

Mapping ferroelectric and piezoelectric properties of molecular organic materials at nanoscale using atomic force microscopy

Job summary

GREMAN is opening a postdoc position on the investigation of organic ferroelectric materials using Atomic Force Microscopy (AFM) with integrated Piezoresponse Force Microscopy (PFM) and PeakForce Quantitative Nanomechanics (PFQNM) modules.

Job description

MISTRAL is an exploratory project which aims to use, for the first time for molecular ferroelectrics (FEs), using microfluidic approach enabling efficient screening of optimal crystallization conditions to accelerate the discovery of new molecular FE materials. We will focus on chiral molecular materials that are purely organic or incorporate non-critical metals (Zn, Fe, Al, Mg, Ca). The high processability of molecular materials will be exploited to form the materials into thin films.

The functional characterizations of FE molecular materials remains challenging due to three main reasons : i) Impossibility to obtain dense material, ii) difficulties to polarize the material due to its high coercive field and iii) absence of ferroelectric to paraelectric phase transition. In such context, local and non-destructive characterization methods such as PFM and PFQNM appear to be the most suitable method to measure the FE properties of the molecular FE. GREMAN gathers a strong expertise on the use of the AFM-based method for semiconductor and ferroelectric material and a good knowledge of ferroelectric materials in ceramic and thin film form. Our objective is to use knowledge and expertise on PFM measurements and on FE in thin film and ceramic forms to apply it to molecular FE.

During this postdoc position, you will:

- realize the non-destructive FE characterization using PFM on the crystal supply by another partner involved the project.
- mapping nanoscale mechanical properties with PFQNM on the same regions analyzed by PFM.
- perform fatigue measurements on the compositions which give the best results.
- automate PFMs measurement (change of stimulus and acquisition settings) to enable high-throughput, high-data-rate acquisition and to reduces human error during long measurements

All the equipment required for this project are available at CERTeM technological platform (<http://certem.univ-tours.fr>), which is a fully equipped clean room facility and an electrical/physical characterization laboratory, hosted by STMicroelectronics Tours.

Profil: You will have a PhD in material science or microelectronics. You have a good knowledge of AFM/PFM measurements. Competence in data analysis, electrical measurement and python will be appreciated.

Location : At GREMAN beside STMicroelectronics site with easy access to the CERTeM platform, 16 rue Pierre et Marie Curie, 37100 Tours, France.

Starting period: Beginning of 2026

Duration: 18 months

Email: kevin.nadaud@univ-tours.fr, micka.bah@univ-tours.fr