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Electronic Structure of Single Crystal α-Perylene S. J. POOKPANRATANA, National Institute of Standards and Technology, K. P. GOETZ[1], Wake Forest University, R. OVSYANNIKOV, E. GIANGRISOSTOMI, Helmholtz-Zentrum Berlin fr Materialien und Energie, Germany, E. G. BITTLE, National Institute of Standards and Technology, O. D. JURCHESCU, Wake Forest University, S. W. ROBEY, C. A. HACKER, National Institute of Standards and Technology — In organic electronics, the highest estimated charge mobility in a device is typically achieved when the organic semiconductor is a single crystal. However, the measurement of the electronic and chemical structure of organic single crystals by photoemission lags far behind of the thin-film counterpart. The measurement challenge is due to two reasons: the insulating nature of the crystal surface and relatively small size of the crystals (millimeter to a few hundred micrometers). X-ray and ultraviolet-based photoemission measurements are achievable on single crystal α-perylene with measurement assistance from a blue light emitting laser to enhance photoconductivity of the crystal surface. We are able to clearly resolve multiple highest molecular orbitals and determine the ionization energy of α-perylene. We are able to obtain high-resolution C 1s spectrum which we can clearly distinguish contribution from carbon atoms in the two inequivalent sites and shake-up satellite features. Electronic "band" structure measurements of α-perylene are realized using a novel angle-resolved time-of-flight electron spectrometer and the complete α-perylene electronic structure and impact on electrical performance will be discussed.

[1]Present affiliation: Universitt Heidelberg, Germany

Emily G. Bittle
Engineering Physics Division, National Institute of Standards and Technology

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