

Biofouling Control in UF membrane Systems Using Silver Nanoparticles

A. Dror-Ehre*, A. Adin*, G. Markovich, H. Mamane****

*Hebrew University of Jerusalem

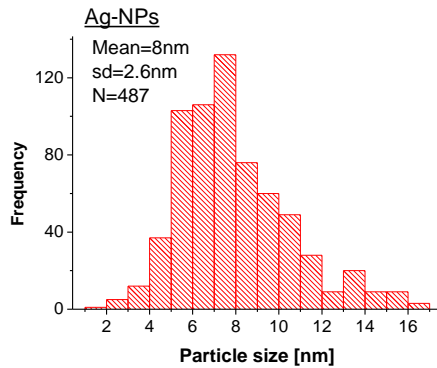
** Tel Aviv University

Research Goal

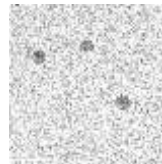
Determine the capability of suspended silver nano-particles (Ag-NPs) produced in this study, to control biofilm formation in an aqueous environment in a membrane filtration system for improving its performance.

Characterization of Silver Nanoparticles

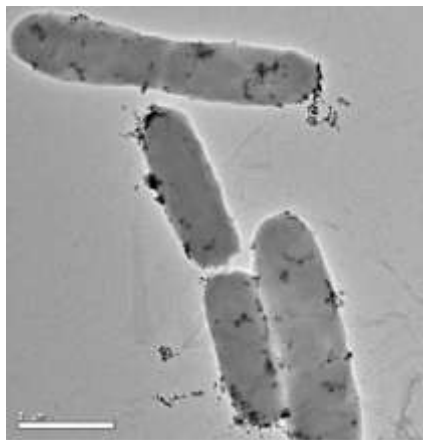
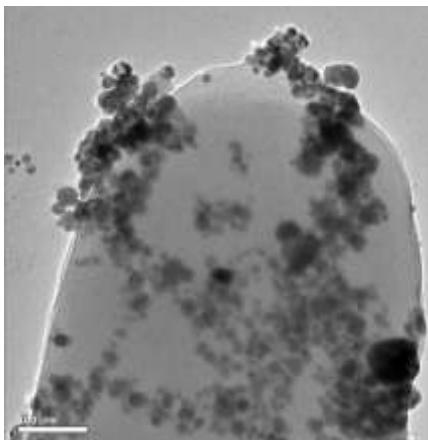
Particle size distribution histogram



TEM micrograph

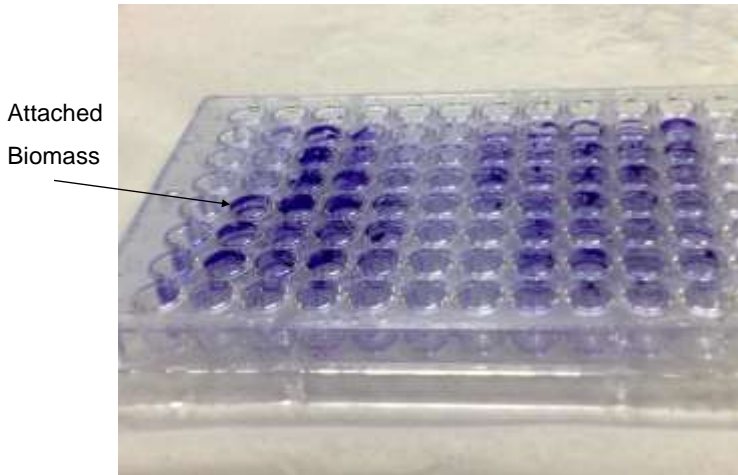


interaction of *E.coli* with NPs.

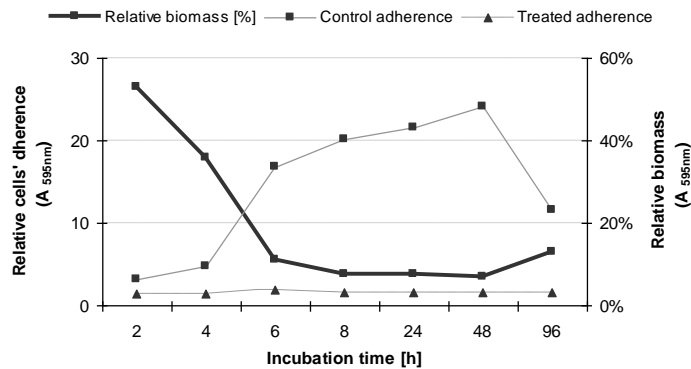


TEM micrograph

Microtiter plates – scanning methods to determine biofilm

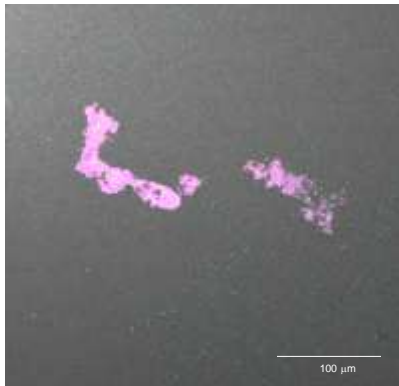


Relative biomass formed by control and treated bacterial cells

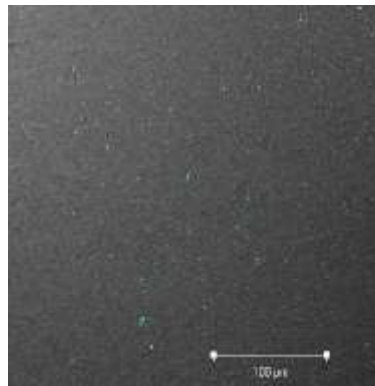


CLSM micrographs of *P.aeruginosa* (GFP) cells on PC membrane after 8 hours incubation (M9 growth medium)

Control Sample



Treated Sample



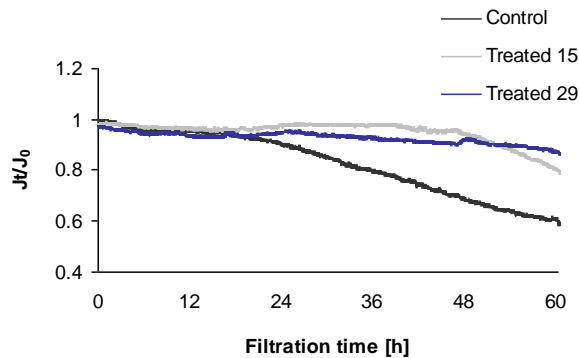
PI and ConA stains showed red and violet fluorescence for EPS and dead cells.

Experimental System

Dead-end UF stirred cell performed with constant pressure



Permeate flux (J/Jo) verses time



CONCLUSIONS

- ✓ Exposure to silver nanoparticles resulted in retardation in formation of biofilm by model bacteria in aqueous solutions.
- ✓ Exposure to silver nanoparticles resulted in lower flux decline in the membrane UF system thus improving its performance.