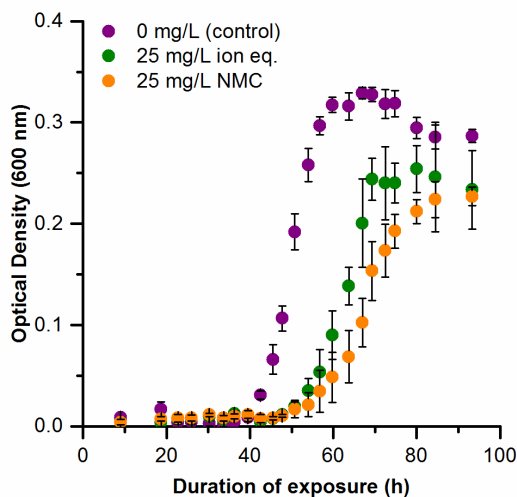
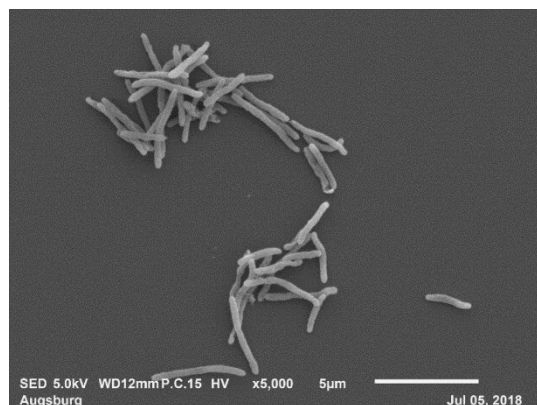


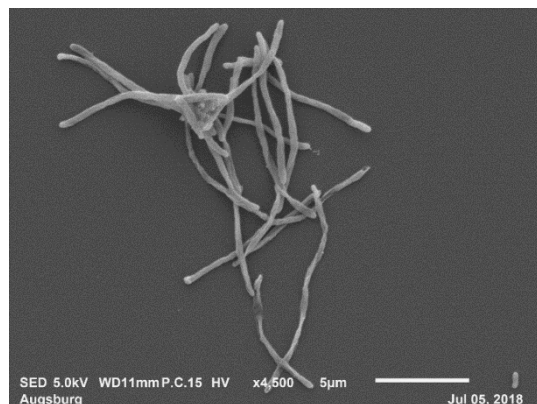
Chronic Exposure to Complex Metal Oxide Nanoparticles Elicits Resistance in *Shewanella oneidensis* MR-1

Wild-type bacteria

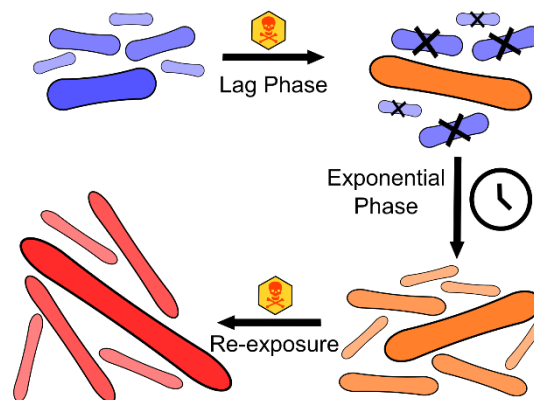
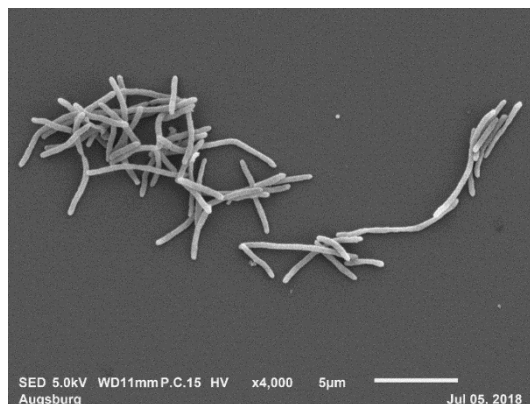


Traditionally, the toxicity of nanoparticles is gauged by the acute exposure of a model organism to a range of nanoparticle concentrations. However, in a real environment, organisms will have prolonged encounters with nanoparticles. In our study, bacteria that were chronically exposed to nanoparticles rapidly developed permanent resistance to the nanoparticles. We have determined that although the compositional metals of the nanoparticles are responsible for much of the toxicity of the nanoparticle as they are released in their ionic form, there is also nanoparticle-specific toxicity and therefore, nanoparticle-specific resistance. This work illustrates that the impact of nanoparticles goes beyond simple toxicity and can lead to long-lasting and dangerous modifications to microbial biochemistry and fitness in the environment.

Nanoparticle-resistant bacteria



Metal ion-resistant bacteria



Award Information

Center for Sustainable Nanotechnology
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University of Wisconsin Madison
Centers for Chemical Innovation Program
PD Michelle Bushey

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