

Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Coverage dependent supramolecular structures: 2D phases of C₆₀: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 C₆₀: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 C₆₀ deposition results in a hexagonal cooperative structure with C₆₀ period nearly three times as large as the normal C₆₀ 2-D packing of 1 nm, and exists in enantiopure domains. A C₆₀ quasi-chain structure is formed when the initial ACA coverage is above 0.8 ML. Parallel C₆₀ chains are separated in space by the ACA dimer structure. Chemically reasonable molecular packing model are presented based on the observed STM images.

¹This work is supported by NSF under the MRSEC grant DMR0520471.

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Date submitted: 28 Nov 2005

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