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Polymer-Incarcerated Chiral Rh/Ag Nanoparticles for Asymmetric 1,4-Addition Reactions of Arylboronic Acids to Enones: Remarkable Effects of Bimetallic Structure on Activity and Metal Leaching
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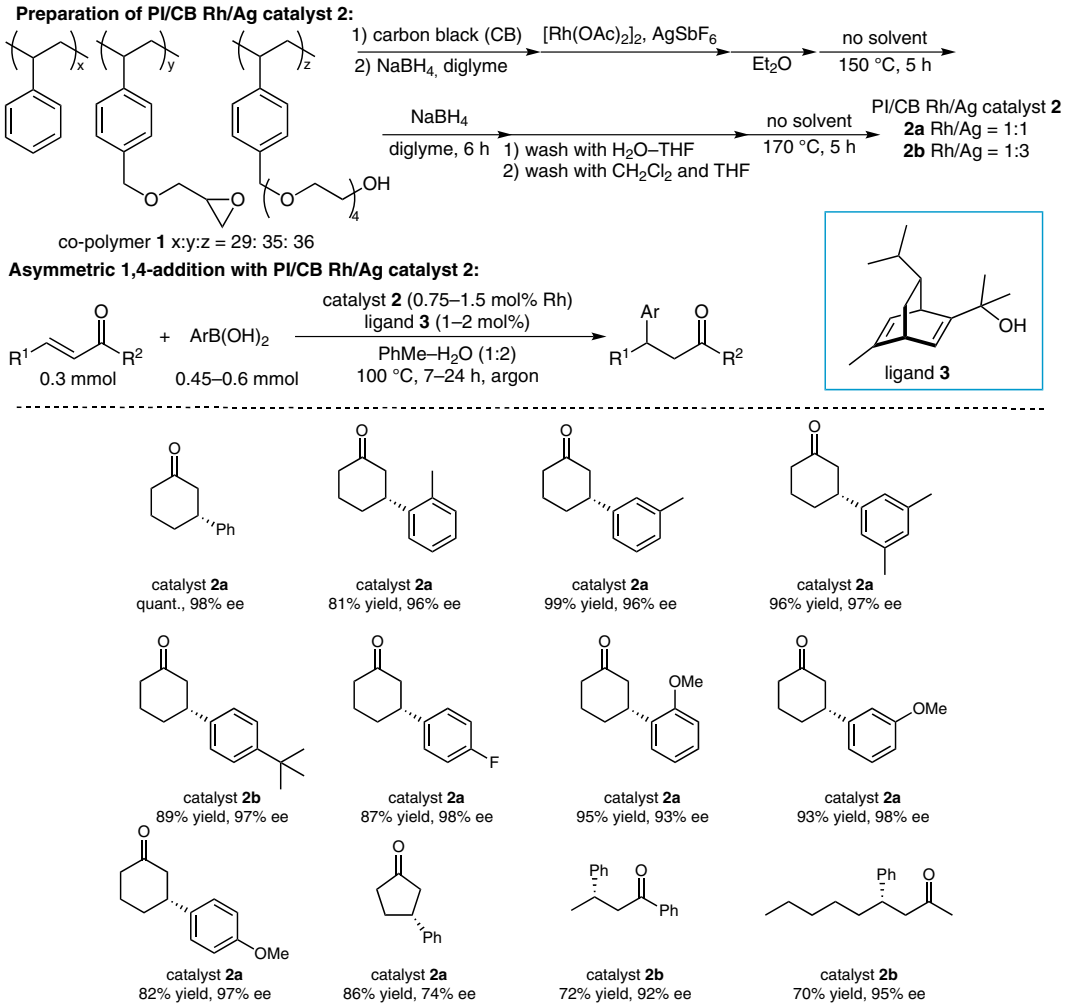
Asymmetric Miyaura–Michael Reaction with Polymeric Rh/Ag Catalysts



Significance: Polystyrene-based polymer-incarcerated bimetallic rhodium nanoparticle catalysts PI/CB Rh/Ag **2a–b** were prepared from co-polymer **1**, carbon black (CB), $[Rh(OAc)_2]_2$, and $AgSbF_6$. Asymmetric 1,4-addition of arylboronic acids to enones was carried out with **2** and chiral ligand **3** to give the corresponding ketones in 70–99% yield with 74–98% ee without leaching of rhodium.

Comment: Catalyst **2a** was reused 13 times for the reaction of phenylboronic acid with 2-cyclohexenone. After the 10th use, the recovered catalyst was heated at 170 °C to regain its catalytic activity (1st–8th use: >94% yield, 9th use: 67% yield, 10th use: 60% yield, 11th–14th use: >90% yield, with 98% ee in all cycles).

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Category
Polymer-Supported Synthesis

Key words
bimetallic nanoparticle catalysts
rhodium
silver
asymmetric 1,4-addition