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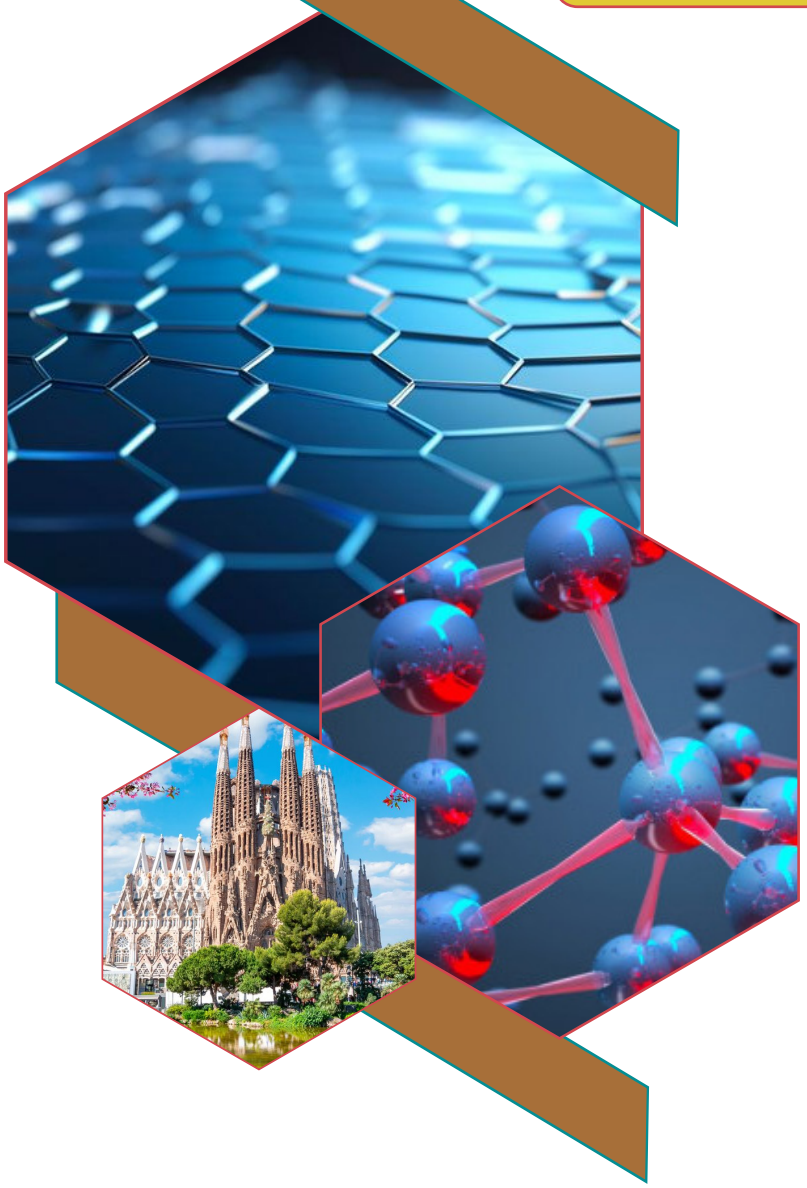

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INDEX

5 **Title: Technology and dielectric properties of multicomponent PZT-type ceramics modified with praseodymium/tungsten**

D. Brzezińska, University of Silesia in Katowice, Faculty of Science and Technology, Institute of Materials Engineering, 75 Pułku Piechoty 1a, 41–500 Chorzów, Poland.

6 **Title: Advancing Traction on Icy Surfaces Through Bio-Inspired Solutions and Additive Manufacturing**

Shaghayegh Bagheri, School of Engineering, Department of Mechanical Engineering, VA 22030, USA.

7 **Title: Improving the Predictive Accuracy of Machine Learning Models for Ceramic Glaze Gloss via Feature Engineering**

Jung-Hoon Choi, Ceramic Ware Materials Center, Korea Institute of Ceramic Engineering and Technology, Icheon 17313, Korea

8 **Title: Ciprofloxacin removal from wastewater using biochar**

M.-L. Soran, National Institute for Research and Development of Isotopic and Molecular Technologies, 67-103 Donat, 400293 Cluj-Napoca, Romania

9 **Title: Preparation and characterization of polyphenolic extracts as possible natural insecticide**

A. Stegarescu, National Institute for Research and Development of Isotopic and Molecular Technologies, 67-103 Donat, 400293 Cluj-Napoca, Romania.

10 **Title: Eco-friendly functionalization of graphene with metal oxides using plant extracts: Preparation and characterization**

Ocsana Opriș, National Institute for Research and Development of Isotopic and Molecular Technologies, 67-103 Donat, 400293 Cluj-Napoca, Romania

11 **Title: Green synthesis of biochar functionalized with metal oxides for water decontamination**

M.L. Soran, National Institute for Research and Development of Isotopic and Molecular Technologies, 67-103 Donat, 400293 Cluj-Napoca, Romania

12 **Title: Materials based on biochar, Fe3O4 and MnO2 with potential in water depollution**

A. Stegarescu, National Institute for Research and Development of Isotopic and Molecular Technologies, 67-103 Donat, 400293 Cluj-Napoca, Romania

13 **Title: Preliminary tests of pollutant removal using tertiary systems based on graphene functionalized with metal oxides**

Ocsana Opriș, National Institute for Research and Development of Isotopic and Molecular Technologies, 67-103 Donat, 400293 Cluj-Napoca, Romania

14 **Title: Self-Adjuvanted Silica Nanoparticles as Delivery Carriers of Therapeutic Enzyme Against Pancreatic Cancer**

Yi-Ping Chen, Graduate Institute of Nanomedicine and Medical Engineering, Taipei Medical University, Taipei 11031, Taiwan

15 **Title: Novel Perspective of Contemplating Existing Principles of Scientific Truth: Novel B-Unified Theory, Postulates, Propositions and Models With Applications and Modeling in Impedance, Transformers, Inverters, Generators, Solar, BLDC, SMPS and Short Circuit Analysis**

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V. Mitin

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Reconfigurable quantum well structures for adaptive infrared sensing

Abstract

Infrared (IR) sensing plays a crucial role in radar and imaging applications, enabling advanced target detection, tracking, and identification. Widely used in security, automotive, and navigation systems, IR imaging continues to drive innovation across multiple industries. All applications would greatly benefit from development of IR sensors with adaptable parameters. Even a basic firefighting IR camera requires a large dynamic range to detect targets against varying background temperatures. Ideally, optoelectronic structures for advanced adaptable IR sensing should offer broad spectral tunability. In this presentation, we report theoretical and experimental findings on potential profile-engineered reconfigurable nanomaterials based on double quantum well (QW) structures for advanced adaptive sensing. The key advancement over previous studies is the development of a detector capable of covering both the Long-Wave IR (LWIR, wave length 8-14 microns) and Mid-Wave IR (MWIR, wave length 3-8 microns). The adaptive photodetectors utilize a reconfigurable, asymmetrically doped double QW array, enabling spectral sensitivity control via applied bias. The structures were designed using a Schrödinger-Poisson solver. The design, growth, and characterization of QW infrared photodetectors (QWIPs) have been carried out to enable MWIR, LWIR and dual-band LWIR/MWIR detection. The structures were grown by molecular beam epitaxy and contained 25 periods of coupled double GaAs QWs and AlxGa1-xAs barriers. One QW in the pair was doped to create potential asymmetry, enabling bias-controlled electron population distribution across split energy levels in the QWIP. The QW structures were calibrated using TEM and tested with blackbody radiation and FTIR down to 77 K. The ratio of the responsivities at the lower and the higher wavelengths was tuned by up to an order of magnitude with the applied bias of +/- 4V.

Biography

Dr. Vladimir Mitin is a SUNY Distinguished Emeritus and Adjunct Professor at the Department of Electrical Engineering, University at Buffalo (UB), SUNY, NY, USA. He was the Chair of the Electrical Engineering Department of UB for two terms (2003—2009). He was elevated to Fellow grade by IEEE, APS, Optica, SPIE, AAAS, and IoP. His research interests include: Nanoelectronic and Optoelectronic Devices and Materials; Photodetectors, Terahertz Generators and Detectors, Graphene Devices. He has authored and coauthored more than 310 peer-reviewed scientific journal papers and book chapters, 12 books, and holds 12 patents. His papers cited more than 7,900 times, his Google H index is 41 and D index is 36. 23 of his PhD students have successfully completed their dissertations. To support his research, he generated about about $7 M (his share) of external funding. More details on his research activities can be found.

D. Bochenek

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Three-component multiferroic composites – technology, electrophysic and magnetic properties

Abstract

The paper presents the technology and electrophysical properties of two ternary multiferroic composites (with a ferroelectric/magnetic percentage of 90/10) obtained by the free sintering method. In the first composite (BT-PFN-F), the ferroelectric component was $BaTiO^3$ (BT) and PbFe1/2Nb1/2O3 (BF) (in the amount of 50/50), and the magnetic component was zinc-nickel ferrite (F). In the second composite (BT-PZT-F), the ferroelectric component was $BaTiO_3$ (BT) and strontium and chromium doped PZT-type solid solution (PZT) (in the amount of 50/50), while the magnetic component was zinc-nickel ferrite (F). The component powders were mixed in a high energy planetary ball mill for 20 h and calcined at 900°C for 3 h, while the multiferroic composite samples were sintered by the free sintering method at 1250°C for 2 h. The multiferroic ceramic composites' crystal structure, microstructure, DC electrical conductivity, and dielectric, ferroelectric, and magnetic properties were investigated. Studies have shown that the use of two appropriate ferroelectric materials in the composite composition can provide high dielectric and magnetic properties of multiferroic composites. Such favorable results are obtained for BT-PZT-F composite composition. The BT-PZT-F composite sample exhibits high ferroelectric properties with saturation of the ferroelectric hysteresis loop P-E (maximum polarization Pm=11.2 μC/cm^2, residual polarization Pr=2.95 μC/cm2 and coercive field Ec=0.57 kV/mm) and correspondingly low dielectric loss values. Ceramic composites with sufficiently high ferroelectric and magnetic properties are suitable candidates for microelectronic and micromechatronic applications. In contrast, the BT-PFN-F

composite sample exhibits giant permittivity values, but at the same time shows a significant increase in the loss values which limits their potential applications.

Biography

Prof. dr hab. Dariusz Bochenek is currently employed as a Professor at the University of Silesia in Katowice (Poland) and is the head of a research group at the Institute of Materials Engineering dealing with the production and testing of ceramic materials and multiferroic composite materials with functional properties for microelectronic and micromechatronic applications. He is a member of the Polish Ceramic Society PTCr's board. He is also a member of the Polish Society of Microscopy PTMi, the European Microscopy Society (EMS), and the International Federation of Societies for Electron Microscopy (IFSM).

Dusan N. Sredojevic

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Electroreduction of CO^2 catalyzed by defective hexagonal boron-nitride: A theoretical study

Abstract

Recycling CO2 offers a great opportunity to lower net anthropogenic global CO2 emissions and a sustainable path to green alternative energy and chemical sources from an abundant and affordable carbon source.1 This can be accomplished through catalysis on 2D materials, which bring up new catalytic possibilities because they are atomically thin and possess distinct electrical and catalytic properties in contrast to larger nanoparticles and traditional bulk catalysts.2 The effectiveness of hexagonal boron nitride (h-BN) lattices with vacancy defects for CO2 electroreduction (CO2RR) was investigated in this study.3 Using a computational hydrogen model (CHE), we conducted comprehensive studies on several CO2RR electrocatalytic reaction pathways on distinct h-BN vacancy sites. With a limiting potential of 1.21 V, the electrochemical pathway of (H+ + e-) pair transfers resulting in methanol synthesis is most favorable for monoatomic defects VN (missing nitrogen). On the other hand, all pertinent species cannot form due to the significantly greater thermodynamic barriers imposed by the chemical pathways via VB (removed boron). The hydrogen evolution reaction (HER) would be the most likely process with a divacancy VBN because of its low rate-determining barrier of 0.69 eV. A limiting potential of 0.85 V is imposed on the tetravacancy defects VB3N by the routes leading to the production of both CH4 and CH3OH. At the same time, a substantially greater energy requirement (2.15 eV) suppresses the HER. We computed and examined the density of states (DOSs) of different structures including various vacancies. The findings showed that many electronic states exist inside the bandgap area of vacancy-bearing h-BN, which could enhance the material's electric conductivity.

Acknowledgment:

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D. N. Sredojević, I. Vukoje, Đ. Trpkov and E. N. Brothers, Phys. Chem. Chem. Phys., 2024, 26, 8356–8365.

Rasa Keruckiene

Department of Polymer Chemistry and Technology, Kaunas University of Technology, K. Barsausko st. 59-A500, Kaunas, Lithuania

A study of structure-properties relationship of stable radical emitters

Abstract

Donor-acceptor (D–A•) type luminescent organic radicals have garnered significant interest due to their potential as efficient doublet emitters, offering promising applications in optoelectronic and photonic devices. However, their typically low photoluminescence quantum yield (PLQY) and poor photostability present major challenges, limiting their practical utility. To address these issues, understanding of the intricate relationship between molecular structure and luminescent properties is crucial but remains elusive. In this study, a series of 9-arylfluorene radical derivatives were synthesized, incorporating substituents with varying electron-donating strengths. By systematically modifying the electron-donating fragments, this work provides a design strategy to enhance both efficiency and stability of luminescent radicals. The approach allows precise tuning of radiative and nonradiative transition rates, achieving an improved balance between the two and thereby enhancing PLQY and photostability. The findings shed light on the structure–property relationships in D–A• type radicals, paving the way for the development of advanced materials with the optimized performance. This study not only advances the fundamental understanding of the properties of luminescent organic radicals but also offers practical insights into their design for diverse applications, including organic light-emitting diodes, bioimaging, and quantum information technologies.

Biography

Associated Professor at the Kaunas University of Technology, Department of Polymer Chemistry and Technology. Her interests and experience are in the field of the design, synthesis, and characterization of organic electroactive compounds by experimental and theoretical methods as well as their thermal, electrochemical, and photophysical properties investigation. She has published >30 scientific articles, Hirsh index is 12. She's a co-author of 2 patent applications.2024, 26, 8356–8365.

D. Brzezińska

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Technology and dielectric properties of multicomponent PZT-type ceramics modified with praseodymium/tungsten

Abstract

This work obtained a multicomponent PZT-type material doped with manganese Mn, antimony Sb, praseodymium Pr, and tungsten W using the classical sintering method (pressureless sintering). Three compositions with the general formula Pb(Zr0.49Ti0.51)0.94Mn0.021Sb0.016PrxW0.018-x/2O3 were tested and analysed, with a variable amount of praseodymium Pr (from 0.008 to 0.012) and tungsten (from 0.014 to 0.012) admixture. The component powders were mixed in a planetary ball mill for 24 h in the technological process. The powder mixture was synthesized by calcination at 850°C for 4 h, while the ceramic samples were sintered by the free sintering method at 1150°C for 2 hours. XRD studies have shown that the obtained multicomponent PZT-type materials have the structure of a tetragonal system with a point group of P4mm. The microstructure of ceramic samples is characterized by fine and properly crystallized grains with sharp and clearly visible grain boundaries. Dielectric studies of PZT-type materials have revealed high values of permittivity with simultaneously low dielectric loss values and low electrical conductivity, which are important parameters for microelectronic applications. Biography: (Up to 150 words) Dr Dagmara Brzezińska is currently employed as an assistant professor at the University of Silesia in Katowice (Poland) in a research group at the Institute of Materials Science and Engineering dealing with the production and research of ceramic materials and multiferroic composite materials with functional properties for microelectronic and micromechatronic applications.

Biography

Dr Dagmara Brzezińska is currently employed as an assistant professor at the University of Silesia in Katowice (Poland) in a research group at the Institute of Materials Science and Engineering dealing with the production and research of ceramic materials and multiferroic composite materials with functional properties for microelectronic and micromechatronic applications.

Jung-Hoon Choi

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Improving the Predictive Accuracy of Machine Learning Models for Ceramic Glaze Gloss via Feature Engineering

Abstract

This study aims to enhance the predictive accuracy of machine learning models for ceramic glaze gloss by employing advanced feature engineering techniques. Utilizing a dataset of 1,250 glaze samples with chemical composition and gloss values, the research evaluates various data preprocessing methods and machine learning architectures. A Multi-Layer Perceptron (MLP) architecture was optimized through modifications to layers, nodes, optimizers, and activation functions to identify the best-performing model configuration. Baseline models without preprocessing exhibited high Mean Squared Error (MSE) values, with a minimum of 986.26, highlighting their inability to capture non-linear relationships in high-gloss samples. Scaling techniques reduced the MSE to 410.22, demonstrating the impact of preprocessing on performance improvement. Feature engineering further improved results by incorporating molar ratios (RO, R2O, RO2, R2O3) based on the Unity Molecular Formula (UMF) and alkali/alkaline earth oxide ratios, reducing the MSE to 326. The Adam optimizer combined with the ELU activation function delivered optimal results, effectively managing non-linearities and scaling challenges. Residual analysis demonstrated improved prediction accuracy in high-gloss regions by capturing non-linear interactions, as supported by scatter plots. This study underscores the significance of tailored preprocessing and feature engineering in enhancing model reliability and provides a framework for extending machine learning applications to other material systems and properties.

Biography

Choi Jung-hoon completed his Ph.D. at Gyeongsang National University at the age of 35. He conducted research at the Korea Institute of Ceramic Engineering and Technology (KICET) on improving ceramic manufacturing processes and synthesizing materials by applying digital technologies such as AI and 3D printing.

M.-L. Soran

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Ciprofloxacin removal from wastewater using biochar

Abstract

Water pollution with pharmaceutical compounds, especially antibiotics, represents a significant concern for both human health and the environment due to the excess of the use of antibiotics. Use of antibiotics can disrupt microbial communities and cause antibiotic resistance, which leads to a serious public health threat. Nowadays, the use of waste biomass for obtaining biochar as an adsorbent for removing antibiotics from contaminated water is a promising solution due to the biochar properties (e.g. high surface area, microporosity, and functional groups that enhance its ability to adsorb various contaminants) and also promotes waste recycling and sustainability. This work is focused on preparation and characterization of cost-effective new adsorbent materials based on biochar obtained from apple and tomatoes residues, hydroxide / acid activated (A-ac, A-HCl, T-HCl). The obtained materials were characterized using transmission/scanning electron microscopy, energy dispersive spectroscopy, Brunauer-Emmett-Teller analysis, Fourier-transform infrared spectroscopy, X-ray diffraction and Raman analysis. Preliminary tests were performed for the removal of ciprofloxacin from synthetic water samples. The best result was obtained in the case of A-Ac. The obtained results could contribute valuable knowledge to the field of water treatment and highlight sustainable methods of utilizing agricultural waste.

Biography

Soran Maria-Loredana, current position: Senior researcher, PhD Habil. at Materials, Energy and Advanced Technologies-META, National Institute for Research and Development on Isotopic and Molecular Technologies, Cluj-Napoca, Romania. She has experience in nanomaterials preparation, water decontamination, plant extracts obtaing and characterization, chromatographic separation and published more than 100 papers in ISI-coated journals and more than 190 participations to international manifestations. PhD in Chemistry, since 2005, Habilitat since 2018 in Environmental Engineering.

Shaghayegh Bagheri

School of Engineering, Department of Mechanical Engineering, VA 22030, USA

Advancing Traction on Icy Surfaces Through Bio-Inspired Solutions and Additive Manufacturing

Abstract

Slip and fall accidents due to icy conditions are a leading cause of hospitalization, affecting both workers exposed to outdoor winter conditions and older adults. For workers, these incidents increase the costs associated with workplace injuries and hospitalizations, while for seniors, the fear of falling contributes to isolation and sedentary behavior, leading to further health complications. A critical factor in these accidents is the lack of traction between footwear outsoles and icy surfaces. To address this issue, our team has developed a novel, bio-inspired technology aimed at creating slip resistant footwear outsoles. This technology leverages a polymer-based composite material reinforced with microfibers that mimic the friction mechanism found in the hair-like structures on polar bear feet, combined with 2D materials that trigger adhesion-based friction mechanisms similar to those in frog feet. Our lab-based testing has shown that this novel composite material provides a coefficient of friction on icy surfaces that is five times higher—even after extensive abrasion—compared to the best materials currently available. This study explores the design of footwear outsole tread patterns based on our novel composite, the use of additive manufacturing to produce these materials, and how the manufacturing process can be optimized to enhance the mechanical performance of the composites. Additionally, it examines how the material properties of these composites influence their coefficient of friction on ice under varying loading conditions.

Biography

Dr. Bagheri is an Assistant Professor in the Department of Mechanical Engineering at George Mason University and an Affiliate Scientist at the Toronto Rehabilitation Institute. Her research focuses on the advanced manufacturing of multi-functional materials for healthcare applications, particularly in rehabilitation, injury prevention, and treatment. With expertise in biomechanics, material science, and advanced manufacturing, she has worked extensively on composite biomaterials and orthopedic implants. Dr. Bagheri completed her PhD in solid mechanics and advanced her research as a postdoctoral fellow at McGill University and the University of Toronto. She has published over 50 journal articles and conference proceedings in top-tier materials and manufacturing journals. In addition to her editorial role as a guest editor for the Journal of Biomechanics Special Issue on "Advances in Sport Injuries," Dr. Bagheri also serves as a reviewer for several prominent biomedical engineering journals.

Ocsana Opriș

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Eco-friendly functionalization of graphene with metal oxides using plant extracts: Preparation and characterization

Abstract

Carbon-based nanomaterials, which include various forms such as fullerenes, single- and multi-walled carbon nanotubes, carbon nanoparticles, and graphene, represent a rapidly developing field of nanotechnology. Among these, graphene (GN) stands out as the most widely used carbon-based nanomaterial due to its fascinating properties. The large surface area of GN can be chemically modified to introduce a variety of oxygen-containing functional groups (e.g., carboxyl, hydroxyl, and carbonyl groups), which enhance its water dispersibility. The addition of GN to metal oxides (MOx) forms a hybrid material with improved physicochemical properties, making it valuable for various applications and technologies. This study focuses on the preparation and characterization of new tertiary materials combining GN, obtained through microwave irradiation of graphite, with MOx (such as Fe_3O_4-CuO), using extracts from fruit and vegetable wastes. The plant extracts used in the synthesis of these materials were characterized for their total polyphenol content and antioxidant capacity. The novel eco-friendly materials obtained were characterized by FTIR spectroscopy, X-ray diffraction, Brunauer-Emmett-Teller (BET), and electron microscopy (TEM, SEM, EDX). With their unique physicochemical properties, the resulting materials GN-Fe_3O_4-CuO-ext will be further explored for environmental applications.

Biography

Dr. Ocsana Opriș is a Scientific Researcher II at the Department of Materials, Energy, and Advanced Technologies, National Institute for Research and Development of Isotopic and Molecular Technologies (INCDTIM), Cluj-Napoca, Romania. She holds a Ph.D. in Environmental Science from "Babeș-Bolyai" University, Cluj-Napoca, Romania obtained in 2013. To date, she has published over 60 papers in ISI-rated international journals, authored a book chapter, and holds 3 patents.

M.L. Soran

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Green synthesis of biochar functionalized with metal oxides for water decontamination

Abstract

Pharmaceutical compounds (e.g. antibiotics, or anti-inflammatories) or other pollutants (e.g. dyes, phataltes), have been detected in water sources. For that reason a efficient technology is necessary to remove these compounds from wastewater. We can observed that biochar and its modified composites are commonly used as adsorbent for agro-industrial wastes. Among them the biochar materials are considered promising adsorbents due to their low cost and for the capacity to removing pharmaceutical contaminants. Here we report the preparation and characterization of the biochar obtained from apple residues, activated (A-ac) and functionalized with green synthesized metal oxides (Fe_3O_4 and NiO), The green synthesis of the metal oxide was done in the presence of Urtica dioica L. (nettle) extract (ext) that was previously characterized for total polyphenolic content and antioxidant capacity. The novel materials prepared (A-ac-Fe_3O_4-ext, A-ac-NiO-ext, and A-ac-Fe_3O_4-NiO-ext) were analyzed for the determination of their morphological, compositional, and structural properties, and determination of the specific surface area and porosity parameters. Preliminary adsorption tests demonstrated that A-ac-Fe_3O_4-ext exhibiting the highest adsorption efficiency for paracetamol (57.54 %) and tartrazine (37.48 %). We can concluded that the biochar derived from apple wastes and enhancement with metal oxides green synthesized have potential for environmental remediation, particularly in the removal of pollutants from waters.

Biography

Soran Maria-Loredana, current position: CSI PhD Habil. at Materials, Energy and Advanced Technologies-META, National Institute for Research and Development on Isotopic and Molecular Technologies, Cluj-Napoca, Romania. Published more than 100 papers published in ISI-coated journals and more than 100 participations to international manifestations. PhD in Chemistry, in 2005, title obtained at “Babeş-Bolyai” University, Cluj-Napoca, Faculty of Chemistry and Chemical Engineering, Romania.

A. Stegarescu

National Institute for Research and Development of Isotopic and Molecular Technologies, 67-103 Donat, 400293 Cluj-Napoca, Romania

Materials based on biochar, Fe_3O_4 and MnO_2 with potential in water depollution

Abstract

Biochar and biochar-based modified composites have started to be studied more and more intensively due to the fact that they are highly effective as adsorbents, especially for water remediation. Biochar, a carbon-rich coal with a porous structure, is obtained in a low/inert oxygen atmosphere (e.g. by pyrolysis in inert gas or in oxygen-poor environments) from natural organic materials (e.g. vegetable waste, wood, poultry litter, manure, sewage sludge or paper waste, etc.). One of the most important functions of biochar is their ability to adsorb organic pollutants from the environment. The relatively low production costs, the widely available wastes for use as raw materials have directed the attention of the scientist towards the use of biochar, either in their raw or functionalized/modified version, as a possible solution for the increasing pollution of freshwater sources. This work will present the method of obtaining, starting from Biochar (Bch-HCl), for two new nanocomposites: Bch-HCl/MnO_2 and Bch-HCl/Fe_3O_4/MnO_2. They were characterized by FTIR spectroscopy, X-ray diffraction, Brunauer-Emmett-Teller (BET) and electron microscopy (TEM, SEM, EDX) and also preliminary adsorption tests of tartrazine, ciprofloxacin and paracetamol respectively from synthetic solutions were carried out and it was possible to conclude that the efficiency of the material used for adsorption depends on the pollutant.

Biography

Stegarescu (born Rotar) Olimpia-Adina, current position: CSII PhD at Materials, Energy and Advanced Technologies Department, National Institute for Research and Development on Isotopic and Molecular Technologies, Cluj-Napoca, Romania. Published more than 40 papers published in ISI-coated journals and more than 50 participations to international manifestations. PhD in Chemistry, in 2007, title obtained at "Babeş-Bolyai" University, Cluj-Napoca, Faculty of Chemistry and Chemical Engineering, Romania.

Ocsana Opriș

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Preliminary tests of pollutant removal using tertiary systems based on graphene functionalized with metal oxides

Abstract

A very important concern of The Times is climate change, environmental pollution, and their associated risks. In recent decades, a considerable number of chemicals used in daily life and various applications (industrial and agricultural), such as pharmaceuticals, pesticides, and their metabolites, have been discharged into the environment. Overall, the use of chemicals has increased annually, and their irresponsible use has become excessive. As a result, their metabolites persist in the environment because they are relatively stable and difficult to control using conventional methods. Therefore, one of today's major challenges is to develop green and environmentally friendly technologies for wastewater treatment. This study focuses on determining the affinity of new tertiary materials based on graphene (GN) combined with metal oxides (MOx) using plant extracts (ext) through preliminary adsorption experiments for the removal of environmental contaminants from water. All adsorption tests were conducted using synthetic solutions. The pollutant, at a concentration of 40 mg L−1, was mixed with 5 mg of the GN-Fe_3O_4-MOx-ext material for 20 min at 25°C and 300 rpm. The pollutant analysis was performed using high-performance liquid chromatography, a method previously established. These tests provide information regarding the efficient adsorption of pollutants onto new materials. Further investigations, including equilibrium, kinetic, and thermodynamic studies, will be carried out to understand the adsorption mechanism. Overall, all of this could lead to the use of the new material in practical applications on an industrial scale as an efficient and cost-effective solution.

Biography

Dr. Ocsana Opriș is a Scientific Researcher II at the Department of Materials, Energy, and Advanced Technologies, National Institute for Research and Development of Isotopic and Molecular Technologies (INCDTIM), Cluj-Napoca, Romania. She holds a Ph.D. in Environmental Science from "Babeș-Bolyai" University, Cluj-Napoca, Romania, which she obtained in 2013. To date, she has published over 60 papers in ISI-rated international journals, authored a book chapter, and holds 3 patents.

Yi-Ping Chen

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Self-Adjuvanted Silica Nanoparticles as Delivery Carriers of Therapeutic Enzyme Against Pancreatic Cancer

Abstract

The combination of cancer immunotherapy and biologics (protein and enzyme-based therapies) offers a promising approach for cancer treatment. In pursuit of this goal, we aim to demonstrate the potential of hollow silica nanospheres (HSN) as both adjuvants to stimulate immunity and carriers to deliver asparaginase (ASNase), resulting in enhanced antitumor efficacy through self-adjuvanticity and synergistic biologic effects. In this study, well-ordered 50 nm PEGylated HSN (HSN-PEG) and solid silica nanospheres (SSN-PEG) as control nanoparticles were synthesized. No significant cytotoxicity, reactive oxygen species (ROS) generation, or inflammatory cytokine production was observed. Serum biochemistry assays confirmed the biocompatibility and biosafety of the nanoparticles. Flow cytometry analysis revealed that HSN-PEG exhibited self-adjuvanticity by activating T cells ($IFN\gamma^+CD8^+$ and $IFN\gamma^+CD4^+$), leading to tumor inhibition in 4T1 tumor-bearing mice. Furthermore, ASNase encapsulation within HSN-PEG (ASNase@HSN-PEG) provided protection against protease degradation, ensuring enzyme stability. This formulation exhibited reduced clearance, lower degradation, and an extended half-life of ASNase in mice. Therapeutic studies demonstrated significant tumor growth inhibition in xenograft mice treated with ASNase@HSN-PEG, suggesting that the deprivation of asparagine by ASNase@HSN-PEG could serve as an effective strategy against pancreatic cancer. We propose that PEGylated HSN possesses dual functions: enhancing immune responses to inhibit tumor growth while efficiently delivering the therapeutic enzyme ASNase into cancer cells, leading to asparagine deprivation and subsequent cancer cell suppression. This combined approach of cancer immunotherapy and biologics therapy may offer an effective treatment strategy for pancreatic cancer..

Biography

Dr. Yi-Ping Chen received his Ph.D. in Chemical Biology from National Taiwan University in 2013 and then conducted postdoctoral research at the Research Center for Applied Sciences, Academia Sinica, Taiwan, from 2013 to 2015. In 2015, he joined Taipei Medical University as an assistant professor. His research focuses on designing multifunctional mesoporous silica nanoparticles with high translational potential by optimizing stealth coatings, charge modulation, size, and surface functionalization. These enhancements improve biocompatibility, biodegradability, immune evasion, circulation time, tumor targeting, and biological barrier penetration. Dr. Chen's research group explores nanoscale therapeutic strategies using silica nanoparticle-based approaches for the intracellular delivery of proteins, enzymes, antibodies, small-molecule drugs, and nucleic acid-based therapies to tackle challenging human diseases. His work integrates nanomedicine with immunotherapy, neurotherapy, cancer therapy, and protein therapy, with a strong emphasis on advancing these technologies toward preclinical applications.

Abhishek Bansal

Principal Consultant, New Era Consultancy Services

Novel Perspective of Contemplating Existing Principles of Scientific Truth: Novel B-Unified Theory, Postulates, Propositions and Models With Applications and Modeling in Impedance, Transformers, Inverters, Generators, Solar, BLDC, SMPS and Short Circuit Analysis

Abstract

In this session, I'm going to present my novel perspective of contemplating the existing principles which have been established or viewed as fixed eternal truth beyond which it is believed there is nothing to explore. I have revisited the concept of electrical current and circuit theory w.r.t quantum mechanics and electrodynamics, and its application in short circuit.
I also provide insight, significance of complex-domain impedance and the work and results developed in this research is also the practical implementation for the open unsolved problem in mathematics. This research aims to examine aspects of impedance in hypercomplex and higher dimension planes. My research studies questions - What is distinctive about j'' that makes it special in defining impedance? What impact the representation of impedance in hyper-complex planes will lead on critical calculations in electrical engg. especially in short-circuit, transmission lines voltage drops or voltage induced, synchnronous motors? What such interpretation leads to? I also present the sinusoidal significance as needed by inverters. In electronics \& electrical engineering, being a `pure sine wave' can be understood from the power quality, power factor and designing of expensive pure sine wave inverters. In many practical applications,not pure-sine(modified) wave or quasi-sine waveform in not acceptable as performance gets degraded.In these three-part paper series,four questions are studied. What makes a sine wave,a special wave?

I also present my model/method in analysis of transformer,SMPS, BLDC.(Should not be uploaded in this form as work still ongoing).

Biography

Abhishek Bansal is an amateur scholar, fully self-studied various engineering, medical & mathematical specializations, and has been working for the past 20 years in R & D(machine designing). He is also involved in non-engg. works. He is fighting himself his litigation matters in Courts. He is the founder of New Era Consultancy Services and Learn Yourself Easy Solutions. His profile can be seen at ORCiD with identification number 0000-0002-2572-9004.

THANK YOU