Major degradation pathways of perovskite absorber materials and solar cells under simulated space environments

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Abstract:

Perovskite solar cells (PSCs) have achieved remarkable progress in power conversion efficiency, with certified values exceeding 27% for the best single-junction devices. The discovery of extreme radiation hardness of PSCs featured their significant potential for space applications, particularly considering impressive power-to-weight ratios demonstrated for these devices. However, the harsh operational conditions in Earth orbit – far more extreme than terrestrial environments - demand stringent stability requirements for PSCs.

In this presentation, we will summarize our systematic study of a panel of perovskite absorber materials and fully assembled PSC, focusing on their stability under simulated orbital conditions. Our study evaluates the effects of the key stress factors, including UV light exposure, different types of ionizing radiation and temperature cycling. The dominant degradation mechanisms will be discussed and potential mitigation strategies to enhance device resilience will be proposed.

Conflicts of Interest

The authors declare no conflict of interest.

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