

A COMBINED DISSOCIATIVE AND KICK-OUT DIFFUSION MODEL
WITH CHARGE EFFECTS, PART I: IN-DIFFUSION

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ABSTRACT

In this paper we propose a new model for impurity diffusion in compound semiconductors. The model incorporates both the kick-out and the dissociative mechanism, as well as charge effects; the resulting system includes as limit cases many models that have previously appeared in the literature. An initial-boundary value problem that models surface source in-diffusion conditions is then considered. The model is studied using a combination of asymptotic and numerical techniques. In particular, the transition from dissociative to kick-out behaviour is analysed, with some noteworthy features of the solutions being highlighted in a number of regimes, including a novel class of moving boundary problems.