Single-phase-field model of stepped surfaces
M. Castro, A. Hernández-Machado, R. Cuerno

Abstract— We formulate a phase-field description of step dynamics on vicinal surfaces that makes use of a single dynamical field, at variance with previous analogous works in which two coupled fields are employed, namely, a phase-field proper plus the physical adatom concentration. Within an asymptotic sharp interface limit, our formulation is shown to retrieve the standard Burton-Cabrera-Frank model in the general case of asymmetric attachment coefficients Ehrlich-Schwoebel effect. We confirm our analytical results by means of numerical simulations of our phase-field model. Our present formulation seems particularly well adapted to generalization when additional physical fields are required.

Index Terms— Theory and models of crystal growth; physics of crystal growth, crystal morphology, and orientation, Interface structure and roughness, Molecular, atomic, ion, and chemical beam epitaxy,....

Due to copyright restriction we cannot distribute this content on the web. However, clicking on the next link, authors will be able to distribute to you the full version of the paper:
Request full paper to the authors

If you institution has a electronic subscription to Physical Review E, you can download the paper from the journal website:
Access to the Journal website

Citation: