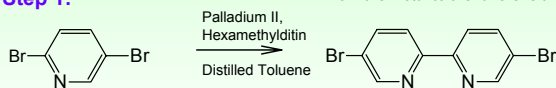


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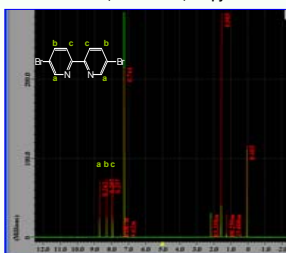
Department of Chemistry, Northern Kentucky University, Highland Heights, KY 41099

**Objective:** The primary objective of our research is to create systems that efficiently move charge when excited by light. Such systems have possible applications in solar cell development, molecular device and computer applications. An example of a system in the making is a fullerene-transition metal system in which, a fullerene,  $C_{60}$ , is attached to a transition metal through a bipyridine ligand. Fullerenes have large absorption cross areas and readily accept multiple electrons, which serve as advantageous properties in photo-induced charge transfer applications. A rigid conjugated link between the fullerene and the metal has been designed to enhance the ability of charge to flow from the metal to the fullerene and vice-versa.

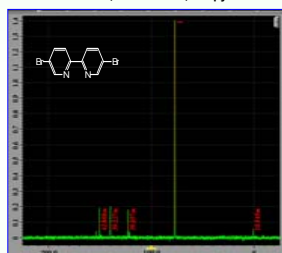
## Bipyridine Ligand Synthesis Step 1:



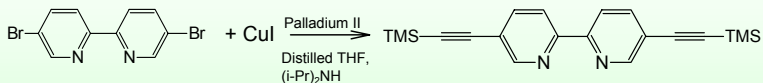
$^1\text{H}$  NMR of 5,5'-Dibromo-2,2'-Bipyridine



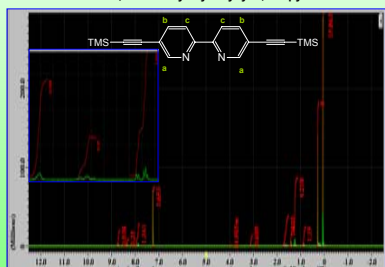
$^{13}\text{C}$  NMR of 5,5'-Dibromo-2,2'-Bipyridine



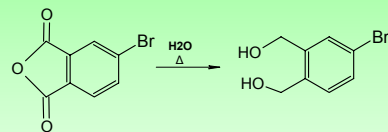
## Step 2:



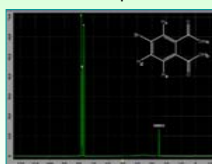
$^1\text{H}$  NMR of 5,5'-Trimethylsilyl ethynyl-2,2'-bipyridine



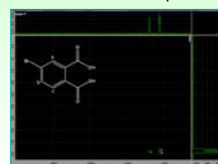
## Fullerene Building Block Synthesis Step 1:



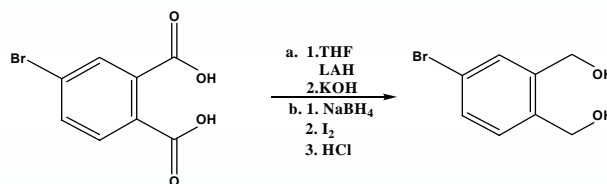
$^1\text{H}$  NMR of 4-Bromophthalic Acid



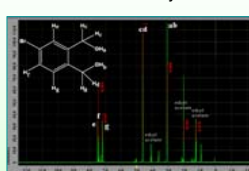
$^1\text{H}/^{13}\text{C}$  Correlation of 4-Bromophthalic Acid



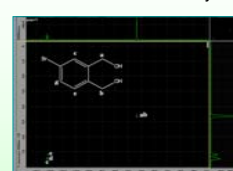
## Step 2:



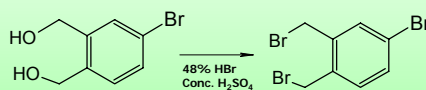
$^1\text{H}$  NMR of 4-Bromo-o-xylene



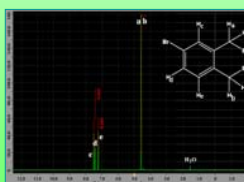
$^1\text{H}/^{13}\text{C}$  Correlation of 4-Bromo-o-xylene



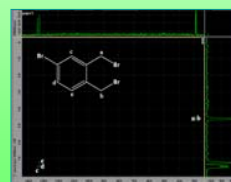
## Step 3:



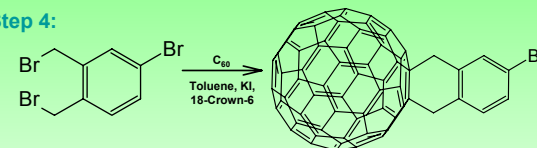
$^1\text{H}$  NMR of 4,α,α-Tribromo-o-xylene



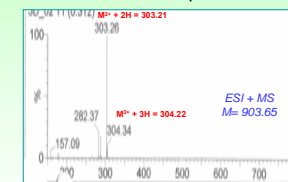
$^1\text{H}/^{13}\text{C}$  Correlation of 4,α,α-Tribromo-o-xylene



## Step 4:



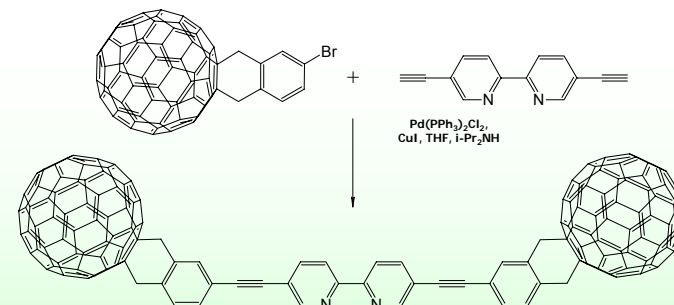
Mass Spectra



$^1\text{H}$  NMR Spectra Revealed Expected Peaks, but Low Solubility Impedes a Good Spectra

## Next Steps:

The next steps involve coupling the fullerene building block to the 5,5'-trimethylsilyl ethynyl-2,2'-bipyridine producing a supramolecular system, which contains a bipyridine ligand. This supramolecular system will be coordinated to various transition metals. The resulting complex will undergo a complete photo-physical evaluation.



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## Acknowledgements

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