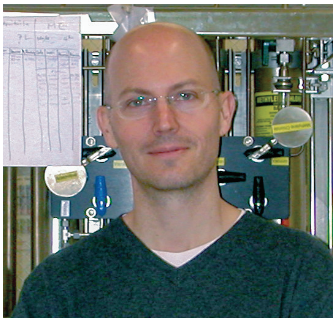

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B.A., 1996,
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Selected Publications

Low-Spin Cobalt(II) Redox Shuttle by Isocyanide Coordination, Raithel, A.L., Kim, T.Y., Nielsen, K., Staples, R.J., Hamann, T.W.; *Sust. Energy & Fuels* **2020**, *4*, 2497-2507. *DOI: 10.1039/D0SE00314J*

Real-Time Observation of the Diffusion Mechanism Progression from Liquid to Solid-State of Transition Metal Complexes, Kim, T.Y., Wang, Y., Raithel, A.L., Hamann, T.W., *ACS Energy Lett.* **2020**, *5*, 2, 583–588.

Improved Performance Induced by in-situ Ligand Exchange Reactions of Copper Bipyridyl Redox Couples in Dye-Sensitized Solar Cells, Wang, Y., Hamann, T.W., *Chem. Communic.* **2018**, *54*, 12361–12364.

Charge-Carrier Dynamics at the $CuWO_4$/Electrocatalyst Interface for Photoelectrochemical Water Oxidation, Shadabipour, P., Raithel, A.L., Hamann, T.W., *ACS Appl. Materials & Interfaces* **2020**, *12*, 45, 50592–50599.

Thin film photoelectrodes for solar water splitting, He, Y., Hamann, T.W., Wang, D.; *Chemical Society Reviews* **2019**, *48*, 2182–2215.

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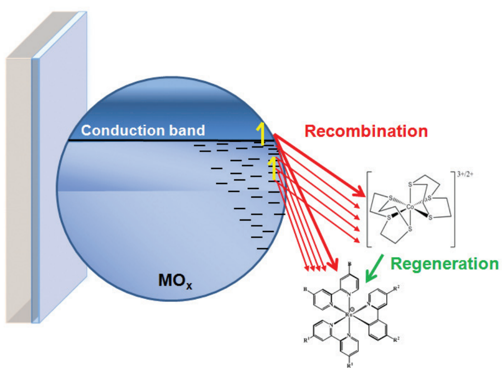
Recent Advances and Challenges of Electrocatalytic N_2 Reduction to Ammonia, Qing, G., Ghazfar, R., Jackowski, S.T., Habibzadeh, F., Maleka Ashtiani, M., Chen, C. Smith, M.R., Hamann, T.W., *Chemical Reviews* **2020**, *120*, 12, 5437–5516.

Homogeneous Electro-Catalytic Oxidation of Ammonia to N_2 Under Mild Conditions, Habib-Zadeh, F., Miller, S.L., Hamann, T.W., Smith, M.R.; *Proc. Nat. Acad. Sci.* **2019**, **116** (8) 2849–2853.

As Precious as Platinum: Iron Nitride for Electrocatalytic Oxidation of Liquid Ammonia, Little, D.J., Edwards, D., Smith, M.R., Hamann, T.W.; *ACS Appl. Mat. & Interf.* **2017**, *9 (19)*, 16228–16235.

Hamann Group Research: The Hamann group is engaged in interdisciplinary research to address basic science issues related to new methods, molecules and materials to convert solar energy to electricity and chemical fuels. Of specific interest are regenerative and non-regenerative photoelectrochemical cells, including dye-sensitized solar cells and thin-film absorber photoelectrocatalytic systems. In addition, we are interested in the use of ammonia as an energy (hydrogen) carrier and are investigating electrocatalytic nitrogen fixation and ammonia splitting.

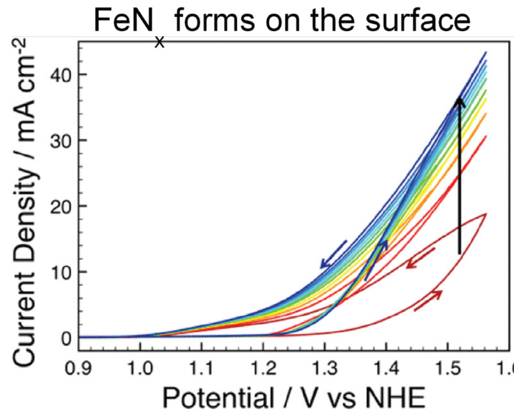
Dye Sensitized Solar Cells: Ultra-fast electron injection from a photoexcited sensitizer into a photoanode produces a charge separated state with typically high quantum efficiency. We are primarily interested in the subsequent processes of dye regeneration and recombination which control the efficiency of charge collection. We systematically vary the components involved in each reaction and interrogate them with a series of photoelectrochemical measurements. The general lessons learned will ultimately be used to develop design rules for next generation



DSSCs comprised of molecules and materials which can overcome the kinetic and energetic constraints of current generation cells. In addition, we are investigating new related paradigms of solar energy conversion based on the knowledge gained from more conventional systems.

Thin Film Absorber Solar Cells: We are interested in exploring the use of thin film semiconductors to drive photoelectrochemical water splitting (solar fuel-forming) reactions. We are currently elucidating the rate limiting steps as well as water oxidation mechanism on the electrode surface. Additional topics of recent interest include understanding the effect of substrate and underlayer materials, incorporation of dopants, and surface layers (e.g. catalysts) on the water oxidation efficiency. Additional oxide, nitride and oxynitride semiconductor materials are also under current investigation.

Ammonia Electrocatalysis: Nitrogen is the most abundant gas in Earth's atmosphere and water is the most abundant liquid on Earth's surface; combining the catalytic reduction of N_2 with the oxidation of H_2O to produce NH_3 offers a route to scalable renewable energy storage. Liquid ammonia has an energy density comparable to methanol, and the stored chemical energy can in principle be used to generate electricity or H_2 on demand. The electrolysis of liquid NH_3 has received



limited attention to date, however. We are also engaged on a broader collaborative effort with the Smith group to investigate the electrocatalytic conversion of liquid NH_3 to H_2. In addition, we are developing new electro-catalysts based on earth-abundant materials for NH_3 synthesis and electrolysis.

https://hamanngroup.weebly.com/