PROTON TRANSFER MECHANISMS OF o-NITROPHENOL OBSERVED BY MeV ULTRAFAST ELECTRON DIFFRACTION

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Excited state intramolecular proton transfer (ESIPT) is key to many important biological mechanisms. However, direct observation of the structural dynamics of ESIPT has been limited given both the required spatial and temporal resolution. The combination of femtosecond temporal resolution and sub-Angstrom spatial resolution possible from mega-electronvolt ultrafast electron diffraction (MeV-UED) make it an ideal method for observing ESIPT. Furthermore, the neighboring -OH and -NO_2 groups on o-nitrophenol are known to undergo proton transfer upon excitation to the lowest singlet state (S_1). Using MeV-UED, the structural dynamics of proton transfer in o-nitrophenol have been resolved following excitation to the S_1 state. In contrast to the S_1 state, higher lying excited states are suspected to follow different relaxation pathways and their structural evolution could provide further insight into the dynamics of ESIPT in o-nitrophenol. This presentation will discuss previous findings of ESIPT following excitation of o-nitrophenol to the S_1 state and will present new findings related to the relaxation dynamics of the S_4 state.