



## #PLATH00018

NANO / Nanomaterials and nanostructured thin films

### PtCu@TiO<sub>2</sub> nanoparticles by low pressure plasma

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#### Abstract content

Pt/Cu nanoparticles (NPs) are promising materials for catalytic application. However, those NPs are often synthesised using wet-chemical deposition procedures involving the extensive use solvents. In this work, a low-environmental impact synthesis technique based on the plasma driven decomposition of solid (powder) Pt and Cu organometallic (OM) precursors is studied. The NPs are deposited on a TiO<sub>2</sub> powder substrate and synthesised using a low pressure inductively coupled Ar/NH<sub>3</sub> plasma discharge. The choice of ammonia discharge limits the oxidation of the nanoparticles, without significant nitride formation. Various working pressures, treatment times, plasma powers and OM precursors ratios are tested, to form Pt, Cu and PtCu nanoparticles. The crystallinity, the size and the lattice parameters of the NPs are evaluated using X-Ray Diffraction (XRD) while the chemical states and the surface compositions are measured using X-ray Photoelectron Spectroscopy (XPS). Both chemical and crystallographic characterizations confirm the formation of metastable alloyed Pt-Cu nanoparticles. The difference of Pt and Cu concentrations in NPs measured with a volume technique (XRD) and a surface technique (XPS) suggests a Pt concentration gradient within NPs attributed to a difference in organometallics degradation kinetics.