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BIO-MINERALIZATION AND REMEDIATION OF HEAVY METALS: FROM MICROBE CELLULAR LEVEL TO MOLECULAR LEVEL

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This lecture will address a variety of topics related to bio-mineralization and bio-remediation, as well as their applications on environmental remediation. Microbial bio-mineralization is a process, by which microorganisms transform aqueous metal ions into amorphous or crystalline precipitates. Bioremediation usually refers to a process of microbial absorption and degradation, which is used to treat polluted water, soil and so on, by altering environmental conditions to stimulate growth of microorganisms. As we all know, the toxic and highly soluble heavy metal elements, such as hexavalent chromium [Cr(VI)] and hexavalent uranium [U(VI)], are of great concern as environmental pollutants. Unlike organic pollutants, heavy metal contaminants cannot be degraded. However, they can be transformed, mineralized, and immobilized by microbial metabolism. Thus, bio-mineralization and bioremediation are regarded as a promising, environmentally friendly and cost-effective way to remediate heavy metal contaminants. This lecture will include discussion of: remediation of chromium and uranium contamination by microbial activity; adsorption and mineralization of REE (rare earth element)-lanthanum onto bacterial cell surface; bioremediation of Pb compound contaminants by microorganisms; transformation from organo-Cr(III) to trivalent chromium mineral and its environment implication. In addition to their applications, the mechanism of transformation of heavy metal from mobilizable form to immobilizable form by microorganisms was investigated in our previous works, attendees of this lecture will be familiarized with it and get a better understanding of bio-mineralization and bioremediation from cellular level to molecular level. It may help us in developing appropriate remediation and long-term management strategies of heavy metal contamination.

Biography

Yangjian Cheng is an Associate Professor of Biochemistry and Microbial Geochemistry in the College of Environment and Resources, Fuzhou University. His current research involves the transformation and immobilization of Au(III), Cr(VI) and U(VI) via environmental microbe, and the microbe diversity at the heavy metal pollution site. He is also interested in field bio-remediation technologies in soil, sediments and wastes.

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