Abstract Submitted
for the TSF16 Meeting of
The American Physical Society

**Electrical characterization of carrier transport properties in CZTSe solar cells** ISTVAN GULYAS, Texas State University, INGRID REPINS, National Renewable Energy Laboratory , JIAN LI, Texas State University — We report measurement of majority carrier concentration, depletion width, mobility, and resistivity in thin-film copper-zinc-tin-selenide (CZTSe) photovoltaic devices. The transport properties of carriers were measured using coordinated admittance spectroscopy and capacitance-voltage techniques in the dark. The depletion width and carrier density are calculated from capacitance-voltage data taken at a range of temperatures. The bias voltage dependence of the modified dielectric relaxation in the absorber of the CZTSe solar cell is also investigated to determine mobility and resistivity. The inflection frequency due to dielectric relaxation is extracted from admittance spectroscopy data. The mobility and resistivity are calculated from the slope of the linear relationship between the square of the freeze-out frequency and the bias voltage, based on a lumped-parameter equivalent-circuit model. We also examine the temperature dependence of the mobility and resistivity. We calculate the activation energy due to mobility and compare it to the activation energy obtained using conventional admittance spectroscopy. This investigation may help understanding the band tail phenomena and/or the potential barrier due to grain boundaries in polycrystalline CZTSe.

Istvan Gulyas
Texas State University

Date submitted: 27 Sep 2016 Electronic form version 1.4