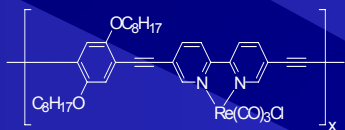


Stacy M. Conrad, Sarah A. Beetem*, Kelly J. Lawson-Ferguson*, Keith A. Walters

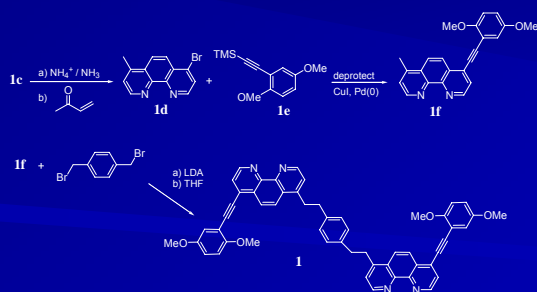
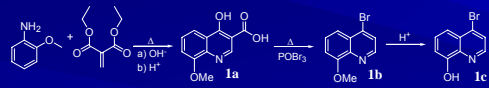
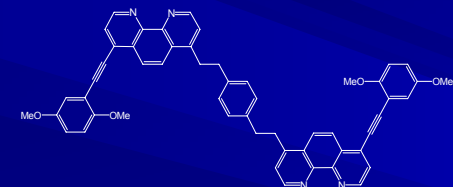
Department of Chemistry, Northern Kentucky University, Highland Heights, KY 41099

Objective: The purpose of this research project is to synthesize a new organometallic supramolecular system that will efficiently move charge when excited by light.

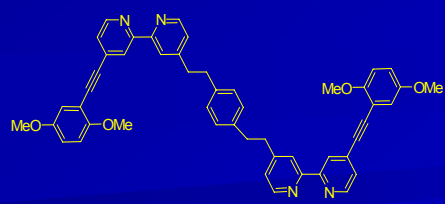
Background: Many researchers¹⁻⁴ have explored polymers with pendant transition metal complexes. When interacted with light, the polymer and transition metal tend to act independently of each other.



Our solution is to incorporate the transition metal directly into the backbone of a ligand inspired by Sauvage⁵ and react it with light to see if there are improvements over current systems. Previously, Sarah Beetem* and Kelly Lawson-Ferguson* have worked on synthesizing a ligand based on a phenanthroline system. The synthesis involves multiple steps, some of which are difficult to accomplish.

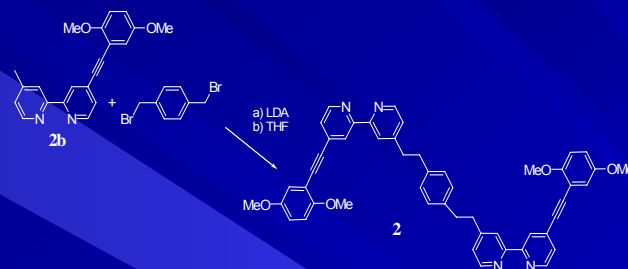
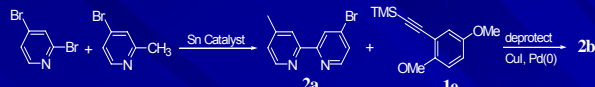


The goal is to synthesize a ligand that is based on a bipyridine structure. This trans-directing linear ligand will incorporate the transition metal directly into the backbone of the photochemically active polymer. In addition, it will require fewer synthetic steps.

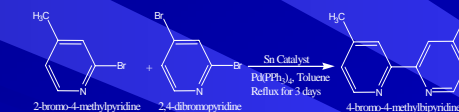


Bipyridine Ligand Synthesis

First Approach:



Step 1 – Synthesis of 4-bromo-4-methylbipyridine

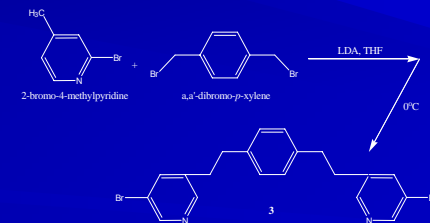


Attempted, but no successful syntheses.

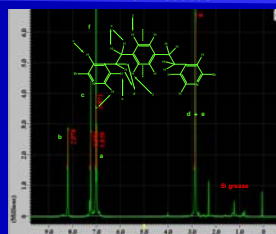
Purple color of product suggested that molecular bromine was produced.

Second Approach:

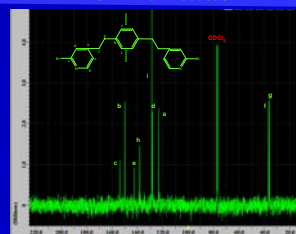
Step 1 – Synthesis of Product 3



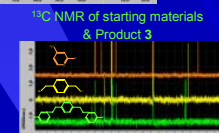
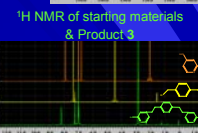
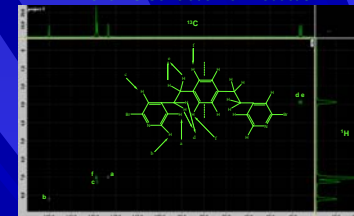
¹H NMR of Product 3



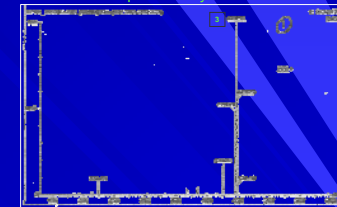
¹³C NMR of Product 3



¹H and ¹³C Correlation for Product 3



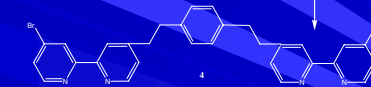
Mass Spectrometry of Product 3



Step 2 – Synthesis of Product 4



Synthesis still in progress.



Future Steps:

- Refine synthesis of Product 4
- Incorporate transition metal into Product 4, forming bipyridine ligand
- Carry out detailed photochemical & photophysical studies on bipyridine ligand
- Make applications in solar cell development, molecular devices, and computer technology

Acknowledgements

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