Electronic Supplementary Material (ESI) for Green Chemistry.
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Supporting information

Of

Lewis Acid Zeolites for Tandem Diels–Alder Cycloaddition and Dehydration of Biomass-Derivable Dimethylfuran and Ethylene to Renewable *p*-Xylene

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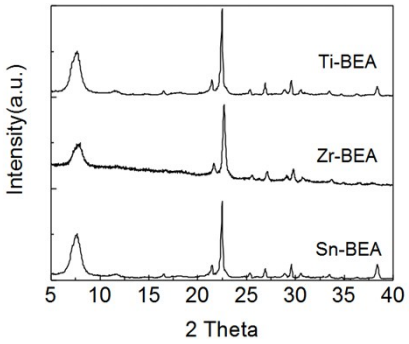

Figure S1. XRD patterns for Sn-, Zr-, and Ti-BEA. Typical reflections for zeolite BEA were observed for all samples, and no impurity phase (i.e., metal oxides) was detected, indicating high-quality crystals were obtained.

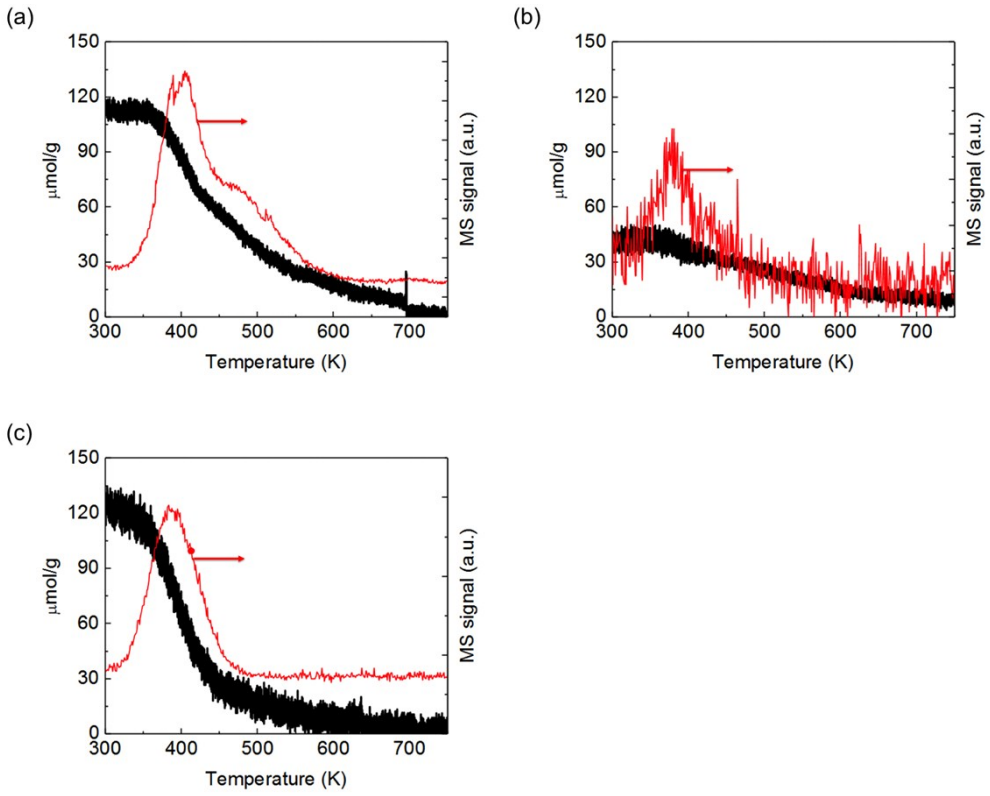

Figure S2. Diethylether TPD-TGA data for (a) Zr-, (b) Ti-, and (c) Sn-BEA. The MS signal represents the signal of m/e=31, which is the most abundant species for diethyl ether in a mass spectrum from electron ionization.

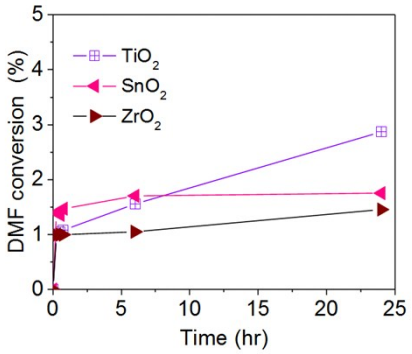

Figure S3. DMF conversion versus time for SnO_2, TiO_2, and ZrO_2. Reaction conditions are the same with the Lewis acid zeolites except for the amount of catalyst used (0.8 g for metal oxides).

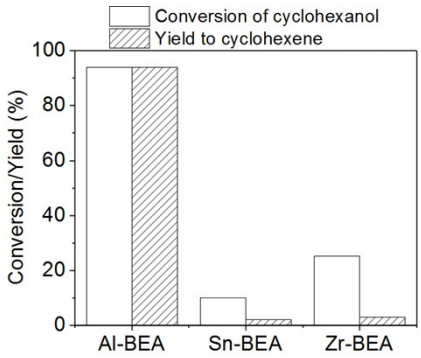

Figure S4 Production rate of cyclohexene from cyclohexanol over Al- and Zr-BEA. Conditions: 0.1 M cyclohexanol in 1,4-dioxane, 0.02 g catalyst, 200 °C for 30 min.

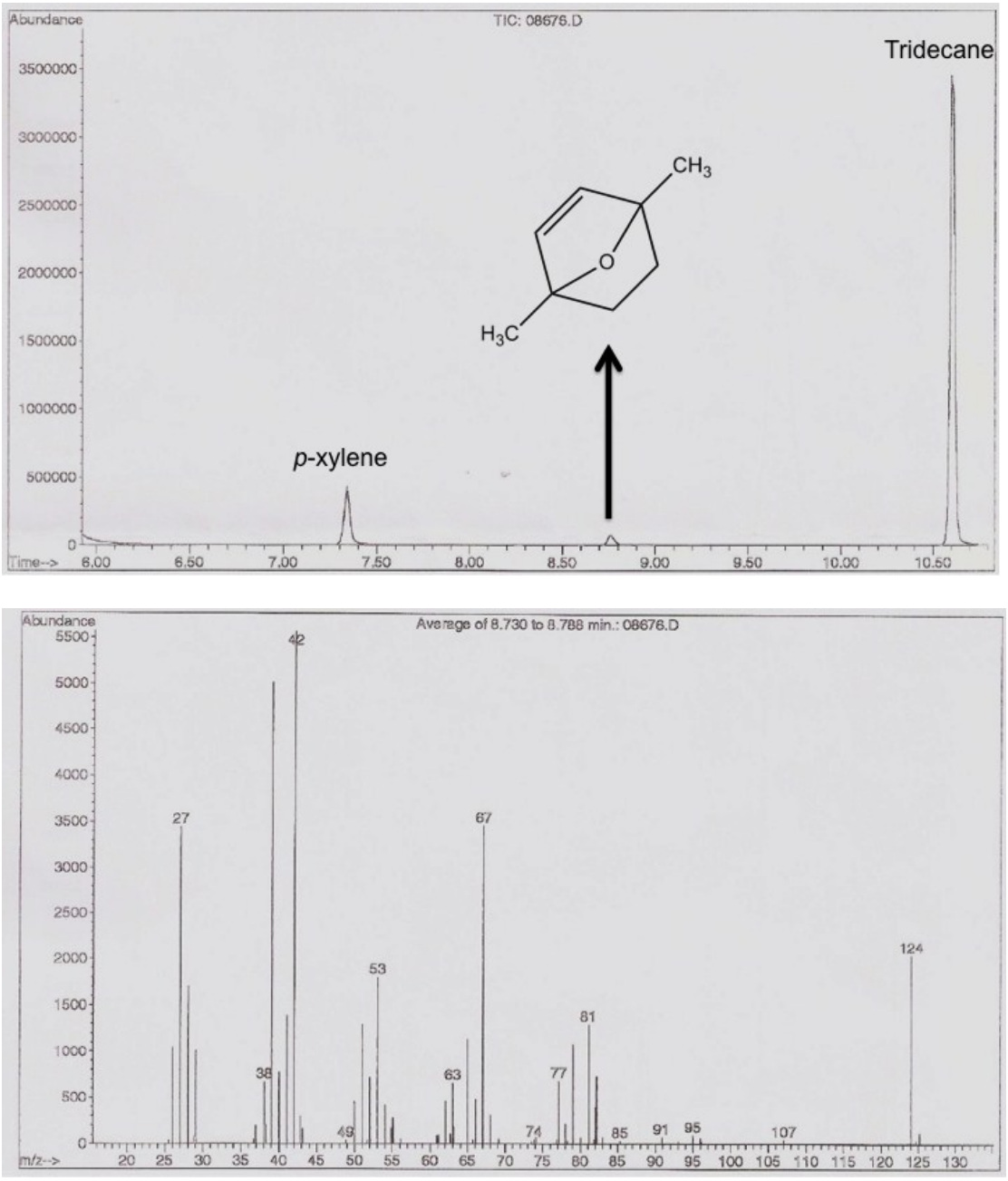

Figure S5. GC chromatogram and electron ionization (EI) spectrum of cycloadduct. The reaction mixture was taken at 30 min reaction time for Zr-BEA at 1 mM acid loading under usual reaction conditions. The EI spectrum is consistent with previous report.[1]

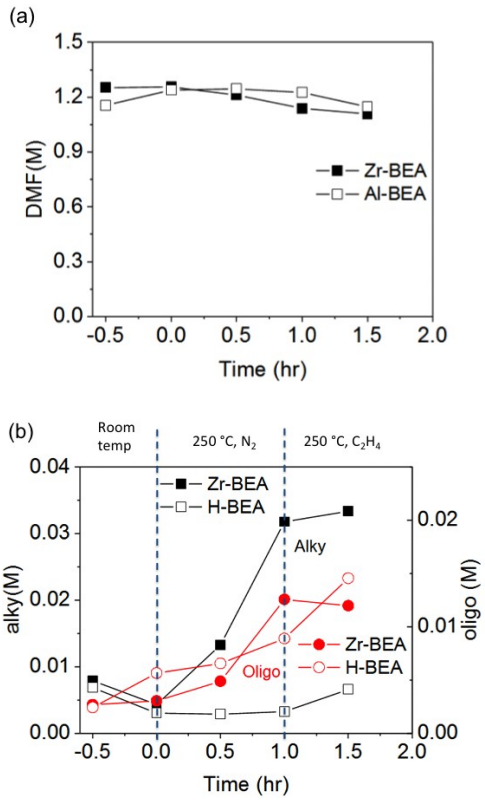

Figure S6. (a) DMF, (b) alkylated products and oligomers concentration evolution with intentional addition of 2, 5-hexanedione into initial reactant solution. The concentration of DMF for Al-BEA and Zr-BEA during the time holding at 250 °C is invariant or slightly decreasing, which suggesting the decrease of diketone is not due to dehydration reaction to form DMF.

References:

1. P. T. M. Do, J. R. McAtee, D. A. Watson and R. F. Lobo, *ACS Catal.*, 2013, **3**, 41-46.