

Photocatalysis for Sustainable Environment and Energy

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The photoinduced electron transfers occurring at the semiconductor surface are the key process of solar conversion processes. This phenomenon has been extensively investigated for the environmental remediation and the solar energy storage through solar fuel synthesis. Metal oxides such as TiO₂ and WO₃, and polymeric carbon nitride that consist of earth-abundant elements are the most practical base materials for such applications. The semiconductor materials have been employed in the form of nanoparticles for photocatalysis and electrodes for photoelectrochemistry. Although both environmental and energy conversion processes are based on the same photoinduced charge transfer phenomenon, the specific characteristics required for one are very different from the other. Despite intensive research activities on the development of new photocatalytic materials, the limitations and challenges in photocatalytic research need to be further studied. In this talk, various semiconductor systems with interfacial heterojunctions and structural modifications will be introduced and discussed for photoelectrochemical and photocatalytic/photosynthetic applications.