Abstract Submitted
for the OSF13 Meeting of
The American Physical Society

Research Efforts on Thin-film Solar Cells[1] ALEX CIMAROLI, NABA PAUDEL, TEJAS PRABHAKAR, YUE YU, CHUANXIAO XIAO, COREY GRICE, JIE GE, YANFA YAN, University of Toledo — Thin film solar cells and earth-abundant, thin-film solar cells can help to reduce the cost of manufacturing solar panels. Close-space sublimation (CSS) is used to grow CdTe and ZnP thin films. CSS is a cheap and scalable approach to thin-film growth. CSS-grown CdTe solar cells have achieved in-lab efficiencies of 15.8%, which is higher than that of sputter-deposited CdTe (14.5%). ZnP is an earth-abundant absorber layer material that has favorable optical and electronic properties. It is difficult to make a good junction with ZnP since it cannot be doped n-type. CZTS is an earth-abundant, non-toxic absorber layer material with a tunable band gap. Spray pyrolysis is used as a cost-effective approach to make superstrate-type devices with CdS or ZnS as the window layer. CuSbS is a new material to be used as an absorber layer. Sputter-deposited films have achieved an efficiency of 0.32% thus far. Sputter-deposited InO is studied as a front contact material. When grown in a hydrogen ambient, films have been fabricated with 85% transmission, $\sim 10\text{cm}^{-3}$ carrier concentration, and ~ 20 cm/V-s mobility. Thin metal oxides have been studied as candidates to replace Cu as the back contact to CdTe solar cells. They may help to improve the stability of CdTe solar cells. The best candidate is $\text{MoO}_{-\text{x}}$/Au.

[1]U.S. Department of Energy SunShot program under contract No. 0492-1662, National Science Foundation under contract No. 1230246, ENN Solar Inc. and the Ohio Research Scholar Program (ORSP)

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Date submitted: 13 Sep 2013 Electronic form version 1.4