Course:
Transmission Electron Microscopy (TEM) Specimen Preparation Methods in Materials Science

Course responsible and examiner:
Justinas Palisaitis,
Electron Microscopy of Materials Group, Thin Film Physics Division at IFM
Email: justinas.palisaitis@liu.se
Office: room P407

Course period:
September-October 2020, provided sufficient interest.

Target audience:
Students who have (/will have) the need for TEM specimen preparation (/in the near future). Priority will be given to:
- students at IFM
- students that are utilizing TEM results in their research, we welcome also students from other departments and other disciplines.

Course aims and outcomes:
TEM is a powerful microscopy technique enabling material investigations on the atomic level. However, TEM investigations require ultra-thin specimens in order for electrons to be transmitted through with number of additional requires for specimens’ quality. This makes TEM specimen preparation of the key importance in order to achieve the optimum TEM characterization results.

The course aims to provide an in-depth understanding of various TEM specimen preparation methods with focus on techniques available at IFM. The emphasis will be placed on efficient hands-on training for different techniques in order to acquire and put required skills in practice.

The course will cover the following topics:
- Basic introduction to TEM and TEM specimen requirements.
- Traditional TEM specimen preparation methods (e.g., cross-sectional ‘sandwich’, plan-view, powders, tripod, small angle cleavage, etc.).
- Focused Ion Beam (FIB).
- Artifacts induced by TEM specimen preparation.
- Recent advances in TEM specimen preparation.
- Safety during TEM specimen preparation.
After successful completion of the course, participants will have proficiency to:

- choose and implement the most appropriate TEM specimen preparation protocols for a given sample with regards to the type of analysis needed.
- demonstrate the practical skills in operation of TEM specimen preparation equipment in efficient way.
- be aware of artefact induced by the preparation.
- work safely and handle waste properly in sample preparation rooms.

Course content and format:
The course consists of lectures (3 x 45 min), seminar (1 x 45 min), laboratory exercises (24 h), self-study of scientific articles, and self-practice in the lab.

Course literature:
Lecture notes, research articles and other hand-outs.

Criteria for passing the course:
Compulsory and active participation in all course activities, demonstration of practical skills in the lab and writing lab report.

The participants who passes the course will be:
- awarded with 3 ETC.
- authorized to perform TEM specimen preparation in sample preparation rooms (M215, M216, and M219).
- given the license to book ion milling systems: Merry & Pippin.

Registration:
Send an email to justinas.palisaitis@liu.se before 2020-09-04, with your name, affiliation and information about which type of samples you intend to prepare for your research. Further information and exact time plan will be distributed to the registered participants before the course start.