

Photocatalytic reduction of nitrophenol catalyzed by Ag nanoparticles-combined WS<sub>2</sub> nanosheets

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One of the fascinating two dimensional (2D) materials, tungsten disulfide (WS<sub>2</sub>) nanosheets were successfully decorated with various sizes of silver nanoparticles (AgNPs) via facile in-situ reduction of AgNO<sub>3</sub> under mild conditions. The structural and optical properties of these AgNPs-combined WS<sub>2</sub> nanosheets (AgNP@WS<sub>2</sub>) were investigated using TEM, XPS, and PL/absorption microscope. Then, AgNP@WS<sub>2</sub> nano hybrids were employed as a photocatalyst for reduction of 4-nitrophenol to 4-aminophenol. The catalytic performance of these novel nano hybrids was far higher under visible light irradiation in comparison with that in the dark. Furthermore, it was found that difference in the size of AgNPs on AgNP@WS<sub>2</sub> hybrids resulted in a size-dependent photocatalytic activity in the reduction reaction of 4-nitrophenol.

Keywords: tungsten disulfide, silver nanoparticles, nitroaromatic compounds, heterogeneous catalysis, photocatalysis