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Shape transitions in strained islands: kinetics versus energetics[1]
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— Recently, it has been argued that the shape transition from compact to ramified islands observed experimentally in submonolayer Cu/Ni(100) growth is not due to kinetics but can be understood in terms of energetic arguments. In order to determine the responsible mechanisms we have carried out temperature-accelerated dynamics (TAD) simulations as well as energetics calculations. Surprisingly, our results indicate that the strain-energy contribution to the dependence of island-energy on shape is relatively weak. In contrast, our TAD simulations indicate that unexpected concerted motions occurring at step edges may be responsible. The energy barriers for these concerted motions are significantly lower than for Cu/Cu(100) and Ni/Ni(100), decrease with increasing island size, and appear to saturate for islands larger than 300 - 400 atoms. These results suggest that the shape transition is of kinetic origin but is strongly mediated by strain.

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