

Green synthesis of silver, gold and silver-gold nanoparticles: Characterization, antimicrobial activity and cytotoxicity

Document Type : Original Article

Authors

Mostafa M.H. Khalil ; D. Y. Sabry ; Huda Mahdi ✉

Chemistry Department, Faculty of Science, Ain Shams University, 11566, Abbassia, Cairo, Egypt



10.21608/JSRS.2018.14711

Abstract

The present study reported a facile and rapid biosynthesis method for gold nanoparticles (GNPs) silver nanoparticles (AgNPs) and bimetallic heterogeneous silver-gold nanoparticles (AgAuNPs) using the leaves of *Gmelina arborea* (ROXB) (Family *Verbenaceae*) extract. The aqueous leaves extract was used as biotic reducing and stabilizing agent of the growing nanoparticles. The synthesized gold nanoparticles (AuNPs), silver nanoparticles (AgNPs) and silver-gold core-shell nanoparticles (AgAuNPs) were characterized using UV-Vis spectroscopy (UV-Vis), Fourier transform infrared spectroscopy, (FT-IR), X-ray diffraction (XRD), transmission electron microscopy (TEM) and thermal gravimetric analyses (TGA). Several factors such as the extract amount, contact time and solution pH, as possible influences; were investigated to obtain the optimized synthesis conditions. The antimicrobial activity study revealed that while the aqueous extract at concentrations of 0.8 and 4% (w/v) showed no effect on the antimicrobial activity, the produced nanoparticles, AuNPs, AgNPs and AgAuNPs inhibited the growth of Gram positive bacteria (*Bacillus subtilis*, *Staphylococcus aureus*), Gram negative bacteria (*E. Coli* and *Pseudomonas aeruginosa*) and Fungi (*Candida albicans* and *Aspergillus niger*). The cytotoxic activity against hepatocellular carcinoma (HePG2) was also evaluated.

Keywords

Biological synthesis ; *Gmelina arborea* ; Gold nanoparticles ; silver nanoparticles ; silver-gold core-shell ; nanoparticles, antibacterial activity ; Hepatocellular carcinoma



View on SCiNiTO