FULLY FUNDED PHD POSITION
Mg Metal Nanomaterials for Sustainable Plasmonics
Driven by Automated Microfluidics and Artificial Intelligence

To date, plasmonic nanomaterials are mainly made from noble elements (Au and Ag). However, noble metals are facing many societal challenges putting them at the heart of environmental, economic and geopolitical issues. Mg is an abundant and sustainable element with expected promising optical properties (plasmonic) at the nanoscale in the metallic state. However, its custom nano-elaboration by wet nanochemistry and its plasmonic properties are still to demonstrate. This project proposes to take advantage of automatized microfluidics coupled to in-line optical detection to explore the impact of a large number of experimental parameters (chemical, mixing, oxidation) on the resulting metallic Mg nanostructures. Artificial intelligence and machine learning algorithms will be used and developed to assist in the fast processing, correlation of the generated data and elaboration of predictive models. We hope to establish using this methodology the clear relationship between the experimental conditions, the resulting structure of the nanoparticles at the nanoscale and their optical properties and bring to the scientific community new opportunities in the field of plasmonics based on metallic colloidal Mg nanoparticles and materials based data science.

The PhD student will carry the multi-parametric synthesis of the magnesium based nanostructures and their transfer to water as well as their characterizations using the different materials science and physico-chemical techniques available in PHENIX. She/he will tightly collaborate with Prof. Isabelle Bloch (LIP6, SU) a reknown specialist in ML and AI, for using algorithms as new methodologies for fast identification of nanostructures, classification of data and elaboration of predictive model and their validation.

Candidate profile: We are looking for a very motivated candidate with a master degree in nanochemistry, physical chemistry or colloidal chemistry motivated by manipulation and experimentation, and with a desire to work with AI algorithms. Skills in microfluidics and a background in mathematics are an asset but not mandatory. A good level of English, spoken and written is required.

How to apply: To apply please send a CV, a short motivation letter, a document stating your master and licence qualifications and one or two reference persons (master professor or master supervisor) that we can contact. The initial deadline of the application is May 30th 2023.

Period: October 2023 - September 2026. The PhD will take place in the PHENIX Laboratory in collaboration with Le Laboratoire d’Inforlmatique de Paris (LIP6) both located on the campus Pierre & Marie Curie of Sorbonne Université.

Salary/month: The thesis is funded by « La Mission pour les initiatives transverses et interdisciplinaires » (MITI) of the CNRS. The monthly salary is 1715 €/net

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Sorbonne University is a world-class, research-intensive university bringing together a broad range of arts, humanities, social sciences, natural sciences, engineering and medicine. The scientific Pierre and Marie Curie campus was completely refurbished in 2016.

PHENIX is a laboratory at the interface between Chemistry, Physics and Materials Science with a long-standing expertise of colloidal systems, electrolytes and fluids under confinement. Its strength lies in a combination of experimental and modelling activities (numerical simulations). Several international projects and networks are in place in PHENIX, providing a rich and multinational environment.