Research Week Abstract

Posters and Presentations

Abstract

Title - Synthesis and Characterization of Some Disubstituted Cyclopentadienyl Rhenium Complexes as Potential Candidates in Semiconductive Materials

Program of Study – Chemistry

Presentation Type – Choose one of the following: Three Minute Thesis

Subtype – N/a

Mentor(s) and Mentor Email - Dr. Chad Snyder (csnyder19@liberty.edu)

Student name and email – Chloe Vernon (cevernon@liberty.edu)

Abstract: Since 2000, when the Nobel Prize in Chemistry as awarded for conductive polymer research extensive studies have been performed concerning polymer conductivity. However, few studies have been performed concerning the conductive capabilities of discrete organometallic compounds. Through having characteristic behavior between that of conductors and insulators, semiconductors allow for flexibility in the functionality of a device. Through synthesizing a diacyl heterocyclic complex with a transition metallic constituent, tunability of its semiconductive capabilities is hypothesized to exist. For this project, organometallic compounds were formed specifically with a transition metal included in the structure. Specifically, rhenium was used based upon its stability compared to alternative transition metal moieties. By redox reactions such as oxidation and reduction, the variation in the electrical conductivity could allow for an analysis of whether this unique structure would allow for tunability. The goal of this thesis was to summarize research that was conducted beginning with aromatic substituted fulvenes to perform various multistep synthesis processes, utilizing thallium salt intermediates, to produce several disubstituted cyclopentadienyl rhenium complexes. In this project, different rhenium complexes were synthesized accurately

and with high yield utilizing methods that were straightforward and generated replicable results. Through melting range analysis, IR spectroscopy, ^{13}C- NMR, and ^{1}H -NMR, the identity and purity of these compounds were confirmed.