. He has received Korea Physical Society Bombee Physics award in 2004 and the Albert Nelson Marquis lifetime achievement award in 2018. His works includes bandgap engineering of nanotube published in nature; scanning probe microscope for advanced material research is published as a cover paper in *Review of Scientific Instruments (*2017) and switching iron-based superconductivity using spin current published in Physical *Review Letters* with Viewpoint (2017).

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21st International Conference on

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September 04-06, 2018 | Zürich, Switzerland

# Scientific Tracks & Abstracts

# Day 2

# Day- 2

## SESSIONS

**Advanced Functional Materials | Polymers Scicence and Engineering | Advanced Optical Materials | Advancement in Nanomaterials Science and Nanotechnology | Coating and Surface Engineering**

**Chair: Dieter M Gruen,** Dimerond Technologies, USA
**Chair: Yutaka Oyama,** Tohoku University, Japan

## SESSION INTRODUCTION

**Title: Relation between internal friction and fatigue**
**Wolfgang Gräfe,** Private Scholar, Germany

**Title: Improvement of CFRP electrical conductivity by applying nano enabled products containing carbon nanotubes**
**Anna Boczkowska,** Warsaw University of Technology, Poland

**Title: Boron carbide-based ceramics for thermostructural application: Sintering by SPS and mechanical performances**
**Alexandre Maître,** University of Limoges, France

**Title: Synthesis of 2D layered semiconductor GaSe for the application of Terahertz non-destructive inspection**
**Yutaka Oyama,** Tohoku University, Japan

**Title: Solution deposition of Cu doped Co3O4 for electrooxidation of glucose**
**Mahabubur Chowdhury,** Cape Peninsula University of Technology, South Africa

**Title: Cu metal/Mn phthalocyanine organic sprinter faces atop Co with high spin polarization at room temperature**
**Wolfgang Weber,** Université de Strasbourg, France

**Title: Producing of aluminium matrix composite wire**
**Janos Dobranszky,** Budapest University of Technology and Economics, Hungary

**Title: Chitosan asiaticoside nanoparticles synthesized from Centella asiatica for glioma therapy**
**V Gayathri,** Jawaharlal Nehru Tropical Botanic Garden and Research Institute, India

**Title: Investigation on weldability behavior of chromium-free nickel filler with stainless steel AISI-304**
**Nataraj J.R,** R.V.College Of Engineering, India

**Title: Multiferroic Properties and Structural Characterizations in Mn and Cr Doped 0.9BiFeO3-0.1BaTiO3 Compositions**
**Ricardo A. M Gotardo,** Technological Federal University of Paraná, Brazil

**Title:** **Synthesis of Pt-WO3@W/GNs as a bifunctional electro-photo catalyst for catalyzing methanol oxidation and oxygen reduction reaction**
**Shen Lin,** Fujian Normal University, China

**Title:** **Low-cost printable hybrid hetero structures for energy harvesting and lighting**
**Sylvain G. Cloutier,** Ecole de Technologie Superieure, Canada

**Title:** **New generation of Colorcoat Prisma®**
**Anna Lewandowska,** Tata Steel UK Limited, United Kingdom

Wolfgang Gräfe, Res. Rev. J Mat. Sci. 2018, Volume 6
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## Relation between internal friction and fatigue

**Wolfgang Gräfe**
Private scholar, Germany

The background of internal friction in solids and their fatigue may be theoretically described by a migration of unspecified items which is caused by the action of mechanical stress gradients. From the two resulting formulae a relation between the fatigue and the background of internal friction has been deduced. With this relation the statistical distribution of the fatigue data can be explained to some extent. Data published by Ravilly in 1938 demonstrates the correctness of this theoretical result. For the case that temperature gradients are the reason for the migration of the unspecified items, a formula results which is similar to the above mentioned one for the fatigue. With the statistical analysis of the data for fatigue and the total internal friction it could be possible to answer the question which physical quantity is the cause of fatigue.

**Recent Publications:**

1. Gräfe W (2000) The effect of the diffusion of interstitial atoms on strength loss of steels. International journal of fatigue 22: 179-188.
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5. Gräfe W (2015) Time-dependent mechanical properties of solids: Relaxation of stress and density, strength (fatigue). Materials Science Foundations 78:1-180.

### Biography

Wolfgang Grafe has completed his Degree in Physics at the Humboldt-Universitat in Berlin (GDR) in 1962. In the following years, he worked with semiconductors and semiconductor surfaces at the Akademie der Wissenschaften in Berlin. With the results of those investigations, he also received the degree Dr. rer. nat. (PhD) at the Humboldt-Universität in 1969. From 1971, he worked in the field of mechanical properties of mineral glasses. With the results of these investigations he has completed his Dr. sc. nat. degree at the Akademie der Wissenschaften in Berlin in 1984. He was employed in a Federal Administrative Authority in Berlin from 1991 till his retirement in 2001.

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Anna Boczkowska et al., Res. Rev. J Mat. Sci. 2018, Volume 6
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## Improvement of CFRP electrical conductivity by applying nano enabled products containing carbon nanotubes

**Anna Boczkowska** and **Paulina Latko-Durałek**
Warsaw University of Technology, Poland

Due to their low weight and high mechanical performance, carbon fiber reinforced polymer (CFRP) is used in the aerospace, automotive and defense industries. In comparison to metal parts, they can reduce total mass but cannot reduce electrostatic discharge or protect against lightning strikes. Therefore, a new challenge is to find a way to improve the electrical conductivity of CFRP, especially throughout its thickness. The most promising idea is to use carbon nano tubes (CNTs), which show not only high electrical conductivity but also good thermal conductivity and mechanical strength, while maintaining low density. There are different approaches to introducing CNTs into CFRP in manufacturing. One such approach is mixing the resin with CNT powder before performing the infusion. However, the significant increase of resin viscosity in the presence of CNTs makes the infusion process difficult. Another way is to bond CNTs covalently onto carbon fabrics. A more convenient way is to apply nano-enabled products such as thermoplastic non-woven fabrics containing CNTs (CNT-doped veils). The first manufacturing method involves the production of fibers and their thermal bonding; the second way is direct melt blowing of thermoplastic polymers doped with CNTs. Implementation of both types of non-woven fabrics in CFRP as inter layers by pre-preg and resin infusion results in good impregnation. When compared to the reference CFRP, the addition of CNTs increases the electrical volume conductivity throughout the panel thickness by as much as 350%. The obtained results are very promising for the further application of CFRP with CNTs as novel, lightweight and conductive structures for the replacement of metallic parts in many industrial sectors.

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### Biography

Anna Boczkowska is an Associate Professor in the Faculty of Materials Science and Engineering at Warsaw University of Technology in Poland. She has completed her Graduation from the same faculty in 1989 and completed her PhD in 2000 and DSc in 2011. Her scientific experience is related to the processing and structure of polymer matrix composites, nano composites and smart materials and industrial background of over 15 years in the development and application of polymers and composites. She is a member of many international organizations (e.g., ACS, AAAS, and SPIE) and author of numerous scientific publications, books and patents.

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**Notes:**

Alexandre Maître et al., Res. Rev. J Mat. Sci. 2018, Volume 6
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## Boron carbide-based ceramics for thermostructural application: Sintering by SPS and mechanical performances

**Alexandre Maître, G Antou, N Pradeilles** and **R Belon**
University of Limoges, France

Boron carbide is a promising ceramic in the armor field and in nuclear reactors due to its low weight, its high hardness and its high capacity to absorb neutrons. These excellent properties result from unusual characteristics of B-B and B-C chemical bond. In the literature, there is a general agreement about the existence of solid solubility of carbon with the stable phase BxC and a large range extending from 8 to 20 at.% C. So, the mechanical properties of boron carbide monoliths depend on their chemical composition (i.e. carbide stoichiometry, presence of secondary phases such as free carbon) and on microstructural characteristics (i.e. porosity level, grain size). In the present work, fully-dense boron carbide monoliths exhibiting fine microstructure (i.e. submicrometric grain size) are shaped and sintered by spark plasma sintering. Two different commercial powder batches, exhibiting different stoichiometries and various amounts of secondary phases are used. Their chemical composition is well-defined by coupling different methods (TEM, XRD, IGA) and are correlated with their mechanical properties, characterized from meso- to macro-scopic scales by nano-indentation and ultrasonic pulse echography. The presence of secondary phases (graphite and boric acid) is noticed in various proportions in each powder batch. Their effect on the mechanical features of the corresponding boron carbide-based ceramics has been investigated. So, if the boric acid disappears during the sintering step, the graphite remains. However, for the considered amounts of graphite (lower than 1 wt.%), the low variation in graphite content have no significant effect on hardness and elasticity. At the opposite, the presence of oxygen in solid solution, leading to a boron oxycarbide phase, induces a decrease of both hardness and elasticity.

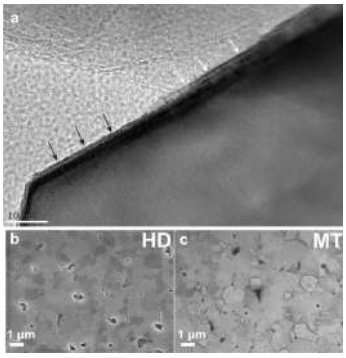



**Figure 1:** TEM observation of a particle of boron carbide (batch HD) exhibiting free carbon under the graphite form (indicated by the white arrows) and an amorphous layer (black arrows).

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## Biography

Alexandre Maître is a Professor at IRCER at Limoges in France. His thesis diploma was devoted to the Kinetic and Thermodynamic aspects of the Synthesis of Transition Metal Carbides by Carbothermal Reduction. In 2000, he has obtained a permanent position as CNRS Researcher at the Laboratory of Chemistry of Inorganic Solid at Nancy to develop investigations concerning the thermodynamic modeling, the electrochemical behavior in corrosive environment and the metallurgical aspects of lead-based alloys. Further, he became Assistant Professor in IRCER to implement research activities about the elaboration by polymer derived ceramics route and the mechanisms of sintering of high temperature ceramics. His scientific production (h index: 22) is now composed of 82 publications in international journals, 25 invited conferences, 98 oral communications, 3 chapters of books and 3 grants.

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**Notes:**

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## Synthesis of 2D layered semiconductor GaSe for the application of Terahertz non-destructive inspection

**Yutaka Oyama**
Tohoku University, Japan

Terahertz (THz) wave has both superior characteristics of radio wave and light, in which high permeability for non-polar materials and efficient reflection from metal surface are principal features. Thus, THz wave reflected from the opaque coated metal surface can be used for nondestructive testing (NDT). In addition, specific inter molecular vibrations (finger print spectra) of soft and hard materials are appeared in THz frequency region. We have developed various THz wave generators by careful control of lattice vibrations in semi conducting GaSe crystals. THz wave has low quantum photon energy, thus it is safe for human tissues even for radiation. We have established a data base of terahertz permeability characteristics for industrial materials and successfully constructed non-destructive THz diagnosis of building blocks, polymers, insulated copper cable and hot-dip galvanized steel sheet, etc. For the efficient THz light sources, two-dimensional (2D) layered GaSe has been attracted much interest because of its superior crystallographic, optical features and even for spintronics. Layered crystals combine thin sheets by out-of-plane Vander Waals interactions. For the use of practical applications, mechanical strength needs to be improved. However, no direct experimental determination has been performed up to now for Vander Waals bonding energy. In our group, a precise tensile testing machine was constructed for the quantitative determination of the inter layer Vander Waals bonding force. In this study, low temperature liquid phase growth of GaSe and its characterization are shown with the improvement of Vander Waals bonding energy by the addition of Te and In. Then, some killer applications of THz wave for the health evaluation of infrastructures will be shown.

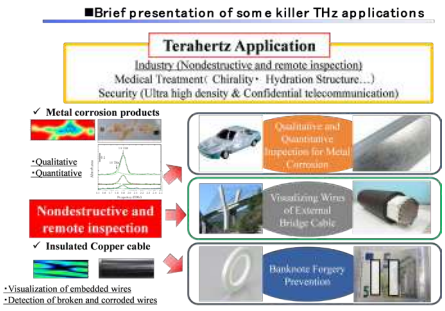



Figure 1 Some examples of THz killer applications based on our THz light source technologies

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## Biography

Yutaka Oyama has completed his BS, MS and PhD degrees in Electronics at Tohoku University, Japan. He was a Researcher with the Semiconductor Research Institute (SRI) in Japan and became a Senior Researcher with SRI. He was a Group Leader of the Nishizawa Teraherz Project of the Research Development Corporation of Japan (JRDC). He has been an Associate Professor and Professor of Materials Science and Engineering, Graduate School of Engineering, Tohoku University. He was a Visiting Researcher with IHP (Institut für Halbleiterphysik) at Frankfurt (Oder) Germany, and also EPFL (École Polytechnique Fédérale de Lausanne) at Lausanne Swiss. He is the author or co-author of over 300 international journals and conference publications on material science and its application for ultrafast semiconductor devices.

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**Notes:**

Mahabubur Chowdhury et al., Res. Rev. J Mat. Sci. 2018, Volume 6
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# Solution deposition of Cu doped $Co_3O_4$ for electrooxidation of glucose

**Mahabubur Chowdhury**[1], **Micaela Harry**[1], **Franscious Cummings**[2] and **Christopher Arendse**[2]
[1]Cape Peninsula University of Technology, South Africa
[2]University of the Western Cape, South Africa

One of the major causes of death and disability in the world is due to diabetes mellitus. The frequent testing of physiological blood glucose levels to avoid grave emergencies is vital for the confirmation of effective diabetic treatment. The current glucose sensors that are being used by diabetic patients are glucose oxidase sensors. However, due to problems associated with fabrication of enzymatic glucose sensors, non-enzymatic glucose sensors have been of focus recently. In this study, a simple solution-based deposition process has been utilized to fabricate a Cu doped $Co_3O_4$ electrode for non-enzymatic glucose detection. The substitution of Cu into the $Co_3O_4$ host lattice resulted in an enhanced electrochemical performance compared to the pristine $Co_3O_4$ as was measured from the Hall Effect measurement. The sensor exhibited two distinctive linear ranges covering upto 7.6 mM at an applied potential of +0.65 V vs. Ag/AgCl in 0.1 M NaOH solution. The sensor depicted good repeatability (RSD of <10%), stability and reproducibility (RSD of <10%). The sensitivity of the sensor was determined to be 1333 µA/cm2 mM (lower concentration range) and 141 µA/cm$^2$ mM (upper concentration range), with a lower detection limit of 0.15 µM (S/N=3). The as prepared electrode showed a response time of <10 seconds and was very selective towards glucose in the presence of various interference species (Figure-1). The ease of fabrication, good electrochemical activity and good inter and intra electrode reproducibility makes this electrode a promising candidate for non-enzymatic glucose detection.

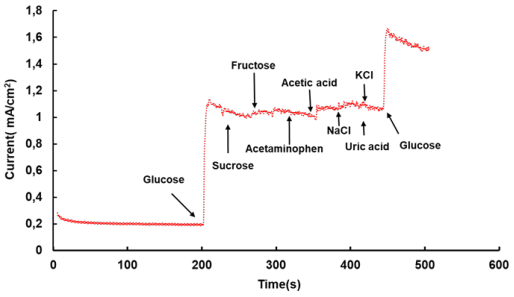



**Figure-1:** Amperometric response of the sensor in the presence of glucose and other interfering species.

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## Biography

Mahabubur Chowdhury has received a Doctoral degree in Chemical Engineering and is currently a Senior Lecturer in the Department of Chemical Engineering at Cape Peninsula University of Technology. His research is on advanced functional materials for bio sensing and water treatment. His interest is on the relationship of electronic structure and ionic transport properties in semiconductor electrodes. He has published many journal articles, conference proceedings, book chapter and patent.

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Wolfgang Weber et al., Res. Rev. J Mat. Sci. 2018, Volume 6
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## Cu metal/Mn phthalocyanine organic sprinter faces atop Co with high spin polarization at room temperature

**Wolfgang Weber[1], E Urbain[1], F Ibrahim[1], M Studiarnek[1], F Ngassam[1], L Joly[1], J Arabski[1], F Scheurer[1], M Alouani1, E Beaurepaire1, S Boukari1, M Bowen[1], F Bertran[2], P Le Fèvre[2], G Garreau3 and Denys P Wetzel[3]**
[1]IPCMS-CNRS France
[2]Synchrotron SOLEIL, France
[3]IS2M, Université de Haute-Alsace - CNRS, France

Spin polarized charge transfer between a ferromagnetic metal and a molecule can magnetize the molecule atoms and generate an interface with a high spin polarization of electronic states at the Fermi level at room temperature. Similarly, the Mn-phthalocyanine molecule's central paramagnetic site Mn can couple magnetically to a Co layer thanks to interlayer exchange coupling upon separating both interfacial constituents with an ultra-thin non-magnetic Cu spacer. However, the large spin polarization at the Cu/Mn-phthalocyanine sprinter face atop Co has so far only been predicted. We experimentally demonstrate this high spin polarization at room temperature through spin resolved photo emission spectroscopy measurements on the prototypical system Co (001)/Cu/Mn-phthalocyanine. Surprisingly, we find that the Cu thickness dependence of the spin polarization remains essentially constant up to 10 monolayers, which is inconsistent with the interlayer exchange coupling description of magnetic coupling between the Co layer and the molecule's Mn site. *Ab-initio* calculations account for this fundamental discrepancy by showing that the top most Cu layer before Mn-phthalocyanine adsorption is already significantly spin-polarized and contributes to the formation of the Cu/Mn-phthalocyanine sprinter face atop Co. We thus find that this example of a non-magnetic metal/molecule organic sprinter face atop a ferromagnet is advantageously impervious to variations in the non-magnetic metal layer thickness as expected from an interlayer exchange coupling description of its formation. Our results open a route toward integrating electronically fragile molecules within organic sprinter faces and electrically manipulating molecular spin chains using the well-documented spin-transfer torque properties of ferromagnetic metal/non-magnetic metal bilayers.

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1. F. Djeghloul, F. Ibrahim, M. Cantoni, M. Bowen, L. Joly, S. Boukari, P. Ohresser, F. Bertran, P. Le Fèvre, P. Thakur, F. Scheurer, T. Miyamachi, R. Mattana, P. Seneor, A. Jaafar, C. Rinaldi, S. Javaid, J. Arabski, J.-P. Kappler, W. Wulfhekel, N.B. Brookes, R. Bertacco, A. Taleb-Ibrahimi, M. Alouani, E. Beaurepaire, W. Weber, Sci. Rep. 2013, 3, 1272.
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4. F. Djeghloul, G. Garreau, M. Gruber, L. Joly, S. Boukari, J. Arabski, H. Bulou, F. Scheurer, A. Hallal, F. Bertran, P. Le Fèvre, A. Taleb-Ibrahimi, W. Wulfhekel, E. Beaurepaire, S. Hajjar-Garreau, P. Wetzel, M. Bowen, W. Weber, Carbon 2015, 87, 269.
5. F. Djeghloul, M. Gruber, E. Urbain, D. Xenioti, L. Joly, S. Boukari, J. Arabski, H. Bulou, F. Scheurer, F. Bertran, P. Le Fèvre, A. Taleb-Ibrahimi, W. Wulfhekel, G. Garreau, S. Hajjar-Garreau, P. Wetzel, M. Alouani, E. Beaurepaire, M. Bowen, W. Weber, J. Phys. Chem. Lett. 2016, 7, 2310.

### Biography

Wolfgang Weber has completed his PhD at RWTH Aachen, Germany during 1988-1992. He has completed his Postdoctoral studies and worked as a Senior Scientist at IBM Ruschlikon, Switzerland during 1993–2002. Since 2002, he is working as a Professor at University of Strasbourg. During 2007-2014, he was the Leader of the Department of Surfaces and Interfaces at the IPCMS. Currently, he is mainly working on the Magnetism of Thin Films and has great expertise in Spin Polarized Electron Spectroscopies.

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Janos Dobranszky, Res. Rev. J Mat. Sci. 2018, Volume 6
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## Producing of aluminium matrix composite wire

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MTA–BME Research Group for Composite Science and Technology, Hungary

Continuous fibre reinforced aluminium matrix composite wires were perspective materials as reinforcing core wire whether in electrical conductors or preferentially reinforced castings. Since the last years of the 2nd millennium composite cores were developed as reinforcement instead of a steel core in the high-tension electrical conductors. The much lower thermal expansion and the much higher specific strength were their advantages. Actually the leading type between these special products is the aluminium conductor composite core (ACCC) cable, in which the reinforcing is made of polymer composite tube that is filled with carbon fibre. Another type of low sag electric conductors is the ACCR cable (aluminium conductor composite reinforced), in case of that high strength steel or invar alloy core wires are replaced by aluminium matrix, alumina fibre reinforced composite wires. In the long-term practice, only two solutions were successfully applied for producing aluminium matrix composite wires. The first one is the 3M's ultrasonic-assisted infiltration and the second one is the Blucher's process. This last one applies continuous infiltration with gas pressure, but only the first infiltration is used on an industrial scale. The most critical step of the Blücher's process is that, the reinforcing fibre roving is pulled across the molten aluminium containing gas-pressure system. The Blucher's process was developed at the Metal Matrix Composite Laboratory of the Northeastern University (Boston MA, USA), but in 2005 the laboratory was transferred to Budapest University of Technology and Economics. The article describes those results, which were achieved in the new working period of the Metal Matrix Composite Laboratory.

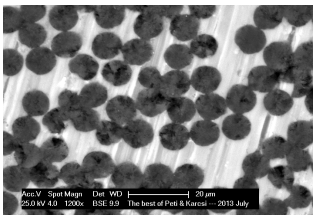


**Figure:** Cross section of a carbon fibre reinforced aluminium matrix composite wire

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### Biography

Janos Dobranszky is working as a Scientific Advisor in the common research group for composite science and technology at the Hungarian Academy of Sciences and Budapest University of Technology and Economics. He is a Mechanical Engineer and International Welding Engineer. Since 2015, he is a Habilitated Doctor of the Faculty of Mechanical Engineering of BME and Doctor of the Hungarian Academy of Sciences. His main research field interests are Metal Matrix Composites, Biomaterials and Biocomposites, Weldability of Stainless Steels, Failure Analysis of Wood cutting Band Saw Blades. He is the Hungarian Delegate in the Commission VI of the International Institute of Welding.

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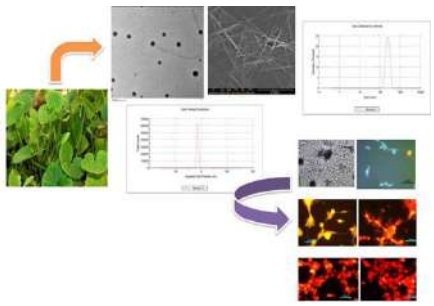
V Gayathri et al., Res. Rev. J Mat. Sci. 2018, Volume 6
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## Chitosan asiaticoside nanoparticles synthesized from *Centella asiatica* for glioma therapy

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Jawaharlal Nehru Tropical Botanic Garden and Research Institute, India

*Centella asiatica* is a high value medicinal plant widely distributed in the tropical and sub-tropical regions. The main active principles are asiaticoside and madecassoside. Both these compounds have wide spectrum of biological activities. The plant is famous in the label of memory booster and it shows neuropharmacological activity. The brain targeted delivery of a drug is very challenging. Previous studies have shown that the penetrability of drug inside the brain is limited due to the presence of defensive mechanism of brain. Free diffusion transposition through the interstitium of the brain is restricted by complex anatomy of blood brain barrier (BBB). The poor solubility and low penetrability of a drug into the brain is the major drawback in the neuropharmacology related studies. To overcome these limitations nanovehicles were used. To enhance the permeability of a drug into the site of action was performed using nano delivery systems were developed. The brain permeability is a risk factor for a drug to exhibit therapeutic effects at a target site. The main objective of our study focuses on the development of a novel drug-based nanoparticle for the effective brain targeted delivery. Ionic gelation method was used for the encapsulation of asiaticoside into the chitosan alginate nanoparticle. Physicochemical and Biological characterization: The physical and chemical characterization study was done by Fourier transform infrared (FTIR), size distribution measurements using dynamic light scattering (DLS), surface morphology by scanning electron microscopy, internal structure by transmission electron microscopy and nature of the particle were analyzed by X-ray diffraction. The thermal characteristics were studied using thermo gravimetric analysis (TGA), differential scanning calorimetry (DSC) and differential thermal analysis (DTA). Interfacing the nanoparticles with glioma cells showed significant death of the cells. The work concludes that Chitosan asiaticoside nanoparticles are potential remedy for the second level treatment of glioma.



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### Biography

V Gayathri is a Senior Scientist at Phytochemistry and Phytopharmacology Division of Jawaharlal Nehru Tropical Botanic Garden and Research Institute, Thiruvananthapuram, Kerala, India. She has obtained her Bachelors' and Masters' in Biochemistry from Bharathidasan University, Tamil Nadu, India. She has obtained her PhD from Jawaharlal Nehru Tropical Botanic Garden and Research Institute (formerly Tropical Botanical Garden and Research Institute) and Rajiv Gandhi Centre for Biotechnology, Trivandrum, India. She has been engaged in various research activities as Post-Doctoral Fellow in Nano- Material Chemistry at Biomedical Technology, Sree Chitra Tirunal Institute for Medical Sciences and Technology, India. Her field of expertise includes toxicological profiling of various materials/drugs/nanoparticles on various cell types and tissue engineering with several bio materials. She has 10 years of experience in the field of nano material chemistry and toxicology and her area of specialization is green nano chemistry. She has 20 research papers to her credit in peer reviewed journals.

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Nataraj J R et al., Res. Rev. J Mat. Sci. 2018, Volume 6
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## Investigation on weldability behavior of chromium-free nickel filler with stainless steel AISI-304

**Nataraj J R**[1], **K Koushik**[1], **Krishna M**[1] and **Karthik S B**[2]
[1]R V College Of Engineering, India
[2]Dayananda Sagar University, India

Two novel Cr-free nickel based welding filler rods were fabricated and used to weld austenitic grade stainless steel 304 (SS304) by tungsten inert gas (TIG) welding. Two welding wires designated as 3S (without Mn) and 4N (with 2% Mn) of %wt composition 43.499Ni, 25Fe, 10Mo, 10Cu, 10Co, 0-2 Mn, 1Ti, 0.5Al and 0.001C were fabricated and welded to SS304. Comparative studies of the joints welded by these two filler rods are presented. The weld joints were characterized for microstructure, mechanical and fracture properties. The microstructure of the weld interface showed presence of TiC and MoC precipitates within the grains and along the grain boundaries which is attributed for its strength of the weld joints. The Unmixed zone in the joint welded by 3S filler rod is wider than that welded with 4N filler rod. Presence of 2% Mn in 4N filler rod promotes the formation of γ' (gamma prime) precipitates and hence may be responsible for better joint strength than joints welded by 3S filler rod. Tensile tests results showed joint strength due to 4N filler rod is marginally superior (by 3.5%) to joints welded by 3S filler rod. However the ductility of the joint welded by 4N filler rod was lower by 6% compared to the joint welded by 3S filler rod. The hardness across the weld joints showed softer heat affected zone (HAZ) and hence is susceptible for failure during mechanical loading. The joint welded with 4N filler rod underwent significant amount of plastic deformation before failure. The joints welded with both the filler rods showed ductile mode of failure.

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3. Nataraj J R, G R Rajkumar, M Krishna, H N Narasimhamurthy and Keshavamurthy Y C (2014) Investigation of tensile and bending behavior of aluminum based hybrid fiber metal laminates. Procedia. Materials Science 5:60-68.
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### Biography

Nataraj J R is an Associate Professor in the Mechanical Department at R V College of Engineering, Bengaluru. He has more than 12 years of teaching and research experience and two years of industrial experience. He has completed his ME at University of Applied Sciences, Wildau, Berlin, Germany with scholarship grants from prestigious DAAD in the year 2003-05. He has completed his Doctoral degree at Kuvempu University, Karnataka, India in 2014 in the field of Cr-free welding and new materials development. He has 27 research publications and is a member of several societies such as ISSS, ISTE, ISSE, ASM, and IEI. He is also a Reviewer/Editorial Board Member for several national and international journals. His research areas are Stainless Steel Welding, New Materials Development, Composite Materials, Heat Treatment, Thin Film Sensors, Inter Metallic and Renewable Energy.

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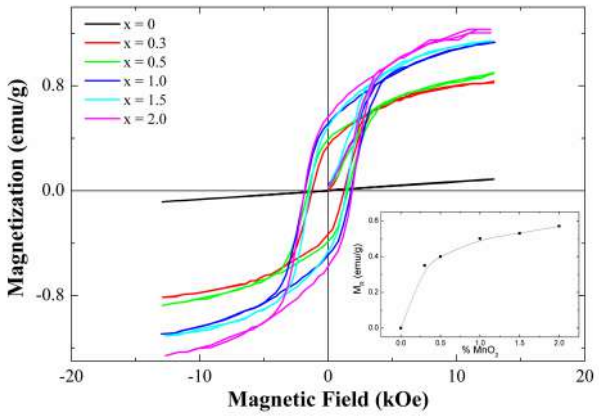
Ricardo A M Gotardo et al., Res. Rev. J Mat. Sci. 2018, Volume 6
DOI: 10.4172/2321-6212-C3-020



# Multiferroic properties and structural characterizations in Mn and Cr doped $0.9BiFeO_3$-$0.1BaTiO_3$ compositions

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Bismuth ferrite ($BiFeO_3$; BFO) is one of the most studied multiferroic materials, mainly due to its reported magnetoelectric properties at room temperature, potential use in nonvolatile memory applications and developments in the fundamentals of solid state physics. BFO ferroelectric and antiferromagnetic phase transitions are found significantly above room temperature, i.e., it is a ferroelectric material below Tc~1100 K and an anti-ferromagnetic one below TN~650 K. The drawbacks of BFO for bulk practical applications are the low resistivity and the difficult to synthetize single-phased polycrystalline materials. To overcome the low DC electrical resistivity, one solution is doping these materials with multiple valence ions like Mn. Also, Cr ions can be used to improve polarization. Therefore, in this work, we describe the structural; dielectric, magnetic and Mossbauer spectroscopy studies in $0.9BiFeO_3$ - $0.1BaTiO_3$ solid solutions doped with Mn and Cr processed by high-energy ball milling. Especially for the Mn doped samples a structurally correlated magnetization enhancement is reported. X-ray diffraction and Rietveld refinement studies revealed a distorted perovskite structure with the coexistence of rhombohedral and monoclinic symmetries. Mössbauer spectroscopy results showed a magnetic spectral signature of ordered $Fe^{3+}$ ions for the rhombohedral phase of the undoped sample and for both rhombohedral and monoclinic phases of the Mn doped samples. A significant magnetization increase (reaching 0.50 emu/g), associated to the magnetic ordering of the Cm phase and to the retention of the $Mn^{3+}$ valence state was observed for Mn doped samples.




Magnetic hysteresis loops for $0.9BiFeO_3$ – $0.1BaTiO_3$ – x wt.% $MnO_2$ solid solutions, at room temperature.
Inset: remnant magnetization as a function of the $MnO_2$ content

## Biography

Ricardo A M Gotardo has studied Physics and has pursued his PhD in Condensed Matter Physics at the State University of Maringa. He is a Professor at the Technological Federal University of Paraná in Cornélio Procópio since 2013. His research focuses on multiferroic materials, relating materials structure with the magnetic and electronic properties.

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Shen Lin et al., Res. Rev. J Mat. Sci. 2018, Volume 6
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# Synthesis of Pt-$WO_3$@W/GNs as a bifunctional electro-photo catalyst for catalyzing methanol oxidation and oxygen reduction reaction

**Shen Lin, Shuhong Xu** and **Zhongshui Li**
Fujian Normal University, China

Direct methanol fuel cells (DMFCs) have attracted increasing attention due to its low cost, high power density, ease of handling, and low operating temperature. And the multifunctional electro-catalysts which can be used simultaneously in both the anode (methanol oxidation reaction, MOR) and cathode (oxygen reduction reaction, ORR) are eagerly needed. So in this work, a bifunctional electro-photo catalyst Pt-$WO_3$@W/GNs was synthesized by high temperature solid phase synthesis method, with two-dimensional plane structure graphene (GNs) as a support, and it was characterized by TEM, HAADF-STEM, XRD, XPS and Raman. It is found that Pt-$WO_3$@W/GNs has two forms of W at the same time, that is the metal state (W) on the surface and the internal oxidation state ($WO_3$), which is due to that only partial surface of $WO_3$ is reduced during high temperature solid phase reaction. Furthermore, it is observed that its substrate GNs show an obvious wrinkle undergoing the high temperature process, and Pt-$WO_3$@W nanoparticles are evenly dispersed on the surface of GNs, with the average particle size about 7.5 nm. Electro-catalytic properties of Pt-$WO_3$@W/GNs were investigated by cyclic voltammetry (CV), linear sweep voltammetry (LSV), chronoamperometry, and electrochemical impedance spectrum (EIS), to discuss the effect of W oxophilic property and its different states on its catalytic properties towards MOR and ORR. The results indicate that both W and $WO_3$ in Pt-$WO_3$@W/GNs have a promoting effect on catalyzing MOR and ORR, resulting in a superior electro-catalytic property than that of commercial Pt-Ru/C. Especially, the presence of some W (0) can endow semiconductor $WO_3$ different contact modes (Ohmic and Schottky contact) between W or Pt, which leads to a strong charge separation efficiency under light irradiation, so an efficient electro-photo-synergistic catalytic properties towards MOR and ORR under simulated sunlight was achieved. The founding in this work is helpful for converting solar energy into electric energy during traditional electro-catalytic process.

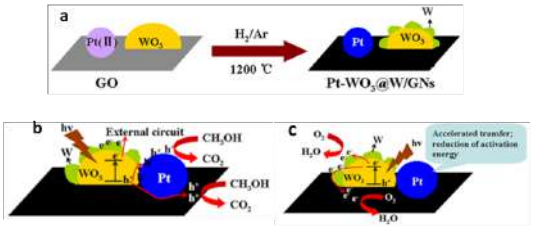



**Figure 1:** a. Synthetic diagram of Pt-$WO_3$@W/GNs (a); Schematic illustration of the electro-photo synergistic catalysis of Pt-$WO_3$@W/GNs in methanol oxidation (b) and oxygen reduction (c) reaction.

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7. L. Ye, Z. Li, L. Zhang, F. Lei, S. Lin*, A green one-pot synthesis of Pt/$TiO_2$/Graphene composites and its electro-photo-synergistic catalytic properties for methanol oxidation, Journal of Colloid and Interface Science, 433 (2014) 156-162.
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10. Z. Li, X. Huang, X. Zhang, L. Zhang, S. Lin*, The synergistic effect of graphene and polyoxometalates enhanced electrocatalytic activities of Pt-{PEI-GNs/ $PMo_{12}O_{40}^{3-}$}n composite films regarding methanol oxidation, Journal of Materials Chemistry, 22 (2012) 23602-23607.

**Biography**

Prof. Dr. Shen Lin obtained her B.S. Degree at Xia Men University in China in 1982, and completed her Ph.D. with Prof. Shixiong Liu at Fuzhou University in China in 2002. She works as a professor since 2000 in College of Chemistry and Material Science, Fujian Normal University, China. Her current research focuses on the development of new synthesis strategies of Pt/GNs based and non- noble metal electrocatalysts for their application in cathode and anode reaction of fuel cell, hydrogen evolution reaction and carbon dioxide reduction. Until now, she has published 20+ the related papers with average Impact Factor (corresponding author) over 3 (IF>3).

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**Notes:**

Sylvain G Cloutier, Res. Rev. J Mat. Sci. 2018, Volume 6
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## Low-cost printable hybrid hetero structures for energy harvesting and lighting

**Sylvain G Cloutier**
Ecole de Technologie Superieure, Canada

The urgent demand for better and cheaper optoelectronic device architectures is a crucial road block towards a better use of our energy resources. As such, we explore new additive manufacturing paradigms in printable electronics to realize ultralow-cost, light weight and fully-integrated light-harvesting and energy-efficient optoelectronic devices using commercial-grade printing capabilities. While solution-processing techniques have yielded a wide range of new hybrid nano-engineered materials for optoelectronic applications, many key parameters including compatibility, interface engineering, surface treatment and processability are essential to achieve the best device performances. More recently, new solution processed materials including organometallics, new high-mobility conductive polymers and nanoparticle inks have shown tremendous potential for low-cost optoelectronic device integration. For example, power conversion efficiencies from printable organometallic solar cells have now surpassed 20%. These advances have also transposed into new photo detector devices with high responsivities. Just in the last year, our team made tremendous ground breaking progress towards viable devices by dramatically enhancing structure and material properties, enhancing conductivities by several orders of magnitude using hybrids, significantly improving stability and lifetime and dramatically improving the performances through advanced processing. In this presentation, we will summarize our work from the last five years exploring new hybrid heterostructures for low-cost opto electronic applications, including mainly light harvesting and lighting. We will present new printable sol gel based $TiO_2$ collector architectures, which then led to promising low-cost solar cell architectures for production using commercial grade inkjet or aerosol printing capability. We will also describe in details how methyl ammonium lead-halide perovskite deposition and chemistry was adapted to produce low-cost photodetectors and LEDs using commercial-grade inkjet printing capability.

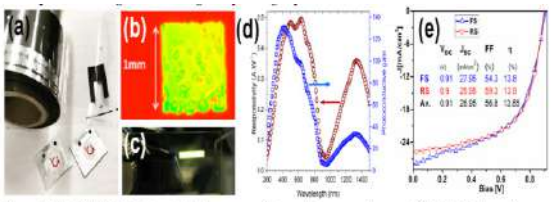



*Figure 1. (a) Printable battery technology manufactured by our partners at ICI. (b) High-performance printable near-IR LED and (c) high-performance printable green LED. (d) Printable two-color photodetector's responsivity and (e) printable organometallic solar cell response.*

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1. C Trudeau, et al. (2018) MRS Advances, 1-6. doi:10.1557/adv.2018.172
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4. S Sepulveda, et al. (2012) Journal of Nanomaterials 286104-7.

### Biography

Sylvain G Cloutier has completed his PhD at Brown University in 2006. He then received the DARPA Young Faculty Award for his work on the use of nano-engineered materials for lasers at the University of Delaware. In 2011, he joined Ecole de Technologie Superieure, Canada (ÉTS), where he leads both the Canada Research Chair on printable hybrid optoelectronic materials & devices and the Ariane Group Industrial Research Chair on Emerging Materials for Aerospace and Space. He was Lead Investigator on several large-scale research projects in the USA and Canada. He contributed over 80 publications and was elected at the College of the Royal Society of Canada in 2014.

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Anna Lewandowska et al., Res. Rev. J Mat. Sci. 2018, Volume 6
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# New generation of Colorcoat Prisma®

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Tata Steel Colors, UK

Tata Steel has launched its new generation three layer Colorcoat Prisma® pre-finished steel, following a substantial investment on the manufacturing line. New Colorcoat Prisma® offers superior ultraviolet (UV) resistance and durability. The latest evolution is based on revolutionary three-layer technology, completely chromate free to be REACH compliant, that delivers greatly enhanced aesthetics with superior color and gloss retention. The new Colorcoat Prisma® product pushes the boundaries of pre-finished steel and is available with an extended Confidex® guarantee for up to 40 years. Colorcoat Prisma® is the result of many years of product development with R&D support, which provided all R&D data required for the product launch, including producing signed technical product specifications for all colors and trials. Working closely with the manufacturing, marketing, commercial and business development teams, R&D managed and delivered all the technical requirements, which enabled the enhanced guarantee package to be signed off by both Tata Steel Exco and back to back guarantee from the paint supplier. In order to develop a profitable business from outside of Europe markets for Prisma®, R&D delivered full assessments according to ASTM standards, performed externally which represent a distinct advantage.



**Figure:** Active classroom based on Swansea University Bay Campus in United Kingdom with new generation of Colorcoat Prisma® Element (Seren Black, Seren Gold and Seren Copper)

## Biography

Anna Lewandowska has completed her PhD in Centre of Molecular and Macromolecular Studies at Polish Academy of Sciences in Poland then furthered her Postgraduate career with Postdoctoral placements at McMaster University in Canada. She has her expertise in Polymer Chemistry with "Experience in design and control of surface science". She joined Tata Steel R&D in 2015 where she has built her technical knowledge of experience in Research & Development team being involved with many of research projects. Currently, she is a New Product Development Design Manager in Tata Steel UK Ltd. focusing on new generation of OCS products for building envelope sector.

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## Notes:







21st International Conference on

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# Young Researchers Forum Day 2

Junshi Ichikawa et al., Res. Rev. J Mat. Sci. 2018, Volume 6
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# FEM analysis for burring process of large diameter SUS304 tube

**Junshi Ichikawa[1], Shinichi Nishida[1], Yuta Kashitani[1], Kentaro Tsunoda[1], Yuto, Horigome[1], Naoki Ikeda[1], Daichi Uematsu[1], Makoto Hagiwara[1], Hideto Harada[1]** and **Yutaka Sato[2]**
[1]Gunma University, Japan
[2]SK Co.,Ltd., Japan

This paper describes a finite element method (FEM) analysis for cold burring process of large diameter SUS304 pipe. The large diameter pipes such as 216.3 mm are used for a plant as a flow channel of gas and liquid. A burring process of pipe is generally for forming the branch. Burring molding is one of the typical molding techniques for branch pipes. The burring process is achieved by drawing of die from prepared hole. And the branch pipes are generally joined by welding. However this process has some problem. First, the burring process is depending on the forming limit of pipe. Second, the wall thickness and strain distribution of formed branch edge is unequal. These problem is caused the pre-hole shape. It generally has difficulty to determine the optimum pre-hole shape. Many try and error is needed. In this study, we proposed that the method of estimation for optimum pre-hole shape of mother pipe by finite element method analysis. The nominal diameter of mother pipe is 200A. And the target nominal diameter of branch pipe is 100A. The diameter is 114.3 mm, and the wall thickness is 3.0 mm. And target burring wall height is 10 mm with uniformly wall height around the edge. The height 10 mm means that is not needed the machining after burring process and is easy to weld to join the branch pipe to mother pipe. Initial pre-hole shape of analysis model is simple circle. After FEM analysis, the height of burring position was measured. Then the diameters of longitudinal direction and circumferential direction was adjusted. After optimum diameter of both direction diameter was determined, the diameter of 45 °direction was analyzed by using point tracking function to estimate of initial optimum diameter. Eventually, the burring formed shape had an uniform 10 mm height. It was clarified that the method of estimation for optimum pre-hole was effective.




**Fig.1** Target shape after burring process

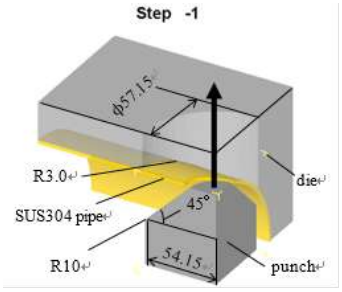



**Fig.2** Schematic illustration of FEM model

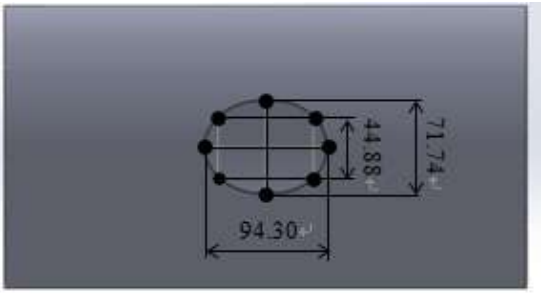



**Fig.3** Estimated optimum pre-hole shape

**Recent Publications**

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**Biography**

Junshi Ichikawa is pursuing his 1st year postgraduate degree. He studied Metal Plastic Forming and FEM Analysis at the Gunma University, Japan. He has done his research at the Faculty of Mechanical Science and Technology of the Gunma University. He has attended six conferences presenting his research works and has published three papers in high impact journals.

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**Notes:**

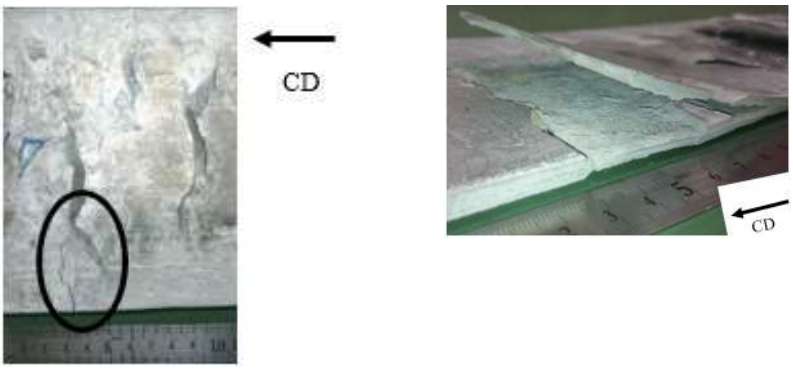
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## Horizontal twin roll casting of aluminum alloy A7075

**Yuta Kashitani[1], Shinichi Nishida[1], Junshi Ichikawa[1], Kentaro Tsunoda[1], Yuto, Horigome[1], Naoki Ikeda[1], Daichi Uematsu[1], Makoto Hagiwara[1], Hideto Harada[1]** and **Toshio Haga[2]**
[1]Gunma University, Japan
[2]Osaka Institute of Technology, Japan

This paper describes a horizontal type twin roll strip casting process for producing aluminum alloy strip of A7075. Twin roll casting process is able to produce a strip from molten metal directly. Thus this process has a possibility to reduce total cost of sheet making comparing to conventional rolling process. Strip casting process has some disadvantages. Casting speed depends on the material properties. It is difficult to determine the casting conditions. Aluminum alloy A7075 has high tensile strength, and it is known as a material for aerospace application. The sheet is manufactured in small quantities comparing to the other sheet aluminum alloy. Because A7075 alloy sheet is generally needed to a number of rolling and annealing process after hot extrusion. It is supposed that the demand of high tensile strength aluminum sheet such as A7075 is going to increase for weight saving of structural material. In this study, the effect of pouring temperature on the strip was investigated. Castability, surface conditions microstructure and strip thickness were estimated. It was possible to produce strip at any pouring temperature by horizontal twin roll strip casting process. Each surfaces of produced strip were transcribed form the roll surface, and the surfaces had a metallic luster. Minor cracks occurred at pouring temperature 710°C. Solidification cracking occurred at a pouring temperature of 740°C. Generally, the strip thickness tends to decrease as the pouring temperature increases. However, the strip thickness of pouring temperature of 710°C and 740°C increased compared with the pouring temperature of 680°C. Moreover, the strip thickness decreased at the pouring temperature of 770°C. As a result of observing the microstructure, equiaxed crystals were produced at any pouring temperature.




**(a) Cracks (Pouring temperature was 710°C)** **(b) Cracks (Pouring temperature was 740°C)**

**Fig.1** Solidification cracks of produced A7075 aluminum alloy strip by twin roll caster

### Recent Publications

1. Yuta Kashitani, Shinichi Nishida, Junshi Ichikawa, Hiroto Ohashi, Nao Ozawa, Ryosuke Okushima, Tomoya Suzuki, Yuto Takigawa and Hideto Harada, Twin Roll Casting of Aluminium Alloy ADC12, A3003, A7075, Key Engineering Materials, Vol.735, 18-23 (2017).
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**Biography**

Yuta Kashitani is pursuing his 1st year postgraduate degree. He studied Metal Strip Casting at the Gunma University, Japan. He has done his research at the Faculty of Mechanical Science and Technology of the Gunma University. He has attended six conferences presenting his research works and has published three papers in high impact journals.

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**Notes:**

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# Cold plastic forming of ABS plastic pipe: ABS plastic pipe

**Kentaro Tsunoda[1], Shinichi Nishida[1], Junshi Ichikawa[1], Yuta Kashitani[1], Yuto, Horigome[1], Naoki Ikeda[1], Daichi Uematsu[1], Makoto Hagiwara[1], Hideto Harada[1]** and **Nobuyuki Kamei[2]**
[1]Gunma University, Japan
[2]DIP Inc., Japan

This paper describes about cold plastic forming of ABS plastic pipe. Experiment and Finite element method (FEM) analysis of pipe expansion process were operated. The application of ABS plastic pipe for air conditioner is under consideration instead of metal pipe in Japan because of weight saving of air conditioner for lowering the gravity point against earthquake. The parts of ABS plastic pipe is generally produced by injection molding. The processes need the cooling time, and it takes much time. In addition, expensive mold die is needed for each application. Thus, cold plastic forming of ABS plastic pipe was proposed. The cold plastic forming of ABS plastic pipe chosen for this study is hardly studied by other authors. Product ability of cold plastic forming is higher than the injection molding or hot working. And the punch and die shape is simple comparing to these process. In this study, pipe expansion process was operated. The ABS plastic pipe has a 10 mm diameter and 8mm inner diameter and 1 mm thickness. At first, true stress and true strain curves at any strain rate were measured by ring compression test. Obtained flow stresses was used to FEM analysis. Experimental device for pipe expansion process was made by Dip Inc.. Objective inner diameter was 10 mm. FEM analysis was operated to clarify the deformation behavior such as load-stroke diagram. It was possible to produce the expanded ABS pipe. The whitening of worked pipe and strain recovery was observed. Analysis result was indicated the good agreement comparing to experimental result in load-stroke diagram.

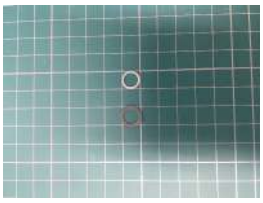


**Fig.1** Ring compression test



**Fig.2** ABS pipe

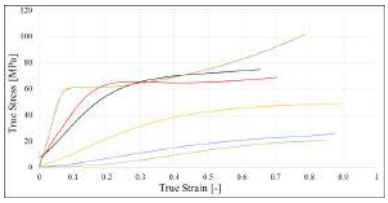



**Fig.3** Flow curve

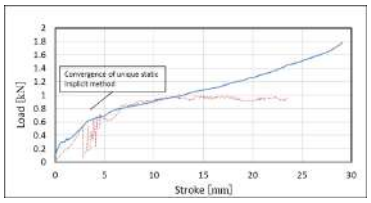



**Fig.4** Load-stroke diagram

## Recent Publications

1. Ryosuke Okushima, Shinichi Nishida, Junshi Ichikawa, Yuta Kashitani, Yujiro Nitta, Atsuhiro Aoki, Yuto Takigawa, Hayato Aso, Hideto Harada and Akihiro Watanabe, FEM Analysis of Cold Flaring Process of SGP Pipe, International Journal of Advanced Engineering, Management and Science, Vol. 3 Issue 2, 75-76 (2017).
2. Nao Ozawa, Shinichi Nishida, Toshio Haga, Junshi Ichikawa, Yuta Kashitani, Ryosuke Okushima, Yujiro Nitta, Atsuhiro Aoki, Yuto Takigawa, Hayato Aso, Hideto Harada and Akihiro Watanabe, Forgeability of AZ Series Magnesium Alloy produced by Twin Roll Casting, International Journal of Advanced Engineering, Management and Science, Vol. 3 Issue 2, 77-80 (2017).
3. Sueji Hirawatari, Hisaki Watari, Shinichi Nishida, Yuki Sato and Mayumi Suzuki, Evaluation of Friction Properties of Magnesium Alloy during Hot Forging by Ring Compression Test, Materials Science Forum, Vol.889, 119-126 (2017).
4. Y. Kamakoshi, S. Nishida, K. Kanbe and I. Shoji, Finite element method analysis of cold forging for deformation and densification of Mo alloyed sintered steel, IOP Conference Series: Materials Science and Engineering, Vol.257, (2017).
5. Shinichi Nishida, Junshi Ichikawa, Yuta Kashitani, Kentaro Tsunoda, Yusuke Takeuchi, Yujiro Nitta, Yuto Takigawa, Atsuhiro Aoki and Yutaka Sato, FEM Analysis of Cold Flaring Process of SUS304 Pipe, Defect and Diffusion Forum, Vol.382, 120-126(2018).

## Biography

Kentaro Tsunoda is pursuing his 4th undergraduate. He studied cold plastic forming of plastic pipe at Gunma University, Japan. He has done his research at the Faculty of Mechanical engineering of the Gunma University. He has attended two conferences presenting his research works.

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Hai Chen, Res. Rev. J Mat. Sci. 2018, Volume 6
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## Engineering protein interfaces yields ferritin disassembly and reassembly under benign experimental conditions

**Hai Chen**
China Agricultural University, China

Ferritin is a class of naturally occurring iron storage protein; it usually consists of 24 subunits that form a hollow protein shell with high symmetry. Recently, scientists have subverted these nature functions and used reversibly self-assembled property of apoferritin cage controlled by pH for the encapsulation and delivery of bioactive nutrients or anticancer drug. In all these cases, the ferritin cages shield their cargo from the influence of external conditions and provide a controlled microenvironment. However, since ferritin disassociation generally needs extreme acidic condition (pH≤2), this strategy is limited to the structures of bioactive compounds that are unstable at such low pH. Here, we engineered protein interfaces to yield ferritin nano cages which disassemble at pH 4.0 and reassemble at pH 7.5. During this process, bioactive molecules can be encapsulated within protein cavity. Thus, this engineered protein has the potential to be exploited as an alternative nano carrier for pH-sensitive bioactive compounds or drugs.

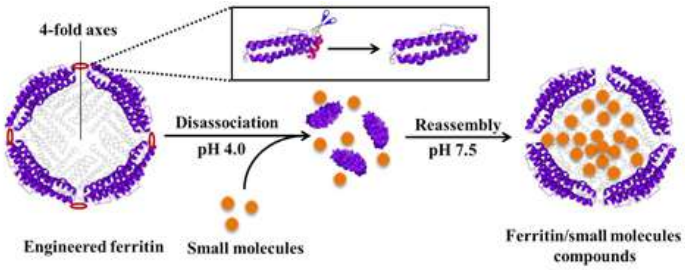



**Figure:** Schematic description of preparation of an engineered ferritin and its application in encapsulating small molecules by its reversible disassociation/reassembly. This new protein can be dissociated into subunits at pH 4.0, followed by reassembly into protein nano cage at pH 7.5

### Recent Publications

1. Chen H, Zhang S, Xu C and Zhao G (2016) Engineering protein interfaces yields ferritin disassembly and reassembly under benign experimental conditions. Chemical Communications 52(46):7402-7405.
2. Zang J, Chen H, Zhao G, Wang F and Ren F (2017) Ferritin cage for encapsulation and delivery of bioactive nutrients: From structure, property to applications. Critical reviews in food science and nutrition 57(17):3673-3683.
3. Zhang S, Zang J, Chen H, Li M, Xu C and Zhao G (2017) The size flexibility of ferritin nano cage opens a new way to prepare nanomaterials. Small 13(37):1701045- 1701051.
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5. Zhang S, Zang J, Zhang X, Chen H, Mikami B and Zhao G (2016) Silent amino acid residues at key subunit interfaces regulate the geometry of protein nanocages. ACS nano 10(11):10382-10388.

### Biography

Hai Chen is a PhD student in College of Food Science and Nutritional Engineering at China Agricultural University, working on Engineering and Application of Protein Nanostructure, especially Ferritin Nano Cages.

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Yuto Horigome et al., Res. Rev. J Mat. Sci. 2018, Volume 6
DOI: 10.4172/2321-6212-C3-020

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# Advanced Materials & Nanotechnology

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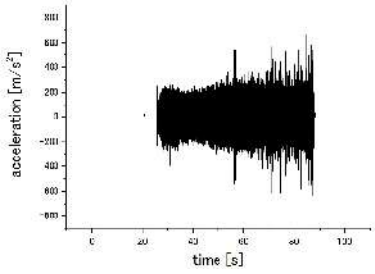
## Dynamic analyses of damping alloy sleeves for boring

**Yuto Horigome**[1], **Shinichi Nishida**[1] and **Fumihito Sakurai**[2]
[1]Gunma University, Japan
[2]National Institute of Technology, Gunma College, Japan

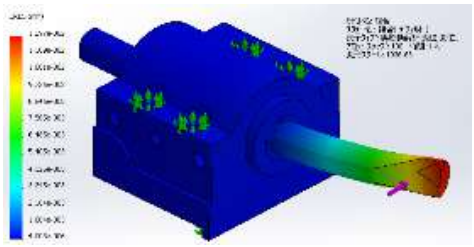
The NC lathe is one of the major metal cutting machine tool. The overhang amount of the tool become large at boring with the NC lathe. The tool vibration often become a problem at boring. The surface roughness and tool life are affected by the tool vibration. Therefore, it is necessary to reduce the tool vibration at boring with NC lathe. In this study, the application of damping alloy for the NC lathe sleeve was proposed. The characteristic of damping alloy is absorb vibration by transforming dynamic energy of the vibration into heat energy. A cutting experiment was operated by using the new type sleeve made of only damping alloy and the traditional type sleeve made of steel. The results such as vibration, surface roughness and tool life are compered between the both tools. The tool vibration became small and the tool life became long with new type sleeve compared to the traditional type sleeve. However the surface roughness became large by using new type sleeve. It is supposed that the rigid of new type sleeve is smaller than that of traditional type sleeve. Therefore, the composite sleeve that was combined with damping alloy and steel was developed for improving the rigidity. As a result, the tool vibration using the composite sleeve indicated one fifth and the surface roughness became half compared to the steel sleeve. The vibration analysis based on this experimental results was studied to clarify the vibration mechanism. The modal analysis was operated with the structural analysis software by using 3D models. And the FFT analysis was operated by the vibration data. As a result, it was revealed that the natural frequency of cutting tool system with new type sleeve was changed compared to the traditional system. And it was revealed that the bending mode frequency was closed to the twist mode frequency.



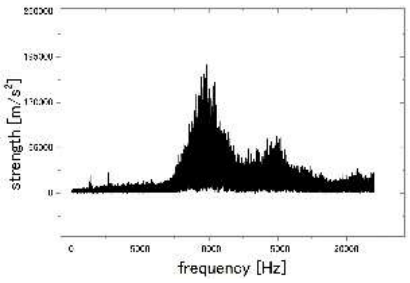
(a) Composite sleeve




(b) Tool vibration of composite sleeve



(c) Modal analysis




(d) FFT analysis

**Fig.1** The composite sleeve, the tool vibration of the composite sleeve, the modal analysis and the FFT analysis

**Recent Publications**

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2. Vadim Khoroshailo, Viktor Kovalov and Predrag Dašić, Improving of Vibration Resistance of Boring Tools by Big Diameter Holes Tooling on Lathe, Procedia Technology, Vol.22, 153-160(2016).
3. G. L. Chern and Jia-Ming Liang, Study on boring and drilling with vibration cutting, International Journal of Machine Tools and Manufacture, Vol.47, Issue 1, 133-140(2007).
4. K. Venkata Rao, B. S. N. Murthy and N. Mohan Rao, Prediction of cutting tool wear, surface roughness and vibration of work piece in boring of AISI 316 steel with artificial neural network, Measurement, Vol.51, 63-70(2014).
5. 5. Satoshi Ema and Etsuo Marui, Suppression of chatter vibration of boring tools using impact dampers, International Journal of Machine Tools and Manufacture, Vol.40, Issue 8, 1141-1156(2000).

**Biography**

Yuto Horigome is pursuing master degree program. He studied the characteristics of the damping alloy sleeve for boring at National Institute of Technology, Gunma College (NITGC). He entered Gunma University after graduating from NITGC, and he studies Machining Science.

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**Notes:**

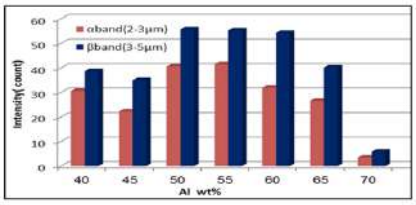
Amir Elsaidy, Res. Rev. J Mat. Sci. 2018, Volume 6
DOI: 10.4172/2321-6212-C3-020



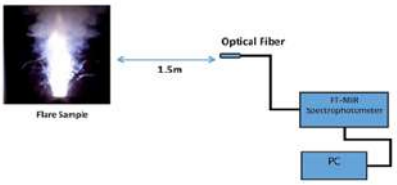
# Infrared spectra of aluminum fluorocarbon polymer compositions to thermal signature of jet engine

**Amir Elsaidy**
Military Technical College, Egypt

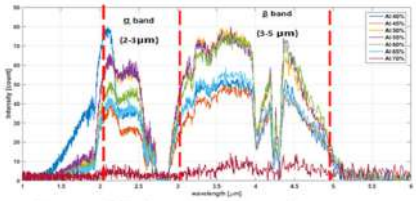
Decoy flares are energetic materials, which are capable of yielding thermal signature to interfere with IR guided missile seekers. The flare thermal signature depends on the duration and intensity of the exothermal reaction and on the chemical nature of the combustion products. Aluminum is the preferred metallic fuel for different pyrotechnic compositions because of its high stability and (high heat source), while magnesium runs in the second place due to lack of its stability. Aluminum is widely employed in wide applications particularly thermite compositions and flare compositions. In this study, different decoy flare formulations based on aluminum/Teflon/Viton (ATV) (with fuel percentage ranging from 40:70 wt %) were prepared by granulation and subsequent pressing. The spectral performance of developed decoy flare formulations were measured to the thermal signature of jet engine nozzle using (FT-MIR 2-6 µm) spectrophotometer. The thermal signature of jet engine was characterized with two characteristic peaks over α band (2-3 µm) and β band (3-5 µm); this thermal signature was correlated to black body emission by the nozzle at 690°C. The characteristic intensity ratio $\Theta=I_{\alpha}/I_{\beta}=0.3$. The developed decoy flares offered similar thermal signature but with higher intensity due to the formation of carbon soot and AlF as nearly ideal emitter and active IR emitter respectively. Quantification of these emitting species and combustion temperature was conducted using the ICT thermodynamic code. ATV decoy flare with 50wt % Al offered an increase in the intensity of α band and β by 6 and 1.5 times respectively. The main IR emitting species in this formulation is (AlF) in the combustion flame. The characteristic intensity ratio Θ was found to be 0.73. This manuscript would open the route for the development of customized decoy flares with tailored spectral performance.



Average intensity of α&β bands as function of Al content



Schematic for spectra measurements of developed decoy flares



Impact spectra of ATV flare formulations with different aluminum fuel percentage

## Recent Publications

1. E C Koch, V Weiser, E Roth, and S Knapp (2012) Metal Fluorocarbon Pyrolants. XIII: High Performance Infrared Decoy Flare Compositions Based on $MgB_2$ and $Mg_2Si$ and Polytetrafluoroethylene/Viton®. Propellants, Explosives, Pyrotechnics 37(4):432-438.
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4. R W Conner and D D Dlott (2012) Comparing boron and aluminum nanoparticle combustion in Teflon using ultrafast emission spectroscopy. The Journal of Physical Chemistry C 116(4):2751-2760.
5. S Yoo, D S Stewart, S Choi, D Lambert, M L Elert, W T Buttler, et al. (2012) Modeling kinetics for the reaction of aluminum and teflon and the simulation of its energetic flow motion. AIP Conference Proceedings, 1426(1):351-354.

## Biography

Amir Elsaidy has completed his Graduation in Chemical Engineering at Military Technical College, Egypt. He has experience in preparations and developments in the field of Chemical Engineering and Energetic Materials by creating new pathways for improvements and; his interest is focused on "Preparation and spectral performance evaluation of these materials". These materials were developed by granulation and subsequent pressing and their spectral performance was conducted.

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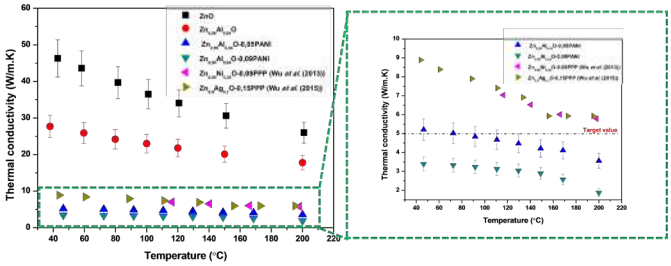
P M Radingoana et al., Res. Rev. J Mat. Sci. 2018, Volume 6
DOI: 10.4172/2321-6212-C3-020



# Thermoelectric properties of ZnO-based ceramics prepared by spark plasma sintering technique

**P M Radingoana**[1], **S Guillemet-Fritsch**[1], **P A Olubambi**[2], **C Estournès1** and **J G Noudem**[3]
[1]Université de Toulouse, CIRIMAT, CNRS INPT UPS, Université Paul-Sabatier, Toulouse, France
[2]University of Johannesburg, South Africa
[3]Crismat-Ensicaen, France

The scarcity and toxicity of high performance thermoelectric materials (such as Bi, Pb, Sb, Te etc.,) has shifted research to focus on metal oxides and organic materials. Recently, inorganic–organic hybrids are of interest due to minimized thermal conductivity and selective scattering of charge carriers that leads to high sea beck coefficient. In this work, $Zn_{0.96}Al_{0.04}O$ prepared through co-precipitation route was sintered using spark plasma sintering. Polyaniline (PANI) concentrations of 5wt% and 9wt% were compared. High dense ceramic of 98.5±0.03% was obtained at a low sintering temperature of 250°C using $Zn_{0.96}Al_{0.04}O$/5wt% PANI. Increasing PANI concentration decreased the relative density. Incorporation of PANI into the inorganic material reduced the thermal conductivity from 27 W/mK (0 wt% PANI) to 5.2 W/mK (5 wt% PANI) and 3.2 W/mK (9 wt% PANI) at 40°C. Maximum ZT of $2.2x10^{-6}$ is obtained at 200°C with PANI concentration of 9 wt%. These findings are an opening for low temperature applications of ZnO-based ceramics.




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2. Wu Z H, Xie H Q and Zhai Y B (2013) Enhanced thermoelectric figure of merit in nanostructured ZnO by nano junction effect. Applied Physics Letters 103(24):243901.
3. Li J, Tang X, Li H, Yan Y and Zhang Q (2010) Synthesis and thermoelectric properties of hydrochloric acid-doped polyaniline. Synthetic Metals 18(3):53–55.
4. Mitra M, Kargupta K, Ganguly S, Goswami S and Banerjee D (2017) Facile synthesis and thermoelectric properties of aluminum doped zinc oxide/polyaniline (AZO/PANI) hybrid. Synthetic Metals 228:25-31.
5. Zhang D B, Zhang B P, Shang P P, Gao C and Zhang Y Q (2014) Effect of $ZnAl_2O_4$ phase on thermoelectric properties of Al doped ZnO ceramics fabricated by spark plasma sintering. Materials Research Innovations 18(4):110-115.

## Biography

P M Radingoana is a PhD student at Université Paul Sabatier-CIRIMAT. She is currently working on “Spark plasma sintering of ZnO/polymer composites for thermoelectric application”. Her research interests include Renewable Energies and Sustainable Development.

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# Posters

Takako Konoike, Res. Rev. J Mat. Sci. 2018, Volume 6
DOI: 10.4172/2321-6212-C3-021



# Fabrication of micro/nano-crystals of organic Dirac fermion system: Nano-scale electro crystallization

**Takako Konoike**
International Center for Materials Nanoarchitectonics (MANA), Japan

**Statement of the Problem:** Since the discovery of graphene, it attracted a great interest because the electrons in graphene behave like massless Dirac fermions. It shows anomalous behaviors resulting from the peculiar liner dispersion. It has been recognized that Dirac fermion system is also realized in organic conductor α-$(BEDT\text{-}TTF)_2I_3$ under high pressure. This system is composed of organic molecule BEDT-TTF and inorganic anions $I_3$. These molecules are stacked alternatively and forming a multi-layered structure of conducting and insulating layer, respectively. By taking advantage of its bulk nature, we have experimentally studied the physical properties of Dirac fermions in this compound. In high magnetic field, the characteristic edge state with spin current at the sample edges is theoretically predicted. By using the micro/nano crystals, which contains large amount of edges, we aimed to observe the evidence of the edge state of this system.

**Methodology:** Micro/nano crystal growth of α-$(BEDT\text{-}TTF)_2I_3$ is based on nano-scale electrocrystallization was carried out by using Nano-Wire Fabrication Kit, Iwata Glass Industrial Co., Ltd., The electrodes used in the crystal growth were made on a silicon substrate with 300 nm $SiO_2$. Platinum electrode was deposited on a masked substrate and 5 μm gap was made by photolithography. The substrate was set into a saturated THF solution of above two molecules. DC current was applied between the electrodes at 20°C in incubator during 24 h.

**Findings:** The typical crystal obtained by this method is shown in Figure 2. The shape of the grown micro-crystal resembles with that grown by usual electrocrystallization. The surface of the crystal is almost flat and specularly reflected suggesting that the crystal is high purity.

**Conclusion:** By using the nano-scale electro-crystallization, we could obtain high purity micro-crystals. We will study this micro-crystal to detect the evidence of the edge state and spin current.



**Figure 1:** Silicon substrate with platinum electrodes

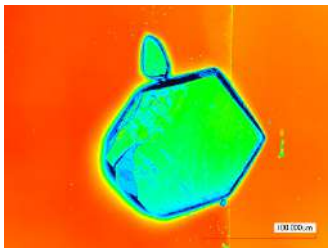


**Figure 2:** 3D laser microscope image of one of micro-crystal

**Recent Publications:**

1. Katayama S, Kobayashi A and Suzumura Y (2006) Pressure-induced zero-gap semiconducting state in organic conductor α-(BEDT-TTF) 2I3 salt. Journal of the Physical Society of Japan 75(5):054705.
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3. Konoike T, Uchida K and Osada T (2012) Specific heat of the multilayered massless Dirac fermion system. Journal of the Physical Society of Japan 81:043601.
4. Konoike T, Sato M, Uchida K and Osada T (2013) Anomalous thermoelectric transport and giant Nernst effect in multilayered massless Dirac fermion system. Journal of the Physical Society of Japan 82(7):073601.

## Biography

Takako Konoike has expertise in Evaluation and her passion in improving the various measurements under pressure and crystal growth of organic conductors, especially organic Dirac fermion system α-(BEDT-TTF) 2I3. We have measured the specific heat and thermo power of organic Dirac fermion System under high pressure. We have succeeded in obtaining the first experimental results of the specific heat of Dirac fermions and observing the giant Nernst effect reflecting the intrinsic nature of the zero-mode Landau level, which is characteristic of the Dirac fermion system. From these results, we can conclude that the high-purity organic crystal can provide an ideal testing ground for experimental studies of Dirac fermions.

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**Notes:**

E A Brocchi et al., Res. Rev. J Mat. Sci. 2018, Volume 6
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## Synthesis by hydrogen reduction and characterization of CuNiCo with nanoparticles content

**E A Brocchi, Eliana P Marin** and **I G Solorzano**
Pontifical Catholic University of Rio de Janeiro, Brazil

Metals alloys are of great technological interest which may even increase if they are nanostructured. Also, it can be found in the literature, same proposed chemical synthesis methodologies obtain different kind of materials with nanocrystal particles content. Then, the main objective of this work was to obtain a CuNiCo alloy, by an alternative procedure capable of generating nanostructured grains, followed by its preliminary characterization. It has been done by dividing the process into two steps the first one is the thermal decomposition of a nitrate solution [$Cu(NO_3)_2$, $Ni(NO_3)_2$ and $Co(NO_3)_3$] aiming to obtain a homogeneous co-formed metal oxide. In the second step, these oxides are heated up to a desired temperature and kept in a reductive flow of hydrogen, leaving the CuNiCo alloy as final product. The applied reduction temperatures were 300°C and 900°C. The materials obtained after each step were characterized by scanning electron microscopy (SEM) and energy dispersive X-ray detector (EDS). As result of the first step, it was found that oxygen, Cu, Ni and Co were, as desired, homogeneously distributed, as shown in the SEM elemental mapping (Figure-1). The after reduction obtained material present different shape and particle size, depending on the applied reducing temperatures (Figure-2). The more circular and greater size observed at 900°C confirms an increased sintering occurrence at higher temperature and the EDS results indicate the expected composition for Co, Ni and Cu (Figure-3). The initial results given by transmission electron microscopy (TEM) have shown the presence of particles with spherical morphology and a homogeneous distribution of the elements, which are sharing the same crystal structure. Also, it was noted the presence of particles smaller than 100 nm in the CuNiCo alloy, as show in Figure-4 (bright and dark fields).

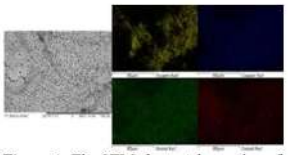


**Figure-1:** The SEM elemental mapping of co-formed oxides. X1000

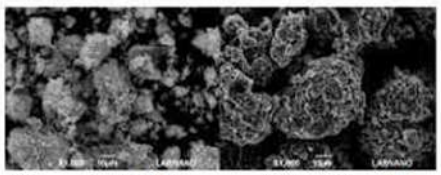


**Figure-2:** SEM images of CuNiCo alloy X1000. Reduction T a)300°C,b) T=900 °C.

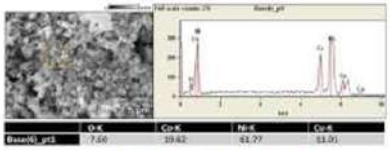


**Figure-3:** The EDS of CuNiCo alloy X10000. Reduction at T=300°C.

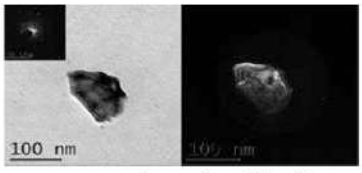



**Figure-4:** TEM observation of the alloy.

### Biography

E A Brochii completed Metallurgical Engineer (1975) and Master in Materials Engineering (1977) from Pontifical Catholic University of Rio de Janeiro (PUC-Rio). Doctorate (PhD) in Extractive Metallurgy from Imperial College of Science and Technology, London (1983). Since this year he has been at the Department of Chemical and Materials Engineering of PUC-Rio teaching and doing research focusing on the recovery of metals from mineral concentrates, and residues as well as synthesis, normaly including a thermodynamic/kinetics studies related to pyrometallurgy routes such as general types of roasting (ex: chlorination) and hydrogen reduction.

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Heeyeon Kim, Res. Rev. J Mat. Sci. 2018, Volume 6
DOI: 10.4172/2321-6212-C3-021



## One-pot synthesis of hybrid nano particles for catalytic applications

**Heeyeon Kim**
Korea Institute of Energy Research, South Korea

We have developed facile CVD techniques for the synthesis of metal hybrid nano-catalysts used for fuel cell or secondary battery. By using CVD technique, we can easily obtain the perfect catalytic structure and manipulate the microstructure of the nano metal catalysts. It is noteworthy that the conventional multi-step synthetic processes can be simplified into a single-step process or a sequential process by these processes. For the single-step CVD synthesis of Pt nano catalyst decorated with porous graphene shells, $MeCpPtMe_3$ was used as a precursor of Pt nano particles. For the synthesis of graphene shells, various hydrocarbon precursors such as acetylene, acetone or ethyl alcohol were used as precursors, which were vaporized and simultaneously flowed into the CVD reactor. For the low-temperature synthesis of bimetallic nano alloys for fuel cell electrode, we applied one-pot sequential CVD technique. For the synthesis of Pt-Co bimetallic nanoparticles, $MeCpPtMe_3$ was vaporized and flowed into a CVD reactor, where carbon black was placed as a support of Pt-Co bimetallic catalyst. For Co deposition, $CpCo(CO)_2$ was vaporized and flowed into the CVD chamber. Then, the Pt with Co nano particles deposited on carbon black was annealed for the synthesis of $Pt_3Co$ bimetallic nanoparticles. By single step CVD technique, Pt with porous graphene shells were synthesized, which showed higher efficiency compared to bare Pt and maintaining long-term stability after extended potential cycling which is due to the protective effect of graphene shells. Also, our sequential CVD techniques for bimetallic Pt-Co nanocatalyst are efficient for the quick, simple and easy synthesis of optimal catalytic structure. This technique is very useful for lowering the synthetic temperature of metal alloys by more than 200°C compared to conventional processes.

### Recent Publications

1. Tom Samuels, et al. (2017) Three-dimensional hybrid multi-layered graphene-CNT catalyst supports via rapid thermal annealing of nickel acetate. *Journal of Materials Chemistry A;* 21(5): 10457-10469.
2. D S Choi, et al. (2016) Low-temperature chemical vapor deposition synthesis of Pt-Co alloyed nanoparticles with enhanced oxygen reduction reaction catalysis. *Advanced Materials;* 28: 7115-7122.

### Biography

Heeyeon Kim has completed her PhD in Chemical Engineering from Seoul National University. She is being working in Korea Institute of Energy Research since 2004. She has investigated nano metals, nano carbons and their hybrids for energy applications. The main applications of the metal-carbon hybrids are catalysts for low temperature fuel cell, the catalysts for hydrogen production, the $CO_2$ absorbents and the electrode material of secondary battery. The focus of her study is to develop cost-effective materials which improve the catalytic performance and concurrently maintain the long-term stability.

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**Notes:**

Tai-Horng Young, Res. Rev. J Mat. Sci. 2018, Volume 6
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## Chitosan delaying human fibroblast senescence through down regulation of TGF-β signaling pathway

**Tai-Horng Young**
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This study evaluated the effect of chitosan, poly vinyl alcohol (PVA) and poly (2-hydroxyethyl methacrylate) (pHEMA) on delaying the human fibroblast senescence. Cells could form suspending multicellular spheroids on these biomaterials, but only chitosan was capable of decreasing the SA β-gal activity and increasing the proliferation ability of senescent fibroblasts. Therefore, in addition to the structure of multicellular spheroids, chitosan itself should play an important role in delaying fibroblast senescence. The main difference of senescence related protein expressions for cells cultured on chitosan, PVA and pHEMA occurred on the TGF-β signaling pathway. In addition to the intracellular TGF-β expression, the extracellular TGF-β expression was also down regulated. Chitosan with cationic amino structure was assumed to bind with anionic TGF-β by forming polyelectrolyte complexes. This assumption was demonstrated by directly adding chitosan into the medium to down regulate the cell TGF-β expression and further to delay cell senescence, indicating TGF-β signaling pathway was involved in the chitosan mediating fibroblast senescence process. Finally, the delaying cell senescence ability of chitosan increased with increasing the amount of amino groups in chitosan and its ionization degree. In summary, these results provide important information for considering the application of chitosan in the future cell therapy and regeneration medicine.

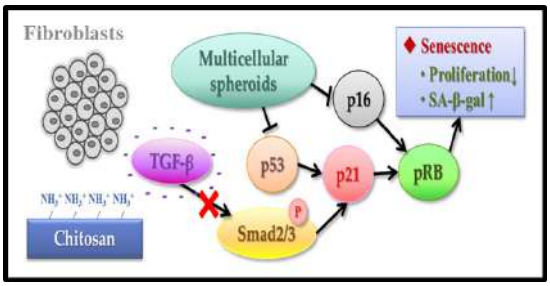



**Figure:** The diagram of chitosan affecting senescent-related pathways.

### Recent Publications

1. C H Chang, D Mau-Hsu, K C Chen, C W Wei, C Y Chiu and T H Young (2018) Evaluation of digital real-time PCR assay as a molecular diagnostic tool for single-cell analysis. Scientific Reports 8(1):3432.
2. C W Tsai and T H Young (2016) CD44 expression trends of mesenchymal stem-derived cell, cancer cell and fibroblast spheroids on chitosan-coated surfaces. Pure and Applied Chemistry 88(9):843-852.
3. C W Tsai, Y T Kao, I N Chiang, J H Wang and T H Young (2015) Chitosan treatment delays the induction of senescence in human foreskin fibroblast strains. PLOS One 10(10): e0140747.
4. Y H Chen, S H Chang, T J Wang, I J Wang and T H Young (2013) Cell fractionation on pH-responsive chitosan surface. Biomaterials 34(4): 854-863.
5. P J Lou, M Y Chiu, C C Chou, B W Liao and T H Young (2010) The effect of poly (ethylene-co-vinyl alcohol) on senescence-associated alterations of human dermal fibroblasts. Biomaterials 31(7):1568-1577.

### Biography

Tai-Horng Young is currently a Professor at National Taiwan University (NTU) in Taipei, Taiwan. Since 2000, he was a Full Professor at the Institute of Biomedical Engineering, National Taiwan University. He received several awards, including outstanding research award of National Science Council, and has been the Chair Professor of National Taiwan University since 2007. From 2008 to 2011, he served as the Director of Institute of Biomedical Engineering, National Taiwan University. He has been a member of many academic societies and has been selected as the President of Formosa Association of Regenerative Medicine (2012-2016).

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Yusuke Daiko et al., Res. Rev. J Mat. Sci. 2018, Volume 6
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# $Ag^+$ ion emission from a sharp tip of $Ag^+$ ion conducting glass and Schottky-model analysis

**Yusuke Daiko, Sawao Honda** and **Yuji Iwamoto**
Nagoya Institute of Technology, Japan

Ion implantation is one effective method for surface modification of materials and has been applied for various field including semiconductor industry and bio-technology. For example, proton ($H^+$) implantation, so called proton therapy, has recently used most often in the treatment of cancer, in which accelerated protons are irradiated directly to cancer cells. In general, discharge plasma (gas) or liquid (e.g., liquid gallium (Ga) focused ion beam (FIB)) has been utilized for an ion source. However, in these cases, side reactions (generation of radicals or various ions with different mass such as $H_{2+}$ and $H_{3+}$ etc.,) are unavoidable. Also, ion (particle) accelerators are huge and expensive. On the other hand, ion emission from solid electrolytes such as YSZ has also been considered. Hosono et al., showed that $O^-$ ions exist inside cages of $12CaO{\cdot}7Al_2O_3$ (C12A7) crystal and they successfully observed $O^-$ ion emission from the C12A7 by applying a high voltage. In the case of these ion emissions from solid electrolyte, one crucial aspect is its high ion conductivity and ion emission current increases with increasing ion conductivity of electrolyte. Compared with gas and liquid ion sources, ion emission mechanism of such solid-emitter is simple and almost ~100% of emitted ions are $O^-$ ion in the case for C12A7. We have studied high ion conducting glasses and those applications for ion emission gun. One big advantage of glass is its good formability and we anticipate such ion conducting glasses can be applied for an emitter of ionic gun since the strength of the electric field is concentrated around the tip of the sharp edged glass emitter. Here we show preparation and emission properties of $Ag^+$ ions from a tip of $Ag^+$ ion conducting glass fiber. A good linear correlation was obtained between log (current) and square root of the voltage, suggesting the emission of $Ag^+$ ion from the tip of glass fiber is expressed by Schottky model.

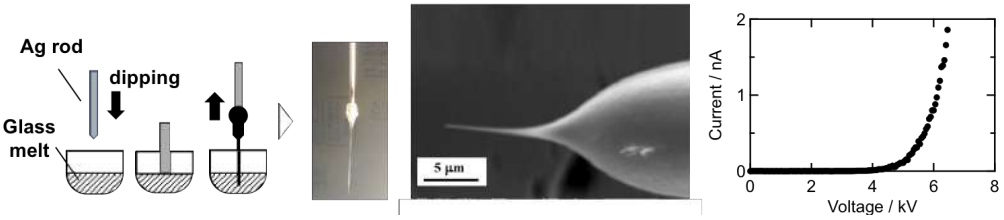



**Figure:** Schematic diagram of fiber preparation, SEM image of the fiber tip, and $Ag^+$ ion emission current as a function of voltage.

## Biography

Yusuke Daiko has his expertise in ion conducting materials including glasses, ceramics and organic - inorganic hybrids. He received Donald R Ulrich Award 2013 from International Sol-Gel Society (ISGS) and; Awards for Advancements in Ceramic Science and Technology in 2013 from 67th Ceramic Society of Japan (CerSJ) for his research development about proton conducting glasses.

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Junzhe Dong et al., Res. Rev. J Mat. Sci. 2018, Volume 6
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## Effect of electrolyte aging on the morphology and mechanical properties of anodic titanium dioxide

**Junzhe Dong, Thomas Loho** and **Wei Gao**
The University of Auckland, New Zealand

Titanium dioxide ($TiO_2$) has attracted extensive attention as multifunctional semiconductors in various applications, such as sensors, photocatalysis and medical devices. Electrochemical anodization is a simple and cost-effective way to produce one dimensional $TiO_2$ nanotubes with large surface area and tunable morphology. Recently great efforts have been made on understanding the formation mechanism behind the regular morphology and influencing anodization parameters. However, rare studies were reported focusing on the mechanical properties of anodic $TiO_2$, such as hardness, modulus and adhesion, which are vital to practical application of $TiO_2$. The purpose of this study is to explore the effect of electrolyte aging on the morphology and mechanical properties of anodic $TiO_2$ nanotube arrays. Electrochemical anodization of titanium foil was conducted in different aging electrolyte to produce regular self-organized $TiO_2$ nanotube arrays. Nano indentation test was then performed on as synthesized $TiO_2$ nanotube surface to measure their mechanical properties. The regularity of obtained $TiO_2$ nanotube improves in short aging electrolyte while deteriorates in long aging electrolyte with pore size decreasing from 146.58 nm to 46 nm. However, the hardness and reduced modulus increase with prolonging aging time as well as adhesion strength. The electrolyte aging has a significant role in the morphology and mechanical properties during titanium anodization. It improves the hardness, modulus and tribological behavior of anodic $TiO_2$ nanotube arrays, but reduces their pore size and surface area. Therefore, the proper aging time of electrolyte should be selected according to the specific applications.

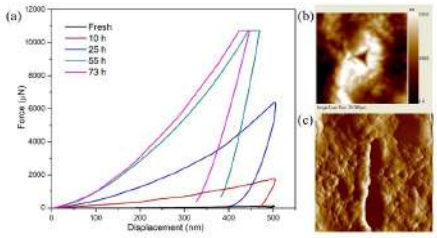



Figure 1: (a) Typical load-displacement curve in nanoindentation test; (b) Residual indent impression left by Berkovich indenter; (c) nanoscratch in adhesion test

### Recent Publications

1. J Dong, et al. (2018) Enhancing photocatalytic activities of titanium dioxide via well-dispersed copper nanoparticles. Chemosphere 204:93-201.
2. D Ariyanti, L Mills, J Dong, et al. (2017) NaBH4 modified $TiO_2$: Defect site enhancement related to its photocatalytic activity. Materials Chemistry and Physics 199:571-576.
3. J Dong, et al. (2017) Patterned titania nano structures produced by electrochemical anodization of titanium sheet. International Journal of Modern Physics B 31:1744049.
4. J Dong et al. (2016) Self-organized ZnO nanorods prepared by anodization of zinc in NaOH electrolyte. RSC Advances 6:72968- 72974.
5. J Dong, R Ullal, J Han, S Wei, X Ouyang, J Dong and W Gao (2015) Partially crystallized $TiO_2$ for microwave. Journal of Materials Chemistry A 3:5285.

### Biography

Junzhe Dong has completed his Bachelor's degree in Materials Physics at Southwest University, China in 2011. Then he went to Northwestern Polytechnical University, China for research project on Ti alloy deformation. He has completed his PhD in "Transition metal oxides and their applications" at University of Auckland, New Zealand. He has expertise in Micro and Nano Indentation Test, Electrochemical Anodization Technique, Raman Signal Enhancement and Photocatalysis.

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A Papadopoulou et al., Res. Rev. J Mat. Sci. 2018, Volume 6
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## Magnetic carbon nano materials as matrices for the immobilization of cellulolytic enzymes

**A Papadopoulou**[1], **H Stamatis**[1], **D Zarafeta**[2] and **A Galanopoulou**[3]
[1]University of Ioannina, Greece
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[3]National University of Athens, Greece

The development of novel nano biocatalytic systems through the immobilization of enzymes on nanoscale materials has attracted much scientific interest and their potential use for applications in various industrial fields has been widely recognized. Among the different types of nanomaterials applied for this purpose, carbon-based materials, such as graphene oxide (GO), the oxidized derivative of graphene, and hierarchical porous carbons (HPC), which possess a multimodal pore size distribution of micro-, meso-, and macropores, have been used for enzyme immobilization. On the other hand, magnetic nanoparticles due to their high surface area, large surface-to-volume ratio and easy separation under external magnetic fields have been broadly utilized as carriers for enzyme immobilization. The functionalization of magnetic nanoparticles with carbon-based nanomaterials has recently attracted great interest as the resulting hybrid nanomaterials combine the properties of both building blocks. In the present study, we investigate the use of hybrid nanomaterials of magnetic iron nanoparticles with GO or HPC as nano supports for the immobilization of cellulolytic enzymes which could be applied to generate glucose feedstock using lignocellulosic biomass. The aim of this work focuses on the investigation of the effect of structural characteristics of hybrid GO and HPC magnetic nanoparticles on the catalytic behavior (activity, thermo stability and operational stability) of cellulolytic enzymes.

### Recent Publications

1. I V Pavlidis, M Patila, U T Bornscheuer, D Gournis and H Stamatis (2014) Graphene-based nanobiocatalytic systems: recent advances and future prospects. Trends in Biotechnology 32(6):312-320.
2. G Orfanakis, M Patila, A V Catzikonstantinou, K-M Lyra, A Kouloumpis, P Katapodis, K Spyrou, A Paipetis, P Rudolf, D Gournis and H Stamatis (2018) Hybrid nanomaterials of magnetic iron nanoparticles and graphene oxide as matrices for the immobilization of beta-glucosidase: synthesis, characterization, and biocatalytic properties. Frontiers in Materials 5:1-11.
3. A A Papadopoulou, A Tzani, A C Polydera, P Katapodis, A Detsi, E Voutsas and H Stamatis (2017) Green bio transformations catalyzed by enzyme-inorganic hybrid nanoflowers in environmental friendly ionic solvents. Environmental Science and Pollution Research DOI: 10.1007/s11356-017-9271-3.

### Biography

A Papadopoulou studied biology at the University of Ioannina, Greece. She has completed her Master of Science degree in Department of Chemistry at University of Ioannina. She has completed her PhD working in the area of Biocatalysis and Enzyme Technology in 2017. Her research focuses on the development of immobilized biocatalytic systems based on the use of solid supports such as nano matrices for the production of biofuels, high-added value products with prospects in food and pharmaceutical industry or for pollutants degradation.

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**Notes:**

Jun-Hyun Kim et al., Res. Rev. J Mat. Sci. 2018, Volume 6
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## Surface texturing with slanted silicon nano pillars to reduce its optical reflectivity

**Jun-Hyun Kim** and **Chang-Koo Kim**
Ajou University, South Korea

Antireflective surfaces are useful in many applications such as solar cells, light emitting diodes and optical lens systems. Coating anti reflection layers is one of the ways to improve light trapping and decrease the optical reflectivity from the surface. By controlling the refractive index of the coating layer, the destructive interference of light minimizes the reflection. However, the use of hetero materials can limit the thermal stability and eventually the long-term reliability. The surface texturing is another way of producing antireflective surfaces. Surfaces with silicon pillars in various shapes have been shown to exhibit low reflectivity compared with bare surfaces. These pillars are mostly vertical. If the pillars are tilted from the surface normal, more light would be trapped between the pillars. This would result in lower reflectivity of the surfaces. The surface can be textured through either wet or dry etching. Wet chemical etching is very simple to operate, but only crystalline substrates can be used to obtain slanted structures in wet chemical etching. Dry etching using gaseous plasmas offers high aspect ratio structures due to its anisotropic etching characteristics. In a conventional plasma etching process, a sheath is formed along the surface of a substrate, irrespective of its angle. Therefore, simply tilting of a sample is not adequate for obtaining slanted etch profiles during conventional plasma etching. In this study, slanted silicon pillars at arbitrary angles were fabricated using the slanted plasma etching technique. Optical analysis of surfaces with silicon pillars was made to investigate their antireflection properties. It was shown that the reflectance of the surface with Si pillars was affected by the aspect ratio as well as the opening area of the pillars.

### Recent Publications

1. Jun-Hyun Kim, Jeong Geun Bak, Kangtaek Lee and Chang-Koo Kim (2018) Control of the electrical resistivity of Ni-Cr wires using low pressure chemical vapor deposition of tin. Applied Surface Science 429:134-137.
2. Jun-Hyun Kim, Sung-Woon Cho and Chang-Koo Kim (2017) Angular dependence of $Si_3N_4$ etching in $C_4F_6/CH_2F_2/O_2$/Ar plasmas. Chemical Engineering and Technology 40(12):2251-2256.
3. Jun-Hyun Kim, Sung-Woon Cho, Chang Jin Park, Heeyeop Chae and Chang-Koo Kim (2017) Angular dependences of $SiO_2$ etch rates at different bias voltages in $CF_4$, $C_2F_6$, and $C_4F_8$ plasmas. Thin Solid Films 637:43-48.
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5. Jun-Hyun Kim, Sung-Woon Cho, Doo Won Kang, Kyung Mi Lee, Chang Yong Baek, Hae-Min Lee and Chang-Koo Kim (2016) Electrical, structural, and morphological characteristics of dopantless tin oxide films prepared by low pressure chemical vapor deposition. Science of Advanced Materials 8(1):117-121.

### Biography

Jun-Hyun Kim has completed his BS and MS degrees in Chemical Engineering at Ajou University, Suwon, South Korea in 2011 and 2013 respectively. He is currently a PhD candidate in Chemical Engineering at Ajou University. He has expertise in Plasma Processing, especially Plasma Etching.

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K Koushik et al., Res. Rev. J Mat. Sci. 2018, Volume 6
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## Simulation and development of counter weight casting

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[1]R V College of Engineering, India
[2]Dayananda Sagar University, India

There is renewed interest in sand casting components due to new technological developments and simulation techniques. Several researchers have developed algorithms and softwares to simulate casting process and predict defects such as porosity, blow holes, cracks and cold shuts. The objective of this paper is to obtain defect free counter weight casting (component) by best gating system based on flow simulation. CAD model of one such critical component counter weight is done in ADSTEFAN software where process parameters like weight, type and temperature of the molten metal and no-bake sand are given as input and flow simulations of three iterations of different gating systems to obtain defect free casting are performed. Actual castings for three gating systems are developed and results (defects) are compared. From first principle, the sizes of risers and flow offs are calculated with cross sections being either rectangular/cylindrical/conical shapes. Pressurized gating system is considered with a D: R: I (Down sprue: runner bar: Ingate) ratio is 1: 1.6: 0.9. Due to improper location of ingates and risers shrinkage formation is about 8-11% and 11-15% by volume in first and second iterations respectively. Installing of sleeve risers (at the point prone to casting defects) at hot spot where solidification ends results in reduction of volumetric shrinkage by 98%. Time taken to fill the mould cavity by molten metal is about 24-26 s for all three iterations. Visual inspection of actual counter weight casting of 1st and 2nd iteration showed the formation of shrinkages, cold shuts and surface blow holes and 3rd iteration showed no defects. Hence, third iteration gating system was recommended for manufacturing.

### Recent Publications

1. K Koushik (2018) Design, Impact, Simulation Studies of Tubular Chassis of an all-terrain Vehicle Metals, Materials and Manufacturing Conference held in Singapore March 12-13th 2018, I: 10.5176/2251-1857_M318.12.
2. K Koushik and Nataraj J R (2018) Impact studies of Roll cage of All Terrain Vehicle. International Journal of Engineering, Global Science and Technical Forum.

### Biography

K Koushik is pursuing his 3rd year Mechanical Engineering at R V College, Bangalore, India. He is currently working as a Chassis Engineer in Team Helios Racing. He is also working on alloy materials for high temperature applications. He has presented his technical paper on Chassis of an ATV at M3 2018 Conference, Singapore.

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**Notes:**

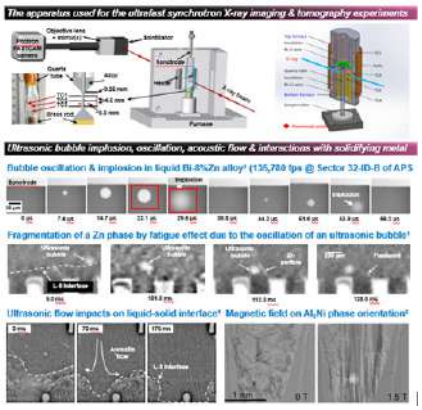
Abdulrahman Sumayli, Res. Rev. J Mat. Sci. 2018, Volume 6
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## Study of fragmentation and ultrasonic flow impacts of several metal-based alloys

**Abdulrahman Sumayli**
University of Hull, UK

We present a number of highlight cases in our recent projects funded by the Royal Society and the EPSRC. Our focus is to study in real-time and *in-situ* dynamic evolution of solidification microstructures under ultrasonic waves and pulse magnetic fields. We have used the speciality beamlines from the Diamond Light Source, Advanced Photon Source, European Synchrotron Radiation Facility, and Swiss Light Source for our studies and worked closely with the relevant beamline scientists. We also used high performance supercomputer, viper, housed at Hull University to process and analyse the many hundreds of TB data acquired from the experiments. Our research demonstrates that real-time and *in-situ* visualisation of the dynamic microstructural evolution is absolutely essential for elucidating some of the ambiguities or missing links in the classical theories concerning the solidification processes of metal alloys. Real-time evidence shows that the shock wave created at ultrasonic bubble implosion and the pinch stresses produced by the electromagnetic pulse are very effective in causing the fragmentation of dendrites or intermetallic phases, promoting greatly the grain multiplication effect and therefore enhancing grain refinement.




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1. B Wang and J Mi (2018) Ultrafast synchrotron X-ray imaging studies of microstructure fragmentation in solidification under ultrasound. Acta Materialia, 144:505-515.
2. F Wang and J Mi (2017) A synchrotron X-radiography study of the fragmentation and refinement of primary intermetallic particles in an Al-35 Cu alloy induced by ultrasonic melt processing. Acta Materialia 142-153.

### Biography

Abdulrahman Sumayli is a PhD student in Advanced Materials group in the School of Engineering and Computer Science at University of Hull. He is pursuing his PhD studies. His research is funded by Saudi Arabian Cultural Burea in London. He has completed his Bachelor's degree at King Abdulaziz University in Mechanical Engineering and Master's degree in Advanced Mechanical Engineering at Sheffield University. His PhD research is focused on "Corrosion resistance of Bulk Glasses Metallic (BMGs) amorphous alloys and the likelihood to use them as biocompatible materials".

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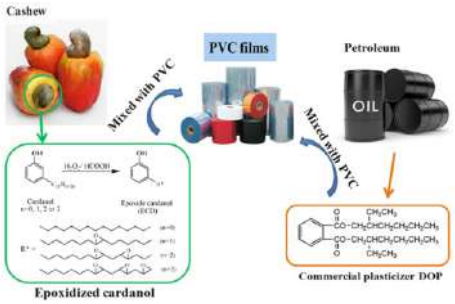
Jie Chen et al., Res. Rev. J Mat. Sci. 2018, Volume 6
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## Effect of epoxidized cardanol on poly (vinyl chloride) as secondary plasticizer

**Jie Chen** and **Ke Li**
Chinese Academy of Forestry, China

An epoxidized cardanol plasticizer derived from cardanol was synthesized and characterized by Fourier transform infrared (FTIR), 1H nuclear magnetic resonance ($^{1}$H-NMR) and $^{13}$C nuclear magnetic resonance ($^{13}$C-NMR). Effects of the epoxidized cardanol used as secondary plasticizer for dioctyl phthalate (DOP) in PVC blends were studied. Dynamic mechanical analysis (DMA), tensile test and thermogravimetric analysis (TGA) of PVC films plasticized with different content of epoxidized cardanol were investigated. The results indicated that the percent elongation increases with increasing epoxidized cardanol content. The epoxidized cardanol had better thermal stability than cardanol, the 10% weight loss ($T_{10}$) and 50% weight loss ($T_{50}$) of which enhanced from 218.73 to 259.53°C and 248.50 to 312.53°C and the plasticized films showed the thermal stability increased with increasing the content of epoxidized cardanol. When 8 phr DOP was replaced with epoxidized cardanol, the $T_{10}$ and $T_{50}$ increased by 9.58°C and 5.53°C respectively. The properties of volatility and extraction resistance of plasticizers were tested and showed similar or higher stability in those properties than that of DOP. Surface characterization of films by FTIR was also investigated.




### Recent Publications

1. Jie C and Ke L (2018) Synthesis of Tung-oil-based triglycidyl ester plasticizer and its effects on poly (vinyl chloride) soft films. ACS Sustainable Chemistry & Engineering 6:642–651.
2. Jie C (2018) Synthesis and application of a novel environmental $C_2$6 diglycidyl ester plasticizer based on castor oil for poly (vinyl chloride). Journal of Materials Science 53(12):8909-8920.
3. Jie C and Ke L (2016) Synthesis and application of a novel environmental plasticizer based on cardanol for poly (vinyl chloride). Journal of the Taiwan Institute of Chemical Engineers 65:488-497.
4. Jie C (2016) Thermal behavior of epoxidized cardanol diethyl phosphate as novel renewable plasticizer for poly (vinyl chloride). Polymer Degradation and Stability 126:58-64.
5. Jie C (2015) A Novel Bio based Plasticizer of Epoxidized Cardanol Glycidyl Ether: synthesis and application in Soft Poly (vinyl chloride) Films. RSC Advances 5(69):56171-56180.

### Biography

Jie Chen has completed her PhD at Beijing Forestry University. She has published more than 30 papers in reputed journals.

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Jianyan Ding et al., Res. Rev. J Mat. Sci. 2018, Volume 6
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# $Eu^{2+}/Eu^{3+}$-activated nitride based red phosphors with narrow emission band for white light emitting diodes

**Jianyan Ding, Xufeng Zhou** and **Yuhua Wang**
Lanzhou University, China

The rare earth $Eu^{2+}/Eu^{3+}$ ions have been widely used to act as activator for phosphors, especially red phosphors. Compared with oxide, $Eu^{2+}$ activated nitride based phosphors commonly present broad excitation band and red emission light due to the larger crystal field splitting and higher nephelauxetic resulting from $N^{3-}$ ions. The compact host lattices produced by the edge or face shared (Al, Si) $N_4$ tetrahedrons present excellent thermal stability and high bright red emission light. However, its broad emission band resulted from 4f-5d transitions of $Eu^{2+}$ ions leads to low color purity. Different from $Eu^{2+}$ ions, $Eu^{3+}$ activated phosphors can emit a sharp red emission light due to its f-f transitions, but sharp excitation band limits their application. For solving this problem, the charge transfer band of $Eu^{3+}$-$N^{3-}$ in α-$M_3B_2N_4$ (M=Ca, Sr) and $Li_2SiN_2$ has been investigated in our work. Meanwhile, $Eu^{2+}$ activated $Ca_5Si_2Al_2N_8$ has also been displayed for comparison. The results show that $Eu^{2+}$ or $Eu^{3+}$ activated phosphors have its own advantages and disadvantages, which also indicates their different application in WLEDs and FEWs.

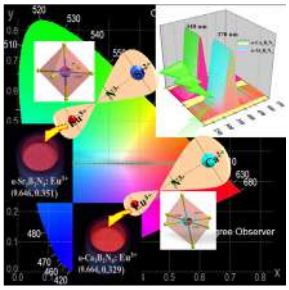


**Figure:** $Eu^{3+}$ activated nitride red phosphors of α-M3B2N4 (M = Ca, Sr) with broad excitation band of $Eu^{3+}$-$N^{-}$.

## Recent Publications

1. Ding J, Li Y, Wu Q et al. (2015) Novel red and green emitting Li 2 SiN 2: Eu $^{3+}$/Tb $^{3+}$ phosphors with a broad charge transfer band. Journal of Materials Chemistry C 3(33):8542-8549.
2. Ding J, Wu Q, Li Y, et al. (2016) $Eu^{2+}$-activated $Ca_5Si_2Al_2N_8$ – A novel nitridoalumosilicate red phosphor containing the special polyhedron of separated corner-shared [$Al_2N_6$] and [$Si_2N_6$]. Chemical Engineering Journal 302: 466-474.
3. Ding J, You H, Wang Y, et al. (2018) Site occupation and energy transfer of $Ce^{3+}$-activated lithium nitridosilicate $Li_2SrSi_2N_4$ with broad-yellow-light-emitting property and excellent thermal stability. Journal of Materials Chemistry C 6(13):3435-3444.
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## Biography

Jianyan Ding has expertise in Physics and Materials Science. At present, his main research interest is focused on nitride based red phosphors used for white light emitting diodes (WLEDs). In order to realize the red phosphors, several nitride based phosphors activated by $Eu^{3+}/Eu^{2+}$ have been reported by him. The red phosphors with narrow emission band and broad excitation band have been realized. However, there are still some problems need to be resolved, such as: thermal stability, quantum efficiency and preparation condition. In the future work, $Eu^{3+}/Eu^{2+}$ activated nitride based red phosphors would be improved through investigating the relationship between luminescence properties and crystal or electron structure.

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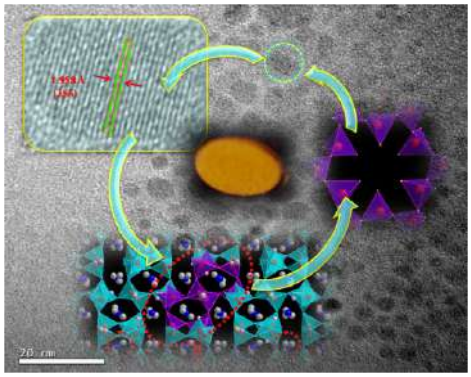
Xufeng Zhou et al., Res. Rev. J Mat. Sci. 2018, Volume 6
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# $K_4CaGe_3O_9:Mn^{2+}, Yb^{3+}$: A novel orange-emitting long persistent luminescence phosphor with special nano structure

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A novel germanate based orange emitting long persistent luminescence (PersL) phosphor: $K_4CaGe_3O_9$(KCGO):$Mn^{2+}$,$Yb^{3+}$ has been successfully synthesized by the solid-state reaction. The special nano structures of KCGO:$Mn^{2+}$ and KCGO:$Mn^{2+}$,$Yb^{3+}$ were indicated by transmission electron microscope (TEM) images that block particles of these samples and consists of many irregular spherical nano-particles and the size of these spherical particles is less than 10 nm. This special nano structure exist many defects and could provide precondition for the PersL properties of KCGO:$Mn^{2+}$. Furthermore, after co-doping with $Yb^{3+}$, the PersL properties have been effectively improved due to the new traps with high concentration caused by the nonequivalent substitution of $Yb^{3+}$. With the optimum doping concentration and sufficient excitation with UV light, the after glow of KCGO:0.02$Mn^{2+}$,0.015$Yb^{3+}$ can persist over 5 h above the recognizable intensity level (0.32 mcd/$m^2$). Both fluorescence and phosphorescence spectra of KCGO:$Mn^{2+}$,$Yb^{3+}$ exhibit only one broad emission band, which belongs to the $^4T_1(G)$-$^6A_1(S)$ transitions of $Mn^{2+}$. In addition, with the help of thermoluminescence (TL) curves, the processes and possible mechanism are studied and discussed.



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2. Xufeng Zhou et al. (2018) $K_4CaGe_3O_9:Mn^{2+}, Yb^{3+}$: A novel orange-emitting long persistent luminescence phosphor with special nano structure. Journal of Materials Chemistry C 6:7353-7360.

## Biography

Xufeng Zhou is a PhD student at Lanzhou University. His main research direction is solid luminescence material.

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# A composite of $MnO_2$ coated with graphene by galvanostatic electrodeposition and its highly active and stable catalysis for oxygen reduction reaction

**Xiaofeng Zhang, Zhongshui Li** and **Shen Lin**
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The development of efficient, low-cost and stable electrocatalysts as the alternative to platinum for the oxygen reduction reaction (ORR) plays key roles in several important energy storage and conversion technologies, such as fuel cells, metal-air batteries [1]. Manganese oxides (MnOx) have been widely investigated as a promising non-precious catalyst for ORR because of its abundance, low cost, environmental friendliness. Nevertheless, their practical applications of these materials are greatly impeded by its lower energetic efficiencies which is primarily ascribed to their poor conductivity and relatively lower amount of catalytically active sites. Moreover, MnOx catalysts are prone to aggregating in recycling use, which may further decrease the ORR catalytic activity and stability [2]. Herein, a composite consisting of spherical $MnO_2$ coated with reduced graphene oxide ($MnO_2$@RGO) has been prepared by step galvanostatic electrodeposition (Figure 1). Firstly, $MnO_2$ is deposited on the electrode surface by anodic galvanostatic method by the following process $Mn^{2+} + 2H_2O \rightarrow MnOOH + e^- + 3H^+ \rightarrow MnO_2 + 4H^+ + 2e^-$. And then a three-dimensional composite of reduced graphene oxide (RGO) coating $MnO_2$ is obtained through cathodic galvanostatic reduction of GO to RGO. The formed core-shell structure not only prevent graphene sheets from damage caused by pressure of MnOx on the surface of graphene, which may thereby maximizing the catalyst conductivity extremely [3], but also reduce the agglomeration of MnOx particles. In addition, owing to the larger specific surface area of graphene on the outer layer and its stronger electron-donating ability than $MnO_2$, the as-prepared composite is easier to adsorb and activate $O_2$ [4]. To the best of our knowledge, few research reports have been involved on the galvanostatic preparation of $MnO_2$-graphene core-shell composite and its application for ORR hitherto.

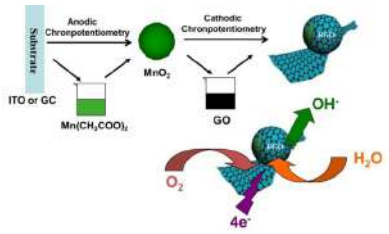



**Figure 1** Schematic preparation and $O_2$ electroreduction of the $MnO_2$@RGO catalyst.

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## Biography

Xiaofeng Zhang graduated with PhD in chemistry from Fujian Normal University (P.R. China) in 2016. She is under the supervision of Prof. Shen Lin, majoring in physical chemistry and materials chemistry. Her scientific interests focus on non-precious metal oxides/graphene composites and their catalytic properties of oxygen reduction.

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## Ni-based nanowire co-catalysts integrated with a Si photoanode for efficient water oxidation

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Photoelectrochemical water splitting is a sustainable pathway to produce clean hydrogen fuel. Due to the slow kinetics of the oxidation evolution reaction (OER), the realization of an efficient photoanode remains a great challenge. To lower the overpotential (η) for OER, crystalized and amorphous metal oxides integrated with photoanodes have been recently utilized as excellent co-catalysts. Considering the high cost of noble metal oxide catalysts due to their scarcity, such as $IrO_2$ and $RuO_2$, earth-abundant transition metal oxides, such as Ni-based nanowire electrocatalysts, hold promises for cost-effective and yet efficient water splitting. Compared to the limitation in charge extraction capability and light blocking of the conventional particle-based co-catalysts, the flexibility of engineering the morphology and the surface properties of templated Ni-based nanowire co-catalyts is enormous. That is, highly-ordered templated Ni-based nanowire co-catalyts can be advantageous for their light trapping, large surface-to-volume ratio, rapid carrier extractions, anti-reflection properties besides lowering the overpotential (η). We demonstrate that engineering the morphology of templated Ni-based nanowire co-catalysts on Si photoanode can lead to efficient OER. We shall further show that optimizing the surface properties of the nanowire co-catalysts by incorporating other divalent metal dopants such as Co and Fe can lead to efficient and stable water oxidation with low overpotential. In this work, Ni-based nanowires arrays are deposited electrochemically and physically on various substrates using ultrathin anodic aluminum oxide (AAO) template. The length, diameter and thickness of nanowires can be varied depending on the pores' dimensions and thickness of the AAO membrane leading to controllable co-catalysts morphology. Shown in figure is the scanning electron microscopy (SEM) image of pristine NiO nanowires deposited electrochemically on ITO substrate. We shall further show that by optimizing the surface charge properties through the deposition techniques and incorporating Co and Fe dopants, the overpotential for OER can be substantially reduced. Full electrochemical properties using three-electrode configuration in NaOH electrolyte will be presented. Further elemental and structural properties of the nanowire co-catalysts shall be thoroughly discussed. In brief, the use of such nanowire co-catalysts integrated with Si photoanode for high efficient and stable photoelectrochemical water splitting shall be demonstrated. This detailed study confirms that the morphology and surface Ni-based nanowire co-catalysts doped with Co and Fe can lead to lower OER overpotential.

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### Biography

Meshal S Aljohani has been working as an Academic Researcher at King Abdulaziz City for Science and Technology since 2016. He has completed his Master's degree in Chemical Engineering at King Saud University in 2015. His Master's thesis is entitled as "Photocatalytic production of hydrogen from ethanol-water solution using $TiO_2$-ZnO." He is currently working on "Fabrication of solar water-splitting device project" collaboration with the University of Cambridge, which is aiming to produce hydrogen from renewable energy sources. His current work focuses on oxides and perovskite-based materials to achieve highly efficient and stable solar fuel with low cost and high scalability.

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## Facile synthesis of laminated porous WS2/C composite and its electrocatalysis for oxygen reduction reaction

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Fujian Normal University, China

The Vulcan XC-72R supported WS2 nanocomposite (WS2/C)was prepared by solid reaction process combined with sonication. The as-prepared WS2/C nanocomposite presents a laminated porous structure by SEM and TEM characterization. The electrochemical experiments show that the onset potential and the limiting-current density of WS2/C is 0.78 V and 4.99 mA $cm^{-2}$, respectively, which is much higher than that of WS2 (3.12 mA $cm^{-2}$) and Vulcan XC-72R (2.79 mA $cm^{-2}$). The number of transfer electrons in ORR at the WS2/C nanocomposite electrode is 3.70, which is close to four-electron process. Besides, the current density of WS2/C nanocomposites remained at 90% after 20000 s, indicating its superior electrochemical stability. All these facts reveal that the as-prepared WS2/C nanocomposite can be regarded as a promising cathode ORR catalyst for fuel cell.

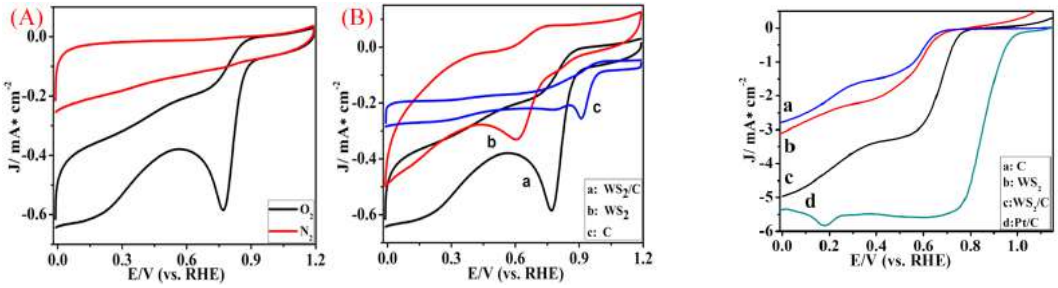



**Fig.1** Cyclic voltammograms of WS2/C (A) and different modified electrodes(B) in 0.1 M KOH solution at Scan rate of 30 mV $s^{-1}$.
**Fig.2** ORR polarization curves of different modified electrodein 0.1 M KOH saturated with $O_2$ at a rotating rate of 1600 rpm.

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### Biography

Xiaofeng Zhang graduated with PhD in chemistry from Fujian Normal University (P.R. China) in 2016. She is under the supervision of Prof. Shen Lin, majoring in physical chemistry and materials chemistry. Her scientific interests focus on non-precious metal oxides/graphene composites and their catalytic properties of oxygen reduction.

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## Controlled antibiotic-loaded, drug-eluting implants for osteomyelitis

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[1]Northwestern University, USA
[2]309th Hospital of the PLA, China

Bone infections are disastrous complications associated with orthopaedic implants such as prosthetic joints and fracture fixation devices. Local inflammation results osteolysis and destruction of the surrounding soft tissues. Management of such infections remains a significant challenge to clinicians, especially given the global rising prevalence of total joint arthroplasty. Current treatment regimens involve surgical debridement along with a prolonged course of antibiotics, which lacks bacterial and risks systematic toxicity to the patient. The efficacy of localized drug delivery, such as antibiotic-infused bone cement, is limited due to having only an initial burst release effect without a controlled, sustainable release profile. The ability to load antibiotics within a hydrogel scaffold to act as a drug delivery mechanism demonstrates promise in addressing this issue. In this study, we describe the fabrication of a vancomycin-loaded, polyethylene glycol (PEG) based hydrogel film covalently attached to titanium implant surfaces. Alginate microspheres were incorporated into the hydrogel to better control the rate of drug release. Specifically, this attenuates the initial burst release and delivers the drug at a more uniform rate by inhibiting hydrogel swelling. The resulting implants proved to be biocompatible and demonstrated minimal burst release, offering a consistent rate of drug elution for approximately four weeks *in vitro*. The rate of drug release could also be controlled by adjusting the amount of vancomycin loaded and hydrogel thickness. Material analysis characterized vancomycin dispersion kinematics as a function of the fabrication process. Antibiotic-loaded hydrogel coatings for titanium implants offer a unique drug delivery mechanism that maintains a sustained rate of drug release. *In vivo* studies are necessary to determine biodegradative properties of the material and the extent of antimicrobial activity against targeted organisms.

### Recent Publications

1. Butler B A, Fitz D W, Lawton C D, Li D, Balderama E S and Stover M D (2018) Early diagnosis of septic arthritis in immunecompromised patients. Journal of Orthopaedic Science 23(3):542-545.
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3. Li D, Li L, Ma Y, Zhuang Y, Li D, Shen H, Wang X, Yang F, Ma Y and Wu D (2017) Dopamine-assisted fixation of drug-loaded polymeric multilayers to osteoarticular implants for tuberculosis therapy. Biomaterials Science 5(4)730-740.
4. Kuiken T A, Bennet B A, Sharkey T, Ivy A D, Li D and Peabody T D (2017) Novel intramedullary device for lengthening transfemoral residual limbs. Journal of Orthopaedic Surgery and Research 12:53.
5. Fu S, Rossero J, Chen C, Alzgheir R, Li D and Takoudis C (2017) On the wetting behavior of ceria thin films grown by pulsed laser deposition. Applied Physics Letters 110:8.

### Biography

Daniel Li has completed his Undergraduate degree in Materials Science and Engineering at University of Illinois. He conducted research under John Rogers Research Group investigating novel biodegradable electronics. He has participated in a wide variety of both basic and clinical research regarding biomaterials in the context of orthopaedic applications, such as the use of hydrogels as a novel drug-eluting mechanism to combat osteomyelitis and tuberculosis infection. He has spent significant time overseas in the orthopaedics department at the 309th Hospital of the PLA in Beijing, China, working under the team of Dr Yuanzheng Ma. Currently, he is performing clinical outcomes research at Northwestern University regarding the evaluation of prosthetic joint infection.

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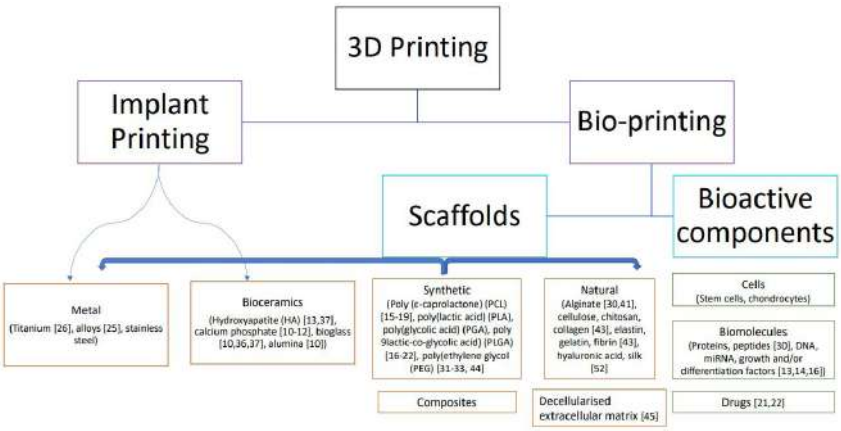
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## Advances in 3D printing in biomaterials for orthopaedic applications

**Dan Li**[1, 2], **Pravin Vence**[1], **Yaoyi Huang**[2], **Hong Shen**[2], **Yunlong Ma**[2] and **Yuanzheng Ma**[2]
[1]Northwestern University, USA
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3D printing aims to deliver intricate biomedical devices based upon advanced diagnostic imaging. With the current upsurge in public interest and increasing access to low-cost printers, efforts are underway to produce patient-specific anatomical models, customized implants, and individualized instrumentation. Examples include the development of disposable surgical saw guides and cutting blocks in total knee arthroplasty. These devices help minimize tissue loss and optimize the native biomechanics of the patient. This review explores the evolution of 3D printing technology in the context of biomaterials. It also aims to critiques the major challenges ahead in optimizing bioinks and biologic performance in bringing 3D bioprinting to clinical practice. Common materials include metals, bioceramics, synthetics, and natural polymers; each having specific mechanical properties, processing methodology and cell-material interaction. Biofunctional biomaterials are an emerging class of materials that display adaptability and activity at every phase of bone growth. These biomaterials have been shown to promote osteogenic differentiation, improve calcium phosphate (CaP) precipitation, and regulate osteoblast gene expression. When crafted to emulate the specific micro-environment of bone, polymer-surface modifications accelerate bony ingrowth. 3D printing holds promise as a scaffold for bone regeneration as precise control of the overall geometry and internal porous structure. The accompanying biomaterials may be successfully embedded within multi-cellular co-cultures and specific growth factors modulated to optimize growth and fixation. Bioceramics such as hydroxyapatite (HA), calcium phosphate, and bioglass, are osteogenic and promote cell proliferation, though they have been shown to lack appropriate mechanical strength. Composite scaffolds of HA and tricalcium phosphate and polycaprolactone (PCL)-HA with carbon backbones have been investigated to optimize biocompatibility and architecture to improve the porosity and mechanical strength of these constructs. Furthermore, microscale manipulation of biomaterials allow for integration of antimicrobial properties to combat infection.




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## Al-MCM-41 reinforced epoxy-polybenzoxazine hybrid nanocomposites

**Ananda Kumar S** and **Jayasree M R**
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Polybenzoxazine (PBZ) is a highly cross-linked thermosetting resin that created a wide interest as a matrix material for the fabrication of composites. Combination of PBZ with epoxy polymer provides an excellent balance of material property and enhances the main features of the resultant polymer such as an easy thermal curing by ring opening polymerization without the need of hardeners or catalysts; a low shrinkage during curing; a high glass transition temperature with a high charring yield; a low coefficient of thermal expansion; a low moisture absorption and good chemical resistance. Hence, attempts were made in the present work that focuses on the development and fabrication of epoxy blended PBZ material and their subsequent characterization by surface analytical techniques in order to find their suitability as advanced composite materials. The composition consists of epoxy resin, benzoxazine resin and varying weight percentages (1, 3 and 5 wt%) of inorganic filler of F-Al-MCM-41. The synthesized monomer was confirmed by 1H NMR and FTIR. The final product was characterized by DMA, dielectric studies and SEM-EDAX. Thermal curing and stability of the final products were also investigated using TGA. Five wt% of epoxy-PBZ nanocomposites showed higher storage modulus and dielectric constant than the neat one indicating its possible use for capacitor applications. The interesting results obtained from the investigation are discussed with experimental evidences.

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## Designing and application of biomaterials based cross-linked hybrid hydrogels

**Anujit Ghosal, Shivani Tiwari** and **Jaydeep Bhattacharya**
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**Statement of Problem:** Polymeric hydrogels are three dimensional (3D) interpenetrating (IPN) polymeric materials with high affinity and ability to hold water or molecular species within. Hybrid hydrogels can be considered as an advance material due to synergistic cocktail of organic and inorganic components. However, only an optimum concentration of the individual components can result in a stable, bio-compatible and cell sustaining hybrid hydrogel. Chitosan is a well-known biopolymer however, stiffness in the free standing dry films or high toughness in 3D structures results in brittle nature of the matrix. So, here we report the effect of secondary bio-polymers (Guar gum, PVA and glycerol) and inorganic nano-filler (Graphite) on the physico mechanical, physicochemical and bio-compatibility properties of the hybrid hydrogels.

**Methodology & Theoretical Orientation:** Longer chain length has the ability to increase the flexibility of the resulting hydrogel matrix in one hand, whereas, it also decreases the stability of 3D structure. So, along with co-polymeric mixture addition of graphite would certainly enhance the stability and intactness of the 3D structure. Additionally, dispersion of graphite also improves the cell adhesion and cell proliferation in the 3D hybrid hydrogel matrix. A set of hydrogels were designed with varying concentration of components over fixed and optimum concentration of graphite nanostructure. Optimum concentration of graphite was defined by the parameters such as cell adhesion, viability, proliferation of human embryonic kidney (HEK-293) cell line and A549, adeno carcinomic human alveolar basal epithelial cells, along with the swelling ability of the resulting hydrogels.

**Findings:** The ten times improvement in physico mechanical, chemical and swelling properties with higher cell adhesion efficiency of the hybrid materials projects their potential in the fields of advance materials for 3D cell culturing and tissue engineering.

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## Modification of cotton fibers with magnetic core-shell mesoporous silica nano particles

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Fabric materials have a wide diversity in the nature which can highlight cotton as one of the most abundant consisted in 96% of cellulose. The functionalization of cotton avoids facile degradation and damage by the environment, moisture, microorganisms, etc., and allows obtaining a highly desired material with extensile applications such as medical, construction, textile, among others. Electrostatic assembly better known as layer-by-layer (LbL) technique is an alternative option of cotton modification that consists in depositing controllable nano layers by the adsorption of oppositely charged poly electrolytes on the surface for further immobilization of charged nanoparticles, besides, LbL technique is very attractive for cotton modification due to its simplicity and its easy incorporation in just one coating at ambient conditions. LbL has an environmental characteristic that the most common solvent employed is water and the concentration needed is relatively low. Nanostructured materials have been aimed of many investigations in the textile field because of their attracting characteristics such as high surface area and unique physicochemical properties compared to bulk materials. Recently, core-shell nanoparticles have been focused due to their synergistic affects using a combination of a core and a shell made by different precursors and which unique and useful functionalities are obtained depending on this interaction affording to expand the fields of applications according to the shape, size and smart characteristics given by these core-shell nanostructures. In the present study, we have pre-treated and modified cotton fibers using PDDA and PSS polymers in order to functionalize the surface with charged polyelectrolytes for further nanoparticles attaching by electrostatic interaction. Magnetite and magnetic core-shell mesoporous suspension were prepared for coating the cotton fibers to compare and characterize the resulting material as a novel, innovative and promising product for different fields of application.

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## Journey from the forest of nanowires to the flatland of 2D materials

**Albert Davydov**
National Institute of Standards and Technology, USA

Silicon whiskers were discovered in late 1950's and rediscovered in mid-90's. A single layer of graphite was discovered in 2004 (crowned with the 2010 Nobel prize) and followed by explosion of research on other 2D layered materials including $MoS_2$ and related transition metal dichalcogenides. Both breakthroughs led to exploration of fascinating properties of nanowires and atomically-thin layers, including quantum confinement, reduced density of structural defects, large active surface area and functional flexibility for electronics, photonics, sensors and energy applications. This seminar discusses our group research on fabrication, characterization and processing of semiconductor nanowires (NWs) into small-footprint chemical sensors, photodetectors and Li-ion batteries. The design of NW platforms spans from pick-n-place silicon and gallium nitride individual nanowire devices to vertically- and/or horizontally aligned periodic arrays towards wafer-scale device fabrication. From the forest of nanowires, the talk will proceed to the flatland of $MoTe_2$, $MoSe_2$ and other metal chalcogenide thin films, with the aim to benchmark their structural, optical and electrical properties and explore their potential application in beyond CMOS low-power, high-speed and flexible electronics and chem/bio-sensors.

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## Anticorrosive performance of the scratched coating systems on carbon steel in marine environment by electrochemical technique

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In practice engineering, defects were inevitable for protective coating systems on steel surface. In this paper, a composite coating system, including primer, middle coat as well as top coat were used to protect the carbon steel against corrosion in marine environment. Among them, two environmental additives, glass fibers and thiourea were applied in middle coat to modify the coating system. The long-term corrosion durability and the self-healing ability of the scratched coating system were evaluated by multiple methods. Results of electrochemical technologies indicated that the coating system containing 0.5 wt.% fibers and 0.5 wt.% thiourea presented a good performance of corrosion protection and self-healing for carbon steel as immersing in 3.5% NaCl for 120 days. The evolution of localized corrosion factor with time obtained from current distribution showed that fibers combined with thiourea could effectively inhibit the occurrence of the local corrosion for the scratched coating systems and greatly delay the development of corrosion process. Surface characterization suggested that adequate of thiourea could be uniformly absorbed on fibers for a long time to play an important role in protecting the carbon steel. At last, the schematic models were established to demonstrate the action of fibers and thiourea on the exposed surface of the carbon steel and the scratched coating system in the whole deterioration process.

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## The role of CNTs on the characteristics of mechanically alloyed and spark plasma sintered CNT-Fe nanocomposites

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Metal composites reinforced by carbon nanotube (CNT) often show improved mechanical properties along with various interesting properties associated with the interfaces between CNTs and metal matrix. For example; ion irradiation experiments on CNT-aluminum composite demonstrate that the CNT-metal interfaces can act as efficient defect recombination sites and as a result reduce void generation and radiation hardening. Most of the metal matrices studied so far are non-ferrous metals, e.g., Al, Cu, Ni etc., and there are only few studies on CNT-ferrous alloy. A recent research paper concerning the fabrication of 304LSS–CNT composites using mechanical alloying combined with hot pressing and melting has also been found. Recently, we fabricated and investigated a 304 stainless steel and carbon nanotube (304SS-CNT) composite with an aim to study its microstructures and high-temperature tensile properties. 304SS powders were mixed with carbon nanotubes using ball milling and consolidated using the spark plasma sintering technique. Tensile specimens made from the consolidated samples of 304SS-CNT were tested in a temperature range from 299 K to 773 K. The yield strength and the work hardening of the 304SS-CNT samples were found to be higher than those of a sample fabricated from 304SS without carbon nanotubes for all tested temperatures. 304SS-CNT samples have a microstructure significantly different from the 304SS sample, e.g., reduced grain size and many small cuboidal particles. Composition analysis using energy-dispersive spectroscopy revealed that the cuboidal particles are chromium carbides and the chromium content is reduced in the 304SS-CNT matrix. In this study, we extended our previous work to CNT-Fe matrix composites. We will present the role of CNTs on the formation of micro structures and mechanical properties of pure Fe and ferrous alloys.

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## Compatibilization and reinforcement effect of thermally reduced graphene: Elemental sulphur composites on high density polyethylene (HDPE)

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In this study, structure and properties of various hybrid composites of high-density polyethylene (HDPE) containing thermally reduced graphene (TRG) and elemental sulphur were investigated. Samples of HDPE-TRGS hybrid composites were fabricated by twin-screw extruder and injection molding machine in accordance with the standard test specimens. Mechanical properties and morphology of HDPE and HDPE-TRGS hybrid composites were examined by universal testing machine (UTM), TEM and SEM. Furthermore, AT- FTIR, XRD and Raman spectroscopy, examinations were performed to establish the structure-properties relationships. The mechanical properties significantly improved, when the proper amounts of TRGS materials were added to HDPE. The tensile strength of the hybrid composites was increased with insignificant loss of elongation. These improvements in properties are mainly due to the compatibilizing effect of TRGS and polymerization of octasulfur rings. TEM and SEM studies show that the graphene and sulfur were dispersed in HDPE matrix uniformly and make the composite more compactable. Elemental mapping and EDAX spectra showed that sulfur is present in the composite and distributed uniformly.

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## Strong hydrogels fabricated by 3D printing with oppositely charged polymers

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Hydrogels are commonly used to prepare bioinks, as they are soft and hydrophilic as well as possess similarities to biological tissues. Natural hydrogels, such as alginate, gelatin, collagen and chitosan, which show good biocompatibility with nontoxic degradation products, have received great attention in the field of biomedical engineering. However, these natural hydrogels have limitations for their broad applications because they are weak by nature. Therefore, many studies focus on improving mechanical properties of hydrogels. 3D printing is a layer-by-layer printing process, where there are often layer defects or weak interface adhesion in 3D printed layered structures with hydrogels. As a new approach, alternate printing of two kinds of hydrogels maybe possible to overcome the drawbacks of printing one hydrogel alone. Furthermore, alternate printing of two oppositely charged ionic hydrogels is expected to result in a strong interface adhesion between layers, but it has not been found in the literature. In this study, we report a new strategy and approach for fabrication of strong hydrogel constructs with strong interfacial bonding by utilizing the ionic interaction between two oppositely charged hydrogels. Six natural ionic polymers are chosen as the representatives of anionic and cationic hydrogels, respectively. Specific properties such as rheological properties of the prepared hydrogels, shape fidelity of a printed structure, structure integrity of a printed construct in the cell culture medium are investigated. These properties help us to find the best concentration of each hydrogel and the best combinations for bioprinting. The interfacial adhesion properties between the printed hydrogel layers are also examined. Additionally, the biocompatibility of the best pair of bioink is also investigated.

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## A new interfacial bio-sensing approach for detecting aberrant protein phosphorylation in cancer

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Protein phosphorylation is one of the most prominent post-translational mechanisms for protein regulation, which is frequently impaired in cancer. Through the covalent addition of phosphate groups to certain amino-acids, the interactions of former residues with nearby amino-acids are drastically altered, resulting in major changes of protein conformation that impacts its biological function. Herein, we report that these conformational changes can also disturb the protein's ability to interact with and adsorb onto bare gold surfaces. Based on the direct interaction of proteins with the gold interface, we further developed an extremely simple method for aberrant phosphorylation detection that circumvents the current need for phospho-specific antibodies. The novel interfacial bio-sensing method, which only requires 50 ng of purified protein, was applied to EGFR phosphorylation analysis in several lung cancer cell lines and enabled monitoring their cell sensitivity to tyrosine kinase inhibitors (TKI) a drug frequently used in the clinic for lung cancer treatment.

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## Thermal investigation of phase change materials based on LLDPE, paraffin wax and expanded graphite

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Paraffin waxes which are saturated hydrocarbon mixtures, generally entailing of a mixture of different alkanes are frequently used as phase change materials (PCMs) due to their numerous advantages such as high latent heat of fusion, negligible super-cooling, low vapor pressure in the melt and chemical inertness. Paraffin waxes, blended with appropriate polymers to avoid the leaching of paraffin during heating, seem to be the best way for preparation of smart PCMs for different applications such as thermal storage of solar energy, thermal protection of electronic devices, thermal protection of food and medical goods, passive storage in bio climatic buildings and thermal comfort in vehicles. Due to the relatively low thermal conductivity of linear low density polyethylene (LLPDE) and also paraffin wax (approximately 0.2 W/mK) it is necessary to improve the thermal conductivity of the PCMs by adding conductive fillers. Nowadays, expanded graphite (EG) is commonly used to improve mechanical, electrical conductivity, thermal conductivity and other thermophysical properties. In this contribution thermal properties of the PCMs based on LLDPE, paraffin wax RT42 (melting point around 42°C) and expanded graphite were characterized by unique devices, namely PCGT and DICO devices, which allows an investigation of thermal properties of large sized samples in comparison with common differential scanning calorimetry (DSC). Storage and release of thermal energy of the PCMs have been performed by means of PCGT device. It was confirmed that all prepared PCMs were able to store and release thermal energy. Also reproducibility of storage and release heat of the PCMs by repeating of heating and cooling process has been demonstrated. The best results in view of time needed for storage and release energy were achieved with PCMs containing 15 wt% of EG. Thermal conductivity and diffusivity of the PCMs have been measured by DICO device. Increase of the EG content in the PCMs led to the increase of thermal conductivity and also thermal diffusivity for all investigated PCMs.

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## Competitive crystallization in Al-Sm involving metastable large-unit-cell intermetallic phases: chemical partitioning and crystal genes

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Amorphous alloys of Al-Sm exhibit competitive devitrification behavior upon reheating, involving competition between multiple metastable phases. These include large-unit-cell phases with cubic, hexagonal and tetragonal symmetry, along with more conventional stable and metastable compounds. Phase selection during crystallization is strongly path dependent, owing to effects of non-crystalline ordering and the role of diffusion and chemical partitioning in the morphological dynamics. In this work, devitrification kinetics is investigated and quantified using high energy X-ray diffraction, thermal analysis and electron microscopy. Measurements are related to system thermodynamics in the highly driven regime highlighting principles of selection. Growth mechanisms are investigated in detail, with particular attention to chemical partitioning associated with the initial crystallization front. Implications with respect to other Al-RE (rare-earth) systems are also discussed.

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## Designing anisotropic metamaterials with wave propagation isolation properties

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The advancement of additive manufacturing has led to a new paradigm in the design of materials. New artificial materials arose, not through chemically modified material units but rather through appropriately coined inner material architectures. The wording metamaterials has been employed to designate the potential of creating static and dynamic behaviors which are typically not encountered in common engineering materials. Up to now a considerable amount of works have been dedicated to a class of metamaterials named auxetics, because of their property of laterally expand when stretched. In the current work, we present a systematic approach to create two-dimensional orthotropic metamaterials with a non auxetic material behavior that exhibit wave propagation isolation features. To that scope, we employ polygonal-shaped unit cell material architectures that lead to highly anisotropic material designs in a systematic manner. We compute the anisotropic metamaterial's wave propagation characteristics for all propagating material directions. Thereupon, we identify a material direction of vanishing longitudinal and shear phase velocities. We observe that the vanishing phase velocity direction coincides with the material direction with the weakest normal mechanical modulus. We discuss on the role of Poisson's ratio and shear stiffness obtained by wave propagation features, deriving overall conclusions on the underlying structural mechanisms.

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## Enhancement of thermoelectric properties in mechanically alloyed $Bi_{0.4}Sb_{1.6}Te_3$ bulk nanocomposite containing $Ti_{50}Cu_{28}Ni_{15}Sn_7$ amorphous particles

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During mechanical alloying of Bi, Sb and Te elemental powder mixture, the $Bi_{0.4}Sb_{1.6}Te_3$ compound phase can be obtained after 2 hours of mechanical alloying treatment. The as-milled $Bi_{0.4}Sb_{1.6}Te_3$ powders were further mixing with $Ti_{50}Cu_{28}Ni_{15}Sn_7$ amorphous particles to form $Ti_{50}Cu_{28}Ni_{15}Sn_7/Bi_{0.4}Sb_{1.6}Te_3$ composite powders after 30 minutes ball milling. The $Ti_{50}Cu_{28}Ni_{15}Sn_7/Bi_{0.4}Sb_{1.6}Te_3$ composite powders were consolidated into bulk samples with a diameter of 20 mm and thickness of 10mm by using vacuum hot pressing. The nano-/microstructured structure were observed for $Ti_{50}Cu_{28}Ni_{15}Sn_7/Bi_{0.4}Sb_{1.6}Te_3$ bulk samples. TEM bright-field image shows that the $Ti_{50}Cu_{28}Ni_{15}Sn_7$ amorphous phase with particle size of about 50 nm were homogeneously distributed along the grain boundary of $Bi_{0.4}Sb_{1.6}Te_3$ matrix with grain size around 0.5~2.0 μm. The thermoelectric properties of $Ti_{50}Cu_{28}Ni_{15}Sn_7/Bi_{0.4}Sb_{1.6}Te_3$ samples were measured. The results indicated, either use high purity (99.999%) or low purity (99.5%) Sb and Te as starting materials, the values of figure of merit (ZT) for the $Ti_{50}Cu_{28}Ni_{15}Sn_7/Bi_{0.4}Sb_{1.6}Te_3$ bulk composite samples were found to increase with temperature in the range from 298 K to 580 K. It is the first time that such specific behavior has been observed. For 3 wt.% amorphous $Ti_{50}Cu_{28}Ni_{15}Sn_7/Bi_{0.4}Sb_{1.6}Te_3$ specimen use high purity Sb and Te powders as starting materials, the maximum ZT value is only 0.9 at 473 K but is expected to reach 1.18 when the ZT curve is extended from 473K to 580K. For 1.75 wt. % amorphous $Ti_{50}Cu_{28}Ni_{15}Sn_7/Bi_{0.4}Sb_{1.6}Te_3$ specimen fabricated from low purity Sb and Te powders, the maximum ZT value is 1.08 at 580 K, which is the highest ZT values among the existing typical low temperature thermoelectric materials has been measured at 580 K.

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## Effect of voltage on micro arc oxidation of 6061-Al alloy

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The ceramic film on 6061-Al alloy was prepared by micro arc oxidation (MAO). Effect of voltage on the microstructure and corrosion resistance of MAO coatings were studied by scanning electron microscopy (SEM), X-ray diffraction (XRD), electrochemistry impedance spectroscopy (EIS) and a coating thickness tester. The results showed that the surface morphology of MAO coating on 6061 aluminum alloys is porous volcano-like microstructures. The ceramic coatings are mainly composed with the phase of $\gamma$-$Al_2O_3$ and slight $\alpha$-$Al_2O_3$. Mullite phase ($3Al_2O_3 \bullet 2SiO_2$) appeases when the value of voltage is 500V. With the voltage increasing, the coating thickness and the size of discharge channels increased. The micro cracks will appear at 500V. However, the number of discharge channels and corrosion resistance increased at first and then decreased with the increasing of voltage. Accordingly, when the value of voltage is 450V, the corrosion resistance of the coating showed enhanced properties.

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## Comparative photoluminescence study of $GdBO_3$: Eu phosphor in bulk and nano phase for its implication in solid state lightening

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Rare-earth borates are excellent candidates for solid state lightening application due to its robust nature and brilliant optical properties. $GdBO_3$: $Eu^{3+}$ is one of the finest phosphors existing amongst borate phosphors for primary red color. In this work we investigate the nature of structure-composition-optical relationships in both nano and bulk forms of $GdBO_3$:$Eu^{3+}$. Nanophosphors have unique physical and chemical properties as compared to their bulk counterpart and so their emission efficiencies vary which can finely be tuned and considerably improved. $GdBO_3$ exists in both monoclinic and triclinic phase. $GdBO_3$ containing 1 at.% $Eu^{3+}$ were prepared in nano-crystalline, monoclinic and triclinic forms by hydrothermal and polyol route. Techniques like XRD, FTIR, TEM, luminescence and lifetime measurements were used to characterize the samples. SAED pattern illustrate phase formation while presence of nano rods with 200 nm length and width less than 10 nm are confirmed from TEM images. Boron was found in both trigonal and tetrahedral coordination in nanorods and triclinic phase, whereas only $BO_4$ structural unit exists in monoclinic $GdBO_3$. Based on bond angle and bond length values obtained from Rietveld refinement of the XRD patterns it is inferred that local environment around $Eu^{3+}$ in the triclinic form is more distorted compared to monoclinic form. This explains increase in the relative intensity of electric dipole allowed transition of $Eu^{3+}$ in triclinic form compared to monoclinic form. Red to orange ratio of $Eu^{3+}$ in triclinic and nanorods is found to be higher than the monoclinic phase. From the results it is inferred that the nanorods have improved red color characteristics compared to the other two forms. By size tuning we improvised optical parameters of the phosphor to develop materials with optimum luminescence characteristics.

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## Energy efficient CuO-ZnO heterojunction nanocomposite: Study of band gap tuning, energy band alignment and photo-induced charge transfer mechanisms

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Oxide-semiconductor based heterojunction nanocomposites (HNCs) have garnered enormous research interest worldwide and exhibited progressively advanced features such as effective separation of photo generated electron hole pairs for their auspicious adoption in photovoltaic, photocatalytic and optoelectronic applications. Great emphasis has been paid to fulfill the objectives of HNCs by synthesizing nanocrystalline narrow band gap p-type copper oxide with wide band gap n-type zinc oxide using sol-gel technique. The structural, optical and electronic properties of developed HNCs were studied using X-ray diffraction, micro-Raman spectroscopy, high resolution transmission electron microscopy (HRTEM), photo-luminescence spectroscopy and X-ray photoelectron spectroscopy (XPS) and ultraviolet photoelectron spectroscopy (UPS) techniques. Results revealed that Cu doping concentration upto 5% remains within the solubility limit of ZnO however, the higher Cu-doping concentration leads to formation of ZnO-CuO HNCs. Cu-doping decreases ZnO band gap by introducing impurity energy levels and exhibits absorption in visible region of electromagnetic radiation. The crucial information of local electronic structures has been understood in terms of the hybridized electronic states and variation of valence band maxima with respect to Fermi level with increasing the Cu-doping in ZnO-CuO HNCs. The enhanced photocatalytic activities and efficient charge transfer mechanism in ZnO/CuO HNCs are rationalized and studied in terms of band gap tuning, energy band alignment and charge migration at ZnO/CuO heterojunction interfaces. Detailed results will be presented.

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21st International Conference on

# Advanced Materials & Nanotechnology

September 04-06, 2018 | Zürich, Switzerland

## Ultrasound in wet biological materials subjected to drying

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The aim of this article is to present the effect of external action of air-borne ultrasound (US) upon biological wet materials subjected to drying. The study allows determining the drying effectiveness of such products like fruits and vegetables by convective drying with ultrasound enhancement. The vibration and heating effects induced by power ultrasound are considered. The mathematical model of drying is developed and validated experimentally using the data obtained from the experimental tests carried out on the hybrid dryer equipped with ultrasonic generator. The obtained results proved that the vibration effect induced by ultrasound has a great impact on the acceleration of mass transfer without significant elevation of product temperature and thus on the drying efficiency with respect to energy utilization and the quality of dried products like fruits and vegetables.

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## Confined nanoscale geometries to enhance sensitivity of plasmonic immunoassays

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Sensitive transduction of bio-molecular binding events on chip carries profound implications to the outcome of a range of biological sensors. This includes biosensors that address both research as well as diagnostic questions of clinical relevance, e.g., profiling of biomarkers, protein expression analysis, drug or toxicity screening and drug-efficacy monitoring. Nanostructured biosensors constitute a promising advance in this direction owing to their ability in catering to better sensitivity, response times and miniaturization. Plasmonic sensors are particularly interesting among nano-biosensors as they exploit light matter interactions in the nanoscale to transduce bio-recognition events with high sensitivity and miniaturized measurement footprints. Examples of plasmonic sensors include localized surface plasmon resonance spectroscopy (LSPR), surface enhanced Raman spectroscopy (SERS) and metal-enhanced fluorescence (MEF). The performance of the plasmonic sensors critically relies on ability to engineer nanoscale geometric attributes at length scales that typically overlap with the size of small proteins. Such geometries invariably introduce constraints on the molecular binding response, thus altering the interaction outcomes, viz. density and kinetics of adsorption, molecular orientations, in a manner that would impact the resulting optical response. A careful engineering of the nanoscale geometries can simultaneously take advantage of EM field enhancements together with molecular interaction within nanoscale geometries. To this end, this project aims at an engineered nanoscale interface with geometry tailored to simultaneously favor molecular adsorption and plasmonic enhancements for application to plasmonic sensors based on surface-enhanced Raman and fluorescence spectroscopies.

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## Advanced protection and evaluation techniques against corrosion

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Corrosion is an unavoidable scenario, which leads to widespread of losses and dangers if not properly protected. Every country faces heavy economic losses due to corrosion everyday irrespective of the level of development of the country and their geographical location. With more industrial advances in the world together with atmospheric changes, there are more challenges to overcome in corrosion protection strategy development. Proof of durability for long term protection under harsh environment is necessary. Need for novel advanced corrosion protection strategies such as smart coatings with self-healing capabilities became inevitable with more environmental regulations being adopted such as the ban of chromate conversion coating. Another major demand from end users from various industrial sectors is the requirement for multifunctional properties to supply the same coating system such as esthetic necessities, fire retardant properties, etc. without compromising corrosion protection attributes. This becomes even more challenging as productivity has also become one strong demand. Thus, to provide productive coating systems with outstanding corrosion protection properties to prove long lasting protection even under harsh environmental and service conditions together with multifunctional properties is the key to success in this area. On the other hand, it is very important to use proper corrosion characterization techniques and methods to evaluate the performance of these coatings. These challenges and a review on current advanced coating systems will be presented in this talk. Recent developments in advanced zinc rich coatings and sol-gel coatings will also be discussed. Some insight into advanced corrosion and electrochemical characterization techniques to evaluate these coatings will also be presented.

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## Tunable light-emitting carbon-dot/polymer flexible films prepared through one-pot synthesis

**Susanta Kumar Bhunia**
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Development of efficient, inexpensive and environmental-friendly light emitters, particularly devices that produce white light have drawn intense interest due to diverse applications in the lighting industry, photonics, solar energy and others. We present a simple strategy for the fabrication of flexible transparent films exhibiting tunable light emission through one-pot synthesis of polymer matrices with embedded carbon dots assembled in situ. Importantly, different luminescence colors were produced simply by preparing C-dot/polymer films using carbon precursors that yielded C-dots exhibiting distinct fluorescence emission profiles. Furthermore, mixtures of C-dot precursors could also be employed for fabricating films exhibiting different colors. In particular, we successfully produced films emitting white light with attractive properties (i.e., warm white light with a high color rendering index)–a highly sought after goal in optical technologies.

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# INDEX


| | | | | | |
|---|---|---|---|---|---|
| A Papadopoulou | 119 | Heeyeon Kim | 115 | Shen Lin | 94 |
| Abdulrahman Sumayli | 122 | Janos Dobranszky | 90 | Sylvain G Cloutier | 96 |
| Alexandre Maître | 84 | Jhinhwan Lee | 78 | Tahmineh Forati | 71 |
| Amir Elsaidy | 72 | Jianyan Ding | 124 | Tai-Horng Young | 116 |
| Amir Elsaidy | 108 | Jie Chen | 123 | Takako Konoike | 112 |
| Ankita Ghatak | 54 | Jun-Hyun Kim | 120 | Tiva Sharifi | 60 |
| Anna Boczkowska | 83 | Junshi Ichikawa | 100 | Toshihiro Miyata | 61 |
| Anna Lewandowska | 97 | Junzhe Dong | 118 | Uliana Pinaeva | 73 |
| Barnali Ghosh (Saha) | 55 | K Koushik | 121 | V Gayathri | 91 |
| Bin Zhu | 41 | Keigo Takeda | 63 | Vignesh N | 66 |
| Clément Genet | 70 | Kentaro Tsunoda | 104 | Wolfgang Gräfe | 82 |
| Dafna Knani | 64 | Kimihisa Yamamoto | 59 | Wolfgang Weber | 89 |
| Dan Li | 130 | Mahabubur Chowdhury | 88 | Xiaofeng Zhang | 126 |
| Daniel Li | 129 | Meshal S Aljohani | 127 | Xufeng Zhou | 125 |
| Dieter M Gruen | 40 | Nataraj J R | 92 | Yoshinobu Aoyagi | 52 |
| E A Brocchi | 114 | Noriko Kurose | 50 | Yusuke Daiko | 117 |
| Florentina Maxim | 48 | P M Radingoana | 109 | Yuta Kashitani | 102 |
| Gerd Kaupp | 44 | Ricardo A M Gotardo | 93 | Yutaka Oyama | 86 |
| Giovanni Perillo | 56 | Rodrigo Martins | 76 | Yuto Horigome | 106 |
| Hai Chen | 105 | Roger Amade | 57 | Zhongshui Li | 128 |

# CME CREDITS

## Physicians, Health professionals including Nurses and Nurse practitioners, Physician assistants, Psychologists, Social workers, Family therapists, Dieticians and Pharmacists

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

6th International Congress on
**Gynecology & Gynecologic Oncology**
July 23-24, 2018 Rome, Italy
E: gynecology@nursingmeetings.com
W: gynecologiccancer.conferenceseries.com

6th World Congress on
**Control and Prevention of HIV/AIDS, STDs & STIs**
August 27-28, 2018 Zurich, Switzerland
E: std@infectiousconferences.com
W: globalhiv-aids-std.infectiousconferences.com

20th International Conference on
**Pediatrics & Primary Care**
September 03-04, 2018 Zurich, Switzerland
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graciejones033@gmail.com
W: primarycare.pediatricsconferences.com

29th International Conference on
**Adolescent Medicine & Child Psychology**
September 04-06, 2018 Zurich, Switzerland
E: childpsychology@psychiatrycongress.com
W: childpsychology.conferenceseries.com

4th International Conference on
**Hypertension & Healthcare**
September 10-11, 2018 Zurich, Switzerland
E: hypertensionconference2018@rediffmail.com
W: hypertension.conferenceseries.com

**24th European Pediatrics Conference**
September 10-11, 2018 Copenhagen, Denmark
E: europediatrics@gmail.com
europediatrics@annualconferences.org
W: pediatrics.conferenceseries.com/europe

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

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

6th International Conference on
**Brain Disorders and Therapeutics**
September 13-15, 2018 Copenhagen, Denmark
E: braindisorder@neuroconferences.com
W: braindisorders.conferenceseries.com

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

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

13th World Conference on
**Neurology and Neuromuscular Disorders**
October 01-02, 2018 Frankfurt, Germany
E: neuromuscular@surgerymeetings.com
W: neuromuscular.neuroconferences.com

17th International Conference on
**Clinical and Experimental Ophthalmology**
October 01-03, 2018 Moscow, Russia
E: ophthalmology@ophthalmologyconferences.com
W: ophthalmology.conferenceseries.com

5th International Conference on
**Gynecology and Obstetrics**
October 08-10, 2018 Zurich, Switzerland
E: gynecology@nursingconference.com
W: gynecology.conferenceseries.com

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

# CME CREDITS

## Physicians, Health professionals including Nurses and Nurse practitioners, Physician assistants, Psychologists, Social workers, Family therapists, Dieticians and Pharmacists

**33rd Euro Nursing & Medicare Summit**
October 08-10, 2018 Edinburgh, Scotland
E: euronursing@nursingconference.com
W: europe.nursingconference.com

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

**25th World Pediatrics Conference**
October 18-20, 2018 Warsaw, Poland
E: worldpediatricsconference@gmail.com
W: worldpediatrics.pediatricsconferences.org

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

**27th European Cardiology Conference**
October 22-24, 2018 Rome, Italy
E: eurocardiology@cardiologymeeting.com
W: cardiologyconference.cardiologymeeting.com

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

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

4th International Conference on
**Central Nervous System Disorders & Therapeutics**
November 12-14, 2018 Edinburgh, Scotland
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