KFM 3: Instrumentation and Methods for Micro- and Nanoanalysis (joint session KFM/CPP)

Chair: Prof. Dr. Theo A. Scherer (KIT Karlsruhe)

Time: Monday 14:30–15:30 Location: POT 106

KFM 3.1 Mon 14:30 POT 106

The Hitchhiker's Guide to BCARS on Solid-State Single Crystals — •Franz Hempel[1], Lukas König[1], Federico Vernuccio[2], Dario Polli[2], Giulio Cerullo[2], Michael Rüsing[1], and Lukas Matthias Eng[1,3] — [1]Institut für Angewandte Physik, TU Dresden, 01187 Dresden, Germany — [2]Physics Department, Politecnico di Milano, 20133 Milano, Italy — [3]ct.qmat: Dresden-Würzburg Cluster of Excellence - EXC 2147, TU Dresden, 01062 Dresden, Germany

Broadband coherent anti-Stokes Raman scattering (BCARS) is an advanced Raman- spectroscopy technique that offers high-speed hyperspectral imaging and is so far widely applied in the biomedical field. For crystalline materials and their high-precision analysis, however, additional aspects of phase-matching, scattering direction, and background removal delicately need to be taken into account. To prove the reproducibility of BCARS results and pinpoint setup-related influences, we have performed a comparison study using (a) two different setups, and (b) comparing transmission with epi-detection BCARS experiments. A broad set of solid-state crystalline materials with increasing complexity was analyzed, achieving comparable, background-free spectra. Also, each machine allows the specification of optimum laser and setup parameters for inspecting the different samples.

KFM 3.2 Mon 14:50 POT 106

Novel techniques for low-energy positron beam diagnostics. — •Francesco Guatieri, Michael Berghold, and Michael Zimmermann — Heinz Maier-Leibnitz Zentrum (MLZ), Technical University of Munich, Lichtenbergstr. 1, 85748 Garching, Germany

Modern surface analysis techniques based on low-energy positron annihilation require the use of a stable, focused and intense particle beam. Although several techniques are available to beam scientists to measure position, shape and intensity of a positron beam, each comes with its own limitations either in terms of precision, cost or measurement time. We will present two innovative techniques to detect low-energy positrons with the goal of performing beam optimization, each of which improves onto the previous state of the art.

KFM 3.3 Mon 15:10 POT 106

Accessible electron microscopy: Adding an EELS workflow to the ChemiTEM project — •Daniela Ramermann, Julia Menten, Elisabeth H. Wolf, and Walid Hetaba — Max-Planck-Institut für Chemische Energiekonversion, Mülheim an der Ruhr

Transmission electron microscopy is a versatile tool for the investigation of micro- and nanostructures as well as chemical and electronic properties. However, TEM experts are needed to perform the majority of analytic measurements, which represents a bottleneck in the throughput of research. To broaden access to TEM investigations for every scientist, the ChemiTEM project[1] has developed workflows for the most used techniques (HRTEM, STEM, EDX). These are implemented in an app and guide the user through every step after only a basic training.

Now a workflow for EELS measurements has been added: For the three most used measurement scenarios, assessing sample thickness, elemental mapping and oxidation state determination, a decision-tree based workflow has been created. A prerequisite is the STEM alignment from the ChemiTEM app. A set of questions about the sample evaluates if EELS measurements using the workflow are possible or a TEM expert is needed. Step-by-step instructions guarantee a standardised measurement and data quality. The workflow can be easily adapted to other microscopes and makes EELS based techniques available to a broader community.

[1] Hetaba et al., Chemistry-Methods, 1, 401-407, https://doi.org/10.1002/cmtd.202100001