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## Facile photochemical synthesis of hierarchical cake-like ZnO/Ag composites with enhanced visible-light photocatalytic activities

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**Abstract:** ZnO/Ag composites were synthesized by photochemical deposition of Ag nanoparticles onto pre-synthesized three dimensional hierarchical cake-like ZnO microstructures, which were fabricated by DMF (N,N-dimethylformamide)-mediated solvothermal method. The crystal phase and microstructures of the as-obtained ZnO and ZnO/Ag were characterized by XRD, DRS, SEM, EDS, TEM and PL. The SEM and TEM results indicated that Ag nanodisks with diameters of 120 nm are uniformly deposited on the surface of hierarchical cake-like ZnO. Furthermore, the visible-light photocatalytic activity of the ZnO/Ag composites was evaluated by the degradation of Rhodamine B (RhB) under Xe lamp irradiation. Such ZnO/Ag composites showed an enhanced visible-light photocatalytic activity, the rate of degradation was nearly five times faster than that of bare hierarchical cake-like ZnO under visible-light irradiation due to the increase of electron-transfer rate of ZnO after hybridized with Ag nanoparticles.

**Keywords:** ZnO/Ag; Hierarchical; Microstructure; Visible-light; Photocatalysis; Nanocrystalline materials

### 1. Introduction

In the past decade, as one of the most promising photocatalysts, ZnO has been attracted much attention due to its wide band-gap energy, low cost, nontoxicity, and high photosensitivity [1-3]. However, ZnO is only active in ultraviolet region and quick recombination of photoinduced

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