

Tuesday, Sept. 26 at 9:30 am in DIAM 242

Carbon Capture and Applications to Ammonia Synthesis

Jen Wilcox

Chemical and Biological Engineering, Colorado School of Mines

The scale by which CO₂ must be mitigated worldwide dwarfs the existing chemical industry, making utilization of CO₂ as a chemical feedstock a minor component of the portfolio of mitigation options. Carbon Capture and Storage (CCS) is one strategy that could potentially mitigate gigatons of CO₂ emissions per year, provided geological storage of CO₂ is feasible. The scale and energy requirements associated with CO₂ separation processes will be presented. Strategies based upon catalytic membrane separation processes in particular, will be of focus. Regeneration of CO₂ is known to be a significant component of sorption-based separation processes and is absent when using membrane technologies. This work involves the adsorption, dissociation, and sub-surface diffusion of N₂ in Group V-based metals, including vanadium, niobium, and their alloys with ruthenium. Experimental N₂ flux measurements have been carried out to validate the theoretical predictions. Application of separation of N₂ to use as a feedstock for ammonia synthesis will be presented.

Short Bio: Jennifer Wilcox is an Associate Professor in the Chemical and Biological Engineering Department at the Colorado School of Mines. Her Ph.D. in Chemical Engineering in 2004 is from the University of Arizona, and her B.A. in Mathematics in 1998 is from Wellesley College. She received an ARO Young Investigator Award (Membrane Design for Optimal Hydrogen Separation), an ACS PRF Young Investigator Award (Heterogeneous Kinetics of Mercury in Combustion Flue Gas), and an NSF CAREER Award (Arsenic and Selenium Speciation in Combustion Flue Gas). Within her research group, she focuses on trace metal and CO₂ capture. Her research involves the coupling of theory to experiment to test newly designed materials for sorbent or catalytic potential. She has served on a number of committees including the National Academy of Sciences and the American Physical Society to assess CO₂ capture methods and impacts on climate. She is the author of the first textbook on Carbon Capture, published in March 2012.

