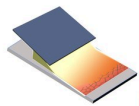


HarvSolar: Eco-friendly Perovskite Photovoltaics

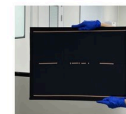
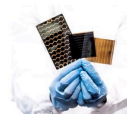
 Energy & Environment

Energy Conservation/Generation/Management/Storage (Battery)

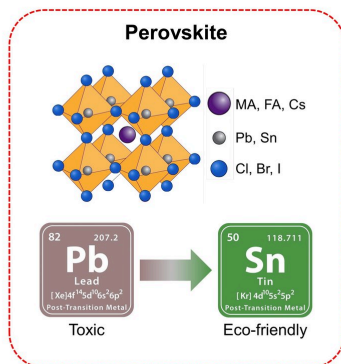
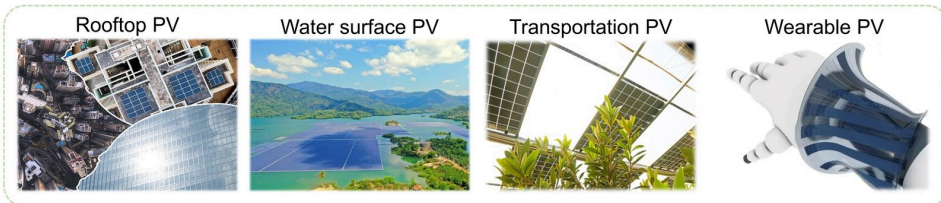
Perovskite Solution



Solution Process



Perovskite Solar Cell



Opportunity

Organic-inorganic lead halide perovskites have made tremendous development owing to their remarkable optoelectronic properties, low-cost solution processing, and the exceptional efficiency approaching 26%. However, the perceived toxicity of lead element in the state-of-the-art perovskite solar cells remains an issue that must be addressed on the path towards commercialization. As an alternative to lead halide perovskites, tin perovskites outperform other lead-free perovskite candidates due to their favorable band gap, low exciton-bind energy, and high carrier mobility. However, there is still a substantial efficiency difference between tin perovskite and lead perovskite photovoltaics, owing to massive energy loss.

Remarks

48th International Exhibition of Inventions Geneva (IEIG) (2023) - Gold Medal

IP Status

Patent filed

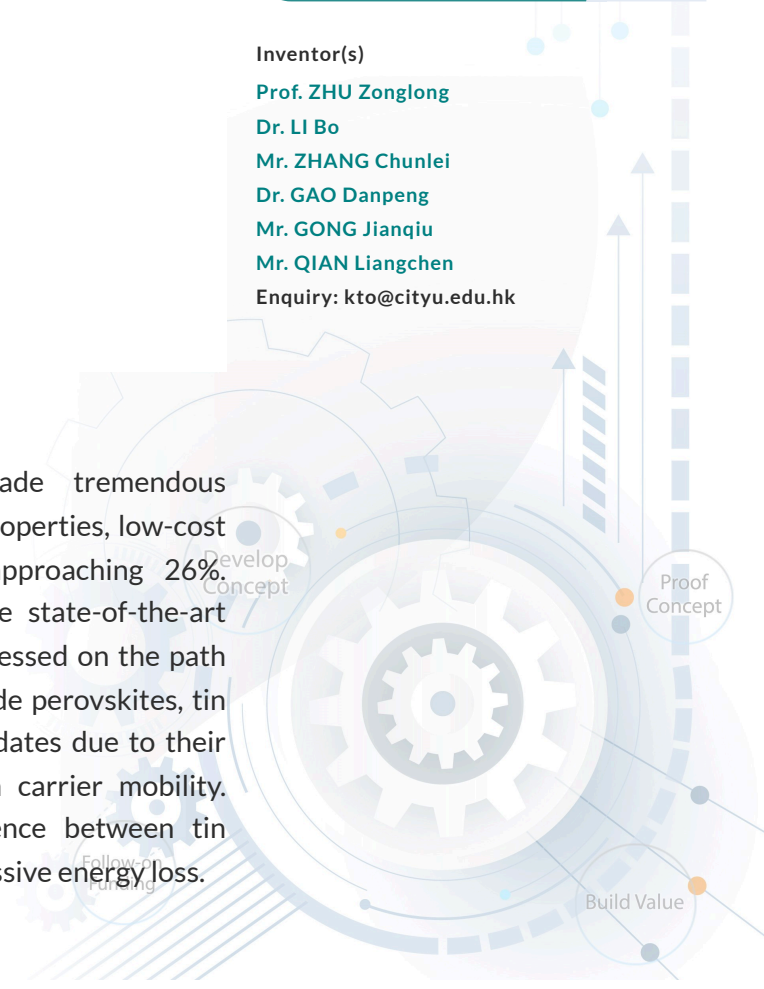


Technology Readiness Level (TRL) ?

4

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Technology

The innovation develops environmentally friendly tin perovskite solar cells and a preparation method to solve the toxicity problem of widely applied perovskite solar cells. To achieve this goal, firstly we designed and synthesized new lead-free tin perovskite materials with excellent optoelectronic properties and stability; Secondly, we developed and optimized thin film deposition processes based on these synthesized lead-free perovskite materials; Thirdly we developed new electron transport materials based on fullerene derivatives. Finally, the invention obtained the lead-free tin-based perovskite solar cell with an efficiency improvement of nearly 30%. Moreover, it can be continuously irradiated under $100\text{mW}/\text{cm}^2$ white light for 1000 hours, and the efficiency drops by $< 5\%$.

Advantages

- No heavy metal harmful substances and environmentally friendly
- Low cost
- Lightweight
- High efficiency

Applications

- Greenhouse power generation
- Self-powered IoT nodes
- Flexible wearable photovoltaic

