VAMAS

Quantitative Microstructural Analysis

TWA 37

Call for Participation

Project 8

Guidelines on FIB Preparation of APT Specimens

Objectives

The guidelines specified in ISO/TC202 are for FIB (focused ion beam) preparation of APT (atom probe tomography) specimens, which need to be in nanometer sizes (10 to 100 nm level) and free of ion beam damage. Thus, the APT specimens can be detected with atom-resolution regarding their micro-structure and composition. Challenges and drawbacks must be well-known to avoid ion-beam damage and prepare extremely thin sample, by FIB. Here, FIB, APT, TEM and EDS measurements are needed.

Background

A project with emphasis on advanced FIB technology and professional APT specimen preparation is needed for standardization, since the recent FIB technological developments can provide perfect solution for the challenging task. The specimen preparation currently relies on the standards of TEM field, which are lacking of professional APT issues.

Relevant Standards

i) ISO/CD 16887: standardising FIB sample preparation, with some content applicable to FIB's TEM sample preparation.
ii) ASTM E2014: related content concerning ion beam sample processing and subsequent electron microscope microanalysis.

Standardization needs

Guidance is needed for the following:

- Provide harmonised protocols, with typical samples like Au/Si APT
- Contribute to pre-normative work by offering reference samples and reproducibility data by means of interlaboratory comparisons
- Relevant standards for related techniques include ISO/CD 16887 (FIB sample preparation for TEM) and ASTM E2014 (FIB techniques)
- Support of ISO TC201/SC1 activities on APT

Measurement Techniques

- FIB and APT
- TEM and EDS measurements for the prepared APT specimens

Work Programme

- Year 1 (2025–2026): Preparation of APT specimens by FIB and pilot studies in lead laboratories
- Year 2 (2026–2027): Interlaboratory comparison (ILC) across multiple labs; collection of APT datasets by project lead
- Year 3 (2027–2028): Statistical evaluation of reproducibility; preparation of report documents

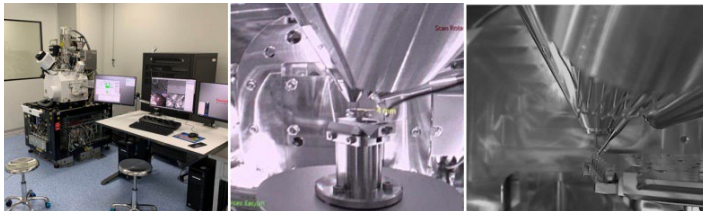

Fig. 1 APT preparation by FIB

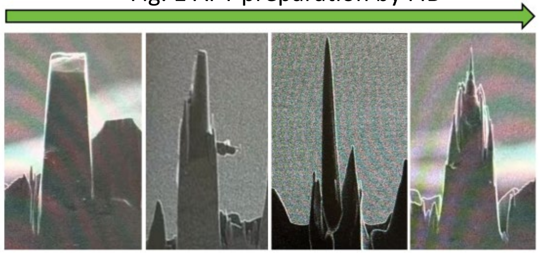

Fig. 2 APT preparation process *via* FIB

Deliverables and Dissemination

The expected products include:

- One chapter book on FIB specimen preparation for APT
- Two workshops on FIB specimen preparation of APT (with typical sample Au-coated Si), and perform FIB, APT, TEM and EDS measurements
- Two presentations on FIB preparation of APT specimen
- One research /test procedure
- One technical report and a draft for future standardisation

Funding

Participants fund their own involvement in the project.

Status

The project is due to start in November 2025 and finish by December 2028.

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