ISGC 2022

N°46 / OC
TOPIC(s) : Biomass conversion / Homogenous, heterogenous and biocatalysis

Rational cleavage of bonds on lignocellulose derived chemicals: the case of catechol production

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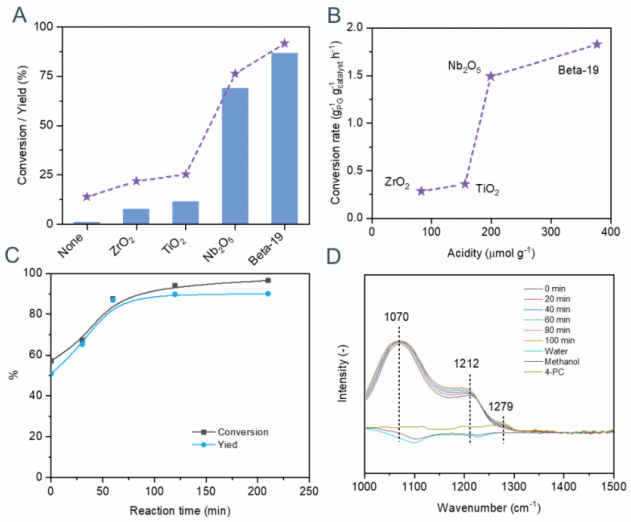
PURPOSE OF THE ABSTRACT

New generation renewable chemicals from biomass is vital to solve energy shortage and environment concerns. Here, we report a catalytic strategy to manufacture renewable catechol from woody biomass in three steps: 1. Reductive catalytic fractionation of pine wood to produce lignin derived monomers. 2. O-demethylation of the monomers to synthesize alkyl-catechols and methanol in water. 3. C-dealkylation of alkyl-catechols to form catechol and olefins. This integrated strategy highlights the potential of utilizing renewable feedstock to selectively produce renewable chemicals.

FIGURES



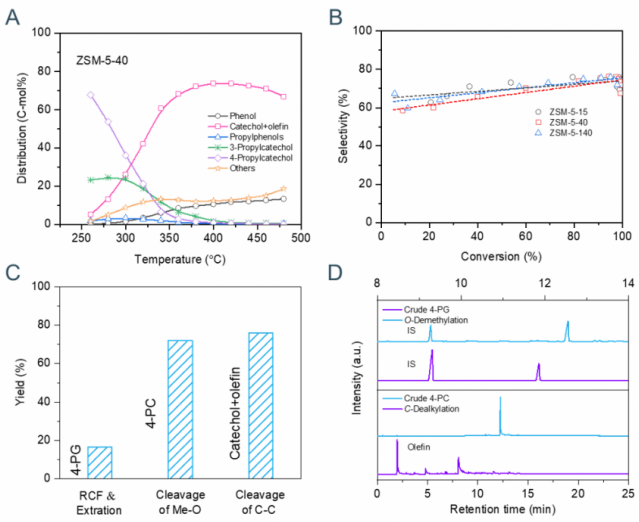


FIGURE 1

Figure 1. O-Demethylation of 4-PG over solid acids.

The activity of O-demethylation increases with the acid density of catalysts. In Figure D., the changes over 1212 and 1279 cm-1 indicate the cleavage of C-O ether bonds.

FIGURE 2

Figure 2. C-Dealkylation of 4-PC over ZSM-5-40 and the catechol synthesized from renewable lignin-first monomers.

1. The selectivity of catechol is scarcely influenced by the ratios of Si/Al at same conversion levels. 2. The overall yield of catechol is 56% from renewable lignin-first monomers.

KEYWORDS

lignocellulose | Zeolites | catalysis | catehcol

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