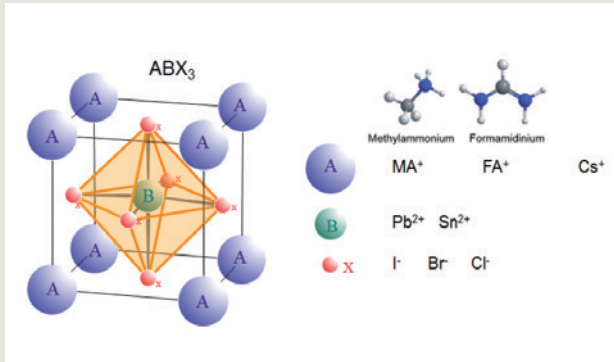
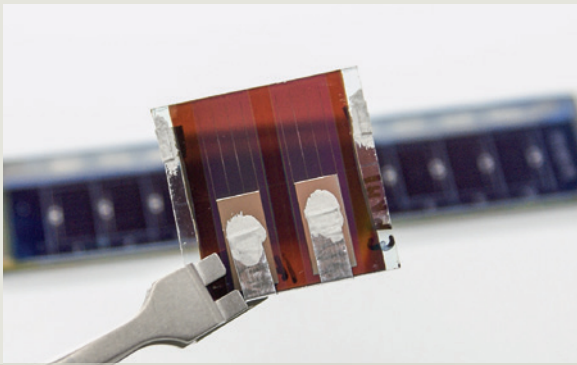


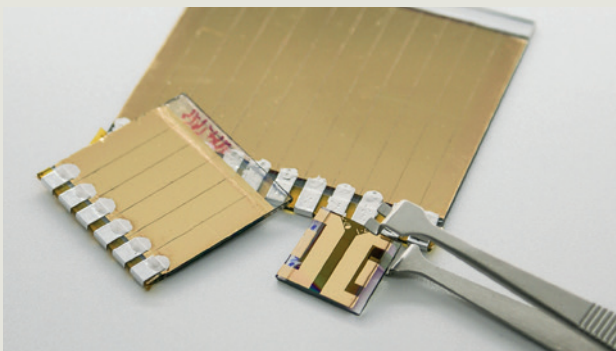
// ZSW Photovoltaics Materials Research: Perovskite solar cells, tandem devices and modules



// Metal organic halide ABX₃ structure



// Tandem: semitransparent perovskite stacked on CIGS



// Upscaling: from cell to minimodule

Perovskite materials

Metal organic halides with ABX₃ structure.
Main focus topics at ZSW:

- // Highly efficient absorber compounds:
Multiple-cation / mixed-halide systems
- // Wide-gap material for use in tandem solar cells
in combination with Cu(In,Ga)Se₂ (CIGS)
- // Lead-free and lead-reduced solar cells:
Bi and Sn based absorber layers
- // Development of stable and non-hazardous solar cells
→ Status: ~ 17 % on 0.25 cm²

Tandem devices

Perovskite/CIGS tandem devices can surpass the efficiency limitations of single-junction solar cells:

Better use of solar spectrum:
// → Status: > 23 % efficiency for 4T tandem cells on 0.5 cm²

Benefits of all-thin-film perovskite/CIGS devices:
// Low energy payback time:
less material needed than in conventional solar cells
// Flexible solar cells possible:
potentially low-cost deposition methods such as R2R,
lightweight devices

Modules/Upscaling

Industry-relevant deposition methods and dimensions are important for paving the way for commercial success

// Upscaling to larger areas
// First mini modules
→ Status: > 14 % for mini modules with 4 cells on 3.8 cm²

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