Supplementary Information (SI) for Reaction Chemistry & Engineering.

Supporting information

Catalytic transformation of epoxy resin toward dicyclohexane

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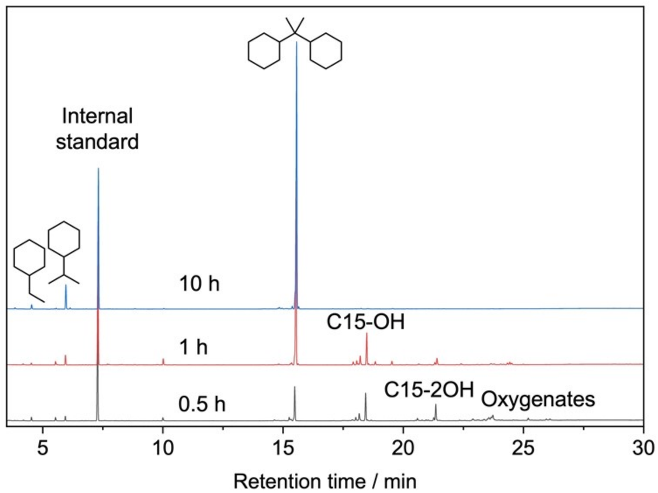

Fig. S1. Gas chromatogram of the reaction products. Reaction conditions: 220 ^{o}C, 5 MPa H_2, 0.2 g glycidyl end-capped poly(bisphenol A-*co*-epichlorohydrin), 15 mL *n*-hexane, 0.05 g Pd/C, and 0.05 g HZSM-5 (SiO_2/Al_2O_3=25). C15-2OH: complete and partial hydrogenation products of bisphenol A (BPA) with two hydroxy groups; C15-OH: complete and partial hydrogenation products of BPA with one hydroxy group.

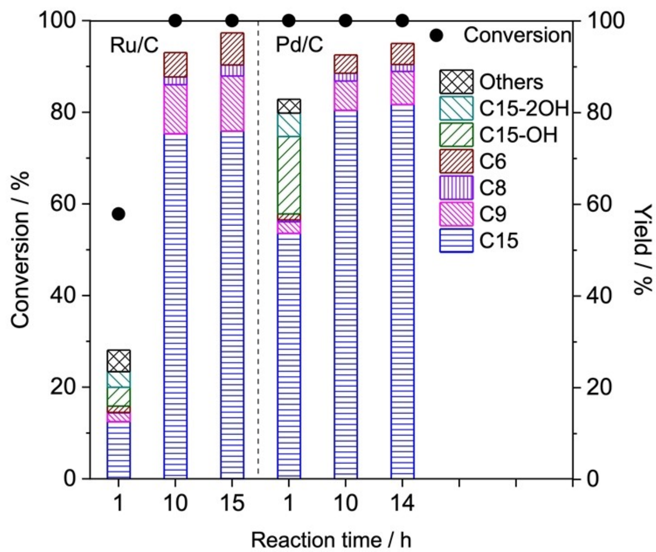

Fig. S2. Conversion of glycidyl end-capped poly(bisphenol A-*co*-epichlorohydrin) in the presence of hydroprocessing catalysts and HZSM-5 (SiO_2/Al_2O_3=25) with different reaction times. Reaction conditions: 220 ^{o}C, 5 MPa H_2, 10 h, 0.2 g glycidyl end-capped poly(bisphenol A-co-epichlorohydrin), 15 mL *n*-hexane, 0.05 g Pd/C, and 0.05 g HZSM-5. C6: cyclohexane; C8: ethylcyclohexane; C9: isopropylcyclohexane; C15: propane-2,2-diyldicyclohexane; C15-2OH: complete and partial hydrogenation products of bisphenol A (BPA) with two hydroxy groups; C15-OH: complete and partial hydrogenation products of BPA with one hydroxy group.

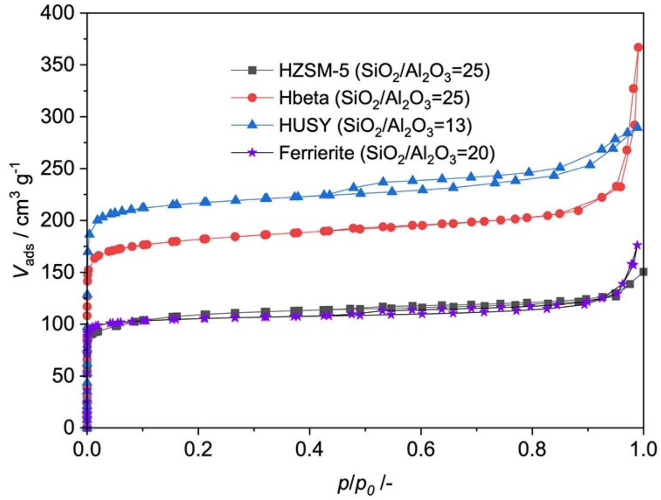

Fig. S3. Nitrogen isotherms of different zeolites.

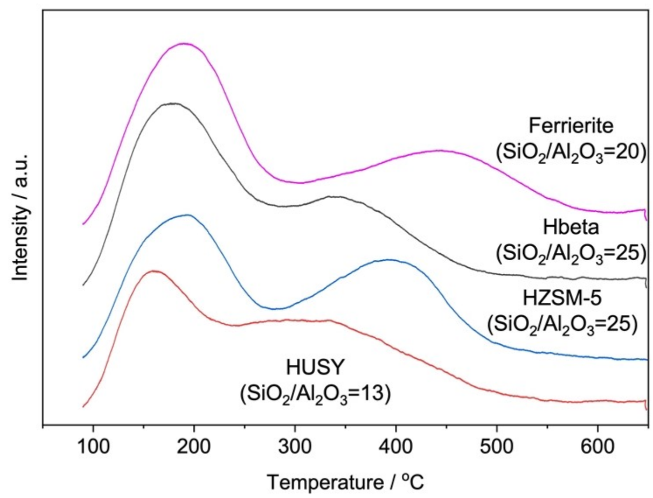

Fig. S4. NH_3-TPD profiles of different zeolites.

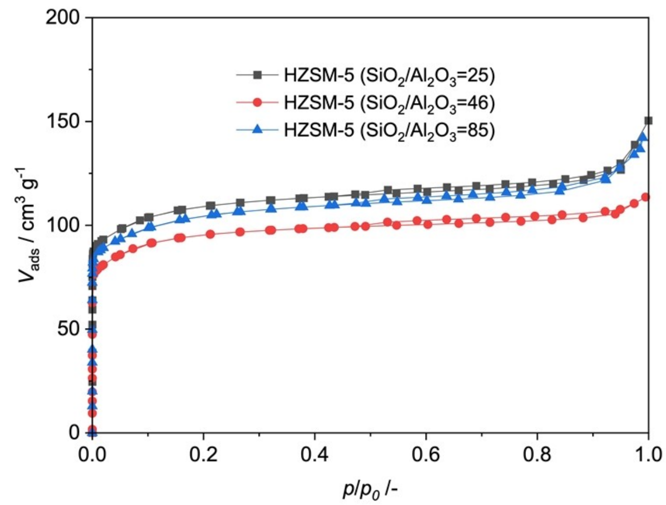

Fig. S5. Nitrogen isotherms of HZSM-5 with different SiO_2 to Al_2O_3 ratios.

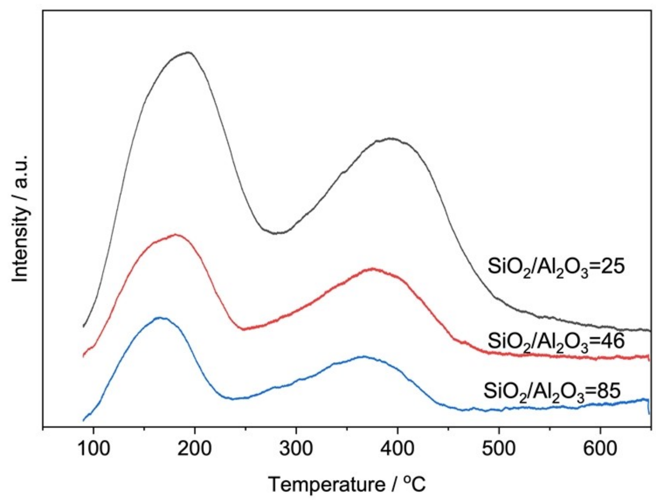

Fig. S6. NH_3-TPD profiles of HZSM-5 with different SiO_2 to Al_2O_3 ratios.

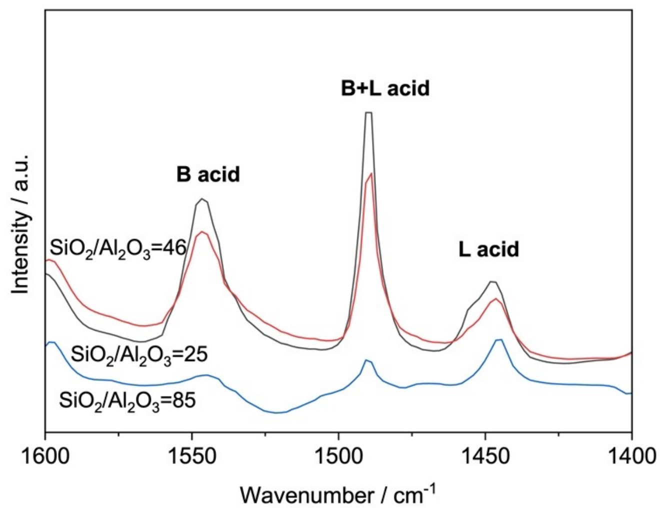

Fig. S7. FTIR spectra of HZSM-5 zeolites (SiO_2/Al_2O_3=25, 46, and 85) after adsorption of pyridine.

B acid: Brønsted acid; L acid: Lewis acid.

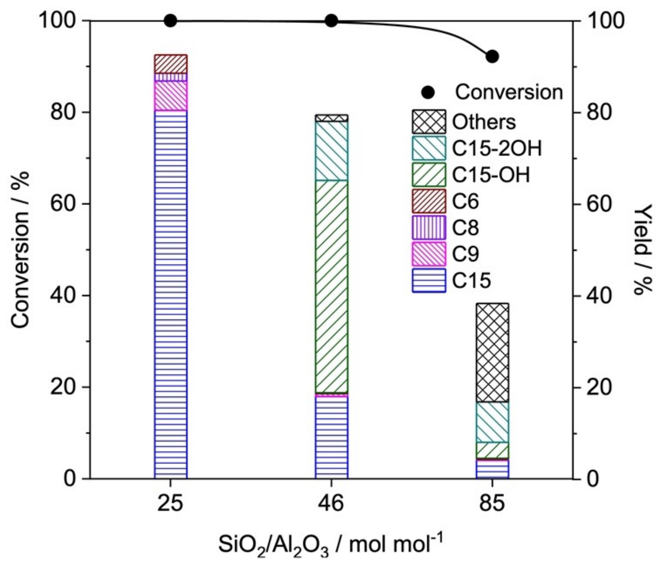

Fig. S8. Conversion of glycidyl end-capped poly(bisphenol A-*co*-epichlorohydrin) in the presence of Pd/C and HZSM-5 with different SiO_2 to Al_2O_3 ratios. Reaction conditions: 220 ^oC, 5 MPa H_2, 10 h, 0.2 g glycidyl end-capped poly(bisphenol A-co-epichlorohydrin), 15 mL *n*-hexane, 0.05 g Pd/C, and 0.05 g HZSM-5. C6: cyclohexane; C8: ethylcyclohexane; C9: isopropylcyclohexane; C15: propane-2,2-diyldicyclohexane; C15-2OH: complete and partial hydrogenation products of bisphenol A (BPA) with two hydroxy groups; C15-OH: complete and partial hydrogenation products of BPA with one hydroxy group.

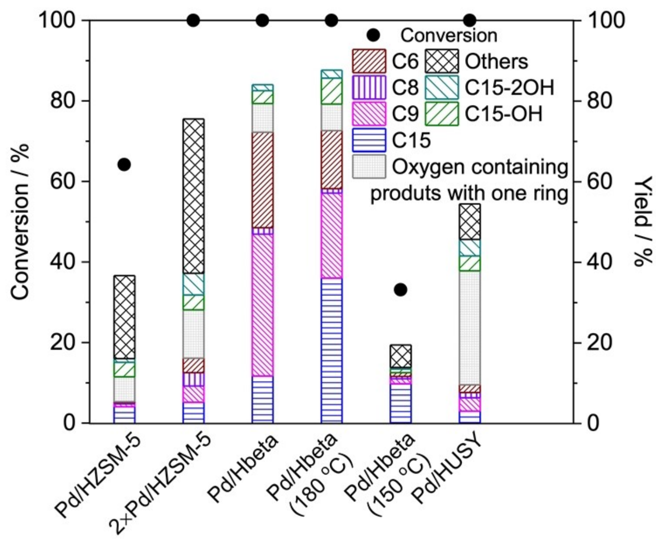

Fig. S9. Conversion of glycidyl end-capped poly(bisphenol A-*co*-epichlorohydrin) in the presence of acidic zeolite supported Pd catalysts. Reaction conditions: 220 ^{o}C (unless otherwise stated), 5 MPa H_2, 10 h, 0.2 g glycidyl end-capped poly(bisphenol A-co-epichlorohydrin), 15 mL *n*-hexane, 0.05 g catalyst (5wt.% Pd in catalyst). 2×Pd/HZSM-5: 0.1 g catalyst; HZSM-5 (SiO_2/Al_2O_3=25), Hbeta (SiO_2/Al_2O_3=25), and HUSY (SiO_2/Al_2O_3=13). C6: cyclohexane; C8: ethylcyclohexane; C9: isopropylcyclohexane; C15: propane-2,2-diyldicyclohexane; C15-2OH: complete and partial hydrogenation products of bisphenol A (BPA) with two hydroxy groups; C15-OH: complete and partial hydrogenation products of BPA with one hydroxy group.

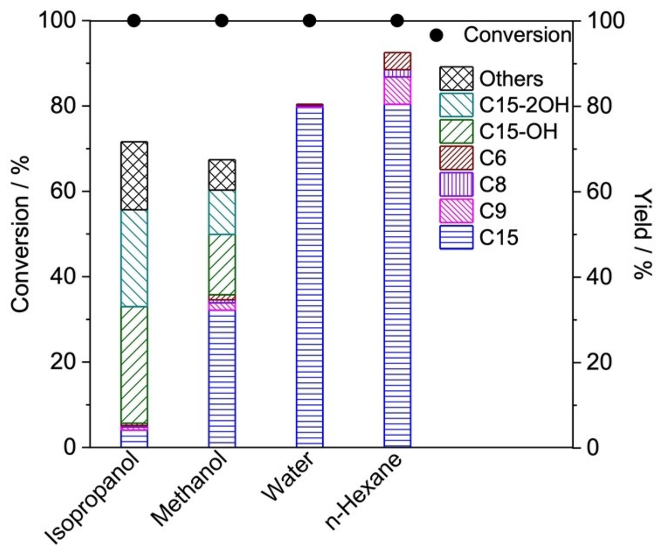

Fig. S10. Conversion of glycidyl end-capped poly(bisphenol A-*co*-epichlorohydrin) in different solvents using Pd/C and HZSM-5 (SiO_2/Al_2O_3=25). Reaction: 220 ^oC, 5 MPa H_2, 10 h, 0.2 g glycidyl end-capped poly(bisphenol A-co-epichlorohydrin), 15 mL solvent, 0.05 g Pd/C, and 0.05 g HZSM-5. C6: cyclohexane; C8: ethylcyclohexane; C9: isopropylcyclohexane; C15: propane-2,2-diyldicyclohexane; C15-2OH: complete and partial hydrogenation products of bisphenol A (BPA) with two hydroxy groups; C15-OH: complete and partial hydrogenation products of BPA with one hydroxy group.

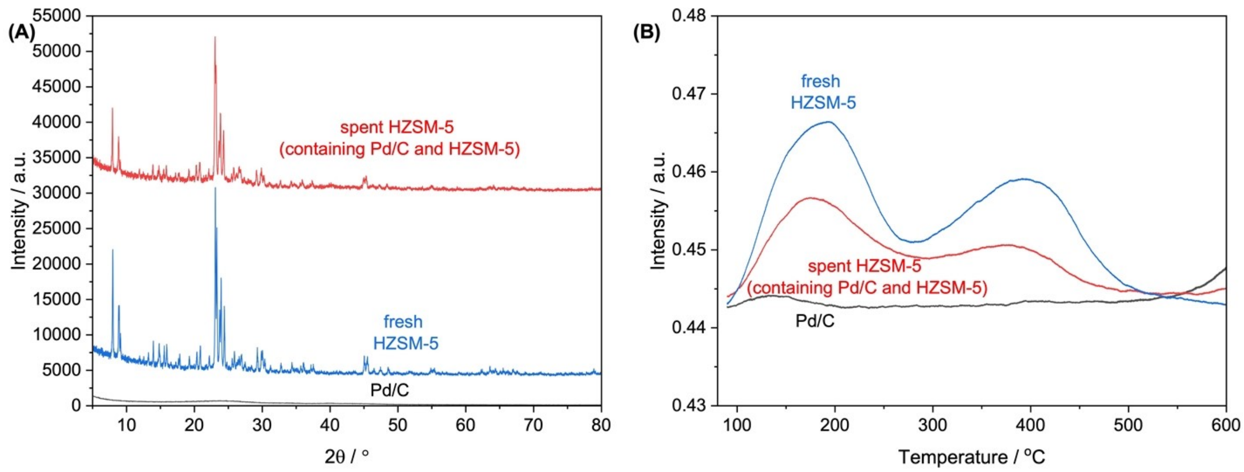

Fig. S11. Characterization of fresh and spent HZSM-5 (SiO_2/Al_2O_3=25). (A) XRD; (B) NH_3-TPD. The spent HZSM-5 includes Pd/C and HZMS-5.

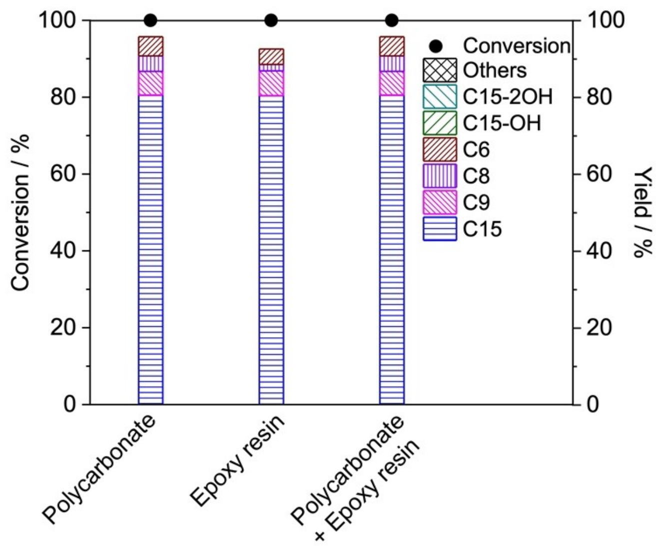

Fig. S12. Conversion of polycarbonate and epoxy resin (i.e. glycidyl end-capped poly(bisphenol A-*co*-epichlorohydrin)), and the mixture of polycarbonate and epoxy resin in the presence of Pd/C and HZSM-5 (SiO_2/Al_2O_3=25). Reaction: 220 ^oC, 5 MPa H_2, 10 h, 0.2 g substrate, 15 mL *n*-hexane, 0.05 g Pd/C, and 0.05 g HZSM-5. Polycarbonate+Epoxy resin: 0.1 g polycarbonate and 0.1 g epoxy resin. C6: cyclohexane; C8: ethylcyclohexane; C9: isopropylcyclohexane; C15: propane-2,2-diyldicyclohexane; C15-2OH: complete and partial hydrogenation products of bisphenol A (BPA) with two hydroxy groups; C15-OH: complete and partial hydrogenation products of BPA with one hydroxy group.

Table S1. The properties of zeolites.

Zeolite	S_{BET} (m^2/g)[a]	S_{micro} (m^2/g)[b]	V_{total} (cm^3/g)[c]	V_{micro} (cm^3/g)[b]
HZSM-5 (SiO_2/Al_2O_3= 25)	410	370	0.23	0.15
Hbeta (SiO_2/Al_2O_3= 25)	709	633	0.57	0.25
HUSY (SiO_2/Al_2O_3= 13)	865	798	0.45	0.31
Ferrierite (SiO_2/Al_2O_3=20)	425	401	0.27	0.15
HZSM-5 (SiO_2/Al_2O_3=46)	417	378	0.21	0.16
HZSM-5 (SiO_2/Al_2O_3=85)	390	348	0.22	0.15

[a] Determined by N_2 sorption.

[b] t-plot was used to determine the V_{micro} and S_{micro}

[c] The total pore volume (V_{total}) was determined by using the adsorbed value at p/p_0=0.99.