ELECTRONIC AND INFRARED PHOTODISSOCIATION SPECTROSCOPY OF THE GREEN FLUORESCENT PROTEIN CHROMOPHORE IN VACUO

WYATT ZAGOREC-MARKS, *JILA and the Department of Chemistry, Universityy of Colorado, Boulder, CO, USA*; MADISON M. FOREMAN, J. MATHIAS WEBER, *JILA and Department of Chemistry, University of Coloroado, Boulder, CO, USA*.

The Green Fluorescent Protein (GFP) is one of the most widely used fluorescent markers in bioimaging, and much work has been dedicated to understanding the electronic structure of its anionic chromophore in solution, protein, and in vacuo. A model for this chromophore (deprotonated p-hydroxybenzylidene-2,3-dimethylimidazolinone, HBDI , see Figure 1) contains the complete conjugated system, and replaces the linkers to the protein structure with methyl groups. Previous work by many groups has established that the initial photophysics of the chromophore upon excitation is likely to be similar in the protein and in vacuo, but quite different from aqueous solution.[ab] All previous spectroscopy in vacuo has been performed at room temperature, which introduces spectral congestion through hot bands. By studying this chromophore as a cryogenically prepared, mass-selected ion, we are able to provide unprecedented resolution in the electronic band origin region of the $S_1 \leftarrow S_0$ electronic transition.

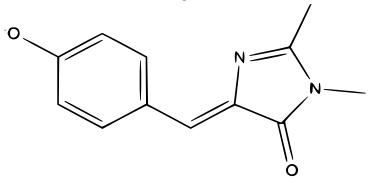

Figure 1: Structure of $HBDI^-$.

[a] S. Brøndsted Nielsen, A. Lapierre, J. U. Andersen, U. V. Pedersen, S. Tomita, L.H. Andersen, Phys. Rev. Lett. 87 (2001) 228102
[b] W. Zagorec-Marks, M. M. Foreman, J. R. R. Verlet, J. M. Weber, J. Phys. Chem. Lett. 10 (2019) 7817-7822