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Adhesive Catalyst Immobilization of Palladium Nanoparticles on Cotton and Filter Paper: Applications to Reusable Catalysts for Sequential Catalytic Reactions

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Adhesive Immobilization of Polymer-Stabilized Pd Nanoparticles on Cellulose

Category

Polymer-Supported
Synthesis

Key words

solid-supported
catalysis

cellulose

hyperbranched
polymers

ammonium salts

palladium

SYNFACT
of the month

Selected examples:

Suzuki–Miyaura reaction:

Mizoroki–Heck reaction:

Intramolecular C–H bond arylation:

Hydrogenation:

Significance: Adhesive immobilization of palladium nanoparticles on cellulose using hyperbranched polystyrene [$\text{Pd@HPS-N(C}_{12}\text{H}_{25})_3\text{Cl}$ on cellulose] was developed. The catalyst promoted efficiently the Suzuki–Miyaura coupling, the Mizoroki–Heck reaction, the intramolecular C–H bond arylation, and the hydrogenation. The catalyst was recycled by a tweezers and reused several times.

Comment: The catalyst was prepared as follows: A reaction of the hyperbranched polystyrenes having tri(dodecyl)ammonium chloride moieties [$\text{HPS-N(C}_{12}\text{H}_{25})_3\text{Cl}$] with $\text{Pd}_2(\text{dba})_3$ was carried out to give the polymer-supported palladium nanoparticles $\text{Pd@HPS-N(C}_{12}\text{H}_{25})_3\text{Cl}$. The resulting nanocomposite $\text{Pd@HPS-N(C}_{12}\text{H}_{25})_3\text{Cl}$ was treated with KI and filter paper (or cotton) as cellulose to afford $\text{Pd@HPS-N(C}_{12}\text{H}_{25})_3\text{Cl}$ on cellulose.

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