Special Issue

Light-Driven Nanocatalysts for Wastewater Treatment

Message from the Guest Editors

Wastewater pollution poses a significant threat to both ecosystems and human health, thereby necessitating the development of advanced treatment technologies. Light-driven nanocatalysts have emerged as a highly promising solution, utilizing solar energy to efficiently degrade organic pollutants, heavy metals, and pathogens. Typically composed of semiconductor nanomaterials (e.g., TiO_2, ZnO, g-C_3N_4) or plasmonic metals, these nanocatalysts generate reactive oxygen species (ROS) under light irradiation, enabling the transformation of contaminants into harmless byproducts. Challenges such as catalyst stability, recyclability, and scalability are currently being addressed through innovative material design and hybrid systems. Future research will focus on enhancing visible-light responsiveness and integrating nanotechnology with practical industrial applications. Light-driven nanocatalysts thus represent a green, cost-effective approach for achieving sustainable wastewater remediation.

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Nanoscience and nanotechnology are exciting fields of research and development, with wide applications to electronic, optical, and magnetic devices, biology, medicine, energy, and defense. At the heart of these fields are the synthesis, characterization, modeling, and applications of new materials with lower nanometer-scale dimensions, which we call “nanomaterials”. These materials can exhibit unusual mesoscopic properties and include nanoparticles, coatings and thin films, metal–organic frameworks, membranes, nano-alloys, quantum dots, self-assemblies, 2D materials such as graphene, and nanotubes. Our journal, *Nanomaterials*, has the goal of publishing the highest quality papers on all aspects of nanomaterial science to an interdisciplinary scientific audience. All of our articles are published with rigorous refereeing and open access.

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