Supporting information

Insight into the Role of UV-Irradiation in Photothermal Catalytic Fischer-Tropsch Synthesis over TiO_2 Nanotube Supported Cobalt Nanoparticles

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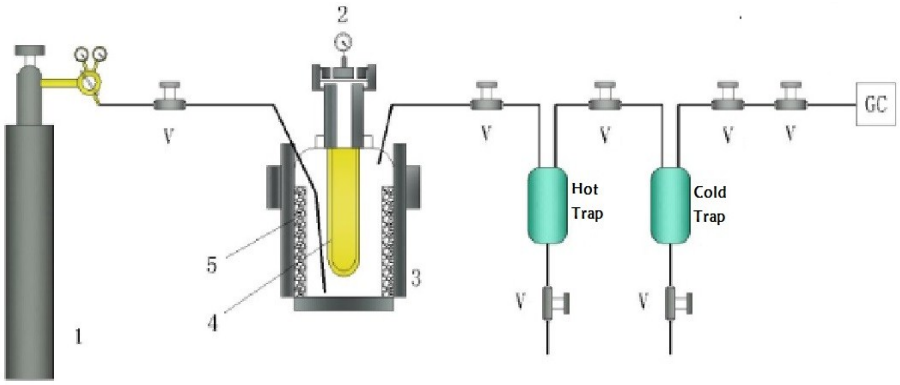

Fig. S1 Reactor used for photothermal synergistic driven Fischer-Tropsch synthesis

1: Sygas cylinder, 2: pressure gage, 3: stainless steel reactor, 4: Hg lamp, 5: catalyst, V:valve

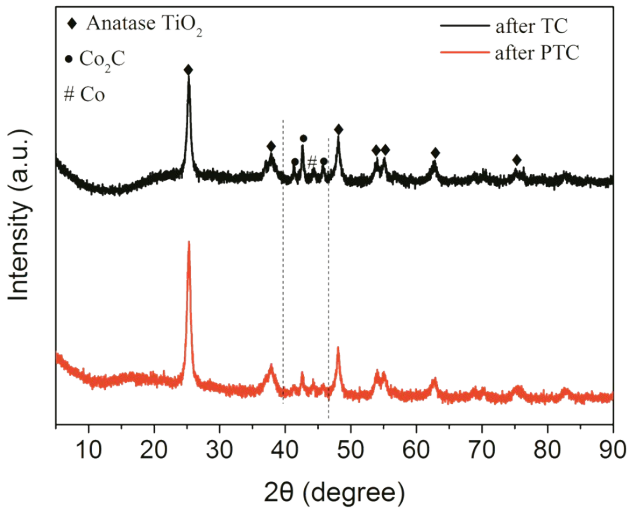

Fig. S2 PXRD patterns of used 20% Co/TNT catalysts after thermocatalysis and photothermocatalysis.

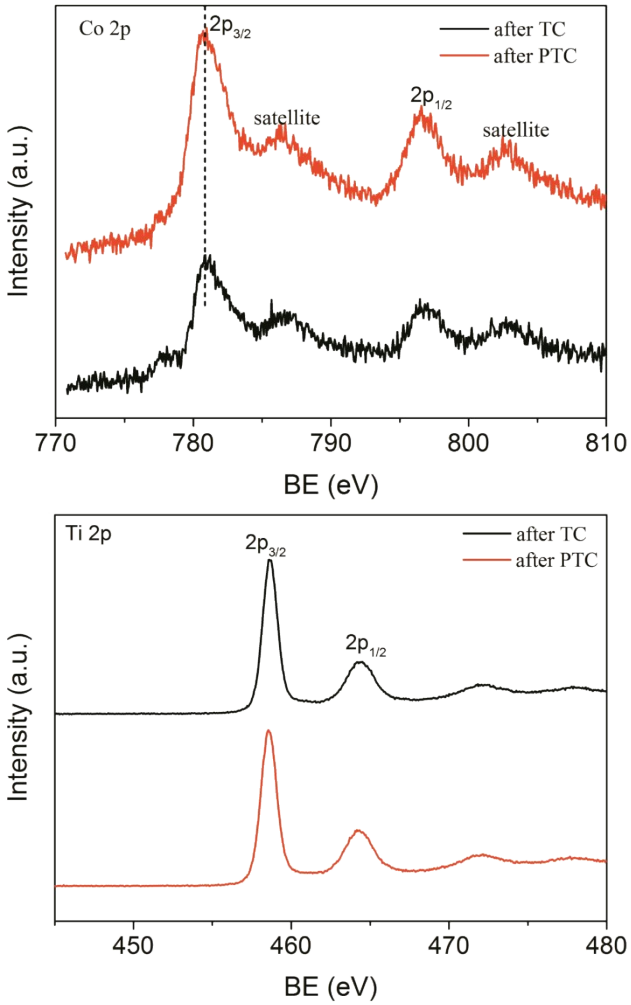

Fig. S3 XPS spectra of used 20% Co/TNT catalysts after thermocatalysis and photothermocatalysis.

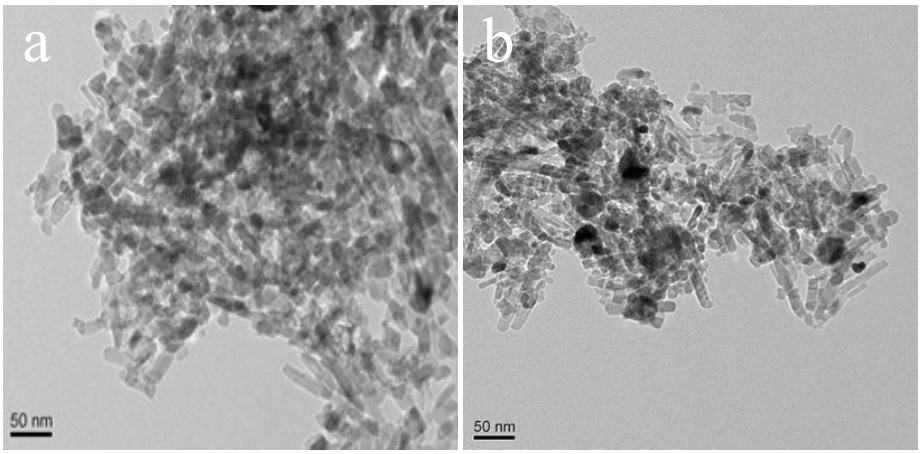

Fig. S4 TEM images of used 20% Co/TNT catalysts after (a) thermocatalysis and (b) photothermocatalysis.

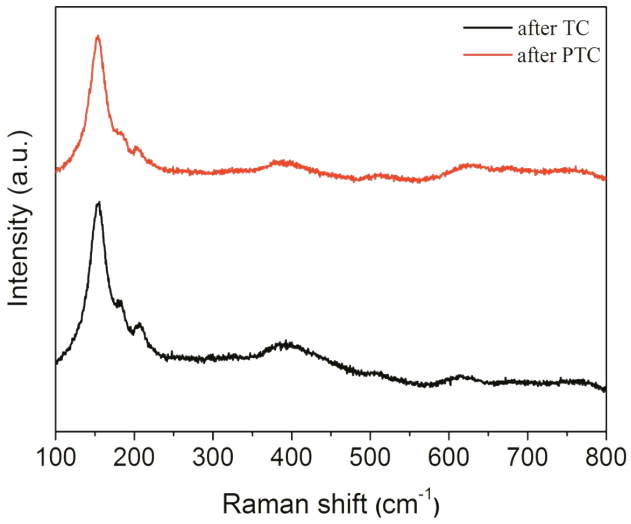

Fig. S5 Raman spectra of used 20% Co/TNT catalysts after thermocatalysis and photothermocatalysis.

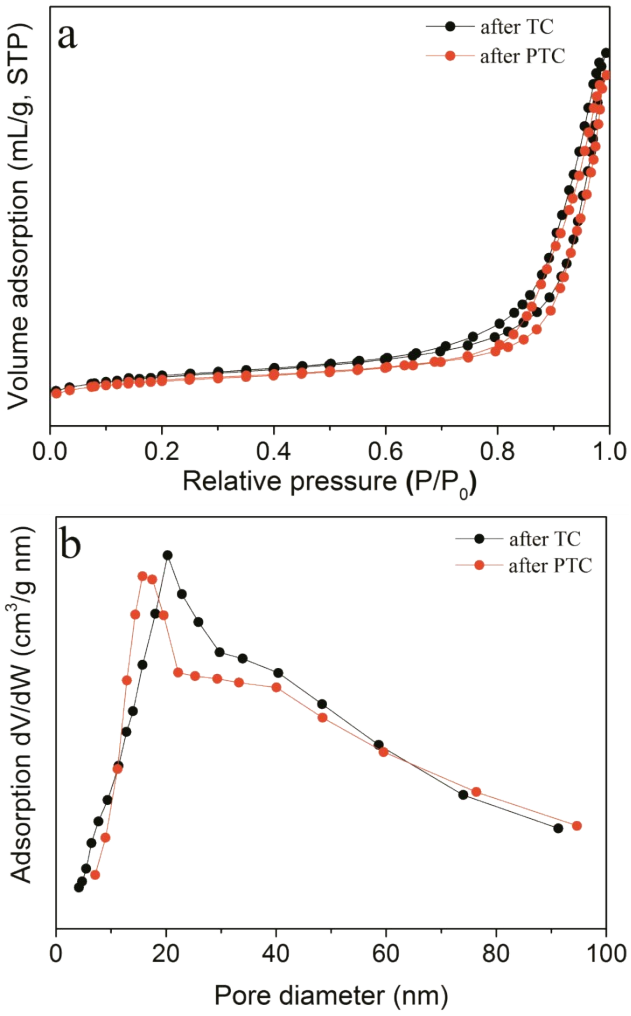

Fig. S6 (a) N_2 adsorption-desorption isotherms and (b) corresponding pore size distribution curves of used 20% Co/TNT catalysts after thermocatalysis and photothermocatalysis

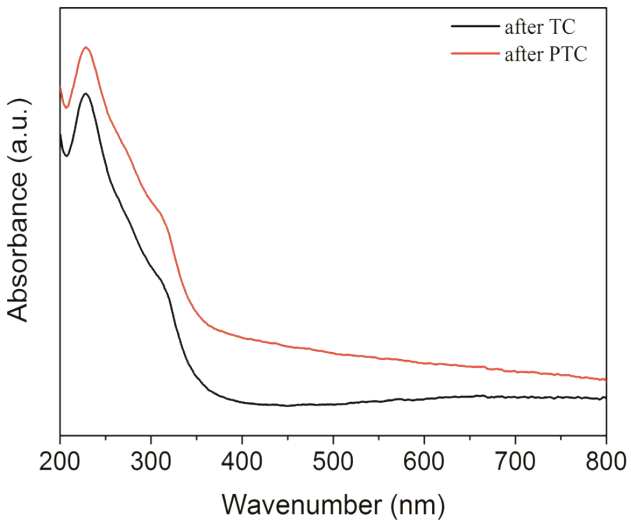

Fig. S7 UV-vis absorption spectra of 20% Co/TNT catalysts after thermocatalysis and photothermocatalysis.

Table S1 Pore structural parameters of used 20% Co/TNT catalysts after thermocatalysis and photothermocatalysis.

Sample	BET surface area (m^2/g)	Pore volume (cm^3/g)	Average Pore diameter (nm)
20% Co/TNT (after TC)	83	0.50	22.41
20% Co/TNT (after PTC)	67	0.47	20.73

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Table S2 Performance of TNT for FTS under photothermocatalytic condition and thermocatalytic condition.

Catalyst	Condition	CO Conversion (%)	CO_2 Selectivity (%)	Hydrocarbon Selectivity (%)			Distribution in C_2-C_4 (%)	
				CH_4	C_2-C_4	C_{5+}	Paraffin	Olefin
20% Co/TNT	30 ^{O}C +UV light	0	–	–	–	–	–	–
	220 ^{O}C	1.5	–	–	–	–	–	–
	220 ^{O}C+UV light	1.6	–	–	–	–	–	–

Reaction conditions: CO/H_2 = 1/2, flow rate = 28 ml min^{-1}, pressure of 2.0 MPa, temperature of 493 K, catalyst (1.2 g). The hydrocarbon selectivities were normalized with the exception of CO_2.