



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI  
SHORT ABSTRACT OF THESIS

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Thesis Title: Anomalous Modulation of Photoinduced Electron Transfer of Coumarin Acceptors in Solvent Mixtures: Effect of Excited-State Hydrogen Bonding

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SHORT ABSTRACT

The thesis describes our results on anomalous fluorescence modulation to illustrate the much debated role of hydrogen bonding on photoinduced electron transfer (PET). We first experimentally confirmed the theoretical prediction that PET becomes facilitated through donor-acceptor H-bonding between coumarin 102 (C102, acceptor) and phenol (donor). Thereafter we showed that PET depends unusually on the mole fraction of H-bond donor (aniline) in a mixture where an additional inert component is present along with the donor. The results may be attributed to possible modulation of polarity or H-bonding environment around the acceptor in the mixture. The anomalous PET behaviour retains even in similar polarity mixture of aniline (AN) and *N,N*-dimethylaniline (DMA) which demonstrates that the effect is primarily due to H-bonding and is discussed in the light of competitive H-bonding concept. Later we also showed that the competitive H-bonding concept can account for the anomalous behaviour of PET for a different H-bonding donor- phenol as well. We have utilized fluorescence up-conversion measurements to detect much more ultrafast H-bond assisted PET of a better electron acceptor coumarin 153 (C153) in AN-cyclohexane mixture.