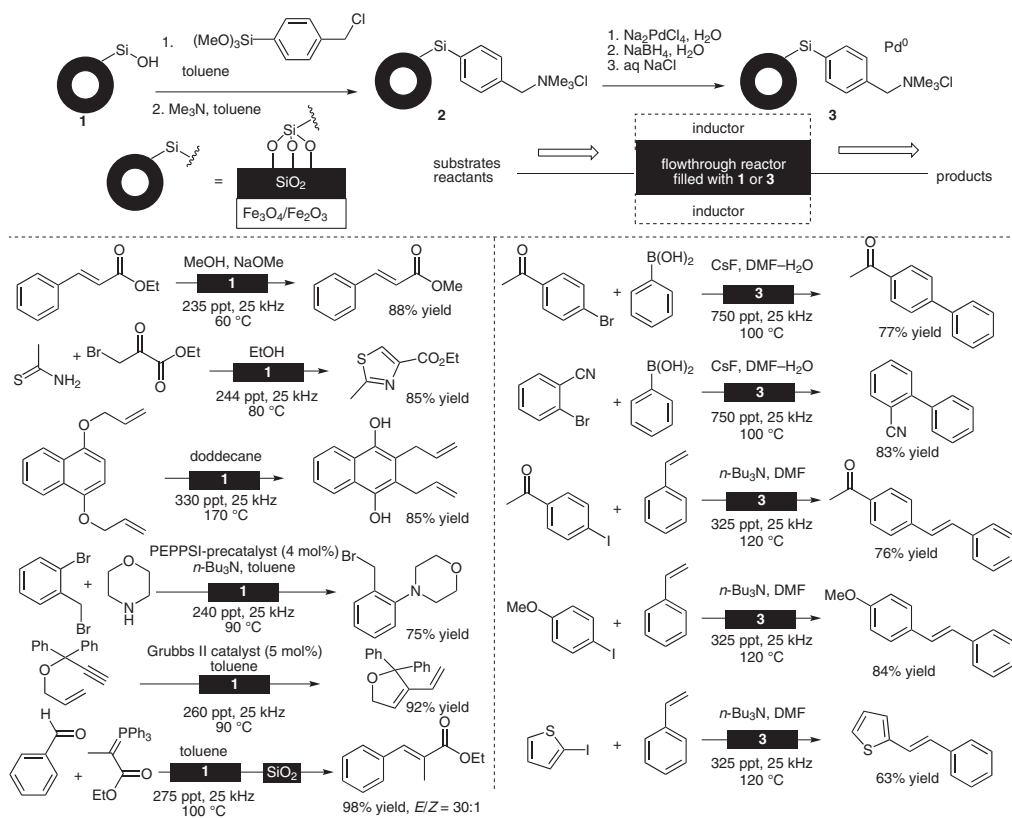


Magnetic Nanoparticles as Inductive Heating Elements in Microreactors



Significance: SiO₂-coated magnetic nanoparticles **1** and **3** (Fe₃O₄/Fe₂O₃ nanoparticles) were developed as heating elements for organic reactions, which were self-heated in an electromagnetic field. Thus, a microflow reactor (14 cm long, \varnothing 9 mm) was filled with a mixture of magnetic nanoparticles **1** and sand (3:1, 5.5 g) without/with 400 mg of Pd-doped material **3** (2.8 mol%, 0.028 mmol Pd). The trans-esterification, Claisen rearrangement, the Buchwald–Hartwig amination, enyne metathesis and Wittig reaction were performed with **1** in an electromagnetic field under continuous-flow conditions to give the corresponding products in 75–98% yield (6 examples).

Comment: The Suzuki–Miyaura and Heck reactions were also carried out with Pd-doped magnetic nanoparticles **3** to afford the corresponding coupling products in 63–84% yield (five examples). The silica-coated Fe₃O₄/Fe₂O₃ magnetic nanoparticles **1** were prepared according to the reported procedure (M. R. Zachariah and co-workers *Nanostruct. Mater.* **1995**, *5*, 383; S. H. Ehrman et al. *J. Mater. Res.* **1999**, *14*, 4551).