

Crystal growth cessation revisited: the physical basis of step pinning

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Abstract-

The growth of crystals from solution is a fundamental process of relevance to such diverse areas as X-ray diffraction structural determination and the role of mineralization in living organisms. A key factor determining the dynamics of crystallization is the effect of impurities on step growth. For over 50 years, all discussions of impurity–step interaction have been framed in the context of the Cabrera–Vermilyea (CV) model for step blocking, which has nevertheless proven difficult to validate experimentally. Here we report on extensive computer simulations which clearly falsify the CV model, suggesting a more complex picture. While reducing to the CV result in certain limits, our approach is more widely applicable, encompassing nontrivial impurity–crystal interactions, mobile impurities, and negative growth, among others.

Index Terms-

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