

Scientists build 'roach motel' for nasty bugs of the bacterial variety

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The vacancy sign is on, but the lowlifes who check in never check out. Scientists at the University of Florida and the University of New Mexico have created tiny microscopic spheres that trap and kill harmful bacteria in a manner the scientists liken to "roach motels" snaring and killing cockroaches.

The research could lead to new coatings that will disinfect common surfaces, combat bioterrorism or sterilize medical devices, reducing the devices' responsibility for an estimated 1.4 million infection-related deaths each year.

"The bacteria get in there, they get stuck, and then they get killed," said Kirk Schanze, a UF professor of chemistry and one of eight authors of the paper. Schanze and his fellow researchers describe the findings in a paper set to be published today in the debut issue of the American Chemical Society journal *ACS Applied Materials & Interfaces*.

The spheres are far from the only such "biocide" on the market or under development, Schanze said, but they are unique in their materials and booby-trap action. That could prove important as bacteria evolve to become increasingly resistant to standard disinfectants.

"The first novelty is the material we are using — these conducting polymers," Schanze said. "The second novelty is the roach motel concept."

The coatings imbued with the spheres could potentially be applied to doorknobs or other surfaces where bacterial diseases are often transferred, Schanze said.

Schanze, David Whitten, a professor of chemical engineering and associate director of University of New Mexico Center for Biomedical Engineering, and collaborating faculty and graduate students developed the tiny traps based on electricity-conducting polymers Schanze and Whitten have worked on for the past decade.

The polymers have a unique trait: When they are exposed to light, they produce singlet oxygen, in Schanze's words a "very reactive form of oxygen" that is highly toxic to bacteria — much like bleach or other potent sterilizers.

On the researchers' hunch the polymers could be used to keep surfaces cleansed, UF doctoral student Jonathan Sommer developed a method to shape them into microscopic spheres – ranging in size from 1 to 5 microns, or 1- to 5-millionths of a meter.

Thomas Corbitt, a UNM doctoral student, and co-workers tested the spheres at the University of New Mexico, using a relatively safe bacteria that is closely related to *Pseudomonas aeruginosa*, a common, persistent and lethal bacteria in hospitals. Often introduced via contaminated medical devices, that bacterium sickens or kills patients suffering from burns, cancer, AIDS other serious conditions. The strain the researchers used was *Pseudomonas aeruginosa* PAO1, which is a close cousin but poses little health threat.

While Schanze said further tests are needed to nail down the spheres' potency, initial experiments revealed they wiped out more than 95 percent of nearby PAO1 bacteria after exposure to light for about an hour.

Source: University of Florida

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