Lehrstuhl für Physik

Department Physik, Mechanik und Elektrotechnik
Montanuniversität Leoben

A-8700 LEOBEN, Franz Josef Straße 18, Austria
Tel: +43 3842 402-4601
e-mail: physics@unileoben.ac.at

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

Mo, 23.03.2026, 11:15 Uhr,

Seminar in person in the physcs lecture hall (HS Physik) *or* via Zoom

"Sheet silicate clays in 2D electronics"

Ass Prof Dr Aleksandar Matkovic

Chair of Physics, Department Physics, Mechanics and Electrical Engineering. Montanuniversität Leoben, Franz Josef Strasse 18, 8700 Leoben, Austria

The rapid growth of AI-driven applications is reshaping the landscape of modern electronics. Future computing will demand novel architectures and materials capable of supporting advanced deep learning algorithms on mobile and wearable platforms, enabling real-time, real-world decision-making. Conventional silicon-based technologies are increasingly constrained in efficiency, motivating the adoption of non-von Neumann architectures to bridge classical and AI-enabled computing. This transition is expected to drive the emergence of post-silicon materials and technologies, with candidates for computing-in-memory, memory transistors, and neuromorphic circuits poised to play a central role in the AI era.

In this talk, I will present an overview of our group's research on 2D-materials-based electronics, with a particular focus on the untapped potential of sheet silicate clays as a novel platform for 2D functional insulators. We will discuss the occurrence of 2D magnetism in silicates and explore their interfaces with 2D semiconductors. Emphasis will be placed on using silicate clays to self-assemble networks of 2D semiconductor ribbons via a vapor–liquid–solid epitaxy process, offering a promising route to scalable 2D semiconductor wafer fabrication.

We will then examine the application of silicate clays as gate insulators in memory transistors. By exploiting interlayer ion migration and deep traps within the silicate layers, we demonstrate memory transistors exhibiting on/off ratios exceeding 10^4 and retention times longer than 24 hours. Finally, we will outline prospective research directions, highlighting how these 2D interfaces could further advance the field and identifying key open questions for future exploration.

Acknowledgments:
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Zoom – Link:
https://zoom.us/j/96375934537?pwd=RTlKTWhSdzRHU211YTY1bGFxTUtpZz09
Meeting-ID: 963 7593 4537
Kenncode: =r=4YQ