Synthesis, Characterization and Photocatalysis of Carbon@TiO_2 Yolk-Shell Nanostructures

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Because of advantageous characteristics including the reduced diffusion resistance and improved molecular accessibility, colloidal nanostructures have received much attention in chemical reactions. Recently, we have developed a simple method for preparing various TiO2-based colloidal nanoparticles. Here, we'd like to report our results on synthesis and photocatalytic applications of carbon@TiO2 yolk-shell nanostructures. The nanostructures were synthesized through a sol-gel coating of TiO2 layer on resorcinol-formaldehyde (RF) spheres followed by protected calcination under inert conditions. Then, we conducted NaOH etching to remove the silica layer and produce carbon@TiO2 yolk-shell nanostructures. The yolk-shell structures have desirable properties for photocatalysis such as existence of aconductive core, uniform particle dimensions, well-maintained structural integrity, favorable mesoscale porosity, and controllable crystalline properties. When used as photocatalysts, carbon@TiO2 yolk-shell nanostructures showed significantly improved catalytic activity. In this presentation, we will discuss further our synthesis, characterization and photocatalytic activity of carbon@TiO2 yolk-shell nanostructures.