

Excited State Proton Transfer in Systems of Chemical and Biological Interest

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Some organic chromophores exhibit enhanced acidity or basicity upon electronic excitation. If acidic and basic sites are in close proximity, excitation can lead to excited-state intra-molecular proton transfer (ESIPT). ESIPT has been intensively investigated over five decades because of its fundamental importance and numerous applications. While remarkable results have been achieved, a comprehensive understanding of the photophysics and photochemistry of H-bonded systems is still missing.

Here we present recent results on the excited state dynamics of selected H-bonding systems. By comparing the excited state dynamics of two prototypical intra-molecular H-bonded systems, malonaldehyde and acetylacetone, we show how chemical substitution affects the motion that controls their relaxation dynamics.[1] We then consider a photochemical reaction which usually takes place with low quantum efficiency - ESIPT to carbon atoms in middle-size organic chromophores and delineate the requirements for an efficient reaction with potential new applications.[2] Finally, we focus on the photodynamics of the retinal chromophore-counterion pair in solution and reveal how the inter-molecular H-bonding affects the nonreactive decay of the pair.[3]

[1] R. J. Squibb et al., *Nat. Commun.* **9**, 63 (2018).

[2] J. Novak, A. Prlj, N. Basarić, C. Corminboeuf, N. Došlić, *Chem. Eur. J.* **23**, 8244 (2017).

[3] M. Mališ, J. Novak, G. Zgrablić, F. Parmigiani, N. Došlić, *Phys. Chem.Chem. Phys.* **19**, 25970 (2017).