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Reversible submonolayer island nucleation and growth with anomalous diffusion[1] EHSAN SABBAR, JACQUES AMAR, University of Toledo
— Motivated by recent experiments with anomalous diffusion, a general rate-equation (RE) theory of submonolayer island nucleation and growth has been developed [J.G. Amar and M. Semaan, Phys.Rev. E 93, 062805 (2016)] which takes into account the critical island-size i, island fractal dimension d_f, substrate dimension d, and diffusion exponent μ, and good agreement with simulations was found for the case of irreversible growth ($i = 1$) with $d = 2$. Here we present the results of simulations of reversible island growth ($i = d = 2$) which were carried out for both the case of subdiffusion ($\mu < 1$) and superdiffusion ($1 < \mu \leq 2$). In the case of superdiffusion, excellent agreement is obtained with the generalized RE theory for the exponents which describe the scaling of the island and monomer densities with deposition rate. In addition, the exponents do not depend on whether or not monomers remain superdiffusive or are thermalized after detaching from a dimer. In contrast, while there is good agreement with the RE theory for point-islands in the case of subdiffusion, for ramified islands ($d_f \simeq 2$) the exponents are significantly higher than predicted. Some possible explanations for this discrepancy are discussed.

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