

Abstract Submitted  
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**Optical properties of pentacene clusters and ultra-thin films (\*)**

RUI HE, Columbia Univ, NANCY G. TASSI, GRACIELA B. BLANCHET, Dupont, Central Research and Development, ARON PINCZUK, Columbia Univ, Bell Labs — Photoluminescence spectra of pentacene clusters and films of few monolayer in thickness reveal two fundamental excitations that are assigned to the Davydov doublets of the lowest singlet exciton. While the energy splittings of the doublets have minor dependence on cluster thickness, their bandwidths become narrower as the pentacene clusters grow larger and into continuous ultra-thin films. The marked similarity of these Davydov doublets to those in optical absorption spectra of thicker pentacene films and crystals suggests a similarity in molecular arrangements. Luminescence of self-trapped excitons is quenched in the few monolayer clusters and ultra-thin films. Asymmetric 0-0 and 1-0 resonance Raman scattering excitation profiles are observed in these samples. (\*) Supported primarily by the Nanoscale Science and Engineering Initiative of the NSF under NSF Award Number CHE- 0117752 and by the NYSTAR, and by a research grant of the W. M. Keck Foundation. We thank I. Dujovne and C. F. Hirjibehedin for their helpful discussions.

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