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Exploration of exciton delocalization in organic crystalline thin films[1] KIM HUA, LANE MANNING, NAVEEN RAWAT, VICTORIA AINSWORTH, MADALINA FURIS, Material Science Program and the Department of Physics, University of Vermont — The electronic properties of organic semiconductors play a crucial role in designing new materials for specific applications. Our group recently found evidence for a rotation of molecular planes in phthalocyanines that is responsible for the disappearance of a delocalized exciton in these systems for T >150K.....()().....[1] In this study, we attempt to tune the exciton delocalization of small organic molecules using strain effects and alloying different molecules in the same family. The exciton behavior is monitored using time- and polarization resolved photolumniscence (PL) spectroscopy as a function of temperature. Specifically, organic crystalline thin films of octabutoxy phthalocyanine (H_2OBPc), octyloxy phthalocyanines and H-bonded semiconductors such as the quinacridone and indigo derivatives are deposited on flexible substrates (i.e. Kapton and PEN) using an in-house developed pen-writing method.....[2] that results in crystalline films with macroscopic long range order. The room temperature PL studies show redshift and changes in polarization upon bending of the film. Crystalline thin films of alloyed H_2OBPc and octabutoxy naphthalocyanine with ratios ranging from 1:1 to 100:1 fabricated on both sapphire and flexible substrates are also explored using the same PL spectroscopy to elucidate the behaviors of delocalized excitons. .[1]N. Rawat, et al., J Phys Chem Lett **6**, 1834 (2015). [2]R. L. Headrick, et al., Applied Physics Letters **92**, 063302 (2008).

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