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Editorial

Special Issue on "Synthesis and Application of Nano- and Microdispersed Systems"

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With numerous advancements, nano- and microdispersed systems are rapidly increasing worldwide. [1]. This particularly includes nanoparticles and nanosystems. Generally, nano is defined as anything on the nanoscale range, from 1 to 100 nm [1]. However, larger sizes, from 100 to 500 nm, are also available for use. Based on the size and surface properties of nanoparticles, application variation occurs [2]. Major changes with respect to particle size and surface properties can lead to major changes in surface plasmon resonance, catalytic variation, magnetic properties, optical properties, and biological activities. Hence, it is essential to tune the structure of nanoparticles and their surface properties for better applications.

There are several approaches to nanoparticles' synthesis that researchers are working on at present. For example, the hydrothermal method, in which the synthesis of nanomaterial takes place at high pressure with high-temperature maintenance in a closed container, produces nanoparticles with a unique surface area and size. In addition, co-precipitation is also a common approach for the synthesis of nanoparticles. In this approach, two different solutes are precipitated together to form a unique and desired nanoparticle. This procedure requires a beaker, stirrers with magnetic bars, and the required solutes and solvents. Another approach to nanoparticle synthesis is chemical reduction. In this approach, the salt precursors are reduced with the reducing agents to produce metal and metal oxide nanoparticles for the desired applications. Furthermore, more recently, organic-microemulsion-based synthesis has been improving, in which different combinations of water, surfactant, and oils are used for the synthesis of nanoparticles. Moreover, a nanoparticle synthesis that is mediated by seeding is also performed, in which the seed nanoparticles are mixed with the salt precursors to form the desired nanoparticles. Hence, a variety of synthesis procedures are available, and each day, there are further advancements in the synthesis methods. Hence, this issue was planned to showcase the recent advancements in the synthesis of nanoparticles.

Furthermore, the applications of nanoparticles are included in this issue because the day-to-day applications of nanoparticles are increasing. Nanoparticles are used in wastewater treatments, sensors, electrode materials for lithium ion and sodium ion batteries, as super-capacitors, piezoelectric materials, optical applications, disease diagnosis materials and catalytic materials, in fuel cell applications, memory devices, antenna cores, pain industries, computer chips, and for biomedical applications. Thus, using this application knowledge, we aimed to build a research theme for the application of nanoparticles. Hence, we welcome the valuable contributions of all our researchers, in the form of original research papers, communications, and review papers on the synthesis and application of nanoparticles, using different key words, such as nanosystems, nanopowder, emulsion, and process.

We received a large number of papers for our Special Issue, which were peer-reviewed by experts in their respective fields. After a rigorous review process, ten original papers

Citation: Kuznetsov, D.; Karunakaran, G. Special Issue on "Synthesis and Application of Nano- and Microdispersed Systems". *Processes* **2022**, *10*, 608. https://doi.org/10.3390/pr10030608

Received: 25 February 2022
Accepted: 11 March 2022
Published: 21 March 2022

and one communication were published in this Special Issue. For example, Anastasia Yakusheva et al. described the synthesis of water-soluble carbon quantum dots for the detection of copper ions in aqueous media [1]. The carbon quantum dots were found to be very effective for the detection of copper in the aqueous medium. Anna A. Ulyankina et al. [3] synthesized TiO_2 nanoparticles with an electrochemical method using a pulse-alternating current for the photocatalytic oxidation of 5-hydroxymethylfurfural (HMF) to 2,5-diformylfuran (DFF). The TiO_2 nanoparticles were found to have higher DFF selectivity in methanol, of up to 33% when compared to the commercially available materials. Mai Ngoc Tuan Anh et al. [4] produced silver nanodecahedrons using photochemical synthesis for surface-enhanced Raman scattering (SERS) properties and applications. It was observed that the synthesized silver nanodecahedrons exhibited stronger SERS properties after 48 h of Light-Emitting Diode (LED) radiation. N. Van Minh et al. [5] synthesized spark plasma-sintered cobalt materials for enhanced mechanical properties. It was found that a high bending strength, microhardness, and relative density enhancement were achieved with the nanomodification of spark plasma-sintered cobalt materials.

Hence, this Special Issue on nano- and microdispersed systems is very useful to any researchers looking for new synthesis and applications, such as sensors, wastewater treatment, and chemical conversion. This Special Issue will also be a valuable reference point for future research in this field. From our Guest Editor team board, we congratulate and thank all the authors who made valuable contributions to this issue. We also sincerely thank all the expert members and reviewers who spent their valuable time and effort reviewing all the papers. We would also like to thank the editorial team and all the technical staff of *Processes* for their efforts.

Author Contributions: D.K. and G.K. writing—review and editing. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

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