

Prof. Habil. David AMANS

Head of the team Luminescence

Institut Lumière Matière (UMR 5306 CNRS)

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Villeurbanne, 01/10/2026

Open PostDoctoral Position

Topic: Laser Synthesis of Nanoparticles, In-Situ Plasma Diagnostics and Data Analysis.

Host institution: Institut Lumière Matière (ILM), Université Lyon 1 / CNRS, Lyon, France.

Supervisor: Prof. David Amans

Duration: 24 month

Monthly net salary (commensurate with experience): 2300€ – 2800€

Starting date: At the earliest convenience of the candidate

Scientific Context: The **NanoPhiA** Project (PEPR DIADEM Financial support)

The NanoPhiA project aims to develop an artificial intelligence-based predictive framework capable of forecasting the structure of nanoparticles (NPs) from their synthesis conditions. The project addresses a major challenge in nanomaterials science: understanding and controlling the complex, non-equilibrium processes governing nanoparticle nucleation, growth and structural organization during physical synthesis. The central strategy of NanoPhiA is to bridge the gap between experimental synthesis parameters and the resulting nanoparticle structures by combining complementary approaches: physical nanoparticle synthesis, in-situ measurements of the thermodynamic conditions prevailing during synthesis (plasma spectroscopy), and machine-learning-assisted molecular dynamics simulations. By integrating these experimental and computational approaches, the project seeks to identify the relationships between synthesis conditions, plasma condition (transient physical and chemical states), and the final structural properties of nanoparticles.

NanoPhiA brings together complementary expertise from several French research laboratories. The experimental partners investigate nanoparticle synthesis using three physical approaches: pulsed laser ablation in liquids (PLAL) at the Institut Lumière Matière (ILM, Lyon), magnetron sputtering at CEMES (Toulouse), and chemical vapour synthesis at INSP (Paris). These activities are closely connected to theoretical and computational research conducted by partners at UMET (Lille), CEMES and INSP, who develop atomistic simulations and machine-learning interaction potentials to investigate nanoparticle formation mechanisms.

Research Activities at the Institut Lumière Matière

The successful candidate will join the Institut Lumière Matière (ILM) in Lyon and work under the supervision of David Amans. The research will focus on (i) pulsed laser ablation in liquids (PLAL), the (ii) development of in-situ plasma diagnostics, and (iii) the processing and analysis of experimental data.

(i) Synthesis experiments using the PLAL facilities available at ILM. The postdoctoral researcher will investigate the influence of experimental parameters on the resulting nanoparticles and intermediate plasma condition.

(ii) Development of an in-situ plasma diagnostic setup: A major part of the position will involve developing an experimental setup to investigate the plasma generated during synthesis experiment. The candidate will contribute to the design, implementation and optimization of in-situ emission plasma spectroscopy, to monitor the evolution of the plasma and extract relevant physical and chemical information. **The setup is intended to be moved to partner working on nanoparticle synthesis for measurement campaigns, giving the successful postdoctoral candidate a central role in the project.**

(iii) Data processing and analysis : The postdoctoral researcher will develop code to extract from atomic and diatomic emission relevant information (temperatures, composition, electron density).

The candidate will also interact closely with the modelling teams developing atomistic simulations and machine-learning models. Experimental data will be shared and discussed with these partners to identify relevant physical descriptors, guide model development and evaluate the ability of computational approaches to reproduce experimental observations.

Candidate Profile :

We are seeking a highly motivated researcher with a PhD in physics, physical chemistry, materials science, laser–matter interaction, or a related field. The ideal candidate will have experience in several of the following areas:

[Mandatory] Optical spectroscopy and plasma diagnostics.

[Mandatory] Writing skills / first-author publications in peer-reviewed journals.

[Mandatory] Experimental setup development, instrumentation, and optical measurements.

[Expected] Signal processing and automation of experimental workflows.

[Expected] Data processing and quantitative analysis.

[Expected] Knowledge of materials science and crystallography.

[Expected] Programming skills in Python.

[Nice-to-have] Pulsed laser ablation applied to nanoparticle synthesis.

[Nice-to-have] Experience in transmission electron microscopy (as an operator).

[Nice-to-have] Programming skills in instrument control and automation.

Candidates with a strong experimental background and an interest in interdisciplinary research are particularly encouraged to apply. The successful candidate should demonstrate scientific independence, strong problem-solving skills and the ability to collaborate effectively with experimentalists and computational scientists.

Our team is committed to diversity, equity, and inclusion. We welcome applications from all qualified candidates regardless of gender, sexual orientation, gender identity, origin, or disability.

Applications should be sent by email to Prof. David Amans (david.amans@univ-lyon1.fr).

The application should include (preferably as download links):

- Curriculum vitae, including a full list of publications
- Cover letter
- Contact details of 2–3 referees
- PhD thesis manuscript / doctoral thesis report

Deadline for applications: 15 November 2026

Selection process: Shortlisted candidates will be invited for an interview.