# Power of dual-crystal solar cells

Does dual-donor induced crystallinity modulation improve solar cell performance?
Finally, we evaluated the long-term stability and the universality of the dual-donor induced crystallinity modulation strategy. Device stability is crucial for solar cell performance [50, 51]. As shown in Fig. S14, after 800 h of indoor light exposure, the ternary device retains 82% of its initial PCE.

Why do solar cells have dual additives?
This efficiency enhancement could be attributed to the enlarged grain size,improved crystallinity,optimized quantum well thickness distribution,and reduced trap states of the perovskite films. Moreover,the solar cells with dual additives present improved stability.

Which ternary organic solar cells have the highest power conversion efficiency?
D18:D18-Cl:L8-BOternary organic solar cells (TSCs) with dual-donor are fabricated,and the highest power conversion efficiency (PCE) of 19.13% is achieved. The open circuit voltage of D18:D18-Cl:L8-BO TSCs is 0.915 V,the short circuit current density is 26.22 mA cm -2,and the fill-factor is 79.75%.

How do 2T tandem solar cells work?
In 2T tandem devices,the constituting top and bottom solar cells are usually connected in series,leading to an addition of the generated voltages and a recombination of the photogenerated currents of each subcell at the junction.

Can a dual-donor recombination modulate the crystallinity of the active layer?
The dual-donor strategy for modulating the crystallinity of the active layer is applicable to a variety of Y6 derivatives, and the increase in PCE exceeds 1%. Trap-assisted charge recombination is one of the primary limitations of restricting the performance of organic solar cells.

How efficient are perovskite solar cells derived from q2D urea and MOAH?
The efficiency of the perovskite solar cells (PSCs) derived from the Q-2D perovskite films induced by the synergistic effect of urea and MOAH dual additives increases to 20.32%from 17.21% for the devices without additive.

Colored solar cells (SCs) are highly useful for applications in esthetic building-integrated photovoltaics (BIPVs). However, the theoretical designs mostly focus on the color quality with rarely addressing the optoelectronic responses. Here, considering both color display and complete electrical evaluation, we report a color-controlled a-Si:H ...

Monolithic two-terminal (2T) perovskite/CuInSe 2 (CIS) tandem solar cells (TSCs) combine the promise of an efficient tandem photovoltaic (PV) technology with the simplicity of an all-thin-film device architecture that is compatible with flexible and lightweight PV.

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We demonstrate through precise numerical simulations the possibility of flexible, thin-film solar cells, consisting of crystalline silicon, to achieve power conversion efficiency of ...

In this study, a high-throughput optoelectrical modelling approach is developed, which allows for the exploration of hundreds of thousands of combinations of thicknesses and bandgaps of active layers for both two-terminal and four-terminal bifacial tandem solar cells under varying lighting conditions, reveals the distribution of the hidden param...

Monolithic two-terminal (2T) perovskite/silicon tandem solar cells are rapidly progressing toward higher power conversion efficiencies (PCEs), which has led to a prominent role for this technology within the photovoltaics (PV) research community and, increasingly, in industrial PV R& D. Here, we define a practical PCE target of 37.8% for 2T perovskite/silicon ...

By modulating the crystalline properties of the active layer with dual donors, the efficiency of organic solar cells reaches 19.23%. The introduction of PTzBI-dF suppresses the accumulation of traps and charge recombination, allowing ternary devices to maintain 82% of their initial power conversion efficiency (PCE) after illumination for 800 h.

D18:D18-Cl:L8-BO ternary organic solar cells (TSCs) with dual-donor are fabricated, and the highest power conversion efficiency (PCE) of 19.13% is achieved. The open circuit voltage of D18:D18-Cl:L8-BO TSCs is 0.915 V, the short circuit current density is 26.22 mA cm -2, and the fill-factor is 79.75%. D18 and D18-Cl form alloys in ternary ...

Therefore, the solar cell based on dual additives-treated perovskite film achieves an optimal efficiency of 20.86%, far higher than 17.11% for that without additive. Moreover, the environmental stability of the quasi two-dimensional perovskite solar cells (PSCs) is raised. The unencapsulated PSCs hold 93% of the initial efficiency after being placed under environmental ...

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