TECHNISCHE UNIVERSITÄT
IN DER KULTURHAUPTSTADT EUROPAS
CHEMNITZ

Institut für Physik
Physikalisches Kolloquium

Donnerstag, 11.12.2025, 15:30 Uhr

Ort: Reichenhainer Str. 90;
Zentrales Hörsaal- und Seminargebäude, Raum C10.013

Prof. Dr. Wolfgang Heiß

Department für Materialwissenschaften und Werkstoffkunde,
Friedrich-Alexander Universität Erlangen-Nürnberg

Epitaxial lead-halide perovskites for lasing

Epitaxial growth of semiconductors on crystalline substrates is performed when high quality materials are required. While traditional semiconductors are epitaxially grown at elevated substrate temperatures, and in high-vacuum chambers, the solution processability of lead halide perovskites makes them promising to perform epitaxy in ambient conditions from solutions, via techniques including spin casting, ink-jet printing, or simple precipitation. Our group focused on simple trop casting and observing crystallization on substrates that provide a close lattice match. The formed micro-crystallites, developed in several generations with improving quality, Figure 1, act as optically pumped lasers that not only function but also rival with those grown by chemical vapor deposition. Advantages of the solution growth include for instance the possibility to make use of ligand assisted growth, a method that is the key to high quality colloidal nanocrystals, to obtain a reasonably slow crystallization in the order of several seconds that allows highly crystalline materials and in addition provides surface passivation, that is required to reduce nonradiative recombination.

[1] H. Afify, M. Sytnyk, V. Rehm et al., “Highly Stable Lasing from Solution-Epitaxially Grown Formamidinium-Lead-Bromide Micro-Resonators”, Adv. Optical Mater. 2022, 10, 2200237
[2] S. Zhou, V. Rehm, H. A. Afify et al., Squeezing the Threshold of Metal-Halide Perovskite Micro-Crystal Lasers Grown by Solution Epitaxy, Adv. Funct. Mater. 2024, 34, 2404700
[3] S. Zhou, V. Rehm, R. Grizfeld, et al. “Boosting the Performance of Epitaxial Perovskite Microstructures by Surface Passivation.” Adv. Optical Mater. (2025):

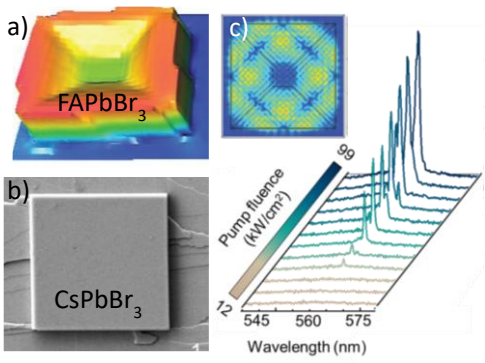

Figure 1. a) Confocal microscopic image of an epitaxial $FAPbBr_3$ microresonator of the first generation and b) scanning electron microscopic image of a $CsPbBr_3$ microresonator from a third generation. c) Lasing of such microresonators under optical excitation enabled by a ring-resonator like optical mode as shown in the inset.

Alle Zuhörer sind ab 15:15 Uhr zum Kaffee vor dem Hörsaal eingeladen.

Informationen zum Vortrag erteilt:
Jun.-Prof. Dr. Simon Kahmann, Tel.: 531 32253

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