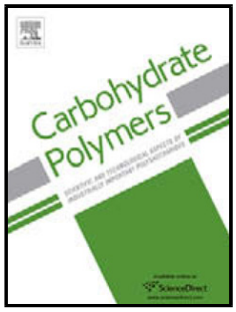

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Enhanced antibacterial profile of nanoparticle impregnated cellulose foam filter paper for drinking water filtration

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HIGHLIGHTS

- Facile synthesis of nanoparticles using hydrothermal method
- Impregnation of nanoparticles in water-resistant cellulose foam paper
- Morphological, structural, and elemental characterization using SEM and EDX
- Antibacterial evaluation of impregnated paper against gram positive and gram negative bacteria.
- Enhanced antibacterial profile of nanoparticle modified filter paper compared to unmodified paper.

Abstract

Filtration is a promising water treatment method to purify drinking water. To develop highly efficient drinking water filter paper, water-resistant cellulose foam paper with a high wet strength property was fabricated using diverse metal oxide (e.g., copper oxide (CuO), zinc oxide (ZnO), and silver oxide (Ag_2O)) nanoparticles. These nanoparticles were synthesized using the hydrothermal reaction method. Their morphological structures were studied using a field emission scanning electron microscope (FESEM). The presence of coated nanoparticles on the cellulose foam filter was verified by energy dispersive X-ray spectroscopy (EDX) methods. The antibacterial performance of different types of modified cellulose foam filters was studied against *E.coli, P. aeruginosa, B. subtilis*, and *B.cereus* strains using the zone of inhibition test. The antibacterial profile of the cellulose foam filter impregnated with Ag_2O nanoparticles, when tested against different types of bacteria, exhibited higher antibacterial activity than the cellulose foam filter impregnated with ZnO and CuO nanoparticles.

Keywords: antibacterial; filter paper; nanoparticles; microscopy; spectroscopy