

William R. Wiley

EMSL In Brief

Environmental Molecular Sciences Laboratory

Oestreicher Receives National Science Foundation Grant

Zachery Oestreicher, a user of the Department of Energy's Environmental Molecular Sciences Laboratory, was awarded a National Science Foundation grant to study protein-mineral/bacterial-mineral interactions in Japan this summer. The NSF East Asia and Pacific Summer Institutes for U.S. Graduate Students and the Japan Society for the Promotion of Science provided the grant to help students learn more about science and engineering in other countries and initiate scientific relationships that will better enable future international collaboration.

For eight weeks, Oestreicher will work at the Kanazawa University with Professor Yoshihiro Fukumori studying proteins associated with the *Magnetosprillum magnetotacticum* magnetosome. The magnetosome is an organelle containing nanometer-sized particles of magnetite that orient the microbe with the Earth's magnetic fields and allow the organism to seek anaerobic microenvironments.

Studying how the microbes synthesize magnetite inside magnetosomes has implications in the fields of evolutionary biology, astrobiology, biotechnology, pharmacology, medicine, and micro-electronics. For example, some microbes can synthesize geometrically consistent, well-defined, nanometer-sized particles of very pure magnetite, purer than inorganically formed magnetite. By studying the proteins that these microbes use to synthesize magnetite, one could mimic this synthesis outside the microbe, allowing industries to manufacture very pure nano-sized particles of magnetite.

A graduate student working on his Ph.D. at Ohio State University, Oestreicher was nominated for the NSF grant, in part, because of his research on single molecule imaging with EMSL's bio-atomic force microscope. He performed this research in 2007 through an internship with the Summer Research Institute. Recently, he co-authored a paper on the team's discovery of a peptide that binds to a metal-oxide surface. This peptide sequence can also be found in multiple copies in two silica-biomineralizing proteins in the cell walls of diatoms. The results are part of an upcoming paper in *Environmental Science and Technology*.

For more information, contact EMSL Communications Manager Mary Ann Showalter (509-371-6017).



Zachery Oestreicher in front of EMSL's atomic force microscope.

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