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X-ray topography and high resolution diffraction of single-crystal rubrene B.D. CHAPMAN, R. PINDAK, NSLS, Brookhaven National Laboratory, T. SIEGRIST, C. KLOC, Bell Laboratories, Lucent Technologies — Assessing the fundamental limits of the charge carrier mobilities in organic semiconductors is an important step in optimizing organic-based electronic devices. Rubrene is an interesting organic semiconductor material with high charge carrier mobility. Improved characterization of the crystalline quality of rubrene is expected to lead to a better understanding of the role of defects on charge transport. Here, we present x-ray topography and high resolution diffraction measurements of high mobility single-crystal rubrene. The topographs reveal many features commonly found in self-nucleated inorganic crystals and they provide important information about the character and distribution of crystallographic defects. In addition, we find significant differences in the topographs of organic crystals that appear equivalent under optical polarization analysis. We demonstrate that x-ray topography is a suitable tool for the optimization of organic crystal growth. We also present complementary AFM and preliminary surface x-ray diffraction measurements of single-crystal rubrene.

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