

Semi-carbonized nanostructures of carbohydrate for high efficient photocatalysts

Supporting Information

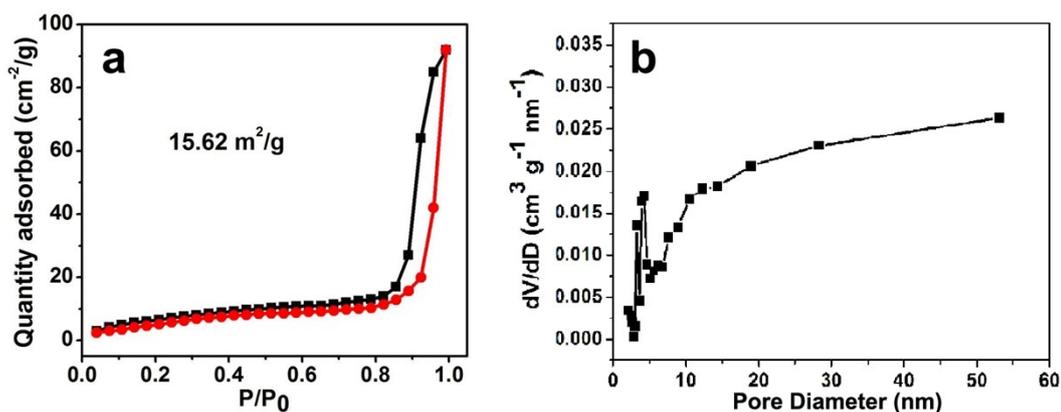


Fig. S1 (a and b) Nitrogen adsorption-desorption isotherms and corresponding pore size distribution of colloidal silica beads.

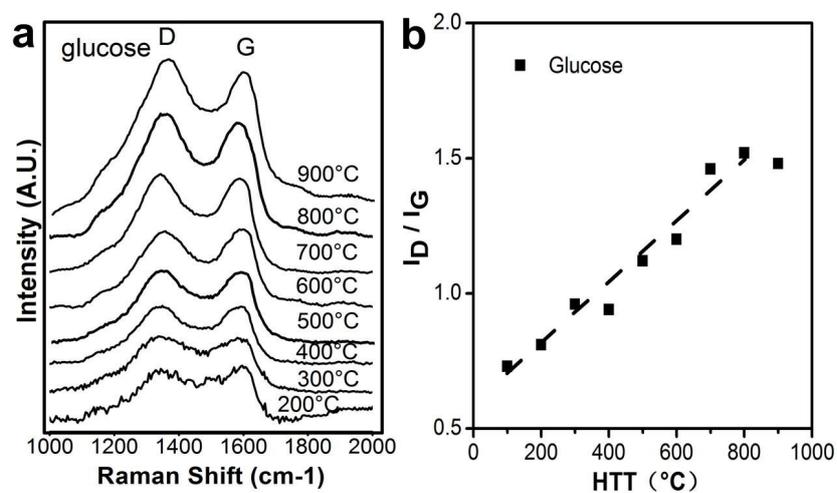


Fig. S2 The Raman spectra (intensity versus Raman shift) and I_D/I_G ratios as a function of HTT for glucose.

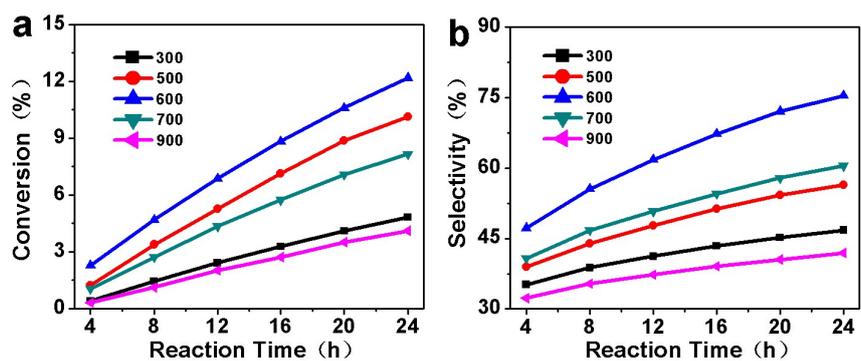


Fig. S3 Reaction profiles of the selective oxidation of *cis*-cyclooctene: (a) The conversion of *cis*-cyclooctene with G-3DMPCS-300, G-3DMPCS-500, G-3DMPCS-600, G-3DMPCS-700 and G-3DMPCS-900 as catalysts. (b) The selectivity of 2-hydroxycyclooctanone with G-3DMPCS-300, G-3DMPCS-500, G-3DMPCS-600, G-3DMPCS-700 and G-3DMPCS-900 as catalysts.

Table S1. Photocatalytic activities for the selective oxidation of *cis*-cyclooctene by different semi-carbonized carbohydrate with (+) or without (-) light ($\lambda \geq 420$ nm) irradiation

Sample	Conversion / % (+/-)	Selectivity / %		
				
C-3DMPCS-0	17.8 /11.3	50.3	30.6	18.8
C-3DMPCS-100	13.7 /10.5	46.8	31.5	20.7
C-3DMPCS-200	10.1 /8.5	40.1	32.4	27.4
C-3DMPCS-300	13.1 /6.6	66.5	21.5	10.8
C-3DMPCS-400	21.1 /7.2	78.8	10.2	8.6
C-3DMPCS-500	32.6 /13.6	90.4	5.3	3.8
C-3DMPCS-600	15.9 /8.4	61.1	21.4	17.2
C-3DMPCS-700	5.2 /1.8	53.2	28.5	17.4
C-3DMPCS-800	4.8 /1.2	44.2	30.3	22.9
C-3DMPCS-900	4.6 /0.9	43.5	31.1	24.5
G-3DMPCS-200	2.3 /0.8	42.3	30.2	25.3
G-3DMPCS-300	4.8 /1.2	46.8	29.8	22.4
G-3DMPCS-400	5.9 /2.6	48.9	25.1	24.6
G-3DMPCS-500	10.1 /5.3	56.4	22.2	20.6
G-3DMPCS-600	12.2 /6.8	75.4	14.5	9.1
G-3DMPCS-700	8.2 /5.1	60.5	23.3	15.2
G-3DMPCS-800	6.5 /3.5	55.7	24.8	19.4
G-3DMPCS-900	4.1 /2.1	41.9	31.8	24.7

Reaction conditions: as-synthesized catalysts (0.1 g), *cis*-cyclooctene (10 mL), TBHP (0.12 g), 80 °C, under visible light irradiation. The TBHP was used as a radical initiator and oxygen (in the air) as an oxidant. All reactions were performed in a quartz three-neck flask. Reactants and catalysts were added into a three-neck flask equipped with a condenser. The reaction mixture was vigorously stirred at low temperatures, followed by visible light irradiation for 24 h (a 150 W Xe arc lamp with a CUT filter to cut off light of wavelength < 420 nm, but removed for experiments without irradiation). Conversion efficiencies were determined by GC with a FID detector.

Table S2. The comparisons of different carbon materials in photocatalytically selective oxidation of *cis*-cyclooctene.

Sample	Conversion / %	Selectivity / %		
				
C-3DMPCS-500	32.6	90.4	5.3	3.8
G-3DMPCS-600	12.2	75.4	14.5	9.1
Active carbon	2.9	54.8	40.1	2.1
Graphene	5.3	62.6	32.7	2.7