View Abstract

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ABSTRACT SYMPOSIUM NAME: Advances In Metal Catalysis for Organic Synthesis (Invited, Poster)

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TITLE: Amine-functionalized carbon nanotubes supported palladium nanoparticles in Buchwald-Hartwig amination

ABSTRACT BODY:

Abstract: Buchwald-Hartwig amination is a cross-coupling reaction between aryl halides or pseudohalides and primary or secondary amines to produce aryl amines. The reaction has become a fundamental tool in organic synthesis for the formation of carbon-nitrogen bonds in a variety of biologically active molecules, natural products, pharmaceuticals, and material science. These reactions usually employ a palladium complex in homogeneous form along with a ligand to stabilize the metal center. In this regard, there are many disadvantages for using homogeneous catalysis including the potential contamination of the metal in the final product and lack of recyclability of the catalyst. Heterogeneous catalysis is an alternative attractive approach to construct carbon-nitrogen bonds in which the metal is fixed on variety of solid supports such as zeolites, polymers, mesoporous silica, and carbon materials. This would allow for ease of separation of the catalyst from the reaction and reusability for the subsequent runs. In this presentation, we will introduce the synthesis of amine-functionalized carbon nanotubes (CNTs) supported Pd nanoparticles (Pd/MWCNTs-NH_2) via simple dry mixing of the corresponding palladium salts and amine-functionalized CNTs using the mechanical energy of a ball-mill mixer. The method is very straightforward and rapid and does not require any solvent or reducing agents, a feature that allows for large-scale preparation of these materials. The as-prepared catalyst demonstrated excellent catalytic activity for the Buchwald-Hartwig carbon–nitrogen cross-coupling reactions of variety of aryl halides and functionalized amines under microwave irradiation conditions and short reaction time. The Pd/MWCNTs-NH_2 nanoparticles prepared by this simple, solventless, and inexpensive preparation provide a more direct, cost-efficient, and streamlined means to accomplish often-challenging Buchwald-Hartwig amination reactions.

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