

[Energy Distinguished Lecture Series]

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Perovskite solar cells for space applications

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Abstract

Perovskite solar cells (PSCs) have attracted significant attention as promising photovoltaic technologies for space applications due to their high power-to-weight ratio, excellent radiation tolerance, low-temperature processing, and compatibility with flexible substrates. In particular, their high specific power offers a major advantage for small satellites and lightweight space platforms, where launch mass and available surface area are strongly limited. However, practical deployment in low-Earth orbit requires reliable operation under harsh environmental conditions, including vacuum, extreme thermal cycling, ultraviolet irradiation, and high-energy proton and electron exposure. This work discusses the potential of perovskite solar cells for space power generation, with particular emphasis on device performance under AM0 illumination, radiation-induced degradation, thermal stability, and encapsulation strategies. Recent progress in compositional engineering, interface modification, and mechanically robust device architectures is also reviewed. These advances indicate that perovskite solar cells could become a competitive next-generation power source for CubeSats and other future space missions.

Brief Bio



Gi-Hwan Kim is currently an Associate Professor in the School of Materials Science and Engineering (Polymer Engineering) at Gyeongsang National University, located in Jinju, Gyeongsangnam-do, Korea. He earned his M.S. and Ph.D. in Energy and Chemical Engineering from the Ulsan National Institute of Science and Technology (UNIST) under the guidance of Prof. Jin Young Kim. He then conducted postdoctoral research in the Department of Electrical and Computer Engineering at the University of Toronto, Canada, working under Prof. Edward H. Sargent. Upon returning to Korea, he served as a Senior Researcher at the Korea Photonics Technology Institute (KOPTI) in Gwangju. Building on this experience, he now continues his research and teaching as an Associate Professor at Gyeongsang National University.

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