J Material Sci Eng 2018, Volume 7
DOI: 10.4172/2169-0022-C5-105

A cyclodextrin directed colloidal approach for the preparation of mesoporous nanocomposites

Rudina Bleta, Cécile Machut, Anne Ponchel and **Eric Monflier**
UCCS - University of Artois, France

The development of sustainable chemical processes and more efficient catalytic technologies is becoming a major feature of research for the protection of human health and the environment. In this context, the heterogeneous photocatalysis, using semiconductor-liquid interfaces as catalytic sites for solar light-stimulated redox reactions, has emerged as a promising technology for environmental clean-up applications. Among the various metal oxide semiconductors, titanium dioxide (TiO_2) has become one of the most important photocatalysts because of its chemical stability and unique ability in catalyzing water splitting, air purification and water decontamination. For effective solar energy utilization, modification of TiO_2 surface with noble metal nanoparticles provides an alternative approach for extending the absorption wavelength from the ultraviolet (UV) to the visible region. In this context, Au/TiO_2composites have attracted much interest as efficient plasmonic photocatalysts owing to the ability of Au nanoparticles to absorb light in the visible region and TiO_2 to efficiently separate the photogenerated electrons and holes at the metal-semiconductor interface. In this work, we describe a simple colloidal self-assembly approach towards highly active UV- and visible-light photocatalysts that takes advantage of the ability of cyclodextrins to direct the self-assembly of TiO_2colloids in a porous network over which Au nanoparticles can be uniformly dispersed. The performance of these nanocomposites is evaluated in the visible light photocatalytic degradation of the phenoxyacetic acid (PAA), a widely utilized herbicide, frequently detected in natural water. The CD-driven approach is simple and provides a versatile route towards a broad range of nanostructured composites with promising properties for environmental clean-up applications.

rudina.bleta@univ-artois.fr