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Combined green synthesis and theoretical study of Ag/Co nanoparticles from biomass materials

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Abstract

A ‘green’ approach which is considered safe was explored in the synthesis and theoretical analysis of bimetallic silver/cobalt nanoparticles (Ag/Co BNPs), using aqueous extract of an indigenous *Canna indica* (leaf part) as reducing and stabilizing agents. Optimal concentration for the synthesis was achieved by varying precursor solution concentrations at room temperature. Visual evidence of nanoparticle formation was observed by change in colour of the reaction medium. Study of the optical activity of the nanoparticles using UV–Vis spectrophotometer and photoluminescence revealed surface plasmon resonance and an intense emission, respectively. Further characterizations confirmed formation of Ag/Co BNPs using transmission electron microscopy, Fourier transfer infra-red spectroscopy and energy-dispersive X-ray spectroscopy. The optical characteristics displayed by Ag/Co BNPs is a suggestion of its possible application in colorimetric metal nanoparticle-mediated sensors, which was further corroborated by the result obtained from theoretical study.