

**Deadline for registration of applications on Galaxie:**  
March 2023, the 30<sup>th</sup> at 4pm (local time).

## JOB DESCRIPTION

**Emploi :** Maître de conférences (Associate Professor permanent position)  
**Section du CNU :** 28  
**Département :** engineering physics and materials (GPM)  
**Laboratoire :** Institut FOTON - UMR 6082  
**Profil :** Materials elaboration and solar hydrogen production

### Employment environment:

INSA Rennes, a founding member of the INSA Group, is the largest public engineering school in Brittany. It welcomes 2,200 students and apprentices and graduates more than 340 engineers, 60 masters and 40 PhDs per year. Composed of 9 teaching departments, including 7 specialties and an apprenticeship program, and supervised by 6 research laboratories, INSA employs approximately 500 public employees (research professors, teachers, permanent and contractual employees) and more than 400 temporary employees, particularly from companies.

By positioning itself as an impact institute, INSA Rennes intends to be part of a positive metamorphosis aimed at building a more just and sustainable world for future generations. Being an engineering school today, producing skills and knowledge, requires more than ever to assert its responsibility; to anticipate the impact of inventions on individuals, society and the environment; to place itself at the service of a reasoned economy and social progress that is a source of well-being.

More aware than ever of its social impact, the school also intends to go further in diversifying profiles and providing each student with the keys to fulfill his or her potential and succeed in his or her studies, regardless of the educational investment he or she made before entering a prestigious school.

The Impact Institute is first and foremost a lever for transformation in the service of society and for meeting the challenges of the sustainable development goals defined by the United Nations.

This affirmed trajectory has been materialized by the adoption of its 2021-2026 strategic plan, which can be consulted on the school's website: [www.insa-rennes.fr](http://www.insa-rennes.fr)

### Specific context:

#### **Materials Elaboration and Solar Hydrogen Production**

INSA Rennes wishes to recruit a high-level teacher-researcher to strengthen the academic and contractual activity of the FOTON Institute around the theme of **solar hydrogen production** with spin-offs in teaching, particularly for the Physical and Materials Engineering (GPM) department. Specific human and financial resources obtained in the general framework of the national strategy and investments (« France 2030 », « PEPR Hydrogène décarboné », EQUIPEX NanoFutur) will be made available for this purpose, to support the start of the activity of the teacher-researcher on this research topic.

### Hosting Laboratory:

#### **FOTON Institute, INSA Rennes**

Director of the FOTON Institute: Mehdi Alouini ([directeur@institut-foton.eu](mailto:directeur@institut-foton.eu))

Head of the INSA component (OHM research team) of the FOTON Institute and coordinator of the solar hydrogen research topic: Charles Cornet ([charles.cornet@insa-rennes.fr](mailto:charles.cornet@insa-rennes.fr))

The "**Optical Functions for Information Technology**" Institute is a joint research unit involving the CNRS (mainly attached to the INSIS, and secondarily to the INP and the INC), the UR1 (Enssat, the IUT of Lannion and the UFR SPM), and INSA Rennes, with a staff of **about 120 people, including 75 permanent staff**. The unit generates a scientific production of more than 100 papers per year, and is **one of the leading public research forces in France in its field**.

The Foton Institute is structured in three teams: **DOP** (leader Marc Vallet), **OHM** (leader: Charles Cornet) and **SP** (leader: Monique Thual); as well as three platforms: **CCLO** (technical leader: Parastesh Pirasteh), **NanoRennes** (technical leader: Rozenn Gautheron-Bernard), and **Persyst** (technical leader: Mathilde Gay).

The specificity of FOTON is therefore to gather around common programs three teams and three platforms covering **targeted areas of photonics**: the physical layer of telecommunications, technologies related to industrial and defense applications (optical sensors, lasers, instrumentation for photonics) **and photovoltaic or photoelectrochemical conversion of solar energy**.

Hosting Teaching department:                      **Engineering physics and materials**

Name of the department head: Soline BOYER ([soline.boyer@insa-rennes.fr](mailto:soline.boyer@insa-rennes.fr))

The GPM department trains engineers capable of developing innovative and sustainable materials and devices, of finely measuring their physical properties and performance, of modeling complex physical systems, and of deploying the associated industrial processes.

Specific skills required:

**Research: Materials elaboration and solar hydrogen production**

The OHM research team (INSA component) of the FOTON Institute (UMR 6082) focused on areas of teaching and research related to the production and storage of energy in connection with photonics and III-V semiconductors, within the general framework of the UN Sustainable Development Goals. Over the past 5 years, the team has acquired strong international recognition through photovoltaic applications, illustrated by high impact publications on perovskites or advanced concepts of III-V photovoltaic structures, the production of solar hydrogen and photonic devices. The OHM team wishes to increase its involvement around the production of renewable hydrogen and related research themes for energy applications and photonics, at the international level, in European programs (Horizon Europe, COST), and in dedicated national structures (GDR , ANR, PEPR), in conjunction with its industrial partners.

The candidate recruited within the OHM team will take charge of the development of new materials, nanostructures and components for the production of solar hydrogen, and more generally for energy and photonics. It will be based on the significant know-how of the team in the development and use of III-V and Si materials and on a complete and coherent equipment park dedicated to nanotechnologies within the framework of the technological platform of the Renatech+ Nano-Rennes network (MBE and CVD epitaxial chambers, electrical measurements, atomic force microscopy and X-rays, clean room dedicated to the processing of optoelectronic devices, characterization of optoelectronic devices). The recruited candidate will participate in particular in experimental developments and research projects on the MBE epitaxial chamber being acquired as part of the PIA EQUIPEX "NanoFutur" project led by the CNRS.

The candidate must have benefited (thesis, post-doctorate) from prior experience in materials

elaboration (MBE, MOCVD, CVD, ALD, etc.), and generally have a good knowledge of the physical and thermodynamic properties of semiconductors and devices for photonics, or for the conversion/storage of solar energy.

### **Teaching: Physics and materials for Energy**

The recruited candidate will be assigned to the Engineering Physics and Materials (GPM) department. The training courses concerned are the GPM engineering specialty and the STPI-1st Cycle department.

The recruited person will be involved in the lessons and their evolution in materials physics and electronic or optoelectronic devices in the 3rd and 4th year, in particular on the practical aspects of these lessons, with an emphasis on the transition to lessons in English and with a teaching by using project-learning approaches.

An active participation of the candidate will be expected to develop the lessons related to energy, in particular on the production and storage of renewable energy. The recruited candidate will contribute to building relationships with industrial partners in the field, and will be involved in particular in the implementation and supervision of industrial projects in the 5th year.

For lessons within the STPI-1st Cycle department, the recruited candidate will be integrated into the physics teaching team and will be in charge of tutorials and practical work in physics (electricity, optics, thermo-energetics, waves, and electromagnetism).

The detailed description of these lessons can be found in the ECTS sheets on the INSA website or by contacting the department directors concerned.

### **For more information, please contact**

Soline BOYER (soline.boyer@insa-rennes.fr) - Head of the GPM department.

Charles CORNET (charles.cornet@insa-rennes.fr) - Head of the OHM research team (INSA component) at Institut FOTON, coordinator of the research on solar hydrogen production.