Electronic Supplementary Material (ESI) for Environmental Science: Nano.

Electronic Supplementary Information

Quasi Single Cobalt Sites in Nanopores for Superior Catalytic Oxidation of Organic Pollutants

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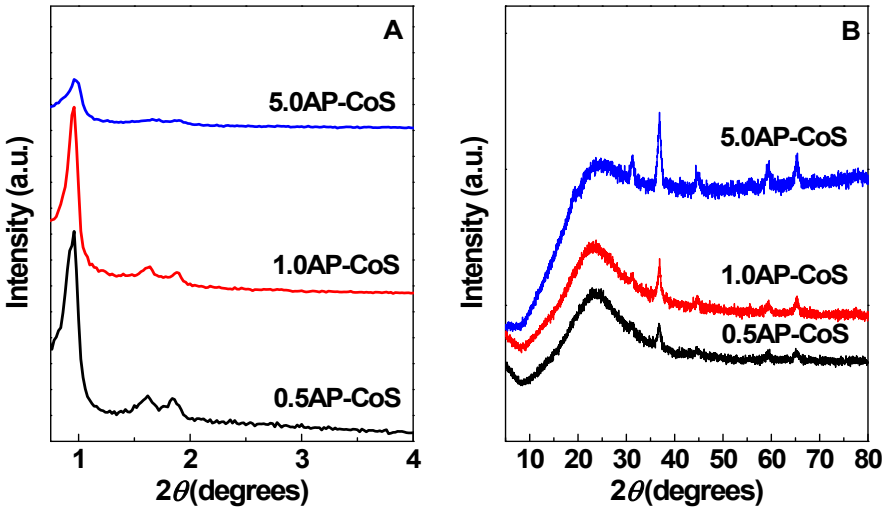


Figure S1. (A) Low-angle and (B) wide-angle XRD patterns for the samples of 0.5AP-CoS, 1.0AP-CoS and 5.0AP-CoS.

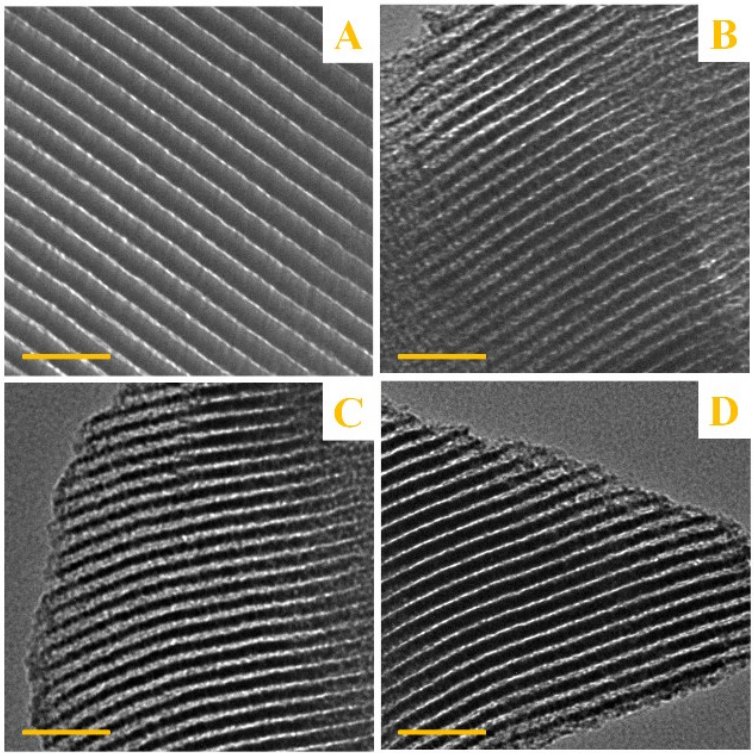


Figure S2. TEM images of the samples of (A) SBA-15, (B) 0.5QS-CoS, (C) 1.0QS-CoS, and (D) 5.0QS-CoS. Scale bars: 50 nm.

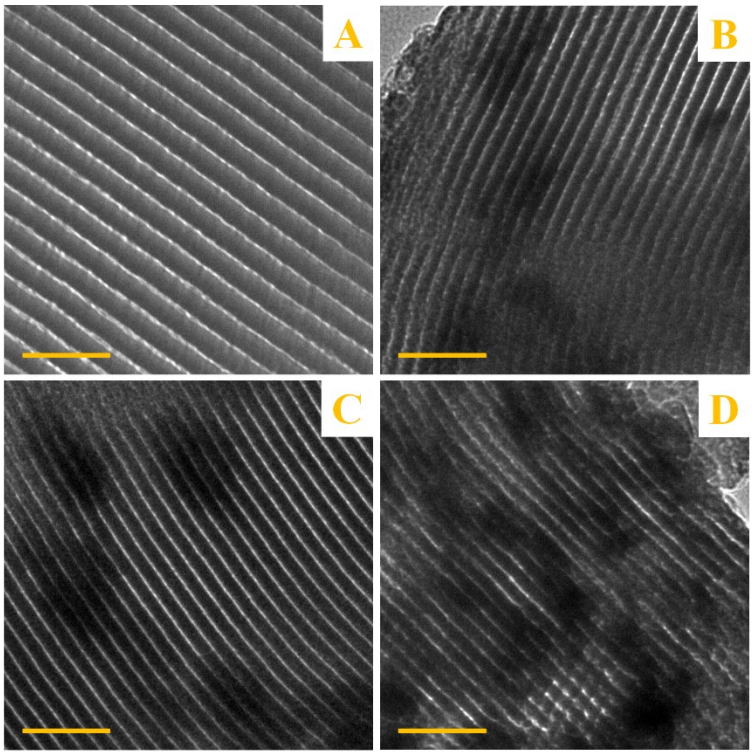


Figure S3. TEM images of the samples of (A) SBA-15, (B) 0.5AP-CoS, (C) 1.0AP-CoS, and (D) 5.0AP-CoS. Scale bars: 50 nm.

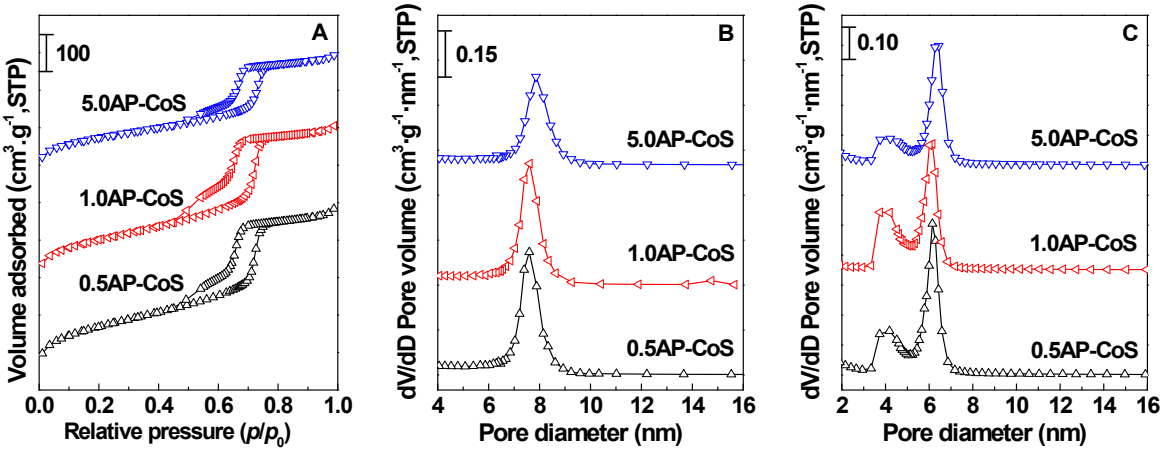


Figure S4. (A) N_2 adsorption-desorption isotherms and pore size distributions calculated by (B) adsorption and (C) desorption branches of the isotherms of 0.5AP-CoS, 1.0AP-CoS, and 5.0AP-CoS samples. Curves are plotted offset for clarity.

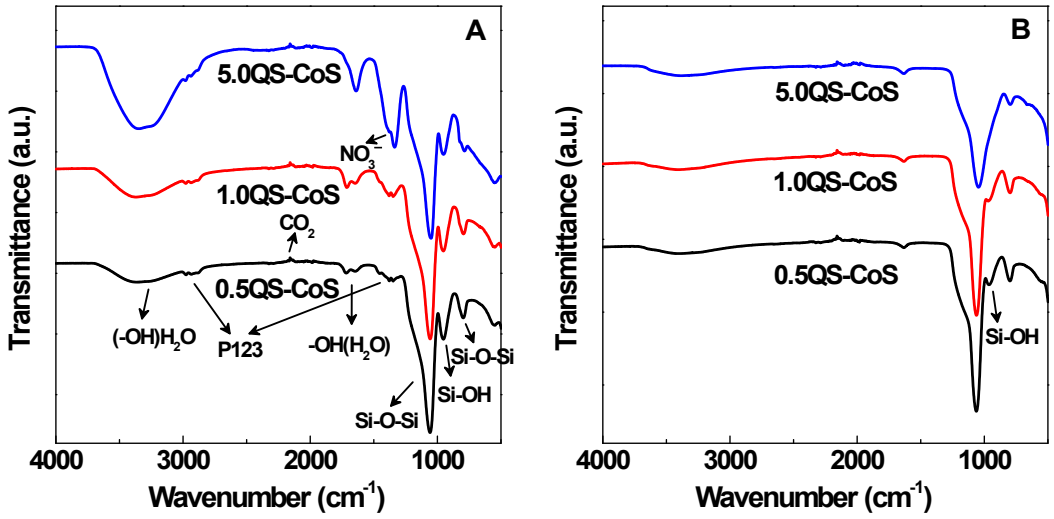


Figure S5. FTIR spectra of QS-CoS samples (A) before and (B) after calcination.

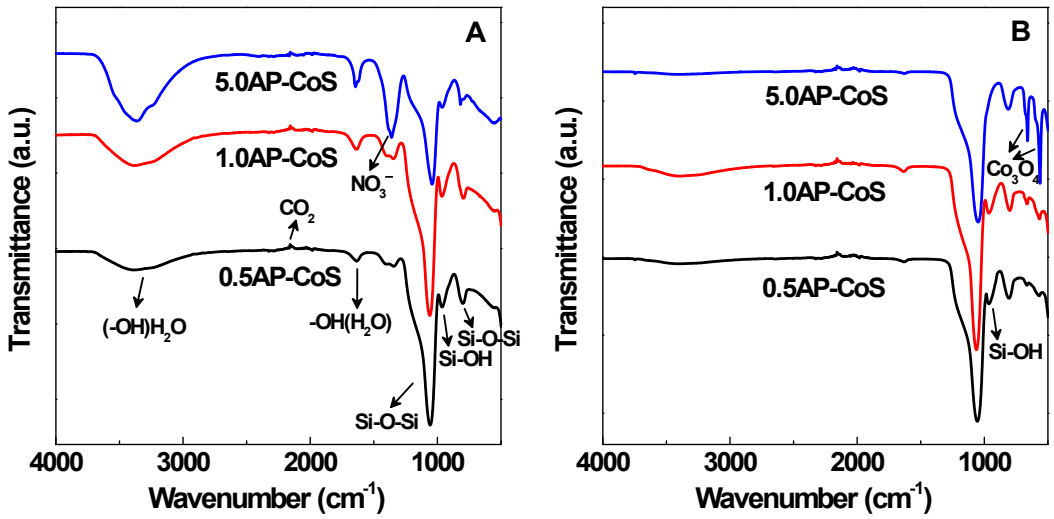


Figure S6. FTIR spectra of AP-CoS samples (A) before and (B) after calcination.

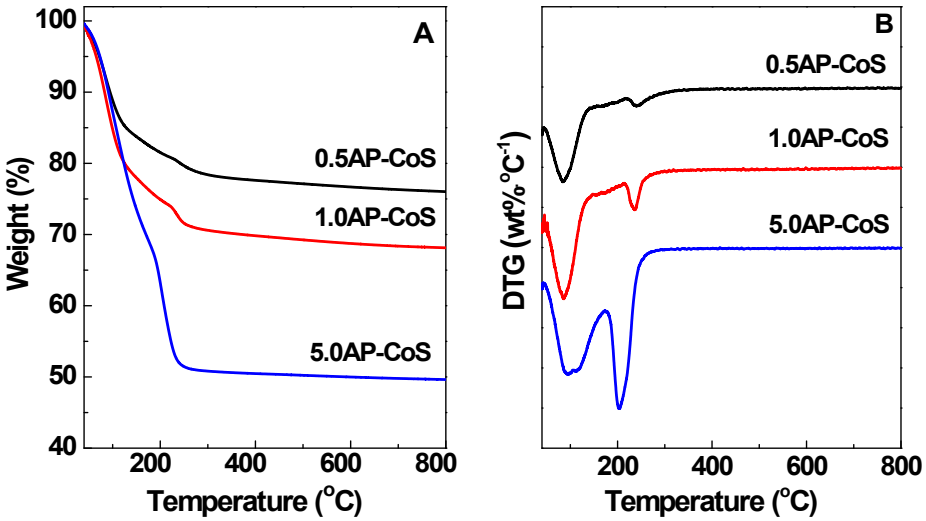


Figure S7. (A) TG and (B) DTG curves of AP-CoS samples before calcination. DTG curves are plotted offset for clarity.

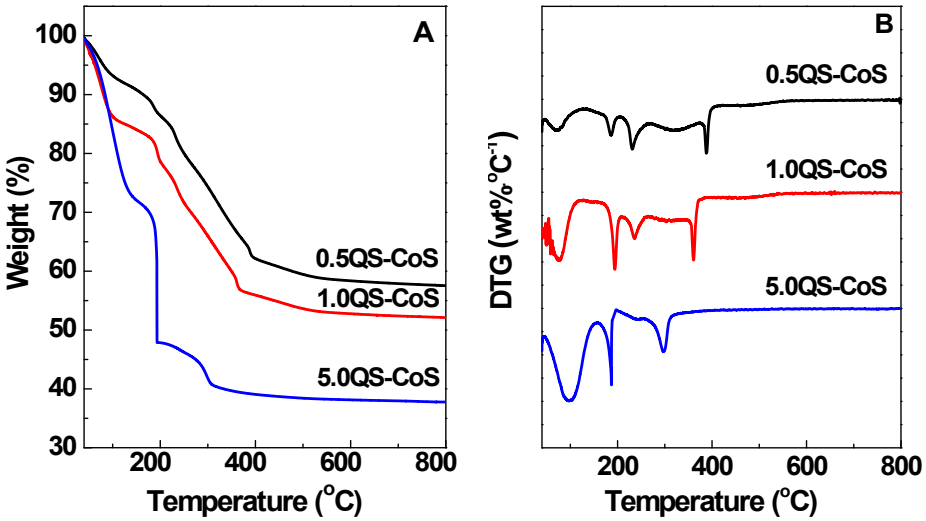


Figure S8. (A) TG and (B) DTG curves of QS-CoS samples before calcination. DTG curves are plotted offset for clarity.

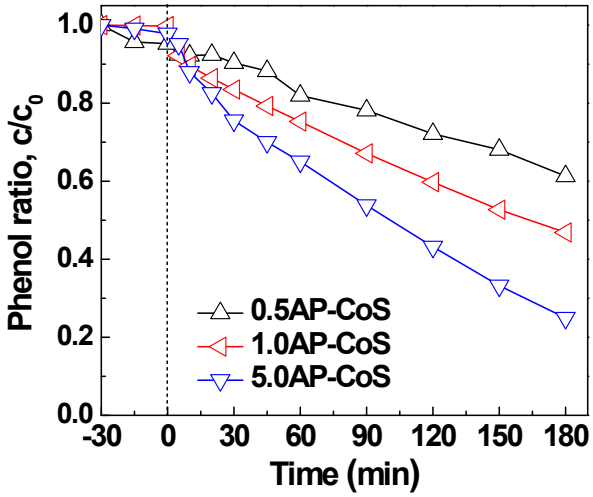


Figure S9. Phenol adsorption and oxidation on 0.5AP-CoS, 1.0AP-CoS and 5.0AP-CoS. ([Catalyst]$_0$ = 0.2 g·L^{-1}, [PMS]$_0$= 2.0 g·L^{-1}, [T] = 25 °C, and [Phenol]$_0$ = 20 mg·L^{-1}).

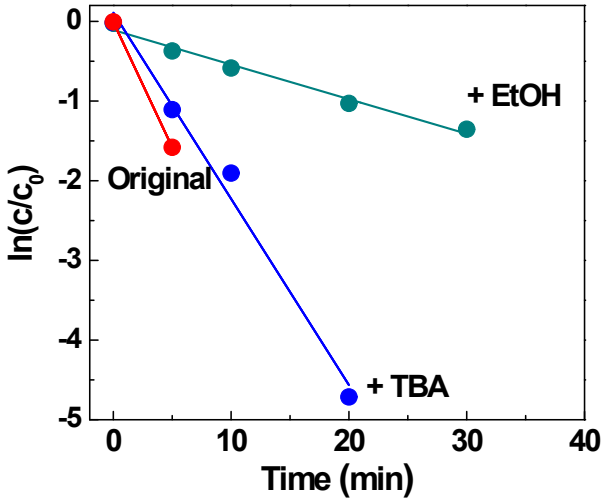
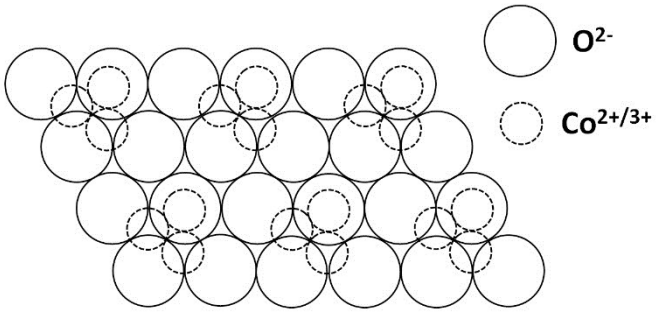


Figure S10. First order kinetic modeling of the 3.0QS-CoS sample on phenol degradation reaction with and without quenching agent, the lines are fitted results. ([Catalyst]$_0$ = 0.2 g·L^{-1}, [PMS]$_0$= 2.0 g·L^{-1}, [T] = 25 °C, and [Phenol]$_0$ = 20 mg·L^{-1}).



Scheme S1. The close-packed monolayer model of Co_3O_4

Table S1. Textural properties of 0.5AP-CoS, 1.0AP-CoS and 5.0AP-CoS samples

Sample	Co content (mmol·g^{-1} (SBA-15))	S_{BET} (m^2·g^{-1})	V_p (cm^3·g^{-1})	D_p (nm)	
				adsorption	desorption
0.5AP-CoS	0.52	588	0.748	7.6	6.1, 4.2
1.0AP-CoS	1.02	527	0.704	7.6	6.1, 3.7
5.0AP-CoS	4.99	429	0.531	7.9	6.4, 4.2

Table S2. Kinetic results of the 3.0QS-CoS sample on phenol degradation reaction.

Sample	Reaction rate constant k (min^{-1})	R^2 of k
Original	0.32	1.000
+ TBA	0.23	0.982
+ EtOH	0.04	0.979