

Nanoparticles Leach from Commercial Products into Sewage but can be Removed during Wastewater Treatment

Supporting/Contributing Agency: U.S. EPA

In 2008, Professor Paul Westerhoff and his graduate student published a paper that showed how nano silver particles can leach from commercially available clothing into wash water. Experiments were conducted using socks that contain nano silver to inhibit bacterial growth that contributes to foot odor. Nano silver is now among the most widely used nanoparticles in clothing and many other products used around the house today. We confirmed the presence of nano silver particles both in the initial sock fabric and in water used to wash the sock, which could mimic the release of silver in a washing machine which would then end up as sewage leaving your house.



Figure. Samples of socks containing nano silver.

Experiments were conducted to evaluate the form of silver in the water. While nano silver was present, a significant fraction of the nano silver actually dissolved into silver ions in water. Subsequent experiments showed that both ionic and nano silver forms could be well removed in simulated wastewater treatment plant processes.

The importance of this research is that it verifies the current release of nanoparticles into sewage, and that existing wastewater treatment plants are capable of removing them, thus capable of limiting their release into rivers and lakes. However, nano silver becomes concentrated in the solid wastes from the wastewater treatment plants (called biosolids), which may be land applied as soil amendments, landfilled, incinerated, or disposed of to the ocean. Thus, nano silver in socks could enter the environment through a number of different vectors. Fortunately, current biosolids regulations include silver, and such regulations should be protective for decades to come.

It is likely that other nanoparticles behave in similar ways as nano silver, where the nanoparticles can pass from commercial products into sewage and enter the environment. Thus monitoring for nanoparticles at wastewater treatment plants may be a proactive method of preventing their release into the environment.

Reference/Publication

Benn, T. and Westerhoff, P. Nanoparticle Silver released into water from commercially available sock fabrics, *Environmental Science and Technology*, 42:11:4133-4139 (2008).