

Optimization of Back Surface Field (BSF) Layers for Efficiency Enhancement in CZTS Thin-Film Solar Cells

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Copper Zinc Tin Sulfide (CZTS) thin-film solar cells have gained significant attention as a promising alternative to traditional photovoltaic technologies, owing to their use of earth-abundant, non-toxic materials. A critical factor in enhancing the efficiency of these cells is the incorporation of a Back Surface Field (BSF) layer. The BSF layer plays a key role in minimizing electron recombination at the rear interface, thereby improving charge carrier collection and overall device performance. This abstract reviews the role of the BSF layer in CZTS solar cells, focusing on material selection, fabrication techniques, and optimization strategies. By addressing current challenges and evaluating the impact of BSF integration, this study aims to highlight the potential of BSF-enhanced CZTS cells in making thin-film photovoltaics more efficient and scalable for widespread renewable energy applications.

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