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Facile synthesis of a-Fe2O3/WO3 composite with an enhanced photocatalytic and photo-electrochemical performance

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ABSTRACT:

The influence of hematite iron oxide (α-Fe_2O_3) nanoparticles in tungsten oxide (WO_3) nanorods photocatalyst on photodegradation of organic pollutant was investigated in the present work. The spherical-shaped α-Fe_2O_3 nanoparticles and WO_3 nanorods were synthesized from citrate precursor and hydrothermal routes respectively. The different weight percentage (wt%) ratios (1, 2, and 3 wt%) of α-Fe_2O_3 added heterostructured α-Fe_2O_3/WO_3composite photocatalysts by a simple physical mixing process. The photocatalytic activities of as-synthesized photocatalysts were evaluated by photodegradation of methylene blue (MB) under visible-light irradiation. It showed that the 2% α-Fe_2O_3/WO_3 composite exhibited excellent photocatalytic activity than the others. This enhancement could be attributed to its strong absorption in the visible region and the low recombination rate of electron-hole pairs. In addition, the photo-electrochemical measurements of the 2% α-Fe_2O_3/WO_3 composite revealed the faster migration of the photo-excited charge-carriers. Hence, this study demonstrates the heterostructured α-Fe_2O_3/WO_3 composite as a promising candidate for environmental remediation.