

## **Understand the complexity of microbial interactions with nanomaterials**

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Despite the growing use of nanomaterials in commercial applications, very little is known about the fate of these nanomaterials once they are released into the environment. In natural settings, nanomaterials will encounter diverse communities of bacteria; these microbes play key roles biogeochemical nutrient cycling and human health. Although laboratory studies have shown that nanomaterials can be toxic for certain species of bacteria, it is far from clear that nanomaterials have the same effect on highly divergent bacterial species. Moreover, bacteria may also modify the nanoparticles themselves, whether through biodegradation, especially of carbon-based nanomaterials such as fullerenes and carbon nanotubes, by coating the surface of particles with extracellular polysaccharides or by trapping them in bacterial biofilms. Although small, bacteria are the dominant organisms in most environments; nanomaterial released into the environment may change bacterial community structure and thus ecosystem function and concurrently bacteria may modify the properties and transport of the nanomaterials.