Abstract Submitted
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Polarization-resolved optical spectroscopy imaging of electronic states in crystalline organic semiconductors thin films[1] Z. PAN, I. COUR, M. SUTTON, R. L. HEADRICK, M. FURIS, University of Vermont, Physics Department and Material Science Program Burlington VT 05405 — We present linear dichroism imaging and polarization-resolved photoluminescence (PL) studies of small molecule organic semiconductor thin films with large crystalline grains. Solution processable, and metal-free phthalocyanine (Pc) films, deposited on different substrates using a pen-writing technique [1], exhibit large linear dichroism and optical activity at the HOMO-LUMO gap, that results from stacking of molecules in columns oriented in the plane of the substrate. The orientation of individual grains is unambiguously resolved through polarization spectroscopy and x-ray diffraction. The latter confirms the crystalline orthorhombic (Pc) phase of the deposited film. Photoluminescence from individual Pc grains is resonant to the lowest energy absorption feature in the Q-band and exhibits a large degree of linear polarization (50 %), in contrast to the luminescence from Pc molecules dispersed in chloroform. This polarization is a direct consequence of the long range ordering of the electronic transition dipoles. [1] R. L. Headrick, S. Wo, F. Sansoz, and J. E. Anthony, Appl. Phys. Lett 92, 063302 (2008).

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