

# Too much nanotechnology may be killing beneficial bacteria

**Too much of a good thing could be harmful to the environment. For years, scientists have known about silver's ability to kill harmful bacteria and, recently, have used this knowledge to create consumer products containing silver nanoparticles. Now, a University of Missouri researcher has found that silver nanoparticles also may destroy benign bacteria that are used to remove ammonia from wastewater treatment systems.**

Several products containing silver nanoparticles already are on the market, including socks containing silver nanoparticles designed to inhibit odor-causing bacteria and high-tech, energy-efficient washing machines that disinfect clothes by generating the tiny particles. The positive effects of that technology may be overshadowed by the potential negative environmental impact.

“Because of the increasing use of silver nanoparticles in consumer products, the risk that this material will be released into sewage lines, wastewater treatment facilities, and, eventually, to rivers, streams and lakes is of concern,” said Zhiqiang Hu, assistant professor of civil and environmental engineering in MU’s College of Engineering.

“We found that silver nanoparticles are extremely toxic. The nanoparticles destroy the benign species of bacteria that are used for wastewater treatment. It basically halts the reproduction activity of the good bacteria.”

Hu said silver nanoparticles generate more unique chemicals, known as highly reactive oxygen species, than do larger forms of silver. These oxygen species chemicals likely inhibit bacterial growth. For example, the use of wastewater treatment “sludge” as land-application fertilizer is a common practice, according to Hu. If high levels of silver nanoparticles are present in the sludge, soil used to grow food crops may be harmed.

Hu is launching a second study to determine the levels at which the presence of silver nanoparticles become toxic. He will determine how silver nanoparticles affect wastewater treatment processes by introducing nanomaterial into wastewater and sludge. He will then measure microbial growth to determine the nanosilver levels that harm wastewater treatment and sludge digestion.

The Water Environment Research Foundation recently awarded Hu \$150,000 to determine when silver nanoparticles start to impair wastewater treatment. Hu said nanoparticles in wastewater can be better managed and regulated. Work on the follow-up research should be completed by 2010.

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Source: University of Missouri-Columbia

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