HL 14: Invited Talk: Karl W. Böer

Time: Monday 13:00–13:30 Location: POT 06

Invited Talk HL 14.1 Mon 13:00 POT 06

Why does a thin Layer of CdS on top of CdTe, and other thin-film solar cells improve their efficiency dramatically — •Karl W. Boer — Physics and Astronomy, Newark DE 19716

Karl W. Boer, University of Delaware When changing the bias from forward to Voc , the field at the CdS side of the CdS/CdTe junction increases. When it reaches the threshold of field-quenching the hole density increases while the electron density decreases, and the electron conductivity in CdS decreases with further shifting bias, i.e. with the increasing field. For reasons of the minimum entropy principle, a high-field domain must appear and absorbs the additional voltage drop. This limits the field at the junction interface to * 50 kV/cm, that is below the tunneling field. It thereby reduces junction leaking. With field quenching, the Fermi level moves further away from the conduction band, and this band must disconnect at the interface from the conduction band of the CdTe. This requires a change in the electron affinity as a function of bias. A similar change of the work function from a blocking contact of CdS as function of the conductivity has been observed, supporting this assumption. In forward bias the two conduction bands seem to be connected, easing the electron flux from CdS into CdTe. With reduced leakage Voc and FF is increased, explaining the observed improvement of the efficiency of the CdS/CdTe solar cell.