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Hydrothermally derived zinc sulfide sphere-decorated titanium dioxide**flower-like composites and their enhanced ethanol gas-sensing performance**

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Abstract

Zinc sulfide (ZnS) sphere-decorated titanium dioxide (TiO₂) flowers at various ZnS hydrothermal synthesis durations were synthesized using a two-step facile hydrothermal methodology. The ZnS hydrothermal synthesis duration affected the content and distribution of ZnS spheres decorated on the surfaces of TiO₂ petals. Thus, the separate and random distribution of these spheres, without considerable aggregation, could be obtained by adequately controlling the ZnS hydrothermal synthesis duration. A structural analysis demonstrated that the as-synthesized ZnS spheres and TiO₂ flowers were in crystalline cubic zinc blend and rutile phases, respectively. Moreover, the gas-sensing response of the TiO₂ flowers to ethanol vapor markedly enhanced after the decoration of the ZnS spheres. An optimal ZnS hydrothermal synthesis duration of 2 h for the TiO₂-ZnS composites was determined to result in the highest gas-sensing response at the given gas-sensing test condition.

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