Forecasts and measurements of nanosilver in wastewater

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CEINT researchers at Duke, CMU and Virginia Tech are collaborating to determine possible and measured levels of nano-scale silver particles in wastewater.

Products containing nanomaterials may be disposed of via municipal sewage and thus encounter wastewater treatment plants as their first gateway into the environment. Estimates of the quantities of sillver nanoparticles that may enter wastewater and the be subsequently removed to biosolids or remain in treated water are calculated by first obtaining estimates for the quantity of U.S. production and combining these with laboratory data on the affinity of nanoparticles for biosolids in Monte Carlo simulations of the treatment plant. The resulting probability distributions of silver nanoparticles in biosolids and treated water (Figure A) show that the fate of these particles during treatment will vary as a function of the coatings engineered on the nanoparticles.

The Ag NPs found in the sludge material are small aggregates of individual 15-20 nm NPs (Figure B). EDX and HR-TEM show this material to be α-Ag_2S. Therefore, sludge disposal, or sludge used as a soil amendment, results in the introduction of Ag_2S into the environment. The question remains as to whether or not nano-scale particles of silver found in waste water originate from engineeered sources or are formed from discharged dissolved silver.
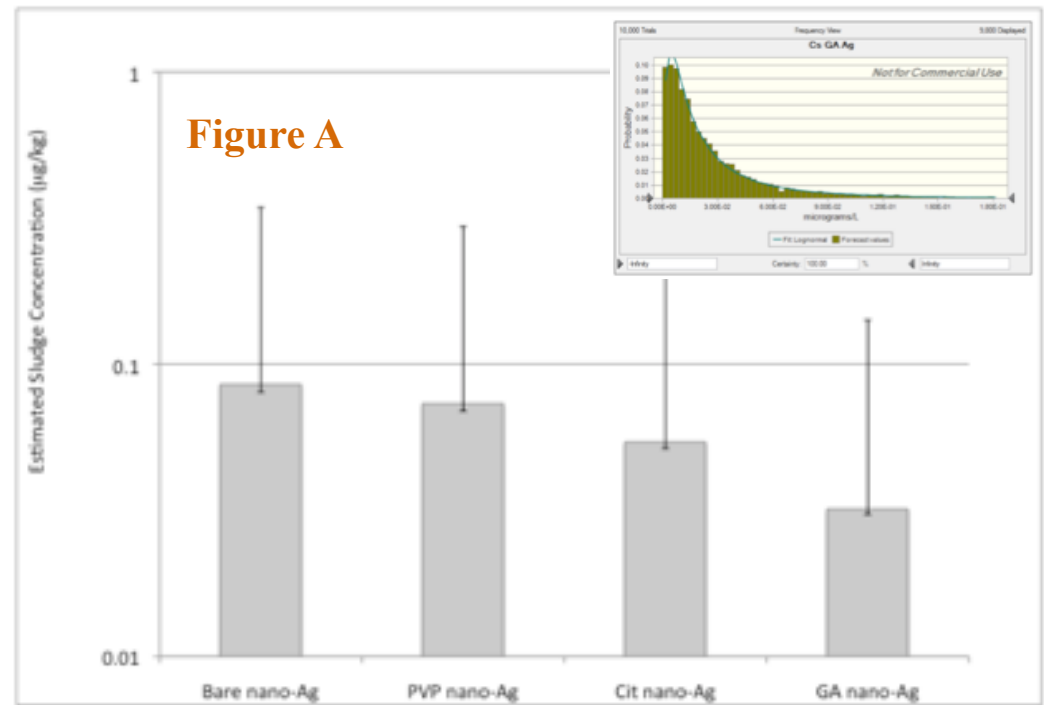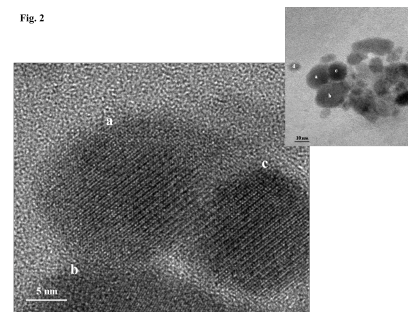

Figure A

Figure B

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