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Novel magnetically chitosan based N-heterocyclic carbene as recyclable nano-catalyst and highly efficient for cross-coupling reaction**Pourya Zarshenas, Hatef Shahmohammadi, Bahareh Heidari and Roya Sedghi**
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In this paper, novel magnetically chitosan at N-heterocyclic carbene-palladium (NHC-Pd) coated Multi-Walled Carbon Nano-Tube (MWCNTs) was synthesized in three steps: (1) The reaction of chitosan, glyoxal and formaldehyde for synthesis of chitosan at imidazole, (2) synthesis of magnetic functionalized-MWCNTs and (3) the esterification reaction via the reaction of hydroxyl and carboxylic acid groups of chitosan at imidazole and magnetic functionalized-MWCNTs respectively and followed with the attachment of palladium chloride to compose of novel NHC ligand for the first time. Catalytic studies of magnetic chitosan at NHC-Pd coated MWCNTs for the Suzuki cross-coupling reaction of various aryl halides with aryl boronic acids have been evaluated in the ethanol-water solution. In general, our new catalyst showed superior reactivity for this model reaction. Moreover, the heterogeneous catalyst can be easily recovered by external magnet field and reused for subsequent use without any significant loss in catalytic activity. The Suzuki-Miyaura cross-coupling reaction is an important synthetic transformation that is widely employed for the preparation of bi aryl compounds in a great variety of industrial applications including the production of natural products, agrochemicals and pharmaceuticals. Challenges facing this reaction are the employ of catalysts that are efficient with higher Turnover Frequencies (TOF) and Turnover Numbers (TON), easily recoverable and can operate in environmentally benign solvents. Therefore, much recent effort has been searched and made approaches to develop efficiently heterogeneous Pd-catalyst systems.

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