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Synthesis of ZnFe2O4/BiOBr nanocomposites immobilized on Palygorskite with enhanced photocatalytic activity under solar light irradiation

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Abstract
Visible-light-driven photocatalyst is an attractive research topic in the fields of pollution removal and fuel production. BiOBr has recently stimulated intensive interest in photocatalytic degradation because of its high photocatalytic activity and stability under UV and visible light irradiation. However, it is difficult to separate from liquid solution and its BET surface is needed to be improved. Thus, incorporating magnetic component into photocatalyst and introducing the hybrid photocatalyst onto a carrier (with high surface) can overcome these two problems. In this article, Attapulgite (a kind of natural clay) was used as the carrier of hybrid photocatalyst ZnFe2O4-BiOBr (presented as magnetic and photocatalytic component respectively). A magnetically recoverable nanocomposite photocatalyst (marked as ATT-ZnFe2O4-BiOBr) was successfully obtained by introducing ZnFe2O4 and BiOBr onto the surface of Attapulgite via hydrothermal method and in-situ precipitation method, respectively. It was found that ZnFe2O4 and BiOBr composite particles were successfully introduced onto the Attapulgite fibers'surface without obvious aggregation. Compared with P25 and BiOBr, ATT-ZnFe2O4-BiOBr exhibits exceptional photocatalytic activity in visible-light degradation of 10 mg•L-1 methyl orange. The highest degradation ratio of methyl orange reached to 98.81 % for ATT-ZnFe2O4-BiOBr. Moreover, ATT-ZnFe2O4-BiOBr could be readily recovered and the degradation ratio maintains more than 95.00 % after 5 cycles.

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