Supporting Information

Chemical recycling of polycarbonate waste into advanced aviation fuel candidates via nickel-oxygen vacancy dual sites

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Figure S1. Photographs of polycarbonate (PC) powder and the obtained C15 dicycloalkane product.

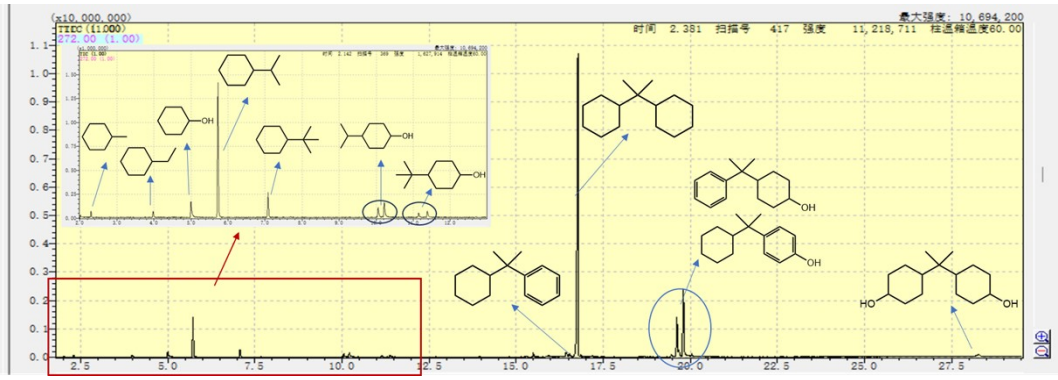

Figure S2. GC-MS spectra of products detected in PC conversion. Reaction conditions: 0.3 g PC, 0.06 g 15Ni/CeO_2, 30 mL cyclopentane, 4 MPa H_2, 523 K.

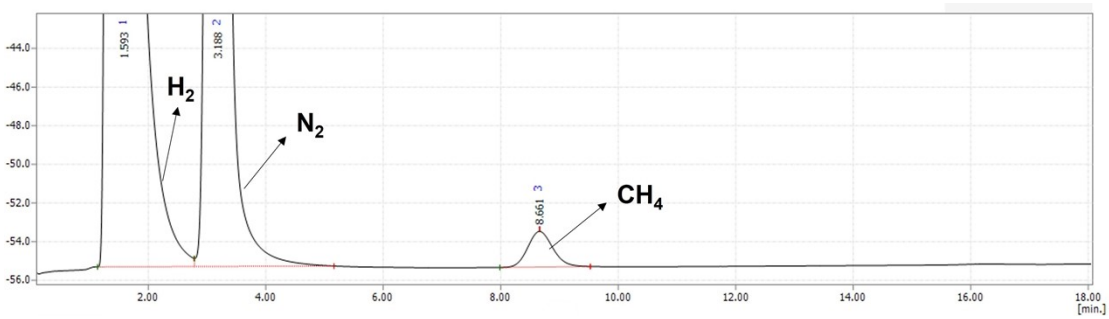

Figure S3. GC chromatogram of the gas phase products from the HDO of PC over the 15Ni/CeO_2. Reaction conditions: 0.3 g PC, 0.06 g 15Ni/CeO_2, 30 mL cyclopentane, 4 MPa H_2, 523 K.

Figure S4. GC chromatogram of products using cyclohexanol as feedstock. Reaction conditions: 0.3 g cyclohexanol, 0.06 g 15Ni/CeO_2, 30 mL cyclopentane, N_2/H_2 atmosphere, 453 K.

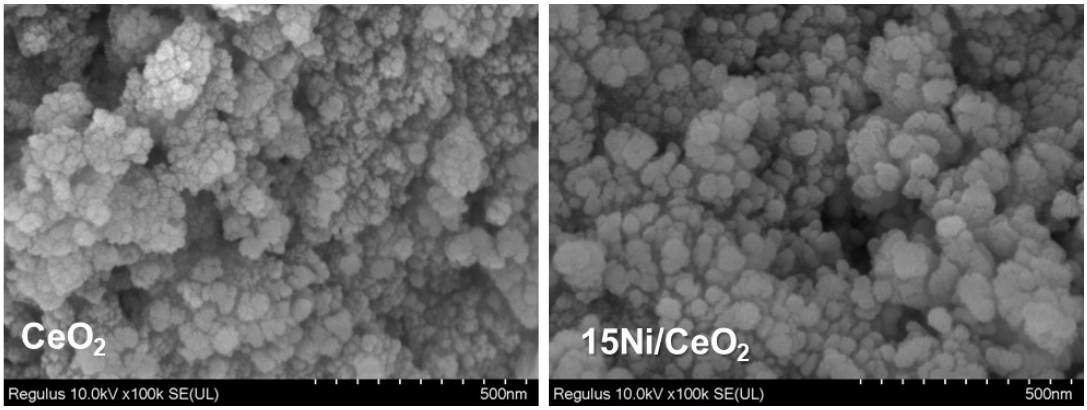

Figure S5. SEM images of CeO_2 and $15Ni/CeO_2$.

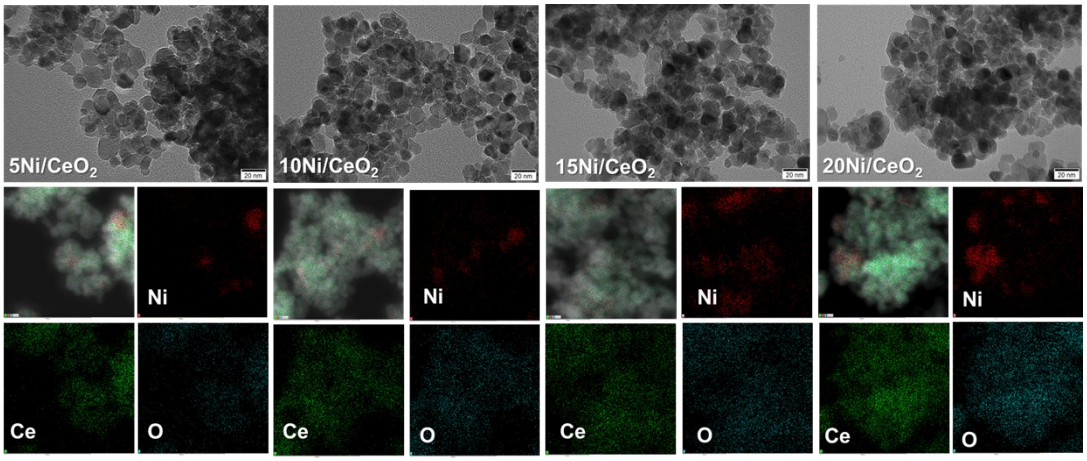

Figure S6. TEM images and EDS spectra of Ni/CeO_2 catalysts.

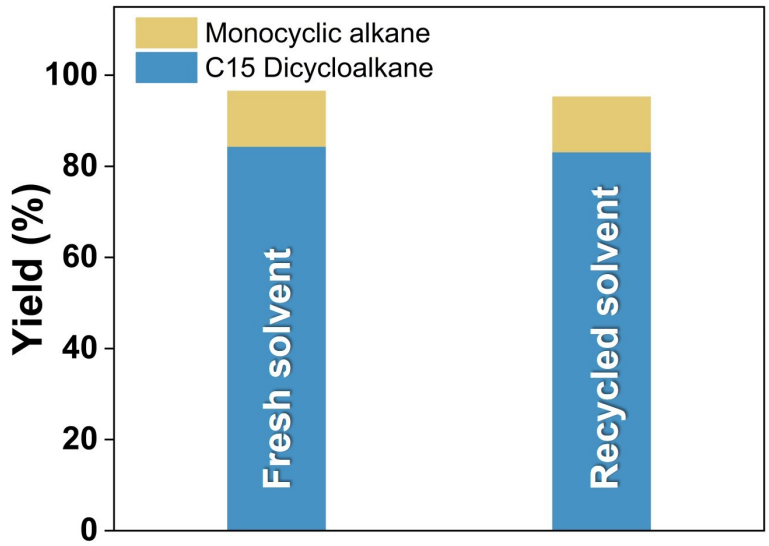

Figure S7. The HDO results of PC powder using the recycled solvent. Reaction conditions: 0.3 g PC, 0.06 g 15Ni/CeO_2, 30 mL cyclopentane/recycled cyclopentane, 4 MPa H_2, 523 K.

Table S1. Yield of saturated alkanes under different catalytic systems.

Entry	Catalysts	Yield of saturated hydrocarbons (%)			Ref.
		Monocyclic saturated alkanes	Bicyclic saturated alkanes	Total	
1	Rh/C + H-USY	/	86.9	86.9	1
2	Ru-Ni/Hβ	8.2	89.4	97.6	2
3	Ru-ReO_x/SiO_2+HZSM-5	5.7	93.4	99.1	3
4	Ni/HZSM-5	18.1	81.2	99.3	4
5	Pd/C + $La(OTf)_3$	4	95	99	5
6	**This work**	12.1	84.4	96.5	

Table S2. Properties and chemical composition of pristine PC powder.

Average molecular weight [a]	Chemical composition (%) [b]		
	C	H	O
35976	74.58	5.35	17.75

[a] Measured by U.S. Agilent PL-GPC50 & Agilent PL-GPC220 gel permeation chromatography (GPC).

[b] Measured by an elemental analyzer (EA, Elementar Unicube, Germany).

Table S3. Characteristics of Ni/CeO_2 catalysts.

Sample	Ni content (wt%) [a]	BET Surface area (m^2/g) [b]			Pore size (nm) [c]	D_{Ni} (%) [d]
		Micropore area	External area	Total surface area		
$5Ni/CeO_2$	4.30	2.56	41.87	44.44	11.1261	0.58
$10Ni/CeO_2$	10.36	2.24	44.23	46.46	10.3561	0.52
$15Ni/CeO_2$	15.76	1.88	42.77	44.65	10.3778	0.38
$20Ni/CeO_2$	21.04	1.84	44.78	46.62	8.8266	0.28

[a] Ni content of catalyst was determined by ICP-OES.

[b] Micropore surface area and external surface area were calculated by t-plot method, specific surface area was calculated by BET equation.

[c] Pore size was determined using the BJH.

[d] The Ni dispersions was determined by H_2 plus chemisorption.

References

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