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Exciton Emission in PTCDA Thin Films under Uniaxial Pressure A. DESILVA, V.R. GANGILENKA, H.P. WAGNER, Department of Physics, University of Cincinnati, Cincinnati, Ohio 45221-0011, USA, R.E. TALLMAN, B.A. WEINSTEIN, Department of Physics, SUNY at Buffalo, NY 14260-1500, USA , R. SCHOLZ, Institut für Physik, Technische Universität Chemnitz, 09107 Chemnitz, Germany — We study the strain dependent photoluminescence (PL) of a 90 nm thick polycrystalline PTCDA film on Si(001) between 20 and 300 K. Uniaxial pressure up to 1 kbar is applied along the molecular stacking direction using a home made pressure cell. With increasing pressure we find a quenching of the total PL intensity which is mainly attributed to the creation of defects. At low temperature the charge transfer exciton emission (CT2) gains intensity relative to the Frenkel exciton emission. Furthermore the CT2 transition reveals a shift to lower energies by approximately 5 meV. At room temperature the PL is dominated by the excimer transition which shows a redshift of 5 meV at highest uniaxial pressure. The increase of the CT2 transition at low temperature and the redshift of the emission bands are attributed to an increased exciton trapping probability and enhanced binding energy with reduced distance between stacked molecules.

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