

Supporting Information

The Effect of Ce Ion Substituted OMS-2 Nanostructure in Catalytic Activity for Benzene Oxidation

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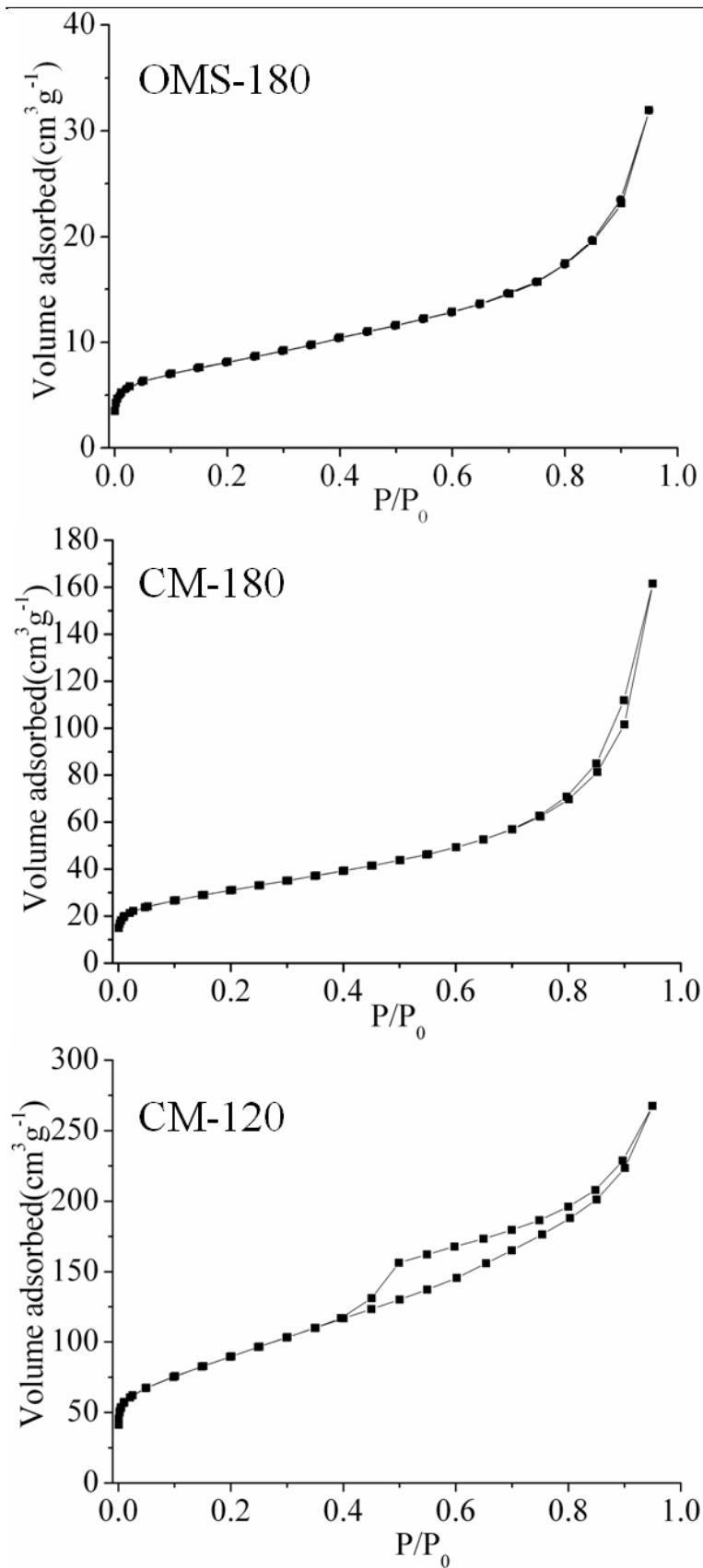


Figure S1. The N_2 adsorption-desorption isotherm of the catalysts.

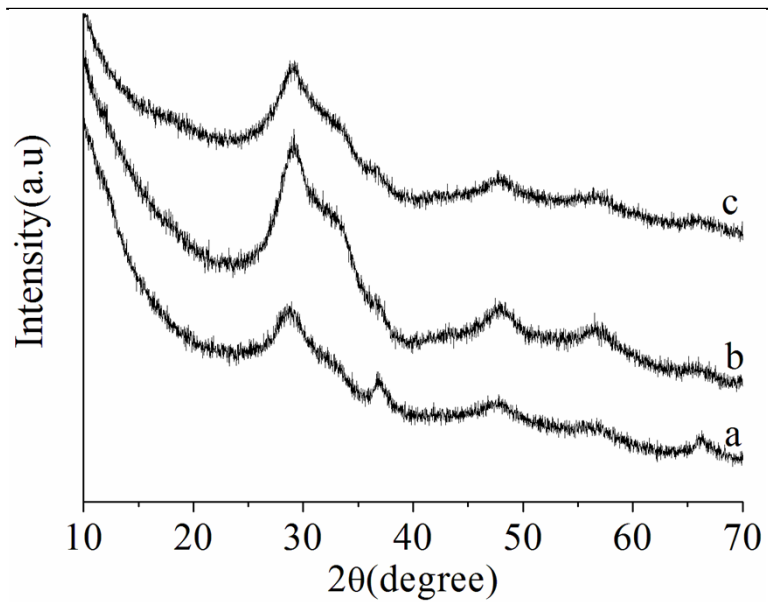


Figure S2. XRD diffraction pattern of the fresh CM-120 sample (a), the CM-120 sample calcined at 500 °C for 10h (b), and the CM-120 sample after 80 h catalytic reaction (c).

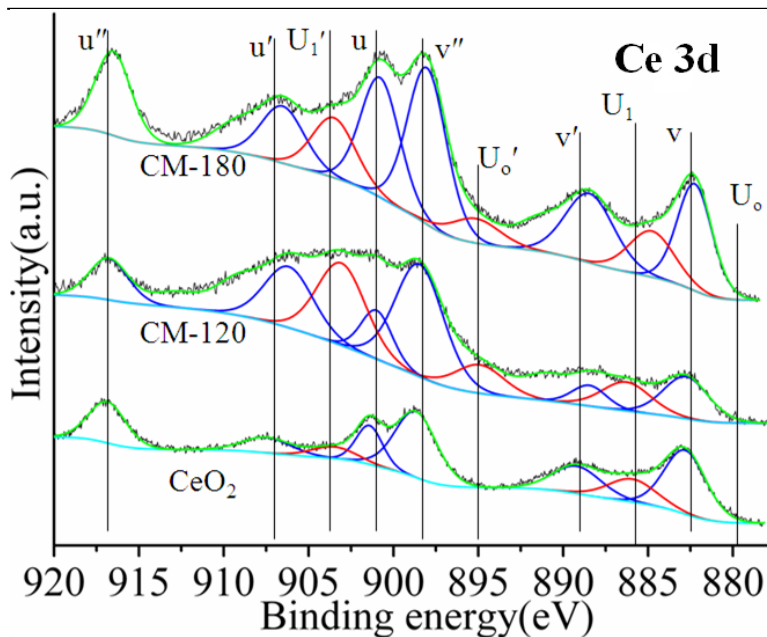


Figure S3. Ce3d XPS spectra of the samples.

The valence state of Ce ions in the samples is characterized by analyzing their Ce3d XPS spectra.^{S1-3} Six peaks labeled as v, v', v'' ($3d_{5/2}$), u, u', u'' ($3d_{3/2}$) referring to three pairs of spin-orbit doublets can be identified and they are characteristic of Ce⁴⁺ 3d final states (blue), while four peaks (noted as U₀, U₀', U₁, U₁') corresponding to Ce³⁺ 3d states (red).^{S1-3} The atomic ratio of Ce³⁺/(Ce³⁺ + Ce⁴⁺) in CM-120, CM-180, and pure CeO₂ is estimated by the deconvolution of their Ce3d XPS spectra to be 0.31, 0.16, 0.13 (Table 1), respectively, indicating most of Ce ions exist in the form of Ce⁴⁺.

References:

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 (S2) A. M. Salvi, F. Decker, F. Varsano and G. Speranza, *Surf. Interface Anal.* 2001, **31**, 255.
 (S3) N. J. Lawrence, J. R. Brewer, L. Wang, T. S. Wu, J. Wells-Kingsbury, M. M. Ihrig, G. H. Wang, Y. L. Soo, W. N. Mei, C. L. Cheung, *Nano Lett.* 2011, **11**, 2666.