

Abstract Submitted
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Narrow Band Tails in Organic Semiconductor Crystals C. KRELLNER, S. HAAS, D. J. GUNDLACH, B. BATLOGG, ETH Zurich, Switzerland — In order to study the electronic states in the bulk of high quality organic semiconductor crystals, we have applied the technique of temperature-dependent SCLC measurements. The result is a quantitative density of states curve extending from typically 0.5 eV to (0.05–0.1) eV above the valence band mobility edge. We have studied dozens of crystals of pentacene, rubrene and related compounds, and find in the purest samples a very low DOS in the range of $10^{15}\text{cm}^{-3}\text{eV}^{-1}$ and a characteristic exponential distribution parameter of ~ 180 meV. Close to the mobility edge, a rapidly rising DOS is found with a narrow typical energy of ~ 10 meV. Extrapolated to the mobility edge, these curves meet the DOS derived from electronic structure calculations. The band tails are significantly narrower than in amorphous Si:H, or derived for pentacene in previous measurements, where surface or interface effects might play a significant role.

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