

Ph.D. student position at the LMGP Laboratory in Grenoble

AI-Driven Combinatorial Spatial Atomic Layer Deposition for Accelerated Multicomponent Thin-Film Optimization

Job description:

The SALD team is a very dynamic group focusing on the development of functional thin films using scalable chemical vapour deposition approaches ([see link](#)). Materials of interest include oxides, metals and metallic nanowire networks for different applications including photovoltaics, sensors, antimicrobial coatings, encapsulation of devices, resistive switching, etc. Our activity and recent research outputs can be checked in the following links: sites.google.com/site/workdmr/ and [TALK](#).

Spatial Atomic Layer Deposition (SALD) is a recent variation of ALD that allows depositing functional thin films at up to 2 orders of magnitude higher rates than conventional ALD, even when processing at ambient pressure. In addition, SALD can be performed in the open air, i.e. without the need of a deposition chamber, thus being suitable to combine with other in-line process techniques such as spray or roll-to-roll. Traditionally, the optimization of the deposition process and final materials properties is done by trial and error and involving the deposition of one sample for each deposition parameter varied. We have recently demonstrated that by proper design of SALD heads, a combinatorial deposition can be achieved (*Adv. Func. Mater.*, **2021**, 31(31), 2103271). In our first results, a thickness gradient was used to optimize metal-insulator-metal (MIM) structures and hybrid perovskite solar cells, in collaboration with the U. of Waterloo. We are currently further developing this approach by designing new SALD heads allowing the deposition of compositional gradients and by building an automated SALD system to ensure reproducibility. This is done in the framework of the FASTNANO project (<https://www.pepr-diadem.fr/projet/fastnano-en/>), within the PEPR Diademe.

The thesis proposed would thus involve a collaboration with two other laboratories participating in DIADEME, SIMAP (<https://simap.grenoble-inp.fr/>) and MEM (<https://www.mem-lab.fr/>), to implement data management and to apply Machine Learning in order to further accelerate the deposition process of multicomponent materials using our automated system with combinatorial heads allowing the deposition of compositional gradients. The thesis objectives are to set the frame an IA models specific of our SALD so that they can then be latter applied to different materials. The case study for the development will be the deposition of doped ZnO thin films (with Al, Ga, etc.) to obtain transparent electrodes with optimum properties for different applications.

The ideal candidate is a highly self-motivated individual of any nationality with a strong experimental background in materials sciences, thin films and Machine learning. Experience/notions of LCA are appreciated

START DATE: October 2026. Ph.D. supervised by **Dr. D. Muñoz-Rojas**, **Dr. N. Jakse** and **Dr. T. Deutsch**

Research profile & skills (required / highly desirable):

- **Master Degree (or equivalent) in physics, chemistry, chemical engineering or materials science, preferably with a master thesis related to thin films**
- Experience in thin film deposition techniques (CVD, MOCVD, ALD, SALD, MBE)
- **Experience in processing, developing and characterizing thin films via techniques such as XPS, AFM, KFM, electrical characterization and ellipsometry, XRR, XRD, TEM, SEM, SIMS,**
- **Knowledge and experience in Machine Learning**
- **Fast learner, hands on and have a flexible attitude**
- 3D drawing and CAD design (Blender/Solid Works/Catia/Fusion 360 etc)
- Have experience in 3D printing
- Have experience in building and/or setting up laboratory equipment or simple systems (i.e. Arduino, etc.)
- **Be someone able to and enjoy to solve problems and pushing your research to achieve results**
- **High degree of responsibility and independence, while collaborating with your team and lab mates, and other laboratory staff.**
- **Good management skills, good presentation skills, excellent written and oral English level (among non-native English speakers, equivalent TOEFL score of 100 or higher).**

Scientific environment:

The candidate will be based at the LMGP, Materials and Physical Engineering Laboratory, in the SALD team within the Synfoni group. Located in the heart of an exceptional scientific environment, the LMGP and our two partner labs offer the applicant a rewarding place to work. The laboratories are very dynamic and highly international. The candidate will have the possibility to supervise master students and perform teaching.

LMGP Web Site: <http://www.lmgp.grenoble-inp.fr/>

Salary: The position is for 3 years, paid by Grenoble INP (gross salary of approx. 2300 €/month)

Application procedure: Please send motivation letter CV, marks transcripts and the name and contact details of 2 references to:

David Muñoz-Rojas: david.munoz-rojas@grenoble-inp.fr ;

Closing date for applications: 30 April 2026