Junior Professor Chair (Tenure track)

MEDICIS: Multifunctional materials dedicated to intelligent actuator and sensor applications

The Institute IEMN has been identified by the CNRS for this position, combining fundamental research and platforms dedicated to microelectronics and nanotechnologies. Below is the job description as seen by the IEMN Institute UMR CNRS 8520.
Location : IEMN / Université Polytechnique Hauts-de-France (UPHF), Valenciennes
Duration: 3 to 4 years (depending on the skills of the candidate)
Starting: between September 2024 and December 2024
Gross salary Minimum (depending on the skills of the candidate): 41 331 € per year

THE RESEARCH POSITION: Major Assets

1.Beyond the position itself, the advantage is to directly access to a full-time senior researcher position at the end of the tenure track period. The chair is financially highly supported in research with extra 460 k€ (200k€ from ANR + 260k€ added from UPHF/IEMN).
2.As regards teaching, max 64 hours of teaching time per year. Speaking French is not required. Teaching will be mainly at INSA Hauts-de-France for Master/Engineer level and IUT for bachelor level.
3. The chair is fully included and accompanied inside the group of Physics and Materials.
It is an important brick reinforcing its activities in this field. Internationally, many collaborations exist, notably with SICAS Shanghai NUS Singapore, ASTAR Singapore, KAIST Korea,...
Research projects related to the field do also exist in the laboratory (ANR, H2020, Interreg ,…).
4. At the end of the period (3 to 4 years), after evaluation of scientific merit and professional aptitude by a tenure commission, it will give access to a permanent position of director of research at the CNRS.

THE CANDIDATE: Expectations

1. Holders of a doctorate or a PhD or equivalent degree in a relevant field (physics, materials, microelectronics, nanotechnology,) with a good research experience. There is no restriction on the age or nationality of applicants.
2. Given the strong support and resources available within the chair, it is expected that after 2 or 3 years the candidate will be able to submit applications for highly competitive projects allowing to reinforce its notoriety and improve the research of the laboratory in the field, an ERC project being a very good example.

SCHEDULE

May 2024: final date for applying. To apply for this offer, it is required to submit your application by email to the contact person.

The recruitment is done in 2 phases.
1. 1st phase selection on file. The application must contain at least an extensive CV, including the candidate's job history and publications + a research project link to the tenure track.
2. 2nd phase. Oral examination (around November; schedule, jury and details will be provided later to candidates)
For more information, please contact Pr. Mohammadi Ouaftouh at **mohammadi.ouaftouh@uphf.fr.**

Summary of the scientific project

This project concerns ferroelectric materials with a high piezoelectric response and the production of microsystems. The objectives are twofold: - to synthesise materials (films and nanowires) so that they can be integrated with silicon technologies (CMOS compatibility) and flexible substrates for microelectronics and micro and nanotechnologies (organic-hybrid/bio-sourced materials), - to develop new environmentally-friendly functional materials (alternatives to obsolescence REACH regulations, POP....) that have high piezoelectric coefficients at low control voltages and high-frequency performance with strong electromechanical coupling. Our technological tools will enable us to produce microsystems dedicated to acoustics (sensors, transducers, actuators), photonics and, more generally, systems engineering for characterising defects in volume and at interfaces (health monitoring).

5 Key words :
- Innovative, high-performance and sustainable multifunctional materials.
- Organic, inorganic and hybrid materials.
- Acoustics and photonics.
- Sensors, actuators, micro/nanotechnologies,
- Surface functionalisation (passive/active coatings).

Host laboratory strategy

The IEMN (**www.iemn.fr**) is renowned for its expertise in materials and components for microelectronics and micro and nanotechnologies. The aim here is to pay particular attention to multiferroic materials. These are multifunctional 'green' gold-organic, inorganic or hybrid materials, and the properties that we are optimising are ferroelectricity, piezoelectricity, ... They are synthesised in the form of films or nanowires by physical or chemical means. This 1st stage of the manufacturing process is crucial and requires considerable investment to ensure the physico-chemical properties of the materials and the expected functional properties. The next stages are the component manufacturing processes, design and multi-physics modelling, and then performance evaluation.

The laboratory is involved in each of these areas, from materials synthesis to components, with a wide range of applications (energy, transport, etc.).

Establishment strategy

This project is part of Hub 3 "Industry and Services of the Future" of our research strategy, which focuses on the synthesis of multifunctional materials and sensor and actuator applications for transport (in particular decarbonisation), health, energy and telecommunications. This theme is based on the FUMAP platform (IEMN - Valenciennes site), which has been developed over many years through strong involvement in regional (CPER), national (ANR) and European (INTERREG, PHC and PICS) projects. These themes are supported by the TRANSPORT, HEALTH and ENERGY Flagships and the MATERIALS cross-cutting theme of the IEMN UMR CNRS. In this respect, the technological resources of the LCI IEMN's characterisation platforms and technology centre obviously reinforce the project. This research strategy has been boosted by the establishment of the EUNICE European Alliance. Within this framework, a cross-border "Materials" cluster in the UPHF-INSA HdF / UMONS (B) ecosystem, including its Materia Nova transfer centre, was created in June 2022. It is coordinated by Denis Remiens, leader of this CPJ project, with the aim of extending it in a second phase to other EUNICE partner universities, in particular the University of Catania which, like the IEMN, is working on functional materials and has also set up a joint laboratory with ST Microelectronics.

Details of the strategic guidelines, how they relate to this draft CPJ and a summary of the added value of the CPJs obtained in previous years are provided in the accompanying framework note.