



Grenoble INP - UGA is a member of international engineering and management education and research networks. It is widely recognized in national and international rankings.



8 schools + 39 laboratories

8300 students

1 300 teaching, research, administrative and technical staff

Grenoble INP - UGA is a renowned public institution of higher education and research, and a major player in the Grenoble ecosystem. It is the engineering and management institute of Grenoble Alpes University, and plays a leading role in the scientific and industrial community.

## Researcher in an exalted photo-catalytic activity using Ti-Cu-O films combined with architected TiO<sub>2</sub> coatings

Job reference number	2024-RESEARCHPHOTOCATALYTIC-LMGP
Research field	Materials Engineering/Materials Technology/Chemistry/Physics
Host laboratory	LMGP (UMR 5628 Grenoble-INP, UGA and CNRS) / Website : <a href="https://lmgp.grenoble-inp.fr/.fr">https://lmgp.grenoble-inp.fr/.fr</a>
Requested profile	Recognized researcher -R1 (PhD needed)
Location	Grenoble, France
Starting date / contract term	01/05/2024 (12 months)
Contacts	Carmen Jiménez <a href="mailto:carmen.jimenez@grenoble-inp.fr">carmen.jimenez@grenoble-inp.fr</a>

Grenoble INP - UGA is a leading public institution accredited with the French label "Initiative d'excellence". It offers innovative engineering and management programs, with an increasing internationalization of its course offers. The courses are grounded in sound scientific knowledge and linked to digital, industrial, organizational, environmental and energy transitions. The Engineering and Management Institute of Grenoble Alpes brings together more than 1300 staff members (teacher-researchers, lecturers, administrative and technical staff) and 8300 students, located on 8 sites (Grenoble INP - Ense3, Grenoble INP - Ensimag, Grenoble INP - Esisar, Grenoble INP - Génie industriel GI, Grenoble INP - Pagora, Grenoble INP - Phelma, Polytech Grenoble, Grenoble IAE and the INP Prepa). Grenoble INP is also a highly-ranked institution of higher education and research, leading the way in the fields of engineering and management on an international scale. It is a member of a large number of international academic and research networks. It is part of the European University UNITE!.

As part of Grenoble Alpes University, Grenoble INP has associated guardianship of 39 national and international research laboratories and of technological platforms. The research conducted there benefits both its socio-economic partners and its students. Grenoble INP is at the heart of the following scientific fields: physics, energy, mechanics and materials; digital; micronanoelectronics, embedded systems; industry of the future, production systems, environment; management and business sciences.

Grenoble INP - UGA is an equal opportunity employer committed to sustainability. Grenoble INP-UGA celebrates diversity and equity and is committed to creating an inclusive environment for all employees. All qualified applications will be considered without discrimination of any kind.

# Research

The postdoctoral researcher will work within the LMGP (<http://www.lmgp.grenoble-inp.fr/en>, Materials and Physical Engineering Laboratory) and in collaboration with SiMAP (Science, Engineering, Materials and Processes, <https://simap.grenoble-inp.fr/en>). These laboratories located in Grenoble are members of the Centre of Excellence of Multifunctional Architected Materials (CEMAM), which funds this project. CEMAM Labex is devoted to the design, creation, and the fundamental understanding of new multifunctional materials and improved performances that will underlie the technologies of the future in a more sustainable world.

Located in the heart of an exceptional scientific environment, the LMGP and SiMAP offer to the applicant a rewarding place to work. The post-doctorate will be carried out in the framework of the ANR Cleansea project (<https://anr.fr/Projet-ANR-22-CE08-0006>).

## Offer description:

### Context

To provide an ecological solution preventing marine biofouling, we propose to study the potential antifouling activity of thin films based on photo-active materials. These coatings, consisting in a mixture of  $\text{TiO}_2$  and  $\text{Cu}_2\text{O}$ , combine functional properties (photo-catalysis, tuned surface energy) with micro topologies made of patterns covering a wide range from nano to micrometric scales.

### Job Description.

The research program will consist in depositing and characterizing thin films of Ti-Cu-O with different cationic composition to establish the influence of the composition on structural and functional properties. The selected deposition method is Aerosol-Assisted Chemical Vapor Deposition (AACVD), compatible with large surface substrates. Film characterization will be done by X-ray diffraction (XRD) and Raman Spectroscopy. Combining Scanning Electron Microscopy (SEM) with Atomic Force Microscopy and Optical microscopy will allow characterising the topography of the films at different scales, from the nanometric and micrometric to the centimetric scale. The functional properties will be evaluated by water contact angle and photocatalytic properties by monitoring the decomposition rate of aqueous Orange G solutions. The influence of the wavelength illumination (UV and visible) and the evaluation of the ROS production will be tackled. The objective is to select the best combination of Ti and Cu based thin films that allow a synergistic tuning of the photocatalytic activity generated by both materials.

Taking into account the application of these coatings in marine environment, their mechanical properties need to be checked. The characterisation by nanoindentation and friction tests will be performed as a function of the composition in the as-deposited films, but also after immersion and aging in salted water.

The analysis of these properties will allow to select an optimal composition, and devoted samples will be sent to our partners in Brittany for immersion in the Atlantic Ocean to evaluate the antifouling response of the proposed materials.

## Specific requirements or conditions

- PhD degree in materials science, physics, chemistry or related field.
- Interest or basic knowledge in biological applications
- A very good knowledge of English language, both spoken and written. Basic knowledge of French will be appreciated
- Good writing skills, ability to publish and promote your research
- Excellent communication, organizational skills and managerial ability for the project
- Proactive, creative, independent and highly-motivated candidate
- Interpersonal skills, problem-solving, initiative, rigor and teamwork abilities

### **Specifics of the position**

The research may be led on 2 locations: Grenoble and St Martin-d'Hères. The labs can be joined by public transport within 40 min.

**Position assigned to a restricted area: YES**

(Device for the protection of the scientific and technical potential of the nation, conditioning the appointment of the researcher to the authorization of the Defense Security Officer).

**NO for LMGP, YES for SiMAP**

## **How to apply**

Send motivation letter, CV and list of publications and academic references to: [carmen.jimenez@grenoble-inp.fr](mailto:carmen.jimenez@grenoble-inp.fr)

Application deadline : 19/04/2024