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Solvothermal Synthesis and Characterization of Nano Molybdenum Disulfide

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Two–dimensional (2D) materials are widely attractive for applicaiton in next–generation nanoelectronic devices. Transition metal disulfides MS_2 (M = Mo, Ti, W, and V) constitute an important class of inorganic layered compounds. Due to the unique properties, MS_2 nanostructures with sheet–like morphology have been emerging as new potential materials for several applications such as catalysis, transistors, hydrogen storage, solid lubricants, Li–ion batteries, and double–layer capacitors. Bulk MoS_2 is an indirect semiconductor with a bandgap of 1.2 eV, whereas single–layer MoS_2 is semiconducting with a direct bandgap of 1.8 eV. Monolayer MoS_2 could complement graphene in the applications that require thin transparent semiconductors, such as optoelectronics and energy harvesting. Recently, considerable efforts have been paid to the synthesis of these materials on a stable nanometer scale [1-5].

In the present study, we describe a solvothermal route to synthesize MoS_2 with a new precusor for source of sulfur. The organic solvents can adhere to the surfaces of MoS_2, leading to the preparation of MoS_2 nanosheets with controllable morphologies. The effect of the solvents on the growth and microstructures of the final products was also investigated. The synthesized molybdenum disulfide was used as photocatalyst for degredation of some organic pollutants.

Keywords:

Molybdenum disulfide, Synthesis, Characterization, Photocatalyst

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