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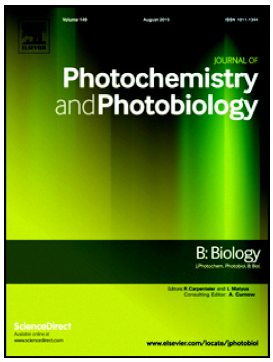


# Green synthesis of zero-valent Fe-nanoparticles: Catalytic degradation of rhodamine B, interactions with bovine serum albumin and their enhanced antimicrobial activities

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# Green synthesis of zero-valent Fe-nanoparticles : Catalytic degradation of rhodamine B, interactions with bovine serum albumin and their enhanced antimicrobial activities

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**Abstract**

Biomimetic method was used for the synthesis of Fe-nanoparticles (FeNPs). $FeCl_3$ and *Hibiscus sabdariffa, Roselle* flower aqueous extract (HBS) were employed in the present studies. The FeNPs have been characterized by using UV-visible spectroscopy, transmission electron microscope (TEM), and energy dispersion X-ray spectroscopy (EDS). The average particles diameter was found to be 18 nm. The as prepared FeNPs were used as a catalyst to the oxidative degradation of rhodamine B (RB) in presence of $NaBH_4$. The effects of various quencher on the degradation rates were examined by employing ammonium oxalate (AO), benzoquinone (BQ), isopropyl alcohol (IPA), and potassium iodide (KI). The interactions of FeNPs with bovine serum albumin (BSA) have been determined and discussed. Adsorption of FeNPs into the core of BSA changes the tryptophan environment from hydrophobic to hydrophilic (from folding to partially folded and/or unfolded). Tryptophan residues, indole moieties of BSA were responsible to complex formation with FeNPs in excited states via electrostatic, van der Waals, hydrogen bonding, hydrophobic and hydrophilic interactions with static quenching. The antimicrobial activities of FeNPs have been determined against human pathogens. *Hibiscus sabdariffa* flower extract shows mild antimicrobial activities against all target pathogenic organisms. FeNPs have potential antimicrobial activity against both bacterial strains and candida fungus even at low concentration, and retains potential application in biomedical industries.

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