

Complete removal of pathogenic bacteria from drinking water using nano silver-coated cylindrical polypropylene filters.

ABSTRACT

An attempt was made to investigate the removal of *Escherichia coli* bacteria from drinking water using nano silver-coated polypropylene water filter. For the production of nano silver filters, a modified Balzers 760 machine equipped with an electron beam gun was used. The nano-silver particles were made by electron beam bombardment of the silver metal, which were subsequently deposited on the polypropylene filters evenly. The thickness of the nano layer coated on the filters was 35.0 nm. The nano silver-coated filters were characterized using scanning electron microscopy, X-ray diffraction, transmission electron microscopy, and atomic force microscopy. The antibacterial efficiency of the filters was evaluated using the membrane filter method. At a flow rate of 3 l/h, the output count of *E. coli* was zero after 7 h filtration when the input water had a bacterial load of 10³ colony-forming units (cfu) per milliliter. The inductively coupled plasma/mass spectrometry (ICP/MS) results showed that the 35 nm layer of the silver nanoparticles were stable on the water filter and were not washed away by water flow even after 72 h.

Keyword: AFM; ICP/MS; Nano silver; SEM; TEM; Water treatment; XRD.