Metal/carbon nanohybrids: tailored laser ablation production, physicochemical properties, and applications in catalysis

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Abstract

Laser ablation of selected coordination compounds leads to the efficient production of metal/carbon nanohybrid foams.[1,2] These nanohybrids consist of metal nanoparticles embedded within amorphous carbon nanoparticles, amorphous carbon nanoparticles, and carbon domains exhibiting a higher graphitic order, including graphene layers, hollow graphitic spheres, and carbon nanotubes. The composition, metal nanoparticle dilution and crystallite size, and structure of the nanohybrid foams can be tailored by suitably tuning the laser parameters used and by choosing the metals and ligands of the irradiated targets.[1-4]

The study of the physicochemical properties and the design of processing strategies for nanostructured carbon foams enable evaluating potential technological applications for these materials. Thus, remarkable magnetic- and electrochemical properties have been demonstrated [4]. Alternatively, wet chemistry strategies have been developed for the gold nanoparticle decoration of metal-free carbon foams. These gold/carbon nanohybrids provided an outstanding performance when tested as catalysts for the hydroamination of alkynes, leading to similar conversion values to those achieved using other carbon materials (such as carbon nanotubes, graphene oxide, nanodiamond, and carbon black) as catalyst supports.[5]

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