

Functionalization of kaolin clay with silver nanoparticles by *Murraya koenigii* fruit extract-mediated bioreduction process for antimicrobial applications

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Abstract

The emergence of multidrug-resistant microbes and newly outbreaking diseases are one of the major threats before mankind. This paves the way for researchers to explore new antimicrobial agents that possess common day-to-day applications. In this concern, we have fabricated the antimicrobial Ag-kaolin functional nanostructures by simple and sustainable protocol employing *Murraya koenigii* fruit extract. UV-visible spectra (UV-Vis) of the Ag-kaolin exhibit absorption peak at 430 nm which corresponds to the characteristic surface plasmon resonance of Ag nanoparticles. X-ray diffraction pattern (XRD) shows the diffraction peak at 37.6° confirms their face-centred cubic nature with (111) plane. Furthermore, the formation of Ag-kaolin functional nanostructures was confirmed through a scanning electron microscope (SEM) and energy-dispersive X-ray spectrum (EDX) analysis. The transmission electron microscopic (TEM) studies reveal the effective formation of quasi-spherical monodispersed Ag nanoparticles having 20–30-nm diameters on the kaolin clay. The bio-synthesized Ag-kaolin nanostructures showed excellent antimicrobial activity against pathogenic gram-positive (*Staphylococcus aureus*, *Bacillus subtilis*) and gram-negative (*Escherichia coli*) bacteria respectively with the inhibition zones of 26 mm, 25 mm and 30 mm.

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