*Supporting Information for*

**Iridium Ultrasmall Nanoparticles, Worm-like Chain Nanowires, and Porous Nanodendrites: One-pot Solvothermal Synthesis and Catalytic CO Oxidation Activity**

Tao Zhang, Shuai-Chen Li, Wei Zhu, Jun Ke, Jing-Wen Yu, Zhi-Ping Zhang, Lin-Xiu Dai, Jun Gu, and Ya-Wen Zhang\*

*Beijing National Laboratory for Molecular Sciences, State Key Laboratory of Rare Earth Materials Chemistry and Applications, PKU-HKU Joint Laboratory in Rare Earth Materials and Bioinorganic Chemistry, College of Chemistry and Molecular Engineering, Peking University, Beijing 100871, China.* *Fax: +86-10-62756787; E-mail: ywzhang@pku.edu.cn*.



***Fig. S1.*** TEM images of Ir nanoparticles obtained under different reaction conditions for Ir nanowires: (a) without KI (0.06 mmol of IrCl3·*x*H2O, 100 mg of PVP, 70 mg of KBr, 15 mL of ultra-pure water, 180 °C, 48 h), (b) without KBr (0.06 mmol of IrCl3·*x*H2O, 100 mg of PVP, 2 mg of KI, 15 mL of ultra-pure water, 180 °C, 48 h).



***Fig. S2.*** HRTEM images of as-synthesized Ir nanodendrites: (a) side view and (b) top view.



***Fig. S3.*** TG analysis results of as-synthesized Ir ultrasmall nanocrystals (NP-1 and NP-2) under air.



***Fig. S4.*** Size statistics for Ir ultrasmall nanoparticles from TEM images for SiO2 supported Ir catalysts before (a, b) and after (c, d) atmosphere treatment.



***Fig. S5.*** TEM images of the sample of NP-1/SiO2 after O2 treatment for 2 hours at 400 °C.





***Fig. S6.***XPS survey spectra (a) and Ir 4f spectra (b) of SiO2 supported Ir catalysts before and after O2-H2 atmosphere treatment. The proportions of Ir in oxidation state for NP-1/SiO2 before and after atmosphere treatment are 37.7% and 23.9%, respectively, while those for NP-2/SiO2 are 28.4% and 20.2% respectively. (Also see the binding energy assignments for the related elements in Ref. S1).



***Fig. S7.***FT-IR spectra of SiO2 supported Ir catalysts before and after O2-H2 atmosphere treatment.



***Fig. S8.***Change of CO conversion with temperature for CO oxidation after different atmosphere treatments with NP-1/SiO2 as the catalyst: black, untreated sample; red, O2-H2 treatment; blue, only O2 treatment.

**References**

1. J. F. Moulder, W. F. Stickle, P. E. Sobol and K. D. Bomben, (Eds.: J. Chastain) *Handbook of X-ray Photoelectron Spectroscopy*, Perkin-Elmer Corporation: Minnesota, 1992.