Electronic supplementary information for

Growth of carbon nanoshells on tungsten carbide for loading Pt with enhanced electrocatalytic activity and stable anti-poisoning performance

*Bao Jun Han,[a] Zhi Juan Huang,[a] Gao Wu,[b] Cai Ying Zhou,[b] Ye Sheng Li, *[b] Qing Hui Wang,[b] Yu Long Zhang,[c] Yan Hong Yin,[b] Zi Ping Wu*[b]*

[a] School of Chemistry and Chemical Engineering, Gannan Normal University, Economic & Technological Development Zone, Ganzhou, Jiangxi Province 341000, (P. R. China)

[b] School of Materials Science and Engineering, Jiangxi University of Science and Technology, 86 Hong Qi Road, Ganzhou 341000, P. R. China

[c] School of Materials Science and Engineering, Guilin University of technology, 12 Jiangan Road, Guilin 541004, P. R. China

* Corresponding author. Tel: +86-797-8312422. Fax: +86-797-8312422.

E-mail: ysli@jxust.edu.cn (Y. S. Li), wuziping724@jxust.edu.cn (Z. P. Wu)

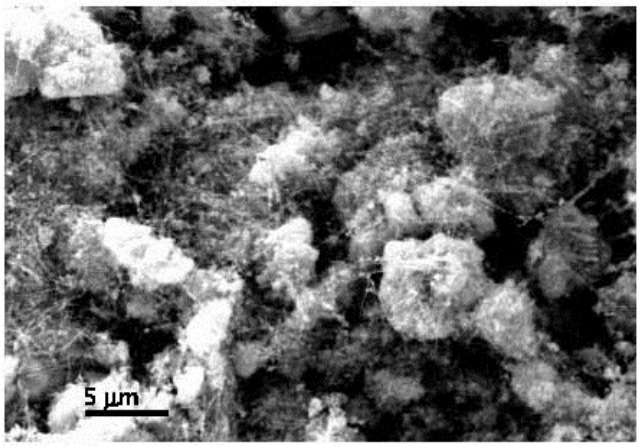

Fig. S1 The microstructures of the prepared H_2WO_4 examined by SEM (the molar ratio of the tungsten precursor and DWCNTs (W:C) is 15:1)

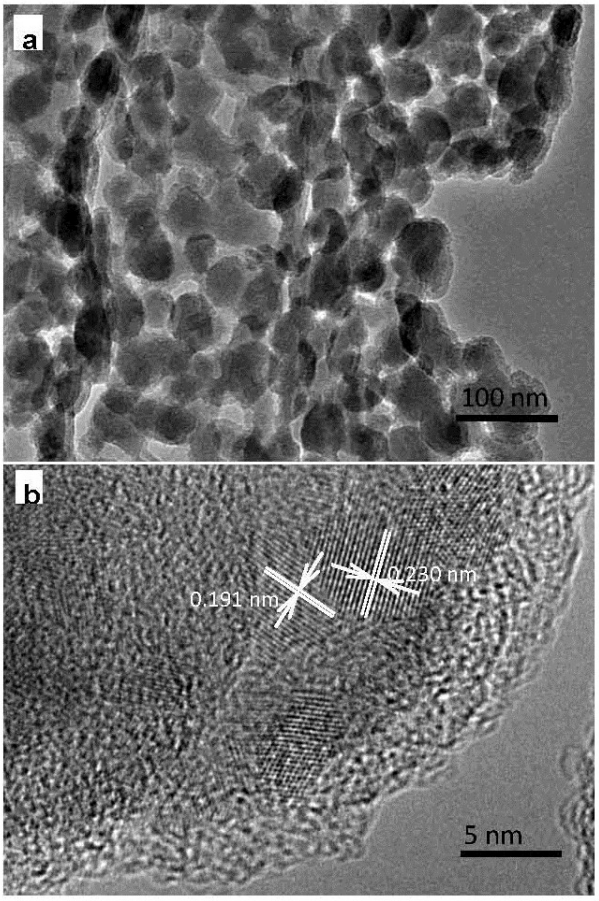

Fig. S2 The typical TEM (a) and HRTEM (b) images of the WO_3 after carbonized at 900 °C

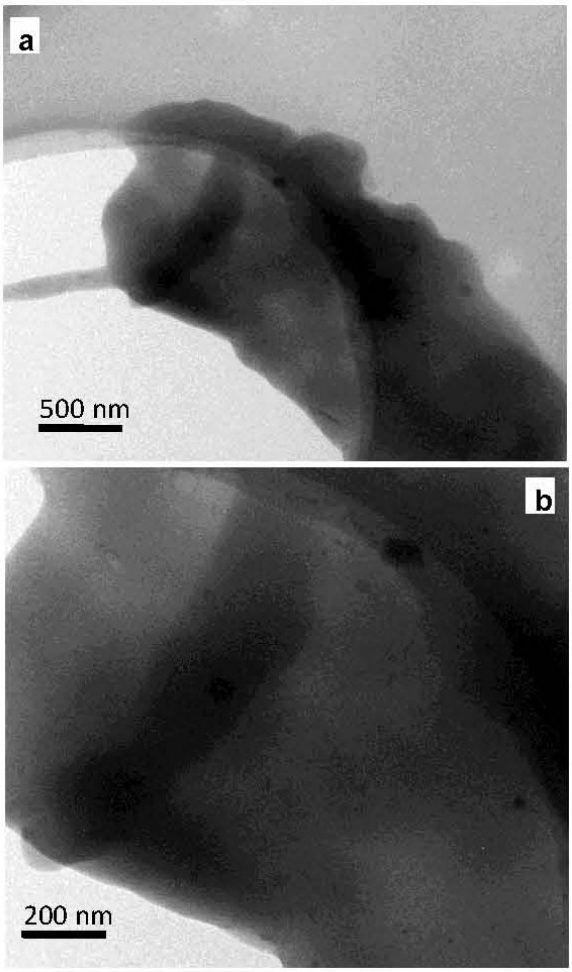

Fig. S3 Thick graphitic carbon layer formed in the samples as the methanol was not added to carbon sources

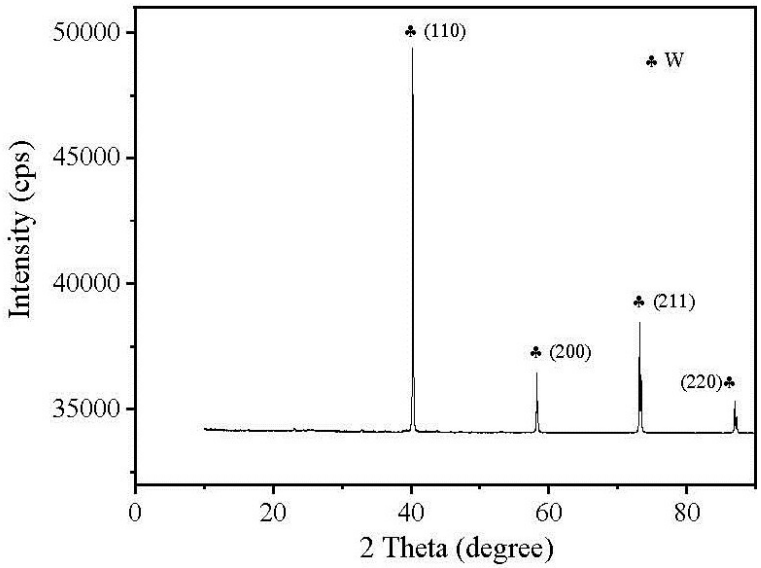

Fig. S4 XRD patterns of the WO_3 after carbonized at 950 ^oC with methanol as carbon sources

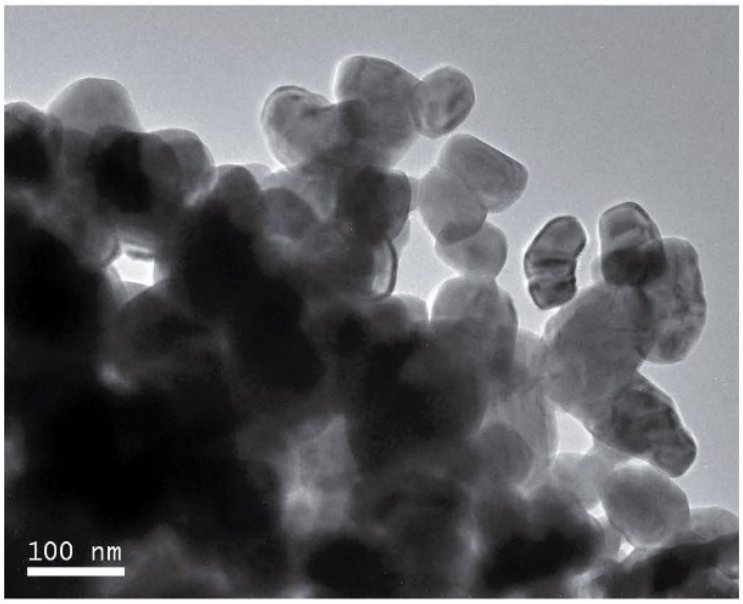

Fig. S5 The morphology of the WC-CNS composite after the hydrogen was supplied into the reaction chamber

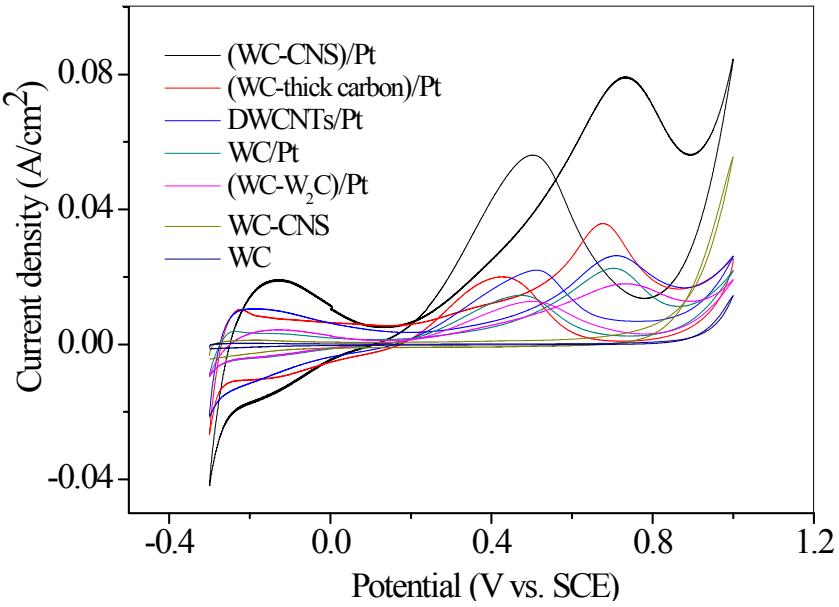

Fig. S6 CV curves of different catalysts in 1 M CH_3OH and 0.5 M H_2SO_4 at a scanning rate of 100 mv· s^{-1}. Note: Pt loading on the working electrode was controlled to be 0.2 mg cm^{-2}

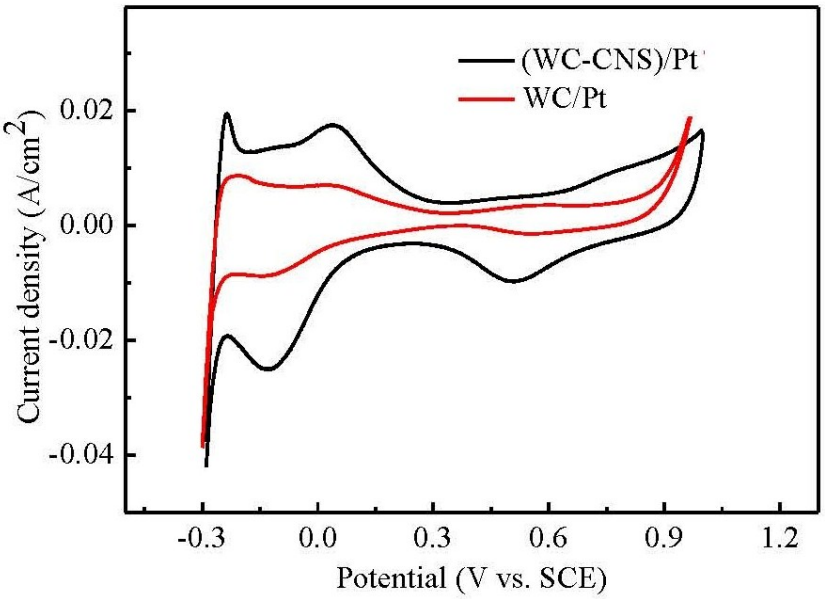

Fig. S7 CV curves of (WC-CNS)/Pt and WC/Pt catalysts in H_2SO_4 at a scanning rate of 100 mv· s^{-1}. Note: Pt loading on the working electrode was controlled to be 0.2 mg cm^{-2}

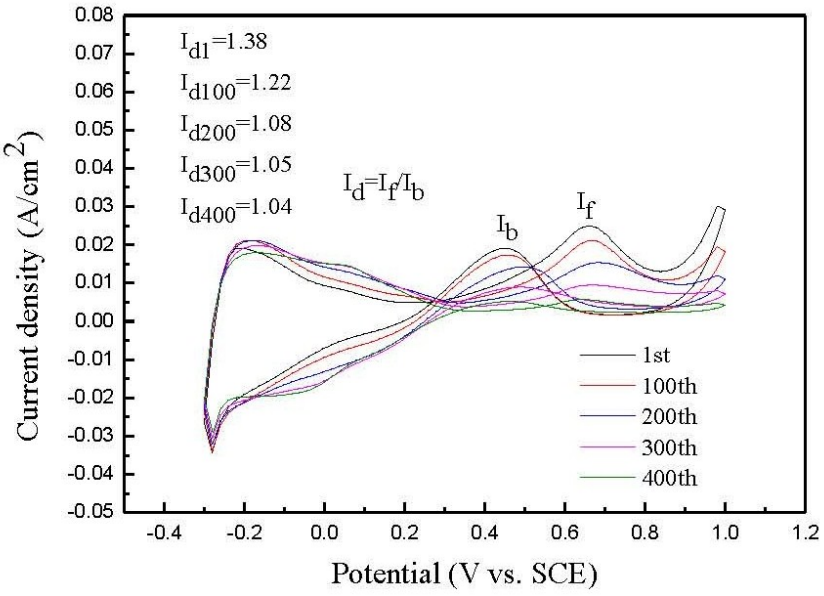

Fig. S8 CV curves of WC/Pt catalyst after different cycles at a scanning rate of 100 mv· s^{-1}. Note: Pt loading on the working electrode was controlled to be 0.2 mg cm^{-2}

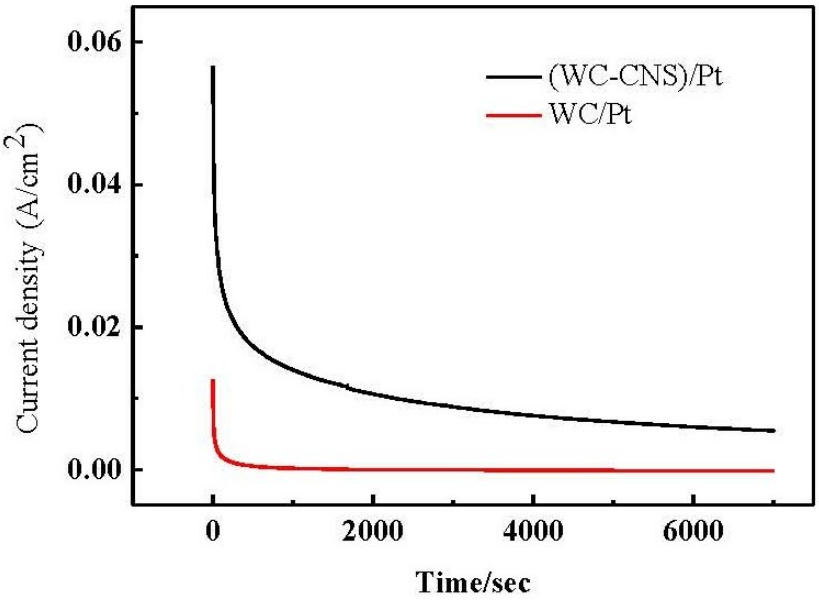

Fig. S9 CA curves of (WC-CNS)/Pt and WC-Pt in 1 M CH_3OH and 0.5 M H_2SO_4 solution at potential of 0.7 V for 7000 s