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SUPPORTING INFORMATION

Nature-Based Catalyst for Visible-Light-Driven Photocatalytic CO_2 Reduction

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Table S1 The photocatalytic CO_2 reduction efficiency of various catalysts.

Photocatalyst	Light source	CO evolution rate (μmol h^{-1} g^{-1})	CH_4 evolution rate (μmol h^{-1} g^{-1})	Reference
$Bi_4O_5I_2$/g-C_3N_4	300 W Xenon lamp (with λ > 400 nm filter)	45.6	6	1
$LaPO_4$/g-C_3N_4	300W Xenon lamp	14.4	N/A	2
SnO_2/g-C_3N_4	500W Xenon lamp	18	2	3
Pt/B_4C/g-C_3N_4	Visible light (405–723 nm)	N/A	0.84	4
ZnO/g-C_3N_4	500 W Xenon lamp (with a 420 nm cut filter)	29	4	5

NA= not available

Table S2 The photocatalytic CO_2 reduction efficiency and the corresponding QE of g-C_3N_4 based photocatalysts

Photocatalyst	Light source	CO evolution rate (μmol g^{-1} h^{-1})	QE (%)	Reference
KOH/g-C_3N_4	300 W Xeon lamp (PLS-SXE300UV)	2.0	N/A	6
Co-porphyrin/g-C_3N_4	300W Xenon lamp (with a UV-cut filter)	17.0	0.8 (420 nm)	7
N-TiO_2/g-C_3N_4	300 W Xenon lamp (Perfect Light)	12.2	N/A	8
$LaPO_4$/g-C_3N_4	300W Xenon lamp (Aulight CEL-HX)	14.4	N/A	9
BiOI/g-C_3N_4	300 W Xenon lamp (with a UV cutoff filter λ > 400 nm)	3.45	N/A	10
rGO/g-C_3N_4	15 W energy-saving daylight lamp (Philips)	N/A	0.56 (420 nm)	11
Co-ZIF-9/g-C_3N_4	Xenon lamp (with a 420 nm cutoff filter)	10.4	0.9 (420 nm)	12
Bi_2WO_6/g-C_3N_4	300 W Xenon lamp (Aulight CEL-HX)	5.19	N/A	13
N-TiO_2/g-C_3N_4	400 W Xenon lamp	12.28	N/A	14

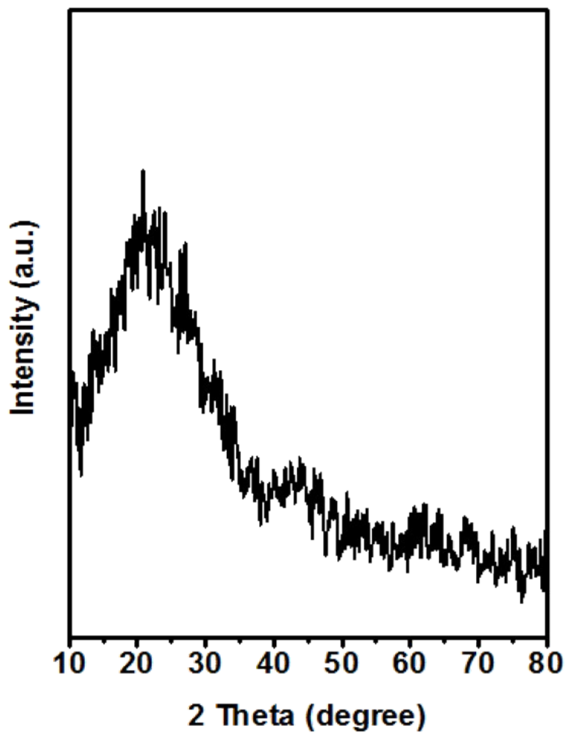

Figure S1. XRD pattern of TRP catalyst.

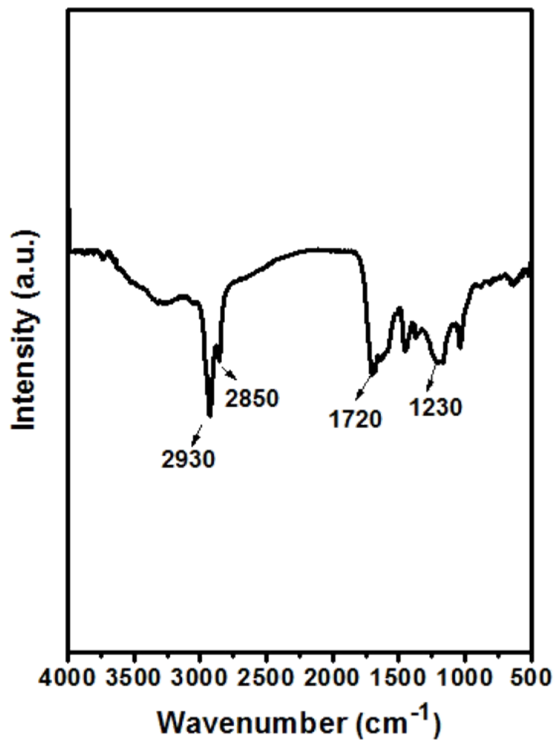

Figure S2. FT-IR spectrum of TRP catalyst.

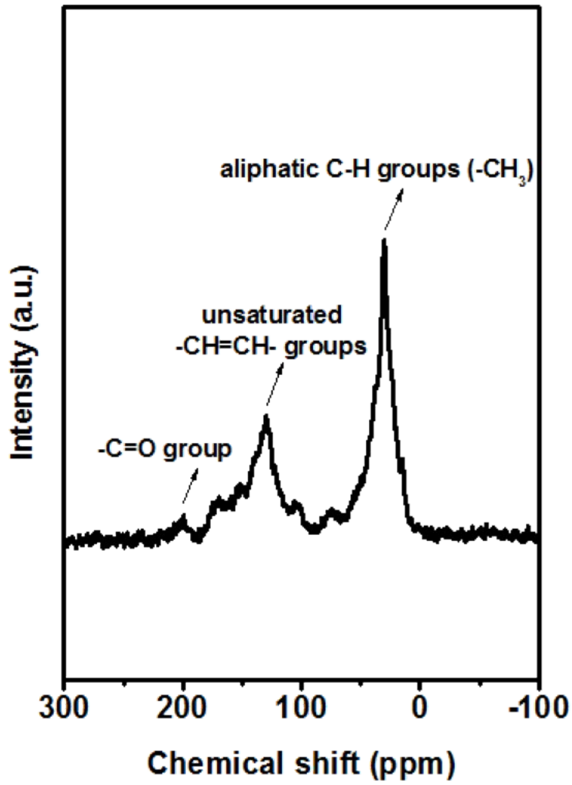

Figure S3. ^{13}C Solid-state NMR spectrum of TRP catalyst.

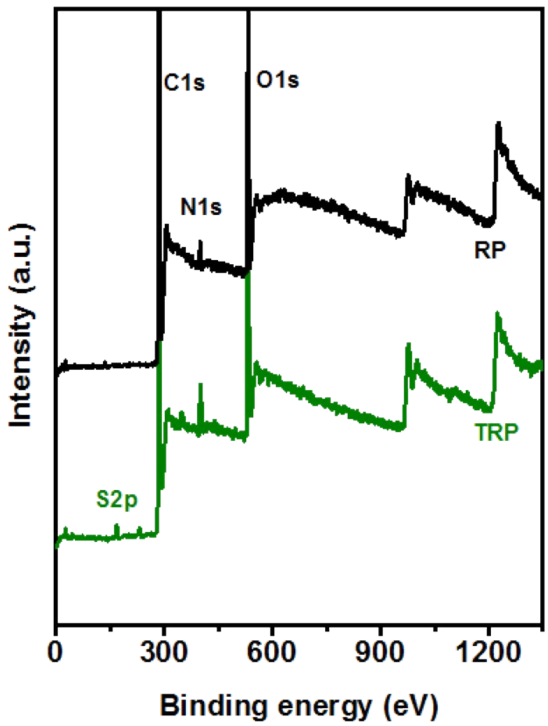

Figure S4. XPS spectra of RP and TRP catalyst.

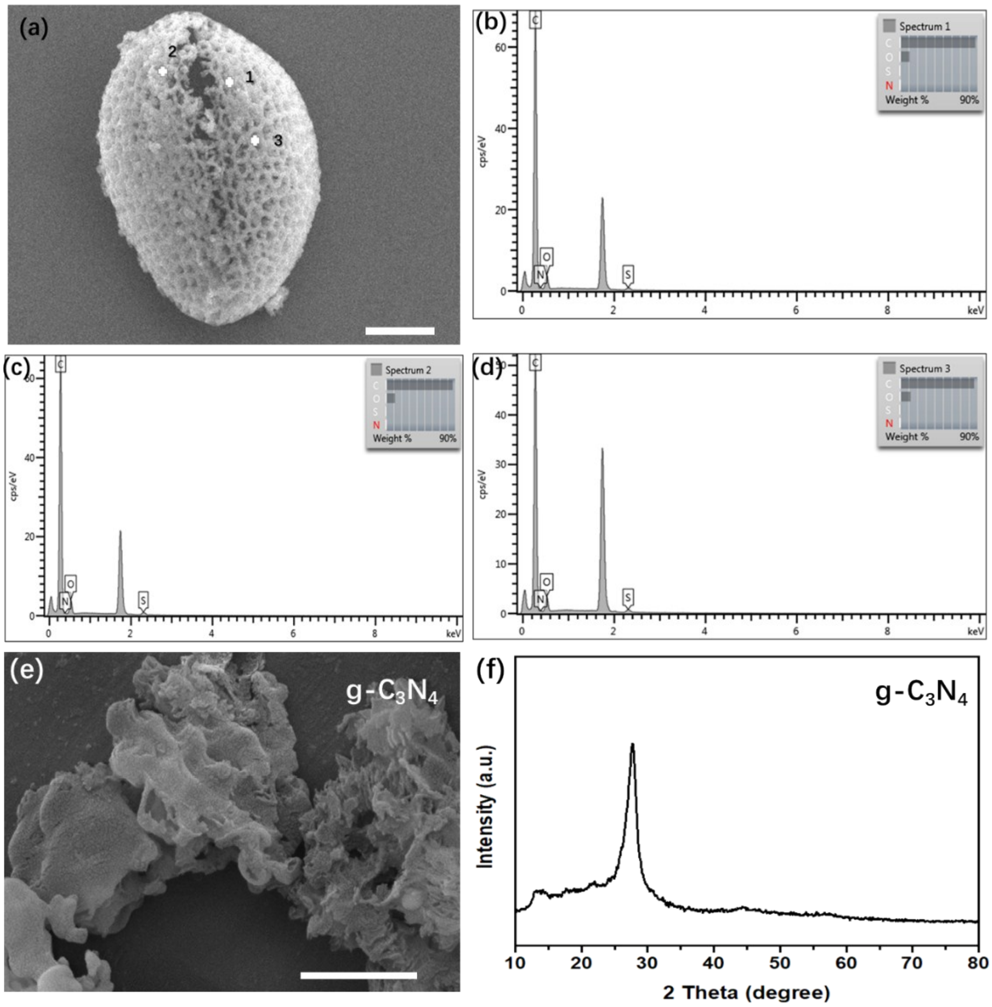

Figure S5. SEM image (a) and corresponding EDX spectra (b-d) of TRP catalyst, SEM image (e) and XRD pattern (f) of g-C_3N_4. Scale bar: 5 μm (a), 1μm (e)

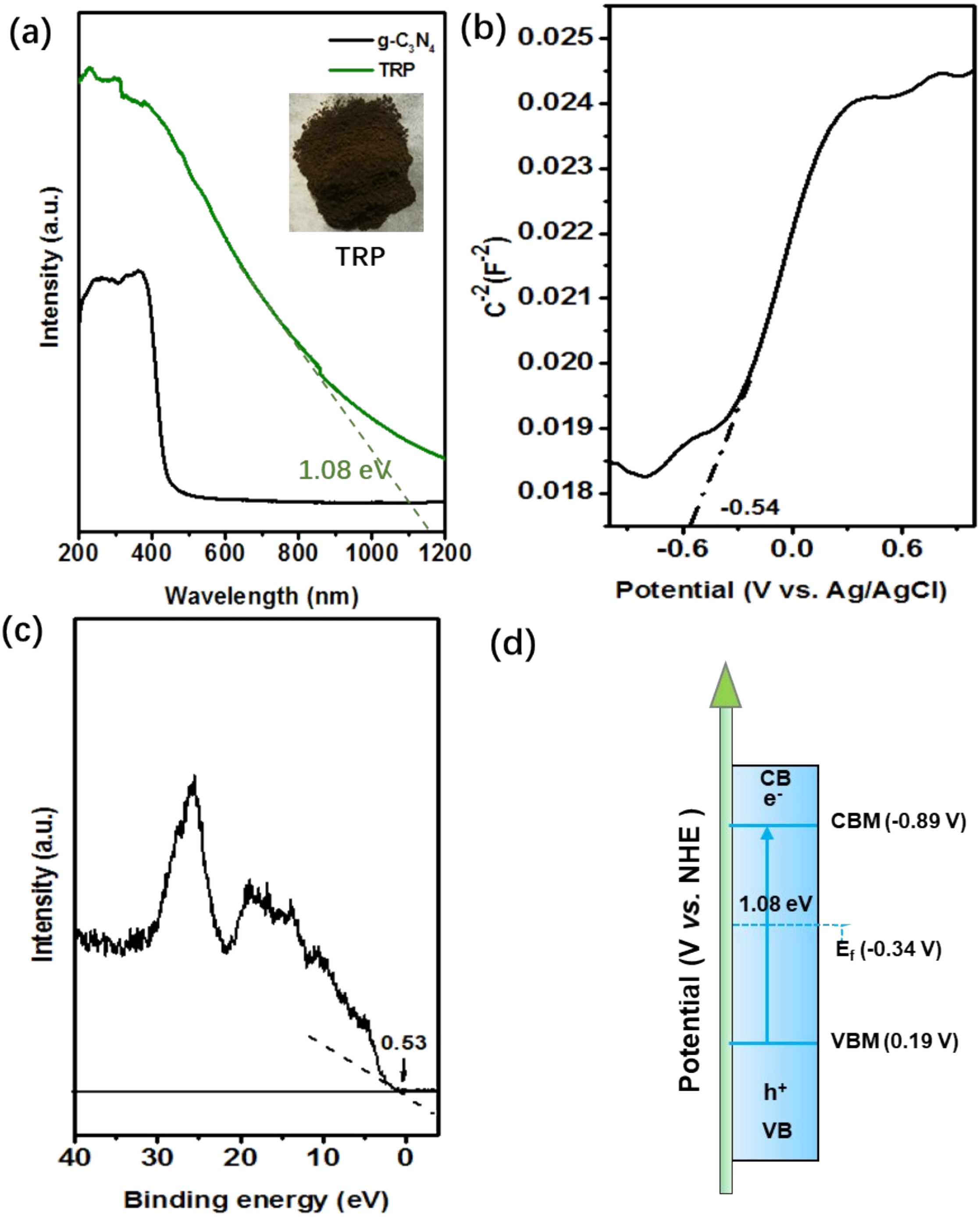

Figure S6. UV-vis diffuse reflectance spectra of g-C_3N_4 and TRP (inset: Photograph of TRP sample) (a), Mott-Schottky plot (b), valance band XPS spectrum (c) and energy band diagram (d) of TRP catalyst.

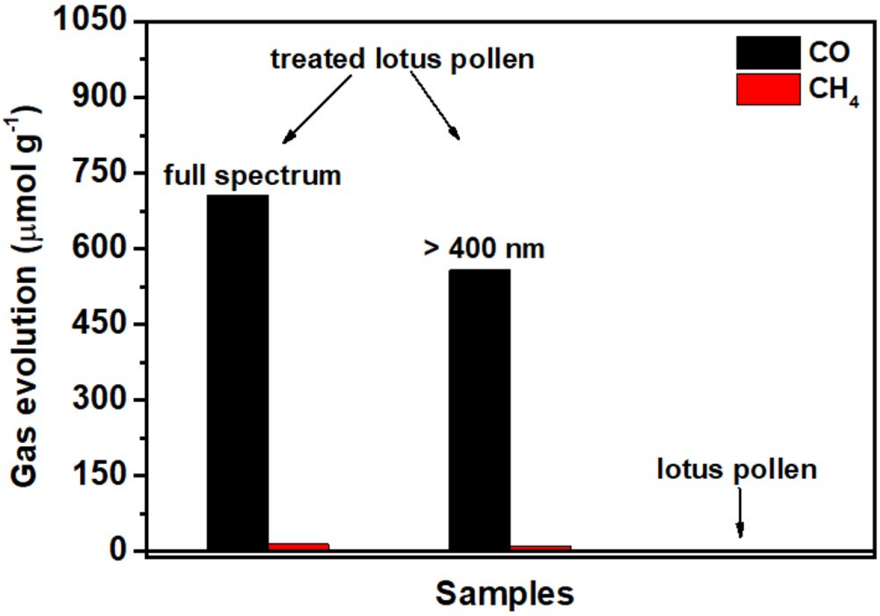

Figure S7. Photocatalytic CO_2 reduction activity of the treated lotus pollen and lotus pollen.

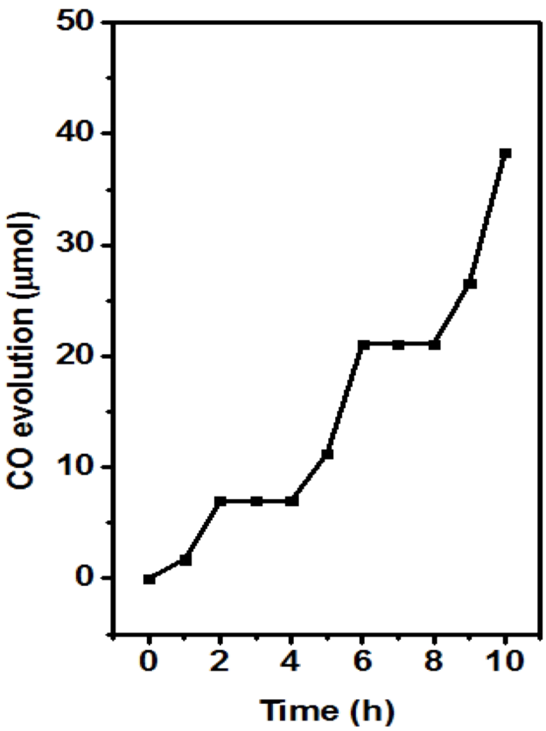

Figure S8. The possibility of recycling ability of TRP catalyst.

(Reaction condition: 15 mg TRP, 20 mL water)

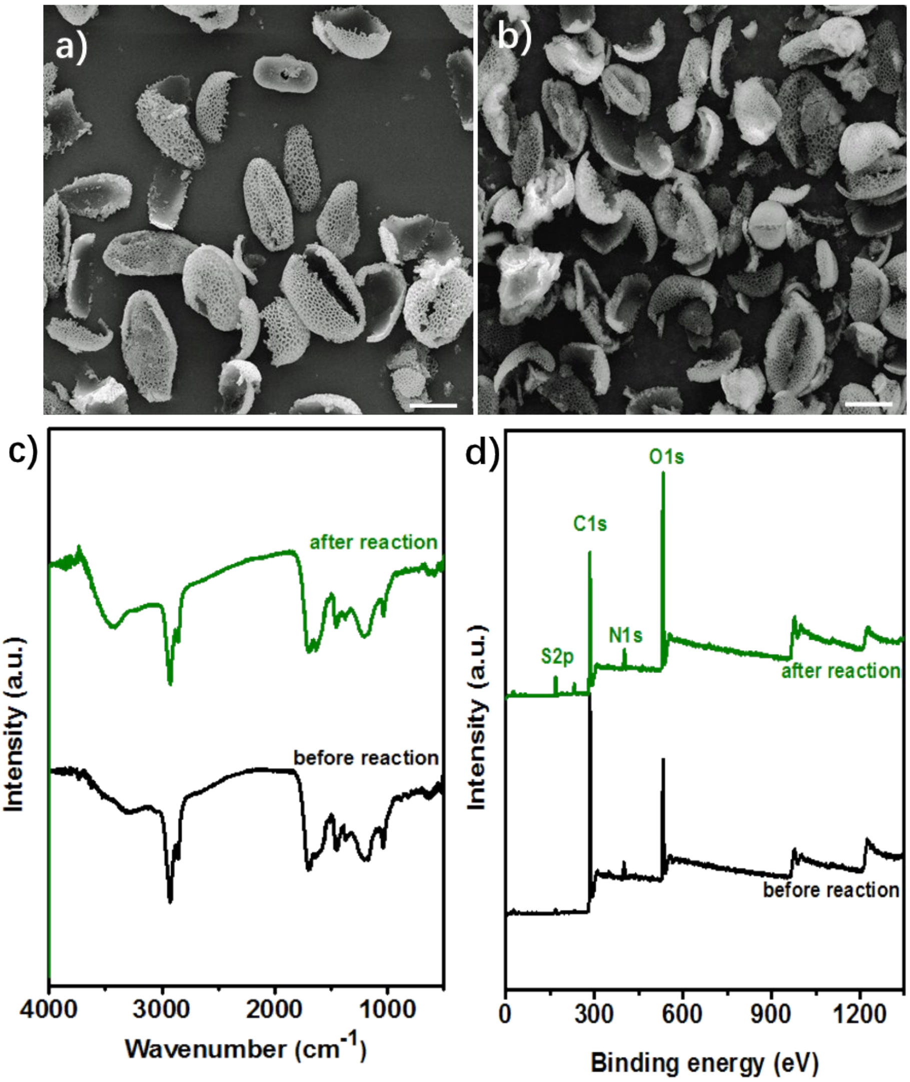

Figure S9. SEM images of TRP before (a) and after (b) reaction, FT-IR (c) and XPS (d) spectra of TRP catalyst before and after reaction. Scale bar (a and b: 10 μm)

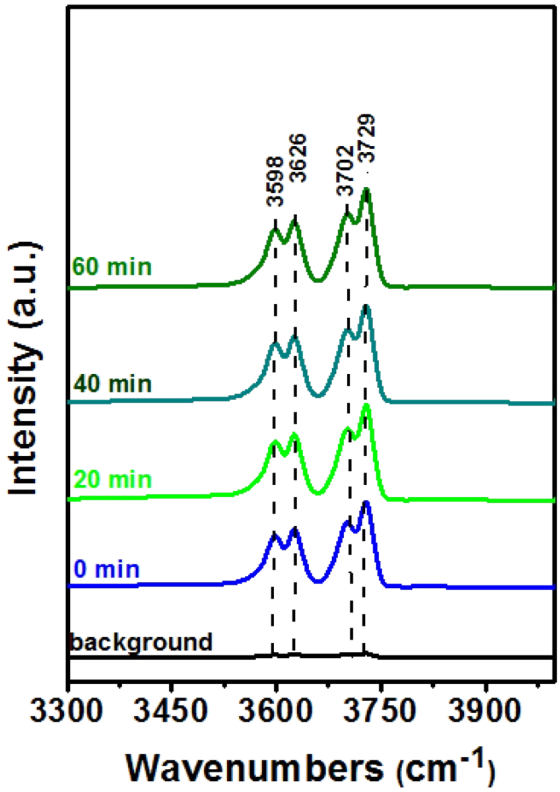

Figure S10. *In situ* FT-IR spectra for co-adsorption of a mixture of CO_2 and H_2O vapor on the TRP catalyst in the dark and under visible light (LED lamp, λ = 420 nm) irradiation for 20, 40, 60 min, respectively.

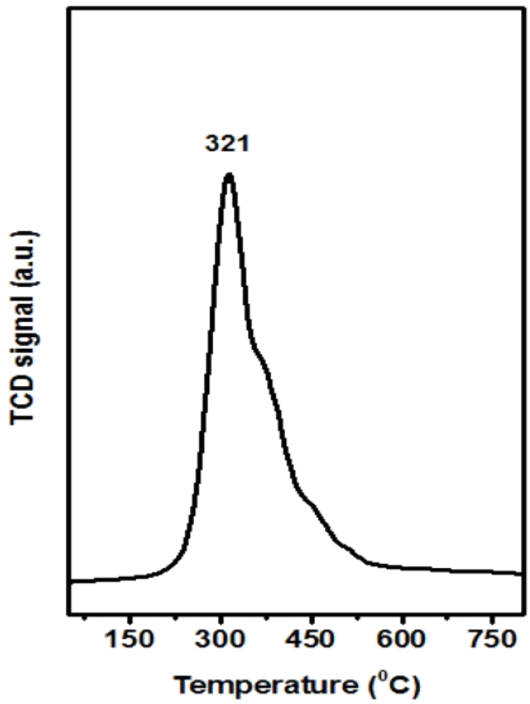

Figure S11. CO_2-TPD spectrum of TRP catalyst.

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