Palladium nanoparticles immobilized on sepiolite–cyclodextrin nanosponge hybrid: Efficient heterogeneous catalyst for ligand- and copper-free C–C coupling reactions

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Abstract

A novel hybrid system composed of sepiolite clay and cyclodextrin nanosponge (CDNS) was prepared via reaction of Cl-functionalized sepiolite with amine-functionalized CDNS. CDNS–sepiolite was then applied for immobilization of Pd(0) nanoparticles. The resulting hybrid system, Pd@CDNS-sepiolite, was characterized using various techniques and successfully used as an efficient and heterogeneous catalyst for ligand- and copper-free Sonogashira and Heck coupling reactions under mild reaction conditions. Recycling experiments confirmed that Pd@CDNS-sepiolite was recyclable and could be used for several consecutive reaction runs with slight Pd leaching and loss of catalytic activity.

Keywords: C–C coupling reactions, cyclodextrin nanosponge, Pd nanoparticles, sepiolite