UNIVERSITÄT LEIPZIG

BuildMoNa

## SCIENTIFIC AND METHOD MODULES

| Module name | Complex Nanostructures: Halide-based Semiconductors and Device perspectives |
|---|---|
| Number | 2022-T3 |
| Aims | The module intends to give an overview of the international and current developments in the research area of halogen-based compound semiconductors. Manifold application potentials arise from such materials, e.g. in the fields of thin film electronics or solar power conversion. |
| Basics | Semiconductors are at the core of many industries and deliver the key contributions to the IT infrastructure (internet, computers, mobile devices), renewable energy (solar cells), displays or electromobility. The listeners should be familiar with the basic solid-state physics and concepts of band structure, band gap, light-matter interaction (optical absorption, emission) and the principle of semiconductor devices (diodes, transistors). |
| Contents | The presentations in the module cover topical developments in the field of functional compound semiconductors, containing halogen elements. The focus is on CuI and related materials such as cation (Ag) and anion (Br, Cl) substitution and doping. Besides physical principles and material science and fabrication aspects, device applications are discussed. |
| Methods | Seminars |
| Type | Lecture |
| Date (month/year) | 28/29 September 2022 |
| Time | See agenda Fall School 2022 |
| Work load | 15 hours presence, 45 hours self-study and passed examination (essay) |
| Examination | Written summary (see page 2 for more information) |
| Credit points | 2 |
| Responsible scientists | M. Grundmann, C. Schnohr |
| Industrial partners | - |
| Recommendations for literature, e-learning | Marius Grundmann et al., Cuprous Iodide - a p-type transparent semiconductor: history and novel applications<br>Phys. Status Solidi A 210(9), 1671-1703 (2013)<br><br>Philipp Storm, Khanim Karimova, Michael Sebastian Bar, Susanne Selle, Holger von Wenckstern, Marius Grundmann, Michael Lorenz, Suppression of Rotational Domains of CuI employing Sodium Halide Buffer Layers<br>ACS Appl. Mater. Interfaces 14(10), 12350-12358 (2022)<br><br>Philipp Storm, Susanne Selle, Holger von Wenckstern, Marius Grundmann, Michael Lorenz, Epitaxial lift-off of single crystalline CuI thin films<br>J. Phys. Chem. C 10(11), 4124-4127 (2022)<br><br>selected chapters of<br>M. Grundmann, Physics of Semiconductors, 4th edition (Springer, 2021)<br>doi:10.1007/978-3-030-51569-0 |

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**Exam:**
For the exam a written summary accompanied by a critical analysis (total of 2-3 pages) of a recent paper in the literature on halogen-containing functional materials/devices will be graded. The students can select this on their own free will, possibly motivated by one of the seminar talks.