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Three dimensional PEDOT nanowires by electrochemical polymerization

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Nanostructured materials have gained great importance into nowadays society due to the advantages offered in a variety of fields of application: biomedical, sensors. In particular, organic materials, since they present great advantages over their inorganic equivalents, such as: low cost, easy chemical modification and biocompatibility. Polymers and, especially conductive polymers, are very interesting structured materials. In this sense, there are several methods for preparing conductive polymers with a specific architecture. They can be organized into two groups: lithography (optical and electron beam), hard and soft template. All they aim to obtain structured polymers in the three dimensions: 0D, 1D, 2D and 3D. The hard template procedure is a versatile process to obtain structured polymers, because it employs a rigid substrate. Anodized alumina membranes are one of the most interesting templates because different porous morphologies can be obtained by selecting the appropriate anodizing conditions. In the case of 3D templates, pulsed anodizing is used. This process generates 3D networks of porous over a large area. The 3D template is used as a template for the PEDOT synthesis. PEDOT (poly (3, 4-ethylenedioxythiophene) has been synthetized by electrochemical polymerization and subsequently the organic network has been released by removing the template. The ordered 3D interconnected PEDOT nanowires can play an important role in the development of: transistors, OLEDS, solar cells, thermoelectric modules and supercapacitors. For that reason their properties and characteristics: morphology, electron properties and Seebeck coefficient have been studies. To conclude, employing anodic alumina oxide templates to obtain nanowires of conductive polymers by electropolymerization is a feasible route for prepare 3D nanostructures.

Biography

Antonio García-Barberá obtained a degree in Chemical from the University of Valencia in 2014 and in 2016, he obtained a Master in Molecular Nanoscience and Nanotechnology.

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