

Co⁰superparamagnetic nanoparticles stabilized by an organic layer coating with antimicrobial activity

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Abstract

Cobalt (Co) is one of the most promising materials in nanotechnology due to its superior magnetic properties. However, due to the high cytotoxicity of cobalt, the activity in biological systems has been little studied. In this work, we report the structural, morphological, and magnetic properties of cobalt nanoparticles stabilized with an organic layer (Co⁰@C-NPs) and its potential antimicrobial activity. The Co⁰@C-NPs were obtained from solvothermal conditions and characterized by X-ray powder diffraction, electronic microscopy, and magnetic measurements. The organic layer was analysed by thermogravimetric analysis, Scanning Electron Microscopy, Energy Dispersive Spectrometer, and Fourier Transform Infrared Spectroscopy. From the TEM image, an organic coating layer is observed around Co⁰ where this coating prevents NPs from oxidation allowing it to remain stable until 400 °C. Surface composition studies by SEM/EDS allowed the identification of carbon, oxygen, and cobalt elements present in the organic layer. This result was corroborated later by FITR analysis. Preliminary antibacterial properties were also investigated, which showed that the cobalt nanoparticles are active against *Staphylococcus aureus* after 1 h of exposure. The superparamagnetic properties and organic coating Co⁰@C-NPs could be biocompatible with biological systems, but more research is needed to apply these nanoparticles in biomedical products.

Indexed keywords

Engineering controlled terms:

Biocompatibility

Biological systems

Cobalt

Fourier transform infrared spectroscopy

Magnetic properties

Microorganisms

Nanomagnetics

Nanoparticles

Organic coatings

Scanning electron microscopy

Spectrometers

Thermogravimetric analysis

X ray powder diffraction