

Tenured Position at CNRS – to join the GUIDE team at LEPMI

Position Offer: Towards a New Generation of Low-Impact, Non-Toxic Perovskites for Photovoltaics – Innovation in Materials, Processes, and Sustainability

Research Project Overview

This research project offers a paradigm shift from traditional approaches focused solely on maximizing photovoltaic efficiency under ideal conditions. It aims to develop next-generation solar cells based on perovskite materials, while integrating key considerations of toxicity reduction, process simplicity, and environmental sustainability. In contrast to the prevailing use of lead-based perovskites fabricated in controlled environments, this project explores low-toxicity formulations and ambient-air processing methods—specifically electrodeposition and drop casting—both of which are already well established at LEPMI. The objective is to design and prototype low-cost, robust, and scalable devices suitable for industrial applications.

Initial efforts will focus on synthesizing perovskite structures with partial or complete lead substitution, seeking to combine high photovoltaic performance with significantly lower toxicity. These fabrication routes, still underexplored in France, offer the potential to move away from complex glovebox-dependent methods and toward higher technology readiness levels (TRL). The project will also investigate alternative material families, including double perovskites, hybrid variants, and all-inorganic oxide systems. A key focus is on improving long-term device stability. Accelerated aging tests under combined stress conditions (humidity, temperature, light exposure, electrical cycling) will be conducted to identify physico-chemical degradation mechanisms. LEPMI's advanced characterization infrastructure, developed over the past two decades, will support this effort.

As part of a holistic eco-design approach, the environmental impact of materials and processes will be assessed early in the project. Criteria will include material availability, toxicity, embodied energy, and end-of-life considerations. Recycling strategies—such as active layer recovery and substrate reuse—will be explored to promote circular economy practices, still uncommon in third-generation photovoltaic technologies.

About the Research Team – GUIDE : The GUIDE team, located at the *Institut National de l'Énergie Solaire* (INES) in Le Bourget-du-Lac, develops high-potential materials for energy applications, including fuel cells, batteries, electrolyzers, and photovoltaic cells. For over 15 years, the team has focused on third-generation solar cells—mainly perovskite-based—with the goal of creating efficient, stable, and scalable devices.

About the Laboratory – LEPMI (UMR 5279) : LEPMI (*Laboratory of Electrochemistry and Physical Chemistry of Materials and Interfaces*), based in Grenoble, is a joint research unit specializing in electrochemistry and materials science. It covers a broad range of energy-related topics including electrochemical energy conversion and storage, and photovoltaics. LEPMI promotes a balanced scientific approach, combining fundamental and applied research—from materials synthesis and characterization to experimental and modeling studies of functional energy devices, with a strong focus on strategic materials recycling.

Candidate Profile

- **Education:** PhD in Materials Science, Physical Chemistry, Semiconductor Chemistry, or related fields. A postdoctoral experience abroad is **required**.
 - **Expertise:**
 - Halide perovskite synthesis and processing
 - Optoelectronic and semiconductor materials
 - Device fabrication using metal halide perovskites
 - Characterization techniques: SEM, XRD, optical spectroscopies, etc.
 - **Qualifications:**
 - Proven track record of scientific excellence, including high-quality publications
 - Diverse and robust methodological skills
 - Strong teamwork and communication skills
 - High motivation, ability to tackle challenging scientific problems
 - Proficiency in English and comfort working in an international environment
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Application Procedure

To apply, please send the following documents to Pr. Emilie Planès at emilie.planes@univ-smb.fr:

- A detailed CV
- References