Ph.D. in Colloidal and Polymer Self-Assembly

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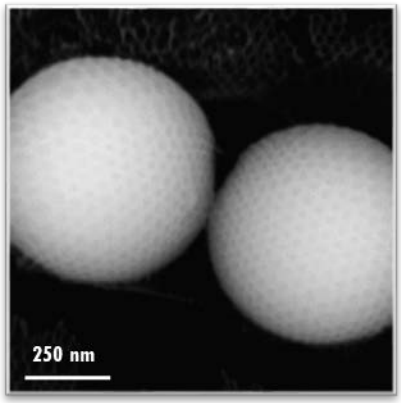
Asymmetric patchy particles and complex nanoscale organization from combined colloidal and block copolymer assembly

In the framework of the LIGHT "Major Research Programme" (GPR LIGHT - https://light-st.u-bordeaux.fr/) at the University of Bordeaux, a Ph.D. candidate is sought to work on optically-active surface obtained by colloidal and polymer assembly for application in advanced plasmonics. The Ph.D. candidate will work at the interface between two research groups: the "polymer materials for electronic, energy and information" team at LCPO and the "colloids, interfaces, assemblies" team at CRPP.
In this project, we propose to combine colloidal assembly of nanoparticles with block copolymer self-assembly, in order to produce both asymmetric patchy particles and complex nanoscale particles organization. Two strategies are envisioned to pursue these objectives:

- an iterative self-assembly strategy involving the formation of a monolayer of nanoparticles covered by a nanostructured block copolymer film in order to form an asymmetric coverage of the particles surface (see Figure for preliminary results).
- the generation of complex nanoscale particles organization by exploiting phase separation and photo-imprinting of block copolymers co-assembled with nanoparticles. The generated phase-separated block copolymer domains will be used as "molds" where nanoparticles will be selectively grafted or incorporated in one of the block copolymer nanodomains.



Asymmetric patchy particles obtained from the coverage of silica particles by a honeycomb lattice formed by block copolymer self-assembly

Accordingly, this project aims at deciphering the complex interplay between colloidal assembly and polymer self-assembly in order to produce unprecedented plasmonic nanostructures. Determining the relationship between structural and optical properties will be a central part of the study, in order to establish design rules for the formation of advanced plasmonic surfaces.

Details: Funded Ph.D. position of 36 months starting on September 1st 2023 at LCPO-CRPP, Bordeaux, France

Required Skills:
Candidates should have a master's degree or equivalent in materials science, with expertise in polymer and colloid science. The ability to work in a team and a good knowledge of English are required.

Contact: Pr. Guillaume Fleury: guillaume.fleury@u-bordeaux.fr
Applications will comprise a CV with a transcript of the Master diploma as well as the names of two references.