Advantages of perovskite solar cell:
- High efficiency over 15%.
- Low cost and nature-abundant (material).
- Strong absorption in ultraviolet-visible range.
- Excellent crystallinity.
- Large carrier mobility.
- Long charge diffusion length.

Perovskite films formed on different surfaces are strikingly different in absorption and PL spectra.
XRD images indicate non-unit precursor ratio could form stoichiometric perovskite film.

Advantages of double fullerene structure:
- Increasing the amount of PbI₂ in the films will increase the film roughness.
- Lots of microfibers are observed when the precursor ratio is larger than 0.8.

Research Motivation

Flexible Perovskite Device

Device and origin of Voc

ZnO/ITO

Planar Heterojunction

Advantage of double fullerene structure

Spin C₆₀

Evaporated C₆₀

Greater efficiency with double layer passivation (gray star) compared with the device without fullerene passivation (black square).

Perovskite composition is sensitive to substrate surface, which leads to a non-stoichiometry precursor ratio suitable for perovskite formation.
Perovskite thickness
- The composition and thickness of perovskite are both critical in determining device performance.
- A record large fill factor (FF) of 80.1% was obtained by optimizing annealing time, fullerene type, perovskite composition and thickness.

Performance optimization

Conclusions

Performance optimization

Bibliography

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