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Self-assembly of L-cysteine–Ag–Au Nanoparticles for catalytic reduction of 4-nitrophenols

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Abstract:

Rapid industrialization in recent years is primarily one of the main causes of environmental concerns, especially water pollution. Various industries have caused many dangerous diseases for humans and aquatic animals. Among organic pollutants Nitrophenol compounds as common carcinogenic pollutant demonstrate adverse effects on human beings and also aquatic life. Chemical reduction of nitrophenols in known as the advanced removal methodology for such hazardous dyes from aqueous reservoirs. Recent years, researchers have used different nanocatalytic systems for chemical reduction of nitrophenols to useful reduction product of aminophenol using sodium borohydride ($NaBH_4$) as the reducing agent. The hierarchically organized particles (Hops) are inorganic or hybrid particles with hierarchically organized nanostructures such as spiky, sheets, and helices. In addition, Au and Ag Hops which are gold, silver complexes with cysteine as ligand have been shown to have structurally ordered and porous structure and are beneficial for recycling. In this study, hierarchical self-assembly of Au-Ag fractal patterns was achieved using a hydrothermal method using L-cysteine as an environmentally friendly reducing and stabilizing reagent. Here, free thiol groups of cysteine molecules electrostatically immobilized gold and silver nanoparticles (NPs). Polymeric material supported dimetallic nanoparticles were used as catalyst for the degradation of 4-nitrophenol to 4-aminophenol.

Keywords: Gold; Silver; L-cysteine; 4-nitrophenol; Sodium borohydride.

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