Investigation of Radiation Tolerance and Elemental Migration in Perovskite Solar Cells

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Abstract:

Perovskite solar cells (PSCs) have attracted interest in recent years due to their potential for both terrestrial and space applications. It is crucial to investigate their performance in the context of stressors such as radiation and environmental aging. Ion beam techniques, such as Rutherford backscattering spectrometry (RBS), provide a useful non-destructive approach for examining the elemental depth profile of multilayered PSCs, revealing the interdiffusion of various elemental species across interfaces. RBS can be simultaneously utilized to analyze the radiation effects induced by the He^+ beam on the device, given their presence in space orbits, as well as simulated equivalent radiation effects due to protons, typically used by the space-PV community for radiation tolerance testing. This presentation will feature our recent research on ion beam irradiation and in-situ analysis of PSCs, conducted at the versatile ion accelerator facility at the University of North Texas. The work was advanced through extensive collaboration with key US-based institutions, including the University at Buffalo, the University of Toledo, Arizona State University, the Rochester Institute of Technology, the National Renewable Energy Laboratory (NREL), and the National Aeronautics and Space Administration (NASA).

Conflicts of Interest

No conflict of interest.

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