

Supplementary Information (SI) for

A new insight into SO₂ low-temperature catalytic oxidation in porous carbon materials: Non-dissociated O₂ molecule as oxidant

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Characterization of the selected samples

Elemental analysis was implemented on Germany Vario Macro Cube elemental analyzer. The amounts of surface basic and acidic sites constructed by heteroatoms (e.g. O, N, S) interacting with carbon matrix were characterized by the conventional titration method by employing reciprocal acid or alkali. In short, 5 g of AC samples was immersed in 50 mL of 0.01 M alcoholic solution of benzoic acid (BA) or diphenylguanidine (DPG). After 24 h, 10 mL of clear solution was titrated with 0.01 M NaOH (or 0.01 M HCl) until the end point. The results were expressed as mmol of total acidic or basic sites per g of sample. This method for surface sites characterization has been chosen for its high precision and reproducibility. X-ray photoelectron spectroscopy (XPS) analysis was performed on a PHI 5700 ESCA System using AlK α X-ray at 14 kV and 6 mA. The values of binding energy (BE) were calibrated with respect to C 1s peak at 284.6 eV.

Table S1. The chemical characteristics and pore microstructural information of the samples.

Elemental analyses (wt%)					BA ^a	DPR ^b					
C _{ad}	H _{ad}	O _{ad}	N _{ad}	S _{ad}			S _{BET} (m ² ·g ⁻¹)	S _{mi} (m ² ·g ⁻¹)	V _t (cm ³ ·g ⁻¹)	V _{mi} (DR) (cm ³ ·g ⁻¹)	(V _{me+ma}) ^c (cm ³ ·g ⁻¹)
83.8	0.59	14.6	0.73	0.34	0.221	0.104	948	675	0.43	0.32	0.11

^a BA, Benzoic acid sorption, mmol·g⁻¹.

^b DPG, Diphenylguanidine sorption, mmol·g⁻¹.

^c (V_{me+ma}), pore volume of mesopores and macropores

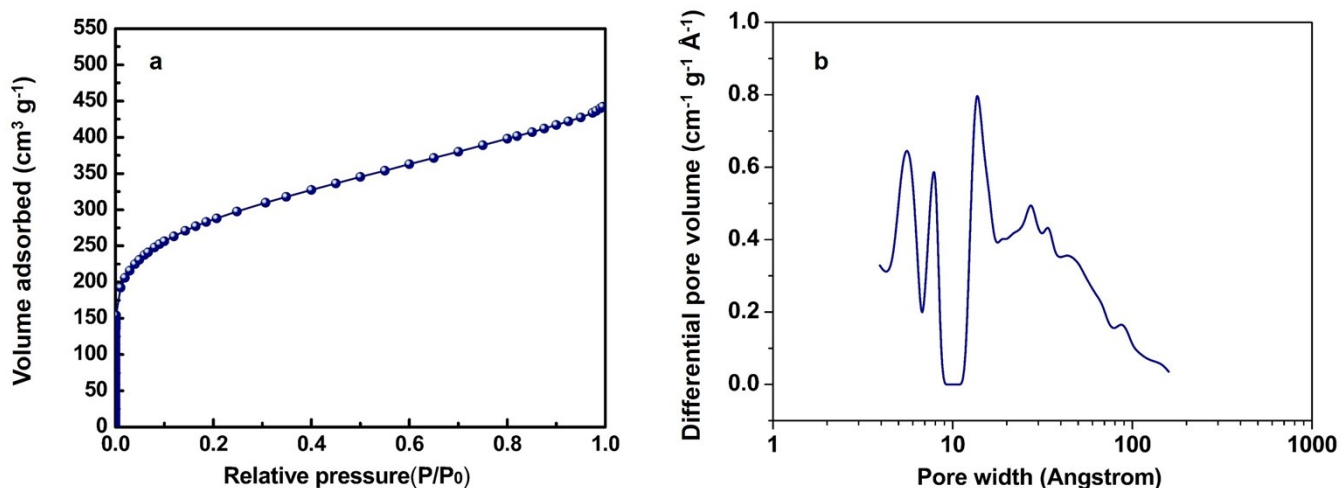


Figure S1. (a) Nitrogen sorption isotherms of the selected activated carbon sample; (b) Pore size distributions of selected activated carbon sample.

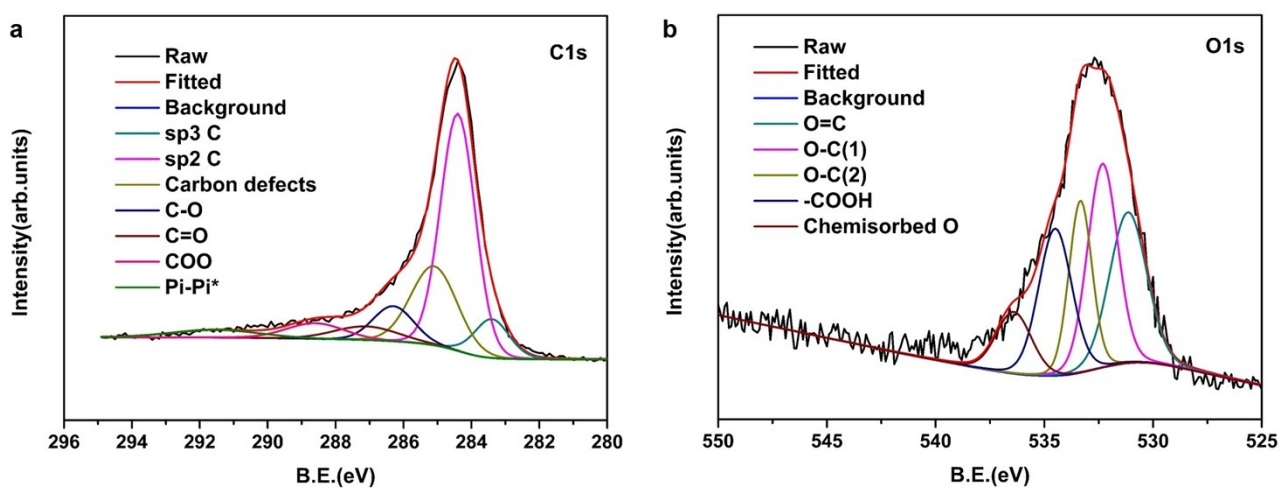


Figure S2. XPS survey spectra of the selected activated carbon sample. (a) C1s spectrum of the selected activated carbon sample; (b) O1s spectrum of the selected activated carbon sample.

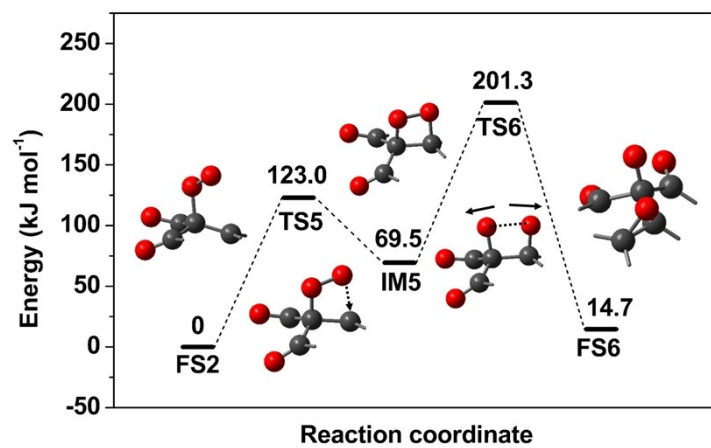


Fig. S3. The potential energy profiles for activated O_2 dissociation at the carbon atom near ketones.