EuroSciCon

8th Edition of International Conference and Exhibition on Separation Techniques

July 29-30, 2019 | Dublin, Ireland

Theme: Exploring new trends in Separation Techniques and its related fields

Abstract

EuroSciCon

Vacuum vs argon 100 years of rivalry in the separation of hydrogen from solid

MukasaTebandekelZ

Wesleyan University,
USA

Production of biogas from aqueous slurries of organic wastes using anaerobic digestion in a reactor relieves pollution of the environment which occurs when garbage is dumped at landfill. It can be produced from cattle dung, decaying leaves, fruits, grass, vegetables, waste cooked foods, sewage sludge, chicken, goat, pig or sheep manure as single or mixed substrate in airtight digesters. Cattle dung, cooked food waste and chicken droppings mixed with coffee husks were degraded singly and also as mixed substrates in a digester for 27 days, the volume biogas formed was measured at fixed time intervals and soil conditioner formed was removed from reactor on 28th day. Slurries containing mixed substrates yielded more gas than single substrate slurries. At a load of 225g/L yielded 315 to 435mL/L of methane at ambient temperatures. The digestion of cattle dung, cooked waste foods, and droppings of chicken was thus effective at transforming bioorganic pollutants to methane, a renewable energy and soil conditioner. The experiments showed achievements in removing fractions of organic pollutants from Kampala as well as recovering energy from decomposing solid wastes which would produce pollute the environment with bad odors in addition to accumulation of solids at garbage pits.

The use of sepaths modern automatic solid-phase extraction system to prepare the samples of drinking water, food, biological medium, in the chemical analysis of N-nitrosamines

Paul C H Li

Simon Fraser
University, Canada

This paper presents a unique design of patterned electrodes on a microchip for dielectrophoretic manipulation of a single particle. The DEP chip, which is developed for the study of 'same-single-cell analysis by accumulation' (SASCA-A), provides better stability for particle trapping. This microchip consists of a retention structure and 3 platinum electrodes embedded on the bottom of the particle retention area. The position of the particle such as a fluorescent polystyrene bead (negative charge) is controlled by the high-frequency alternating voltages generated at the electrodes. The effects of frequency and magnitude of the applied voltage on the bead's position have been investigated in detail. A polystyrene bead has been successfully trapped between two electrodes under the optimal conditions (18.5 V_{pp}, 9 MHz). The bead's shuttling has been obtained by voltage switching, and the fluorescent signal of the bead is also measured. To help understand the dynamics of DEP manipulation of the polystyrene bead in a microchip device, three-dimensional (3D) COMSOL Multiphysics simulations with particle tracing model were employed.

Analysis of complex geometric structures and packed porous media for the specific cell separation produced by additive manufacturing

Sebastian Sdrenka

Clausthal University of
Technology, Germany

Porous media are of great interest for numerous engineering applications, in particular for mass transfer, heat and energy transport, separation technique, and the use as catalyst. New application possibilities currently exist, especially in the area of so-called life science technologies. The TACS® technology (Traceless Affinity Cell Selection) is developed by IBA GmbH for the reversible immunochromatography of specific cells from whole blood samples in a higher and more cell-sparing quality and yield than current separation methods. The most important point of this new development from various washing and rinsing cycles is the separation matrix based on agarose, which is constantly being optimized. A new idea in the context of process modification is to produce the separation matrix by innovative additive manufacturing technologies under considerations of the special biological and process-related boundary conditions. One of the most important points for an effective separation result belongs to the geometrical structure. Related to the structural volume a large surface area in microstructures is required. An important feature for optimal mass transfer and thus for high-quality cell separation is the smoothest possible surface, so that the cells do not have the possibility to adhere on the surface of the structure and subsequent to build agglomerate formations due to their characteristic surface structure

SPEAKER SLOTS AVAILABLE

Biography

EuroSciCon

Advanced treatment technologies for wastewater recovery & reuse – AUS perspective

Peter S Cartwright

University of Minnesota, Netherlands

While the total volume of water on this planet has remained relative constant for millions of years, its overall quality continues to deteriorate, primarily resulting from increasing human population and activity.Climate change is contributing to the growing shortages of fresh water in many areas of the United States. Industries and municipalities are investigating solutions to these challenges, involving advanced treatment technologies to not only reduce water use, but to also intercept wastewater discharges for treatment and reuse. This workshop identifies the specific contaminants in these wastewater streams and identifies the technologies appropriate for reuse treatment. Whereas the crossflow, pressure-driven membrane separation technologies of microfiltration, ultrafiltration, nanofiltration and reverse osmosis are the most widely used advanced treatment technologies today, many applications require additional technologies to produce the optimum system in a given application. A number of case histories are detailed with regard to design, application and successful operation.

Dielectrophoretic manipulation of a single particle on a microfluidic chip: experimental observation and COMSOL simulation

Vladimir A Polyanskiy

Peter the Great St.Petersburg Polytechnic University, Russia

It was M. Fremy who first established in 1861 that the mechanical properties of steel degrade because of the dissolved hydrogen. It has been found out that microscopic concentrations of hydrogen at 10 ppm can permanently and imperceptibly damage steel. As a result, the concentration of hydrogen in steel was first measured during the production of rolled metal and later on in the production of castings from aluminum and aluminum alloys, titanium alloys, magnesium alloys, zirconium alloys, nickel alloys, in the weld metal, etc.
Initially, the measurement methods were based on the idea of heating the sample under vacuum. In the 1930s, the first patents appeared on the use of a chromatographic sensor for measuring the concentration of hydrogen in argon stream. The era of hydrogen argon analyzers began. Currently, 99% of hydrogen analyzers operate on the basis of gas detectors.
Suddenly, the competition with vacuum devices reached a new level.New materials turned out to be very sensitive to internal hydrogen.

Biogas synthesis: a means of organic solid waste management in Kampala

Nurislamova T V

Federal Budget Scientific Institution, Russia

Nitrates in drinking water cause a genetic risk, because they might transform into secondary N-nitrosamines with a high degree of mutagenic activity under certain conditions in the body. When preparing drinking water samples for chromatography-mass spectrometry analysis of N-nitrosamines (N-nitrosodimethylamine NDMA, N-nitrosodiethylamine NDEA), a modern method of solid-phase extraction (SPE) has been used, which enables to obtain in pure form the determined compounds when throwing out of the matrix, which makes it possible to identify and quantify their using chromatography-mass spectrometry method. To optimize the preparation process of drinking water samples using SPE, the following parameters have been varied: the adsorbent content (coal, polymer base and octadecyl), the use of various solvents for N-nitrosamines elution from cartridges and testing the conditions of elution schemes. The selectivity of SPE is achieved by the selection of the cartridge with the appropriate phase ("Coconut 6 ml"). The SPE mode has been selected in such a way that the target components (N-nitrosamines) were sorbed on the cartridge, and the interfering substances passed through the cartridge and washed off with a polar solvent (methylene chloride).

SPEAKER SLOTS AVAILABLE

Abstract

EuroSciCon

Modeling and speciation study for a complete description of te chnetium (VII) and uranium (VI) co-extraction mechanism with TBP

Moeyaert Pauline

French Alternative Energies and Atomic Energy Commission, France

Among the fission products present in the spent fuel, technetium exhibits a singular behaviour in reprocessing operations performed by solvent extraction. Indeed, this strong acid readily dissociates to form the oxo-anion TcO_4^- that may interfere with uranium(VI), plutonium(IV) and zirconium(IV) in the extraction cycles of the PUREX process. [1-3] This presentation will be focused on the uranium-technetium complex with TBP and on its non-radioactive rhenium surrogate. Despite the large set of distribution data available for rhenium and technetium extraction with TBP [4], the structures of the co-extracted complexes remain largely unknown. However, it is important to understand clearly the extraction mechanism of technetium with TBP in the PUREX process to optimize the separation process and to correctly model its behavior during the extraction steps. Based on distribution data available in the literature, a thermodynamic model was developed for the extraction of technetium with TBP. A good representation of uranium and technetium distribution data was obtained when considering the formation of $(HTcO_4)(TBP)_n$ complexes, as well as mixed $UO_2(NO_3)(TcO_4)(HNO_3)_x(TBP)_n$,

Advances in membrane-based separation processes

Lidietta Giorno

National Research Council of Italy, Italy

Membranes manufactured by synthetic or natural polymers are recognised among the most sustainable strategies for highly efficient and selective processes. Polymers used in membrane preparation include hydrophilic and hydrophobic materials for treatment of liquid and gaseous streams. Synthetic polymers are currently used in industrial applications even though natural polymers are attracting much attention due to the need for green materials and preparation methodologies. For liquid stream treatment, usually meso- micro-porous membranes are used. Pore size and pore size distribution (enabling a precise control over molecular transport), porosity and thickness (influencing the throughput), surface properties/surface modification (for chemical stability and fouling control) need to be tuned in order to assess proper process selectivity and productivity. Nanostructured bio-inspired membranes offer unique properties to improve separation performance. Tailored nanostructured polymeric membranes for operations such as pressure driven membrane processes for separation, fractionation and purification.

Microfluidic centrifuge of mixed particles

Jeung Sang Go

Pusan National University, Republic of Korea

This paper presents a circular microfluidic centrifuge with two inlets and two outlets to separate mixed microparticles with a specially designed sample injection hole. To separate the mixed particles, it uses a rotational flow which is a secondary flow generated in a specially designed centrifuge chamber by counter primary flows in the microchannel inlets. The shape and sizes of the 2x2 circular microfluidic centrifuge have been designed through numerical evaluation to have a large relative centrifugal force. Under a Reynolds number of 2300, the flow is laminar, which means that the viscous effect is comparably dominant to inertia. Thus, it is easy to dissipate the energy of the rotational flow by the viscous effect. Two different diameters of the circular chamber of 250 μm and 500 μm were considered. The width of the microchannels was 50 μm and the depth of the whole circular microfluidic centrifuge was 100 μm. Also, different sample injection hole sizes of 10 μm, 20 μm and 40 μm were examined. The difference of centrifuge times of the mixed particles of 1 μm and 6 μm was determined to be 8.2 s at an inlet Reynolds number of 500 and a sample Reynolds number of 20. In the experiment, this was measured to be about 10 s. From the separation of the two polymer particles analogous to the representative sizes of platelets and red blood cells, the circular microfluidic centrifuge shows a

SPEAKER SLOTS AVAILABLE

Abstract

EuroSciCon

Is it possible to improve efficiency of extraction by applying nanoparticles

Jasna Prlić Kardum

Faculty of Chemical Engineering and Technology, Croatia

Besides the proper selection of solvent and extraction procedure, improvement of extraction efficiency can be obtained by optimization of process conditions, such as duration, temperature, solid-to-solvent ratio, etc. The question is whether is possible to achieve some improvement in extraction efficiency and mass transfer by applying nanofluids (NF) as selective solvent in the extraction process.

After two decades of research in heat transfer, following the analogy between heat and mass transfer, the researches have focused on the processes involving the mass transfer. Although there is no doubt that the addition of nanoparticles will not increase the diffusion coefficient in liquids (diffusion coefficient of solids is three order sizes lower than a diffusion coefficient of liquids) it can be expected that their micro motion within stable NFs could improve mass transfer in the same way as in heat transfer.

Improvment of the transport properties of nanofluids can open many opportunities for their application in separation processes (apsorption, extraction or leaching).

In this work application of stable nanofluid prepared with relatively new green solvent (deep eutectic solvents) was researched in liquid–liquid extraction and leaching.

Separation of biodiesel and using on diesel internal combustion engine

Hasan Aydogan

Selcuk University, Turkey

Biodiesel is an alternative fuel similar to conventional or 'fossil' diesel. Biodiesel can be produced from straight vegetable oil, animal oil/fats, tallow and waste cooking oil. The process used to convert these oils to Biodiesel is called transesterification. After removal from glycerin, the catalyst remaining in biodiesel is washed with the aim of removing soap, glycerides and impurities. Two methods are used in the washing process: Aqueous washing and dry washing. Aqueous wash: with pure or soft water; Dry washing: Magnesol. In this study biodiesel was produced with two different washing processes. Later performance and emission characteristics of diesel engine investigated. The values obtained were compared with diesel fuel.

Application of membrane distillation for metal removal in acid mine drainage

David Amaya-Vías

University of Cadiz, Spain

Currently, metal-polluted industrial wastewater and, specifically, acid mine drainage (AMD) have the potential to cause serious environmental problems. AMD are highly acidic waters, enriched with sulphates and metals as for example iron, nickel, manganese, cadmium and copper. AMD can be generated by any anthropogenic or natural activity, which expose pyrite minerals and other sulphide rocks to oxidation, contaminating soils, aquifers and rivers, as well as affecting the health of plants, animals and humans. Conventionally, different techniques are applied to remove or to recover these metals from the water, such as absorption, chemical precipitation, ion exchange, coagulation-flocculation and electrodialysis. However, membrane technologies as nanofiltration (NF) and reverse osmosis (RO) are a valuable alternative. Within membrane-based technologies, membrane distillation (MD) is a thermal process that has certain advantages for metal removal over NF and RO, including low-grade waste heat or renewable energies use, low working pressures, more compact and safe equipment, as well as 100% theoretical rejection of non-volatile compounds, producing very high quality water. In this work, a MD pilot plant has been used for AMD water desalination from Rio Tinto (SW Spain), using 0.45 µm unsupported PTFE membranes in water gap (WGMD) and air gap membrane distillation (AGMD) configurations. MD tests have been carried out at different operating conditions by measuring

SPEAKER SLOBLE

Abstract

EuroSciCon

Separation of yohimbic acid ethyl ester, a synthetic yohimbine analogue from a herbal product

Chee-Leong Kee

Health Sciences Authority, Singapore

Yohimbic acid ethyl ester is the first yohimbine analogue detected as an adulterant from a herbal product. It has been isolated using a semi preparative high-performance liquid chromatography (HPLC) system. Salt free and acidic mobile phases have been used in the purification process. The addition of 0.1% formic acid (v/v) in deionised water and acetonitrile is important to produce the well resolved and symmetry peak for yohimbine and the unknown compound. The purified compound has been elucidated by nuclear magnetic resonance spectroscopy (NMR) and high resolution mass spectrometry (HRMS). Both accurate mass and NMR results support the replacement of methyl ester group of yohimbine by an ethyl ester group. The protonated molecular ion has 14 *m/z* units higher than yohimbine as a result of the addition of one methylene group

New approach to modeling and simulation of absorption processes in industrial column apparatuses

Christo Boyan Boyadjiev

Institute of Chemical Engineering, Bulgaria

The classical mass transfer theory is not applicable for the modeling the mass transfer of absorption processes in column apparatuses, where the velocity distributions and interphase boundaries are unknown. The modeling of these processes is presented with the creation of new type of convection-diffusion models (for qualitative analysis) and average-concentration models (for quantitative analysis), where the surface reactions are replaced by equivalent volum reaction, while the velocity and concentration distributions are replaced by average velocity and concentrations. The effect of the radial non-uniformity of the velocity in the average-concentration models is introduced by model parameters, which must be obtained experimentally.

Two hydrodynamic situations are considered, when the radial velocity component is equal to zero, in the cases of an axial modification of the radial non-uniformity of the axial velocity component and when the radial velocity component is not equal to zero. The theoretical analysis of modeling and simulation of the absorption processes in column apparatuses shows significant differences in the models of the co-current and counter-current absorption processes and are considered separately.

SPEAKER SLOTS AVAILABLE

Biography

EuroSciCon

Chiral separation of biologically active organic compounds by Supercritical fluid chromatography

Attila Kiss-Szikszai

University of Debrecen, Hungary

The development of a new drug in a form of pure enantiomer often requires a chiral separation step. The chiral Supercritical Fluid Chromatography (SFC) has the potential to become a primary method for separating racemic mixtures. During our research we developed an efficient chiral chromatographic method for separating the enantiomers of eleven flavone-aminoacid-esters under supercritical conditions. We focused on optimizing four main chromatographic parameters such as: chiral stationary phase (CSP), mobile phase, pressure and temperature.We studied the separations on Chiralpak IB and IC stationary phases, we experienced faster runs on the IB column. In some cases the needed resolution was only achievable on IC column however we had to apply double flow rate to reduce the retention times. As a mobile phase, we used supercritical carbon dioxide fluid with mixed mobile phase modifiers; 2-propanol to enhance the enantioselectivity and methanol to increase the eluent strength. Furthermore trifluoroacetic acid was used as an additive to improve the peak shape.

Simultaneous sorption and biodegradation of phenol and cyanide from simulated wastewater using bio-composites

Bhumica Agarwal

Dr. A. P J Kalam Technical University, India

Bio-composites have strong potential utility for decontamination of industrial wastewater. The present study deals with the optimization of process parameters for simultaneous sorption and biodegradation of phenol and cyanide from synthetic coke waste water onto iron impregnated fly ash and isolated strain of *Serratia odorifera* MTCC 5700 bio-composite in batch reactor. The optimum process conditions were found to be: pH 8, temperature 30 ^{0}C and contact time 48 h. Under these conditions, almost complete removal of phenol and cyanide takes place at an initial concentration of 200 mg/L phenol and 20 mg/L cyanide. Among equilibrium models, Extended Langmuir model was found suitable for description of sorption of both phenol and cyanide. The maximum sorption capacity for phenol and cyanide, as calculated by Extended Langmuir model, was found to be 817.34 and 2.72 mg/g of biosorbent, respectively. It was observed that phenol and cyanide show synergism in the process of sorption from wastewater. Kinetic modelling of experimental data on sorption of phenol and cyanide established the suitability of pseudo-second order model indicating chemisorption to be the mechanism of sorption of phenol and pseudo-first order for the sorption of cyanide on *S. odorifera* MTCC 5700 immobilized on Fe-FA. It was observed that sorption of phenol and cyanide is controlled by both surface and intraparticle diffusion with surface diffusion dominating the overall rate of reaction

Glycerol plasticized-starch/citric acid functionalized MWCNTs: A novel sorption material for the removal of Pb from water

Faheem Shah

COMSATS University Islamabad

In this study, a green, rapid, economic and proficient procedure for the synthesis and functionalization of glycerol plasticized-starch/citric acid functionalized MWCNTs (GPS-CA-MWCNTs) has been proposed. The novelty of the present work is that the entire procedure takesplace in a single pot with the aid of ultrasonic radiation. Citric acid (CA) was used as crosslinker to functionalize MWCNTs with glycerol plasticized-starch (GPS) under ultrasonic dispersion. The characterization of funtionalized MWCNTs has been carriedout with FTIR, UV/vis spectrophotometry and TEM. Lead (Pb) was complexed with 2-(5-bromo-2-pyridylazo)-5-diethylaminophenol (5-Br-PADAP) and easily extracted by the GPS-CA-MWCNTs. Different experimental parameters were optimized prior to validation and application of the developed extraction technique. It was observed that under optimal conditions, GPS-CA-MWCNTs expressed excellent stability even after >100 adsorption/desorption cycles run with 97% analyte recoveries.

SPEAKER SLOTS AVAILABLE

Biography

EuroSciCon

Studies on process intensification for pre-combustion CO_2 capture

Weiyang FEI

Tsinghua University, China

Considering the importance of CO_2 Capture and Sequestration (CCS) and its huge costs, the process intensification of CCS is extremely important indeed. The IGCC with CCS is one of the best clear coal technology and pre-combustion CO_2 capture has many advantages. However, costs for existing pre-combustion CO2 capture technologies (such as Methanol, Selexol, MDEA etc.) are still too high. Therefore, the study on process intensification for pre-combustion CO_2 capture is essential. The main results are as follows,

1. The theoretical analysis and experiments show that comparing with propylene carbonate and methanol, the di-methyl carbonate (DMC) is a better green solvent for pre-combustion CO_2 capture.
2. Comparing with Mellapak and several other column internals, the PFMR (Plum Flower Mini Ring) has higher throughput and higher efficiencies under high liquid loading.
3. A new hybrid stripping process for solvent recycle could reduce the energy consumptions.
4. The pilot plant tests demonstrated that above new approaches might save energy and reduce solvent loss substantially compared with the existing processes.

Pre-salt “and “salt mirror” Diapir separation and leaching of salt compounds and petroleum formations based upon an ancient Silk Road qanat karez brine and salt separation technology

David Bloch

SALT Archive M.R.Bloch

The surface crust of an inland Sabkha basin typically is made up of relatively pure layers of salts that have re-crystallized and settled or precipitated during the evaporation process of controlled Qanat system surge flood waters. The mother liquor of Leached Salts dissolves quickly in a desert endorheic basin, and over a short intensely hot period, the process of re-crystallizing the salts can produce purer and more concentrated, layered playa cakes. The dissolved salts leached out of the layers in the vast desert basin flats, are intermittently precipitated back onto the basin surface, predominantly sodium chloride crystals, followed by many other salts one after the other leaving the familiar brilliant white salar playa crust . The original ancient engineered design of the Qanat Karez and its multiple bore hole surge flooding, have served mankind for past millenniums and have been compared to the Great China Wall and the Pyramids.

Experimental research on demulsification of oil-water emulsion with super-hydrophobic porous plate membrane

Yu Zhijia

Dalian University of Technology, China

High-efficient demulsification and separation of oil-water emulsion is of great significance for resource recovery and environmental protection. With porous stainless steel plate as substrate and polytetrafluoroethylene (PTFE) and polyphenylene sulfite (PPS) as coating materials, super-hydrophobic membrane was prepared by a simple spraying-plasticizing method, and used for oil-water separation. The surface morphology and wettability was investigated by electron microscope and contact angle meter respectively. It is shown that, lots of microscale PTFE particles and nanoscale strip on these particles evenly distribute on the membrane surface and constitute the rough surface with micro-nano structure. The separation membrane shows a super-hydrophobic property, with water contact angle of 153º, and a super-olephilic property with diesel contact angle of almost 0º. The membrane was designed to be used in demulsification and separation of oil-water emulsion. Effects of demulsification stages, flux and the size of emulsion droplets on the demulsification efficiency were investigated. The experiment result shows that, the flux increases with pressure.

SPEAKER SLOTS AVAILABLE

Abstract

EuroSciCon

Hyphenated separation techniques for toxic metal ions in water analysis

Reena Saxena

University of Delhi, India

The methods of separation and determination of toxic metal ions have received a special attention in recent years as they have a strong impact on the environment and human health. These metal ions like lead, cadmium, arsenic and mercury even in trace concentration possesses risk to humans and other organisms and interfere with various biological processes. The industrial effluents are one of the major reasons responsible for the contamination of environmental system. The direct determination of trace metal ions using a singular detection technique is a challenging task and it suffer from limitations such as high cost, more reagent consumption and low sampling rate. To overcome these challenges hyphenated analytical technique is developed from the coupling of a separation technique and an on-line spectroscopic detection technology. This is one of the simplest, fast, highly efficient automated techniques that can be coupled to different detection systems in various quantitative chemical analyses. This offers many advantages like minimum reagent consumption, insignificant interference, reproducible results, and high sampling frequency. It also gives better recovery, lower detection limit, high precision and repeatability of the determinations. In view of the importance of Hyphenated separation techniques, various methods based on the hyphenation

Preparation of partially sub-1 µm inorganic-organic hybrid silica monolith materials as highly efficient stationary phases in reverse phase liquid

Faiz Ali

Ulsan The University of Poonch, Rawalakot

Pseudo monolithic architecture have been produced inside a stainless steel (1 mm ID X 150 mm long) column by means of Altech slurry packer. The silica monolith particles were synthesized in sub-1 µm range followed by their modification with polystyrene polymer film by means of Reversible Addition Fragmentation Chain Transfer Polymerization. Those inorganic-organic hybrid materials when packed in column which resulted in very high separation efficiency (N value~181,000 plates/m). A mobile phase of 62/38 (v/v) % acetonitrile/water with a flow rate of 22 µL/min was used. The column of current study has the potentials of fast HPLC analysis. The materials were used as stationary phase media in revers phase liquid chromatography.

Development of Low Arsenic Accumulating Rice variety for safer human consumption

Joshi H.V

Sankalchand Patel University, India

A simple, economic, selective and robust stability-indicating reversed to phase high performance liquid chromatographic method was developed for simultaneous estimation of Azelastine hydrochloride and Fluticasone propionate, Hypersil BDS C_{18} (250 x 4.6 mm i.d.,5 µ particle size) column used and a mobile phase composed of 0.05 M KH_2PO_4 Buffer (pH 3.5 with OPA) : Methanol (35 : 65 %v/v). The retention time of Azelastine hydrochloride and Fluticasone propionate were found be 4.213 and 6.797 min respectively. Linearity was established for Azelastine hydrochloride and Fluticasone propionate in the range of 27.5-82.5 µg/mL and 10-30 µg/mL respectively. The percentage recovery of Azelastine hydrochloride and Fluticasone propionate were found to be in the range of 98.63-99.04% and 98.76-99.27% respectively. The drug was subjected to acid degradation, alkali degradation, oxidation degradation, thermal degradation and photolytic degradation. This method can be successfully employed for the quantitative analysis of Azelastine hydrochloride and Fluticasone propionate in bulk drugs and formulations

SPEAKER SLOTS AVAILABLE

Abstract

Antifouling grafting of nanofiltration membranes: New insights into membrane fouling mechanisms

Ghulam Mustafa
University of Karachi

Membrane technology can be a flexible and viable long-term strategy for water treatment. However, prosperous and effective application of membrane technology has been hampered by membrane fouling induced by a wide spectrum of components in water. Particularly, dissolved natural organic matter (DNOM), a major organic constituent in surface water, has been considered to be a significant foulant, strongly reducing the membranes performance especially for NF (nanofiltration) membranes.
Furthermore, It is well known that membrane fouling by DNOM is significantly enhanced in the presence ofdivalent cations (e.g. Ca2+). Despite much research and industrial developments since the early 1960's, membrane fouling and especially irreversible fouling remains challenging and in-depth studies on mechanisms and solutions for irreversible fouling of inorganic membranes are lacking.
We have developed a smart surface functionalization method to decrease the fouling tendency by preventing the undesired adsorption or adhesion of foulants. Focus is put on two approaches for robust surface functionalization of ceramic NF membranes using Grignard reagents and phosphonic acids.

Comparison of interfacial behavior and Ag(I) extraction kinetics with various types calix[4]arene derivatives at heterogeneous liquid-liquid interfaces

Jee Young Kim

Kosin University, South Korea

Various *p-tert*-octylcalix[4]arene derivatives as hydrophobic extractants have been prepared to investigate Ag(I) extraction efficiency in a batch-wise process in nitric acid media. The influence of the functional groups of the hydrophobic extractants on the interfacial behavior and Ag(I) extraction efficiency in nitric acid media has been investigated using the drop-voulum method. Fitting of the interfacial tension isotherms to the Gibbs and Szyszkowski equations has provided parameters characterizing the interfacial activity of the extractants. The amido-type *p-tert*-octylcalix[4]arene derivatives have strong interfacial activity and fast extraction rates. The relationship between the interfacial activity and teh dependence of the Ag(I) extraction efficiency on the different functional groups is discussed. The interfacial behavior of the extractants affected both the solvent extraction equilibrium and the kinetics and the overall results are consistent with a mass transfer mechanism at the heterogeneous liquid-liquid interfaces.

Abstract

The fluid flow, heat and mass transfer in a novel hollow fiber membrane contactor

Kui He

South China University of Technology, Republic of China

Membrane distillation has great potential in future energy sustainable applications, such as, fresh water harvest from seawater. A key component used in membrane distillation is a membrane contactor. In this study, it is demonstrated a hollow fiber membrane contactor with novel design. It consists of uniformly distributed elements but hollow fiber membrane is randomly distributed in elements. The fluid flow, heat and mass transfer in the contactor are studied via computational fluid dynamic method. A numerical model is constructed for the whole contactor, which is of complex structures. A novel method based on machine vision technology is employed to study the effect of random distribution of hollow fibers on the heat and mass transfer of elements

CO2 absorption and mass transfer in film flow on a rotating disc

MD Salim Miah

Military Technological College

The phenomena of mass transfer is of vital importance in numerous industrial applications where gas and liquid phases interact. These mainly comprise chemical, semiconductor production, material industries etc. Separation of CO2 and other gasses from different materials, generating impurities and compromising material's electrical and mechanical properties are of prime importance. CO2 absorption of a film flow of poly-ethylene terephthalate (PET) on a rotating disc is taken as a sample case for investigation through advanced computational fluid dynamics (CFD) modelling. A survey was conducted for different degrees of polymerization and angular velocities. The Volume of Fluid model (VOF) was used to measure the layer thickness of the molten PET, which can affect the mass transfer phenomenon. The profile of the concentration of CO2 was also investigated through user defined scalar (UDS) transport equations. This work is based on observation and investigation of the concentration profiles at different positions over the disc which emphasised the effects of the convective forces in the mass transfer phenomenon particularly at higher radial position. The results revealed that mass transfer of CO2 depends on the thickness of PET layer and fluid viscosity.

A new green switchable hydrophilicity microextraction method in a portable syringe system couple with GFAAS for determination of vanadium in real water samples

Naeemullah

University of Turbat

First time we launch an innovative and simple portable in situ switchable hydrophilicity microextraction couple with GFAAS through micropipette tip online syringe system (μS-SHS) was developed for preconcentration and determination of vanadium using 2-(5-Bromo-2-pyridylazo)-5-diethylaminophenol (5- Br-PADAP), as complexing. In the proposed method decanoic acid was used as a switchable hydrophilicity extraction solvent and their polarity was switched on and off (water miscible/immiscible) by simply changing their pH. The hydrophobicity of the deconoic acid switchable on (dispersed/miscible) in an aqueous medium by reaction of sodium carbonate enhanced the contact area between two medium, which completely improve the extraction capacity of the V-(5-Br-PADAP form aqueous medium to switchable solvent. The Phase separation is induced by simply adding sulphuric acid that switch off hydrophilicity (non-dispersed/immiscible) of deconoic acid. The metal complex enriched phase (V-(5-Br-PADAP-SHS) was separated by simply removing the aqueous phase through manually dispensed syringe system. Then finally acidic ethanol (100 μL) drawn into the syringe contains metal complex enriched SHS phase to reduce viscosity

Abstract

Removal of methylene blue dye from aqueous solutions by a new chitosan/zeolite composite from shrimp waste: Kinetic and equilibrium study

Mohammad Hadi Dehghani

Tehran University of Medical Sciences

The adsorption of methylene blue dye (MBD) from aqueous solutions was investigated using a new composite made up of shrimp waste chitosan and zeolite as adsorbent. Response surface methodology (RSM) was used to optimize the effects of process variables, such as contact time, pH, adsorbent dose and initial MBD concentration on dye removal. The results showed that optimum conditions for removal of MBD were adsorbent dose of 2.5g/L and pH of 9.0, and initial MBD concentration of 43.75mg/L and contact time of 138.65min. The initial concentration of dye had the greatest influence on MBD adsorption among other variables. The experimental data were well fitted by the pseudo-second order kinetic model, while the Freundlich isotherm model indicated a good ability for describing equilibrium data. According to this isotherm model, maximum adsorption capacity of the composite was 24.5mg/g. Desorption studies showed that the desorption process is favored at low pH under acidic conditions

Comparison of two Ba-faujasite adsorbents for separation of xylene isomers

Mohammadreza Khosravi-Nikou

Petroleum University of Technology

In this work, the equilibrium adsorption of xylenes, including para xylene, meta xylene, ortho xylene and ethyl benzene in liquid phase of mesitylene solvent onto two types of commercial adsorbents (SPX3000-fine and SPX3000-coarse) was studied. The specifications of adsorbents were specified by using various characterization techniques like X-ray Fluorescence (XRF), scanning electron microscopy (SEM), thermogravimetric analysis (TGA). The adsorption capacity and removal percentage of adsorbents were determined at ambient temperature and under atmospheric pressure. It was discovered that SPX3000-fine particles brought out higher adsorption capacity than SPX3000-coarse for removing para xylene component. The outcomes of present experiments show that SPX3000-fine particles have higher degree of removal percentage of para xylene than other adsorbent. Several isotherm models were applied to describe the adsorption processes, where Langmuir model reveals satisfactory output for covering experimental data of entire components.

Pharmaceutical impurity analysis of raw materials and final product by using analytical techniques

Muhammad Jehangir

Novamed Group

The evaluation of pharmaceutical raw materials and finished products for impurities and degradation products is an essential part of the drug development and manufacturing testing process. Additionally, toxicological information must be obtained on any drug-related impurity that is present at a concentration of greater than 0.1% of that of the active pharmaceutical ingredient (API). In pharmaceutical QC and manufacturing, impurity analysis has traditionally been performed by HPLC with UV, PDA, or MS detection. As it is essential to detect and measure all of the impurities in the sample, it is necessary to have a high resolution separation process. This usually involves long analysis times resulting in low throughput. As candidate pharmaceutical compounds become more potent and are dosed at lower and lower levels, ever more sensitive assays are needed to detect and measure impurities. The low throughput of HPLC can become the rate-limiting step in product release testing or process evaluation. Since much of the process of impurity identification involves the coupling of LC to sophisticated MS, any reduction in analysis time will result in a more efficient use of these significant investments.

SPEAKER SLOTS AVAILABLE