

JOB ADVERTISEMENT **AREA Science Park, Trieste, Italy**

We are seeking for highly motivated scientists with proven experience in Transmission Electron Microscopy to work at LAME (Laboratorio di Microscopia Elettronica) in the newly establishing world-class Electron Microscopy Center at Area Science Park in Trieste (Italy).

Highly motivated candidates will be selected for a **Researcher position (12 months renewable and with possible permanent career prospects)**. All documentation relative to the call and instructions on how to apply are available here: <https://amministrazionetrasparente.areasciencepark.it/selections/selezione-pubblica-a-tempo-pieno-e-determinato-di-1-ricercatore-di-iii-livello-progetto-pnrr-nffa-di-cup-b53c22004310006-riferimento-bando-td32024-profilo-electron-microscopy-researcher/>

Deadline for applications is November 8th

IMPORTANT NOTE: Merit ranking will remain open up to two years and top ranked candidates will be automatically considered for additional positions on presently active projects. Based on current project fundings, we have the opportunity to scroll down to the fourth ranked candidate with start of the job from January 2025. Applicants are encouraged to apply and to provide a fully comprehensive CV with all their scientific and technical skills after verification of the possession of all formal requirements (possession of permanent residence in Europe at the time of the submission is a mandatory prerequisite).

DESCRIPTION OF LAME

The Electron Microscopy Center (LAME, Laboratorio di Microscopia Elettronica) at AREA Science Park in Trieste has formally established in 2022 and focuses its activities on the advanced characterization of materials, as part of the Innovative Materials Platform. Here a list of some of instrumentation:

- a Jeol JEM F200 TEM/STEM (cold FEG) equipped for
 - advanced chemical analysis,
 - double EDX and EELS (also with hybrid pixelated detection and 4DSTEM)
 - tomography and in-situ applications
- a Tescan Amber X Plasma FIB-SEM for:
 - high-end in situ lamellae preparation
 - advanced slice and view and 3D chemical mapping
 - in situ batteries device shaping (including sample transfer under controlled environment)
 - high-end HTofSIMS (coming soon update)
- a JEOL Grand Arm 300 KV (cold FEG), state-of-the art double corrected TEM/STEM microscope equipped for:
 - low dose TEM and STEM imaging modes;
 - phase contrast methods in TEM and STEM, including techniques based on 4D STEM;
 - optimized bright field imaging and DPC for visualization of light elements (e.g. Li);
 - advanced chemical analyses by double EDX with wide collection angle;
 - high resolution EELS spectroscopy coupled to a hybrid pixelated detector for low background noise spectroscopy and measurements at high energy range;
 - advanced data analysis based on open-source python-based packages.

The main research activities at LAME are based on:

- Advanced analysis of materials using TEM instrumentation capable of carrying out nanostructural analyzes using a corrected probe up to sub-Angstrom resolution and electron loss energy spectroscopy up to resolution lower than 300meV;
- Fine analysis of materials using TEM instrumentation capable of carrying out high resolution TEM and STEM analyses, tomographic and chemical compositional analyses;
- Nanomanipulation, growth of nanostructures and in-situ preparation of lamellae for TEM microscopy using dual beam focused technology (Dual Beam FIB-SEM);
- Morphological and chemical-compositional analysis of materials by scanning electron microscopy (SEM);
- In-situ/In-operando TEM/SEM analysis of transient states inside materials such as structural transitions, effects of corrosive processes, etc.

Additional information on the general framework of the Research activities

In line with the general characteristics of the profile, successful candidates will work on competitive research projects in the area of electron microscopy applied to materials science as well as on instrumentation development for correlative approaches between different instrumental techniques, including the design of portable devices for in-situ/in-operando analysis on different instrumentation and their transfer through multiple environments. The major (not exclusive) research focuses will be:

FOCUS 1 - ADVANCED ELECTRON MICROSCOPY OF NANOSTRUCTURED MATERIALS AND ON HETEROSTRUCTURES IN FORM OF THIN FILMS

Required experience in transmission electron microscopy and characterization of structural chemical and physical properties of materials as well as good knowledge of typical materials science research topics generally addressed by electron microscopy and its complementarity with other experimental techniques. Prior experience in TEM/STEM characterization of complex oxide systems, EELS, 4DSTEM, DPC, PED, data analysis and simulation of TEM/STEM images, and on in-situ TEM/STEM/SEM experiments will be most positively valued. The successful candidate will work at the experimental activities concerning characterisation by scanning and transmission electron microscopy of nanostructured materials in strong connection with the research groups devoted to thin films growth and synchrotron-based advanced electronic characterization operational within the AREA Science Park campus in Basovizza.

FOCUS 2 - IN SITU/IN OPERANDO ELECTRON MICROSCOPY AND COMBINED SYNCHROTRON SPECTROSCOPIES IN MULTIPLE ENVIRONMENTS

Required experience in electron microscopy and characterization of structural, chemical and physical properties of materials in operating materials handling systems using Focused Ion Beam for deep chemical/physical measurements of materials (e.g., slice-and-view, lamellae extraction), of developing instrumentation for correlative approaches will also be positively evaluated. The successful candidate will work at the experimental activities concerning in operando characterization by transmission electron microscopy of different materials systems (e.g. catalysts, liquid/solid interfaces, batteries, hydrogen storage/production) in different environments (liquid, ambient pressure, etc...). He/she will contribute to the design of MEMS nanoreactors for operando TEM on different applications (batteries research as well catalytic applications) in combination with other techniques also including synchrotron spectroscopy.

FOCUS 3 – ANALYSIS OF ELECTRON MICROSCOPY DATA AND MACHINE LEARNING IN ELECTRON MICROSCOPY APPLIED TO MATERIAL SCIENCE

Prior experience in Electron Microscopy as well as with one or more programming languages commonly used for large-scale data management and machine learning (such as Python, C++, Scala, Julia, etc.), with Analysis of electron microscopy data and with applying software engineering practices in a scientific environment, or another environment with similar characteristics are required. The successful candidate should contribute to conceive and devise innovative algorithms for remote control interfaces for electron microscopy equipment, to develop foundation AI models for experimental metadata/data integration and cross domain analysis, to build, deploy, optimize and manage correlative analysis pipelines for scientific analysis, and machine learning workflows in an integrated, usable framework to understand scientists' needs across a wide range of instrumentation techniques by collaborating with both users and software engineers, to bridge the communication gap between experimental scientists, algorithm developers and software deployers, to demonstrate software engineering skills to develop reliable, scalable, performant distributed systems in a cloud environment.

Candidates are encouraged to contact Dr. Regina Ciancio – Head of LAME - (preferably as soon as possible) for further information about the position, technical issues regarding the application, and future perspectives. (regina.ciancio@areasciencepark.it)