

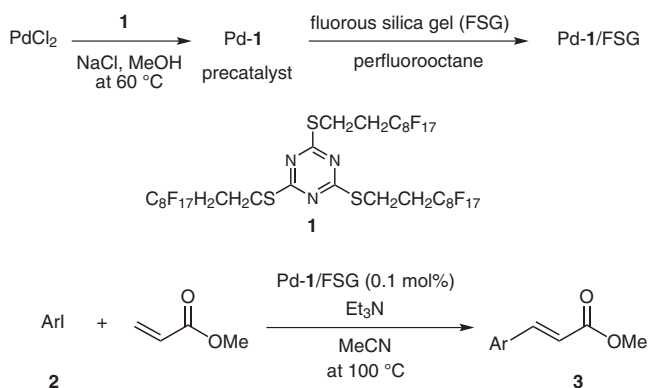
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Phosphine-Free Perfluoro-Tagged Palladium Nanoparticles Supported on Fluorous Silica Gel: Application to the Heck Reaction

*Org. Lett.* **2008**, *10*, 561-564.

## Heck Reaction with Silica Gel Supported Palladium Nanoparticles



aryl iodide <b>2</b>	yield % of <b>3</b>
PhI	93
4-MeCOC <sub>6</sub> H <sub>4</sub> I	89
4-MeOC <sub>6</sub> H <sub>4</sub> I	90
4-MeC <sub>6</sub> H <sub>4</sub> I	90
4-O <sub>2</sub> NC <sub>6</sub> H <sub>4</sub> I	74
3-F <sub>3</sub> CC <sub>6</sub> H <sub>4</sub> I	93
4-EtOCOC <sub>6</sub> H <sub>4</sub> I	98
3-Me,4-O <sub>2</sub> NC <sub>6</sub> H <sub>3</sub> I	96
2-H <sub>2</sub> NC <sub>6</sub> H <sub>4</sub> I	84
2-MeOCOC <sub>6</sub> H <sub>4</sub> I	89

**Significance:** Phosphine-free perfluoro-tagged palladium nanoparticles (Pd-**1**), which were obtained by reduction of PdCl<sub>2</sub> with methanol at 60 °C in the presence of NaCl and compound **1**, were immobilized on fluorosilica gel (FSG) by addition of FSG to a perfluorooctane solution of Pd-**1**. The nano composite Pd-**1**/FSG (0.1 mol% Pd) catalyzed the Heck reaction of various aryl iodides **2** with methyl acrylate at 100 °C to give the corresponding methyl cinnamates in 74–98% yield (10 examples). The catalyst was recovered by filtration and reused 14 times without loss of catalytic activity.

**Comment:** TEM analysis of Pd-**1**/FSG showed that spherical Pd particles dispersed in the silica matrix. The reactions of various aryl iodides with methyl acrylate and recovery of Pd-**1**/FSG were carried out in the presence of air, without any particular precaution. The catalytic efficiency of Pd-**1**/FSG was significantly high. Thus, a small amount of the catalyst (0.001 mol% Pd) promoted the reaction of iodobenzene with methyl acrylate at 140 °C to afford methyl cinnamate in 100% yield.

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Synfacts 2008, 5, 0550-0550 Published online: 23.04.2008  
**DOI:** 10.1055/s-2008-1072553; **Reg-No.:** Y03308SF

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