

MONASH CENTRE FOR ELECTRON MICROSCOPY

The TOMO project – Integrating a fully functional atom probe in an aberration-corrected TEM

Date: Monday, 25th November 2024

Time: 2:00 – 3:00PM

Venue: Theatre S1,
16 Rainforest Walk, Monash Clayton Campus

Abstract

In this presentation, I will introduce the TOMO microscope, which integrates an atom probe into a TEM. The main motivation in this project is to combine the particular advantages of each technique and make significant steps towards an improved materials characterization at the atomic level. On the one hand, atom probe tomography provides superior elemental sensitivity via time-of-flight mass-per-charge spectroscopy together with inherent 3-dimensional resolution. On the other hand, aberration-corrected TEM can provide sub-Ångström spatial resolution in projections.

The combination into one instrument requires technological advances in several areas and some solutions to these problems are discussed in detail. The approach implemented in the TOMO microscope allows us to switch between TEM and atom probe data acquisition within seconds. We expect that the ability to obtain intermediate, high-resolution updates on the apex shape of the specimen from TEM images, as well as additional microstructural and crystallographic information, will help us to improve the 3D reconstruction, in particular its spatial resolution. I will present preliminary experimental data from a prototype instrument.

Biography

- Studied Physics at the RWTH Aachen University
- Diploma work on the interaction of extreme ultra-violet (EUV) radiation with matter and design of an EUV microscope
- PhD on the ultra-precise measurement of optical aberrations for sub-Ångström TEM at the Forschungszentrum Jülich
- PostDoc in Jülich, characterization of membrane materials for carbon capture and storage techniques
- Since 2009, staff scientist at RWTH Aachen University and Forschungszentrum Jülich, responsible for Cs- and Cc-corrected electron microscopes at the Ernst-Ruska Centre



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