Ammonia's Role in Enabling H2@Scale

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H2@Scale is a U.S. DOE initiative that advances hydrogen as the primary fuel in a future decarbonized energy economy. A major challenge with putting H_2 at the center of this system is the high costs associated with its storage, transportation, and distribution. Among potential carriers, ammonia (NH_3) is a leading candidate due to its high gravimetric and volumetric storage density. Drawbacks are its decomposition is highly endothermic, inhibited by hydrogen, and the purification requirements for applications such as PEM fuel cells. Catalytic membrane reactors offer process intensification by integrating decomposition and purification in a single unit operation. In this work we explore its advantages over conventional packed bed reactors. In this seminar we describe improvements in both membrane fabrication and catalyst integration that dramatically improve CMR productivity relative to PBR decomposition and discuss our progress developing a 10 slm prototype module to demonstrate the viability of this technology for distributed hydrogen delivery.

Bio:

Dr. Colin Wolden is a Professor in the Department of Chemical & Biological Engineering at Colorado School of Mines and holds a joint appointment at the nearby National Renewable Energy Laboratory. The Wolden lab focuses on the development of materials and processes germane to the production, storage, and distribution of renewable energy. Current projects in the group include thin film solar cells, solid state batteries, and composite membranes with applications ranging from fusion to sustainable hydrogen production. Colin earned his B.S. degree at Minnesota, his M.S. and Ph.D. at MIT, all in chemical engineering. He joined Mines back in the 20th century after completing an NRC/ARO postdoctoral fellowship at North Carolina State University in the Materials Science department.