Tuning Nonlinear Optical Properties in \( \pi \)-Delocalizable Ruthenium Complexes

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**Introduction**

- Current trends suggest that optical based information transfer and handling will increasingly be used in the area of information technology. This work examines the variance properties of organometallic compounds depending upon the polarity of different terminal moieties.
- Organic compounds that are unsymmetrically polarizable, e.g. through conjugated π-systems, have been shown to produce large, rapid non-linear optical (NLO) responses.
- Organometallic complexes combine the advantage of organic materials with the design flexibility of inorganic complexes: variation in oxidation state, coordination number, coordination geometry, co-ligands, and intense MLCT transitions.

**Previous Work**

- The combination of 1,3,5-tris-ethynylbenzene with excess cis-RuCl3(dppe), led to substitution at only two of the three ethynyl sites due to steric hindrance.
- Taking advantage of this ‘steric control’, conjugated organometallic wedges were made. By stepwise metal-acetylide coupling and Sonogashira reactions, these building blocks were constructed into larger dendrimers.

**Synthesis**

- Three aromatic caps of differing polarity, including electron withdrawing, neutral and electron donating, were attached at the chlorine sites.

- Centrosymmetric molecules were created to examine the 3rd order NLO properties.
- Iodine combined with a palladium catalyst proved to be the best method to homocouple the wedges.

**NLO Properties**

To be completed…

The only characterization I am going to discuss is the NLO (2nd and 3rd order) results. I am considering putting the 2nd order results at the bottom of the first column (after taking out some wordy intro) and the 3rd order results here. I want to re-align all of the structures and schemes (just remade em all) to fit each other, which is picky work for the week-end.

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**References**