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Nano Ag-doped magnetic-Fe₃O₄@mesoporous TiO₂ core–shell hollow spheres: synthesis and enhanced catalytic activity in A3 and KA2 coupling reactions

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Abstract

Nano Ag-doped Fe₃O₄@mesoporous TiO₂ core–shell hollow spheres (h-Fe₃O₄@m-TiO₂/Ag) were efficiently prepared. They were fully characterized by FT-IR, FE-SEM, EDX, ICP, TGA, XRD, and BET methods. In addition, their magnetic properties were determined by means of the VSM method. Also, the ρ_{shell} of the prepared hollow Fe₃O₄ micro-particles was calculated, being found just slightly lighter than that of solid sphere-like Fe₃O₄. The catalytic activity of this novel catalyst system was successfully examined as a novel catalyst system in A3 coupling reactions (aldehyde + amine + acetylene). This highly active magnetic catalyst was easily separated using an external magnet and re-used in five consecutive runs in the model reaction without appreciable loss of its catalytic activity.

Keyword

Heterogeneous catalyst, Hollow sphere, Nanocatalyst, Silver catalyst, Three component reaction