# Lehrstuhl für Physik

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## S E M I N A R
## on
## Semiconductor Physics and Nanotechnology

**Mo, 11.03.2024, 11:15 Uhr,**

**Seminar in person in the Physics lecture hall *or* via Zoom**

## "SiGeSn alloys for Si-based photonics"


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In recent years, the field of silicon photonics has developed rapidly. The driving force behind this development lies in the possibility of integration on Si substrates using various passive waveguide structures and in particular active electro-optical components integrated therein. A variety of approaches have been demonstrated today. This includes low-loss Si waveguides, high-speed photodetectors, high-speed modulators or emitters. The Group IV material Ge plays a crucial role in the development of active optoelectronic components. This material can be grown epitaxially on a Si or silicon on insulator (SOI) substrate with well-defined in-situ doped structures. The indirect band gap of Ge is smaller than the direct one, but only by 136 meV compared to more than 2 eV for Si. By adding Sn to the Ge matrix, this energy difference can be further reduced. A direct bandgap material was demonstrated using a GeSn alloy with a Sn concentration between 6 and 8%. The growth of ternary SiGeSn compound semiconductors now even enables the separation of band gap and lattice constant. However, the growth of GeSn and SiGeSn is challenging due to the large lattice mismatch of the individual elements and the low solubility of Sn in Ge and SiGe. The growth of device quality alloys can be achieved with molecular beam epitaxy by using ultra-low temperature growth techniques. In this talk we report on the fabrication and characterization of active electro-optical devices made of the material SiGeSn.


***Zoom – Link:***
https://zoom.us/j/96375934537?pwd=RTlKTWhSdzRHU211YTY1bGFxTUtpZz09
Meeting-ID: 963 7593 4537
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