

# ULTRAFAST CHARGE TRANSFER DYNAMICS OF A FUNCTIONALIZED RUTHENIUM DYE IN A ZEOLITE SUPERCAGE

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We are investigating integrated photochemical molecular assemblies for the conversion of solar to chemical energy. In our architecture, a ruthenium polypyridyl complex is tethered to a zeolite membrane via a functionalized ligand, which is encapsulated inside a zeolite supercage. Photoexcitation of the ruthenium dye induces intramolecular electron transfer to the zeolite-encapsulated ligand. Ultimately, this initial charge injection step will be followed by charge transport across the zeolite membrane. As a first step, we have investigated the excited-state dynamics of our chosen photosensitizer molecule,  $[(bpy)_2RuL_{DQ}]^{4+}$  (structure shown in Figure 1), in homogeneous acetonitrile solution. The transient spectra in Figure 1 reveal the ultrafast decay of the initial MLCT state, charge trapping on the diquat end of the  $L_{DQ}$  ligand, and eventual charge recombination. The signals indicate that charge is efficiently transported to the  $L_{DQ}$  ligand on an ultrafast time scale, where it is ready to be transferred to an electron acceptor located within the zeolite framework. Spectroscopic studies of dye molecules encapsulated in zeolite nanocrystals will also be presented.

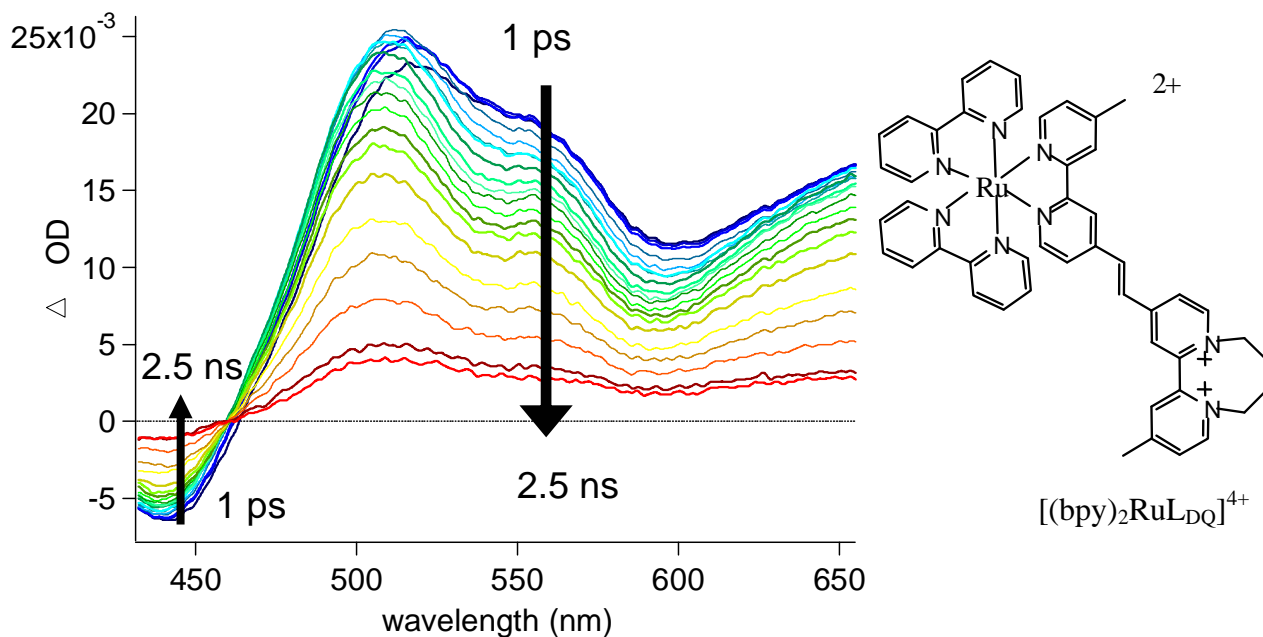


Figure 1