

NANOTECHNOLOGY SEMINARS

In-situ growth of shape-selected metal nanoparticle arrays on seed -particle-templated surfaces

Wednesday, 22nd October 2025

12:00 pm

Aula 04 | Planta 0 | ETS de Ingenieros Industriales y de Telecomunicación

ABSTRACT: Colloidal synthesis in solution is by far the most effective method for preparing highly monodisperse, size- and shape-controlled metal nanoparticles, thereby enabling precise tailoring of their optical, electronic, and catalytic properties. However, fully exploiting the potential of these nanoparticles in nanotechnology, both individually and cooperatively, often requires them to be precisely placed on a substrate surface, for example, in the form of well-

In this context, direct growth of nanoparticles at predefined positions on templated surfaces has recently emerged as a powerful strategy.¹ Initially conceived to overcome the intrinsic limitations associated with the traditional synthesis-then-positioning paradigm, it has now become increasingly apparent that synthesizing nanoparticle directly on the substrate surface gives access to new synthetic possibilities and enables the production of nanostructures with structural and functional features that are otherwise unattainable through the conventional colloidal synthesis routes. In this talk, I will use a case study on the preparation of shape-selected palladium nanoparticle arrays to illustrate some of these emerging synthetic opportunities enabled by on-site nanoparticle growth.^{2, 3}

(1) Vinnacombe-Willson et al. Direct bottom-up in situ growth: A paradigm shift for studies in wet-chemical synthesis of gold nanoparticles. Chemical Reviews 2023. (2) Piella et al. Shape-selected nanoparticle arrays with intrinsic particle size gradients (in preparation). (3) Piella In-situ growth synthesis of shape-selected nanoparticle arrays: the case of Pd (under review in Nature Comm.).



DR. JORDI PIELLA BAGARIA

I started my doctoral studies in 2012 at the Institut Català de Nanociència i Nanotecnologia (ICN2) under the supervision of Prof. Víctor Puntès, and since then, I have dedicated my research to developing colloidal synthesis routes for the preparation of size- and shape-controlled noble metal nanoparticles. In 2018, I successfully defended my PhD thesis entitled Advanced Synthesis and Characterization of Noble Metal Nanoparticles. In 2019, I joined the research group of Prof. Christoph Langhammer at Chalmers University of Technology (Sweden), where I was awarded a

Wenner-Gren Fellowship for postdoctoral training (2019–2021) and subsequently a Marie Skłodowska-Curie Individual Fellowship (2022–2024). During this period, my work focused on advancing methodologies for the precise positioning of nanoparticles on surfaces using in situ growth approaches. Finally, in 2025, I transitioned to industry, joining Chalmer's start-up Nanoscientifica Scandinavia AB as a research developer, where I am currently involved in scaling-up nanoparticle synthesis processes.



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