Exploiting microbial biomineralization reactions; from contaminated land clean-up to high technology applications

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Microbial processes offer scalable and sustainable alternatives to conventional chemical syntheses routes for a broad range of functional nanomaterials. Subsurface metal-reducing bacteria are particularly adept to synthesizing such materials, including magnetic nanoparticles, multifunctional nanocatalysts, remediation agents and quantum dots. Many of these novel bioproducts can be potentially synthesized from waste materials or effluents. Such "revalorization" reactions could offer financial incentives to remediate land and water contaminated with waste metals.

Recent innovations in imaging, spectroscopy and genomic-enabled technologies have underpinned rapid advances in the molecular-scale understanding of the synthesis of functional bionanomaterials in natural and engineered systems. This talk will give an overview of new work, done applying these cross-disciplinary techniques, to underpin the scalable synthesis of metallic nanoparticles, and their potential deployment in applications including remediation, high value chemical synthesis, healthcare and energy generation.