

Preparation and characterization of nanodot MoS₂ @ 3DOM TiO₂ composites

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Abstract

In this work, the strategy for preparation of nanodot MoS₂@ 3-dimensional ordered macroporous (3DOM)TiO₂ was presented. Nanodot MoS₂ suspension was synthesized by intercalation and exfoliation processes. To give the high yield of nanodots, MoS₂ prepared by the hydrothermal method was selected instead of large-plane commercial MoS₂. In case of 3DOM TiO₂, polystyrene opal prepared by self-assembly method was used as the 3DOM template. Then, the hydrolysis and calcination of titanium alkoxide filled in template void were employed to get the 3DOM TiO₂ structure. Finally, nanodot MoS₂ and 3DOM TiO₂ was combined via the impregnation method. Interestingly, nanodot MoS₂@ 3DOM TiO₂ exhibited the higher performance in degradation of methylene blue than non-doping 3DOM TiO₂. It strongly emphasizes that MoS₂ still exhibits the quantum confinement effect when deposited on 3DOM TiO₂. Nanodot MoS₂ can prohibit the electron-hole recombination on TiO₂ surface. Furthermore, the 3DOM structure of TiO₂ can also improve the scattering of incident light. Thus, nanodot MoS₂@ 3DOM TiO₂ is underlined to be of interest in the electronic material and photocatalyst.

Keywords: nanodot MoS₂, 3DOM TiO₂, photocatalyst, degradation