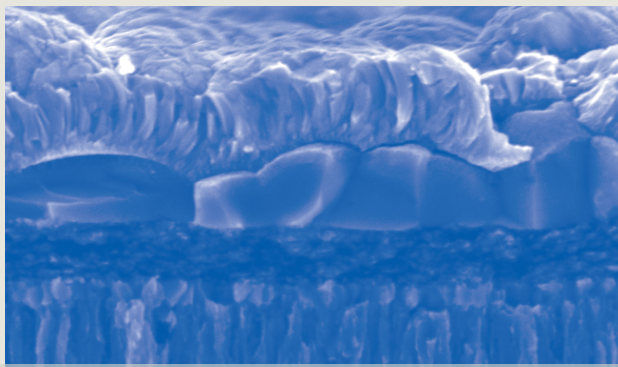


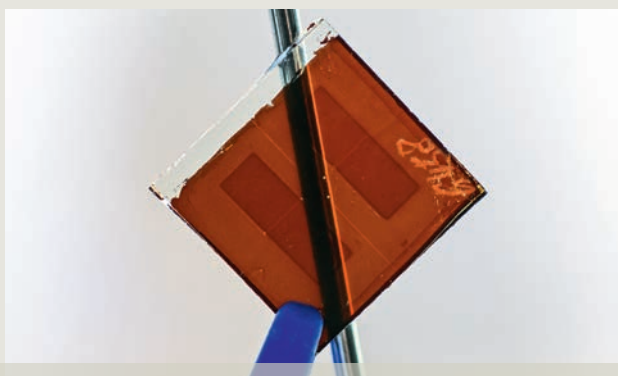
// ZSW PV Materials Research: Printable solar cells and new materials



// Solutions for solar cells based on organic or inorganic absorber materials



// Low-cost, highly abundant material $\text{Cu}_2\text{ZnSn}(\text{S},\text{Se})_4$
(SEM cross-section)



// Semitransparent perovskite solar cell from the ZSW lab

Printable low-cost solar cells:

ZSW develops organic and inorganic solar cells: vacuum-free, low-cost, solution-processible.

Organic solar cells:

- // On glass and flexible substrates:
Potentially cheap materials, no vacuum processes and no high temperatures needed
→ Status: ~ 7 % cell efficiency (glass)
- // Slot-die-coated cell
→ Status: ~ 6 % cell efficiency
- // Semitransparent cells with various colours:
New fields of applications (window integration etc.)
→ Status: ~ 5 % cell efficiency (glass)
- // Tandem cells:
Stacked layers for expanded spectral range
→ Status: ~ 7 % cell efficiency (glass)

Abundant, low-cost materials:

Kesterite $\text{Cu}_2\text{ZnSn}(\text{S},\text{Se})_4$

- // Similar to $\text{Cu}(\text{In},\text{Ga})\text{Se}_2$ (CIGS), but based on low-cost, abundant, non-toxic elements.
- // Vacuum-free selenization of printed precursor layers
→ Status: > 10 % cell efficiency
- // Also possible as high-band-gap material for the application as top cell in tandem solar cells by substituting tin for germanium
→ Status: ~ 6 % cell efficiency

Perovskite material

- // Wide gap material for use in tandem solar cells with CIGS or $\text{Cu}_2\text{ZnSn}(\text{S},\text{Se})_4$
→ Status: ~ 15 % normal cell efficiency
→ Status: ~ 12 % semi-transparent cell efficiency

Contact

Claudia Brusdeylins
+49 (0)711 7870-278
claudia.brusdeylins@zsw-bw.de