Geophysical Research Abstracts, Vol. 9, 04908, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-04908

Biotransformation of heavy metals, precious metal, and radionuclides

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Dissimilatory Fe(III)-reducing bacteria, such as *Geobacter sulfurreducens*, can reduce high valence metals, e.g. Cr(VI), Hg(II), Se(VI), Ag(I), U(VI) to lower oxidation state, less soluble compounds. Therefore, it may be possible to use these bacteria for *in situ* bioremediation of contaminated sites and to recover precious metals from waste streams .

The objective of this project is to understand the mechanism of metal reduction in this organism. Studies have shown *G. sulfurreducens* can reduce Cr(VI), Hg(II), Ag(I), Se(VI), U(VI) and Tc(VII). Cr(V) and U(V) were identified as intermediates by EPR and XAS, respectively, suggesting that reduction of these two metals occurs *via* a one-electron transfer process. The localization of reduced metal precipitates will be described, as well as the proteins involved in electron transfer to the metals, elucidated by studies using deletion mutants and purified enzymes *in vitro.*