

Is Ag@TiO₂ Core-Shell Nanoparticles Superior to Ag Surface Doped TiO₂ Nanostructures?

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Abstract : Silver@titanium dioxide (Ag@TiO₂) core-shell nanostructures and Ag surface doped TiO₂ particles (TiO₂@Ag) have been designed and synthesized by sol-gel and hydrothermal methods under mild conditions. These two types of Ag/TiO₂ nanocomposites were characterized in terms of their properties by various techniques such as transmission electron microscope (TEM), X-ray diffraction (XRD), Brunauer Emmett Teller (BET) and ultra violet-visible absorption spectroscopy (UV-Vis). Specifically, the photocatalytic performance and antibacterial behavior of such nanocomposites have been investigated and compared. It was found that The Ag@TiO₂ core-shell nanostructures exhibit superior photocatalytic property to the Ag surface doped TiO₂ particles under the reported conditions. While with UV pre-irradiation, the Ag@TiO₂ core-shell composites exhibit better bactericidal performance. This is probably because the Ag cores tend to facilitate charge separation for TiO₂, producing greater hydroxyl radicals on the surface of the TiO₂ particles. These findings would be useful for the design and synthesis of Ag/TiO₂ nanocomposites with desirable photocatalytic and antimicrobial activity for environmental applications.

Keywords : Ag@TiO₂ core-shell nanoparticles, Ag surface doped TiO₂ nanoparticles, photocatalysis, antibacterial

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