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How Hot Precursor Modify Island Nucleation: A Rate-Equation Model[1] JOSUE MORALES-CIFUENTES, T.L. EINSTEIN, Univ of Maryland-College Park, ALBERTO PIMPINELLI, Rice Quantum Institute — We describe the analysis, based on rate equations, of the hot precursor model mentioned in the previous talk.[2] Two key parameters are the competing times of ballistic monomers decaying into thermalized monomers vs. being captured by an island, which naturally define a "thermalization" scale for the system. We interpret the energies and dimmensionless parameters used in the model, and provide both an implicit analytic solution and a convenient asymptotic approximation. Further analysis reveals novel scaling regimes and nonmonotonic crossovers between them. To test our model, we applied it to experiments on parahexaphenyl (6P) on sputtered mica.[3] With the resulting parameters, the curves derived from our analytic treatment account very well for the data at the 4 different temperatures. The fit shows that the high-flux regime corresponds not to ALA (attachment-limited aggregation) or HMA (hot monomer aggregation) but rather to an intermediate scaling regime related to DLA (diffusion-limited aggregation). We hope this work stimulates further experimental investigations.

[1]Work at UMD supported by NSF CHE 13-05892
[2]J.R. Morales-Cifuentes, T.L. Einstein, & A. Pimpinelli, PRL, in press
[3]L. Tumbek & A. Winkler, Surf. Sci. 606, L55 (2012)

Theodore Einstein
Univ of Maryland-College Park

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