

## New trends on microbiological water treatment.

### ABSTRACT

Silver nanoparticle-decorated porous polypropylene filter is prepared by physical vapor deposition method using a modified Balzers 760 coating machine. Silver nanoparticles were generated by electron beam bombardment of the silver metal. A 45nm layer of the silver nanoparticles were subsequently deposited on the polypropylene filter homogenously. The nano silver-coated filters were characterized using scanning electron microscopy, transmission electron microscopy and atomic force microscopy. The antibacterial efficiency of the nano silver-coated filters was evaluated using a custom- made experimental set up and the membrane filter method. A zone of inhibition test was also performed to compare the bactericidal effect of coated versus non-coated filters. At a flow rate of 3L/hr, the output count of *Escherichia coli* was zero after 6.5 hours filtration when the input water had a bacterial load of 10<sup>3</sup> colony-forming units (cfu) per milliliter. The inductively coupled plasma/mass spectrometry (ICP/MS) results showed that the 45nm layer of the silver nanoparticles are stable on the water filter and are not washed away by water flow even after 6.5h filtration.

**Keyword:** AFM; Antibacterial; Balzers 760; Nanosilver; Polypropylene filter; SEM; TEM; Water treatment.