

Microbial iron oxidation in the environment: mechanisms, biogeochemistry, and applications

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Microbes can catalyze the formation of iron oxyhydroxides, which are among the most reactive minerals in the environment. We have found these biomineralizing organisms in environmental ranging from the deep sea to terrestrial wetlands, rhizospheres, groundwater and acid mine drainage, where they have significant impacts on a wide range of biogeochemical cycles. To understand their impacts, we study the mechanisms, physiology, and mineralogy of iron oxidizing bacteria. I will present our most recent results on the molecular mechanisms of oxidation of different sources of iron, including minerals like magnetite. I will discuss connections between Fe oxidation and C cycling, including autotrophy/mixotrophy and how this may relate to biomineral formation. I will relate this to case studies in terrestrial wetlands and applications in remediation and resource recovery.