Artificial photosynthesis for solar fuels: A clean pathway from sunlight to chemical fuels

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Artificial photosynthesis as a route to solar fuels from CO_2 and water represents a promising strategy to deliver H_2, syngas and hydrocarbons as sustainable feedstocks to support global energy needs and security, and (albeit to a limited extent) mitigate anthropogenic climate change. We have been working on design and synthesis of nanostructured-based materials like TiO_2, Cu_2O, g-C_3N_4, layer double hydroxides and halide perovskites for photo catalytic and photoelectrocatalytic water splitting and CO_2 reduction. In particular, heterojunction-based materials involving visible light absorbing semiconductor and other semiconductors and/or metal nanoparticles greatly enhances interfacial contact between both components relative to their bulk counterparts. The resulting synergic interaction confers a significant improvement in photo induced charge carrier separation, and concomitant aqueous or gas phase CO_2 photocatalytic reduction, in the absence of a sacrificial hole acceptor. Our recent highlights on nanoparticle based photocatalysts design and synthesis for water splitting and selective photocatalytic CO_2 conversion to reusable low carbon-based products as sustainable feedstocks will be discussed.

Biography: Dr. Rawaz Ahmed: She worked at Teesside University, with valuable experience in heterogeneous catalysis and sustainable technology having won the top poster prize in catalysis by Royal Chemical Society at Johnson Matthey Conference, Biillingham in March, 2011, and the optimized preparation method and results obtained over the catalyst with optimal formulation are the subject of a patent application (P136962GB; New UK Patent Application; Supported Metal Catalyst; Teesside University). She worked as Research Associate: biomass carbonization at Teesside University after her PhD study. The major subject is focus on the biomass hydrothermal carbonization. Dr. Ahmed's is currently working on a number of research projects on heterogeneous catalysis and refinery processing at KISSR.

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