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Isotropic interfaces in a structurally anisotropic organic thin film[1]

C. G. TAO[2], Q. LIU, B. RIDDICK, W. G. CULLEN, D. EVANS, J. REUTT-ROBEY, J. D. WEEKS, E. D. WILLIAMS, University of Maryland — We investigate the interfacial boundary fluctuations of Acridine-9-Carboxylic Acid (ACA) deposited on Ag(111) using UHV STM. The ACA molecule is anisotropic in shape and intermolecular interactions, and has been shown to exhibit a disordered 2D gas phase on Ag(111) at low coverage[3]. At higher coverage, the molecules arrange in domains of ordered chain-like structures which coexist with the disordered phase. We measure the real-time fluctuations at the phase boundaries, and show that these fluctuations are governed by molecular exchange between the two phases. Due to structural anisotropy, there are two types of domain boundaries with significantly different molecular interactions. Surprisingly, the fluctuation magnitudes, mobilities, and free energies are nearly equal for the two boundary types. A lattice-gas statistical model is presented which includes the influence of molecular conformations on substrate interactions, and reproduces the essential features observed experimentally: domain shapes, boundary fluctuations, and phase densities.

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[3]B. Xu et al., J. Phys. Chem. B 110, 1271 (2006)

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