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12:00

Sala de Grados  
Facultad de Ciencias

## Single Molecule-based Nanophotonics for Biology



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Nanophotonics has revolutionized our ability to probe biological systems with unprecedented spatial and temporal resolution. In this talk, I will discuss how single-molecule approaches, combined with nanophotonic architectures, enable the direct visualization and quantification of biomolecular interactions at the nanoscale. By leveraging plasmonic and dielectric nanostructures, we can enhance fluorescence signals and confine light to sub-diffraction volumes, allowing us to study dynamic processes in living cells with exceptional sensitivity. I will show efforts to fabricate and validate large arrays of highly packed plasmonic nanostructures that we address in a high throughput (>1000 nanostructures simultaneously) and multicolor fashion. I will highlight recent advancements in multi-color single-molecule tracking, super-resolution imaging, and nanoscale manipulation to unravel fundamental biological mechanisms, from membrane organization to intracellular signaling. These insights not only deepen our understanding of molecular behavior in complex environments but also pave the way for novel applications in biotechnology and medicine.

- 1.- E. Herkert, ... , M.F. Garcia-Parajo, ACS Nano 17, 8453 (2023)
- 2.- M. Sanz-Paz, ... , M.F. Garcia-Parajo, SMALL 2207977 (2023)
- 3.- E. Herkert, ... , M.F. Garcia-Parajo, ACS Appl. Mater. Interfaces, 16, 41271 (2024)
- 4.- N Mateos, ... , MF Garcia-Parajo, J.A Torreno-Pina, ACS Nano 18, 28881 (2024)