Postdoctoral Researcher Position

Flexible Piezoelectric Membranes

for In Situ Tissue Monitoring and Regenerative Stimulation

Project Overview

We invite applications for a Postdoctoral Researcher to join an interdisciplinary project focused on the development of flexible, biocompatible piezoelectric membranes for in situ monitoring of micro-scale tissue signals and regenerative stimulation, particularly for bone tissue engineering (piezoelectric scaffolds).

Although the biomedical relevance of piezoelectric materials has been clearly demonstrated over the past decade, commercially available thin films still exhibit insufficient piezoelectric performance and limited scalability toward market-ready devices, despite strong socio-economic demand from the medical device and specialty polymer sectors.

This project introduces a novel strategy: controlled orientation of lithium niobate nanoparticles (npLN) directly during PVDF (polyvinylidene fluoride) membrane processing via electrospinning, combined with in situ and ex situ molecular structure control.

Objectives

- Optimization of the electrospinning process; investigation of PVDF/npLN blends; in situ monitoring of nanoparticle orientation and PVDF crystallization.
- Measurement of dielectric parameters (permittivity, loss factor, tan δ) via dynamic dielectric analysis; quantification of PVDF/npLN interfacial quality.
- Determination of nanoparticle orientation using Raman spectroscopy.
- Development of a proof-of-concept device for micro-pressure variation monitoring.

Expected Outcomes and Impact

The project aims to overcome three major scientific and technical bottlenecks limiting high-performance piezoelectric membrane development:

- Ensuring nanoparticle orientation during processing.
- Achieving macroscopic fiber alignment for effective polarization.
- Controlling the porosity between electrospun PVDF fibers.

By the end of the project, we target to build some prototypes demonstrating highly oriented membranes and integrated in situ control of the processing device.

Context

This position will be based at LMOPS-Metz, but the work will be carried out in collaboration with the Photonics team at LMOPS-Metz (David CHAPRON) and the Physics, Mechanics, and Plasticity team at IJL-Nancy (Isabelle Royaud).

Candidate Profile

- PhD in Materials Science, Polymer Physics, Nanomaterials, Biomedical Engineering, or related field.
- Experience in polymer processing and electrospinning and polymer.
- Background in spectroscopy: dielectric and/or Raman/IR.
- Knowledge of piezoelectric materials and structure–property relationships.
- Ability to work in a multidisciplinary, application-driven research environment.

Contract Details

Duration: 12 months
Funding: Carnot ICEEL
Start date: from March 2026
Location: LMOPS-Metz, 2 rue Edouard Belin, 57070 Metz France

Contacts and to apply

Send a CV and cover letter to the two contacts below:

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