# Lab project / internship M1 PPN (1,5 months : 13/05-21/06)

2023-2024

**Title of the project: Development of Gold Nanorod-Embedded Polymer Thin Films**

**Supervisor(s): Benoit CLUZEL, Adem DAHI**

Laboratory / Department / Team : Photonics Department, ICB

**Summary:**

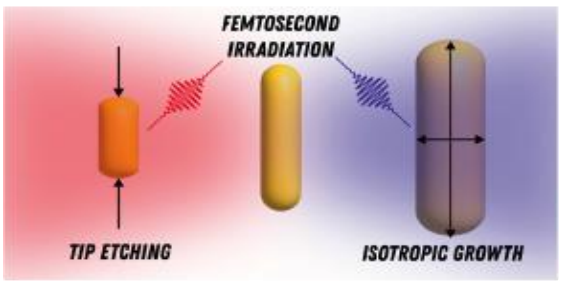
Gold nanorods are renowned for their exceptional optical, thermal, and electronic properties, making them highly sought after in various fields including photochemistry, cancer therapy, drug delivery, and photovoltaics. Despite their promise, the reproducibility of synthesis methods using wet chemistry approaches has been a challenge.

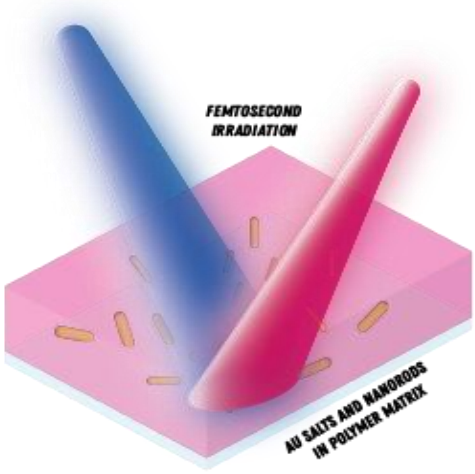
To address this issue, our team has devised a novel method involving the post-synthesis modification of gold nanorods in colloidal solutions. By subjecting these nanorods to irradiation in the presence of gold salts, we have demonstrated the ability to induce controlled growth or tip etching, depending on the wavelength of irradiation[1]. However, the underlying mechanisms of these phenomena remain unclear, with reaction kinetics primarily influenced by the diffusion of reactive species.

To enhance control and reduce diffusion rates, we propose transitioning from a colloidal (liquid phase) environment to a solid polymeric phase. The objective of this internship is to fabricate thin polymer films doped with gold nanorods and to conduct irradiation experiments. Additionally, the intern will have the opportunity to employ various characterization techniques, including dark-field microscopy, UV-visible spectroscopy, and transmission electron microscopy, to analyze the resulting materials.

This internship offers a unique opportunity for a master's student to delve into cutting-edge research at the intersection of materials science, nanotechnology, and photonics while contributing to the advancement of practical applications for gold nanorods.

The duration of the internship can be extended to July 31th for interested and motivated students.




[1]Adem Dahi et al., « Tuning the plasmonic resonance of gold nanorods by femtosecond photocatalysis », J. Phys. Chem. C, 2024 https://doi.org/10.1021/acs.jpcc.3c08272

**Type of project (theory / experiment): Experiment**

**Required skills: Optics, materials, data processing**