Electronic Supplementary Material (ESI) for RSC Advances.

An Investigation on the Aqueous-phase Hydrodeoxygenation of Various Methoxy-substituted Lignin Monomers on Pd/C and HZSM-5 Catalysts

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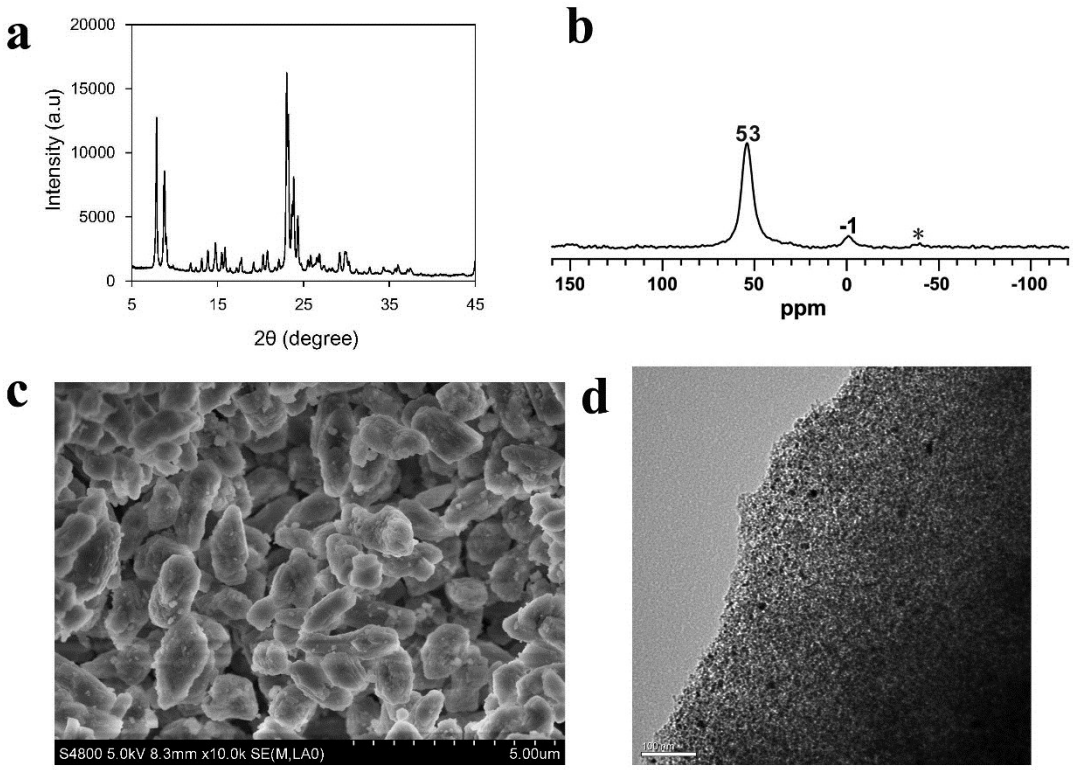


Fig. S1. Catalytic characterization: (a) XRD patents of HZSM-5 zeolite catalyst; (b) ^{27}Al MAS NMR spectra of HZSM-5 zeolite catalyst; (c) SEM micrographs of HZSM-5 zeolite catalyst; (d) TEM micrographs of Pd/C catalyst.

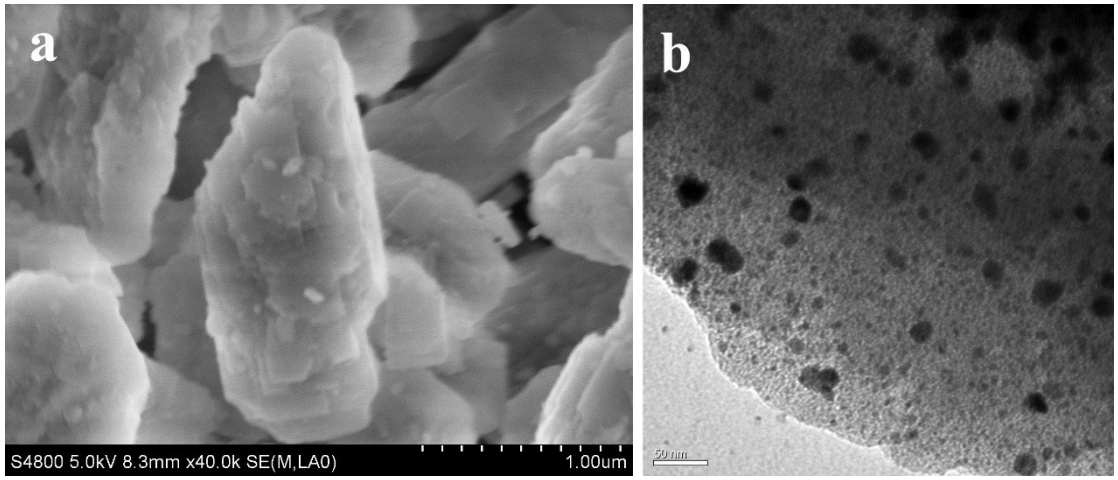


Fig. S2. (a) Magnified SEM micrographs of HZSM-5 zeolite catalyst; (b) Magnified TEM micrographs of Pd/C catalyst.

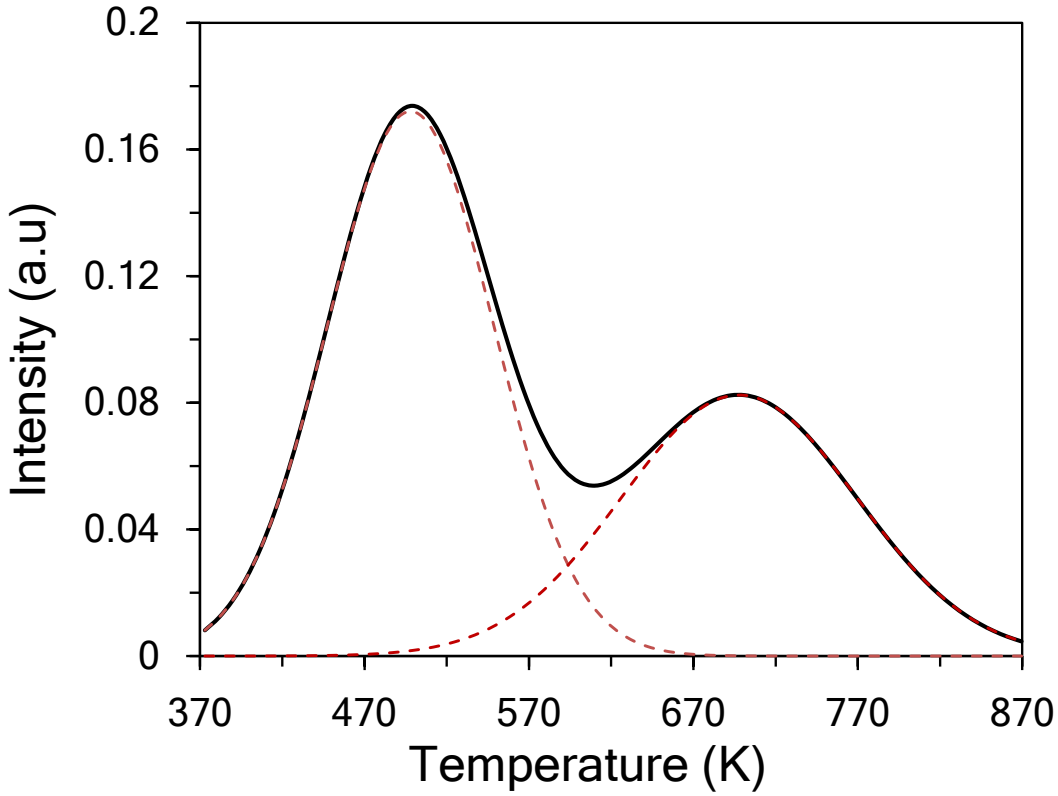


Fig. S3. NH_3-temperature programmed desorption of HZSM-5 zeolite catalyst; experimental data (solid line) and fitted data (dotted line).

Table S1. Textural and acidity properties of HZSM-5 zeolite.

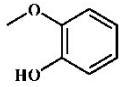
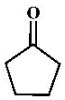
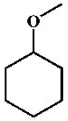
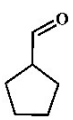
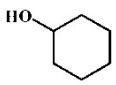
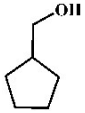
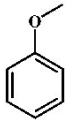
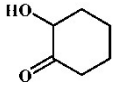
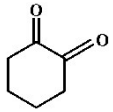
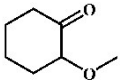
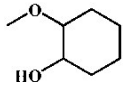
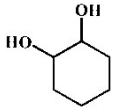
Catalyst	Si/Al	BET surface area[a], m^2g^{-1}	External surface area[b], m^2g^{-1}	Mesopore volume[c], cm^3g^{-1}	Micropore volume[b], cm^3g^{-1}	Acidity (NH_3 mmol/ g cat)			Ea (kJ/mol)	
						total acid sites	weak acid sites	strong acid sites	weak acid sites	strong acid sites
HZSM-5	15	396	13	0.04	0.16	3.62	2.16	1.46	51	76

[a] BET method.

[b] t-plot method.

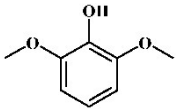
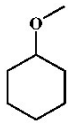
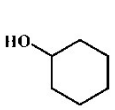
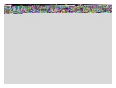
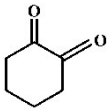
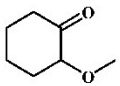
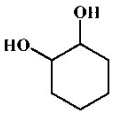
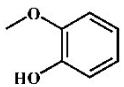
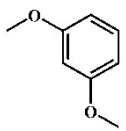
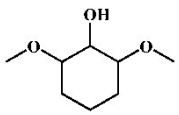
[c] BJH method (adsorption branch).

Table S2. Product distribution of hydrodeoxygenation of guaiacol over Pd/C and HZSM-5 as a function of reaction temperature.

Reaction Temperature (K)	Selectivity of products (C %)															Conversion of  (C %)
	CH_3OH																
383	0.9	0.0	0.0	0.1	0.0	5.4	0.0	0.0	0.0	0.3	0.0	0.0	56.6	36.6	0.0	39.4
413	3.0	0.0	0.0	1.3	0.0	6.4	0.1	0.1	0.0	0.0	0.0	0.0	41.8	35.8	11.5	100.0
443	9.6	0.0	0.0	0.1	0.1	1.4	8.0	0.7	0.1	0.0	19.5	5.6	20.4	12.4	22.2	86.4
473	11.5	0.0	0.0	0.0	0.4	0.6	15.5	1.7	0.1	0.0	16.9	5.1	8.8	10.7	28.6	83.0
513	14.3	5.9	0.6	0.0	1.6	0.0	51.7	0.0	0.1	0.0	19.0	4.5	0.2	0.0	2.0	77.4

[a] Typical reaction condition: guaiacol (0.005 mol), HZSM-5 (Si/Al=15, 0.5 g), Pd/C (0.05 g), H_2O (20 mL), 2 MPa H_2, 2 h, stirred at 680 rpm.

Table S3. Product distribution of hydrodeoxygenation of 2,6-dimethoxy-phenol over Pd/C and HZSM-5 as a function of reaction temperature. [a]

Reaction Temperature (K)	Selectivity of products (C %)												Conversion of  (C %)
	CH_3OH												
383	18.8	0.0	0.0	0.0	30.5	0.0	0.0	0.0	25.4	1.2	0.0	24.0	6.5
413	21.9	0.3	1.4	3.9	23.6	8.5	1.4	2.2	26.5	0.4	0.0	10.0	89.2
443	23.2	0.0	0.1	9.5	43.6	7.8	0.2	0.0	7.7	1.7	0.0	6.2	53.1
473	23.0	0.0	0.3	19.1	30.5	11.1	0.1	0.0	7.0	2.4	0.0	6.4	66.9
513	24.4	0.0	0.0	65.9	6.4	0.0	0.0	0.0	0.0	2.3	0.9	0.0	73.1
413 K with Pd/C and Beta（Si/Al=12.5）	19.0	0.2	1.0	2.7	16.3	5.9	28.0	1.6	18.3	0.3	0.0	6.9	92.3

[a] Typical reaction condition: 2,6-dimethoxy-phenol (0.005 mol), HZSM-5 (Si/Al=15, 0.5 g), Pd/C (0.05 g), H_2O (20 mL), 2 MPa H_2, 2 h, stirred at 680 rpm.