

*Electronic Supplementary Information (ESI)*

## Highly dispersed CeO<sub>2</sub> on carbon nanotubes for selective catalytic reduction of NO with NH<sub>3</sub>

Cheng Fang,<sup>a,b,c</sup> Dongsong Zhang,\*<sup>a,b</sup> Liyi Shi,<sup>a,c</sup> Ruihua Gao,<sup>a</sup> Hongrui Li,<sup>a</sup> Liping Ye<sup>d</sup> and Jianping Zhang<sup>b</sup>

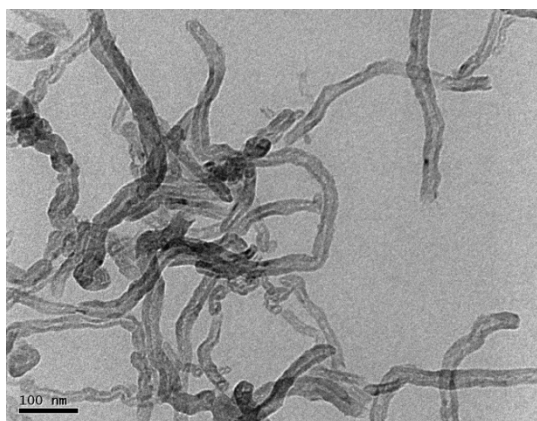
<sup>a</sup> Research Center of Nano Science and Technology, Shanghai University, Shanghai 200444, China.

Fax: 86 21 66134852; E-mail: dszhang@shu.edu.cn

<sup>b</sup> Department of Chemistry, Shanghai University, Shanghai 200444, China.

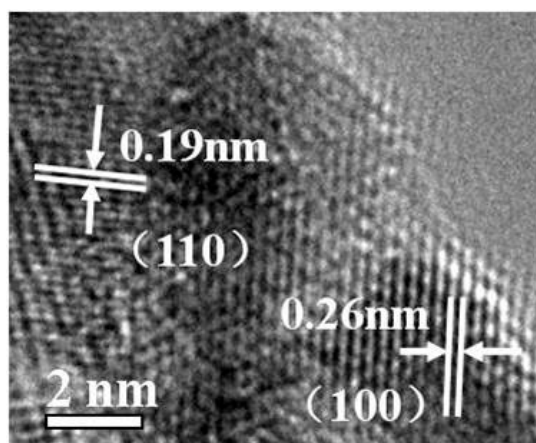
<sup>c</sup> School of Material Science and Engineering, Shanghai University, Shanghai 200072, China.

<sup>d</sup> Shanghai Research Institute of Chemical Industry, Shanghai 200062, China.



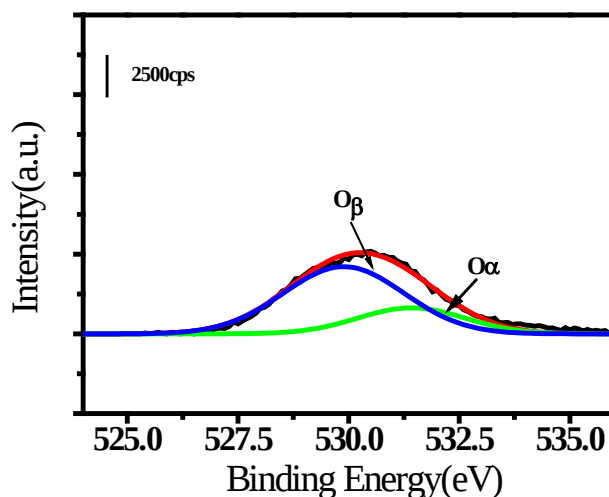
**Fig. S1.** TEM image of the purified CNTs.

The TEM image of the purified CNTs is shown in Fig. S1. The interior and external surfaces of the purified CNTs are clean, which indicates that the impurities are removed completely by strong acid treatment. This clean surface is available for active components to inhabit on the support.<sup>1</sup> Moreover, the carbon nanotubes also keep the original structure after this pretreatment.

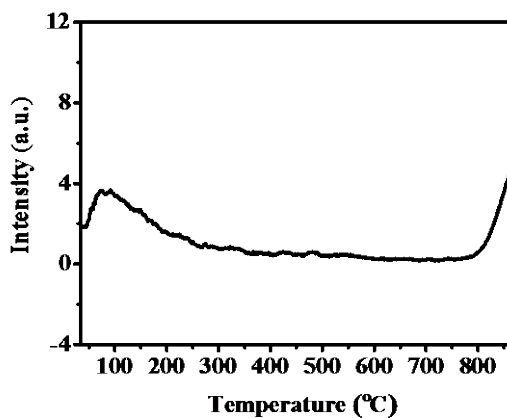


**Fig. S2.**HRTEM image of CeO<sub>2</sub>/CNTs-PT.

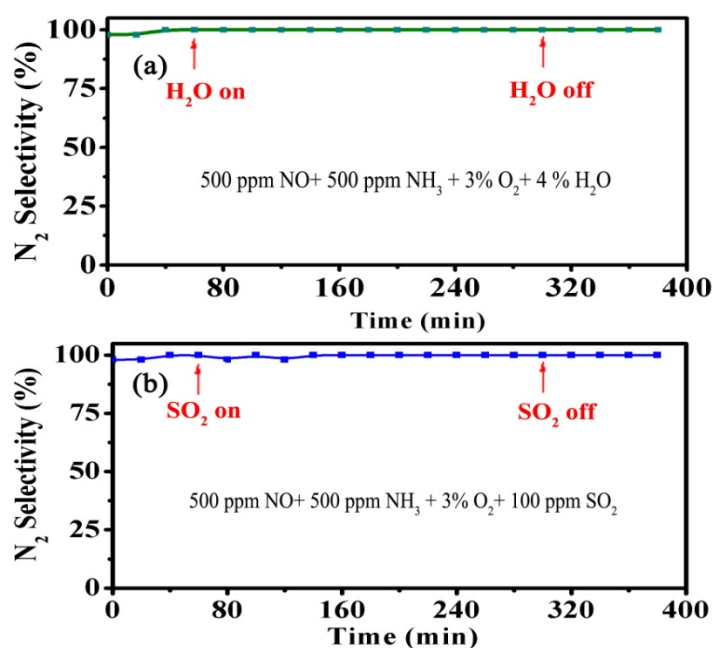
Fig. S2 is the HRTEM image of CeO<sub>2</sub>/CNTs-PT. Other characteristic facets of the fluorite cubic structure of CeO<sub>2</sub>, such as {110} and {100} are also observed. The XRD pattern does not exhibit the CeO<sub>2</sub> phases, which suggests that the CeO<sub>2</sub> is highly dispersed.



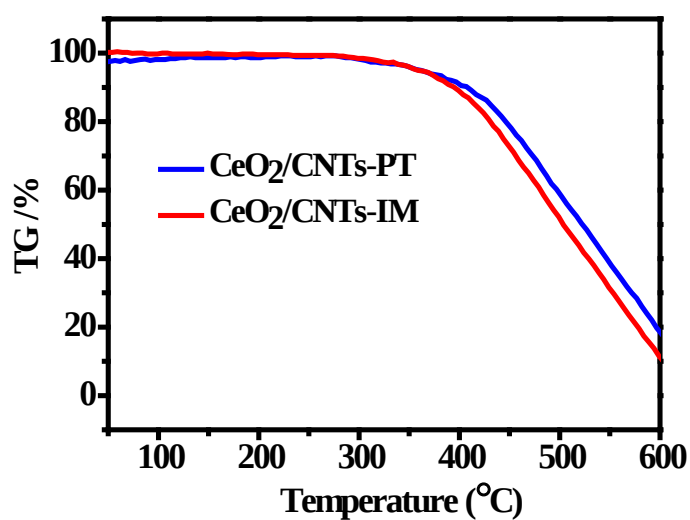
**Fig. S3.**O 1s core level spectra of XPS of the CNTs.



**Fig. S4.** NH<sub>3</sub>-TPD profiles of the CNTs.



**Fig. S5.** The influence of (a) H<sub>2</sub>O and (b) SO<sub>2</sub> on N<sub>2</sub> selectivity for CeO<sub>2</sub>/CNTs-PT at 300 °C (GHSV=20 000h<sup>-1</sup>).



**Fig. S6.** TG curves of CeO<sub>2</sub>/CNTs-PT and CeO<sub>2</sub>/CNTs-IM.

Thermo gravimetric (TG) analysis for the samples was carried out on a Simultaneous Thermal Analysis STA409PC/4/HLuxx from room temperature to 600 °C at 10 °C /min in air. For the loaded catalysts, the stability of the support is a key factor to maintain the activity of the catalyst. In order to study the thermal stability of

CeO<sub>2</sub>/CNTs, the TG experiments are carried out in air stream. Typical TG curves of CeO<sub>2</sub>/CNTs-PT and CeO<sub>2</sub>/CNTs-IM are presented in Fig. S6. For CeO<sub>2</sub>/CNTs-PT, the weight loss below 350 °C is due to the loss of water and pyridine absorbed on the surface of the CeO<sub>2</sub>/CNTs composites.<sup>2</sup> A sharp weight loss took place from 350 °C to 600 °C and this weightlessness may be ascribed to the increasing decomposition of CNTs, which can be confirmed by the test of pristine CNTs.<sup>3</sup> The TG curve of CeO<sub>2</sub>/CNTs-IM is similar with that of CeO<sub>2</sub>/CNTs-PT, but shifting slightly towards the low temperature range, which could be due to its weaker interaction between CeO<sub>2</sub> and CNTs. These results show that the thermal stability of CeO<sub>2</sub>/CNTs-PT is higher than that of CeO<sub>2</sub>/CNTs-IM.

## References

- 1 W. Chen, Z. L. Fan, X. L. Pan and X. H. Bao, *J. Am. Chem. Soc.*, 2008, **130**, 9414.
- 2 D. S. Zhang, C. S. Pan, L. Y. Shi, L. Huang, J. H. Fang and H. X. Fu, *Micropor. Mesopor. Mat.*, 2009, **117**, 193.
- 3 D. S. Zhang, H. X. Fu, L. Y. Shi, J. H. Fang and Q. Li, *J. Solid State Chem.*, 2007, **180**, 654.