

## Au@Pd core-shell nanostructures: synthesis and related optical properties

**Authors:** Cynthia CIBAKA NDAYA (1), Nicolas JAVAHIRALY (2), François LE-NORMAND (2), Arnaud BRIOUDE (1)

### **Affiliations:**

(1) Université de Lyon, Laboratoire des multimatériaux et interfaces, UMR 5615, Campus Lyon Tech La Doua bâtiment CHEVREUL, 6, rue Victor GRIGNARD- 69622 Villeurbanne cedex, FRANCE

(2) University of Strasbourg, ICUBE Laboratory, MaCEPV Group, 23, rue du Loess - BP 20 CR - 67037 STRASBOURG Cedex 2, FRANCE

Bimetallic nanoparticles (NPs) attract great attention in many research domains because of their interesting physicochemical properties [1]. In fact, those properties drastically evolve as a function of the structure, the composition, and the morphology of those NPs, parameters that can be tuned by different synthesis methods such as co-reduction, thermal decomposition and seeded-growth, among others [2, 3]. This versatility renders bimetallic NPs very efficient and useful in various applications that include plasmonics, biological sensing, and catalysis, which places them on the frontier of advanced materials chemistry [4]. In particular, in the case of core-shell (CS) bimetallic nanostructures like Au@Pd NPs, the improvement of their catalytic activity in low-temperature electrooxidation [5, 6] is due to both their sizes and the interactions between the Pd shells and Au cores [5, 7].

The work presented here is dedicated to the deep correlation between the optical properties of CS Au@Pd particles and their morphologies and sizes. Their preparation involves seed-assisted synthesis based on successive reduction steps that allow a better control of the morphology (size and shape) at the atomic scale [2, 4, 8]. The CS structure of the obtained NPs and their optical response are investigated respectively by transmission electron microscopy (TEM) and by UV-vis spectroscopy. Those experimental results are confirmed and predicted by optical simulations based on the DDA (Discrete Dipole Approximation) method, exhibiting the high optical sensitivity of CS nanostructures to their environment.

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