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Highly Efficient and Recyclable Graphene Oxide-Magnetite Composites for Isatin Mineralization

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ABSTRACT: A series of graphene oxide-magnetite (GO-Fe_3O_4) composites with various GO/Fe_3O_4 weight ratios (i.e., GO/Fe_3O_4 = 1/20, 2/20, 3/20 and 4/20) was successfully synthesized via chemical precipitation of Fe_3O_4 nanoparticles on GO sheets. The chemical and physical properties of as-synthesized GO-Fe_3O_4 composites were characterized by XRD, TEM and FT-IR. Results from XRD and TEM revealed that cubic-phase Fe_3O_4 was *in situ* deposited on the surface of GO resulting in GO-Fe_3O_4 composites. The C-O-Fe bridging coordination mode was determined by FT-IR, demonstrating the Fe_3O_4 nanoparticles were well coupled with GO sheets by coordination bond. TEM images revealed that two types of geometrical structures of GO-Fe_3O_4 composites were formed by loading different amounts of GO. With low GO loadings (i.e., GO/Fe_3O_4 = 1/20, 2/20 and 3/20), a single layer structure GO-Fe_3O_4 composite was obtained. At a high GO loading (i.e., GO/Fe_3O_4 = 4/20), stacking structure of GO-Fe_3O_4 composite was formed. The as-prepared GO-Fe_3O_4 nanocomposites exhibited an excellent catalytic performance in the degradation of isatin in the presence of H_2O_2. With GO/Fe_3O_4 weight ratio of 3/20, GO-Fe_3O_4 composites showed superior degradation efficiency of isatin, mainly due to the effective functional combination between GO and Fe_3O_4.

Keywords: *Graphene oxide; Magnetite; Catalytic; Isatin; Mineralization*