Geophysical Research Abstracts
Vol. 12, EGU2010-6872, 2010
EGU General Assembly 2010

Biologically Enhanced Geologic Carbon Sequestration

Robin Gerlach (1,2,3), Andrew C. Mitchell (2,3), Lee H. Spangler (3), Al B. Cunningham (2,3)

(1) (robin_g@biofilm.montana.edu), (2) Center for Biofilm Engineering, Montana State University, Bozeman, MT, USA, (3) Energy Research Institute, Montana State University, Bozeman, MT, USA

There are four trapping mechanisms proposed to play significant roles in the deep geologic sequestration of CO_2: i) formation trapping, ii) capillary trapping, iii) solubility trapping, and iv) mineral trapping.

Our research has shown that microbial biofilms are capable of enhancing formation trapping, solubility trapping, and mineral trapping under conditions found in brine aquifers targeted for geologic carbon sequestration.

1. We have demonstrated that engineered microbial biofilms are capable of reducing the permeability of porous media (including sandstone cores) at pressures and temperatures, which would be found in the presence of supercritical CO_2.
2. The formed biofilms have been demonstrated by us to be resistant to supercritical CO_2 exposure.
3. Microbial biofilms have been shown by us to precipitate CO_2 in the form of calcium carbonate ($CaCO_3$), which resists dissolution by brine and supercritical CO_2.
4. We observed that microbial activity in brine can increase rate and extent of CO_2 solubilization in brine.

This presentation will summarize our activities, which are part of U.S. DOE sponsored research at Montana State University, focusing on the development of biologically-based concepts for enhanced carbon sequestration.