Karlsruher Institut für Technologie

KIT-Fakultät für Physik

Einladung zum Physikalischen Kolloquium

14.02.2025 **Yolita M. Eggeler, Karlsruher Institut für Technologie**

»Unlocking the Nanoscale: New Insight Gained with Advanced Transmission Electron Microscopy«

Einführung: G. Drexlin

The interaction of a high-energy, focused electron beam with matter generates a multitude of sig-nals, enabling us to explore the nanoscale world of materials and make the unseen visible. Electron microscopy (EM) takes advantage of the wave-particle duality of electrons to reveal atomic ar-rangements, crystallographic and chemical details of nano- and microstructures, and provides rele-vant information in the real and reciprocal space. Specific research topics demand tailored ap-proaches, depending on what needs to be explored and what the properties of the materials in ques-tion are. Moreover, advancements in electron microscopy techniques need to be considered.

In my presentation I will offer a brief overview of research activities in three key areas: Quantifica-tion method development to address the critical issue of beam-induced contamination, the analysis of internal interfaces in technologically relevant multicomponent alloys, and the high resolved char-acterization of internal structures and composition in 3D-printed microelectronic devices for piezoe-lectric applications, Figure 1.

One significant advantage of transmission electron microscopy (TEM) is its ability to provide rich atomic-scale insight and complete structural and compositional information beyond the results of other techniques with similar resolution like synchrotron and neutron beam lines. A close by EM facil-ity strengthens interdisciplinary materials related research in physics, chemistry and materials engi-neering. However, accessing advanced TEM capabilities does come with challenges such as quali-fied scientific staff, high instrument costs, special requirements regarding lab space, interdisciplinary labor and cost intensive specimen preparation. Like for all other experimental activities, regular hard and software updates and an extensive maintenance of the supporting infrastructure.

The presentation outlines these aspects of TEM research, and shows that it is a fascinating research field which is well worth the effort to keep it up at a high internationally competitive level.

After the presentation, the LEM warmly invites you to join for a reception - an opportunity to further discuss electron microscopy and exchange ideas. We look forward to seeing you there!

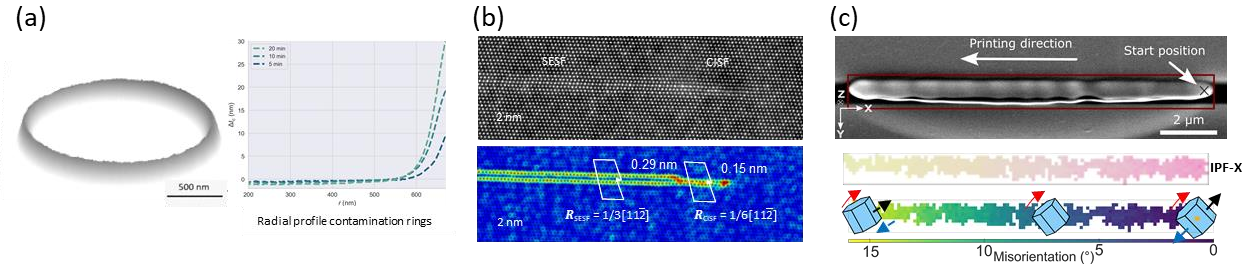

Figure 1: Electron microscopy research activities in three key fields: (a) Method development for addressing local contamination, (b) analysis of internal interfaces in multicomponent alloys, and (b) 3D characterization of microelectronic devices for piezoelectric applications.

Der Vortrag findet **am Freitag, den 14. Februar 2025 um 15:45 Uhr im Otto-Lehmann-Hörsaal**, Physik-Flachbau (Geb. 30.22), KIT-Campus Süd statt.

Karlsruher Institut für Technologie (KIT)
Universitätsaufgabe • Campus Süd
KIT-Fakultät für Physik

Physik-Hochhaus, Geb. 30.23
76128 Karlsruhe
Wolfgang-Gaede-Straße 1

www.physik.kit.edu
fakultaet@physik.kit.edu
Tel.: (07 21) 6 08 – 4 35 18