Supporting Information for

Selectively photocatalytic C-C coupling of isopropanol into pinacol with concurrent hydrogen evolution over the GO_{NaOH} photocatalyst

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This supporting information contains:

Experimental details

Figures S1-S4

Table S1

supporting information

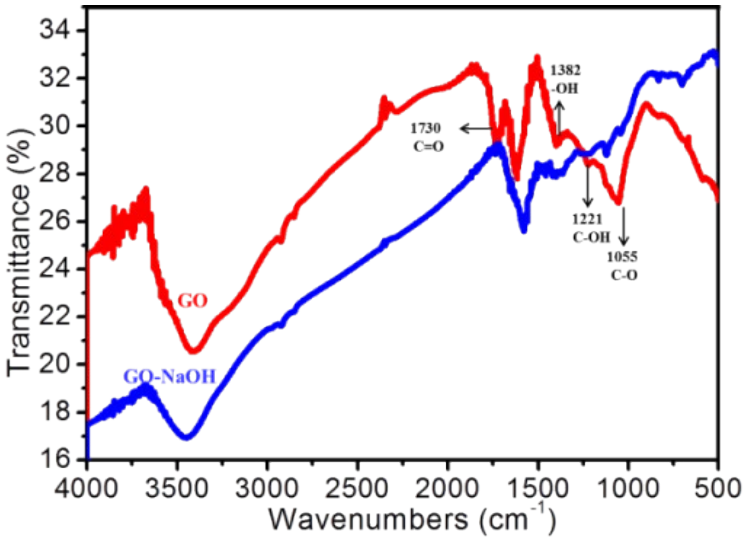

Fig. S1 FT-IR spectra of GO and GO_{NaOH}.

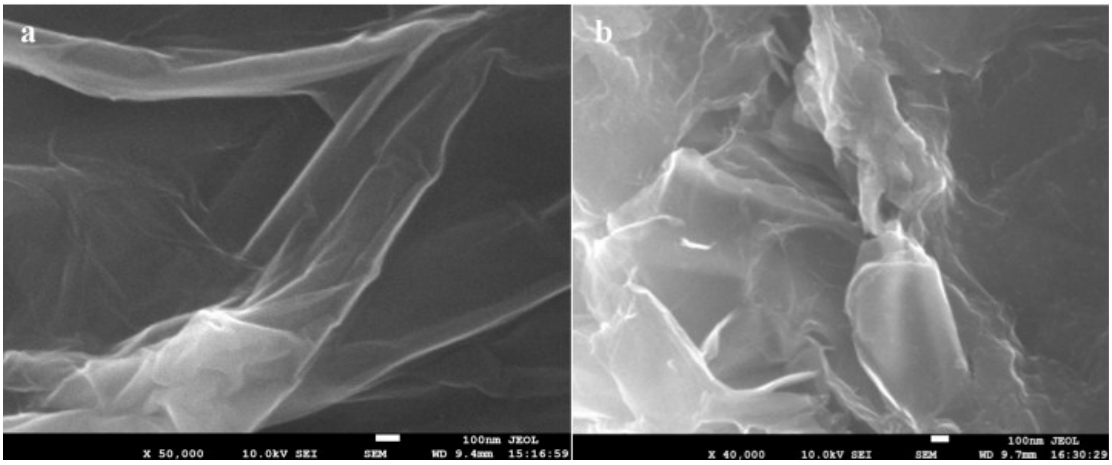

Fig. S2 SEM images of (a) GO and (b)GO_{NaOH}.

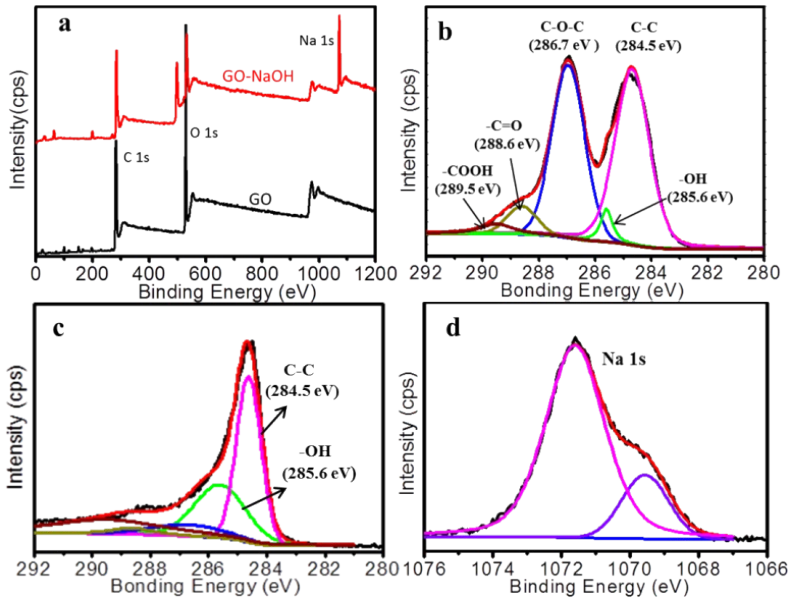

Fig. S3 (a) The XPS wide scan spectra of GO and GO_{NaOH}, C 1s spectra of (b) GO, (c) GO_{NaOH}, and (d) Na 1s spectra of GO_{NaOH}.

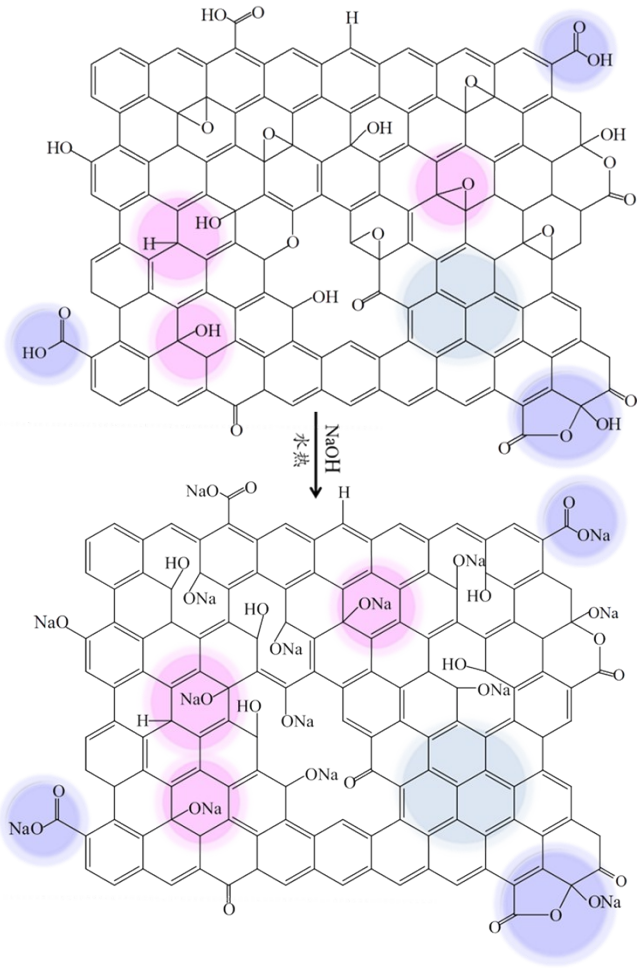

Fig. S4 The schematic diagram for the hydrothermal treatment of GO with 10 M NaOH.

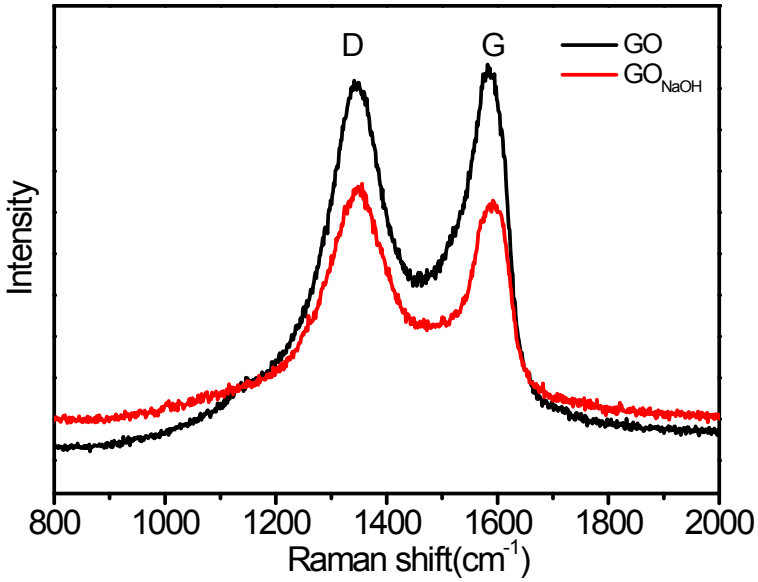

Fig.S5 Raman spectra of GO and GO_{NaOH}.

Fig. S6 The GC-MS spectrum of reaction products.

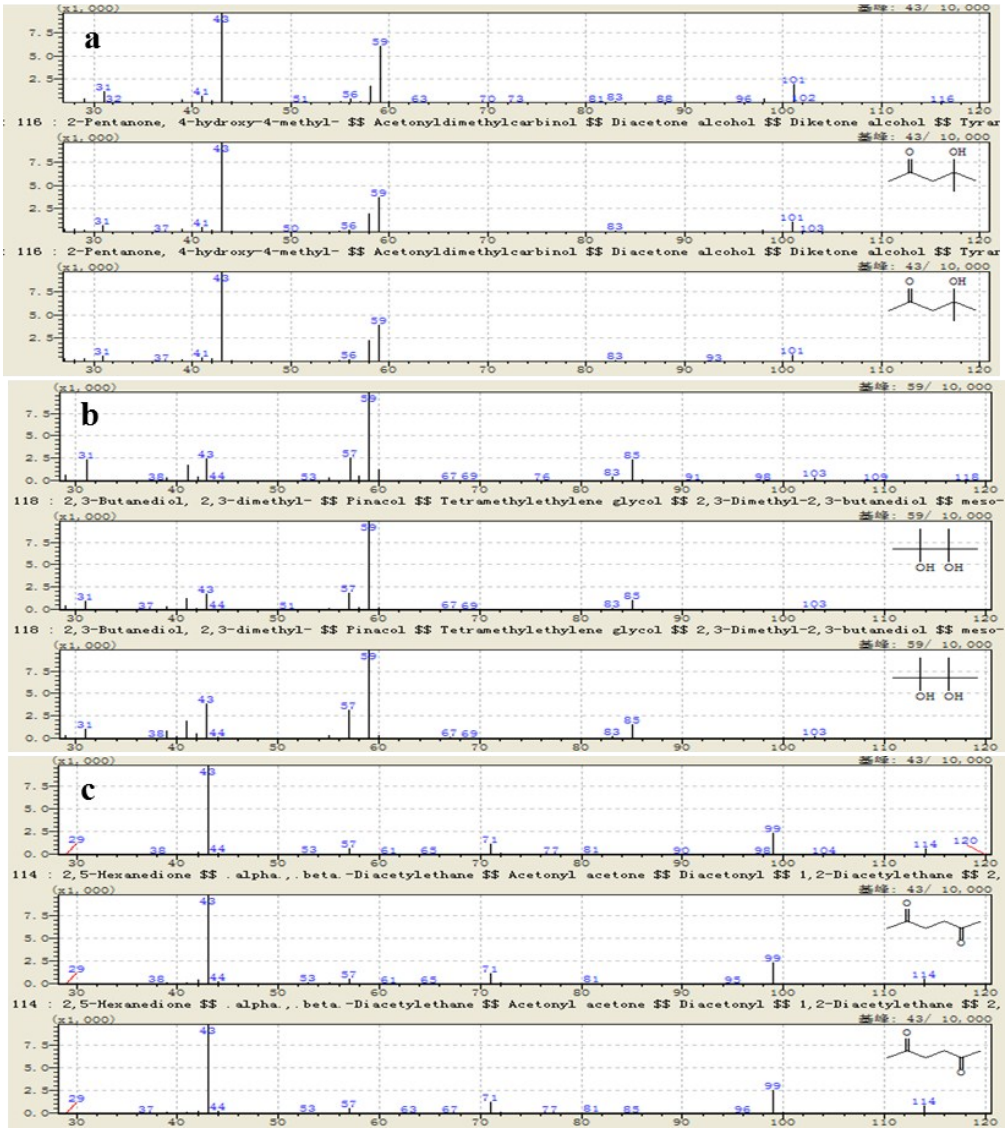

Fig. S7 The GC-MS spectra of photocatalytic isopropanol oxidation reaction products: (a) 4-hydroxyl-4-methyl-2-pentanone, (b) pinacol, (c) 2,5-hexanedione.

Different photocatalyst oxidative isopropanol can produce acetone and 2, 3-2- methyl-2, 3-

butanediol (pinacol). In order to further confirm the reaction product, the products were dissolved in the ethyl acetate, and then qualitative analysed by the Gas chromatography-Mass spectrometry(GC-MS). The Figure S2 and Figure S3 were respectively mass spectrogram and ion current chromatograms of the products. The ion flow mass spectrometry and accordingly in the chromatogram of standard mass spectrogram, the similarity were over 90 %. Which further confirmed that in the photocatalytic hydrogen production system the isopropanol as a sacrificial agent, hydrogen produce efficiently, meanwhile, the isopropanol can been oxidized to generate acetone and pinacol, and a small amount of 2, 5-hexanedione by-product.

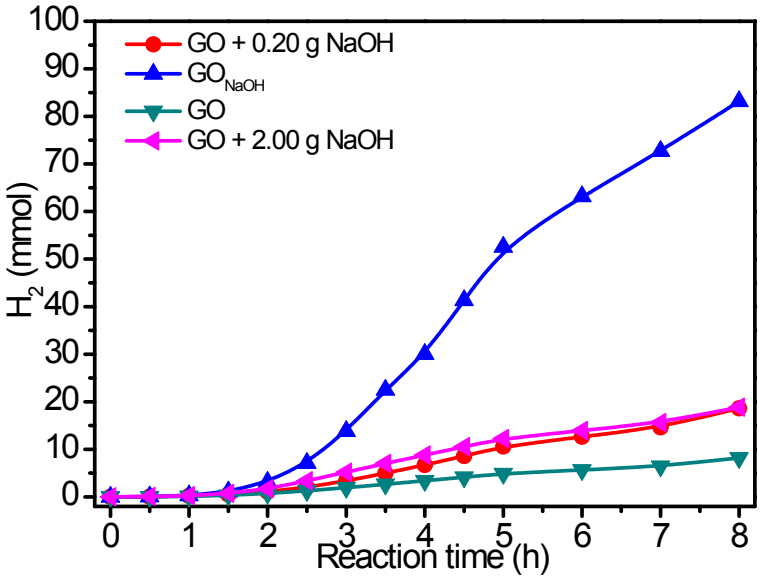

Fig. S8 Reactant conversion and products selectivity by adding of NaOH. Reaction conditions: photocatalyst, 0.10 g; 2.0 wt % Pt cocatalyst; total volume of reactant aqueous solution, 200 ml; isopropanol, 10 ml; light, 300 W high pressure Hg lamp (λ=365 nm); temperature, ~25 ^{o}C; reaction duration, 12 h.

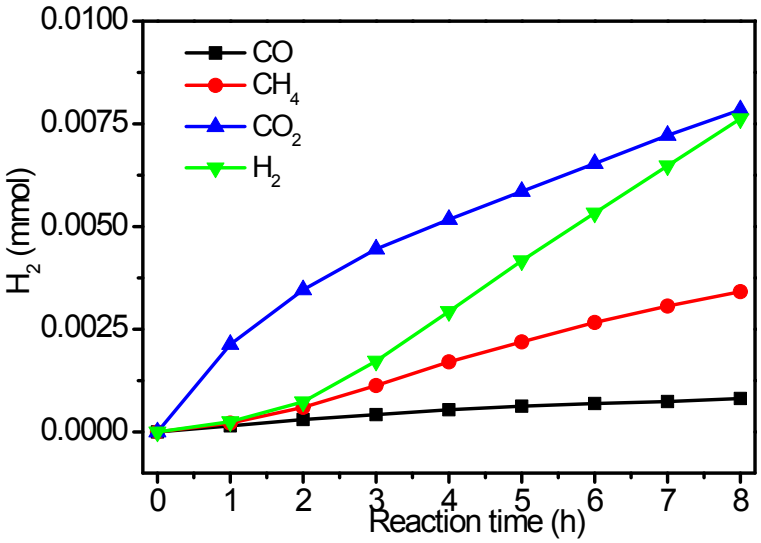

Fig. S9 Time course of gas production in photolysis of isopropanol. Reaction conditions: total volume of reactant aqueous solution, 200 ml; isopropanol, 10 ml; light, 300 W high pressure Hg lamp (λ=365 nm); temperature, ~25 °C; reaction duration, 12 h.

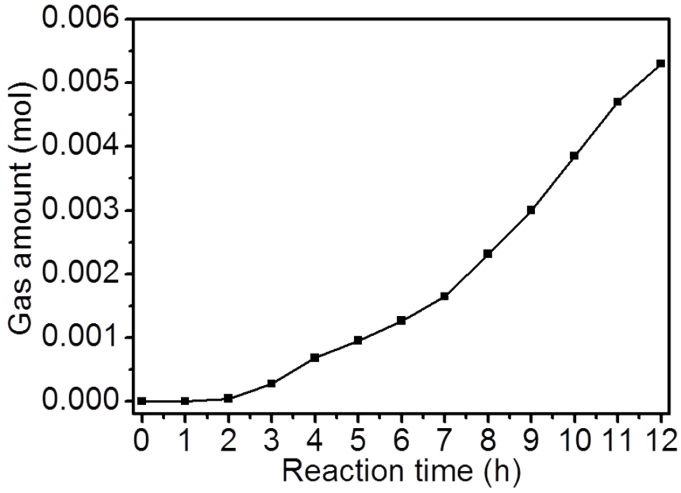

Fig. S10 Time course of gas production in photocatalytic oxidation of isopropanol. Reaction conditions: photocatalyst, 0.1 g; total volume of reactant aqueous solution, 200 ml; isopropanol, 10 ml; light, 300 W high pressure Hg lamp (λ=365 nm); temperature, ~25 °C; reaction duration, 12 h.

Table S1 Surface atom content of C, O and Na on the GO and GO_{NaOH}.

Photocatalyst	C (At. %)	O (At. %)	Na (At. %)
GO	61.06	38.93	0.00

GO_{NaOH}	54.71	31.62	13.66