Online Proceedings

POSTER SESSION 2

Balcony, Easel 113

1:00 PM to 2:30 PM

Catalytic Conversion of Carbon Dioxide by Bimetallic Complexes

Ashley Mary (Ashley) Mathews, Junior, Chemistry
Mentor: Brandi Cossairt, Chemistry
Mentor: Sarah Flowers

Since the 20th century, the concentration of atmospheric carbon dioxide has increased dramatically, inducing several environmental issues. Our research seeks to reduce this excess carbon dioxide in our atmosphere by using a chemical method to capture and utilize carbon dioxide. In our research, we have developed a bimetallic complex coordinated by a multidentate carbene-phosphine ligand. We hypothesize that the carbon dioxide molecule will be cooperatively reduced by the two metal centers. Using nuclear magnetic resonance and crystallography techniques we have been able to analyze our complex's molecular structure. So far, we have concluded that this complex successfully reduces a molecule with a shape and stability similar to that of carbon dioxide. Moving forward in our research, this bimetallic complex should behave similarly with the bonds of carbon dioxide and thus represents a potential method of reducing the amounts of carbon dioxide in our atmosphere.

POSTER SESSION 3

Commons West, Easel 18

2:30 PM to 4:00 PM

Probing Photoelectrochemical Redox Processes Using CdSe Quantum Dots

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Mentor: Brandi Cossairt, Chemistry
Mentor: Danielle Henckel, Chemistry

The need for energy efficient chemical reactions is growing in response to the world's energy crisis. Reactions must not only be high yielding but also require low energy input. Many redox processes of interest involve the transfer of electrons from the surfaces of electrodes and need an electrical input as driving force. The ability to promote redox reactions photochemically would greatly reduce the energy input needed. As of yet, interfacing electrochemical reactions with colloidal photosensitizers in order to promote them photochemically has not been done. This project experiments with CdSe quantum dots as the colloidal photosensitizer by absorbing visible light from an LED light source and transferring an electron in order to reduce ferrocenium to ferrocene as a model reaction. The goal of this project is display the ability of CdSe in the productive electron transfer promoted by visible light to ferrocenium. Knowledge of this model system can be applied to more complex reactions in the future and the work done here will help understand how to drive industrial chemical reactions via sunlight.