Synthesis and investigation of photocatalytic properties of Au/Fe$_3$O$_4$ nanocomposite materials for degradation of methylene blue

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**ABSTRACT**

In this work, Au/Fe$_3$O$_4$ nanocomposite materials with exact spinel structure were successfully synthesized where impurities-free Fe$_3$O$_4$ was prepared using sol–gel auto-combustion method and gold was doped with various concentrations 1, 3, and 5 wt.% using conventional deposition–precipitation method. Methylene blue with fixed concentration (0.05 mM) was used to investigate the photocatalytic activity under visible light. Due to homogeneous and controlled compositions, Au/Fe$_3$O$_4$ nanocomposites showed enhanced photocatalytic efficiency than pure Fe$_3$O$_4$.

**Keywords:** Single-phase Fe$_3$O$_4$; Composite materials; Au nanoparticles; Photocatalytic activity; Methylene blue