Small defects mean big problems for industrial solar cells

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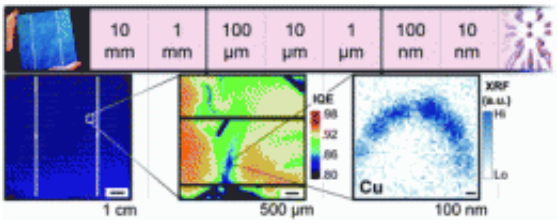

High-resolution X-ray nanofluorescence spectroscopy identifying metallic nanoclusters responsible for poor transport in solar cells.

Nanoscale clustering of metal impurities at intragranular dislocations within industrial mc-Si solar cells have been observed by users from the Massachusetts Institute of Technology working with the Center for Nanoscale Materials (CNM) X-Ray Microscopy Group, in collaboration with scientists at the Advanced Photon Source (APS).

These nanoscale clusters are shown to directly correlate with local recombination activity within the cell, regulating the overall performance of the energy conversion device.

Industrial conversion efficiencies of solar cells are far from their theoretical maxima, and their performance is often limited by inhomogeneously distributed nanoscale defects. The team used X-ray nanofluorescence spectroscopy at the Hard X-Ray Nanoprobe beamline to probe the elemental nature of recombination-active intragranular

dislocations in industrial solar cells.

Nanoscale metal impurities of copper and iron were shown to cluster near dislocations with a high recombination strength, and be absent from dislocations with a low recombination strength. This correlation gives an important insight into the effects of nanoscale metal impurities on energy conversion device performance.

More information: M.I. Bertoni et al., "Nanoprobe X-Ray fluorescence characterization of defects in large-area solar cells," Energy Environ. Sci, 4, 4252-4257 (2011) DOI: 10.1039/C1EE02083H

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