SEMINAR: Friday Nov 5

Kurt Zenz House

The Feasibility of CO_2 Mineralization as a Climate Change Mitigation Option

Location: E19 – 319

Time: 2:00 – 3:30pm

ABSTRACT: The energetic feasibility and the potential scale of carbon dioxide (CO_2) mitigation through the use of industrial alkalinity production is considered. Specifically, several options for the artificial production of alkalinity are analyzed, including: (1) Geologic deposits of reactive hydroxide minerals (e.g., brucite), (2) Physical and thermal treatment of silicate minerals, (3) Industrial wastes, and (4) Electrochemical production of alkali solutions. We assess the energetics of producing alkalinity by these options and the scale at which the options could be performed. That comparison reveals that in certain circumstances, alkalinity production is an energetically attractive approach to CO_2 mitigation, but that the potential scale of those circumstances is limited. In other circumstances, the potential scale for CO_2 mitigation is extraordinarily large, but in those circumstances, the thermodynamic work required to capture one unit of CO_2 as carbonate mineral is close to the work that can be performed from producing that unit of CO_2 in a coal-fired power plant; as such, for the approaches to be effective CO_2 mitigation options, then these processes must be powered by less carbon intensive CO_2 sources than coal-fired plants.

Kurt Zenz House studies the physics, chemistry, and economics of capturing and storing anthropogenic carbon dioxide in ways that will ensure it does not enter the atmosphere. That work includes both storing CO2 in the sub-surface as well as converting CO2 to stable carbonate minerals. He is currently a fellow at MIT, where his work is partially supported by the King Abdullah University of Science and Technology. In addition, he is the President of C12 Energy, which is commercializing geologic CCS.

In 2007, Esquire magazine featured him among its "Best and Brightest," in 2009, he was named by Technology Review Magazine as one of the "Top 35 Innovators Under 35," and in 2010 he was named one of Boston's "Top 15 Innovators" by the Boston Globe. He has a bachelor's degree in physics from the Claremont Colleges and a Ph.D. in geoscience from Harvard University.