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Abstract

Nanomaterials are now widely used in the fabrication of electrodes and electrocatalysts. Herein, we report a sonochemical study of the synthesis of molybdenum and palladium alloy nanomaterials supported on functionalized carbon material in various solvents: hexadecane, ethanol, ethylene glycol, polyethylene glycol (PEG 400) and Ionic liquids (ILs). The objective was to identify simple and more environmentally friendly design and fabrication methods for nanomaterial synthesis that are suitable as electrocatalysts in electrochemical applications. The particles size and distribution of nanomaterials were compared on two different carbons as supports: activated carbon and multiwall carbon nanotubes (MWCNTs). The results show that carbon materials functionalized with ILs in ethanol/deionized water mixture solvent produced smaller particles sizes (3.00 ± 0.05 nm) with uniform distribution while in PEG 400, functionalized materials produced 4.00 ± 1 nm sized particles with uneven distribution (range). In hexadecane solvents with Polyvinylpyrrolidone (PVP) as capping ligands, large particle sizes (14.00 ± 1 nm) were produced with wide particle size distribution. The metal alloy nanoparticles produced in ILs without any external reducing agent have potential to exhibit a higher catalytic activity due to smaller particle size and uniform distribution.

Keywords: Electrocatalysts, Ionic liquid, Metal nanoparticles, Sonolysis, Sonochemistry.

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