

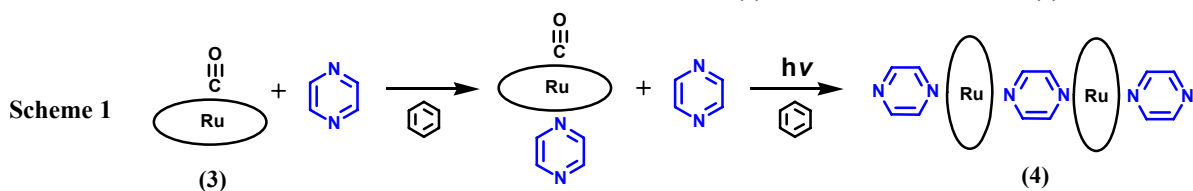
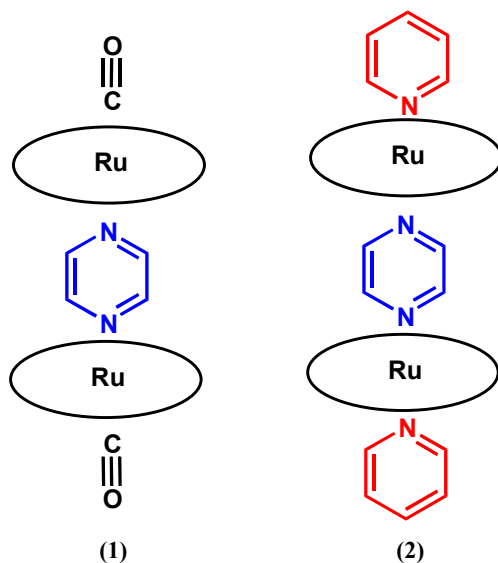
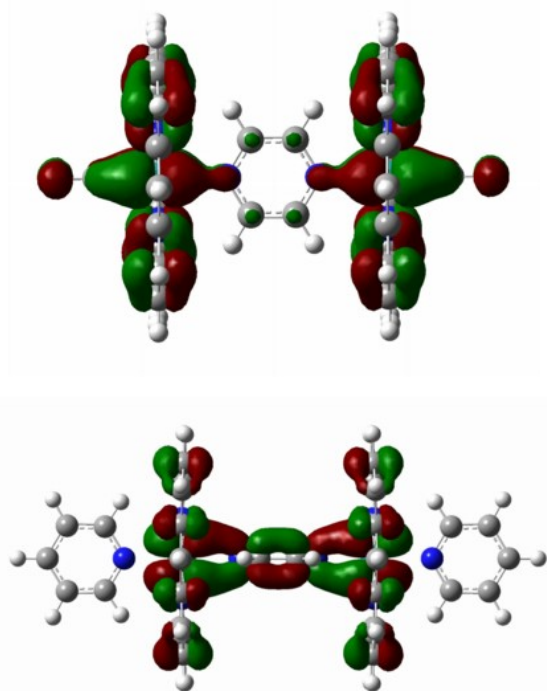
Synthesizing Ruthenium Porphyrin Dimers

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Background. Nanotechnology is a rapidly advancing field that evokes the possibility of developing molecular-based electronics. To better understand the potential for molecular wires, the Van Ryswyk group synthesizes metalloporphyrin dimers believed to have strong metal-metal electronic coupling elements as based on predictions made by the Cave group through their Koopmanns' Theorem – Generalized Mulliken-Hush approach (KT-GMH).

Approach. Organometallic synthesis of ruthenium-octaethylporphyrin dimers via air-sensitive techniques on an NMR mass scale, photolysis, and inert atmosphere (glove box) techniques, followed by characterization with ^1H NMR with signature dimer peaks lying to the right of zero.

Results. We photolyzed our starting dimer, $\text{pz}[\text{Ru}(\text{OEP})(\text{CO})]_2$ (**1**), first in the presence of pyridine and then acetonitrile, in an attempt to synthesize the py-capped dimer (**2**). However, we found that both pyridine and acetonitrile were stronger ligands than the bridging pyrazine, and thus broke apart the dimer. We instead photolyzed the CO-capped monomer (**3**) with pyrazine in benzene (scheme 1), successfully synthesizing the pyrazine-capped dimer (**4**). This was then confirmed by ^1H NMR. While we did not attain a 100% yield of **4**, we were able to determine the side products, whose spectral properties are already known.



Future Work. Performing calculations on **4** via observation of near-infrared intervalence charge-transfer bands, comparing these to the Cave group's predictions, and synthesizing other porphyrin dimers.

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