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Exciton absorption in thin PTCDA and PTCDA/Alq3 multilayers V.R. GANGILENKA, Dept. of Physics, Unversity of Cincinnati, OH 45221-0011, AJITH DESILVA, Dept. of Physics, University of Cincinnati, OH 45221-0011, H.P. WAGNER, Dept. of Physics, University of Cincinnati, OH 45221-0011 — We investigate the absorption of Frenkel excitons in crystalline PTCDA thin films and PTCDA/Alq3 multilayers in the temperature range from 10 to 300 K by optical transmission spectroscopy. The organic nanostructures are fabricated under high vacuum using organic molecular beam deposition. The measurements provide information about microscopic interactions between molecules, the coupling of Frenkel excitons with various vibronic states and possible strain fields within different organic films. Of particular interest are absorption changes in the PTCDA/Alq3 multilayers. Compared to pure PTCDA films the 0-0 vibronic transition in multilayer structures is shifted to lower energy by 10 meV and the whole absorption spectrum is shifted to higher energy by 20 meV. The observed energy shifts are mainly attributed to strain fields present in multilayered films. Other reasons might be dielectric effects and/or exciton confinement within the nanometer thick PTCDA layers.

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