J Nanosci Nanotechnol. 2019 May 1;19(5):2625-2632. doi: 10.1166/jnn.2019.15887.

Synthesis of Biogenic Copper Nanoparticles Embedded in Graphene Oxide-Chitosan Composite and Its Anti-Bacterial and Cytotoxic Activities

Subramanian Mugesh [1], Renganathan Arun [1], Kulanthaiyesu Arunkumar [2], Marudhamuthu Murugan [1]

Affiliations + expand

PMID: 30501759 DOI: 10.1166/jnn.2019.15887

Abstract

In the current scenario, nanoparticle synthesis has been fascinated by biogenic approaches than the chemical methods. However, reproducibility of the source stands essentially in nanoparticle synthesis. Nanoparticle synthesis by fungi has more advantages such as the potential for bioaccumulation, immunity towards toxicity, relatively easier to handle, simpler in synthesis and downstream processing. In this study, biogenic copper nanoparticles (CuNPs) were embedded within graphene oxide-chitosan (GO-CS) polymer to endure the biocompatibility and toxicological effects on both normal and cancer cells. The characteristics of the copper nanoparticles/graphene oxide-chitosan (CuNPs/GO-CS) nanocomposites was found to be superior to the GO-CS. This is evident from the results obtained from X-ray diffraction technique, UV-visible spectroscopy, atomic force microscope, fourier transform infrared spectroscopy, fluorescence spectroscopy, confocal laser scanning microscope and scanning electron microscopy. The synthesized new copper nanoparticles/graphene oxide-chitosan (CuNPs/GO-CS) nanocomposites were studied for their anti-bacterial activity against Escherichia coli MTCC 443 and anti-cancer activity on breast cancer MCF7 cell lines.