

INTERNSHIP PROPOSAL

(One page maximum)

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Thesis possibility after internship: YES

Funding: YES

If YES, which type of funding:

ANR funding already obtained

Temperature-controlled plasmonic nano-antennas

Summary (half a page maximum)

Already around 15 years ago, it has been shown that liquid crystal topological defects can be used to confine and organize nanoparticles. In particular, oriented chains of nanospheres or of tip-to-tip nanorods have been formed in unidimensional smectic defects, dislocations and disclinations (Fig.1) [1]. The liquid crystal phase transitions occurring at low temperature, liquid crystals can provide temperature-activated assemblies of nanoparticles [2]. In this context, we propose to use oriented unidimensional smectic defects in order to build plasmonic nanoantennas based on strictly facing gold nanorods in close contact. We will study the evolution of the light absorption of the nanoantennas when temperature is increased in relation with the disappearing of the liquid crystal defects driven by the liquid crystal phase transition. This study will pave the way for an activation of the coupling strength between nanoparticles actively tuned by the temperature. This would be a first step towards future optical devices based on visual appearance controlled by varying temperature.

[1] S.P. Do et al. Nano Letters 20 (2020) 1598, [2] H. Jeridi, Appl. Phys. Lett. 123 (2023) 203101

Please, indicate which speciality(ies) seem(s) to be more adapted to the subject:

Condensed Matter Physics: YES Soft Matter and Biological Physics: YES

Quantum Physics: NO

Theoretical Physics: NO