Spectroscopy and Dynamics of Phosphonate-Derivatized Ruthenium Complexes on TiO_2

Meyer

Scientific Achievement

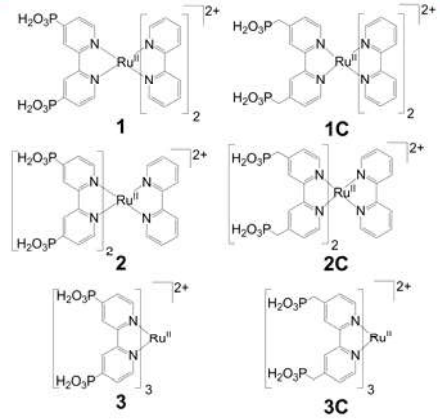
Uncovered dominant surface binding motifs and electron injection rates for phosphonate-derivatized ruthenium complexes on TiO_2.

Significance and Impact

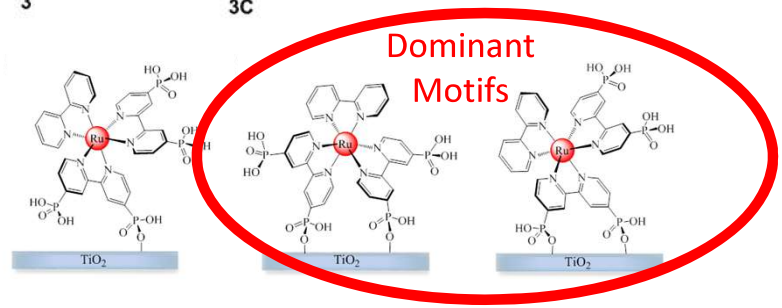
Correlations between structure and forward /backward dye-TiO_2 electron transfer rates will inform the design of new sensitizer molecules.

Research Details

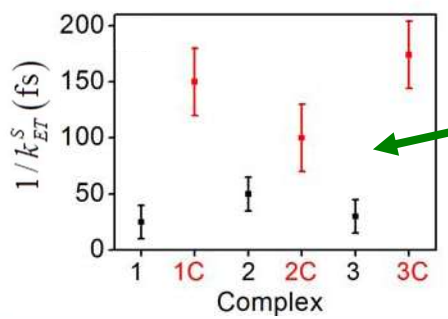
- Resonance Raman spectroscopy was used to determine vibrational mode-specific reorganization energies for a family of 6 ruthenium complexes.
- Modes assigned to the phosphonate linker groups provide information about geometries at the interface.
- Electron injection time scales associated with the singlet and triplet states of the molecules are 100fs and 1ps, respectively.
- Addition of a methylene group to the phosphonate linker increases the efficiency of electron injection from the triplet states of the molecule.

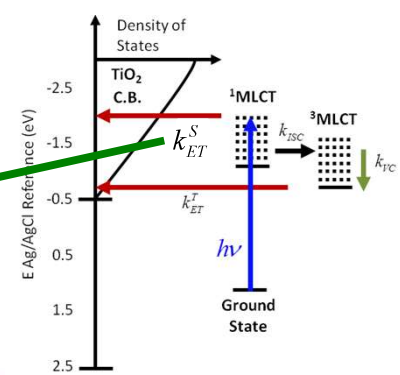


Family of phosphonate-derivatived ruthenium complexes



^{1}MLCT Injection Times





P. G. Giokas, S. A. Miller, K. Hanson, M. R. Norris, C. R. K. Glasson, J. J. Concepcion, S. E. Bettis, T. J. Meyer, A. M. Moran *J. Phys. Chem. C* **2013**, *117(2)*, 812-824. DOI: 10.1021/jp310155q

Work was performed at the University of North Carolina, Chapel Hill