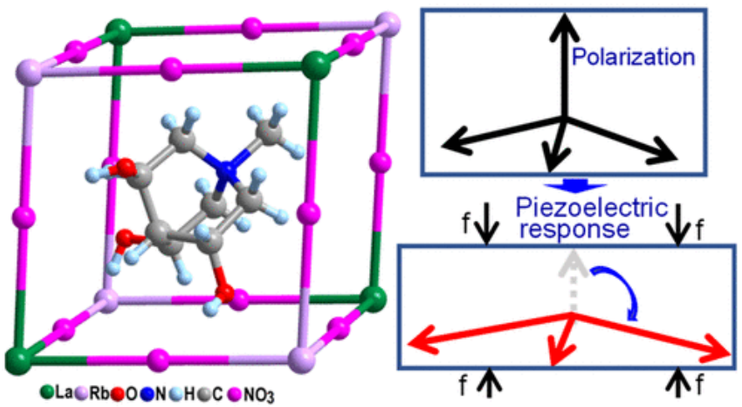
PhD offer, University of Bordeaux, 2022-2025

Synthesis of molecular piezoelectric materials

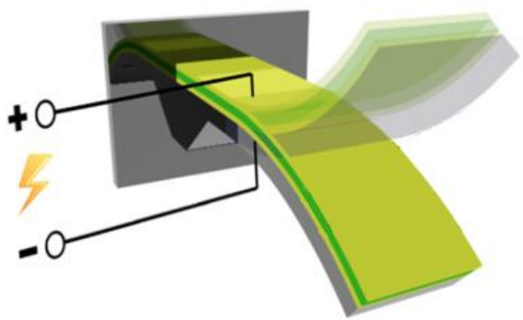
The project will focus on the development of new, robust and highly efficient energy harvesting devices. These devices will be based on nanocomposites made of piezoelectric 2D molecular platelets (PZ) embedded within polymer films. They will convert energy of ambient vibrations into electrical energy. The main objective is to develop power sources for sensors integrated in the next generations of sustainable composite materials bearing self-maintenance capabilities. From a scientific point of view, the present approach will address the challenge of making flexible MEMS (Microelectromechanical Systems) with an efficient mechanical stress transfer from the polymer matrix to the active PZ nanocrystals.

The work will be based on the chemistry expertise of the CRPP/ICMCB in synthesis and formulation of nanoparticles and composites, and on the expertise of the IMS on the design, microfabrication and characterization of electronic micro-devices. In the longer term the most efficient systems will be actually embedded in composites to power autonomous sensors.



Crystal structure of $(RM3HQ)_2RbLa(NO_3)_6$, an example of a hybrid organic–inorganic perovskite piezoelectric

Shi, *et al. J. Am. Chem. Soc.* 2020, 142, 21, 9634-9641



MEMS energy harvester

Grand Programme de Recherche PPM | Post-Petroleum Materials

université de BORDEAUX

Supervisors

CRPP CENTRE DE RECHERCHE PAUL PASCAL

Nanotubes and graphene group link

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icmcb institut de chimie de la matière condensée de bordeaux

Switchable Molecules and Materials Group

Missions

- Synthesis of piezoelectric materials (powders and crystals) using wet chemistry techiques
- Characterization of materials by powder X-ray diffraction, thermogravatmetric analysis, formulation of composites and their ferroelectric characterizations

Desired profile

- Master 2 in molecular chemistry, materials or nanosciences.
- Oral and written proficiency in English and/or French (level C1 or higher).
- Ability to work on multidisciplinary projects, ability to work in a very organized manner; ability to work safely and accurately.
- Experience in the field of perovsikes is a plus.

To submit an application, contact Cecile.Zakri@crpp.cnrs.fr and elizabeth.hillard@icmcb.cnrs.fr