Complex hybrid nanomaterials by block terpolymer templating

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Hybrid materials based on polymer and inorganic components are of increasing importance because of their potential in catalysis, micro-electronics or biomedical applications[1,2]. The great advantage of polymer-templated hybrid materials is that they provide access to complex three-dimensional morphologies on the nanoscale, which are not accessible with common wet chemical processes[3].

This presentation discusses the synthesis of nanometer-sized hybrid architectures based on an ABC triblock terpolymer with helix-on-cylinder bulk morphology. After film preparing of polystyrene-*block*-polybutadiene-*block*-poly(*tert*-butyl methacrylate) (SBT) and cross-linking of the polybutadiene part, the bulk film can be re-dispersed in an appropriate solvent. Through selective loading of these multicompartment templates with different suitable inorganic precursors, we receive polymer-metal hybrid double helices (Figure 1). We follow carbonization *in-situ* in TEM, analyze the three-dimensional nanostructure by electron tomography, and verify the catalytic performance in model catalytic reactions. The synthesis of multimetallic architectures on the nanoscale opens up new opportunities to create well-defined, uniform and highly ordered materials for electrical energy storage or nanophotonics with special tailored properties[3,4]. Further aims are the synthesis and application of freestanding Pt@C nonwovens as well as the formation of libraries of bimetallic hybrid materials.

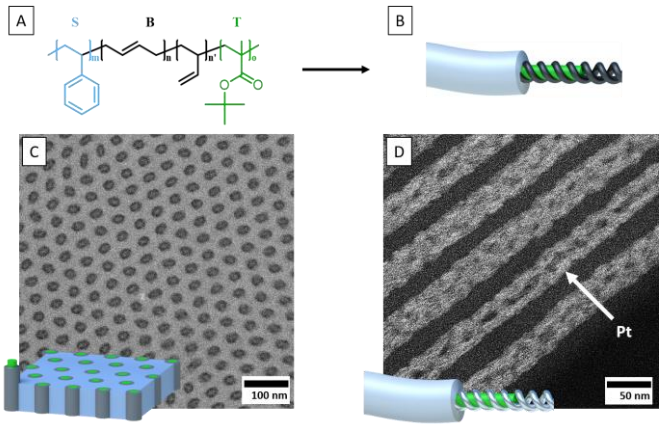

Figure 1. From core-shell cylinder morphology to double helices. A) Chemical structure of SBT. B) Schematic of cross-linked and unloaded helix-on-cylinder. C) SBT bulk film. D) Platinum loaded double helices.

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