MAR17-2016-002089

Abstract for an Invited Paper
for the MAR17 Meeting of
the American Physical Society

**Functional imaging of photovoltaic materials**[1]

MARINA LEITE, Univ of Maryland-College Park

For the past two decades, extensive efforts have been made to increase the short-circuit current (Jsc) of non-epitaxial solar cells to achieve higher efficiency devices. Yet, improvements in the overall device performance are still limited by the open-circuit voltage (Voc). We address this critical limiting factor of all promising materials for photovoltaics by realizing a novel nanoscale imaging platform with unprecedented spatial resolution (<100 nm), based on a variant of Kelvin-probe force microscopy. We mapped the local Voc of a variety of inorganic materials, and measured local changes >150 mV in CIGS, not resolved by conventional electrical measurements. To identify the origin of the instability frequently observed in perovskite solar cells, we leveraged our recently developed method to scan one frame in 16 seconds to spatially and temporally resolve their photo-voltage. Surprisingly, we observed local and reversible changes in the Voc of the devices upon post-illumination treatments. Our innovative functional imaging is non destructive and can be applied to other optoelectronic devices, such as LEDs and photodetectors.

[1]The author acknowledge APS and NSF (Award 16-10833) for funding.