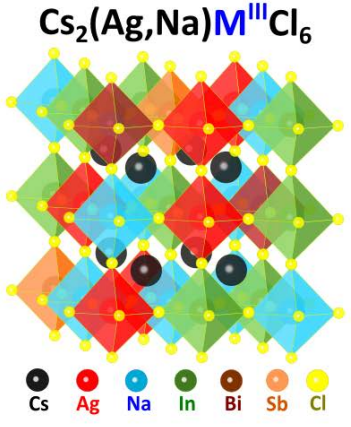
Master Theses in
Robot-Assisted Synthesis of High-Entropy Lead-Free Halide Perovskites

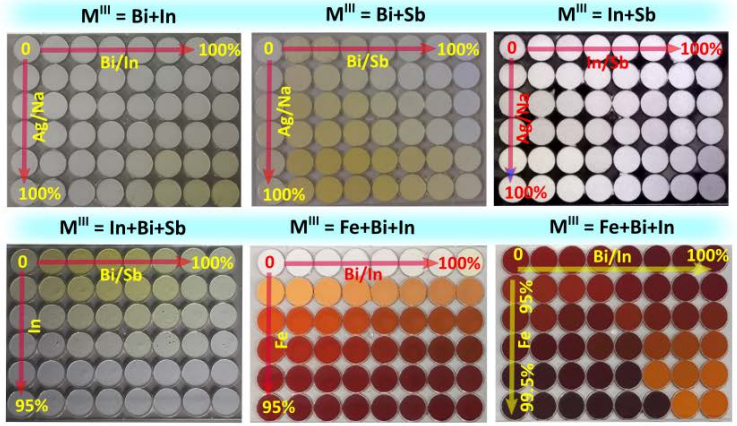
The Helmholtz Institute Erlangen-Nuremberg for Renewable Energies (HI ERN), part of the Forschungszentrum Jülich, researches and develops material- and process-based solutions for climate-neutral, sustainable and cost-effective utilization of renewable energies

The research group High Throughput Materials and Devices specializes in

- Combinatorial materials research
- High throughput synthesis and characterization
- Characterization and Processing equipment development
- Big data methods and Machine Learning

for the development of printed solar cells with advanced efficiency and stability.





We offer the opportunity for a **Masters theses** in **High-Throughput Synthesis and Characterization of Novel Inorganic Materials for Energy Conversion Applications**.

The M.Sc. project focuses on an ambitious and challenging aim of developing protocols of high-throughput combinatorial syntheses of medium/high-entropy lead-free halide perovskites combining seven and more different elements. Such compounds are strongly expected to reveal unique stability and non-additive spectral and photophysical properties promising for versatile light conversion/storage/management applications.

Qualifications:

- Student of Materials Science, Nanotechnology, Energy Technology, Process Engineering, Physics or comparable require an examiner from their department
- Knowledge of chemistry and chemical lab operation
- Basic knowledge of characterization methods (spectroscopy, XRD, SEM/EDX, *etc*.)
- Ambition, motivation, capability of self-driven work, communication

Recent Publications:

O. Stroyuk et al., Six Metal Cations in One Double Perovskite: Exploring Complexity of Chloride Elpasolites by High-Throughput Experimentation, **J. Mater. Chem. C** (2024), 10.1039/D4TC01693A.
O. Stroyuk et al., Band-Bowing Effects in Lead-Free Double $Cs_2AgBi_xSb_{1-x}Cl_6$ Perovskites and Their Anion-Exchanged Derivatives, **J. Mater. Chem. C** (2024), 10.1039/D3TC04004F.
O. Stroyuk et al., Doping/Alloying Pathways to Lead-Free Halide Perovskites with Ultimate Photoluminescence Quantum Yields, **Angew. Chem. Int. Ed**. (2023), 10.1002/anie.202212668
O. Stroyuk et al., $Cs_2Ag_xNa_{1-x}Bi_yIn_{1-y}Cl_6$ Perovskites Approaching Photoluminescence Quantum Yields of 100 %, **Mater. Adv.** (2022), 10.1039/D2MA00737A.

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