Supplementary Information

Photodeposition of Pd onto TiO_2 nanowires for aqueous-phase selective hydrogenation of phenolics to cyclohexanones

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Table S1 Physiochemical properties of TiO_2 samples.

Sample	S_{BET} (m^2/g)	V_{pore}[a] (cm^3/g)	V_{mes}[b] (cm^3/g)	V_{mes}/V_{tol} （%）	D_{pore} (nm)
TiO_2 (P25)	58	0.28	0.26	95.1%	15. 6
TNWs-450	220	0.64	0.57	90.4%	9.9
TNWs-550	102	0.85	0.82	96.5%	29.8
TNWs-650	61	0.48	0.47	96.4%	39.3
TNWs-750	40	0.20	0.19	94.4%	32.0

[a] Total pore volume of all pores; [b] total volume of mesopores pores.

Table S2 Catalytic performance for cyclohexanone and phenol hydrogenation of Pd/TNWs and Pd/CeO_2.

Entry	Catalyst	Reactant	Products / %		
			Phenol	C═O	C─O
1	Pd/TNWs	Cyclohexanone	–	83.5	16.5
2	Pd/CeO_2	Cyclohexanone	–	11.5	88.5
3	Pd/TNWs	90%Cyclohexanone+10 %Phenol	5.7	94	0.3
4	Pd/CeO_2	90%Cyclohexanone+10 %Phenol	8.2	83.4	8.4

Typical conditions: 25 mg catalyst, 5.0 mL solvent with 1.0 mmol reactant, 50 °C, 5 bar, stirring at 500 rpm for 2 h.

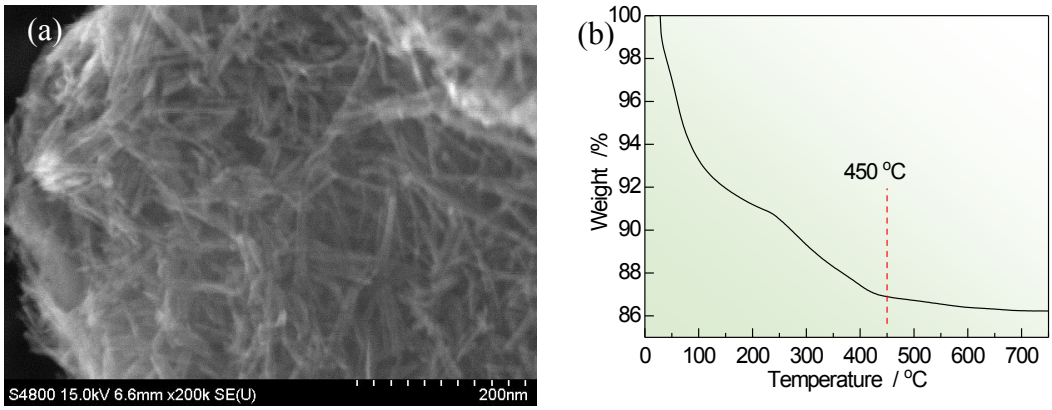

Fig. S1 (a) SEM image and (b) TGA pattern of titanic acid nanowire synthesized by hydrothermal-ion exchange method.

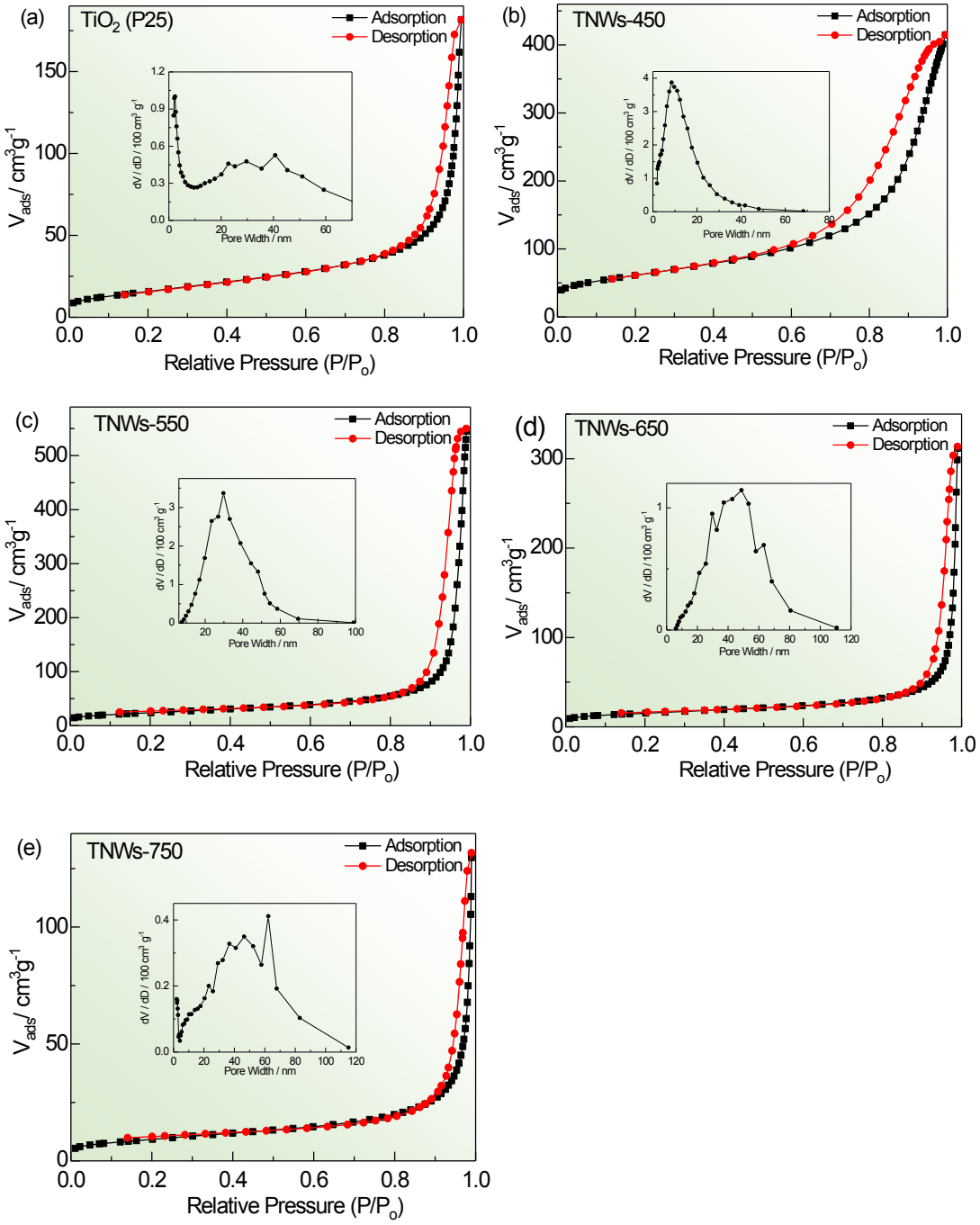

Fig. S2 N_2 adsorption/desorption isotherms and BJH pore size distributions (inserts) of (a) P25; (b) TNWs-450 °C; (c) TNWs-550 °C, (d) TNWs-650 °C, (e) TNWs-750 °C.

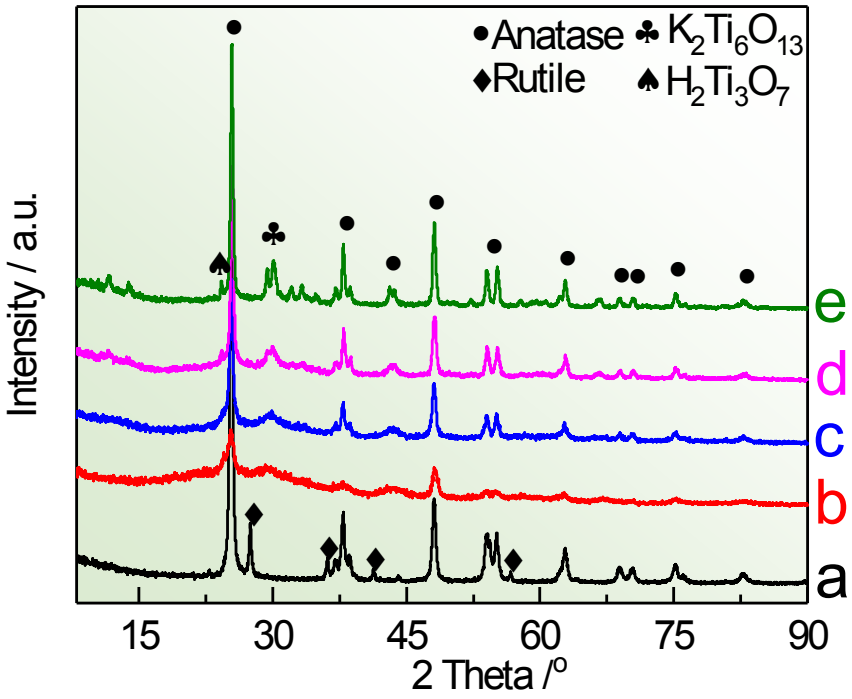

Fig. S3 XRD patterns of (a) P25, (b) TNWs-450 °C, (c) TNWs-550 °C, (d) TNWs-650 °C, and (e) TNWs-750 °C.

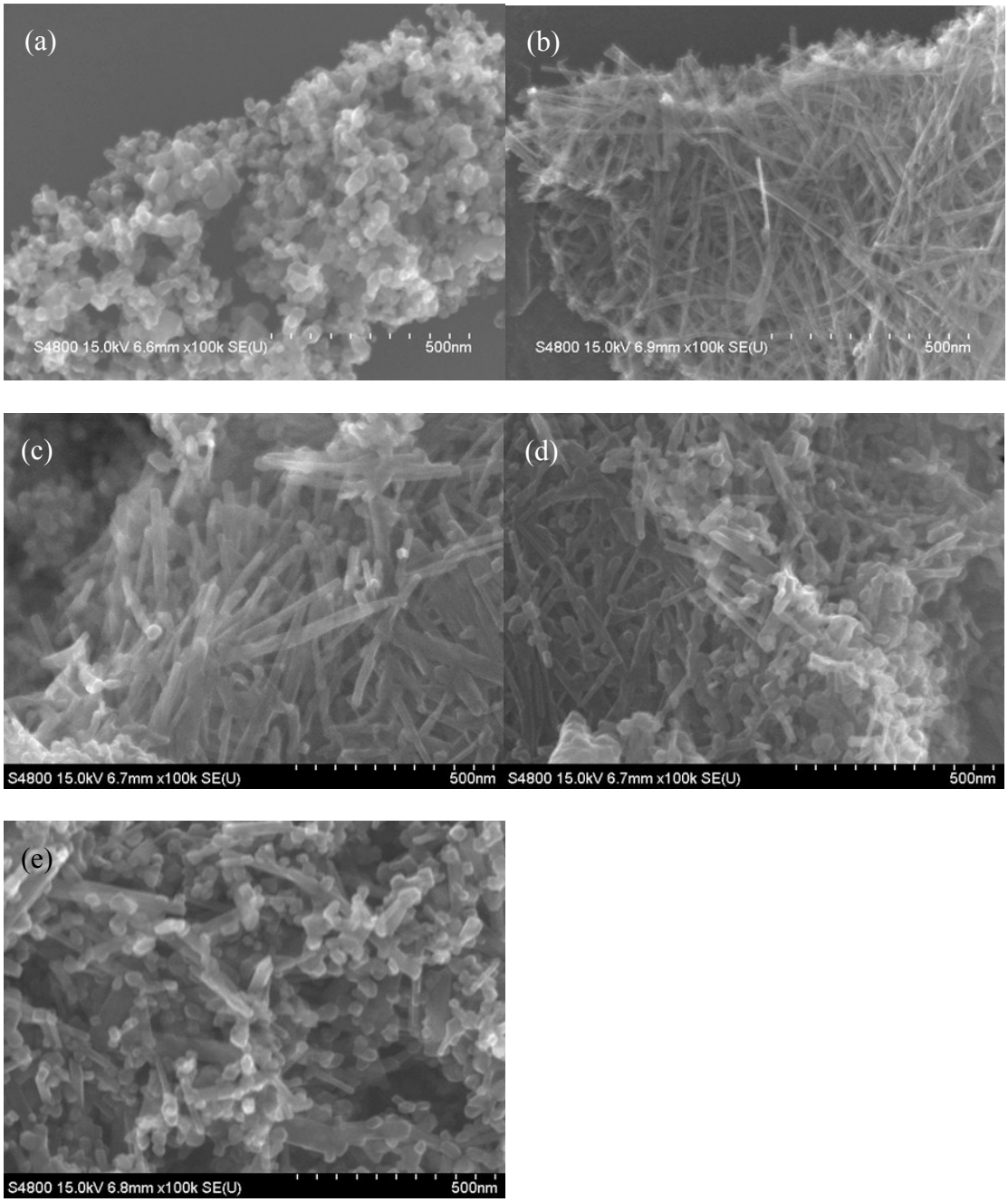

Fig. S4 SEM images of (a) P25; (b) TNWs-450 °C; (c) TNWs-550 °C, (d) TNWs-650 °C, and (e) TNWs-750 °C.

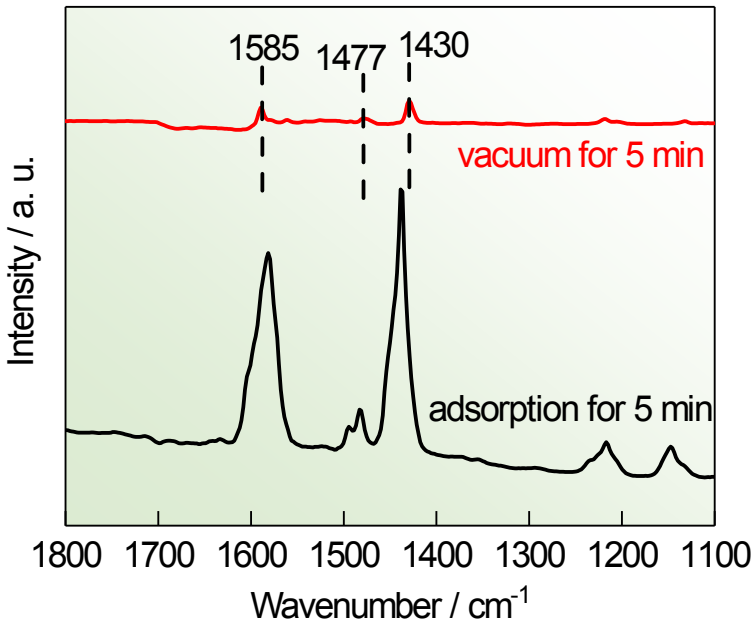

Fig. S5 In-situ FTIR spectra of TiO_2 (P25) for pyridine absorption: adsorption for 5 min (black line); evacuation of excess probe molecules under vacuum for 5 min (red line).

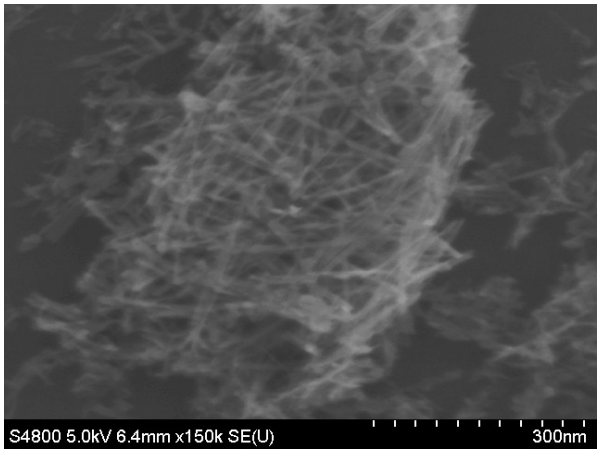

Fig. S6 SEM images of Pd/TNWs.

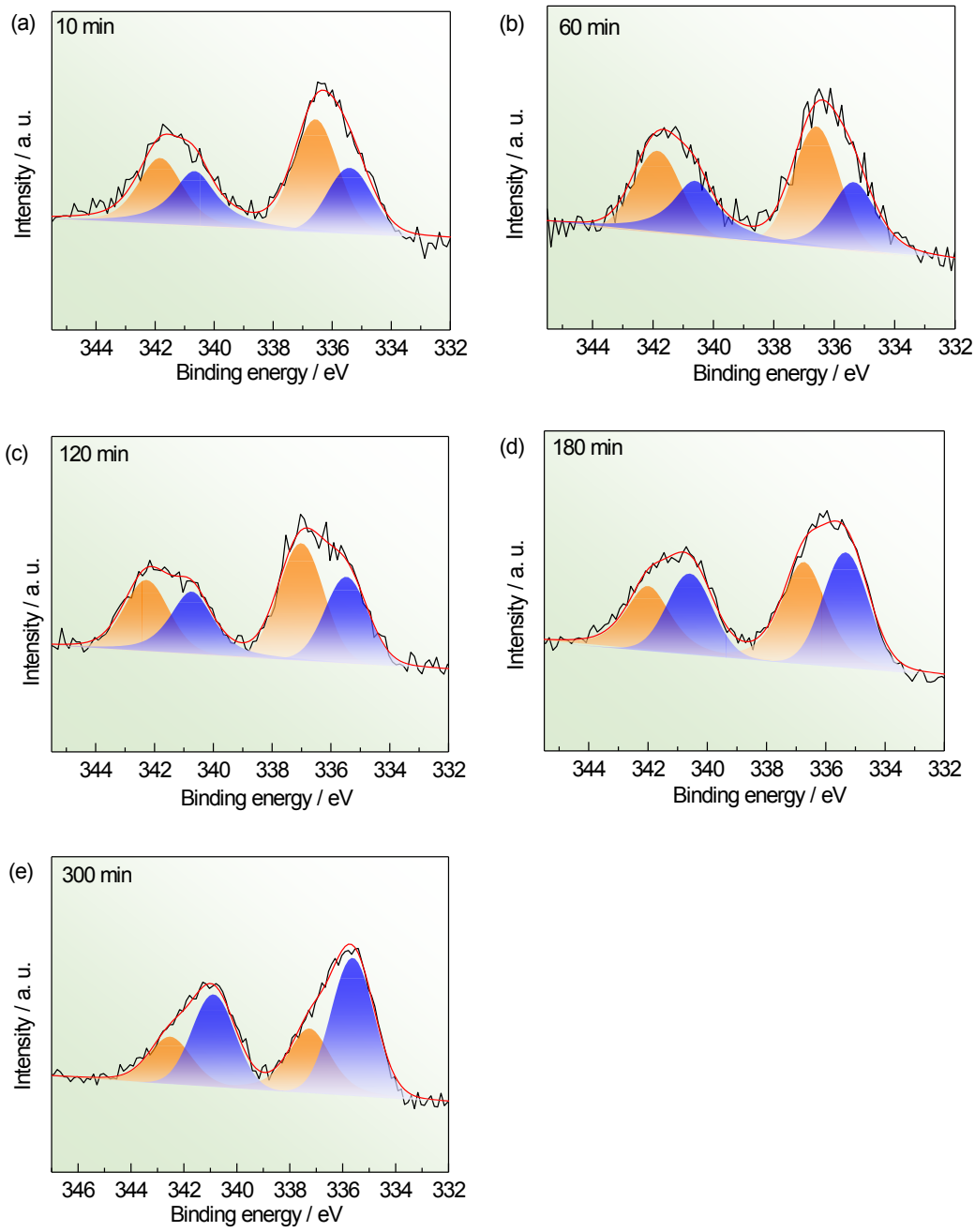

Fig. S7 XPS analyses of Pd/TNWs by photoreduction for different time: (a) 10 min, (b) 60 min, (c) 120 min, (d) 180 min, and (e) 300 min.

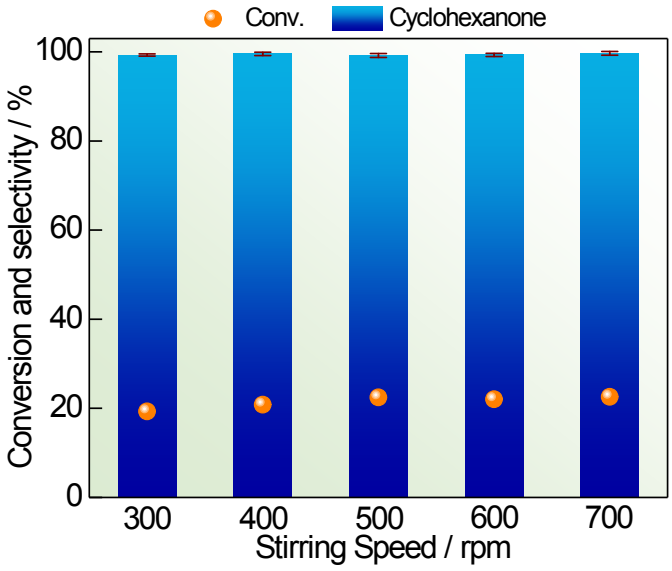

Fig. S8 Effect of stirring speed on the phenol conversion over Pd/TNWs.

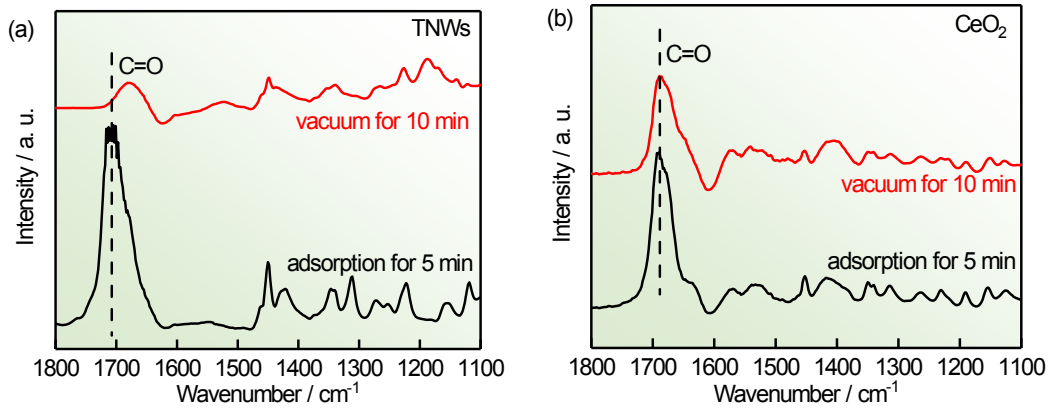

Fig. S9 In-situ FTIR spectra of TNWs (a) and CeO_2 (b) for cyclohexanone absorption: adsorption for 5 min (black line); evacuation of excess probe molecules under vacuum for 10 min (red line).

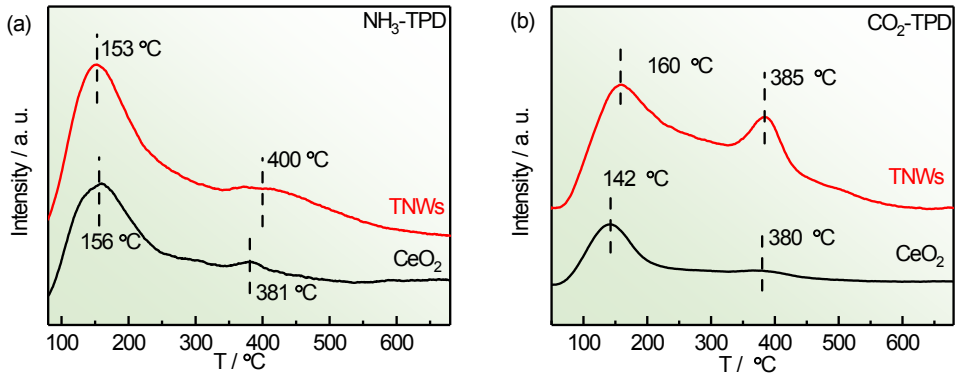

Fig. S10 (a) NH_3–TPD spectra and (b) CO_2–TPD of TNWs and CeO_2 samples.