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Microsized Bacterial Bait Could Provide New Treatment for Infections

Micromotors that swim to infected sites in the body to lure, trap and destroy bacteria could offer a more efficient form of treatment against pathogens. Nanoengineers at the University of California San Diego have developed a “microtrap” that zips around in an acidic environment (like that found in the stomach) and serves as a toxic bait for *E. coli* bacteria.

The proof-of-concept work addresses a common medical issue that most drugs get diluted in body fluids before they can do their job. It would be more efficient if the drug and its target were brought together so that less medicine is wasted, said Joseph Wang, a professor of nanoengineering at UC San Diego and the study’s senior author. By creating a self-propelling chemical trap to corner and destroy pathogens, Wang and his team present a new way to make medications, as well as environmental decontaminants, more effective.

Researchers published their findings in the journal *Angwandte Chemie*.

The micromotor is made up of an onion-like structure, consisting of a magnesium metal core partially enclosed in several polymer layers. The exposed part of the magnesium core reacts with acid to produce hydrogen bubbles to propel the micromotor forward. Once the magnesium core is fully dissolved, a hollow structure remains.

This hollowed-out micromotor acts as a trap for *E. coli*. Its exposed inner layers are made of an acid-soluble polymer containing the amino acid serine, which lures the bacteria inside. After these layers dissolve and bacteria accumulate in the micromotor, the remaining polymer layers then dissolve and release silver ions, which kill the bacteria.

The micromotors were tested in an acidic solution containing a suspension of *E. coli* bacteria. They were four times more effective at killing bacteria than micromotors loaded with silver ions alone.

The researchers report in the paper that this is a “first step towards chemical communication between synthetic microswimmers and motile microorganisms. Such a novel concept can be readily expanded to a multitude of important applications ranging from food safety, healthcare, or environmental remediation.”

Paper title: “Onion-like Multifunctional Microtrap Vehicles for Atraction-Trapping-Destruction of Biological Threats.” Co-authors include Fernando Soto, Daniel Kupor, Miguel Angel Lopez-Ramirez, Fanan Wei, Emil Karshalev, Songsong Tang and Farshad Tehrani, UC San Diego.

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