

## SUPER – Stuttgart University Program for Experiencing Research Project Information

### Institute's Information

Name of Institute Institute for Materials Science, Materials Synthesis Group, Faculty 3 (Chemistry)  
Contact Person Prof. Dr. Oliver Clemens  
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### Duration of Project/Number of Students

June/July \_\_\_\_\_  
June/July/August x  
Number of Students 2

Name of Project Synthesis and Characterisation of Novel Materials for Fluoride Ion Batteries

### Beneficial Skills & Knowledge

Materials Synthesis, X-ray Powder Diffraction, Electrochemical Characterisation,  
Solid State Batteries, Materials Testing, Electron Microscopy

### Description of Work

Solid State Fluoride Ion Batteries are an upcoming battery concept relying on the transport of fluoride (instead of lithium) ions. This concept could facilitate higher battery capacities and longer system life; however, a deeper understanding of the materials, their detailed development as well as thorough characterization is required in order to achieve fully reversible battery systems and decrease capacity fading.

In this project, the students will prepare materials relevant for battery testing and modify them, e.g., by purification techniques and/or coating. The materials will be characterized using diffraction and microscopical techniques and will be tested within solid state fluoride ion battery setups regarding their battery performance characteristics.

(1) Chen, H.; et al.; *Small Methods* **2025**,. DOI: 10.1002/smt.202500374.

(2) Chen, H.; et al.; *Small Structures* **2024**. DOI: 10.1002/sstr.202300570.

(3) Nowroozi, M.; et al.; Fluoride ion batteries – past, present, and future. DOI: 10.1039/d0ta11656d.

