

Biogenic mediated Fe₃O₄-Au Nanocomposite for Photodegradation and Antimicrobial Activities on Pharmaceutical Pollutants

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Abstract

we were designed heterogenous Fe₃O₄-Au nanocomposite with average size of 27 nm that synthesized by *Foeniculum vulgare* seeds extract to photodegrade methyl orange, imipenem and imatinib dye/drugs under UV-visible light irradiation. Physico-chemical properties of biogenic nanocomposite were characterized by XRD, FTIR, UV-Vis, SEM, EDX and X-ray elemental mapping. The complete degradations of methyl orange, imipenem and imatinib are about 95% after 2100 s, 91% after 1200 s and 93% after 1500 s, respectively under UV light irradiation, whereas under visible light irradiation are about 87% after 4200s and 88% after 4800s for imipenem and imatinib, respectively. In addition, antimicrobial activity was screened by biogenic Fe₃O₄-Au nanocomposite vs. *Estaphilu* and *Bacillus subtilis* and *E. coli*. Remarkable zone of inhibition was observed for *Bacillus subtilis* in 25mg/mL concentration of nanocomposites. Photocatalysts that have antimicrobial properties in addition to their unique photocatalytic properties have the potential of being no longer polluting the environment.

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