

JOB ADVERTISEMENT
AREA Science Park, Trieste, Italy

We have now multiple openings to work at LAME (Laboratorio di Microscopia Elettronica) in the newly establishing world-class Electron Microscopy Center at Area Science Park in Trieste (Italy).

Valuable research associates will be given the opportunity to work in an international and multidisciplinary environment to perform cutting-edge research and be involved in competitive research projects.

Highly motivated candidates will be selected to fill **2 positions as Research Technologists (18 months, with possible permanent career prospects)** having the following general professional profile:

General description of Profile B – 2 Electron Microscopy Technologists

Technologists shall perform the activities described below in the Materials Science sector using scanning and transmission electron microscopy, with a sufficient level of independence:

- installation and commissioning of microscopy laboratories of the Institution;
- research activity for development of instrumentation for combined approaches between different instrument techniques, including the planning of advanced methods for preparation of samples for electron microscopy and devices for in-situ/operando analysis with different instrumentation and transfer in a controlled environment
- research into the characterisation of materials using scanning and transmission electron microscopy;
- training and access to instrumentation for national and international academic and industrial users
- publication in national and international journals and on conference proceedings of scientific articles describing the most important results of research activity;
- participation in seminars and events aimed at sharing scientific knowledge to promote collaboration between researchers at the Institution and those from other organisations
- management of electron microscopy and related technical expertise (e.g. vacuum and ultra-high vacuum pumping systems).

Deadline for applications is November 17th

All documentation relative to the call and instructions on how to apply are available here:

<https://www.areasciencepark.it/selections/selezione-pubblica-per-titoli-ed-esami-per-lassunzione-con-contratto-di-lavoro-a-tempo-pieno-e-determinato-di-n-4-posizioni-di-tecnologi-di-iii-livello-professionale-del-c-c-n-l-i/>

Merit ranking will remain open up to two years and top ranked candidates will be automatically considered for additional positions on presently active projects. In this regard, applicants are encouraged to provide a fully comprehensive CV with all their scientific and technical skills.

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 advanced sample preparation methods for electron microscopy and devices for in-situ/in-operando analysis on different instrumentation and their transfer through multiple environments. The major research assets will be:

FOCUS 1 - ADVANCED CHARACTERIZATION BY ELECTRON MICROSCOPY OF NANOSTRUCTURED MATERIALS AND ON HETEROSTRUCTURES IN FORM OF THIN FILMS (Profile B in the call)

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, data analysis and simulation of TEM/STEM images, and on in-situ TEM/STEM/SEM experiments will also be 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 CHARACTERIZATION OF MATERIALS BY ELECTRON MICROSCOPY AND COMBINED SYNCHROTRON SPECTROSCOPIES IN MULTIPLE ENVIRONMENTS (Profile B in the call)

Required experience in electron microscopy and characterization of structural, chemical and physical properties of materials, as well as good knowledge of sample preparation techniques for electron microscopy. Prior experience in instrumentation development for TEM/STEM characterization in a controlled environment, 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) 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 (Profile B and C in the call)

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 perspectives (regina.ciancio@areasciencepark.it)

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. The main research activities at LAME are:

- 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.

These research activities are presently carried out at the existing [Electron Microscopy Facilities](#) which operate in full synergy with the Research Infrastructures [Elettra Synchrotron and FERMI Free Electron Laser](#) as well as and with the other institutes and companies within the Area Science Park Campus in Basovizza.

TOWARD THE ESTABLISHMENT OF A WORLD-CLASS ELECTRON MICROSCOPY CENTER

LAME is facing a groundbreaking transition, which is to set up an international microscopy center equipped with state-of-the-art instrumentation for the advanced characterization of materials by electron microscopy. Here a list of some of instrumentation now in course of acquisition:

- 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.
- a JEM F200 TEM/STEM (cold FEG) equipped for
 - advanced chemical analysis,
 - double EDX and EELS,
 - tomography and in-situ applications
- a Tescan Amber X Plasma FIB-SEM for:
 - high-end in situ lamellae preparation,
 - advanced slice and view (including sample transfer)
 - optimized for in situ batteries device shaping and characterization with HTofSIMS
- a SEM/STEM, equipped with all analytical detectors including EBSD.

LAME is currently part of research national and EU programs and works in close collaboration with the academic and industrial world as well as with national and international bodies, providing open access to electron microscopy laboratories also in combination with other instrumentation. LAME is deeply involved in the IMPRESS project (coordinator Regina Ciancio) which aims to revolutionize the field of electron microscopy. For more info about the IMPRESS project, please go to: www.e-impres.eu or follow the IMPRESS [LinkedIn page](#).