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Understanding Cu migration in CdTe solar cells[1] DA GUO, DANIEL BRINKMAN, RICHARD AKIS, DRAGICA VASILESKA, Arizona State University — In this work, we report on development of one-dimensional (1D) finite-difference and two-dimensional (2D) finite-element diffusion-reaction simulators to investigate mechanisms behind Cu-related metastabilities observed in CdTe solar cells. To achieve such capability, the simulators solve reaction-diffusion equations for the defect states in time-space domain self-consistently with the free carrier transport. Evolution of concentration profile for an arbitrary defect (including drift, diffusion and reaction) is simulated by solving reaction-diffusion equation. In our 2D FEM scheme, anisotropic diffusion model for a single grain boundary is utilized to simulate fast movement of defects in the grain boundaries. For a finite difference mesh with a symmetric grain boundary, this model gives identical discretization to the traditional Fisher model. Results of 1-D and 2-D simulations have been compared to verify the accuracy of solutions. The simulation results from this study give us a deeper understanding of the role of Cu on the performance of CdTe solar cells.

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