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Strained Islands Evolution during Thin Film Heteroepitaxy with Planar and Pre-patterned Substrates CHAMPIKA GIGIRIWALA GAMAGE, ZHI-FENG HUANG, Wayne State University — Evolution of strained islands or quantum dots is analyzed via constructing a continuum elasticity model based on the second order perturbation theory. The resulting nonlinear dynamic equation for film morphology also incorporates the film-substrate wetting effect. In order to study the formation and evolution of strained islands on a planar substrate for different film-substrate misfit strain, we analyze the time dependent behavior of the structure factor for surface heights, its moments and the surface roughness, and obtain the detailed dynamic process of island coarsening and stabilization. We also study the formation of these nano structures on a nonplanar patterned substrate. The properties of islands formed are highly affected and controlled by the periodicity and amplitude of the pre-defined substrate patterns, as shown in our analytic and numerical results.

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