

# ANYAGTUDOMÁNYI SZEMINÁRIUM 2016

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### Research Interests:

- Nanocrystalline materials: synthesis, properties and interactions.
- Thin films and interfacial phenomena.
- Chemical deposition of semiconductor thin films: microstructure, morphology evolution and chemical epitaxy.

**Aims of the module:** The module will provide an introduction to modern materials characterization techniques and their principles of operation.

**Objectives of the module:** The module will provide students with basic concepts in interaction of radiation with matter, and will present several key techniques for the characterization of bulk material as well as surfaces. Classification to microscopy, scattering and spectroscopy techniques will provide the students with effective means for assigning the proper characterization tools for a given problem in materials characterization.

### Module Content/schedule and outlines:

Introduction to materials characterization

Transmission electron microscopy and electron diffraction

Scanning electron microscopy

Micro and nanoanalysis using characteristic x-rays

X-ray photoelectron spectroscopy and Auger spectroscopy

Summary and conclusions

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**Learning outcomes of the module:** On successful completion of the course, the student should be able to:

1. be familiar with basic concepts in interaction of radiation (e.g., electrons and x-rays) with solid matter.
2. understand basic principles in materials characterization, such as quantitative and semi-quantitative analysis, bulk vs. surface analysis, sensitivity and detection limits.
3. be familiar with transmission electron microscopy and its principles of operation.

4. be familiar with scanning electron microscopy and its principles of operation.
5. understand x-ray microanalysis (EDS) and the fundamental differences between EDS coupled with scanning vs. transmission electron microscopy.
6. understand surface analysis techniques such as x-ray photoelectron and Auger spectroscopies and their principle of operation; be able to explain the origin of surface sensitivity in these techniques.