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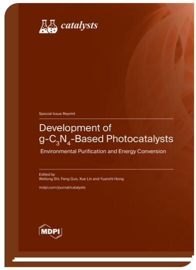
Development of g-C_3N_4-Based Photocatalysts: Environmental Purification and Energy Conversion



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Energy crises and environmental pollution are two serious problems facing the development of human society. Photocatalysis is a promising environmentally friendly technology to address the above issues due to its low energy input and carbon footprint. In particular, graphitic carbon nitride, a typical organic–nonmetallic semiconductor photocatalyst, has become a research hotspot due to its unique properties; g-C_3N_4 is innoxious, inexpensive, easy to synthesize, has an appropriate energy band gap (2.7 eV), and demonstrates outstanding thermal stability and chemical stability. Nevertheless, some inherent scientific factors, such as its small surface area, low utilization of visible light, and fast recombination of electrons and holes, limit its applications in the field of photocatalysis. Among key modification methods, the construction of a heterojunction/homojunction between graphitic carbon nitride and other semiconductor photocatalysts with interleaved energy band positions is an effective approach to improve photocatalytic activity, attributed to the accelerated photon-generated carrier transfer rate. In particular, such S-scheme structures can simultaneously accelerate photon-generated carrier transfer rates and yield higher redox potentials. Therefore, there is an urgent need to design a neoteric g-C_3N_4-based photocatalytic system that can further promote the development of photocatalysis.

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