

# THE ROLE OF MULTIPLE CHARGE STATES IN ZINC DIFFUSION IN GALLIUM ARSENIDE

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## ABSTRACT

In this paper we provide a mathematical analysis of an effect whose significance for the diffusion of zinc in gallium arsenide has recently been indicated. The relevant model is of kick-out type and involves both doubly and triply charged self-interstitials; it can be written as a coupled pair of non-linear diffusion equations. Both numerical and asymptotic results are presented. It is found that the model is capable of reproducing much of the behaviour observed in experimental profiles. The singular perturbation analysis reveals the range of validity of the various regimes, as well as yielding other information about the diffusion processes.