JOHANNES KEPLER
UNIVERSITÄT LINZ

PHYSIKKOLLOQUIUM
Fachbereich für Physik

Im Rahmen des Physikkolloquiums spricht

Prof. Dr. Joachim Mayer

Central Facility for Electron Microscopy, RWTH Aachen University, 52074 Aachen, Germany
and
Ernst Ruska-Centre for Microscopy and Spectroscopy with Electrons, Research Centre Juelich, 52425 Juelich, Germany

über

Nanoswitches: resistively switching chalcogenides and their future potential for nonvolatile memory and neuromorphic computing

The invention of aberration correctors has revolutionized the development of TEM and STEM instrumentation. In order to provide a platform for these novel developments and based on the experience with the first aberration corrected TEM, Research Centre Juelich and RWTH Aachen University have jointly founded the Ernst Ruska-Centre for Microscopy and Spectroscopy with Electrons (ER-C). In the lecture, the present state of aberration corrected TEM will be outlined and it will be shown how it has improved the possibilities and accuracies of measurements on the atomic scale. As primary example, applications to resistive switching phenomena in both oxide and phase change materials on the basis of the local structural and bonding information at the atomistic level will be presented. By employing aberration-corrected HRTEM and STEM, we conduct a detailed analysis of the atomistic structures of the different phases and defects, which are considered to play essential roles in the switching properties of oxides and other chalcogenides. In our experiments, we aim at elucidating the atomistic structure of the filaments and elementary clusters which control the switching kinetics. Monochromated STEM enables us to obtain atomically resolved information on the electronic structures of the nanoscale defects and their coupling to the structural transitions. The results provide insight in the formation and disruption of the atomistic structure of the elementary defects which essentially control the switching kinetics and the performance in future devices.

Datum: Mi, 19.10.2022 **Zeit: 17:15 Uhr** **Ort: HS 19**