



Contribution ID: 70

Type: **Poster**

Tracking the formation of MAPbI₃ by in situ GIWAXS

Wednesday, 9 December 2020 17:40 (20 minutes)

Elucidating structure-function relationships in perovskite based materials for photovoltaic and LED application is important to push this material class towards commercialization. Focusing on scaling up methods and working out differences to well established deposition methods, e.g. spin casting, might open up unexpected possibilities for low-cost fabrication.

Slot-die coating is one very promising deposition method for high output production. In this work we investigate the conversion of printed PbI₂ on ITO with printed methylammonium iodide (MAI) towards methylammonium lead iodide (MAPbI₃) by in situ grazing incidence wide angle X-ray scattering (GIWAXS). Using synchrotron radiation, a time resolution of less than 1 s was achieved and the kinetics of the reaction becomes visible. Time resolved texture evolution during the formation of MAPbI₃ shows the connection between preferential orientation of the “precursor” PbI₂ thin-film and the final perovskite film, which shows face-on and corner-on orientation (cubic indexing). In contrast, spin-cast MAPbI₃ prepared from the same solution and converted with identical parameters shows edge-on orientation. Time resolved deterioration of initially existing solvent-PbI₂ complexes is also shown.

The fabrication method and precursor systems have a significant influence on the resulting film morphology, which is highly relevant for optimizing perovskite absorber layers for PV or LED applications.

Primary author: SCHEEL, Manuel (TUM E13)

Co-authors: REB, Lennart (TUM E13); GUO, Renjun (Physics E13, Technical University in Munich); GENSCH, Marc (DESY); SCHWARTZKOPF, Matthias (DESY); ROTH, Stephan (DESY / KTH); MÜLLER-BUSCHBAUM, Peter (TU München, Physik-Department, LS Funktionelle Materialien)

Presenter: SCHEEL, Manuel (TUM E13)

Session Classification: Joint poster session of MLZ User Meeting and DN2020

Track Classification: UM: Materials Science