

216 - New cobalt glyoximes as potential hydrogen catalysts

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The environmental and social implications of global carbon emissions require a rapid transition to alternate energy sources. The development of cost-effective catalysts for the interconversion of electrical and chemical energy could enable the widespread acceptance of existing renewable energy technologies. In particular, the production of hydrogen gas via water electrolysis is a promising method of renewable energy storage. For the hydrogen evolution half-reaction, cobaloximes have received attention as active catalysts containing only Earth-abundant elements. We currently are investigating the surface immobilization of cobaloxime catalysts in order to improve the stability and optimize the complexes for catalysis under aqueous conditions. At present, we are pursuing two immobilization strategies. The first involves the synthesis of glyoxime ligands suitable for electropolymerization. This approach can result in long-chain, insoluble glyoxime polymers that entrain catalytic units at an electrode surface. In a second approach, N-alkyl glyoxime ligands are being pursued for immobilization via hydrophobic interactions with a diazonium-modified electrode surface. In both approaches, the inductive effects of electron donating and withdrawing substituents are being explored to tune the electron density on the central cobalt ion. Such substituents can influence the basicity of Co(I), modifying the catalyst to match the acidity of a target solution. The synthesis and characterization of these glyoxime ligands will be presented, along with a preliminary electrochemical investigation of the catalytic activity of the resulting cobalt complexes.

Monday, September 9, 2013 02:00 PM

[Undergraduate Research Posters \(02:00 PM - 04:00 PM\)](#)

Location: Indiana Convention Center

Room: Halls F&G

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