Electronic Supplementary Material (ESI) for Green Chemistry.

Supporting Materials

Production of a renewable 1,3–diene containing a functional group from furfural–acetone adduct in a fixed–bed reactor

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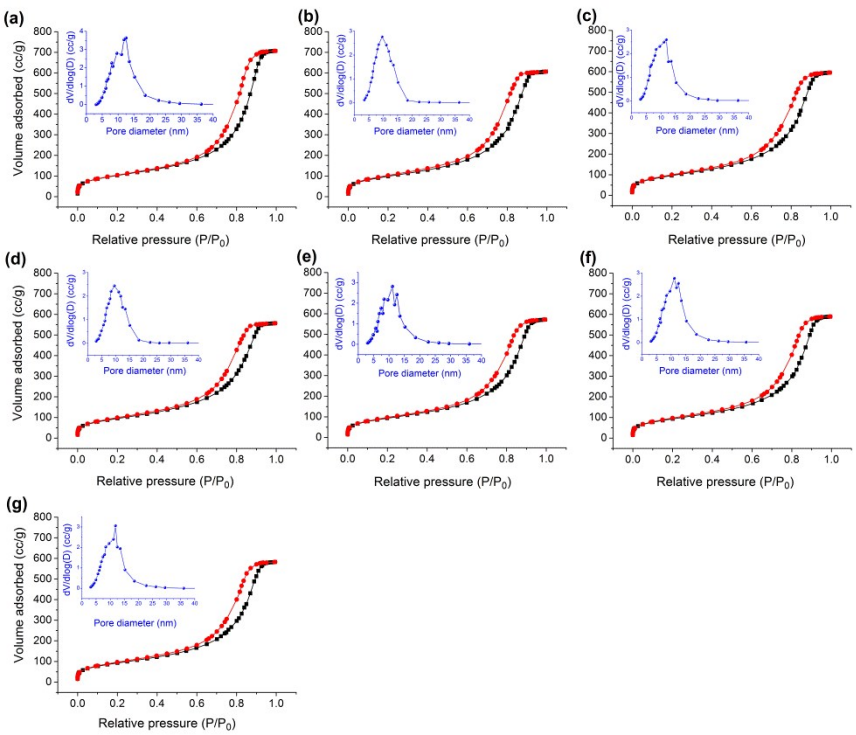

Fig.S1 The N_2 adsorption isotherms and the pore size distribution plots of CeO_2 catalysts: (a) SiO_2, (b)15Ce/ SiO_2, (c) 20Ce/SiO_2, (d) 25Ce/SiO_2, (e) 30Ce/SiO_2, (f) 35Ce/SiO_2, (g) 40Ce/SiO_2.

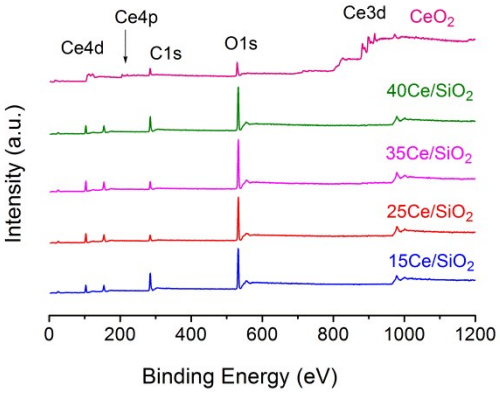

Fig. S2 XPS patterns of ceria-based catalysts

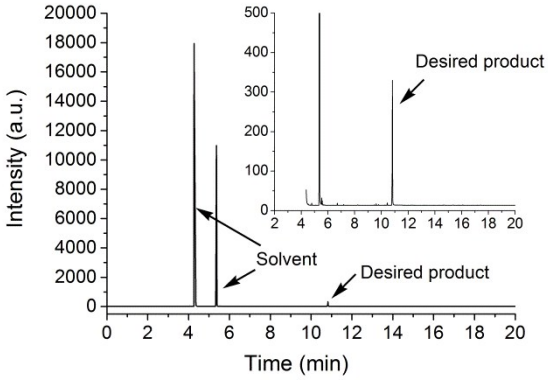

Fig. S3 GC analysis of the products

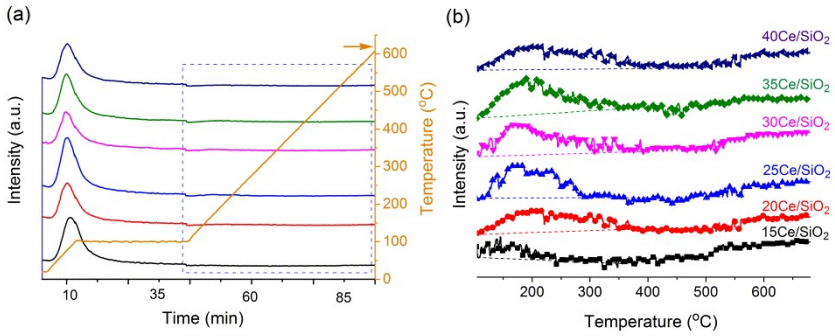

Fig. S4 NH_3−TPD curves of the ceria−based catalysts. (b) is the magnification of dotted box in (a)

Table S1 The dehydration over some acid catalysts

Catalyst	Temperature (°C)	Conversion (%)	Selectivity (%)	Yield (%)
PW/SiO_2	300	100	79	79
Ag/SiO_2	300	99	56	56
P/SiO_2	300	100	6	6
Cu/SiO_2	300	99	14	14
PMo/SiO_2	300	100	38	38

Catalyst weight: 0.40g; N_2 flow rate: 50 mL/min; the result data are averaged within 1 h.

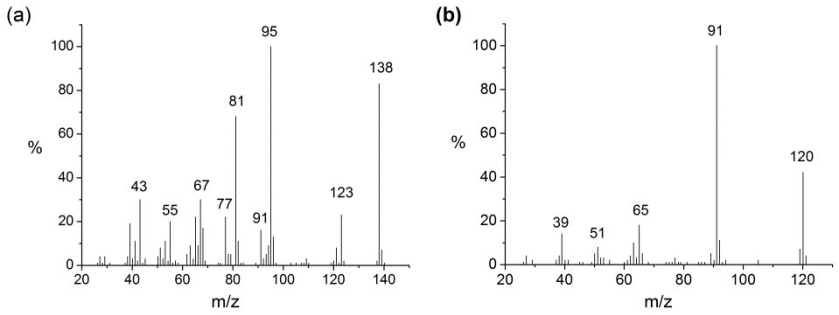

Fig. S5 MASS of FAH (a) and target product (b)

(a): MS m/z: 138 (83), 123 (23), 95 (100), 91 (16), 81 (68), 77 (22), 67 (30), 55 (20), 43 (30); Reference: *J. Mol. Catal. B* 2016, **126**, 37–45; *J. Chem. Soc.,Perkin Trans.* 1985,**1**, 747–756

(b): MS m/z: 120 (42), 91 (100), 65 (18), 51 (8), 39 (14); Reference: *Org. Biomol. Chem.*, 2010, **8**, 2312–2315

The boiling point of FAH is evaluated as follows:

Table S2 Retention time from GC data, and boiling point/pressure from SciFinder and Reaxys.

	Retention time (min) [a]	Boiling point/Pressure (°C/Torr) [b]			
F–diene	10.8	175/760			
FAH	13.4	-			
FA	13.7	135/30	116/10	110/9	104/5

[a]: GC with a ramp of 10 °C/min

[b]: F–diene data comes from SciFinder and FA data from Reaxys.

(1) Based on retention time of GC data, the boiling point shows an order: FA≈FAH> F–diene.

(2) Based on lgP=A+B/T, A and B are constant, T is temperature (K),

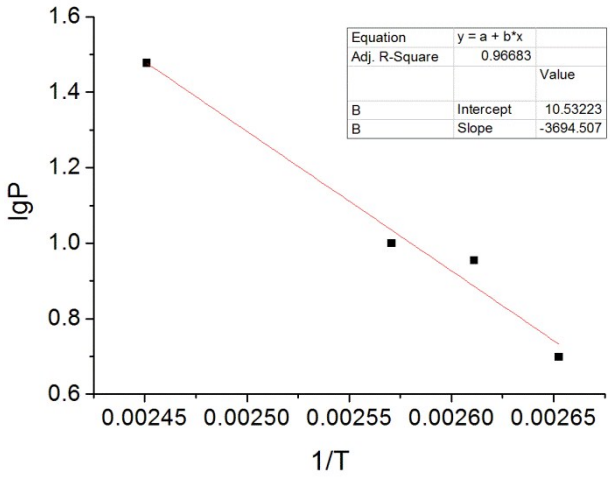

Fig. S6 1/T as function of lgP

(3) The boiling point of FA at atmosphere pressure (760 Torr) is 210 °C.

(4) Therefore, the boiling point of FAH is around 200 °C (760 Torr).

Additionally, SciFinder suggests FA has a boiling point of approx. 175 °C (760 Torr). Considering Retention time of FA (10.8) and FAH (13.4), and GC with a ramp of 10 °C/min, the boiling point of FAH may be approx. 205 °C (760 Torr).