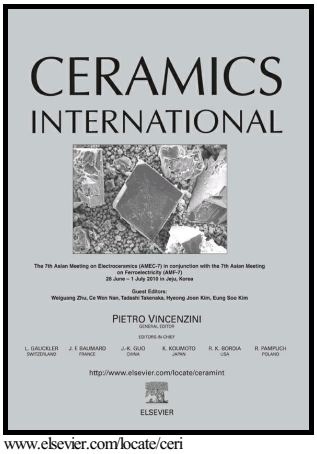

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Graphene/Fe_3O_4 nanocomposite: interplay between photo-Fenton type reaction, and carbon purity for the removal of methyl orange

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ABSTRACT: Graphene/Fe_3O_4 nanocomposite obtained via soft chemical method is characterized for its crystallinity, morphology, microstructure, optical properties, vibrational modes and magnetic properties. Graphene sheets decorated with magnetite nanoparticles are employed to investigate their photocatalytic response against methyl orange. The study reveals that the conducting nature of graphene, engineered bandgap and photo Fenton like reaction synergistically govern the efficient photocatalytic activity of nanocomposite. Interestingly, it is observed that methyl orange can be completely removed i.e., upto 99.24% by graphene/Fe_3O_4 nanocomposite, whereas the removal efficiency is 43% for Fe_3O_4 nanoparticles, alone. The presence of graphene endows the delay in charge carriers' recombination whereas, photo Fenton like reaction stimulates the generation of reactive oxygen species. This ultimately leads to the highly enhanced photocatalytic activity and complete removal of methyl orange. The magnetically separable photocatalyst, presented in this work, offers great prospects for fast and economical decontamination of dye polluted water.