Postdoctoral position (12 months)
Active Plasmonics with Colloidal Cobalt Nanoparticles

Context

Plasmonics has been at the forefront of the technological revolution witnessed by materials science during the recent development of nanotechnology. Such prominent position has been achieved thanks to the outstanding optical properties inherent to Au and Ag nanoparticles. Nevertheless, the high price of noble metals (Ag and Au, but also Ru, Rh, Pd, Os, Ir or Pt) remains today an important limitation to the broad applicability of these materials, especially in those industrial sectors in which added values and profit margins are particularly narrow. In this manner, the development of more sustainable plasmonic materials is today a matter of particular interest. Recently, we reported very encouraging results revealing that Co nanostructures prepared by electron beam lithography display a tuneable plasmonic response with quality factors that compete with that of Au.[1] These bi-functional magnetic and plasmonic nano-objects hold high potential for their use in different technological domains such as information storage, catalysis, optical communication or for biomedical applications.

Currently, we aim at studying the plasmonic properties of colloidal cobalt nanoparticles obtained through wet-chemistry methods. For that, we will take advantage of the different synthetic protocols developed in our group for the synthesis of Co nano-objects with an outstanding control over their size, shape, crystal structure and surface chemistry.[2,3] The large variety of morphologies and structures that can be obtained in this way will allow us to synthesize a library of nanoparticles with different plasmonic features. Such optical properties will be subsequently characterized both in solution and at the single particle level.

Activities

The postdoctoral fellow will be in charge of the synthesis of cobalt nanoparticles through soft-chemistry methods. Techniques such as transmission and scanning electron microscopy or X-ray diffraction will be routinely used for the characterization of the materials. The influence of the different reaction parameters on the plasmonic response of the nanoparticles will be assessed by classical absorption spectroscopy and advanced electron energy loss spectroscopy (EELS), the latter being performed in the framework of a collaboration with our colleagues at MPQ laboratory (Université de Paris).

Competences

PhD in Chemistry, Nanotechnology or Materials Science. Previous experience in colloidal synthesis of inorganic nanocrystals is mandatory. Knowledge of plasmonics and/or magnetism will be highly valued.

Starting date: January-March 2022. The salary range is defined by Université de Paris and depends on the experience of the candidate.
Applications: Motivation letter, CV with a complete list of publications and 2 contact references should be sent to Miguel Comesaña-Hermo (***miguel.comesana-hermo@u-paris.fr***).

References

[1] M. Braik et al., Nanoscale, 2021, 13, 2639–2647.
[2] A. Viola et al., Catalysis Today, 2019, 333, 97.
[3] R. K. Ramamoorthy et al., Nano Letters, 2019, 19, 9160-9169.