



Microscopic Effects in Photovoltaic Perovskites

Next generation solar cells based on metal halide perovskites materials (MHP) exhibit a delicate nano- and microstructure. Structures such as grain boundaries, hetero-interfaces, phase segregation and domain formation within the active MHP layers are currently the bottleneck for an efficient energy conversion. Usually, key figures of merit for a photovoltaic cell are recorded on full devices using millimeter-sized electrodes, merely giving an average over the local performance.

My group develops methods based on atomic force microscopy (AFM) to investigate nanoscale structure-function relationships in MHP thin films and devices. Using Kelvin probe force microscopy (KPFM), we can map

the electric surface potential distribution in operating solar cell devices under illumination or external bias. Such measurements reveal space charge layers and ion accumulation at interfaces. On MHP thin films, we can record the dynamics of the surface photovoltage and thereby identify regions with higher defect density.

If you are interested in joining the team as a Bachelor-, Master- or PhD student or just for a research internship, please reach out to me!

