

## PHD Position Hybrid plasmonic nanomaterials

The chemistry laboratory of the École Normale Supérieure de Lyon (<https://www.ens-lyon.fr/CHIMIE>) is a partner in the LUMA PEPR Moonshot project “SUNRISE” (<https://www.pepr-luma.fr/projet/sunrise/>), as part of a consortium of seven major research institutions (University of Bordeaux, University Jean Monnet, Sorbonne University, University of Haute Alsace, CEA, Institut de la vision, ENS de Lyon) and the CNRS. The SUNRISE Moonshot aims to explore the plasmonic effects generated by customized functionalized metal nanoparticles in various photochemical processes, including free radical photo-polymerization, oxidative polymerization, and reversible deactivation radical polymerization, as well as triplet-triplet annihilation upconversion (TTA-UC) to reduce the photon energy required for photopolymerization and microfabrication. It also seeks to disentangle the contributions of electronic, electromagnetic, and thermal effects in photochemical reactions by elucidating fundamental mechanisms.

The PhD student will work in the “Functional Materials and Photonics” team of the chemistry laboratory at ENS Lyon and will have the following objectives: (i) synthesis of metallic nanoparticles of various sizes, shapes including chirality (gold, silver), (ii) coupling with photoactive molecules through different architectures allowing control of interactions, and (iii) characterizing their structures and optical properties. One of the challenges will be to decouple energy and charge transfer effects to understand the fundamental aspects of these interactions and optimize them. The architectures will vary, including colloidal suspensions, films, and bulk glasses. Beyond the fundamental aspects, one goal will be to nanostructure surfaces through photochemical processes induced by plasmons. Access to state-of-the-art ultrafast spectroscopy experiments within SUNRISE will provide measurement techniques at the highest international level. The PEPR LUMA spectroscopy and microfabrication platforms will be available for the project (<https://www.pepr-luma.fr>). The PhD student will work in close interaction with the partners of the SUNRISE project.

Expected candidates should possess a background in chemistry, with a Master's degree or equivalent, and in-depth knowledge of nanomaterials and spectroscopy. They must be capable of working in a team and actively leading collaborations with partners. Proficiency in English is required.

### Contact:

Prof. Stephane Parola / [stephane.parola@ens-lyon.fr](mailto:stephane.parola@ens-lyon.fr)

Laboratoire de Chimie (UMR ENS/CNRS/UCBL 5182)

École Normale Supérieure de Lyon