Efficient charge transfer from excited state dye molecules into nanoparticles as a model for dye sensitized solar cells

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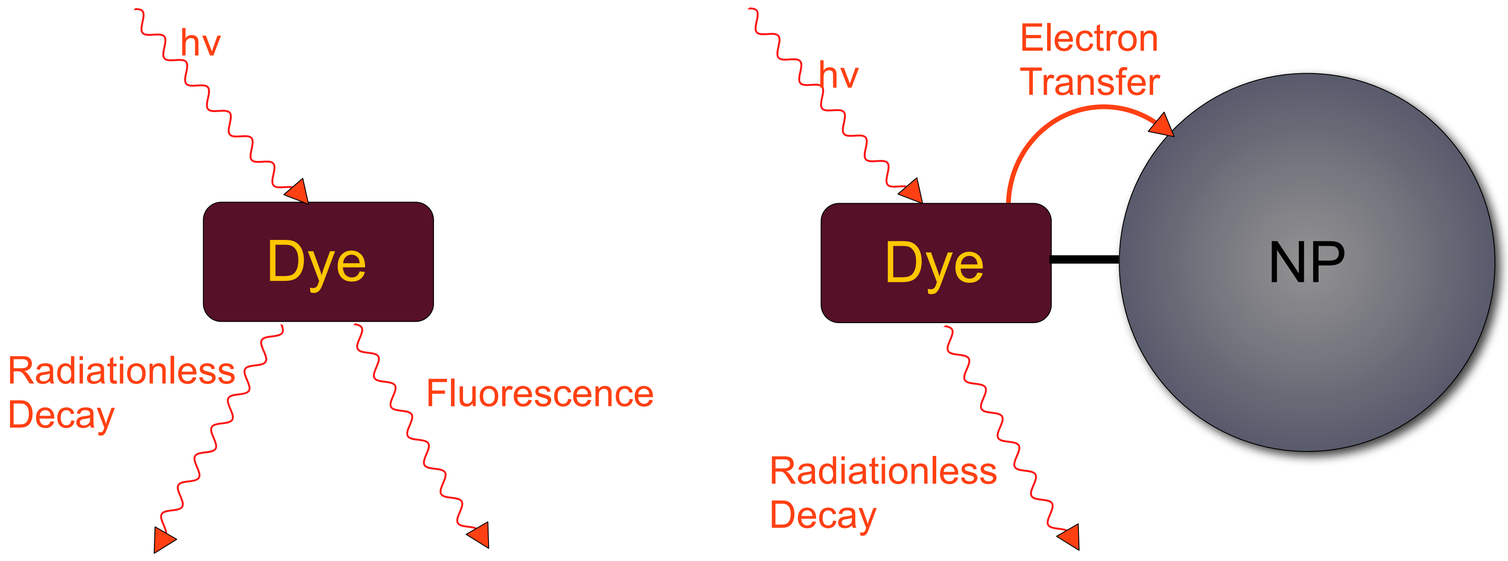
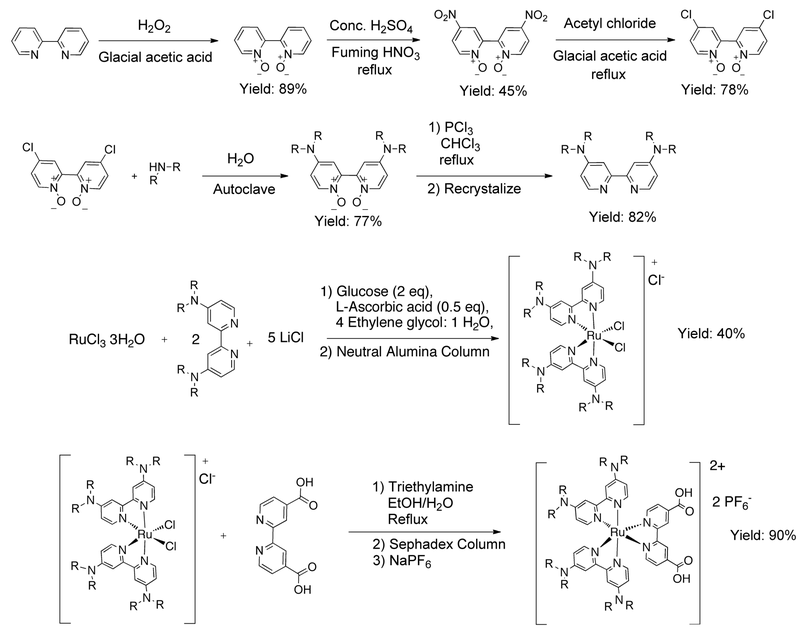
Introduction



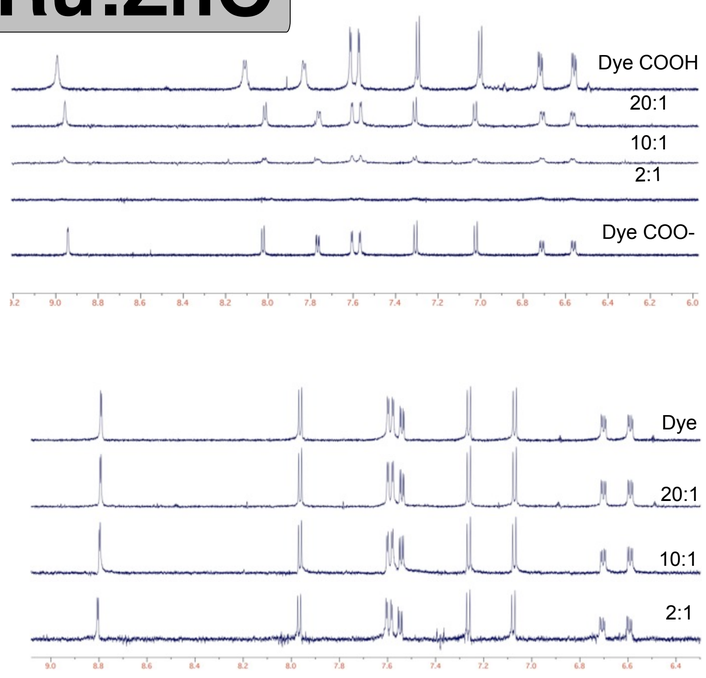
Objective: Use isolated dye:nanoparticle dyads to probe the critical charge transfer event following absorption of solar radiation (i.e. the conversion of light into electrical energy).

Ruthenium Dye Synthesis

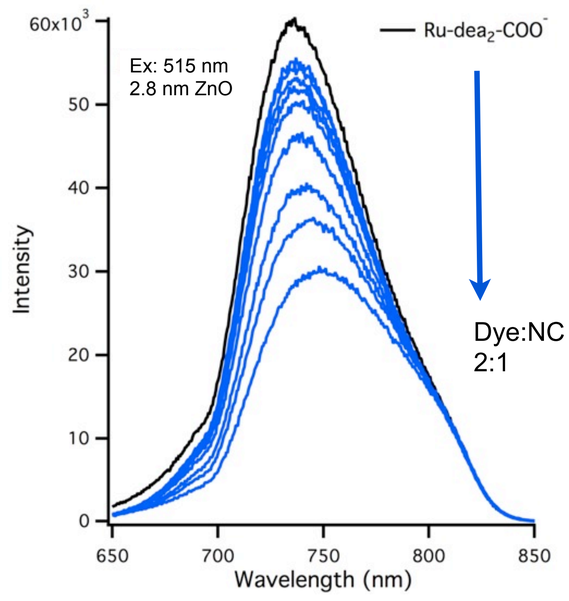


Ru:ZnO

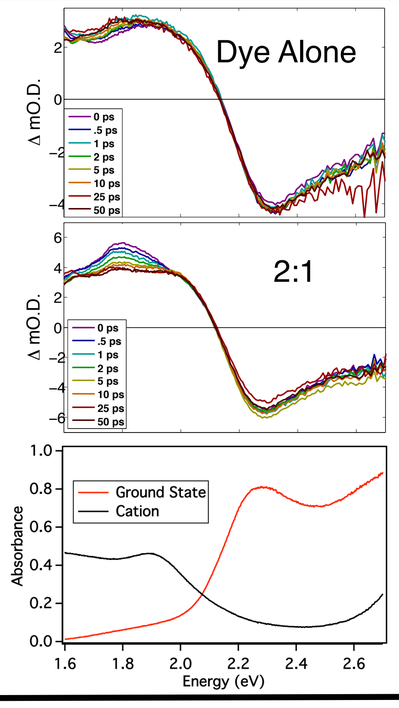
^{1}HNMR



Fluorescence Quenching

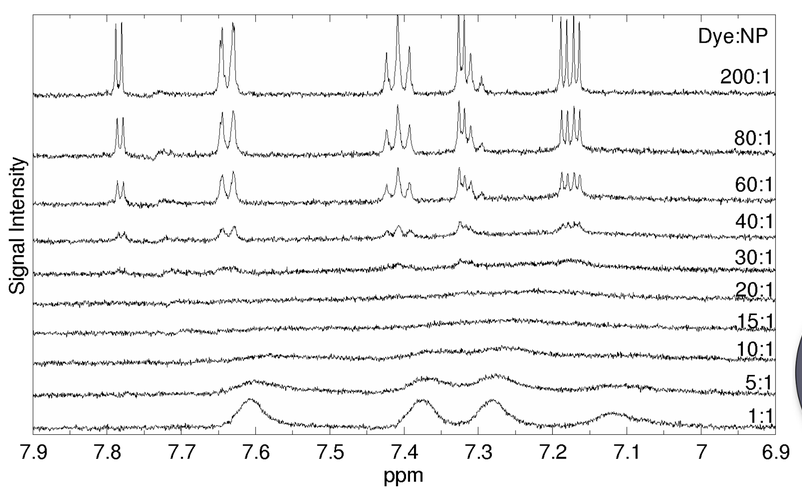


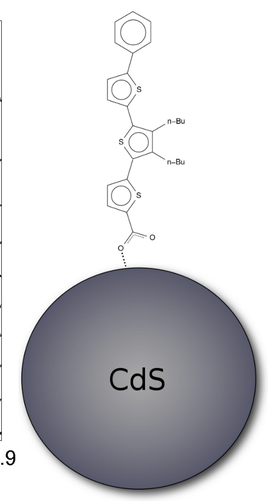
Transient Absorption



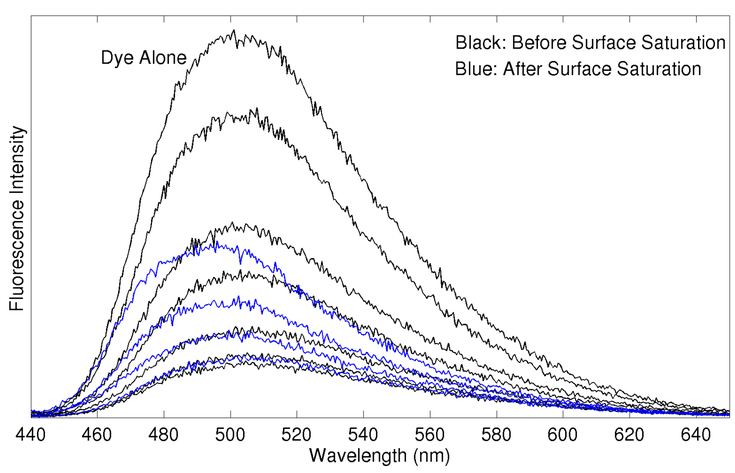
3T:CdS

^{1}HNMR

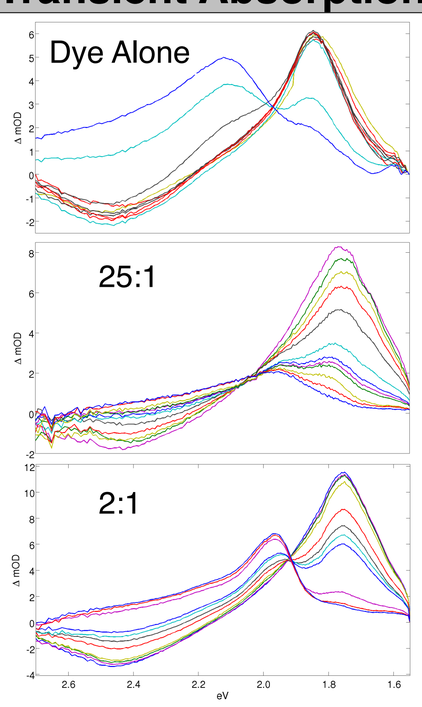




Fluorescence Quenching



Transient Absorption



Conclusions

- Synthesized a series of amino-substituted ruthenium dyes, which perform better than organic dyes.
- NMR shows the dyes attach through the carboxylate group.
- Fluorescence quenching experiments show that the nanoparticles are capable of quenching the emission of the excited dye.
- Transient absorption spectroscopy shows that an electron transfer event has occurred.
- We have evidence to show that the better performance of the ruthenium dyes is due to the shape of the dye and not just the increased spectral coverage.

Acknowledgments

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