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## **Computational study of environmentally friendly CsSnBr<sub>3</sub> perovskite solar cells has achieved a power conversion efficiency of 31.62%.**

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In this study, we conducted a computational optimization of four designs for CsSnBr<sub>3</sub> perovskite solar cells using the SCAPS-1D simulation tool. We explored how variations in the thicknesses of the electron transport layer (ETL), hole transport layer (HTL), and perovskite layer, as well as changes in temperature, series and shunt resistances, and the acceptor doping density of the HTL, influenced key performance metrics such as short-circuit current (J<sub>sc</sub>), open-circuit voltage (V<sub>oc</sub>), fill factor (FF), and power conversion efficiency (PCE). The highest optimized PCE achieved was 31.62%. Moreover, our findings indicated that the PCE values of all CsSnBr<sub>3</sub>-based solar cell designs developed in this research exceeded those of the previously reported ITO/WS<sub>2</sub>/CsSnBr<sub>3</sub>/Cu<sub>2</sub>O/Au cell, which had the highest recorded PCE for similar devices. Our best-performing structure demonstrated a 9.19% increase in efficiency over the previous record.

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