

Microscopic methods for chemists – with an emphasis on SEM

Lecture by Martin Jönsson-Niedziółka, martinj@ichf.edu.pl

The lecture will introduce the students to the basic concept of microscopic techniques starting from the fundamental principles of microscopy (components, basic optical theory). Further, the lecture will cover variations in optical microscopy (widefield, confocal, brightfield vs. darkfield, fluorescence microscopy, high-resolution microscopy) and the principle of force microscopy (AFM). The main focus will be electron microscopy with a general introduction to SEM and TEM and an in-depth lecture about SEM and EDX, which will be deepened with an additional 4 hours of practical hands-on sessions.

Completion of the course will give students the possibility of using and booking the institute's SEM.

Course Outline:

- History of Microscopy – basic optics and components of a microscope (2h)
- Optical microscopy – comparison between different techniques; how to overcome the resolution limits (I^5M , 4π and STED) and fluorescent microscopy (3h)
- AFM (1h)
- Principle of electron microscopy, electron-material interaction, SEM vs. TEM (3h)
- SEM – backscattered, EDX, limitation, artefacts (2h)
- SEM – examples, what is a good image and what's not (1h)
- Practical SEM session (4h)

The course will take place in the summer semester starting in late February 2025.