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Editorial

Visible-Light-Active Photocatalysts for Environmental Remediation and Organic Synthesis

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In recent years, the formulation of innovative photocatalysts activated by visible or solar light has been attracting increasing attention because of their notable potential for environmental remediation and use in organic synthesis reactions. Generally, the strategies for the development of visible-light-active photocatalysts are mainly focused on enhancing degradation efficiency (in the case of environmental remediation) or increasing selectivity toward the desired product (in the case of organic synthesis). These goals can be achieved by doping the semiconductor lattice with metal and/or non-metal elements in order to reduce band gap energy, thereby providing the semiconductor with the ability to absorb light at a wavelength higher than the UV range. Other interesting options are the formulation of different types of heterojunctions (to increase visible absorption properties and to reduce the recombination rate of charge carriers) and the development of innovative catalytic materials with semiconducting properties. This Special Issue is focused on visible-light-active photocatalysts for environmental remediation and organic synthesis, featuring the state of the art as well as advances in this field.

Currently, this issue has collected six papers addressing the preparation and characterization of novel photocatalytic materials and their use in the visible (or solar) light-driven photocatalytic removal of pollutants from liquid phases and in the inactivation of bacteria [1–6]. The photocatalytic efficiencies of Ag_3PO_4 nanoparticles [2], $Bi_{12}NiO_{19}$ sillenite crystals [3], g-C_3N_4/nanodiamond heterostructures [4], Ag/Cu_2O [5], and activated carbon/TiO_2 [6] are shown. An improvement in photocatalytic activity toward the simultaneous removal of phenol and Cr(VI) under visible light is also evidenced by MoS_2 decorated on a g-C_3N_4 heterostructure catalyst [1].

Moreover, a review article highlighting recent progress in the development of visible-light-active heterogeneous photocatalysts based on the design of sustainable synthetic methodologies and the use of biomass and waste as sources of chemicals embedded in the final photoactive materials [7] is also included in this Special Issue.

I sincerely hope that additional papers and/or review articles will be submitted to this interesting Special Issue in order to achieve a collection covering all of the aspects related to the preparation and chemical–physical characterization of different types of photocatalyst to be studied both for environmental purposes and in the selective synthesis of organic compounds (e.g., phenol from benzene, aniline from nitrobenzene, and methanol from methane).

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