chemisch
physikalische
gesellschaft

Gegründet im Jahre 1869 von H. Hlasiwetz,
J. Loschmidt, J. Petzval und J. Stefan

EINLADUNG

zum Vortrag von

Prof. Dr. Horst Hahn

Karlsruhe Institute of Technology (KIT), Institute for Nanotechnology,
Karlsruhe, Deutschland

Nanotechnology in modern materials science

am Dienstag, 24. Mai 2011, um 17:30 Uhr

Ort: Lise-Meitner-Hörsaal, Fakultät für Physik, Universität Wien,
1090 Wien, Strudlhofgasse 4 / Boltzmanngasse 5, 1. Stock

Barrierefreier Zugang: Boltzmanngasse 5, Lift, 1. Stock rechts über den Gang zum Hintereingang des Hörsaals

Abstract:
Nanotechnology has branched into many areas, from chemistry to physics to biology. Due to the potential for applications, the development of novel materials has been one of the main drivers of nanotechnology in the past 25 years. The impact of nanotechnological approaches on the newest developments of materials will be discussed in the presentation.

The properties of materials are typically tailored by their micro- and nanostructure. This implies control of the grain size, defect concentration, structure and metastability. As long as the microstructure does not change during the use of the material, the properties of the material are fixed. These materials exist in a wide range of morphologies, e.g. thin films, nanoparticles, nanocomposites, nanowires, and nanotubes, in different atomic structures, e.g. crystalline and amorphous, and with the incorporation of defects, such as vacancies, impurity atoms, dislocations and second phases. Some novel aspects of highly defective disordered structures, so-called nanoglasses, will be presented and their key differences to existing materials will be highlighted.

Different from tailoring the nano- and microstructure, properties of semiconducting materials can be tuned reversibly by the application of external fields due to the space charge regions which extend far from interfaces. In conducting systems, this effect, normally, it cannot be observed unless the dimensions of the structures are in the nanometer scale. The reason for this different behaviour is the small spatial dimension of the space charge regions due to the effective screening of the induced charges by the conduction electrons.

Several examples of tuneable property changes for metal and oxide nanostructures in the form of thin films and nanoporous, nanoparticulate structures will be presented. The focus will be on the tuneable electrical conductivity of conducting nanostructures. The potential for applications in printable electronics, based on the observation of field-induced effects using electrochemical gating of oxides will be illustrated.