Effect of Metal Ion Incorporation into Conjugated Polymers

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A major focus of our research is to study the roles of metal ion incorporation and interactions between/within chains on the optoelectronic properties of π-conjugated polymers (CPs), particularly conducting metallopolymers (CMPs). Understanding these parameters will greatly facilitate the *rational design* of materials for incorporation into chemosensors and electroluminescent devices. To meet these goals we are investigating hybrids of organic CPs (OCPs) and CMPs in which chain separation and orientation are tuned by sterically encumbered sidechains. These targets will permit a quantitative study on how structure affects energy/exciton transfer among components and allow the amount of free space surrounding the π-conjugated backbones to be tuned. An undergraduate summer research project will focus on the most widely studied bipyridyl-containing CMPs to allow the greatest comparison to previous work in the field. Specifically, students will prepare and study the optical properties of CMPs with sterically-enshrouded bipyridyls that enforce a 1:1 metal:bipy ratio (**Figure**). This property prevents coordinative crosslinking that can occur in current-generation bipy-CMPs. Crosslinked materials can also be highly insoluble, hampering solution spectroscopy. Students will examine structure-property relationships through modification of peripheral substituents.

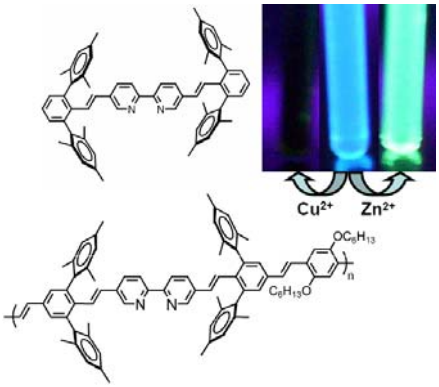

Figure. *Sterically-enshrouded small molecular (top) and polymeric (bottom) fluorescent metal-ligating scaffolds that have been explored by current undergraduates. The inset shows the emission response to Cu(II) or Zn(II) ions.*