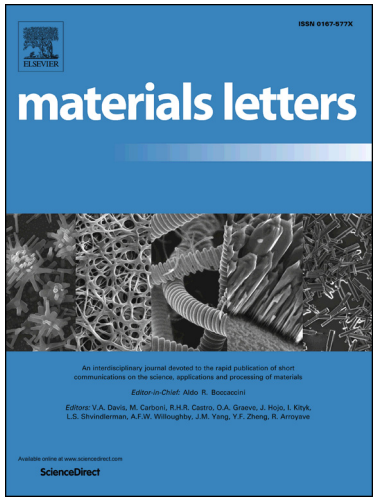

Synergistic Effects of Copper and Nickel Bimetallic Nanoparticles for Enhanced Bacterial Inhibition

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Synergistic Effects of Copper and Nickel Bimetallic Nanoparticles for Enhanced Bacterial Inhibition

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Abstract

The growing concern about antibacterial resistance has made it imperative to engineer effective, strong and economic nanoparticles with strong inhibitory activities. Copper-Nickel (CuNi) bimetallic nanoparticles (NPs) have been synthesized solvothermally. X-ray diffraction analysis exhibits CuNi NPs with face-centered-cubic structure arising from (100), (200) and (220) planes. Porous, flaky NPs with interspersed spherical cuboids were observed through scanning electron microscopy. CuNi showed zones of inhibition of 31 mm and 30 mm against *S.aureus* and *E.coli* respectively which was comparable to a 31 mm zone observed for a third generation drug, Cefixime. This strong antibacterial activity is due to the synergistic bactericidal Cu^{2+} and bacteriostatic Ni^{2+} ions released from CuNi bimetallic NPs. Additively, reactive oxygen species that can be produced on the NP surface enhance the inhibitory activity of CuNi NPs. The obtained results suggest the possible utilization of CuNi NPs as antibacterial coatings and surfaces.

Keywords: Solvothermal-synthesis, Metallic composites, FTIR, X-ray techniques, CuNi NPs, Antibacterial-activity