OF EARTH AND MICROBES: ACTIVE PARTICIPATION OF MICROORGANISMS IN GEOCHEMICAL PROCESSES III

Wednesday, May 23, 2001

3:55 p.m. Grand Ballroom East

Chairs: K. J. Edwards
T. J. Beveridge

Lower S. K. * Hochella M. F. Jr.

Nanoforce and Nanomechanical Measurements Between Living Microorganisms and Mineral Surfaces: Evidence of Specific Biomolecule-Mineral Recognition [#3191]

Young’s modulus of a living bacterium and the forces of interaction between a living microbe and mineral are probed with force microscopy. This information is used to identify biomolecules that interact specifically with the mineral surface.

Tadanier C. J. * Lower S. K.

Modeling Nanoforce Measurements Between Viable Microorganisms and Mineral Surfaces: Influence of Environment on Interfacial Phenomena [#3636]

Measured interfacial and adhesion forces were extensively modeled for a variety of microbe-mineral systems using DLVO theory. Interfacial forces that occur during the initial approach between microbial and mineral surfaces were generally well described by DLVO theory.

Marín A. * Liermann L. J. Brantley S. L. LeBron V.

The Release of Fe and Mo from Silicates by Azotobacter Vinelandii [#3798]

Azotobacter vinelandii is a common nitrogen fixing bacterium that requires Fe and Mo for nitrogenase activity. However, the availability of these metals is limiting in soil environments. We investigate the acquisition of these metals from a solid by bacterial siderophores.


Bacterial Influences on the Concentration of Trace Metals and the Isotopic Composition of Fe Released from Minerals into Solution [#3736]

Research into the effects of soil bacteria on the release of trace metals (including Fe, Cu, Mo, and Ni) into solution from minerals and the isotopic composition of Fe released from these minerals in the presence of bacteria and organic ligands.

Kendall T. A. * Hochella M. F. Jr.


Confocal microscope images of A. vinelandii siderophores have provided spatial information on their interaction with mineral surfaces. This data combined with chemical force microscopy is being used to study siderophore removal of Fe from minerals.

Buss H. L. * Brantley S. L. Liermann L. J.

Using AFM and XPS to Evaluate Pitting by Bacteria Grown on Fe-Silicate Surfaces [#3710]

We used AFM and XPS to investigate effects of bacteria on mineral surfaces. Five methods were tested for the ability to remove bacteria without chemically or physically changing the surface. Observed pitting may be due to siderophores in glycocalyx.