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Coverage dependent supramolecular structures: 2D phases of C_{60} :ACA monolayers on Ag(111)¹ BO XU, CHENGGANG TAO, ELLEN WILLIAMS, JANICE REUTT-ROBEY, University of Maryland — The dependence of supramolecular structures on fractional molecular coverage in a 2-component ad-layer has been investigated using scanning tunneling microscopy. A series of acridine-9-carboxylic acid (ACA) surface structures emerges sequentially when deposited on Ag(111) at room temperature. At low molecular coverage ($\theta < 0.4ML$), ACA forms a two-dimensional gas phase. Ordered ACA structures appear with increased coverage: firstly a chain structure composed of ACA molecules linked by O–H · · · N hydrogen bonds ($\theta > 0.4ML$), then a dimer structure composed of ACA dimers linked by carboxyl-carboxyl hydrogen bonds ($\theta \sim 1.0ML$). The structures of the C_{60} :ACA binary system depend on the coverage of pre-deposited ACA. When the initial ACA coverage is between 0.4 ML and 0.8 ML, subsequent C_{60} deposition results in a hexagonal cooperative structure with C_{60} period nearly three times as large as the normal C_{60} 2-D packing of 1 nm, and exists in enantiopure domains. A C_{60} quasi-chain structure is formed when the initial ACA coverage is above 0.8 ML. Parallel C_{60} chains are separated in space by the ACA dimer structure. Chemically reasonable molecular packing model are presented based on the observed STM images.

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Bo Xu
University of Maryland

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