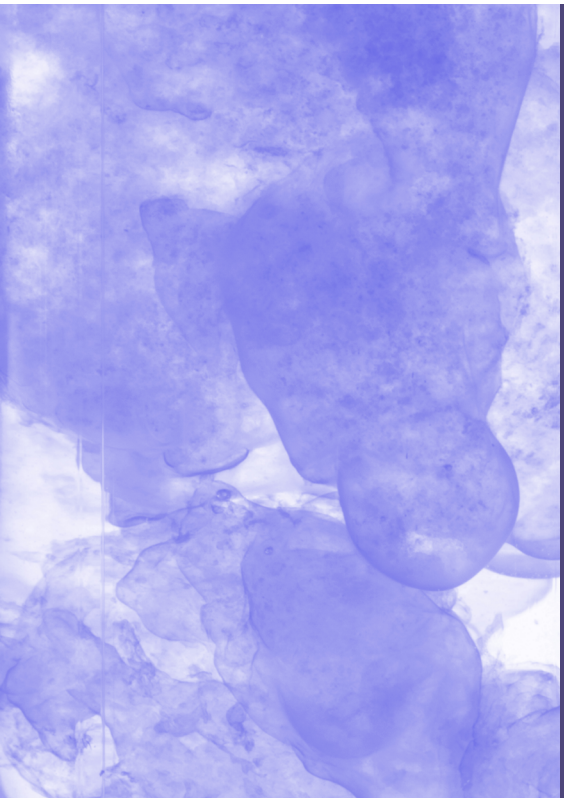
Applied Sciences
an Open Access Journal by MDPI

Impact Factor 2.5
CiteScore 5.3

Section
Nanotechnology and Applied Nanosciences



mdpi.com/
journal/
applsci

MDPI

Section Information

This section is intended for accounts of experimental and theoretical works pertaining to nanotechnology or to nanosciences oriented towards applications. More specifically, papers dealing with the production, manipulation or assembly of nanostructures, the construction or characterization of nano-architectures, the design of nanoscale devices, the use of nanoparticles or nanostructures to improve macroscopic properties of materials and systems are welcome. This section is particularly suited to applications of nanomaterials in all the domains, ranging from sustainable materials science to medical treatments. In contrast, works focusing on nano-biological research involving living cells, viruses, bacteria and works involving bio-ethical issues should be addressed to more specialized journals.

Author Benefits

Open Access

Unlimited and free access for readers

No Copyright Constraints

Retain copyright of your work and free use of your article

Thorough Peer-Review

2023 Impact Factor: 2.5

(*Journal Citation Reports* - Clarivate, 2024)

Discounts on Article Processing Charges (APC)

If you belong to an institute that participates with the MDPI Institutional Open Access Program

No Space Constraints, No Extra Space or Color Charges

No restriction on the maximum length of the papers, number of figures or colors

Coverage by Leading Indexing Services

Scopus, SCIE (Web of Science), Inspec, CAPlus / SciFinder, and other databases

Rapid Publication

A first decision is provided to authors approximately 17.8 days after submission; acceptance to publication is undertaken in 2.7 days (median values for papers published in this journal in the first half of 2024)

Content Highlights

Variations in Gold Nanoparticle Size on DNA Damage: A Monte Carlo Study Based on a Multiple-Particle Model Using Electron Beams

Authors: Christine A. Santiago and James C. L. Chow

Abstract: Research is currently focused on maximizing cancer cell death while minimizing harm to healthy cells. Gold nanoparticles (GNPs) have been extensively studied as a radiosensitizer to improve cancer cell death while sparing normal tissue. Previous research and simulations have demonstrated that the presence of a single GNP increases DNA damage and dose. In this study, a Monte Carlo simulation using the Geant4-DNA code was used to investigate the effects of multiple GNPs on DNA damage when exposed to electron beams with energies of 50, 100, 150, and 200 keV. The study examined DNA damage caused by 1–4 GNPs of the same total volume by analyzing both single- and double-strand breaks. The results indicate that increasing the number of GNPs and decreasing the electron beam energy increases the total number of strand breaks. Although DNA damage increased, the proportion of double-strand breaks remained unchanged in relation to the total number of strand breaks.

https://doi.org/10.3390/app13084916

The Application of Transition Metal Sulfide Nanomaterials and Their Composite Nanomaterials in the Electrocatalytic Reduction of CO_2: A Review

Authors: Jason Parsons and Mataz Alotaibi

Abstract: Electrocatalysis has become an important topic in various areas of research, including chemical catalysis, environmental research, and chemical engineering. There have been a multitude of different catalysts used in the electrocatalytic reduction of CO_2, which include large classes of materials such as transition metal oxide nanoparticles (TMO), transition metal nanoparticles (TMNp), carbon-based nanomaterials, and transition metal sulfides (TMS), as well as porphyrins and phthalocyanine molecules. This review is focused on the CO_2 reduction reaction (CO_2RR) and the main products produced using TMS nanomaterials. The main reaction products of the CO_2RR include carbon monoxide (CO), formate/formic acid ($HCOO^-$/HCOOH), methanol (CH_3OH), ethanol (CH_3CH_2OH), methane (CH_4), and ethene (C_2H_4). The products of the CO_2RR have been linked to the type of transition metal–sulfide catalyst used in the reaction. The TMS has been shown to control the intermediate products and thus the reaction pathway. Both experimental and computational methods have been utilized to determine the CO_2 binding and chemically reduced intermediates, which drive the reaction pathways for the CO_2RR and are discussed in this review.

https://doi.org/10.3390/app13053023

Towards Mirror-Less Graphene-Based Perfect Absorbers

Authors: Sangjun Lee and Sangin Kim

Abstract: Owing to its exceptional electronic and optical properties, graphene has attracted extensive attention among researchers in the development of high-performance optoelectronic devices. However, the light absorption of pure graphene is very poor, limiting its development in practical application. In this review, as a solution for this issue, various types of graphene-based perfect absorbers are addressed in terms of their operation principles and design requirements. Their recent progress and potential applications such as photodetectors and modulators are also discussed. In particular, we emphasize the importance of mirror-less (in particular, one-port mimicking) perfect absorber design due to simplified fabrication processes or enhanced tolerance for fabrication error.

https://doi.org/10.3390/app13179708

Chitosan Nanoparticles Production: Optimization of Physical Parameters, Biochemical Characterization, and Stability upon Storage

Authors: Eduardo M. Costa, Eduardo M. Costa and Manuela Pintado

Abstract: Ionic gelation is among the simplest processes for the development of chitosan nanoparticles reported so far in the literature. Its one-shot synthesis process in conjunction with the mild reaction conditions required are among the main causes for its success. In this work, we sought to optimize a set of physical parameters associated with the ionic gelation process at two different pH values. Following that, the NPs' freeze-drying and long-term storage stability were assayed, and their biocompatibility with HaCat cells was evaluated. The results show that NPs were more homogenously produced at pH 5, and that at this pH value, it was possible to obtain a set of optimum production conditions. Furthermore, of the assayed parameters, TPP addition time and overall reaction time were the parameters which had a significant impact on the produced NPs. Nanoparticle freeze-drying led to particle aggregation, and, of the cryoprotectants, assayed mannitol at 10% (w/v) presented the best performance, as the NPs were stable to freeze-drying and maintained their size and charge in the long-term stability assay. Lastly, the chitosan NPs presented no toxicity towards the HaCat cell line.

https://doi.org/10.3390/app13031900

Two-Dimensional Metal–Organic Frameworks and Their Derivative Electrocatalysts for Water Splitting

Authors: Lin Shen, Yongteng Qian, Zhiyi Lyu, Dong-Hwan Kim and Dae Joon Kang

Abstract: The escalating urgency to mitigate climate change and enhance energy security has prompted heightened exploration of hydrogen production via electrocatalysis as a viable alternative to conventional fossil fuels. Among the myriad of electrocatalysts under investigation, two-dimensional (2D) metal–organic frameworks (MOFs) stand out as a particularly appealing option. Their unique properties, including a large active specific surface area, distinctive pore structure, ample metal active sites, ultra-thin thickness, superior ion transport efficiency, fast electron transfer rate, and the ability to control the morphological synthesis, endow these frameworks with exceptional versatility and promising potential for electrocatalytic applications. In this review, we delineate the structural features and advantages of 2D MOFs and their derivatives. We proceed to summarize the latest advancements in the synthesis and utilization of these materials for electrocatalytic hydrogen evolution reactions (HER) and oxygen evolution reactions (OER). Finally, we scrutinize the potential and challenges inherent to 2D MOFs and their derivatives in practical applications, underscoring the imperative for continued research in this captivating field of electrocatalysis.

https://doi.org/10.3390/app13169343

MDPI is a member of

Editorial Office
applsci@mdpi.com

MDPI
Grosspeteranlage 5
4052 Basel, Switzerland
Tel: +41 61 683 77 34
mdpi.com