From the Lab to the Future: How Semiconductor Materials Are Shaping Advanced Electronics

Stefano Leone
Fraunhofer Institute for Applied Solid State Physics IAF, Freiburg (Germany)

Abstract:

In the era of advanced electronics, the development of new semiconductor materials is essential to pushing the boundaries of current technologies. This seminar provides an overview of the main growth techniques used for the creation of semiconductors, with a special focus on Metal Organic Chemical Vapor Deposition (MOCVD), the industry-preferred method for growing materials like silicon carbide and nitrides. These materials, which are foundational for applications such as power electronics (e.g., electric vehicles) and telecommunications (e.g., 6G), represent the future of advanced technologies. We will dive into advanced case studies, such as the epitaxial growth of SiC assisted by chlorides and the growth of innovative nitrides like AlScN and AlYN. We will conclude with a look toward the next frontier in ferroelectric materials, which promise to revolutionize non-volatile memory technologies.