



PhD FUNDING

Monthly gross income: 2300 €*

36 months – Deadline to take up the position: December 2026, 1st

CEISAM - UMR CNRS 6230 / NANTES UNIVERSITY - FRANCE

FUNCTIONAL ORGANIC NANOMATERIALS FOR ULTRAFAST INVESTIGATIONS OF OPTICAL AND MAGNETIC COUPLING

Context. The CEISAM lab seeks talented and motivated students to conduct research works in the field of photo- and magneto-responsive nano-architectures, driving considerable interest in data storage, catalysis and nanomedicine. While most of the studies have been carried on inorganic materials, combining both photo- and magneto-activities within organic architectures remains quite scarce. Moreover, whereas such a coupling has often been investigated at the stationary state, deciphering how magnetic switching could influence the dynamics of photoexcited states, and conversely how light could impact the magnetic properties at short ns and sub-ns timescales, would bring considerable progress in the design of performing materials.

Research studies. The multiple goal of the planned researches will be to design, elaborate and investigate hybrid nanoassemblies, composed of organic radicals, endowed with photoactive units (fluorescent, photochromic and strong affinity toward superparamagnetic iron oxide nanoparticles. Particular attention will be paid to retention and reproducibility of the properties after self-assembly, which will require precise molecular engineering as well as size control of the nano-objects by resorting to microfluidic synthesis, allowing for additional post-processing like surface functionalization. This work will be carried out in the framework of interdisciplinary projects, funded by the French Research National Agency (ANR), addressing high-level challenges in light-matter interactions. It will involve strong collaborations with chemists at Sorbonne University (PHENIX), photophysicists at ENS Paris, physicists at Strasbourg University (IPCMS) and theoreticians at Perpignan University (PROMES), respectively experts in nanomagnetism and magnetic nanoparticles, ultrafast spectroscopic studies, ultrafast spin dynamics and theory of heat and optical coupling in magnetic nanoparticles and nanoassemblies.

Locations. Our team is more specialist in the design, manufacturing and studies of photoresponsive molecules and nanoassemblies. The lab is equipped with all common organic synthesis facilities and photophysical setups (steady-state and time-resolved absorption and emission spectroscopies, fluorescence microscopy) and has straightforward access to nanomaterial characterizations (TEM, AFM, DLS, zetametry). The candidate will work in a very dynamic scientific atmosphere, embracing energy and biology challenges, at the crossroad of molecular synthesis, photosciences, (nano)materials science and magnetism.

Skills. The recruited candidate is thus expected to possess a strong working-together spirit, be open-minded and ready for interdisciplinarity, and finally have a solid background in organic synthesis and physical chemistry.

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Application will first proceed by e-mail by sending a detailed CV and contact names.

Keywords: photoactive molecules, hybrid nanomaterials, photochemistry and photophysics, magnetism, hyperthermia.

References.

F. Zizzi et al, *ACS Appl. Nano Mater.* **2025**, *8*, 24412; E. Bequet et al., *Small* **2024**, *20*, 2403912; J. Boucard et al., *ACS Appl. Mater. Int.* **2019**, *11*, 32808; F. Rodriguez et al., *Adv. Opt. Mater.* **2021**, *9*, 2100525; T. Briolay et al., *Int. J. Nanomedicine* **2024**, *19*, 633; T. Blondy et al. *Nanoscale* **2022**, *14*, 5884; S. Hoang et al., *ChemPhysChem* **2020**, *21*, 2502.

*Tuition fees, including social security, amount to ~ 510 € per year.