processes

Editorial

Advances in Supported Nanoparticle Catalysts

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In catalysis, the design and application of supported nanoparticle catalysts is a cornerstone for addressing contemporary challenges in environmental remediation, sustainable synthesis, and analytical methodologies [1–6]. This Special Issue of *Processes* brings together a collection of research papers that exemplify the forefront of innovation in developing and utilizing supported nanoparticle catalysts.

One of the contributions in this issue focuses on the highly efficient removal of anionic dyes from water, achieved through cationic polymer brush-functionalized magnetic mesoporous silica nanoparticles (contribution 1). This study underscores the efficiency of supported nanoparticles and highlights their potential in addressing water pollution challenges.

In pursuing sustainable chemical transformations, the synthesis of palladium and copper nanoparticles supported on TiO_2 for the solvent-free aerobic oxidation of benzyl alcohol showcases the catalytic efficiency of supported metal nanoparticles in environmentally benign processes (contribution 2).

A distinctive approach to material design is explored in the study on fabricating high-yield superhydrophobic carbon nanomaterials using a cobalt/iron co-catalyst impregnated on powdered activated carbon (contribution 3). This work advances the superhydrophobic materials field and demonstrates the synergistic effects of co-catalysts in nanoparticle synthesis.

Nanotechnology and electrochemiluminescence are joined together in the research focusing on polymer nanoparticle enhancement and particle structure stabilization by doping anionic polyelectrolyte and cationic polymer containing tertiary amine groups (contribution 4). The findings have significant implications for highly sensitive immunoanalysis applications.

The main focus is photocatalysis, with research into the effects of gold and ruthenium on the band gap in TiO_2 support (contribution 5). Understanding the intricacies of these supported nanoparticle systems is crucial for optimizing photocatalytic processes for environmental and energy applications.

Glycerol oxidation over supported gold catalysts is explored in another significant contribution, unveiling the combined effects of gold particle size and the basicity of the support (contribution 6). This work contributes valuable insights into the design principles of supported gold catalysts for diverse catalytic applications.

The biogenic synthesis of magnetic nanoparticles of Fe_3O_4 using *Cnicus benedictus* extract opens up new possibilities for photocatalytic organic dye degradation and antibacterial behavior (contribution 7). This eco-friendly nanoparticle synthesis approach further expands the sustainable catalyst fabrication toolbox.

The physicochemical properties and CO oxidation performance of nanostructured CeO_2/TiO_2 oxides are systematically investigated, shedding light on the influence of the preparation method (contribution 8). Such insights are crucial for tailoring nanostructured catalysts for enhanced performance in various catalytic reactions.

Exploring the influence of electrostatic interactions during the resorcinol—formaldehyde polymerization on the characteristics of Mo-doped carbon gels provides an understanding of the factors influencing the properties of supported nanoparticle catalysts (contribution 9).

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Finally, this Special Issue also deals with a review of hydrogenation reactions using supported palladium nanocatalysts (contribution 10), emphasizing the significance of supported metal nanoparticles in catalyzing crucial industrial processes.

As the guest editor for this Special Issue, I am thankful to all the contributing authors and the dedicated staff members at MDPI for their great editorial support. I am confident that readers will discover the papers featured in this Special Issue to be important examples of the application of supported nanoparticles in catalytic processes.

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