# PhD FUNDING - NANTES UNIVERSITY, France
## 3-year funding starting October 2022, 1st

PHOTOSWITCHABLE ORGANIC NANOASSEMBLIES

FOR PHOTOACOUSTIC IMAGING

Medical imaging keeps exploring novel technologies to gain sensitivity, reliability and spatial resolution, thereby improving detection of pathologies. Photoacoustic microscopy, based on light excitation and ultra-sound detection, has recently appeared as a very promising technique to increase depth of probing and allow for dynamic follow-up, down to the scale of single cells. It is nowadays recognized as the privileged method to detect oxygen by monitoring hemoglobin and allow for *in vivo* quantification of biological dysfunctions. However, in order to diagnose and follow inflammatory processes implied in numerous pathologies (cancers, diabetes, cardiovascular diseases…), the development of novel contrast imaging agents is highly requested to complete the use of endogenous markers.

In this context, the targeted studies during the PhD work will involve an interdisciplinary approach, associating chemists, physicists and biologists, so as to generate innovative photoswitchable nanoparticles with high performance and break down the current limitations in terms of contrast, photostability, phototoxicity, and biodegradability. They will aim at synthesizing photoactive molecules, processing them as crosslinked nanoparticles, and exploring their photomechanical properties through different methods to rationalize the mutual interplay between structures and photoacoustic properties, quite overlooked so far. Organic synthesis and physico-chemical studies coupling photophysics, nanomechanics and microscopy, will be combined and bring broad skills and knowledge in the scientific field of nanomaterials applied to nanomedicine.

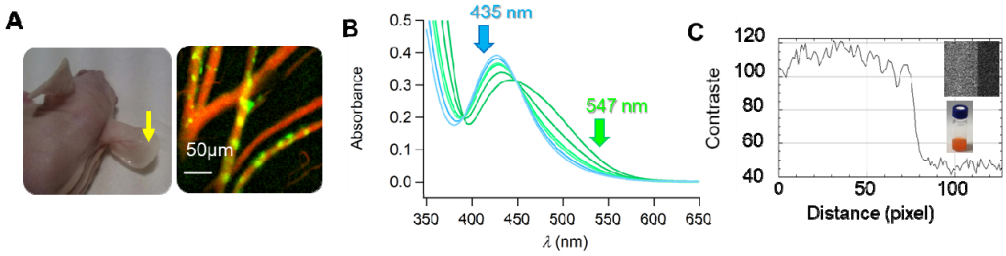


**Figure 1.** A) Photoacoustic microscopy of the vascularization of mouse's ear. B) Absorption photoswitching of molecular precursors for photoacoustics. C) Photoacoustic contrast of nanoparticles.

All studies will be carried out in the framework of a funded national ANR project, and take place at CEISAM – UMR CNRS 6230 and IMN - UMR CNRS 6502 laboratories of Nantes University, possessing strong expertise in the synthesis of molecular and polymeric nanomaterials, and the investigations of their photophysical and nanomechanical properties toward various biological applications.

The recruited candidate will be tightly interacting with another PhD student, involved in the biological investigations of the manufactured nanoparticles, as well as with the team in Grenoble responsible for the development of the photoacoustic microscopy setup. She/he is expected to be highly motivated and open-minded toward interdisciplinary topics.

**Expected profile: solid background in organic synthesis and skills in physical chemistry.**

**Application will first proceed by e-mail by sending a detailed CV, and two names of possible referees.**


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