Abstract Submitted
for the NES17 Meeting of
The American Physical Society

Cross-Sectional NanoscaleMapping of PoilycrystallineSilicon Solar Cell Performance ALEXANDRA J. LONGACRE, University of Connecticut — A challenge for approaching theoretical efficiency limits in polycrystalline Si solar cells is recombination at grain boundaries and back electrode contacts. This work employs conductive Atomic Force Microscopy to measure and map the topography and current pathways in cross sections of Si solar cells. Current is measured through the probe during in situ illumination up to 1 sun, providing nanoscale resolution of microstructural features and their photoconductive response. Applying such pcAFM reveals the distinct cell components (top electrode, front surface structuring, Si absorber, distinct facets, and back electrode). Performing these measurements as a function of bias further enables analysis of traditional photovoltaic performance metrics such as I SC and V OC . Back Surface Field (BSF) and Passivated Emitter and Rear Contact (PERC) solar cells are investigated. Ultimately this project aims to measure differences in the back contact properties as a function of processing and accelerated aging conditions to inform and ultimately improve solar cell lifetime predictions and efficiencies.

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Date submitted: 29 Mar 2017 Electronic form version 1.4