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Quantitative model of EBIC for CdTe PAUL HANEY, HEAYOUNG YOON, National Institute for Standards and Technology, PRAKASH KOIRALA, ROBERT COLLINS, U. Toledo, NIKOLAI ZHITENEV, National Institute for Standards and Technology — Electron beam induced current (EBIC) is a powerful characterization technique which offers the high spatial resolution needed to study polycrystalline solar cells. In an EBIC experiment, a beam of high energy electrons excites electron-hole pairs, some fraction of which are collected by contacts. Ideally, an EBIC measurement reflects the spatially resolved quantum efficiency of the device. However, experiments on polycrystalline CdTe solar cells reveal that the EBIC collection efficiency is substantially lower than the quantum efficiency of the device under optical excitation. In order to reliably extract intrinsic material properties from EBIC signals, this difference must be reconciled. Two important differences between an EBIC experiment and normal device operation are: 1. the high generation rate density associated with the electron beam, and 2. the substantial effect of the exposed surface in an EBIC experiment. By developing numerical and analytical models which account for both of these effects, the difference in the material response under EBIC and normal device operation conditions can be understood. Comparison between the model and experiment show good agreement between quantities such as maximum EBIC collection efficiency versus charge generation rate.

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