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Editorial

Special Issue: Applications and New Trends in Catalysts and Photocatalytic Nanomaterials for Environmental Remediation

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In an era where environmental sustainability has become paramount, the scientific community is continually pushing the boundaries of innovation to address the pressing challenges posed by pollution and environmental degradation. This Special Issue on "Applications and New Trends in Catalysts and Photocatalytic Nanomaterials for Environmental Remediation" in *Catalysts* serves as a beacon, illuminating the groundbreaking advancements and emerging trends in this field.

Catalysts and photocatalytic nanomaterials have emerged as formidable tools in our ongoing progress to combat environmental pollution. These materials possess exceptional properties, enabling them to facilitate chemical reactions under mild conditions, and thus offering a sustainable pathway for the degradation of pollutants and the purification of water, air, and soil.

The interdisciplinary nature of the research presented in this Special Issue features the collaborative efforts required to address complex environmental challenges. Chemists, material scientists, environmental engineers, and other experts have come together to share their insights and findings, enriching our understanding of the potential and limitations of catalysts and photocatalytic nanomaterials.

The articles compiled within this Special Issue exemplify the remarkable potential of these materials. For instance, Contribution 1 delves into the fabrication of carbon/zinc oxide nanocomposites, demonstrating their efficacy as catalytic materials for dye-sensitized solar cells, thus contributing to cleaner energy production. Meanwhile, Contribution 2 explores the application of zero-valent iron/cork as a permeable reactive barrier for in situ remediation of phenanthrene-contaminated soil, showcasing a promising approach to soil remediation.

In the realm of water treatment, Contribution 3 investigates the photocatalytic degradation of estriol (E3) hormone using boron-doped TiO_2, addressing the pervasive issue of endocrine-disrupting chemicals in water systems. Expanding the scope of nanomaterial synthesis, Contribution 4 presents an eco-friendly approach to producing silver nanoparticles using the biomass filtrate of *Bacillus amyloliquefaciens*. This study highlights the growing interest in sustainable methods for nanoparticle synthesis and their potential for antimicrobial and cytotoxic applications, exemplifying the versatility of these materials and their potential applications beyond traditional environmental remediation.

Looking towards innovative solutions, Contribution 5 takes a bio-inspired approach, utilizing plant-based copper oxide nanoparticles for the dual purpose of antibacterial activity and heavy metal removal from tanning wastewater, exemplifying the versatility of

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these materials. Meanwhile, Contribution 6 introduces the in situ growth of Ti_3C_2/UiO-66-NH_2 composites for the photoreduction of Cr(VI), highlighting the potential of composite materials in mitigating heavy metal pollution. These diverse studies collectively paint a vivid picture of the transformative power that catalysts and photocatalytic nanomaterials hold for environmental remediation.

As guest editors of this Special Issue, we believe that the contributions in this Special Issue will inspire further research and innovation, driving the development of effective solutions for environmental remediation. We encourage the scientific community to continue exploring new materials and methods, optimizing existing processes, and fostering interdisciplinary collaborations to enhance the efficacy of environmental remediation technologies. The integration of advanced oxidation processes, photocatalysis, and catalytic nanomaterials will undoubtedly play a pivotal role in addressing the environmental challenges of today and tomorrow.

We extend our gratitude to all the authors, reviewers, and researchers who contributed to this Special Issue. It is our sincere hope that the findings presented within these pages will ignite further research and innovation towards a world where environmental remediation is not just a goal, but a reality.

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List of Contributions

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