

Lehrstuhl für Physik

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

Mo, 26.05.2025, 12:00 Uhr,

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

"Are there green routes to silicon-based materials?"

Prof. Dr. Nicola Hüsing

Paris-Lodron University Salzburg, Salzburg, Austria

The production of silicon- and silane-based materials ranks among the most energy-intensive processes in the chemical industry. Making these processes more sustainable is therefore essential for the future of silicon chemistry. Traditional methods rely on carbon-rich, high-energy procedures involving also chlorine chemistry. In addition, organic silicon compounds derived from these processes serve as key precursors for materials such as silicones, glasses, and hybrids, but their synthesis poses significant environmental challenges.

This lecture will first focus on the development of greener alternatives to address these issues, particularly through the use of rice hull ash (RHA), a biogenic waste material composed of roughly 85% silica. With its high surface area and reactivity, RHA offers an efficient, low-impact route to valuable silicon building blocks such as silica, elemental silicon, and alkoxysilanes.

Secondly, this talk will present recent advances in environmentally friendly silane, silica and silicon synthesis, with a focus on the diverse chemistry of polyol-based silanes. These compounds enable the depolymerization of (biogenic) silica in a more sustainable way and open new pathways for material processing, including templated structures, melt synthesis, and 3D printing technologies.