Paper ID: 68412
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student

IAF SPACE POWER SYMPOSIUM (C3)
Advanced Space Power Technologies (3)

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APPLICATION OF HIGHLY EFFICIENT AND FLEXIBLE METAL HALIDE PEROVSKITE SOLAR CELLS FOR LOW INTENSITY CUBESAT MISSIONS

Abstract

The amount of power consumed in a regular CubeSat mission varies with it's operational characteristics. Irrespective of the size of the CubeSat, this power must be managed and moderated. Extending the lifetime is not only economical but also a sustainable effort. It is done by upgrading the power systems and ensuring that the load on the system is cut down to a marginal amount. To address these aforementioned problems, third-generation solar cells (able to overcome the Shockley-Queisser limit) are to be employed, which focus on state-of-the-art materials, unconventional architectures, and cheaper manufacturing techniques.

The paper proposes the use of versatile Metal Halide Perovskite Solar Cells (MHPSC) for CubeSat missions that reflect the existing potential of all transpiring technologies. The materials can absorb more energy from the blue end of the spectrum to harness the sun's rays in a way that is more efficient with the highest rate of power conversion efficiency improvement. MHPs can also be layered in tandem with other light-absorbing semiconductors to absorb various bands of the solar spectrum. These semiconductors have the potential to provide a high power-to-weight ratio along with a high tolerance to radiation and can be contrived onto flexible substrates for augment-on-demand solar panels. The paper also delves into the development, fabrication, and optimization of the MHPSC to ensure its moldability characteristics and possible ways to encapsulate it into a compact space on the CubeSat to successfully undertake and execute low-intensity missions with the highest efficacy.

The growing demand for frequent missions to space has increased the need for quicker production of CubeSats. This paper opens up a new perspective on understanding the use of MHPSCs for low-intensity CubeSat missions.