

## **ZnO thickness and ZnTe back contact effect of CdTe thin film solar cell Voc and efficiency progression**

### **ABSTRACT**

CdTe thin film (TF)solar cells are most promising photovoltaic (PV)technology in commercial platform. Back contacts and interface defects related opto-electrical losses are still vital to limit its further technological benefit. TF PV cells shallow recombination and parasitic loss lessening purpose carrier selective back contact with band matching window layers are essential. Beside that back and front contact thickness choice is vital for field associated selective carrier collection and generous optical transmission into the active junction of the cell. It can make variation of cell efficiency. Window and front contact layers band edge variation and back contact thickness effect is analyzed by SCAPS-1D simulation software. ZnO and SnO<sub>2</sub> front contact for CdS and CdSe window layers effect are numerically studied for 1 μm CdTe thin film PV cell. Significance of materials for front contact and its thickness effect on current density while ZnTe back surface field contact thickness effect on open circuit voltage and efficiency are demonstrated. Finally, ZnO/CdS/CdTe/ZnTe cell of 0.925 V open circuit voltage and 19.06% efficiency has been achieved for 90 nm of ZnTe with Molybdenum (Mo) back contact.