

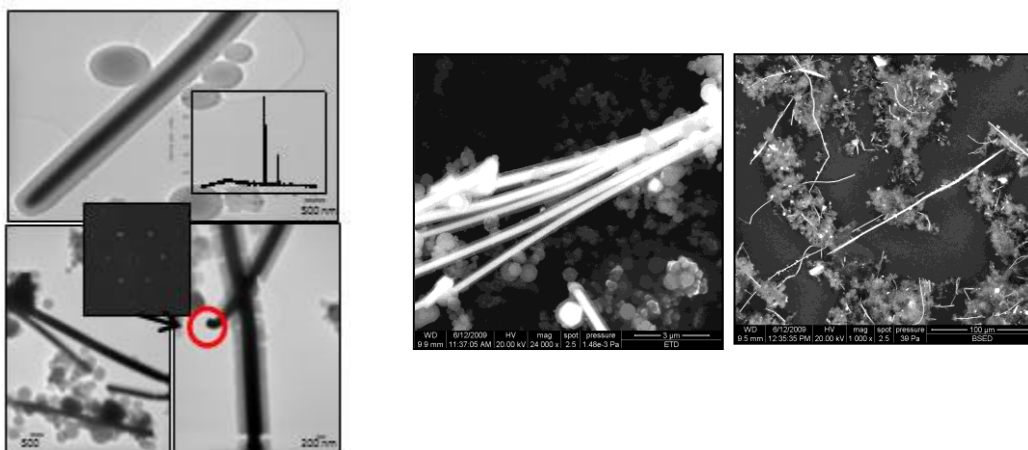
Hydrothermal Synthesis of Metal-Polymer Hybrid Nanostructures. Polypyrrole-coated Copper Nanocables

Jullieth Suárez-Guevara, Omar Ayyad, David Muñoz-Rojas and Pedro Gómez-Romero*

Centro de Investigación en Nanociencia y Nanotecnología, CIN2 (CSIC-ICN)
Campus UAB, 08193 Bellaterra (Barcelona), Spain
e-mail: pedro.gomez@cin2.es

Nanoparticles, nanotubes and nanowires are some of the most studied objects being developed by nanotechnologists. Noble metals have been widely used for these purposes given their ease of formation and stability. However, the fabrication of multicomponent or core-shell nanoparticles or nanowires is a more complex task.

In our group we have developed a line of work on the synthesis of hybrid nanostructures formed by metals (with Ag as a prototypical material) and conducting polymers [1-3] or biopolymers.[4] Hydrothermal techniques have played an important role in the fabrication of these structures. We present here several of the wide variety of hybrid materials prepared along this line, including Ag@PPy nanoparticles, Ag@PPy nanosnakes and AgCN@PPy nanotubes. Among these materials we will make special emphasis on the newest member of the family, namely Cu@PPy nanocables.[5] Thus we will present the first synthesis of polypyrrole-coated copper nanowires (Cu@PPy). These nanostructures are formed by rods of metallic copper coated with polypyrrole forming wires of a few hundred nanometers in diameter and lengths up to a few hundred microns, as seen on TEM (left) and SEM (center and right) photographs below.



These samples contain a large number of nanowire structures together with abundant globular formations of PPy. It should be remarked that the metallic copper core is single-crystalline in nature as showed by the SAED pattern.

Reference

- [1] Muñoz-Rojas, D., Oro-Sole, J., Ayyad, O., Gomez-Romero, P. *Small*. **4** (2008). 1301–1306.
- [2] Muñoz-Rojas, D., Oro-Sole, J., Gomez-Romero, P. *Journal of Physical Chemistry C*. **51**(2008). 20312-20318
- [3] Muñoz-Rojas, D., Oro-Sole, J., Gomez-Romero, P. *Chemical Communications*. **39**(2009). 5913-5915.
- [4] Ayyad, O., Munoz-Rojas, D., Oro-Sole, J., Gomez-Romero, P. *Journal of Nanoparticle Research*. **1**(2010). 337-345.
- [5] Submitted for publication.