

One-pot Lignocellulosic Biomass Conversion into Value-Added Chemicals

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Lignocellulosic biomass is a rich, abundant, renewable resource and most importantly has enormous potential to be converted into various value-added chemicals for future biorefinery application. However, selective conversion of woody biomass is extremely challenging due to its complex structure and various functionalities. Herein, we investigated multifunctional bimetallic Cu-Ru/HZSM5 catalyst for one-pot lignocellulose conversion in aqueous environment. HZSM5 (Si:Al=200) provides Bronsted and Lewis acid site that are required for consecutive depolymerization of holocellulose, dehydration, and isomerization while Cu-Ru synergistically promote hydro-genation/genolysis and stabilization of lignin-derived reactive intermediates. Simultaneous conversion of lignocellulose yielded up to 24.2 wt% of (a)lignin-derived monomers, (b)cyclopentanone and (c)methyl-cyclopentanone at 300°C under pressurized H₂ (3.0MPa) for 1h. This one-pot process can be a very promising and energy-efficient approach for utilization of whole lignocellulose into versatile platform chemicals in pharmaceuticals, fragrance, and polymer industries.