



Fully funded 12-month Post-doctoral position

Robotic synthesis and Machine learning to guide the synthesis of anisotropic metallic nanoparticles

12-month open post-doctoral position at CEA Paris-Saclay included in the research project BIMAN (PEPR DIADEM).

Topic: Optimization through machine learning approaches of robotic synthesis of anisotropic iron and gold nanoparticles characterized by SAXS/WAXS, UV-Vis and TEM.

Context: This project is part of the BIMAN project from PEPR DIADEM on the development of innovative materials using machine learning/artificial intelligence (ML/AI). It aims to design new high-performance magnets with minimal critical element composition. Magnetic material are key components for the energetic and societal transition, but the large number of critical elements, particularly rare earth elements in their composition is a major drawback in terms of their sustainability.¹ A promising approach with nanostructured materials is the control of individual nanoparticles in terms of composition/structure and shape prior to their self-assembly. In this post-doctoral project, a generic optimization strategy will be developed for anisotropic metallic nanoparticles (target and model systems), combining robotic approaches and Bayesian optimization. The BIMAN project involves 4 teams² with complementary expertise in chemistry, physics, chemical engineering, data science and ML/AI. Specifically, the LIONS team has expertise in bottom-up nanoparticles suspension synthesis with different synthetic tools (e.g., microfluidics, batch reactors, robotic synthesis) and *in situ* SAXS/WAXS analysis (laboratory and synchrotron). The two demonstrators: FastNano³ and 2Fast³ from DIADEM will also be used in the project.

Job responsibilities: The recruited person will be in charge of (1) developing metal (gold, iron, ...) nanoparticles synthesis with robotic approaches (2) combining SAXS/UV-vis and TEM analysis (3) designing a synthesis optimization process for anisotropic metallic nanomaterials through high throughput analysis and Bayesian approaches.

Candidate profile: Motivated PhD-level researcher with a strong expertise in robotic nanoparticles synthesis, Python programming and machine learning approaches, SAXS and TEM for nanoparticles characterization.

Salary: CEA salary grid (calculated from the CV profile)

Work location: CEA Paris-Saclay, DRF/IRAMIS/NIMBE/LIONS.

Application: CV, a cover letter and recommendations should be sent to fabienne.testard@cea.fr and pierre-baptiste.flandrin@cea.fr. Due to the security of the CEA Saclay site, background checks and a clearance process of up to 3 months is required before the start of the contract. Applications will be considered as they are received until the 15th of October.

References: 1) Xia, W. et al, Accelerating the discovery of novel magnetic materials using machine learning-guided adaptive feedback. PNAS 2022, 119(47), e2204485119. 2) INSA/LCPNO; INP/LGC; CNRS/LPS, CEA/DRF/IRAMIS/NIMBE/LIONS 3) Levenstein M. et al, FastNano Liquid: An Automated Platform for SAXS-Based Materials Discovery. Adv. Eng. Mat. 2026, accepted