Lewis University
STEM Undergraduate Research Experience (S.U.R.E.) 2020
Faculty Mentor – Project Application

Due Date: ***January 17, 2020 by 5pm***

Faculty Name: Daniel S. Kissel

Department: Chemistry

Research Project Title: Investigating Surface Interfaces for the Functionalization of Photocatalytic Metal-Organic Framework Materials onto Solid Substrates.

Research Project Abstract (Please provide an overview of your project -- this will be shared with students as a project description; maximum 250 words):

Storage of energy produced by solar and other renewable sources is critical to the long-term sustainability and practicality of these systems. Photoelectrochemical (PEC) cells are an attractive solution for energy storage that converts solar energy into hydrogen gas through water electrolysis. The hydrogen gas produces can readily be stored and used as a fuel source when needed. Due to their photoactive nature, PEC electrodes are most effective when they are placed on a clear substrate. ITO glass has traditionally been used as an electrode substrate because of its charge transport capabilities, but its cost prohibits the practicality for large-scale systems. In an effort to obtain lower costs per volume of hydrogen produced, alternative substrates with low resistivity are currently under investigation. The conductive organic polymer polyaniline (PANI) has charge transport properties that can be utilized in place of ITO. This project will focus on functionalizing PANI with a photoactive Metal-Organic Framework onto a solid substrate to create a stable, photocatalytic cathode that can operate in a PEC cell.

Introduction