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Carrier compensation in semi-insulating CdTe[1] MAO-HUA DU, DAVID SINGH, Materials Science & Technology Division and Center for Radiation Detection Materials and Systems, Oak Ridge National Laboratory — Carrier compensation in semi-insulating CdTe has been attributed to the compensation of surplus shallow acceptors by deep donors, usually assumed to be Te antisites. However, our first-principles calculations show that intrinsic defects should not have a significant effect on the carrier compensation due either to lack of deep levels near midgap or to low defect concentration. We demonstrate that an extrinsic defect, O_{Te}-H complex, may play an important role in the carrier compensation in CdTe because of its amphoteric character and reasonably high concentration. Our findings have important consequences for improving device performance in CdTe-based radiation detectors.

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