McGill

*BRACE CENTRE FOR WATER RESOURCES MANAGEMENT*

# SEMINAR

## QUANTIFYING THE INTERACTIONS BETWEEN BACTERIA AND NATURAL ORGANIC MATTER

Terri A. Camesano
Department of Chemical Engineering, Worcester Polytechnic Institute

There is great interest in studying how bacteria interact with soils and surfaces in the natural environment, affecting applications ranging from bioremediation to the protection of drinking water quality from pathogenic microorganisms. Molecular techniques, such as atomic force microscopy (AFM) can be very useful for helping to characterize and quantify the interfacial forces between microbes and surfaces. Since environmental systems are heterogeneous and complex in their chemical and physical properties, we sought to explore a model for natural organic matter (NOM), and to describe the interactions between bacteria and NOM at the nanoscale. Poly(methacrylic) acid was chosen as a simple model for NOM, due to its highly charged nature and presence of carboxylic groups. The way that the model NOM interacted with bacteria was compared with Suwanee River Humic Acid and a Soil Humic Acid, by developing colloidal probes in which the NOM was coated onto a silica sphere. Gram-negative bacterial isolates were chosen with well-characterized surface properties. The interactions between *Pseudomonas aeruginosa* PAO1, a smooth strain, or *P. aeruginosa* AK1401, a semi-rough mutant strain, and each of the three NOM-probes was measured. Interestingly, we found that PMA is not a good model for the way bacteria interacts with the natural humic acids. For either bacterial strain, the grafting density of the bacterial surface polymers was the most important predictor of how the bacteria would interact with NOM. We also observed that steric repulsion due to the more complex lipopolysaccharide layer of AK1401 compared to PAO1 dominated the interactions for the former strain.

Terri Camesano is Associate Professor in the Department of Chemical Engineering at Worcester Polytechnic Institute. She received B.S. degrees in Chemical Engineering and Environmental Science from the University of Rochester, her M.S. degree in Environmental Engineering at the University of Arizona, and a Ph.D. in Environmental Engineering at the Pennsylvania State University. Her research involves a combined approach of experiments and modeling, aimed to help understand the adhesion of bacteria to various surfaces, including, soil, biomaterials, and mammalian cells.

Thursday, May 11th, 2006
Downtown Campus, Trottier Building, Room 0070
2:00 - 3:00 pm

**EVERYONE WELCOME**

Brace