(Abstract 3)

"The enhanced photocatalytic performance of SnS_2@MoS_2 QDs with highly-efficient charge transfer and visible light utilization for selective reduction of Mythlen-blue"

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Abstract:

Molybdenum disulfide (MoS_2) has recently been considered as an effective material for potential photocatalytic applications; however, its photocatalytic activity was limited due to the low density of active sites. In this work, MoS_2 Quantum dots (QDs) were synthesized via the ultrasonication technique to construct heterostructure with SnS_2 nanosheets (SnS_2@MoS_2 QDs) and the prepared materials were tested for photocatalytic applications for Methylene blue (MB). Pristine SnS_2 and SnS_2@MoS_2 QDs nanocomposite were analyzed by XRD, TEM, PL, and Uv-Vis. Both SnS_2 and SnS_2@MoS_2 QDs exhibited a single trigonal phase with the P-3m1 space group. The TEM analysis confirmed the coupling between the pristine SnS_2 and SnS_2@MoS_2 QDs. The results of photocatalytic activity toward MB indicated that SnS_2@MoS_2 QDs material exhibits much superior photocatalytic performance compared to pristine SnS_2. The excellent photodegradation performance of SnS_2@MoS_2 QDs is due in the main to the formation of heterojunction between SnS_2 and MoS_2 QDs with narrow bandgap formation, which results in a facile carriers transfer and thus high photocatalytic efficiency. A representative mechanism of the photodegradation for SnS_2@MoS_2 QDs photocatalyst was proposed. Such an ultrasonic technique is capable of producing small metallic particle size that can be used to construct new heterostructures for water remediation applications.