Contribution ID: **45** Type: **Abstract TEC2ZERO**

Perovskite and Organic Solar Cells to Overcome the Green Paradox

Climate change presents unprecedented global challenges, urging a rethink of how resources, particularly energy, are harvested. Renewable energies like photovoltaics (PV) are probably the most sustainable energy sources, relying on the sun's free energy. However, PV remains underutilized, especially in developing countries, where infrastructure costs and maintenance pose significant barriers. Additionally, fossil fuels remain often more affordable and flexible, exacerbated by the "green paradox" - as decarbonization progresses, the reduced demand for fossil fuels may cause their prices to fall.

To remain competitive, renewable energy technologies like solar cells must continue to become cheaper and more adaptable. Unfortunately, silicon solar cells have nearly reached their efficiency and production limits, which underscores the critical need for a next generation of solar cells.

At the Institute of Electronic Devices, we are devoted to developing advanced thin-film solar cell technologies using organic or perovskite materials, that we believe to provide an avenue of breaking the green paradox. Both technologies require minimal energy and can be processed using cost-effective printing techniques from abundant materials, whilst offering efficiencies competitive with silicon. As thin-film devices they can also readily be integrated into buildings, vehicles, and other applications like IoT and satellites, able to transform the landscape of solar energy.

For the vision of affordable solar power from perovskite or organic solar cells to become a reality, several roadblocks have to be overcome. Most prominently a solid understanding of the processing routes and an enhancement of the long-term device stability are challenges that we tackle in several projects spanning from fundamental to industry-oriented research. Here I will present recent breakthroughs in our chair with internal barriers and process design, that have led to significant improvements in both stability and efficiency, bringing us step by step closer to an actual industry viable perovskite-organic PV technology.

Primary author: Dr BRINKMANN, Kai Oliver (Chair of Electronic Devices)

Co-authors: ZIMMERMANN, Florian (Fakultät 6 - Lehrstuhl für Elektronische Bauelemente); BOCCARELLA, Gianluca (Lehrstuhl für elektronische Bauelemente); WANG, Pang (Fakultät 6 - Lehrstuhl für Elektronische Bauelemente); Dr HEIDERHOFF, Ralf (Fakultät 6 - Lehrstuhl für Elektronische Bauelemente); OPITZ, Sven (Lehrstuhl für elektronische Bauelemente); Prof. RIEDL, Thomas (Chair of Electronic Devices); MASCHWITZ, Timo Marcel (Fakultät 6 - Lehrstuhl für Elektronische Bauelemente)

Track Classification: Future Technologies: Energy Efficiency