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Effects of shadowing and steering in oblique-incidence metal growth[1] J.G. AMAR, Y. SHIM, V. BOROVIKOV, University of Toledo — The effects of oblique incidence on the surface morphology in metal (100) epitaxial growth are studied using a simplified model which includes shadowing but not the effects of short-range and long-range attraction of depositing atoms to the surface. Surprisingly, we find that many of the qualitative features observed in oblique incidence Cu(100) growth, including the existence of anisotropy in the submonolayer regime, as well as of a transition from anisotropic mounds to ripples perpendicular to the beam with increasing deposition angle, can be explained primarily by geometrical effects. We also find that the formation of (111) facets is crucial to the development of well-ordered ripples at large angles of incidence. A second transition from ripples oriented perpendicular to the beam to 'rods' with (111) facets oriented parallel to the beam is also found at very high deposition angles and film thicknesses. When the effects of short- and long-range interactions are included in our simulations, we find two main effects. In the submonolayer regime, attraction tends to weaken the effects of shadowing and reduce the submonolayer anisotropy. However, in the multilayer regime 'flux-focusing' due to long-range attraction tends to enhance the anisotropy and reduce the critical thickness/angle for the ripple transition. Near the transition from ripples to rods, sideways attraction also tends to stabilize the isotropic phase as is observed experimentally.

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Jacques Amar
University of Toledo

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