

The University of Limoges is recruiting an

Engineer in cell and molecular biology

Category A – ITRF

Presentation of the University of Limoges

Founded in 1968, the University of Limoges is a regional university on a human scale that educates more than 16000 students and employs more than 1800 permanent staff.

At the heart of Europe, it is an important center of multidisciplinary higher education, in an environment that is most conducive to scientific development. The university is open, dynamic with many opportunities for interactions, a diverse student population, up to date structures, close collaborations between teams, training based on very high-level research and clearly identified opportunities. Its scientific excellence, with cutting-edge laboratories and large-scale partnerships, is helping to invent the world of tomorrow.

The University is structured into 5 Research Institutes:

GEIST : Genomics, Environment, Immunity, Health and Therapeutics

XLIM : Electronics and Hyperfrequencies, Photonics and Coherent Sources, Mathematics, Computer Science and Images

IPAM : Institute for Processes Applied to Materials

SHS : Science of Man and Society

GIO : Governance of Institutions and Organizations

Position location

University of Limoges / [IR CER](#) (Institute of Research for Ceramics) / Strong collaboration with the other actors of the Intensive project (see below)

Context

Intensive - INTElligences Numériques au Service de l'Ingénierie pour le Vivant à l'Université de LimogEs (that stands for Digital Intelligence at the Service of Engineering for Life at the University of Limoges)

Thanks to its multidisciplinary dynamics, the University is running an inter-institute project on Life Engineering, in order to integrate a complete value chain combining scientific and technological aspects with societal and legal dimensions.

The current challenges in Engineering for Life cover very broad disciplinary fields which aim in particular at :

- 1. Improving prevention (i.e. earlier, more inclusive, multimodal diagnosis),*
- 2. Improving the quality and sustainability of care (i.e. support for the practitioner, selectivity and traceability of treatments),*
- 3. Increasing the performance of the subjects (i.e. augmented human).*

In this context the Intensive project targets the use of advanced microscopy and spectroscopy techniques as an exploratory approach including several modalities (multiphoton fluorescence, second and third generation harmonic generation, coherent Raman scattering, electron microscopy, etc.). The data acquired by these innovative methods will be associated with clinical data. All of these data will be analysed using artificial intelligence approaches with the aim of isolating new specific signatures of pathologies and developing a tool for practitioners, patients and researchers. This medicine, which in the future will be more predictive, personalised or precise, must be supported in the legal field to guarantee respect for fundamental human rights.

This project is based on a panel of recognised and complementary skills from the GEIST, IPAM, XLIM, IRSHS and IRGIO institutes of the University of Limoges and will enable the development of new tools and new skills at the interfaces between the institutes.

In the context of the Intensive project, the different imaging modalities (i.e. optical, photonic, electronic, spectroscopic) and correlative modalities have the advantage that they can be used both on biological samples and to characterise a wide range of tissue engineering materials including ceramics. The development of multi-functional and customised implantable ceramic devices is a particularly promising strategy in regenerative medicine, especially in the field of bone tissue regeneration. The possibility of identifying new signatures/methods for monitoring the evolution of the material/living interface is of major interest both at a fundamental level (understanding of cellular responses to materials and associated mechanisms, optimisation of materials) and in terms of applications: monitoring of the material after it has been brought into interaction with living organisms *in vitro*, *in vivo* and after implantation in the patient. To this end, the "Bioceramics" team at IRCER is a partner in the Intensive project and is recruiting an engineer in cell and molecular biology who will be responsible for the preparation of samples consisting of cultures made on calcium phosphate ceramic biomaterials and for data acquisition according to the imaging methods defined in the Intensive project. At the same time, it will have to characterise these same samples using conventional techniques to compare them with the exploratory data. The person recruited will have to work in close collaboration with all the actors of this project and more particularly the other people recruited in the framework of this project. Within the IRCER, he/she will have to interact in a strong way with scientists from different disciplines.

Link to the Intensive project website : <https://unilim.fr/intensive/>

Missions

Sampling :

- The engineer will have to manufacture ceramic pieces according to established protocols that will constitute the tested biomaterials.
- The engineer will have to implement cell cultures of cells belonging to the osteoblastic lineage and/or endothelial cells on hydroxyapatite-based calcium phosphate ceramics.

Analysis, data collection:

- The engineer will be responsible for the acquisition of data on the evolution of cells from the bone lineage to the surface of ceramic samples using multimodal imaging techniques in particular using a confocal microscope equipped with a spectral detector, a multimodal microscope CARS/SHG/TPF and a multiphotonic microscope.
- The phenotypic evolution of these cells will be characterised by reference techniques in cellular and molecular biology (immunofluorescent or histological staining, SDS-PAGE, western-blotting, qRT-PCR, etc.).
- These data will have to be analysed and/or annotated, classified and stored.

Activities to be declined :

- To gather and edit the results
- To analyse and interpret the results
- To write protocols
- To manage a laboratory notebook
- To write summary reports
- To present the results to an audience of biologists and non-specialists.
- To use software dedicated to image analysis
- To ensure technological and scientific monitoring
- Apply the health and safety instructions in the various laboratories.

Profile required, competences

PROFILE REQUIRED:

- MSc degree in the biological sciences field. An experience in microscopy and image analysis is highly desirable.

KNOWLEDGE:

- With a cursus in cellular and molecular biology (MSc degree), the candidate must have a solid experience in cellular and molecular biology: command of cell culture techniques and analysis of the cell phenotype and functions.
- Strong experience in fluorescence microscopy and image processing and analysis is required.
- Knowledge of developmental physiology and repair of bone tissue is required.
- Knowledge of ceramic biomaterials for health would be desirable.
- Autonomous with the English language

OPERATIONAL SKILLS / KNOW-HOW:

- Mastering the basic techniques in molecular and cell biology is required as well as optical microscopy skills in transmitted light and fluorescence (epifluorescence, confocal microscopy).
- Imaging skills other than optical microscopy (eg: CARS) would be a plus.

BEHAVIORAL SKILLS / KNOW-BEING:

- Ability to work independently (organizational skills, versatility, adaptability) as well as in a team (interpersonal skills) is essential.
- The candidate should be able to work in a transdisciplinary environment and to interact with specialists from other scientific disciplines (curiosity, open-mindedness).

Relationships:

- Internally:
 - With the researchers of the "Bioceramics" team and IRCER
 - With the photonics and Artificial Intelligence researchers of the XLIM institute involved in the project
 - With all the members of the project, during scientific meetings and seminars
- Externally:
 - With researchers from the fields concerned by the project (seminars, conferences, thematic days)

	Fixed term contract 14 months
Starting date	September 2021
Application	CV + cover letter to be sent only by email Before 14th May 2021 to : Mme Amandine Magnaudeix – Mr Eric Champion Scientific managers Mme Véronique Blanquet Head of the GEIST Institute, coordinator of the <i>Intensive</i> project Mailing address : amandine.magnaudeix@unilim.fr ; eric.champion@unilim.fr
Work quota	100%