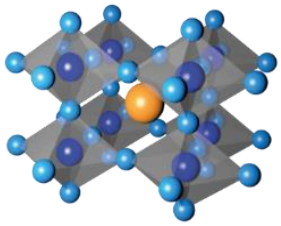
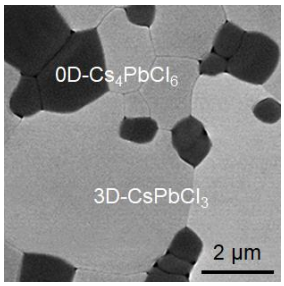
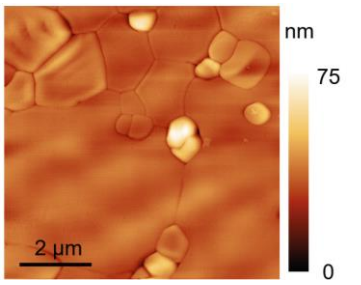
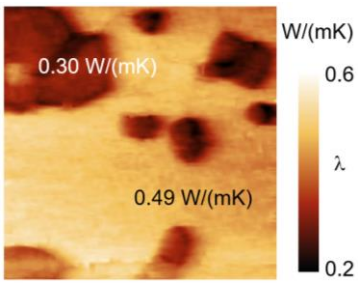
Lehrstuhl für
Elektronische Bauelemente

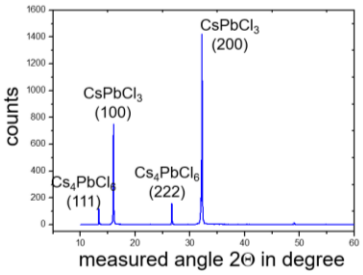
Bachelor /Master Thesis











Thermal transport in metal-halide perovskite semiconductors under operating conditions

Metal-halide perovskites are becoming more and more important in a wide range of applications due to their outstanding (opto-)electronic properties. Aside solar cells (PSCs), this family of materials also holds great promise for future applications in light emitting diodes and lasers. In a wide range of device applications, thermal management becomes increasingly important, because both lifetime and performance are influenced by temperature or temperature gradients. Thus, the analysis of thermal transport in organic–inorganic metal-halide perovskites is indispensable.

Our research is aimed to provide a comprehensive understanding of the thermal transport in these materials and its implications for operating devices. Hereby, thermal investigations by Scanning Near-field Thermal Microscopy (thermal conductivities, thermal diffusivities, and volumetric heat capacities) will be complemented by X-ray diffraction, Raman spectroscopy, electron backscatter diffraction, electrical characterization, and (time resolved) photoluminescence spectroscopy. The main goal of the project is to develop a framework that allows to complement the typically considered electro-optical description of metal-halide perovskite devices with thermal description, which would allow to predict fundamental heat transfer properties within the active perovskite layers and the interfaces to adjacent materials.

We expect that the results envisaged in this project will be essential to optimize the thermal management in metal-halide perovskite devices, such as LEDs and lasers.

I would be happy to provide further information

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