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2nd International Conference and Expo on

Separation Techniques

September 26-28, 2016 Valencia, Spain

Keynote Forum

(Day 1)

Iakovos Yakoumis, J Chromatogr Sep Tech 2016, 7:6(Suppl)
http://dx.doi.org/10.4172/2157-7064.C1.018

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Iakovos Yakoumis
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Towards hollow fibers automotive catalytic converters: Effect of carbon on the NO abatement efficiency of Cu decorated C/Al_2O_3 porous hollow fibers

In this work, biopolymer/ceramic hollow fibers were manufactured at high yield using a modified polyol process in spinneret set-up and allowed to adsorb controllable amounts of Cu^{2+}. The fibers were further converted to catalytic Cu decorated, carbon/ceramic composite hollow fibers (C/Al_2O_3) by a post-sintering technique. The polyol process modification pertained to the use of alginate as the metal ion binder and metallic nanoparticles stabilizer. The walls of the hollow fibers were porous, exposing a high surface area decorated with Cu nanoparticles. The structural and morphological properties of the obtained catalytic composite hollow fibers have been studied and their $DeNO_x$ abatement efficiency has been evaluated via continuous flow process we propose here, with the gas stream sweeping the shell and lumen side of a bundle of the fibers in the tangential flow mode. The stability, long working-life and easy regeneration of the composite catalytic fibers were studied in relation to the carbonaceous content and the possible deactivation/reactivation mechanisms. It has been concluded that carbon contributed significantly to the improvement of the $DeNO_x$ activity, especially in the cases, where reducing gases such as CO were absent from the gas stream. Moreover, the $DeNO_x$ efficiency was high and stable for more than 300 hours on stream, a feature which combined with the viability in terms of manufacturability and yield, makes us propose these catalytic fibers and the respective bundle type reactor as the next generation technology for NO abatement.

Biography

Iakovos Yakoumis has obtained his MSc degree in Chemical Engineering from the National Technical University of Athens in 1997. He has published 14 research papers in international scientific journals. He is the Founder and the Managing Director of Monolithos Catalysts and Recycling Ltd. In 2000, he was honored for the Organization of the Greek Small and Medium Enterprises with the Panhellenic Award of the Best Young Businessman of the Year. He was a Member of the Board of several local and business associations. He has served as an elected Vice-President of the City Council of Naxos and Small Cyclades Municipality (2014).

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Dusan Berek, J Chromatogr Sep Tech 2016, 7:6(Suppl)
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Dusan Berek
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Liquid chromatography of block copolymers

Block copolymers represent an important group of materials with extensive applications in science, medicine and technology. In a block copolymer, at least two chemically distinct polymer chains are connected with a chemical bond. Comprehensive molecular characterization of block copolymers represents an analytical challenge. A special problem is determination of amount and molar mass of parent homopolymers, which are present in most block copolymers, and which constitute highly undesired, expensive ballast. Gel permeation chromatography, (size exclusion chromatography) GPC/SEC is commonly employed for characterization of block copolymers. Molar mass of a precursor, the block polymerized as first, is determined by GPC/SEC and the same method is employed for the approximate assessment of total molar mass of block copolymers. Due to low separation selectivity and detector sensitivity GPC/SEC can hardly identify presences and render molar mass information on parent homopolymers. We will discuss principles and applications of the original alternative liquid chromatography methods namely liquid chromatography under limiting conditions of enthalpic interactions, LC-LC and sequential two-dimensional polymer liquid chromatography, S2D-LC. LC-LC methods are well robust and experimentally feasible. Their separation selectivity is very high and sample recovery is reasonable. LC-LC can in one single step easily and efficiently discriminate both parent homopolymers from diblock copolymers. The separated sample constituents can be one-by-one forwarded into an on-line GPC/SEC column for determination of their molar mass average and distribution. Parent homopolymers present in the block copolymer at very low concentrations below 1% of can be traced and characterized, by this novel approach.

Biography

Dusan Berek is currently employed at Polymer Institute, Slovak Academy of Sciences in Bratislava. He has served as Elected Member of the Presidium of the Slovak Academy of Sciences, President of the Slovak Chemical Society and Chairman of the Czecho-Slovak and Slovak National Committee of Chemistry for IUPAC. He is Corresponding Member of the Central European Academy of Sciences and Member of the Learned Society of the Slovak Academy of Sciences. He is the author or co-author of two monographs and 250+ scientific papers published in refereed periodicals, proceedings and chapters of books, as well as 60+ patents (four of them were licensed) and was cited more than 2,000 times. He has presented over 110 invited plenary, key and main lectures as well as over 900 regular lectures and poster contributions on symposia and conferences and during lecturing tours to over 40 countries. He was elected as "Slovak Scientist of the Year 1999" and "Slovak Innovator of the Year 2001".

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Rafael Lucena Rodriguez
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Composites of polyamides and nanoparticles for dispersive micro-solid phase extraction

Polymeric materials are widely employed in (micro) extraction techniques due to several advantages such as their stability and versatility. Polyamides, a specific type of polymers, are obtained by the controlled synthesis between a diacid and a diamine compounds yielding a polymeric chain where amide groups are distributed periodically. The chemical forces that allow the chain stacking can also be used for the extraction of target compounds from samples of different nature. In addition, polyamides can be easily synthesized in the lab using several monomers with different moieties that may increase the potential of these polymers as sorbents since the material can be synthesized to boost the interaction with the target compounds. The introduction of nanoparticles inside the polymeric network has been demonstrated as a good way to improve the extraction capacity of the sorbents as well as their mechanical properties. On the one hand, nanoparticles disturb the normal stacking of the polymer increasing their superficial area which results critically to improve both thermodynamics and kinetics aspects of the extraction. On the other hand, the use of special nanoparticles, like magnetic ones, may provide singular properties to the resulting composite. In this communication, the easy synthesis of polyamides-NPs composites, their main advantages and disadvantages will be described in detail to clearly show the potential of this material. This potential, which is supported by practical application of these composites in fields as different as food analysis or bioanalysis, will be explained with suggestions of further research.

Biography

Rafael Lucena Rodriguez is a Professor at the Analytical Chemistry Department of the University of Cordoba since 2010. He has co-authored 80 scientific articles and several chapters mainly on microextraction techniques. He has been Guest Editor in one special issue of *Analytical and Bioanalytical Chemistry* journal devoted to this field. He is the Editor of Microextraction Tech blog. His main research interest comprises different areas, especially the development of new microextraction techniques as well as the evaluation of ionic liquids and nanoparticles in this context. Presently, he is also working on bio-recognition.

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Johannes Carolus Jansen, J Chromatogr Sep Tech 2016, 7:6(Suppl)
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Analysis of the transport of the individual gas mixture components in polymers of intrinsic microporosity and PIM-based mixed matrix membranes

Due to the increasing need for sustainability in all industrial sectors, membrane operations are gaining territory over energy demanding and less environmentally friendly traditional separation processes. Successful implementation of membrane technology requires the development of novel materials with enhanced performance. In the field of gas separation, polymers of intrinsic microporosity (PIMs) and mixed matrix membranes (MMMs) are two classes of such materials which are intensively investigated by the scientific community. PIMs have exceptional permeation properties owing to their stiff contorted polymer backbone that induces an unusually high fractional free volume, in combination with a modest size-sieving behavior. MMMs consist of porous materials dispersed in a dense polymer matrix and metal organic frameworks (MOFs) are often used as such fillers because of their generally good compatibility with the polymer and their specific pore structure. MOFs may further increase the selectivity of polymeric membranes, enhancing the permeability of certain gas species and blocking others, especially MOFs with a high aspect ratio. The use of novel materials also requires better characterization methods to analyze their performance. In this light, the present paper discusses the development of a novel method for the analysis of the individual permeability and diffusion coefficients of gas mixtures in polymeric membranes, using in-line analysis of the permeate composition by a Quadrupole Mass Spectrometer. A comparison is made with the so-called time lag method for pure gases and some peculiarities of the gas and vapor transport in PIMs and other high free volume polymers will be discussed.

Biography

Johannes Carolus Jansen has completed his PhD in the Department of Polymer Technology of the Delft University of Technology, Netherlands in 1996. After a short stay as a Visiting Researcher at DSM Resins, he has worked at the Agrotechnological Research Institute ATO-DLO, Wageningen, Netherlands from 1997-2000 and the CNR Institute of Macromolecular Chemistry, Milan, Italy from 2000-2001. In his current position as a Researcher at the CNR Institute on Membrane Technology, Rende, Italy, he is responsible for various national and international public and private research projects. He holds 2 patents and is the author of 1 book, over 80 publications and book chapters with an h-factor of 29.

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Adolfo Iulianelli
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An overview about inorganic membrane technology application in the field of hydrogen generation and purification

Nowadays, inorganic membrane technology is considered as an attracting option for the separation and purification of hydrogen, particularly in the field of fuel cells supplying. The application of inorganic membranes in membrane reactors makes feasible the chemical reaction to produce hydrogen and its simultaneous separation/purification in only one process unit, without requiring any other complementary stage. Among them, Pd and Pd-alloy membranes represent excellent systems for the purification of hydrogen rich-streams due to their special behaviors of perm-selectivity towards hydrogen with respect to all of the other gases. Unfortunately, Pd-based membranes are expensive and many efforts are still on going to combine high performance (in terms of high grade hydrogen separation) and cost effective processes. Meanwhile, Pd-based membrane reactors technology combined to biofuels exploitation is considered today really attracting to solve the issues related to the environmental pollution. It is worth noting that there is an extensive literature addressing hydrogen production through membrane reactors via reforming reactions of biofuels as renewable feed-stocks coming from biomass transformation and/or utilization. Hence, this work gives a panoramic view about the state of the art on the recent progresses about inorganic membranes and their application in membrane reactors to generate high grade hydrogen from reforming reactions.

Biography

Adolfo Iulianelli has completed his Degree in Chemical Engineering and PhD in Chemical and Material Engineering. Presently, he works at the Institute on Membrane Technology of the Italian National Research Council. He has published more than 50 articles in international scientific ISI journals, more than 20 chapters in international books, author of one patent and a book and of more than 50 papers in proceedings of national and international conferences. He is a Reviewer of more than 20 scientific ISI journals, Associate Editor of International Journal of Membrane Science & Technology, Editor of Journal of Membrane Science and Technology, Advances in Chemical Engineering and Process Technology, Journal of Fuels and Scientific World as well as serving as Guest Editor for International Journal of Hydrogen Energy.

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Sergey N Krylov
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Kinetic separation with MS detection: A "Swiss Army Knife" in selection and characterization of drug leads

The slowing discovery of new chemical entities in small-molecule drug development calls for disruptive approaches in drug discovery. Among such approaches is selection of drug leads from ultra-diverse (>109 different structures) combinatorial libraries. However, such selections as well as kinetic characterization of selected molecules constitute ultimate analytical challenges: They require ultra-efficient separation without immobilization, highly-selective detection without labeling, and data deconvolution algorithms for extracting kinetic information. We are developing a novel conceptual platform "Kinetic Separation with MS Detection" for addressing these challenges. Uniquely, a single method of kinetic separation can be used for 3 major applications: Selection of drug leads and affinity probes from ultra-diverse libraries, kinetic characterization of binding of drug leads and affinity probes to their protein targets and the use of affinity probes in disease diagnostics. We dub this multi-blade tool an Analytical Swiss Army Knife. The concept of kinetic separation has been proven for 2 modes of separation: Capillary electrophoresis and size-exclusion chromatography. We are now developing the application of kinetic separation to development of drug leads from libraries of DNA-encoded small molecules and affinity probes from random DNA libraries. In this lecture, the fundamentals of kinetic separation will be explained and examples of its practical use for selection and characterization of drug leads and affinity probes will be presented. Prospective of the utilization of kinetic separation in the pharmaceutical industry and academic research will be discussed.

Biography

Sergey N Krylov has obtained his PhD from Moscow State University and was trained as PDF at the University of Alberta. He has been a Professor of Chemistry at York University in Toronto since 2000. He has held Canada Research Chair Tier II for a maximum term and is currently York Research Chair in Bioanalytical Chemistry. He is the Founder and Director of the Centre for Research on Biomolecular Interactions. He is recognized internationally for his pioneering work in the fields of chemical cytometry, kinetic analysis of affinity interactions and selection and applications of oligonucleotide aptamers. He has authored over 160 peer-reviewed papers and his research contributions have been recognized with a number of distinctions including two awards from the Chemical Society of Canada.

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Muataz Ali Atieh
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Can carbon nanomaterials revolutionize membrane separation for water treatment and desalination?

Membrane separation is a separation process where specifically-fabricated membranes act as a semi-permeable barrier and the separation process takes place by the membrane controlling the movement rate of various molecules between two liquid phases, two gas phases, or a liquid and a gas phase. Despite its superior impact (economically and environmentally) when compared with thermal separation, membrane separation still has several drawbacks, which prevents its global reliance by people as a robust separation technology. Some of these drawbacks are the high fouling rate (organic, inorganic and bio-colloidal). Several techniques have been introduced to develop novel membranes, which exhibit anti-fouling behavior in addition, to be highly selective, permeable and stable (chemically and mechanically) which requires less replacement. Due to their attractive properties (such as stability and antibacterial behavior), the use of carbon nanomaterials have been widely practiced by scientists to fabricate smart membranes which are strong and exhibit less fouling. Additionally, the surface modification of conventional membranes by incorporating carbon nanomaterials have also been reported in several research papers for the same reasons. This review paper aims to cover the use of carbon nanomaterials in the field of membrane separation as freestanding or surface-modified membranes. The carbon nanomaterials covered are: Carbon nano tubes (CNT), graphene, graphene oxide, carbon nano fibers (CNF), MXene, carbide derived carbon (CDC) and fullerene. This presentation is important for membrane scientists/researchers who work on fabricating/modifying separation membranes using carbon nanomaterials.

Biography

Muataz Ali Atieh is an Associate Professor at the College of Science and Engineering and Senior Scientist in the Qatar Environment and Energy Research Institute under Hamad Bin Khalifa University. He has received his PhD in Chemical Engineering at the University Putra Malaysia in 2005. His research focuses on design and fabrication of different types of CVD reactors for production of micro and nano carbon materials for different applications. He has produced different materials from nanostructure materials such as carbon nanotubes, carbon nanofibers, nanocatalyst and graphene to microstructure materials such as Activated carbon, vapor grown carbon fiber, polymers and membranes. He is working in different applications such as water treatment, water desalination, water disinfection, heat transfer, nano-fluid, nanocomposite, nanocatalyst, polymerization, membrane synthesis, nanosensors and corrosion. He is the author of over 75 peer-reviewed publications, 50 conference papers, 5 published USA Patents. In 2010, he was awarded with an Excellent Research Award from King Fahd University, Saudi Arabia.

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