

Progress in Application of Generalized Wigner Distribution to Growth and Other Problems
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Role of Transient Mobility on Submonolayer Island Growth: Extensions and Testing¹ JOSUE MORALES CIFUENTES, THEODORE EINSTEIN, Univ of Maryland-College Park, ALBERTO PIMPINELLI, Rice Quantum Institute — In studies of epitaxial growth a major goal is assessing the smallest stable cluster ($i+1$ monomers, with i the critical nucleus size), by analyzing the capture zone distribution (CZD) or the scaling of incident flux F to the density of stable islands N ($N \propto F^\alpha$, with α the growth exponent). As noted in the previous talk, the GWD has well described the data in several experiments, including submonolayer para-hexaphenyl (6P) on amorphous mica ($i \approx 3$). Different scaling (F^α) for 6P at (small) large F is attributed to (DLA) ALA dynamics, i.e. $i = (5)7 \pm 2$.² Our recent theoretical work considered monomers propagating ballistically before thermalizing or attaching to islands, leading to scaling, non-monotonic crossover, and activation energies that account for the data and reconciling the values of i .³ We present applications to other experimental systems: 6P on SiO₂ and pentacene (5A) on amorphous mica. We describe useful simplifying approximations, and preliminary kinetic Monte Carlo simulations including transient effects on growth.

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²L. Tumbek A. Winkler, Surf. Sci. 606, L55 (2012)

³J. R. Morales-Cifuentes, T. L. Einstein, and A. Pimpinelli. Phys. Rev. Lett. 113, 246101 (2014)

Josue Morales Cifuentes
Univ of Maryland-College Park

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