Neues Denken. Neue Materialien.

INM-KOLLOQUIUM

"NEW VIEWS ON THE NANO-WORLD OFFERED BY THE MULTI-SIGNAL SCANNING TRANSMISSION ELECTRON MICROSCOPE (STEM)"

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INM, Leibniz-Saal, Campus D2 5
Gastgeber: Prof. Niels de Jonge

In electron microscopy, the information results from the interaction mechanisms between the primary beam of electrons and the material under study. Consequently, all efforts and successes aimed at improving the instrumentation for signal acquisition and at developing the required software for data processing and for theoretical simulation, radically extend the domains of application of the newly designed instruments, thus opening wide and unexpected fields in many domains of research. In particular, the recent developments of the Scanning Transmission Electron Microscope (STEM) pave the way towards a very comprehensive characterization of individual objects of the nanoworld, either isolated or in interaction. Major progress concern the properties of the incident electron probe delivered from the high brightness source and shaped by monochromators, aberration correctors and eventually holographic masks. The present contribution will however focus on the multi-detection strategy around the specimen, allowing the collection of complementary signals of scattering (imaging), absorption (EELS) and emission (EDX, cathodoluminescence) nature. Basically, the new generation of instruments combines spatial resolution down to the sub-Å level (so that atomic-level imaging and chemical mapping have become routinely accessible) and spectral resolution in the tens of meV range for EELS spectroscopy giving access to plasmonics, electronics and even phononics studies. With the support of theoretical tools and computing assistance to model structures and to calculate electron states, the impact of these upgraded instrumentation and methods will be demonstrated through studies on nano-objects, surfaces and interfaces, of natural or artificial origin, which can now be fully characterized individually in terms of atomic structure, elemental composition, electronic and optical properties.
This multi-signal approach in the STEM constitutes the first step for designing and using the next generation of instrument dedicated to nanophysics, incorporating for instance. time-resolution with pulsed electron guns or control of the environmental parameters at the specimen level (temperature, gas or liquid cell, laser beam illumination) in a dedicated nanolaboratory.

Wir laden 15 Minuten vor Beginn zu einem Get-together mit dem Referenten ein.

KONTAKT

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