

## Metal and Polymer Nanostructures Induced in Mesophases for Applications in Electrocatalysis and Photocatalysis

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Synthesis of nanoparticles with well-controlled size and shape is often critical for their performances especially in catalysis, electrocatalysis and photocatalysis. Therefore a lot of research is being carried out to develop synthetic approaches to achieve control over the composition, structure, size and shape of the nanostructures. Radiolysis is a powerful method to synthesize metal and polymer nanostructures. Swollen hexagonal mesophases have been also used as nanoreactors to synthesize nanostructured materials (metal and polymers). Different 1D, 2D or 3D metal nanostructures have been synthesized by radiolytic reduction of metal salts confined in the water phase. Our templating approach allows synthesis of bimetallic nanoballs of tunable three-dimensional porosity and composition. These nanostructures might find applications in catalysis and electrocatalysis. On another hand, conducting polymer nanowires of controlled diameters can be induced in the oil phase of the hexagonal mesophases. Nanofibers of poly(diphenylbutadiene) (PDPB) show a high photocatalytic activity under visible light without the assistance of sacrificial reagents or precious metal co-catalysts. These polymer nanostructures are very stable even after repeated cycling. These findings may open a door to the development of semiconducting-based polymers, which can also find applications in self-cleaning surfaces, hydrogen generation and in the fields of photovoltaic and solar cells.

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Hynd Remita got her PhD in Physical Chemistry from Paris-Sud University and did her post-doc in the University of Medicine of Sherbrooke (Canada). She is a CNRS researcher since 1994 and she is working in the Laboratoire de Chimie Physique in Orsay at Paris-Sud University. She is presently director of research at the CNRS. Her research interests focus on radiolysis, metal nanoparticles and nanomaterials, nucleation and growth processes, and conducting polymers. She works on the applications of nanomaterials in fuel cells and photocatalysis. She is also interested in the actions of dissemination and implementation of science.

