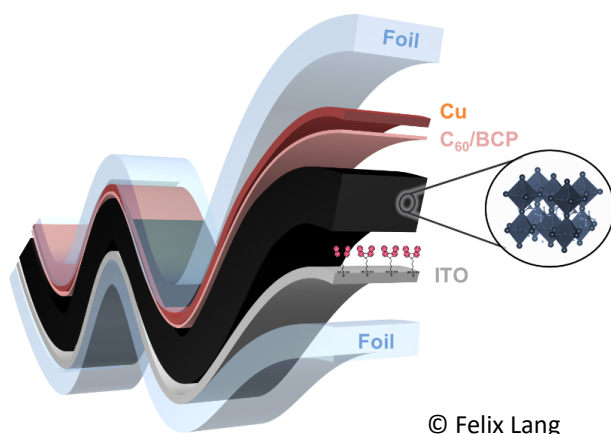


Flexible Perovskite Solar Films

Description



Ultra-lightweight and flexible solar films that offer high energy conversion efficiency at an affordable price could be a breakthrough technology in combating excessive CO₂ emissions from non-renewable energy sources, which are responsible for global warming. Unlike conventional rigid solar cells on glass, flexible solar films offer a better carbon footprint and could find even wider application due to their potentially lower price. Their

low weight also enables their use in future electric aircraft and other aerospace applications. Ultra-light solar films would also allow for easier integration into architecture, as greenhouses, warehouses or factory buildings often cannot support heavy photovoltaic systems.

Details

In the ROSI Freigeist Junior Group *Radiation-tolerant electronics with soft semiconductors*, led by Dr Felix Lang, such solar films with high efficiency and low weight are being developed using halide perovskites. These crystalline semiconductors have high absorption coefficients and enable the simple production of ultra-thin solar cells by applying the perovskites in solution (using spin coating, blade coating or printing processes), which then crystallise at temperatures of 100 °C. The efficiencies achieved are over 23%. Future research will focus on the development of novel additives and active intermediate layers, as well as on the identification of bottlenecks in terms of reliability and efficiency.

Methods

Performance and reliability issues are identified through a powerful combination of electro-optical characterisation and drift-diffusion modelling.

- Electro-optical diagnostics and imaging
- Quantification and control of losses due to mobile ions
- In-situ degradation tests

In addition to standard characterisation tools, customised in-operando bending stability tests, temperature cycle and environmental stability tests are used to determine the stability, degradation and self-healing of perovskite solar films. This enables both a deeper understanding and further improvements in terms of efficiency and stability.

Applications

- Aerospace
- Architecture
- Greenhouses

Keywords

- Contract research
- Solar cells
- Perovskite
- CO₂ emissions

Interest in cooperation

- Research-based collaboration
- Contract research
- Industry-sponsored research

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