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Strain Modified Exciton Emision in Organic Multilayers AJITH DESILVA, Dept of Physics, University of Cincinnati, OH 45221-0011, H.P. WAGNER, Dept of Physics, University of Cincinnati, OH 45221-0011, T.U. KAMPEN, Department of Molecular Physics, Fritz-Haber-Institut der Max-Planck Gesellschaft, 14195 Berlin, Germany — We study the exciton emission in 3,4,9,10-perylene tetracarboxylic dianhydride (PTCDA) films and in PTCDA/ aluminum-tris- hydroxyqinoline (Alq_3) multilayers by analyzing the photoluminescence (PL) spectrum at temperatures between 10 and 300 K. In multilayers we observe a strain modified charge transfer exciton (CTE) emission while the indirect Frenkel exciton transition is not strongly affected. The PL intensity enhancement and the red shift of the CTE emission in attributed to tilted PTCDA crystallites within the multilayer structure due to compressive strain fields that increase the CTE trapping probability and binding energy. This assignment is supported by x-ray diffraction that reveals an increase of out of plane disorder of PTCDA molecules in the multilayer structure. Furthermore uniaxial strain dependent PL measurements on pure PTCDA films show similar strain modifications of the CTE emission as observed in multilayer structures.

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