



Biosynthesis of novel *Hypericum sabrum* extract mediated functionalized Ag@Fe₃O₄@SiO₂ NCs for the efficient removal of poisonous pollutants: Greener journey and bioactivity

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Highlights

- Phytochemical profile monitoring and elemental analysis of the *Hypericum sabrum* plant extract.
- Fabrication of TMSPHMAF and CPT functionalized Ag@Fe₃O₄@SiO₂ NCs and their formation mechanism.
- Structural elucidation of NCs using spectrophotometric, spectroscopic and surface analysis techniques.
- Study of the zero-point charge pH (pH_{ZPC}) of the NCs surface.

Abstract

The full phytochemical profile and elemental analysis of the *Hypericum sabrum* plant extract as natural reducing media was investigated. The plant then was employed for green fabrication of recyclable 1-(3-(Trimethoxysilyl)propoxy)-1-hydroxy-2-methylallyl format (TMSPHMAF) and 5-Chloro-1-phenyl tetrazole (CPT) functionalized Ag@Fe₃O₄@SiO₂ nanocomposites (NCs) and their formation mechanism. The structure of green fabricated NCs was elucidated using spectrophotometric, spectroscopic and surface analysis techniques. Also, for better catalytic performance of NCs in reduction of toxic nitro compounds and organic dyes and evaluation of potential removal efficiency (RE) of catalysts, the zero-point charge pH (pH_{ZPC}) of their surface was studied. Furthermore, the antimicrobial activities and scolicidal effect of NCs were studied against current pathogenic bacteria and hydatid cysts protoscolices.