Island nucleation and growth with anomalous diffusion in one-dimension

Ehsan H Sabbar, Jacques G Amar

Abstract:

Recently a general rate-equation (RE) theory of submonolayer island nucleation and growth was 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 df, substrate dimension d, and diffusion exponent μ, and good agreement with simulations was found for the case of irreversible growth corresponding to a critical island-size i=1 with d = 2. Here we present the results of simulations carried out in 1D (corresponding to d = 1) of island nucleation and growth with anomalous diffusion which were carried out for both the case of superdiffusion (μ>1) and subdiffusion (μ<1). Excellent agreement is found with the general RE theory for both irreversible growth (i=1) and reversible growth with i=2 for all 0≤μ≤2.