Institut für Physik
Montanuniversität Leoben
A-8700 LEOBEN, Franz Josef Straße 18, Austria
Tel: +43 3842 402-4601, Fax:+43 3842 402-4602
e-mail: physics@unileoben.ac.at

S E M I N A R

aus

Halbleiterphysik und Nanotechnologie

Di, 24.11.2015, 11:00 Uhr

Hörsaal für Physik

”Scalable growth and integration of low-dimensional nanomaterials”

Dr. Bernhard C. Bayer,
Faculty of Physics, University of Vienna, Austria

Two-dimensional (2D) and one-dimensional (1D) nanomaterials such as graphene, hexagonal Boron-Nitride, transition metal dichalcogenides and carbon nanotubes are set to revolutionise transparent and flexible electronics, add unprecedented efficiency to energy harvesting/storage devices and also function as ultimately thin functional coatings of structural materials. There are however two current key roadblocks for real-world low-dimensional nanomaterials applications: First is the need to develop industrially-scalable synthesis methods for low-dimensional nanomaterials with controlled properties, where the most promising synthesis technique is chemical vapour deposition (CVD). Second, actual real-world device applications will require all these novel low-dimensional materials to integrate seamlessly with a wide range of other established functional (nano-) materials such as metals, metal-oxides or organic semiconductors. Understanding and control of the resulting structural, chemical andelectronic interaction phenomena remains however elusive. In this talk I will describe how both issues are addressed by combining parametric CVD and integration process development with advanced nanomaterials characterisation: A combination of in-situ techniques (such as X-ray photoelectron spectroscopy and X-ray diffractometry during scalable CVD conditions and realistic processing) with atomically-resolved scanning transmission electron microscopy thereby provides the critically required physical and mechanistic insights towards rational 2D and 1D growth and integration process design.