MÁSTER DE FÍSICA BIOMÉDICA. CURSO 2023/24

PROPUESTA DE TRABAJO FIN DE MÁSTER

Título: Hacia la mejora de la señal de los fluoróforos oculares

Title: Towards ocular fluorophores signal enhancement

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Resumen**

The damage threshold for in vivo application in the human eye is a significant drawback for imaging techniques (i.e. multiphoton microscopy), which requires work at very low radiation levels, where either the Second Harmonic Generation Signal (SHG) or the fluorescence signals (FLIM) are not well generated. Functionalized nanoparticles (NPs) with controlled geometrical and optical properties are the subject of intensive studies and biomedical applications, including genomics, biosensors, immunoassays, clinical chemistry, laser phototherapy of cancer cells and tumors, the targeted delivery of drugs, DNA and antigens, optical bioimaging and the monitoring of cells and tissues with the use of state-of-the-art detection systems. In particular, Gold NPs allow individual enhancement of the fluorophores signals1, therefore enhancing our access to low intensity endogenous fluorophores. Moreover, collagen-GNPs hybrid hydrogels2 can be used for local delivery of therapeutic agents, showing enhanced antitumor efficacy. In this project, the candidate will work in the development of a novel nanoscopy experimental procedure involving novel imaging multiphoton microscopy techniques in combination with metallic/bio NPs, targeting different ocular treatments (i.e. crosslinking of corneal collagen fibers-Keratoconus & sclera-Myopia & 2Photon scleral crosslinking).

1 Li, G.-C. et al. Light-induced symmetry breaking for enhancing second-harmonic generation from an ultrathin plasmonic nanocavity. Nature Communications 12, 4326, doi:10.1038/s41467-021-24408-x (2021).
2 Xing, R. et al. An Injectable Self-Assembling Collagen-Gold Hybrid Hydrogel for Combinatorial Antitumor Photothermal/Photodynamic Therapy. Advanced materials 28, 3669-3676, doi:10.1002/adma.201600284 (2016).

Observaciones***

Más información en ficheros extra

*Solo en el caso de dos co-tutores.

**Breve resumen de los objetivos.

***Optativo. Por ejemplo si se recomienda tener algun conocimiento o experiencia previa.