Abstract Submitted
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Impurity Decoration for Crystal Shape Control: C_{60} on Ag(111)[1]

T.J. STASEVICH[2], C.G. TAO, W.G. CULLEN, E.D. WILLIAMS, T.L. EINSTEIN, U. of Maryland, College Park — The decoration of hexagonal Ag/Ag(111) monolayer islands by chains of C_{60}, observed via STM at 300K, dramatically changes their shape and fluctuations. We tune coverage so that a single C_{60} chain fully decorates each Ag island boundary.[3] The C_{60}-induced rounding appears due to competing energetic and entropic effects.[4] We estimate the Ag - C_{60} and C_{60} - C_{60} attractions as $\sim$0.13 eV and $\sim$0.04 eV, respectively.[5] The edge fluctuations are remarkable: 1) C_{60} decoration does not notably impede the step-edge diffusion (SED) and 2) while the bare-island fluctuations are driven by SED, the decorated island has the signature of non-conserved dynamics, even though the C_{60}s remain at the island edge. We suggest that rapidly diffusing Ag atoms randomly attracting the nearby C_{60}s. Generalizations of our model show that both spherical and rectangular decorating molecules will similarly lower the energy of highly-kinked boundaries, leading to similar island shape changes.

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[2]TJS now at LRBGE, NCI, NIH; CGT at U. Cal. Berkeley
[3]C.G. Tao et al., PRB 73, 125436 (2006); Nano Letters 7, 1495 (2007).
[4]T.J. Stasevich & TLE, (SIAM) Multiscale Model. Simul. 6, 90 (2007)
[5]T.J. Stasevich et al., submitted.

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