Internship at Laboratoire Mixte CNRS/Saint-Gobain “Surface du Verre et Interfaces”

Optical properties of liquid crystal-based coatings and films containing plasmonic nanoparticles

Metallic nanoparticles (NPs) exhibit unique optical properties due to localized surface plasmon resonance that lead to enhanced absorption and scattering of light. In fact, the optical properties of a single NP can be tuned through modification of its size and shape, and the material it is made of as well as the surrounding dispersing medium [1]. In the case of the assembly of NPs, collective oscillations related to small inter-particle distances can also appear. Therefore, fine control over the spatial organization of NPs and inter-particle distances will permit to tailor the optical properties of NP-based coatings on demand.

Meanwhile, it has been recently shown that localized defects in thin liquid crystal (LC) films (Fig. 1-2) can efficiently trap and organize gold NPs in straight lines or rings [2,3].

The aim of this internship is to realize LC coatings/films containing plasmonic NPs on glass/in glass cells, and study how their structural properties (NP size, shape, concentration, film thickness) and chemistry (surface and LC) impact their optical properties. Various experimental techniques will be used in this project in order to characterize the structural and optical properties of those composite coatings and films: optical microscopy (polarized light, bright field, dark field – see Fig. 3), SEM, AFM, in situ UV-Vis spectroscopy, DLS, and TGA.

The student will benefit from an in depth experience in surface modification technologies and optical phenomena in a mixed academic/industrial environment.

Profile
Student in Physical Chemistry and/or Materials Science, and experimentalist. Experience with the topic and/or with the above techniques will be a plus.


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