Área: MAT

Synthesis of Pd Nanoparticle Supported on Aluminum Oxide by Mechanochemical Route and its application in Suzuki-Miyaura Reaction

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Highlights

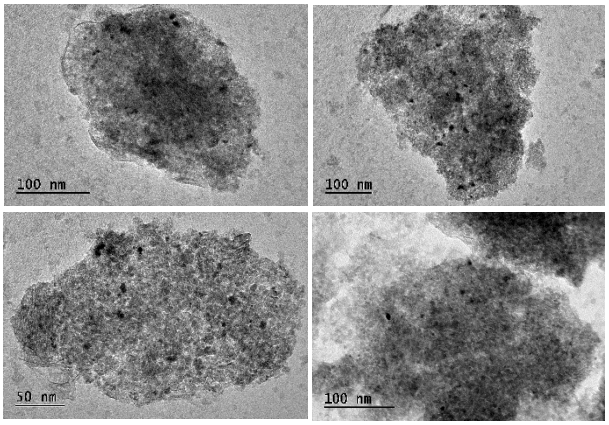
The Palladium nanoparticle supported on aluminum oxide synthetized by planetary milling was characterized by several techniques and was empolyed in organic solid-state Suzuki-Miyaura Reaction as a catalyst.

Resumo/Abstract

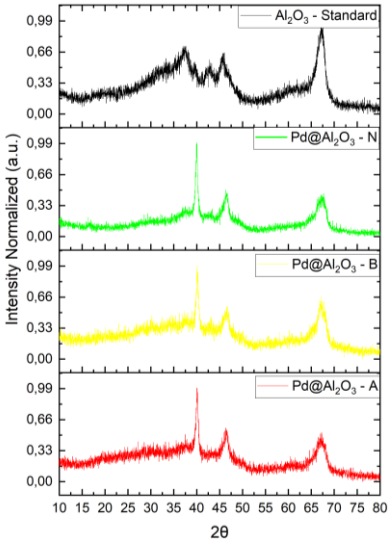
Mechanochemistry uses mechanical energy to promote chemical reactions in the solid state, dismissing, in the most of reactions, heating up and the use of toxic environmental solvents, being a potential green approach, alternative to conventional methods of synthesis.[1] Because of its advantages, different scientific areas have been using mechanochemistry to obtain a increase number of chemicals and materials,[2] including noble metallic nanoparticles.[3] In the synthesis of nanoparticles specifically, mechanochemistry can be used in two methods named as bottom-up or top down.[3] Metallic nanoparticles synthetized in the process can be used for many applications, for example catalysis, biosensing, imaging and energy.[4]

The bottom-up mechanochemical synthesis of noble metal nanoparticles are performed by planetary milling the metal precursor salt with the supporting oxide in the presence of a reducting agent. Specifically in this work, Pd^{2+} was reduced by $NaBH_4$ in the presence of Al_2O_3 as solid support. The nature of Al_2O_3 was also investigated, i.e. whether it is a neutral (N), basic (B) or acid (A) oxide. These materials were characterized by differents techniques as **(a)** Transmission Electron Microscopy (TEM), **(b)** Powder X Ray Diffraction (PXRD), X Ray Photoelectron Spectroscopy (XPS) etc, to confirm the presence of Palladium nanoparticles on the oxide sufarce.

a.



b.



The Palladium Supported synthetized was used as catalyst in Suzuki-Miyaura cross-coupling reactions, where all the reagents are in solid state.[5] The first catalysis was performed using the vibratory milling to obtain 4-biphenylcarboxaldehyde from biphenylboronic acid and 4-bromobenzaldehyde in basic environment. This product will be characterized and quantified by Gas Chromatography with Flame Ionization Detector acoupled (GC-FID), Nuclear Magnetic Resonance etc.

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