PhD in Chemistry

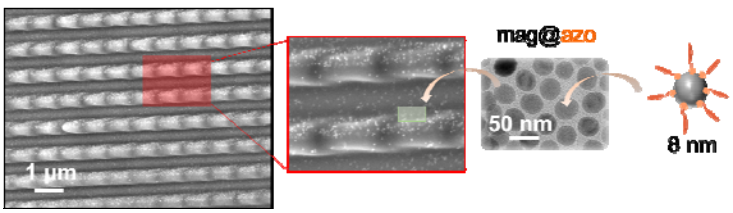
3-year funding from October 2019, 1st / gross income ~1800 € per month

NANTES UNIVERSITY - FRANCE

DEADLINE OF APPLICATION: March 2019, 31st

PHOTOSWITCHABLE MAGNETIC NANOARCHITECTURES

The research studies developed in partnership with the French General Delegation of the Armament (DGA) will tackle the **fabrication of organized structures based on magnetic nanoparticles**. The latter raise considerable attraction in the fields of energy, information transfer and data storage thanks to the **emergence of cooperative effects** and the generation of ultra-thin layers adapted to miniaturized devices. The research project will address three main current issues, namely a low density of patterned nanoparticles, patterning processes with poor modularity, and patterns with dimensions not smaller than a dozen of micrometers. In order to overpass such limitations, **two research teams of chemists** (CEISAM-UMR 6230) and **physicists** (IMN-UMR CNRS 6502) **of Nantes University** will work in a tight together manner and share their long expertise in the fabrication and characterizations of **photo- and magneto-active nanomaterials**. They propose a disruptive strategy involving a remote and solvent-free patterning procedure, soundly differing from the usual self-assembling and stamping methods. Such innovative approach will advantageously involve **holographic structuration of photochromic sub-micrometric thin films, doped with magnetic nanoparticles and amenable to induce periodic mass transfer** under interferential illumination. By combining **orthogonal stimuli** (static magnetic, optical field) and devising **bicomponent systems** comprising nanoparticles with distinct magnetic properties, novel perspectives in the field of multifunctional smart structures will be explored. The appearance of **unexpected couplings**, **especially at the nanoparticle interface,** will undoubtedly contribute in the short term to the understanding of interactions at the nanoscale. Extension of the photopatterning strategy to structurable semi-conductive matrices could represent a first potential step toward organic spintronics, currently representing a buoyant field of investigations.



This interdisciplinary project will provide the PhD candidate with strong knowledge and expertise in nanomaterials chemistry and physics (from synthesis of hybrid nanomaterials to structural characterizations), physico-chemical investigations (photophysics, magnetism measurements), optical, electronic and near-field microscopy (especially AFM). It will request high motivation, an open-minded spirit supported by a solid background in materials science and physical chemistry.

Application will first proceed by e-mail by sending a detailed CV, records of the master and bachelor degrees (or Engineer School), two letters of recommendation, or two names of possible referees. Only high-quality applications with an European citizenship will be considered.

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