Dual Pd and CuFe₂O₄ Nanoparticles in a Core/Shell Silica Microsphere

Significance: A dual catalyst containing Pd and CuFe₂O₄ nanoparticles in a core/shell silica microsphere (SiO₂@CuFe₂O₄-Pd) for selective hydrogenation of arylacetylenes to styrenes was described. A sequential modification of SiO₂ with CuFe₂O₄ and Pd nanoparticles led to the formation of the dual catalyst SiO₂@CuFe₂O₄-Pd. The hydrogenation of arylacetylenes was performed in hexane under H₂ (1 atm) using SiO₂@CuFe₂O₄-Pd to give the corresponding styrenes in 98–99% conversion with 73–98% selectivity.

Comment: SiO₂@CuFe₂O₄-Pd was prepared on the basis of the authors’ previous work (Chem. Mater. 2008, 20, 6738). The SiO₂@CuFe₂O₄-Pd catalyst was recovered by using an external magnet and reused in the hydrogenation of phenylacetylene (1st use: 98% conversion, 98% selectivity; 2nd use: 99% conversion, 98% selectivity; 3rd use: 98% conversion, 97% selectivity). SiO₂@CuFe₂O₄-Pd was characterized by powder X-ray diffraction, TEM, EDX, HR-SEM, ICP, field-dependent magnetization, etc.