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Cellulose Nanocrystals as Chiral Inducers: Enantioselective Catalysis and Transmission Electron Microscopy 3D Characterization

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Category

Polymer-Supported Synthesis

Key words

palladium

cellulose

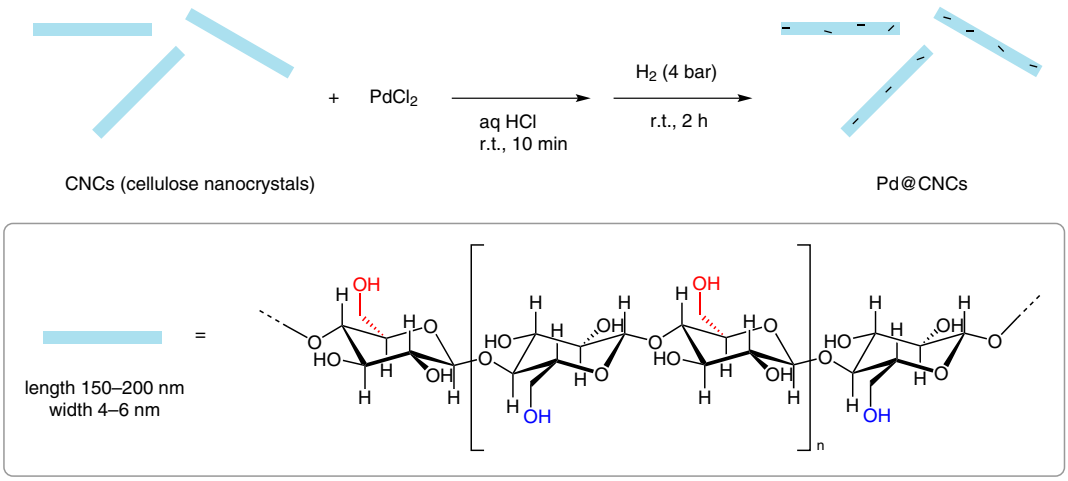
nanocrystals

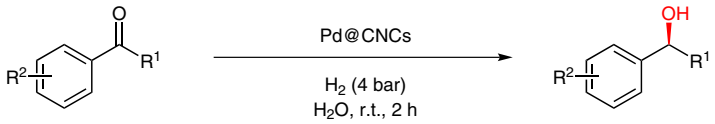
asymmetric catalysis

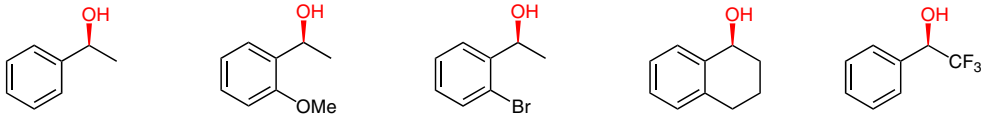
hydrogenation

ketones

Enantioselective Hydrogenation of Ketones on Palladium/Cellulose Nanocrystals







87% yield, 7% ee | 67% yield, 65% ee | 90% yield, 5% ee | 89% yield, 21% ee | 91% yield, 6% ee

Significance: Palladium(0) deposited on cellulose nanocrystals (Pd@CNCs) was prepared by treatment of CNCs with palladium(II) chloride in aqueous hydrochloric acid, followed by the reduction with hydrogen gas. The Pd@CNCs was used in an enantioselective hydrogenation of prochiral ketones under hydrogen pressure in water to give the corresponding alcohols in 67–91% yield and 5–65% ee.

Comment: The aqueous suspension of Pd@CNCs was reused twice without significant loss of the catalytic activity or enantioselectivity. CSCs did not catalyze the carbonyl hydrogenation in the absence of palladium. Hydrogenation of 2-methoxyacetophenone on PdNPs@C under similar conditions gave the corresponding racemic alcohol in 38% yield.

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