

5 March 2026

## PhD contract offer

### Subject: Development and characterization of a surface texturing process using DC microdischarges

#### General information

**Workplace:** Nancy – Orléans, France

**Type of contract:** PhD contract

**Contract period:** 36 months

**Expected date of employment:** October 2026

**Proportion of work:** Full time

**Remuneration:** 2300€ gross per month-

**Desired level of education:** Master's degree in Plasma Physics or Process Engineering.

#### Keywords

Cold plasma, microdischarge, surface treatment, texturing, nitriding, diagnostics

#### Missions / Activities

This PhD project is part of the **MINITL ANR-25-CE51-3871 project**, which began in January 2026. The project aims to develop and optimize a **micrometric scale surface texturing process** based on **thermochemical treatments** using **cold microplasmas** arranged in arrays. The goal is to demonstrate the feasibility of localized nitriding on AISI 316L stainless steel metallic surfaces using these sources. Mastering and understanding the plasmas produced, along with the lifespan of the devices, are key scientific and technological challenges to address. Ultimately, this study aims to achieve controlled, positive micrometric structuring of metallic surfaces through thermochemical treatment without the use of masks.

The MINITL project brings together four partner laboratories, including the Institut Jean Lamour and GREMI, which have complementary expertise in experimental aspects (fabrication of microdischarges, advanced plasma diagnostics, surface treatments, and surface characterization) and theoretical aspects (modeling of such discharges).

The proposed PhD project will address several tasks within the MINITL project, including:

- (i) Cleanroom fabrication of microdischarges using semiconductor substrates and microelectronics processes.
- (ii) Fabrication of Al/Al<sub>2</sub>O<sub>3</sub>-based microdischarges via a plasma electrolytic oxidation process.
- (iii) Study of these sources in N<sub>2</sub>-H<sub>2</sub> mixtures to determine and optimize their properties, particularly in terms of lifespan (plasma diagnostics: OES, imaging, electrical measurements, etc.; source characterization: optical and electron microscopy, XRD, etc.).
- (iv) Application of these sources to nitriding treatments and characterization of treated surfaces.

## Work context

The PhD will be conducted in two laboratories: the Institut Jean Lamour in Nancy (Plasmas, Processes, and Surfaces team) and GREMI in Orléans (Low-Pressure Plasmas and Lasers, and Diagnostics, Simulations, and Digital Tools axes), under the supervision of Dr. Grégory MARCOS (IJL) and Dr. Sylvain ISENI (GREMI). The position is fully funded by the ANR for a duration of 36 months.

## Skills

This work primarily requires expertise in **cold plasma physics**. Skills in process engineering, electrical engineering, materials science, and/or cold plasma diagnostics will also be appreciated. A strong interest in **experimental work** is essential. Curiosity, rigor, autonomy, and a methodical approach to teamwork are indispensable qualities for this PhD project and the overall advancement of the MINITL project. Proficiency in English and/or French, both written and spoken, is required.

## About Institut Jean Lamour

The Institute Jean Lamour (IJL) is a joint research unit of CNRS and Université de Lorraine. Focused on materials and processes science and engineering, it covers: materials, metallurgy, plasmas, surfaces, nanomaterials and electronics.

By 2025, IJL has 259 permanent staff (34 researchers, 133 teacher-researchers, 92 IT-BIATSS) and 374 non-permanent staff (136 doctoral students, 48 post-doctoral students / contractual researchers and more than 190 trainees), from some sixty different nationalities. Partnerships exist with 150 companies and our research groups collaborate with more than 60 countries throughout the world. Its exceptional instrumental platforms are spread over 4 sites ; the main one is located on Artem campus in Nancy.

## About GREMI

The Groupe de Recherches sur l'Énergétique des Milieux Ionisés (GREMI), based in Orléans and Bourges, is a joint research unit (UMR 7344) associated with the CNRS and the University of Orléans. It specializes in the design of cold plasma sources, their understanding, and the development of innovative associated processes.

The laboratory relies on rich experimental platforms, including the Center for Characterization and Plasma and Laser Processes for Micro-Nanofabrication (C2P2L), and a cleanroom where microdevices will be fabricated and partially characterized.

## Constraints and risks

This position is in a sector subject to the protection of scientific and technical potential. Therefore, in accordance with regulations, your appointment must be authorized by the competent authority of the MESR for both sites.

The work will primarily be conducted at IJL in Nancy but will require organizing occasional experimental campaigns at GREMI during the PhD, coupled with stays in Orléans.

## Application

The application deadline is **June 21, 2026**.

The application dossier must include:

- Curriculum Vitae
- Cover letter
- Copy or certificate of the Master's degree
- Grades and rankings for both years of the Master's program (M1 and M2)
- Copies of internship reports (Bachelor's, M1, etc.)
- Letter(s) of recommendation

Incomplete applications or those received after the deadline will not be considered.

Applications should be sent by email to:

- Grégory MARCOS (Director): [gregory.macros@univ-lorraine.fr](mailto:gregory.macros@univ-lorraine.fr)
- Sylvain ISENI (Co-Director): [sylvain.iseni@univ-orleans.fr](mailto:sylvain.iseni@univ-orleans.fr)
- Cédric NOEL (Project Coordinator): [c.noel@univ-lorraine.fr](mailto:c.noel@univ-lorraine.fr)