4CF10-2010-000206

Abstract for an Invited Paper
for the 4CF10 Meeting of
the American Physical Society

Peering into the heart of a solar cell[1]

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In recent years, low-cost solar cell technologies have taken major strides, emerging out of the research laboratory into the marketplace. Still, a great deal of work remains to understand the electronic properties of these rather imperfect, non-single-crystalline materials, and improve the efficiencies of devices. We have been working to extract quantitative information about fundamental electronic properties of semiconductor-based solar cell devices from scanning electron microscopy and scanning probe microscopy images. These include the exact location of the p-n junction, the depletion region width, and the existence of depletion regions near certain grain boundaries. From these studies arise interesting questions about our fundamental understanding of the interaction of a probe with the semiconductor surface, while our results also contribute to the practical application of these techniques in understanding, and improving, the electronic properties of solar cells.

[1]We are grateful for funding from the Donors of the American Chemical Society Petroleum Research Fund and the U.S. Department of Energy under Contract No. DE-AC36-08GO28308 with the National Renewable Energy Laboratory.