Electronic Supplementary Information for

High-yield synthesis of ultrathin silica-based nanosheets and their superior catalytic activity in H_2O_2 decomposition

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Experimental Section

Preparation of ultrathin CSO nanosheets

In a typical method, 0.74 g of $Co(CH_3COO)_2 \cdot 4H_2O$ was dissolved into 10 g of N,N-dimethylethanolamine (DMEA) and then 8.3 g of tetraethyl orthosilicate was added. After a homogeneous system obtained, 5 mL of water was added into the above obtained solution. The sol-gel could be formed after 5 min at 50 ºC with the aid of ultrasonic and then transferred into Teflon-lined stainless steel reactor, which is heated at 160 ºC for 24 hours. After reaction, the obtained cobalt doped silica (CSO) was dried at 150 ºC and than annealed at 300-500 ºC for 2 hours.

Preparation of Pt loaded CSO nanosheets

The Pt loaded CSO sample (PCSO) could be synthesized in situ as same as the synthesis of CSO nanosheets. H_2PtCl_6 was first dissolved into the DMEA. Following this, 0.74 g of $Co(CH_3COO)_2 \cdot 4H_2O$ was dissolved into 10 g of DMEA and then 8.3 g of tetraethyl orthosilicate was added. After a homogeneous system obtained, 5 mL of water was added into the above obtained solution. The sol-gel could be also formed with the help of ultrasonic and then transferred into Teflon-lined stainless steel reactor, which is heated at 160 ºC for 24 hours. After reaction, the obtained PCSO sample was dried at 150 ºC and than annealed at 300-500 ºC for 2 hours.

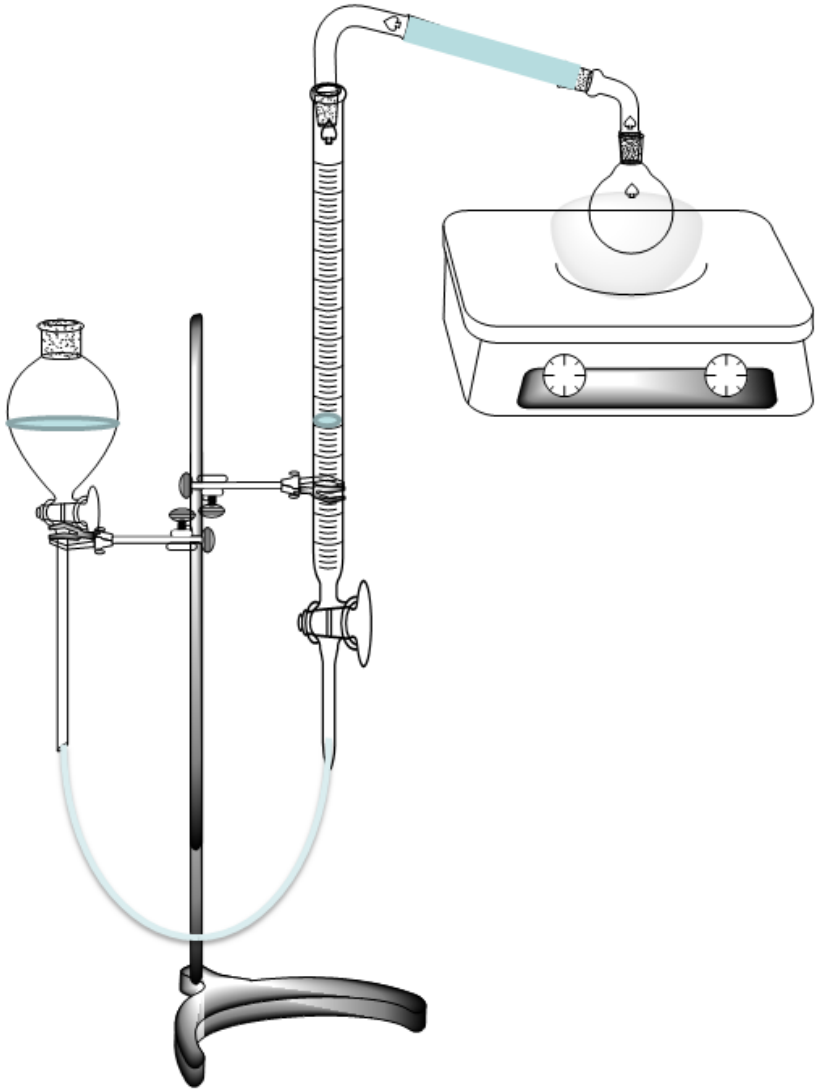
Characterization

XRD patterns were performed with a D8 diffractometer with Cu-Kr radiation (λ = 1.54056 Å). TEM images were obtained with JEOL JEM-1400 and JEOL 2100F at 120 and 200 kV respectively. N_2 adsorption-desorption isotherms were conducted at 77 K on a Micromeritics Tristar 3000 analyzer. The BET surface areas and pore-volume distribution curves were calculated using adsorption data by DFT method. X-ray photoelectron spectroscopic (XPS, KRATOS, AXIS ULTRA) measurements were carried out by using a monochromated Al Kα (1486.7 eV) X-ray source at power of 150 W (15 kV × 10 mA). The XPS analysis was carried out at room temperature under a typical pressure in the range of 4.0×10^{-7} – 8.0×10^{-7} Pa, at take-off angle relative to the surface holder of 90°. A charge neutralizer was employed

to neutralize charge accumulation during the analysis. Each sample was measured before and after argon ion etching at 4.0 kV and 15 mA for 5 min to remove possible surface contaminants.

H_2O_2 Decomposition:

In a typical experiment, CSO or PCSO (2-10 mg) was added into a 50 mL round-bottomed flask with 30 mL of 3wt% H_2O_2 solution and stirred at 294 K. The volume of oxygen was measured by a closed **U**-tube pressure-balanced system. The scheme of apparatus equipped for volumetric measurement is provided in Supporting Information (Scheme S1).



Scheme S1: The O_2 volume measuring apparatus for H_2O_2 decomposition experiments. The left tube can be regulated to keep the H_2O level as high as that in right tube.

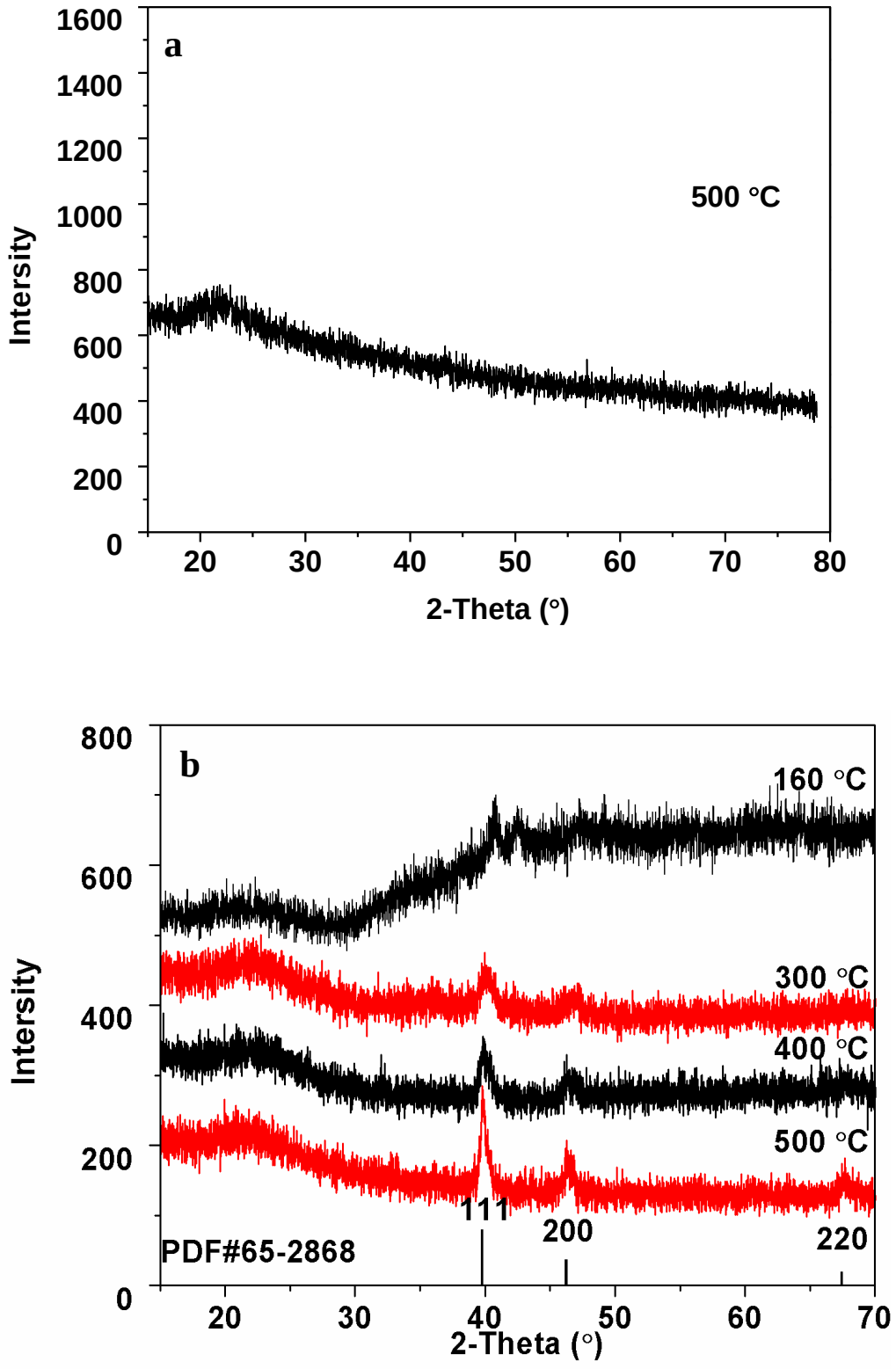


Figure S1: (a) XRD pattern of CSO annealed at 500 ºC; (b) XRD patterns of PCSO annealed at different temperature.

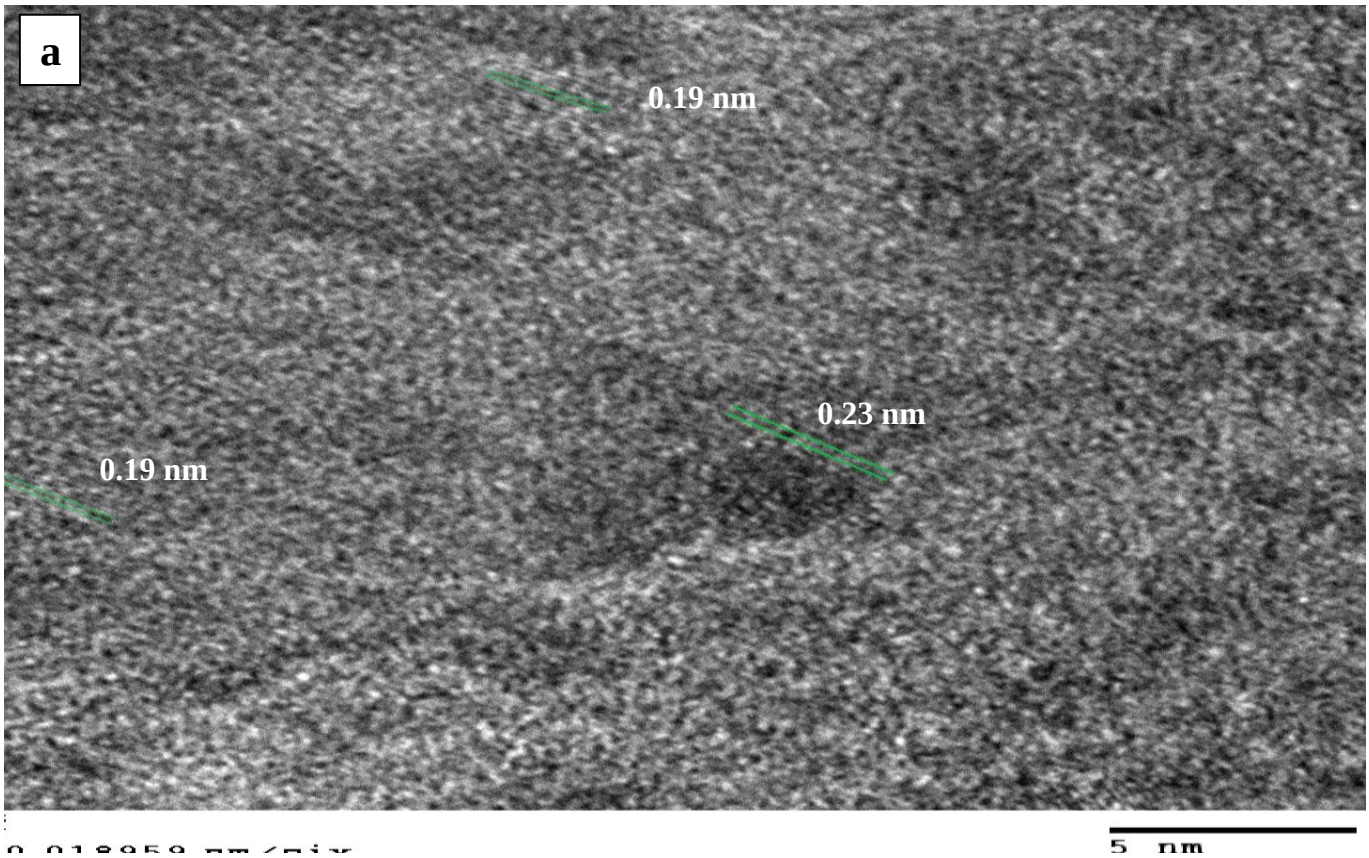


Figure S2: HRTEM image of PCSO sample

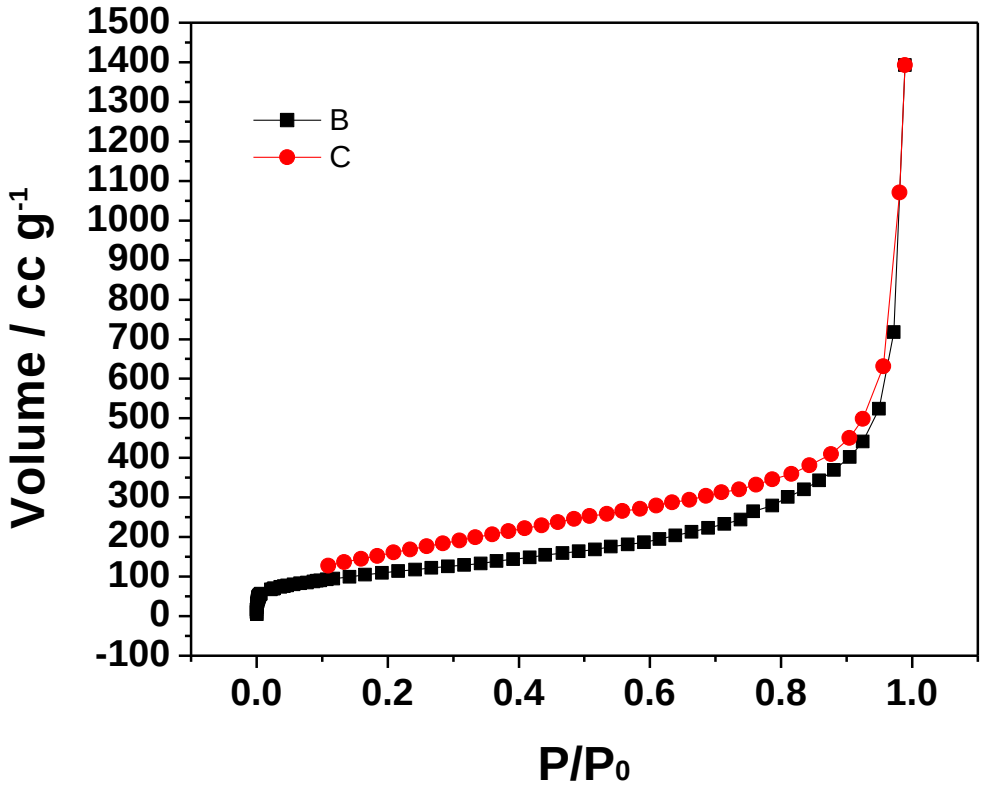


Figure S3: Nitrogen adsorption-desorption pattern of PCSO nanosheets.

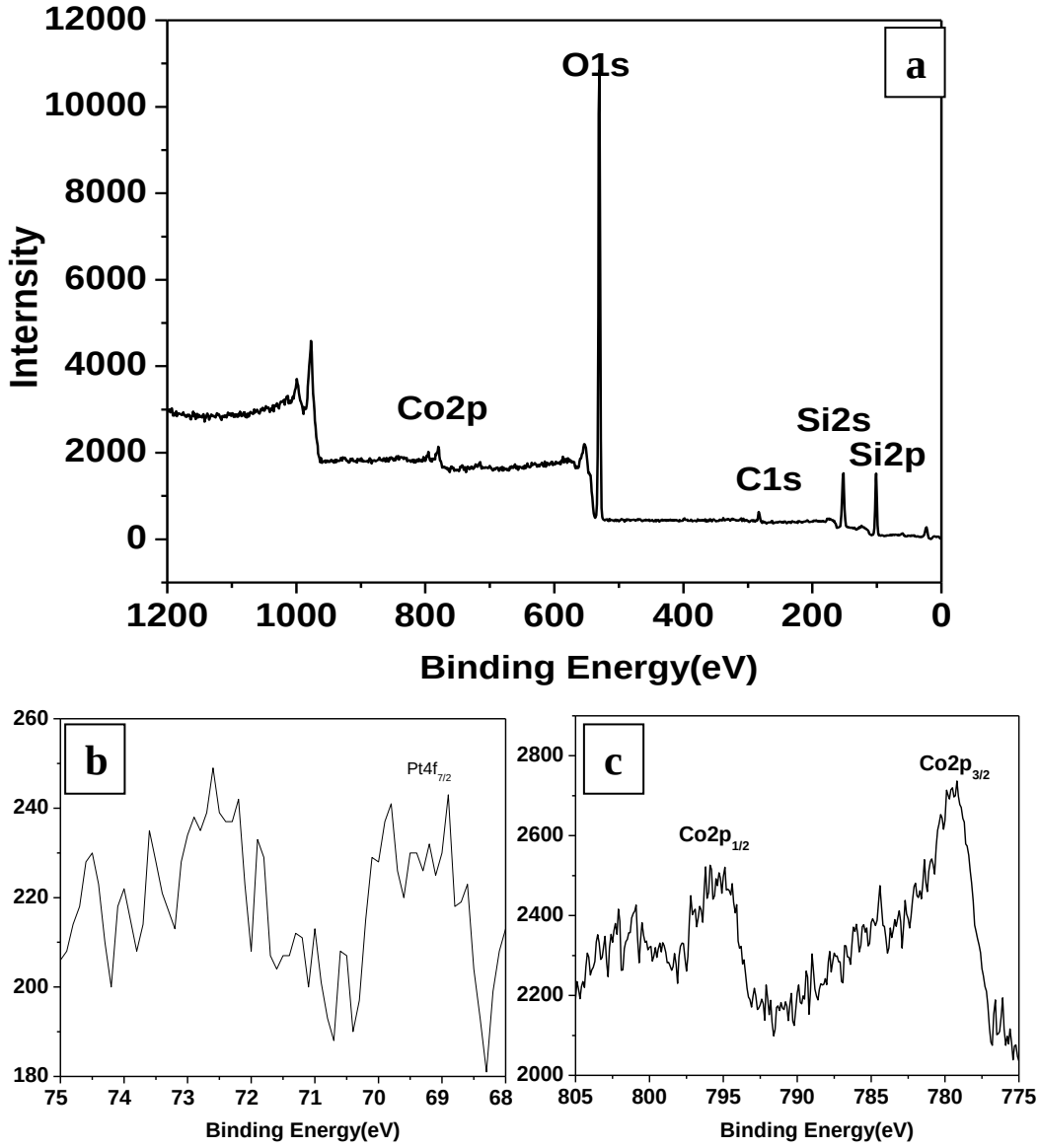


Figure S4: XPS spectra (a) of PCSO (~0.4wt%. loaded on CSO nanosheets) and the detail analyses of Pt (b) and Co (c).