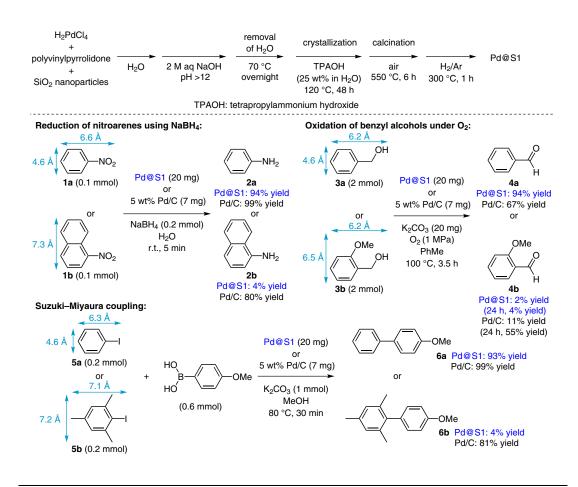
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Encapsulating Palladium Nanoparticles inside Mesoporous MFI Zeolite Nanocrystals for Shape-Selective Catalysis *Angew. Chem. Int. Ed.* **2016**, *55*, 9178–9182.

Shape-Selective Mesoporous Silicalite-Encapsulated Palladium Catalyst



Significance: Palladium nanoparticles encapsulated in mesoporous silicalite-1 (Pd@S1; pore size 5.3×5.6 Å, 1.7 wt% Pd) were prepared for use as a shape-selective catalyst. Reduction of nitrobenzene (1a) by NaBH₄, oxidation of benzyl alcohol (3a) under O₂, and the Suzuki–Miyaura coupling of iodobenzene (5a) with 4-methoxyphenylboronic acid proceeded in the presence of Pd@S1 to give the corresponding products 2a, 4a, and 6a in 93– 94% yield. Under similar conditions, the reactions of substrates with larger molecular size (1b, 3b, and 5b) gave the corresponding products in less

than 4% yield.

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Comment: The selectivity of the catalysis was evaluated by using Pd/C as catalyst as a control instead of Pd@S1 under similar conditions. Reduction of **1a,b**, the oxidation of **3a,b**, and the Suzuki–Miyaura coupling of **5a,b** with 4-methoxyphenylboronic acid proceeded in the presence of Pd/C to give the corresponding products **2a,b**, **4a,b**, and **6a,b** in 55–99% yield. In the coupling reaction of **5a** with 4-methoxyphenylboronic acid, Pd@S1 was reused fourteen times without significant loss of its catalytic activity.

Category

Polymer-Supported Synthesis

Key words

palladium catalysis

nanoparticles

zeolite catalysis

shape-selective catalysis

oxidation

hydrogenation

