

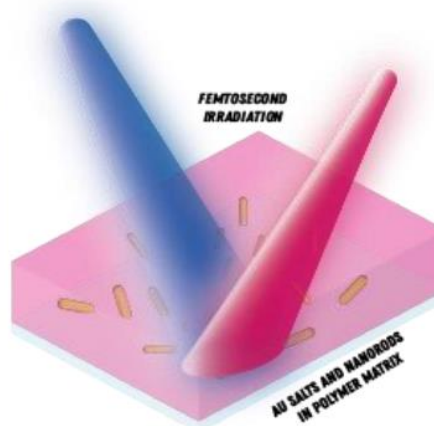
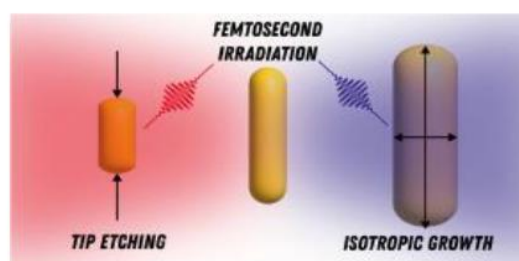
Erasmus Mundus Master QuanTEEM Research Project

TITLE	Development of Gold Nanorod-Embedded Polymer Thin Films
SUPERVISORS	Benoit CLUZEL, Adem DAHI
INSTITUTION	Université de Bourgogne
LAB / DEPARTMENT / TEAM	Photonics Department, ICB
COLLABORATIONS	
TYPE OF PROJECT (theory / experiment)	Experiment

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 irradiation¹. However, the underlying mechanisms of these phenomena remain unclear, with reaction kinetics primarily influenced by the diffusion of reactive species.



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>

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.

Additional Information

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.

Required skills: Optics, materials, data processing.

Duration: from 13/05/2024 to 21/06/2024. The duration of the internship can be extended to July 31st for interested and motivated students.

