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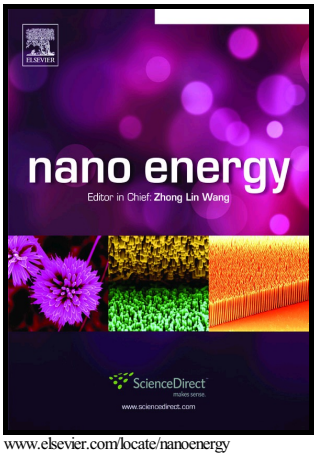

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Designing Ternary Blend All-Polymer Solar Cells with an Efficiency of Over 10% and a Fill Factor of 78%

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Abstract

In recent years, ternary blend bulk-heterojunction (BHJ) all-polymer solar cells have been gradually developed to better utilize the solar irradiance spectrum. However, power conversion efficiencies remain below 10%, mainly because of the low fill factor. Generally, the fill factor of all-polymer solar cells is limited mainly by the competition between the recombination and extraction of free charges. Here, we design advanced ternary blend all-polymer solar cells with a high fill factor of 78%, thus demonstrating how such recombination thresholds can be overcome. These results can be attributed to the high and balanced bulk charge mobility, reduced recombination, and optimized morphology, as well as the intimate mixing properties of the two donors in the photoactive layer.

Graphical abstract