

Effect of calcination temperature on the physical properties of $\text{Zn}_{0.5}\text{Co}_{0.5}\text{PrxFe}_{2-x}\text{O}_4$ nanoparticles synthesized by co-precipitation method

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Abstract

Amongst different living organisms studied as potential candidates for the green synthesis of copper nanoparticles, algal biomass is presented as a novel and easy-to-handle method. However, the role of specific biomolecules and their contribution as reductant and capping agents has not yet been described. This contribution reports a green synthesis method to obtain copper oxide nanoparticles (CuO-NPs) using separated protein fractions from an aqueous extract of brown algae *Macrocystis pyrifera* through size exclusion chromatography (HPLC-SEC). Proteins were detected by a UV/VIS diode array, time-based fraction collection was carried out, and each collected fraction was used to evaluate the synthesis of CuO-NPs. The characterization of CuO-NPs was evaluated by Dynamic Light Scattering (DLS), Z-potential, Fourier Transform Infrared (FTIR), Transmission Electron Microscope (TEM) equipped with Energy Dispersive X-ray Spectroscopy (EDS) detector. Low Molecular Weight (LMW) and High Molecular Weight (HMW) protein fractions were able to synthesize spherical CuO-NPs. TEM images showed that the metallic core present in the observed samples ranged from 2 to 50 nm in diameter, with spherical nanostructures present in all containing protein samples. FTIR measurements showed functional groups from proteins having a pivotal role in the reduction and stabilization of the nanoparticles. The highly negative zeta potential average values from obtained nanoparticles suggest high stability, expanding the range of possible applications. This facile and novel protein-assisted method for the green synthesis of CuO-NPs may also provide a suitable tool to synthesize other nanoparticles that have different application areas..

Biography:

Zouheir Bitar is a researcher in the physics department of Beirut Arab University, Lebanon. Currently, he is working on researches related to nanomaterials in the materials laboratory of

Beirut Arab University. He received the Ph.D. in 2018 from Beirut Arab University. He has seven articles published in international journals. Recently, he is working on a new project. He believes in teamwork.

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