IAP Seminar

Stefan Facsko

Ion Beam Center, Institute of Ion Beam Physics and Materials Research, Helmholtz-Zentrum Dresden-Rossendorf, Dresden/Germany

Tuesday, 21th November 2023, 16:00 s.t.
TU Wien, Institut für Angewandte Physik, E134
1040 Wien, Wiedner Hauptstraße 8-10
Yellow Tower „B“, 5th floor, SEM.R. DB gelb 05 B

Ion-induced Nanopatterning: New Insights from in-situ X-Ray Scattering Studies and Numerical Simulations

A plethora of self-organized nanoscale patterns emerge on surfaces which are irradiated by low-energy ion beams. Depending on the irradiation conditions, hexagonally ordered dot or pit patterns, checkerboard patterns, as well as periodic ripple patterns are formed spontaneously due to the non-equilibrium conditions induced by continuous ion irradiation. In-situ studies of the surface morphology can reveal the kinetics of the patterning process, yielding further insight into the dominant mechanisms and thus enabling to gain precise process control. For instance, by real-time in-situ Grazing Incidence Small Angle X-Ray Scattering (GISAXS) investigation the significant morphological parameters of the surface are deduced, thus tracking the development of the crystalline Ge(100) surface morphology during ion irradiation. Observing the kinetics of pattern formation in the non-linear regime, we find that the temporal evolutions of characteristic length and roughness conform to power laws, their exponents agreeing with scaling laws for conserved continuum equations with four-fold symmetry.

Stefan Facsko, born in Timisoara, Romania, studied physics at the RWTH Aachen from 1986 to 1993. He continued with his PhD at the same university in the Institute of Semiconductor Technology, led by Prof. Heinrich Kurz, where he defended his thesis „Particle Emission from Semiconductor Surfaces Induced by Ion Beams and Ultra-short Laser Pulse: Applications in Nanotechnology and Analysis“ in 2001. In 2003 he changed to the Helmholtz-Zentrum Dresden-Rossendorf (HZDR) and became a junior research group leader for „Highly Charged Ions“ at the Ion Beam Center in the Institute of Ion Beam Physics and Materials Research. Later he continued as a group leader for „Ion Induced Nanostructures“ and „Ion Beam Analysis“. Since 2019 he is leading the Ion Beam Center.

All interested colleagues are welcome to this seminar lecture (45 min. presentation followed by discussion).

Friedrich Aumayr
(LVA-Leiter)

Richard Wilmhelm
(Seminar Chair)