

ZnO-Ag core shell nanocomposite formed by green method using essential oil of wild ginger and their bactericidal and cytotoxic effects

ABSTRACT

In this paper, a novel green method for fabrication of zinc oxide-silver (ZnO-Ag) core-shell nanocomposite using essential oil of ginger (EO-G) is reported. The EO-G played two significant roles in the synthesis process: it could act as a reaction media for the formation of ZnO and reduce Ag⁺ to Ag⁰. The bioformed ZnO-Ag nanocomposite was compared with pure biosynthesized ZnO-NPs and characterized by UV-vis spectroscopy, TEM, EDX, XRD and FTIR. The characterization results confirmed that Ag-NPs had been embedded in ZnO hexagonal nanoparticles. Six Gram positive and negative pathogens were used to investigate the antibacterial effects of these samples. Ag-doping improves the bactericidal activity of ZnO-NPs. In vitro cytotoxicity studies on Vero cells, a dose dependent toxicity with non-toxic effect of concentration below 100 µg/mL was shown for ZnO-Ag nanocomposite. The biosynthesized ZnO-Ag nanocomposites were found to be comparable to those obtained from the conventional methods using hazardous materials which can be an excellent alternative for the synthesis of ZnO-Ag using biomass.

Keyword: ZnO-Ag nanocomposite; Core-shell; Green synthesis; Ginger; Antimicrobial activities