

A general one-pot methodology for the preparation of mono and bimetallic nanoparticles supported on carbon nanotubes: Application in the semi-hydrogenation of alkynes and acetylene

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The decomposition of organometallic metal complexes in the presence of stoichiometric amounts of ligands have demonstrated to be an effective method for the preparation of well-defined metal nanoparticles under mild conditions.¹ Recently, a new procedure for synthesizing small and well-defined NHC-stabilized NiNPs has been developed.² This methodology permitted the preparation of not only colloidal nanoparticles but also the direct immobilization on carbon nanotubes by a simple “one-pot” procedure. The supported Ni NPs/CNTs revealed to be efficient catalysts in the selective hydrogenation of internal alkynes into the corresponding (Z)-alkenes. In the present contribution, the “one-pot” methodology was extended for the preparation of monometallic (Cu and Pd) and bimetallic nanocatalysts (NiCu and PdCu) stabilized by a N-heterocyclic carbene ligand. Both colloidal and supported nanoparticles (NPs) on carbon nanotubes (CNTs) exhibited well-defined control on their size, morphology and composition and were evaluated in the selective hydrogenation of alkynes and alkynols. PdCu/CNTs revealed to be an efficient catalytic system providing highly selectivity in the hydrogenations of terminal and internal alkynes. Moreover, this catalyst was tested in the semi-hydrogenation of acetylene in industrially relevant acetylene/ethylene-rich model gas feeds displaying

excellent stability even after 40 h of reaction.³

Biography: Jorge A. Delgado is a research scientist in the field of advanced materials and heterogenous catalysis. He was born in Bogotá, Colombia. In 2009, he completed his undergraduate studies in chemistry at the Universidad Nacional de Colombia and subsequently he moved to Tarragona, Spain to conduct postgraduate studies. In 2014, he concluded a PhD thesis on the field of the Fischer-Tropsch synthesis at the Universitat Rovira i Virgili under the supervision of Prof. Cyril Godard and Prof. Carmen Claver. During 2015 and 2017 he worked at the Centre Tecnològic de la Química (CTQ) in Tarragona, as a postdoctoral researcher in a project sponsored by Total S.A. focused on selective hydrogenation reactions. In 2017 and 2018 he developed activities of associated professor at the Universitat Rovira i Virgili and associate researcher at EURECAT. His research interests lie in the areas of nanoscience, advance materials, unconventional catalytic approaches, transformation of small molecules and technologies for sustainable applications.

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