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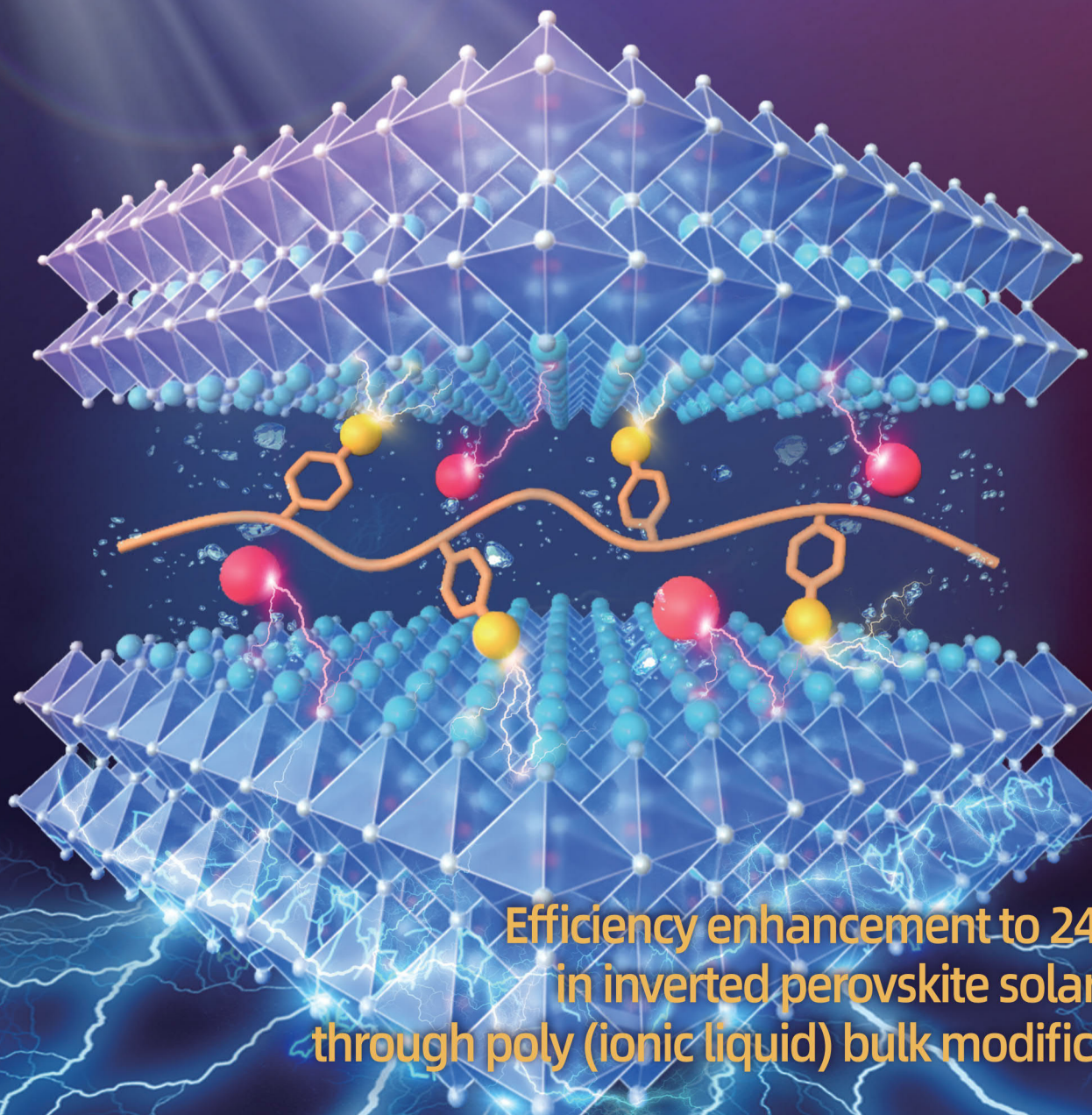

Efficiency enhancement to 24.62% in inverted perovskite solar cells through poly (ionic liquid) bulk modification

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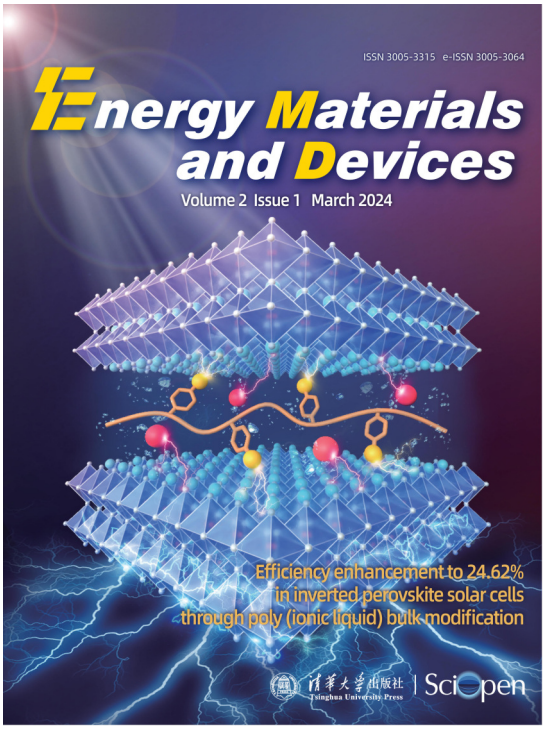

Front Cover Story

Small–molecule ionic liquids (ILs) are often used as efficient bulk phase modifiers for perovskite materials. However, their inherent characteristics pose challenges in addressing the stability issues associated with perovskite solar cells (PSCs). In this study, a poly(IL) is designed with multiple active sites, named poly[4–styrenesulfonyl(trifluoromethylsulfonyl)imide] pyridine (P[STFSI][PPyri]), as an efficient additive of perovskite materials. P[STFSI][PPyri] demonstrates the ability to passivate defects and suppress nonradiative recombination in PSCs. Additionally, it facilitates the fixation of organic and halide ions, thereby enhancing the device's stability and photoelectric performance. Consequently, the introduction of P[STFSI][PPyri] as a dopant in the devices resulted in an excellent efficiency and outstanding long-term operational stability. (See the article by Chen X. Y. et al. https://doi.org/10.26599/EMD.2024.9370029)

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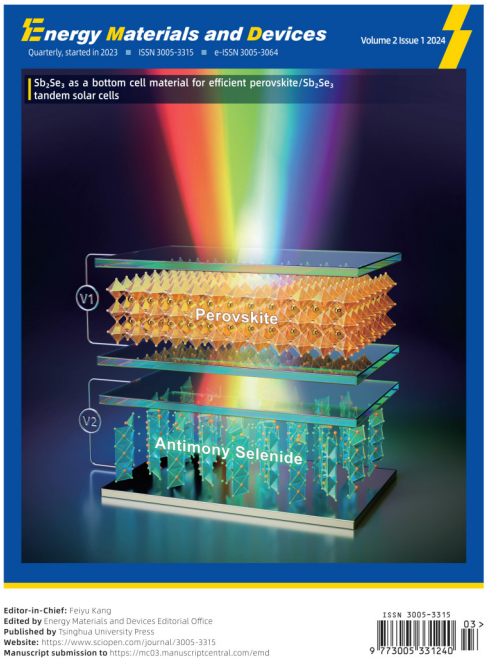

Back Cover Story

Sb_2Se_3 semiconducting material has been widely applied in single-junction solar cells. It has a band gap of 1.05–1.2 eV, and is used as the bottom cell absorber material in tandem solar cells. Sb_2Se_3 solar cells exhibit excellent stability with nontoxic compositional elements. The band gap of organic–inorganic hybrid perovskite is tunable over a wide range. In this work, a perovskite/antimony selenide four-terminal tandem solar cell with a specially designed and fabricated transparent electrode for an optimized spectral response is demonstrated for the first time. Through adjusting the thickness of the transparent electrode layer of the top cell, and optimizing antimony selenide bottom cell by introducing a double electron transport layer, the four-terminal tandem solar cell achieves an impressive efficiency exceeding 20%. This work provides a new tandem device structure and demonstrates that antimony selenide is a promising absorber material for bottom cell applications in tandem solar cells. (See the article by Cai Z. Y. et al. https://doi.org/10.26599/EMD.2024.9370027)

Information for Contributors

Energy Materials and Devices **(EMD)** is a quarterly academic journal sponsored by Tsinghua University. The journal aims to present the up-to-date scientific achievements of high creativity and great significance in the cutting-edge field of energy materials and devices. Contributions from all over the world are welcomed.

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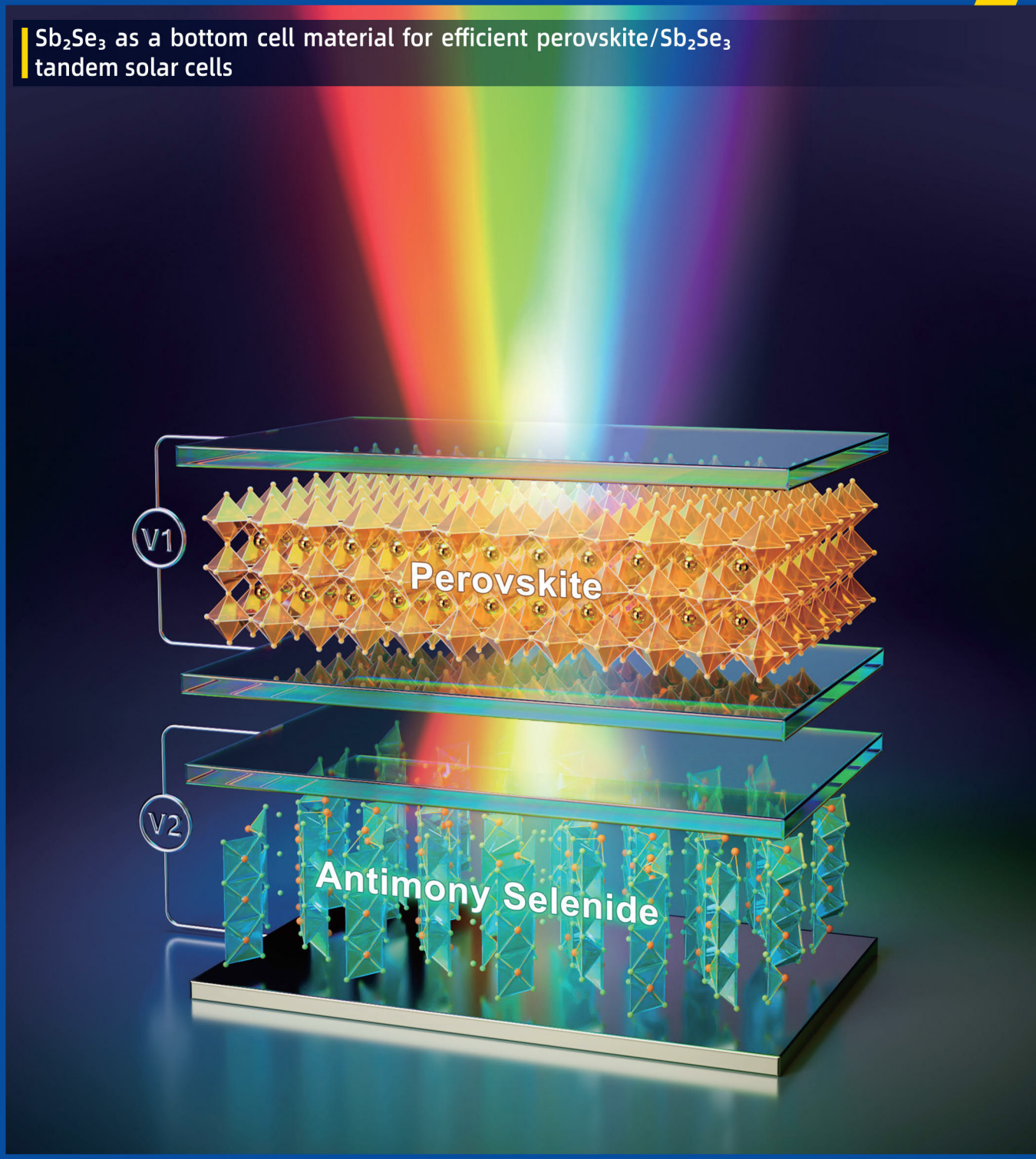
Sb_2Se_3 as a bottom cell material for efficient perovskite/Sb_2Se_3 tandem solar cells



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