



## OPEN PERMANENT ACADEMIC POSITION IN PHYSICAL METALLURGY

**Institution** : Mines Paris - PSL (Ecole Nationale Supérieure des Mines de Paris)  
**Laboratory** : Materials Center (Centre des Matériaux)

To further develop teaching and research activities in the field of materials science and mechanical engineering, Mines Paris, engineering school member of PSL University, opens an assistant research professor position dedicated to physical metallurgy.

This permanent position is open to young researchers that seek for interdisciplinary research work, at the interface between fundamental research and industry. The successful applicant will have the opportunity to work in close relationship with the economic world and will participate to research projects and to research contracts in his/her research team. He/she will also have the opportunity to define a PhD research project by himself/herself as soon as he/she will integrate the laboratory. He/she will be a co-supervisor of that PhD student, together with a senior (habilitated) member of the laboratory as thesis supervisor.

### 1. RESEARCH AT MINES PARIS - PSL

Along with its training activity, Mines Paris - PSL develops research covering a very broad field of scientific disciplines. The 18 Research Centers are organized into 5 Departments: Earth and Environmental Sciences, Energy and Processes, Mechanics and Materials, Mathematics and Systems and, Economics, Management and Society.

The research undertaken at Mines Paris - PSL aims both at academic excellence and socio-economic impact. This targeted research model is developed in close interaction with the socio-economic sphere: private and public sector companies, public institutions, and administrations. Mines Paris - PSL is the first school in France in terms of volume of contractual research, supported by ARMINES, the Mines Paris Foundation or Mines Paris - PSL. This original positioning has enabled the School to expand its teams (by recruiting researchers on permanent contracts using its own resources via the contractual research association ARMINES) and allows it to maintain unique experimental and digital platforms whose quality is recognized by its partners.

Located in the heart of Paris, Mines Paris - PSL brings together all areas of knowledge, innovation, and creation. Ranked among the top 50 universities in the world, PSL trains researchers, artists, engineers, entrepreneurs and managers while fostering awareness of their social, individual, and collective responsibility.

The ability of Mines Paris - PSL to work together with companies in scientific and industrial collaborative projects is recognized at the national and international levels. Regarding the Materials Center, one may cite the Silver Medal of the French Scientific Research Council (CNRS) awarded to Samuel Forest, also recently elected to the French Academy of Sciences; the Bronze Medal of the CNRS awarded to Vladislav Yastrebov. PSL is ranked 40<sup>th</sup> in the World University Rankings and Mines Paris - PSL is ranked among the top 3 higher education institutions in several well-recognized national rankings (Usine Nouvelle 2022, Figaro Etudiant 2022).

### 2. THE MATERIALS CENTER

The Materials Center is located in Evry (35 km from Paris) and associated to the French National Scientific Council (CNRS UMR 7633). Research activities address experimental characterization and modeling of the mechanical behavior of materials, and of the links between manufacturing processes and resulting microstructures. The strong link between processing conditions, materials, microstructures, and in-service properties is at the heart of the scientific strategy of the laboratory, both from a theoretical and from an experimental point of view. Research projects focus on the development of novel materials, including from additive manufacturing. The resulting

microstructures are frequently out-of-equilibrium and able to further evolve during post-processing or in service conditions.

The position is open at the Materials Center (<https://www.mat.minesparis.psl.eu/Accueil/>), composed of about 60 staff members (academic staff and technicians) and about 100 students (PhD students, post-doc, master students and specialized master students). It is organized into three research teams and six supporting platforms. The laboratory aims at increasing its staff in the field of physical metallurgy.

### **3. JOB DESCRIPTION**

The successful applicant demonstrates strong ability to conduct academic research work in Materials Science. He/she is autonomous and able to commit himself/herself in the projects that he/she will build in the laboratory. He/she will also be quickly able to find external funding through public calls (French National Research Agency, European programs, and so on), and through collaborative projects together with academic and industrial partners.

#### **Research**

The Materials Center wishes to strengthen scientific skills of the « Genesis, Evolution and Use of Microstructures » (the « GEM » team hereafter) about the links between microstructures and in-use properties of metals and metal alloys, in particular, deformation mechanisms. Within the GEM research team, the successful applicant will carry out and supervise studies of microstructure/property relationships. He/she will focus on fine-scale features such as dislocations, i.e., on physical mechanisms that govern the evolution of in-service (e.g., mechanical, thermal, electrical) properties. The main research tool will be transmission electron microscopy.

The successful applicant will carry out both fundamental and applied research in the field of physical metallurgy and of microstructure-property relationships. In the laboratory, he/she will be the reference person in this field regarding relationships with our partners such as Safran, EDF, Framatome, AddUp, Naval Group, Constellium, Aperam, ArcelorMittal, CEA, Renault, Stellantis. He/she will also work on the development of innovative materials through microstructural optimization. This historical research topic of the laboratory is still of importance, in particular, in collaborative projects with our partner Safran. Part of these projects will be oriented toward the energy transition and health-related applications. For instance, research projects could be associated to our current work in all three research teams on the interactions between hydrogen, plasticity, and fracture of metal alloys to be applied to the energy transition (<https://messiah.minesparis.psl.eu/en/home/>).

The successful applicant will participate to the development of experimental microstructural analysis facilities (including 2 SEMs, 2 TEMs, X-ray diffraction), in close collaboration with the  $\mu$ MAX technical platform which is in charge of equipment dedicated to microstructural characterization. He/she will also interact with the technical platforms in charge of manufacturing processes (EPRM), and of mechanical characterization (SESAMES). He/she will supervise and train PhD students about the analysis of microstructures and of deformation mechanisms.

The successful applicant will benefit from the links between the Materials Center, the Metallurgy research network of the Paris area (FERMI), the French National Metallurgy Network (RNM), and national and international platforms such as e.g., X-ray synchrotron facilities. He/she will actively participate to these networks. He/she will intensively collaborate with the researchers from the three research teams of the laboratory, in order to characterize microstructures and physical mechanisms behind the processing-microstructure-property relationships. He/she will develop his/her own innovative research on these topics, in close collaboration with companies and he/she will publish in higher-level journal and international conferences.

#### **Education**

The successful applicant will participate to teaching activities operated by the Mechanics & Materials Department. He/she will teach at Mines Paris - PSL and at the PSL level in physical metallurgy (core introduction courses, elective course on crystallography, PSL master entitled Materials Science and Engineering, specialized Mastère DMS and courses open to PhD students). He/she will be encouraged to build up new courses to enrich the offer of the Department. He/she will supervise undergraduate and postgraduate students (hands-on in the introductory Materials science course, student research projects, master-level internships, Mastère professional thesis), as well as PhD students.

The successful applicant will also participate to the development of the executive education programs operated by MINES-PSL EXED.

## **Attributes of the candidate**

The position is aimed at a researcher who has graduated from a university or a “Grande Ecole” with a doctorate in Materials science and engineering, with a strong interest in physical metallurgy and significant experience in transmission electron microscopy. A post-doctoral period or a stay at a research center or institution other than that in which he/she pursued his/her doctorate, and preferably in a different country, will be highly appreciated.

Applicants must demonstrate their ability to work in a team, their potential to develop their research activities in collaboration with the other researchers of the Materials Center and with other French and foreign research teams, and sufficient autonomy to develop their own research activity in connection with the themes described above.

The successful applicant will be required to seek external resources through partnerships with various players in the industrial and academic worlds and to actively collaborate in setting up projects at national and international levels. He/she must demonstrate his/her ability to manage research projects. He/she will contribute to setting up and coordination of research projects that associate microstructural characterizations and either processing conditions or in-service properties (including mechanical properties).

Fluency in spoken and written French and English is essential.

## **4. CONTACTS AND APPLICATION FILES**

The application must contain the following items:

- a motivation letter,
- the proposed scientific research project, and its integration within the GEM research team,
- a detailed resume,
- a list of research projects and publications,
- if available, the written reports of his/her PhD thesis committee about the written manuscript and about the viva voce defense,
- three recommendation letters that will be directly sent to us by the persons to be selected by the applicant. If not yet available, at least send the name and contact details of three scientists that may be asked for their opinion about the applicant’s work and his/her skills.

**The application is to be sent before 30. November, 2023 to the Director of the laboratory (Jérôme Crépin), using the following address :**

**Centre des Matériaux- MINES Paris  
63 - 65 rue Henri-Auguste DESBRUERES  
BP 87  
F-91003 Évry cedex, FRANCE,**

**and/or by email to [jerome.crepin@minesparis.psl.eu](mailto:jerome.crepin@minesparis.psl.eu)**