

Is step-flow epitaxy ever stable?

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Recent experiments have established that one- and two-dimensional instabilities, bunching and meandering, can coexist during step-flow epitaxy on vicinal surfaces with minimal kinetic pathways, in contrast to the predictions of the standard Burton-Cabrera-Frank (BCF) theory. Indeed, in the BCF framework, meandering requires the Ehrlich-Schwoebel (ES) barrier, whereby adatom attachment to ascending steps is energetically favored, whereas bunching is contingent on the inverse ES effect. Bunching and meandering appear therefore to be a priori mutually exclusive. In this talk, a thermodynamically consistent generalization of the BCF theory is presented that resolves this apparent paradox in the sense that it yields simultaneous bunching and meandering under the assumption of an ES barrier, granted that the equilibrium adatom coverage is sufficiently high.