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Editorial

Feature of Review Papers in Nanotechnology and Applied Nanosciences

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1. Introduction

Nanoparticles have been in use for centuries [1]. However, it is only since the development of reliable nanoparticle synthesis processes and the mastering of appropriate characterization tools, including nanoprobe microscopy (among which are STM and AFM), that nanosciences have expanded. Nowadays, this field has grown to such a level that real-life applications of nanosciences have become a reality. Nanoparticles can be produced through different approaches, with green chemistry garnering increasing interest [2], and are studied using a variety of methods. Many domains employ nanotechnology—the use of nanostructures for specific goals—ranging from health sciences to cosmetics to building and road construction, and including the oil, agriculture, food, aeronautics, communications and energy industries, to cite a few.

The Section "Nanotechnology and Applied Nanosciences" of *Applied Sciences* covers an important domain of research and development. The special issue "Feature of Review Papers in Nanotechnology and Applied Nanosciences" intended to gather moderate-sized review papers featuring important and recent developments or achievements in the field of nanosciences, with emphasis on real or possible applications. Given that writing review papers in a field that evolves as rapidly as nanosciences is a challenge, authors who are well-known experts in their domain were invited to contribute. Finally, seven contributions were published in this Special Issue, details of which are given below. A list of the contributions is provided at the end of this article, cited in order of publication date.

2. Contributions

The first publication in the special issue reviews the structural and physico-chemical properties of nanocellulose-based materials. The authors comment on recent applications of these eco-friendly bio-nanomaterials for the restoration and conservation of cultural heritage, and describe the advantages of nanocellulose for the recovery of degraded wood and the treatment of painting canvases and ancient papers.

Water electrolysis by proton exchange membranes is a promising route for the production of hydrogen. In the second paper, it is explained that metal-based bipolar plates play an important role in this technology. However, the metal plates must be protected against corrosion through surface modification. In this contribution, different protective coatings are reviewed and compared. The authors demonstrate that hybrid nanoparticle-promoted polymers have several advantages over other coating solutions.

Carbon dioxide electrocatalytic reduction reactions are investigated using experimental and computational tools in the third paper. The catalysts of interest in this study are transition metal sulfide nanomaterials. The proportion of each product in the reduction reaction, among which are carbon monoxide, methane, ethene, methanol and ethanol, is shown to depend on the particular transition metal the sulfide is made of.

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Pollution of the environment by micro- and nano-plastics is a subject of great concern. The detection of these plastic residues via plasmonic effects is investigated in paper four, where the authors compare the efficiency of different techniques that exploit visible and UV plasmon resonances in noble metal nanoparticles.

The authors of the fifth paper review different models of perfect absorbers based on graphene, despite the fact that the light absorption coefficient of atomically thin graphene is only around 2%. As emphasized in this review, the application of graphene as a perfect absorber is particularly suited to devices that do not require a back-reflection mirror, due to their ease of fabrication. Patterned substrates, multilayers and metasurfaces offer interesting alternatives.

The large-scale use of green hydrogen as a fuel, for instance, raises a lot of challenges. Some of its applications are under scrutiny from a nanotechnological point of view. In paper six, the properties of nano-titanium dioxide are reviewed in the context of hydrogen production and storage. In addition to exhibiting photocatalytic activity, the authors emphasize that TiO_2 may be used to enhance the performance of magnesium hydride for solid-state hydrogen storage.

Aside from catalysis, metal–salen complexes have many promising applications. The seventh paper reports on the use of X-ray spectroscopy (XPS, valence band PES, EXAFS and NEXAFS). Some of the spectra and data presented in the review contribute to elucidating the atomic and electronic structures of salen-based complexes and derivatives, including polymers and their composites with carbon nanostructures, graphene and nanotubes.

3. Conclusions

This special issue constitutes a sample of studies illustrating the vast range of applications of nanotechnology. Due to the small number of papers collected, this sample is not fully representative of the richness of research in this domain. Although all of these papers focus on materials sciences, leaving out many other fields, most of them touch upon important issues prevalent in our polluted and climate-degraded world.

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Conflicts of Interest: The author declares no conflict of interest.

List of Contributions:

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