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Facet-edge fluctuations on finite volume crystallites* MASASHI DEGAWA, WILLIAM CULLEN, ELLEN WILLIAMS, Univ. of MD phys dept. MRSEC — Technological demands of the fabrication of nano-structures provide renewed motivation for understanding the atomistic properties that control the morphology changes of nano-structures and nano-crystallites. Using the continuum step model of the thermodynamic correlation function of step fluctuation has proven to be very powerful in such studies. For straight isolated steps on fcc(111) metal surfaces, the principal mass transport mechanism is often found to be periphery diffusion, with time correlations $\sim t^{1/4}$. However with decreasing structure size, issues of finite size and shape effects become non-negligible. When considering facet-edge fluctuations, the normal assumptions of "straight" and "isolated" do not apply. "Straight" is changed to "curved" due to finite size, which results in a KPZ term in the equation of motion. "Isolated" is changed to "restricted" where the amplitude of fluctuation is restricted due to mass conservation, which alters the scaling property of the noise term. Such considerations result in a different universality class of dynamic scaling giving α=1/3, β=1/11 and z=11/3. Here we present results of facet-edge fluctuation measurements on Pb crystallites using scanning tunneling microscopy. Results of the temporal correlation function show an exponent different from $1/4$, of 0.15±0.02 at early times, closer to 2/11 predicted for facet-edge fluctuations. *Supported by the UMD NSF-MRSEC, with originating support from DOE-NNI.

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