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# Solar Hydrogen Production by Solar Thermal Decoupled Electrolysis: Analysis of FE3O4 in Solution

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The Valparaiso University Solar Research Project utilizes a solar thermal decoupled electrolysis process for the production of $H_2$ from water. This study focuses on the electrochemical conversion of magnetite to hematite during the $H_2$ production process. Laboratory experiments show that the expected amount of $H_2$ gas forms at the cathode of the electrolytic cell, but we have encountered difficulties recovering the expected amount of solid hematite at the anode. An intensive study of the complex solution chemistry using cyclic voltammetry, Mossbauer spectroscopy, and solubility modeling showed that several dissolved iron species potentially exist in solution. Further work must be done to clarify which species are key participants in the overall electrochemical reaction. This information will help us to determine and implement reaction conditions that are favorable for precipitation of hematite or other oxidized iron species.

*Information about the Authors:*
Jordan Otto is a junior biochemistry major. She plans to pursue graduate studies in biochemistry or organic chemistry after graduating from VU. Evan Beyers is a senior biochemistry major and will be attending Colorado State University for graduate studies in biochemistry and molecular biology this coming fall. Otto and Beyers presented their solar research at the 246th Annual American Chemical Society meeting held in Indianapolis last fall.

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