



INSTRUMENT USE SHEET

SCANNING ELECTRON MICROSCOPE ESEM-FEG XL30 FEI (PHILIPS) WITH EDAX ELEMENT EDS MICROPROBE FOR ELEMENTAL ANALYSIS

General Information

Instrument: Scanning Electron Microscope with elemental analysis microprobe

Brand: ESEM-FEG XL30 FEI (PHILIPS) + EDAX Element EDS microprobe

Location:

- CRIETT – Valleggio Anello
- Via Valleggio 11, Como
- Floor: basement level, Electron Microscopy laboratory

Contact people:

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Training path: Yes*

* Autonomous use of the instrument is allowed starting from PhD level and above. Practical training consists of individual instruction (several days of training, the duration of which is defined by the instrument contact person based on an assessment during supervised training).

Internal tickets can be viewed on the intranet page (access with university credentials): <https://intranet.uninsubria.it/areadocumenti/ticket-strumenti-criett-utenti-interni>

The fee schedule for external users can be viewed on the website:
www.uninsubria.it/criett

Traceability of CRIETT services in scientific publications (see CRIETT Regulation Art. 11): It is mandatory to acknowledge in scientific publications the CRIETT large instrumentation used, according to the following formula:

“The scientific support from CRIETT centre of University of Insubria (instrument code: XXX) is greatly acknowledged”.

Instrument code: MAC09

Access Mode

1. Direct Access (Self-Service)

Who: Only users who use the instrument continuously have received specific training and are authorized by the instrument contact person.

Mode: The trained user can independently access and operate the instrument, booking via Google Calendar.

2. Technical Scientific Service Access (Full Service)

Who: Research groups using the instrument occasionally, external users, or users without qualified personnel.

Mode: Access is provided through dedicated technical staff, who manage booking and instrument operation.



3. Occasional/Temporary user

May access the instrument through the contact person or an authorized user.

Description and Functionality

Instrument for high-resolution microscopic observation of surfaces. It is equipped with a field emission gun (FEG) that produces a high-brightness electron beam, enabling images with excellent contrast and detail. The system provides high-resolution surface morphology imaging with topographical and material contrast (SE and BSE detectors).

Integration with an EDAX EDS microprobe enables qualitative and quantitative elemental analysis of chemical elements, including elemental mapping and line scans to visualize spatial distribution.

The instrument is equipped with a Cressington sputter coater accessory for gold coating of non-conductive samples.

Technical Specifications – SEM ESEM-FEG XL30

- Type: Scanning Electron Microscope (SEM) with ESEM capability
 - Electron source: FEG (Field Emission Gun) – high-brightness field emission source
 - Acceleration Voltage (HV): ~200 V – 30 kV
 - Operating mode: currently high vacuum only
 - Magnification: ~10× to ~300,000×
 - SEM detectors: Secondary electrons (SE) and backscattered electrons (BSE)
 - Sample stage: multi-axis movement (X, Y, Z, tilt, rotation)
 - Working distance (WD): variable (typically 5–25 mm)
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Technical Specifications – EDAX Element EDS

- Technique: Energy Dispersive X-ray Spectroscopy (EDS)
- Detector: SDD (Silicon Drift Detector) with thermoelectric cooling
- Detectable element range: Boron ($Z \approx 5$) to Uranium ($Z \approx 92$)
- Analytical mode: Spot analysis, line scan, elemental mapping
- Software: EDAX TEAM platform for spectral control and analysis

Safety Warnings

- Use only after completing the training program
- High voltage operation: do not open electronic panels or modules. Internal maintenance must be performed only by qualified technical staff
- The microscope operates under high vacuum: do not open the chamber until the system is fully vented
- Vent only when the stage is in the “safe vacuum” position
- Always wear nitrile gloves when inserting or removing samples
- Insert only dry and vacuum-compatible samples. Avoid samples containing water, solvents, or volatile materials
- Do not introduce materials that may evaporate, sublime, or outgas, to avoid contamination of the column and detectors
- Always properly mount the sample on the stub; avoid loose powders or unstable materials
- Non-conductive samples may accumulate charge, causing artifacts or damage; use conductive coating if necessary (consult supervisors for sputter coater use after training)
- Collision risk: always verify sample size and position to avoid contact with the BSE detector

- For data storage, use only USB drives formatted and scanned with updated antivirus software
- In case of anomalies, system crashes, or vacuum issues, stop the analysis and notify a supervisor
- If in doubt about sample compatibility or instrument use, consult a supervisor

Operational Notes

- Instrument booking is mandatory via the internal management system (online Google Calendar – access granted after completion of training)
- Self-service use is allowed only for trained and authorized users
- Any malfunction must be promptly reported to CRIETT staff

Materials and accessories provided by CRIETT

- Sample stubs
- Carbon tape
- Copper tape
- Gloves
- Tweezers
- Scissors
- Gold targets for sputter coaters

Materials and accessories provided by the user

- Anything not explicitly listed in the section above