

**Plenary Talk**

PLV IX Thu 14:00 HSZ/AUDI

**On the sunny side - polymer-based organic solar cells —**

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Polymer-based organic solar cells open up new fields of application compared to conventional silicon-based solar cells, as they are flexible, lightweight, color-adjustable, and potentially very cost-effective. In addition, they also function in low-light conditions and have a high power density, which makes them very attractive for space applications, in addition to their classic terrestrial applications. Since 2025, single-junction organic solar cells have surpassed the magic 20% efficiency rate. Moreover, organic solar cells are also successfully combined with

other solar technologies in tandem devices as recently demonstrated with an efficient near-infrared harvesting in perovskite-organic tandem solar cells [1]. Current research questions focus on the aging mechanisms of organic solar cells and the feasibility of converting solar cell production to highly scalable manufacturing methods. The Müller-Buschbaum Group is investigating both issues using advanced X-ray and neutron scattering methods in situ and operando during production [2] and solar cell operation [3]. In addition, the Müller-Buschbaum Group has conducted pioneering work in investigating organic solar cells in space, demonstrating that organic solar cells function equally well in space as they do in the laboratory [4]. [1] Nature 643, 104-110 (2025); [2] Adv. Energy Mater. 15, 2404724 (2025); [3] Nano Energy 140, 111043 (2025); [4] Joule 4, 1880-1892 (2020)