

SEMINARIO DEPARTAMENTO DE QUÍMICA FÍSICA

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Guillermo González Rubio
Departamento de Química Física,
Universidad Complutense de Madrid

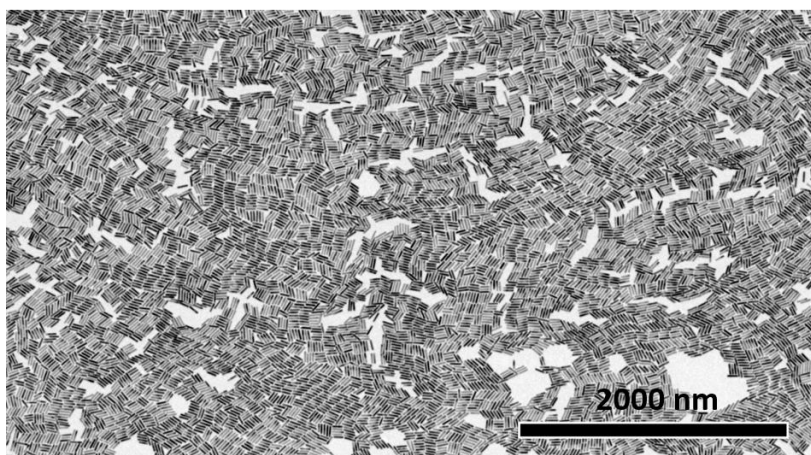


Controlling Anisotropy of Colloidal Gold Nanocrystals

The strong interaction of gold nanoparticles with light, dependent on morphology and size, makes them highly attractive for diverse applications like cancer diagnosis and treatment, optical devices, or photocatalysis. Anisotropic gold nanocrystals, such as nanorods, can exhibit narrow tunable extinction bands in the visible and near-infrared regions, influenced by their morphology and length-to-width ratio. Synthesis methods and post-synthesis modifications are crucial for tailoring gold nanorod anisotropy, ensuring desired optical and physicochemical properties for practical implementation in technology.

In this presentation, I will explore various approaches for producing gold nanorod colloids, focusing on surfactant-assisted seed-mediated growth routes and the use of femtosecond laser irradiation.

Symmetry breaking, anisotropic and chiral growth, and laser-induced reshaping of anisotropic nanocrystals will be covered. The talk will delve into the complex interplay between the different experimental parameters determining the quality of resulting gold colloids. Recent advances in the characterization of gold seeds using analytical ultracentrifugation will be highlighted, emphasizing its role in unraveling symmetry breaking mechanisms.



Electron microscopy image of highly monodisperse gold nanorods obtained through disconnecting symmetry breaking from anisotropic growth stage.

- [1]. G. González-Rubio et al. Femtosecond laser reshaping yields gold nanorods with ultranarrow surface plasmon resonances. *Science*. **2017**, 358, 640–644.
- [2]. G. González-Rubio et al. Disconnecting Symmetry Breaking from Seeded Growth for the Reproducible Synthesis of High Quality Gold Nanorods. *ACS Nano*. 13, **2019**, 4424–4435.
- [3]. G. González-Rubio et al. Micelle-directed chiral seeded growth on anisotropic gold nanocrystals. *Science*. 368, **2020**, 1472–1477.
- [4]. G. González-Rubio et al. Surfactant-Assisted Symmetry Breaking in Colloidal Gold Nanocrystal Growth. *ChemNanoMat*. **2020**, 6, 698–707.
- [5]. G. González-Rubio et al. Simple Determination of Gold Nanocrystal Dimensions by Analytical Ultracentrifugation via Surface Ligand-Solvent Density Matching. *Nanomaterials*. **2021**, 11, 1427.
- [6]. G. González-Rubio et al. Revisiting the Role of Seed Size for the Synthesis of Highly Uniform Sub-10 nm Length Gold Nanorods. *Chem. Mat.* **2024** (Just Accepted)