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Applications of scanning Kelvin probe microscopy in the characterization of photovoltaic materials and devices CHUNSHENG JIANG, HELIO MOUTINHO, MOWAFAK AL-JASSIM, NATIONAL RENEWABLE ENERGY LABORATORY TEAM — We have in recent years developed scanning Kelvin probe microscopy (SKPM), and applied this nanometer resolution technique to the characterization of III-V-, II-VI-, and thin film Si-based single- and multi-junction solar cell devices. In this presentation, we will report our improvements of the SKPM technique and show three examples of the potential measurements. We will first show a Bi-incorporation-induced junction movement in a MBE-grown single-junction GaInNAs cell. This junction movement caused significant device degradation, especially in the short wavelength range. We then present potential distributions among the top and bottom junctions in a GaInP₂/GaAs tandem-junction cell. A light-induced potential flattening in the top junction and a potential accumulation in the bottom junction was clearly measured. Lastly, we will show a non-uniform distribution of the electric field across an a-Si:H $n-i-p$ junction, and this electric field was significantly improved by depositing buffer layers at the n/i and i/p interfaces.

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