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Molecular and electronic structure at C_{60}:pentacene interfaces
S.W. ROBEY, D.B. DOUGHERTY, NIST-Gaithersburg, W. JIN, W.G. CULLEN, G.J. DUTTON, J.E. REUTT-ROBEY, University of Maryland — Successful utilization of organic donor-acceptor systems for photovoltaic applications requires understanding factors controlling molecular and electronic structure at interfaces. We have used STM, STS, and photoemission to study the donor- acceptor system C_{60}:pentacene. At low coverage, C_{60} deposited on a well-ordered pentacene bilayer structure on Ag (111) adsorbs in between two adjacent pentacene rows. Isolated C_{60} molecules are easily observed at room temperature indicating that the mobility of C_{60} on pentacene is significantly smaller than on metal surfaces. Some images of C_{60} reveal structure that may indicate a preferred C_{60} orientation. Electrostatic contributions to intermolecular interactions are discussed to help explain C_{60} adsorption between pentacene molecules. With increasing coverage, C_{60} forms linear chains, still locked to underlying pentacene rows. A further increase in coverage results in domains of disordered C_{60} that we propose result from competing C_{60}-C_{60} and C_{60}-pentacene interactions. Information on nanoscale transport gaps and band alignment was obtained using constant-current distance-voltage spectroscopy. A gap of 4.5 eV is found over the linear C_{60} chains compared with a gap of 3.6 eV for the surounding pentacene bilayer.

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