

Supplementary Information

Nanochain-structured mesoporous tungsten carbides and its superior electrocatalysis

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As we discussed in the paper that the molar ratio of AMT/glucose and the reaction time obviously affect the formation of tungsten carbides during the hydrothermal and thermal treatment process. In the case of 0.039 molar ratio of AMT/glucose and 900°C, tungsten is mainly presented as WO₂, W and a small quantity of W₂C reacted for 60 min, while WC and a very small amount of W₂C dominate the product when the reaction time is over 180 min with the WC nanocrystallite size of 13 nm. However, the WO₂ and WO₃ were observed by X-ray photoelectron spectroscopic measurement even at the optimized conditions as shown in Fig. S1. It is believed that the thin WO_x film at nanometer level formed in air, which is hardly detectable by XRD.

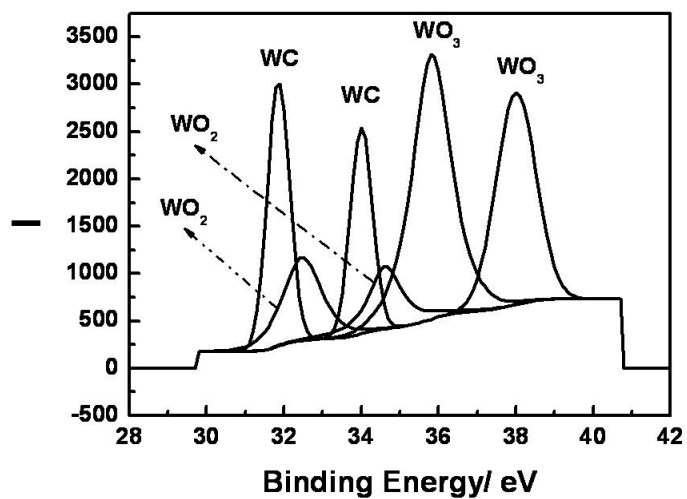


Fig. S1 The X-ray photoelectron spectroscopic result of the as-prepared sample.

The proposed mechanism of the formation of *m*-NCTC is schematically shown in Figure S2.

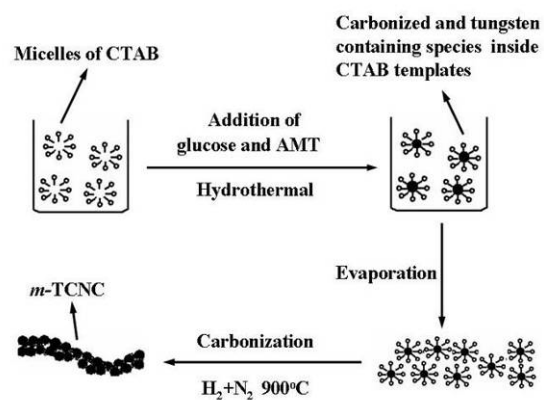


Fig. S2 Schematic diagram for the formation of *m*-NCTC.

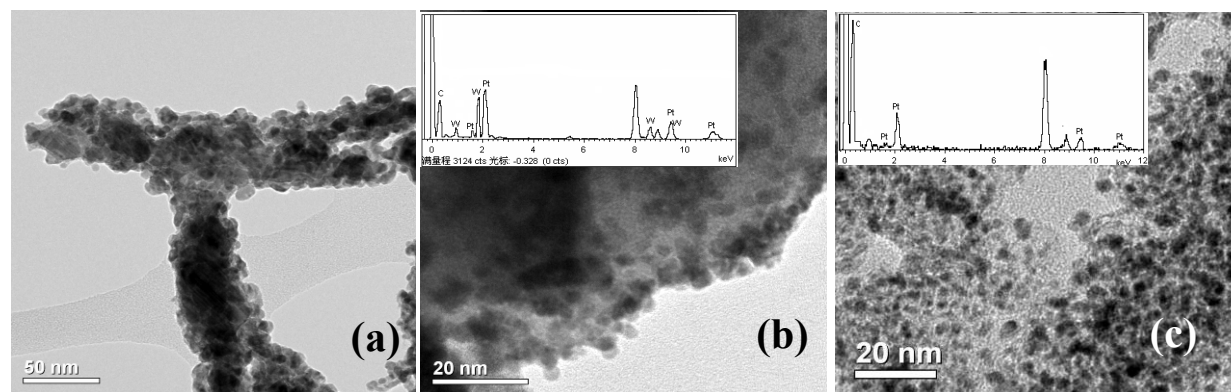


Fig. S3. The TEM images of Pt/*m*-NCTC (a, b) and Pt/C (c). The inset images in Figure S3 (b) and (c) are the EDS patterns of Pt/*m*-NCTC and Pt/C, respectively.

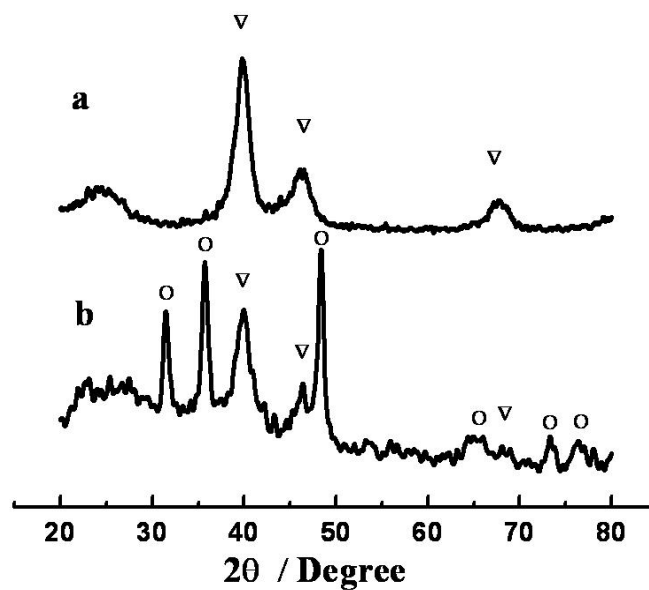


Fig. S4 XRD patterns of as-prepared (a) Pt/C and (b) Pt/*m*-NCTC catalysts (o--WC, ∇ --Pt).

Table S1 Electrocatalytic performance of various catalysts for methanol oxidation

Catalysts	ESA (m ² /g)	Mass activity (A/g Pt)	Onset potential (V)	Backward peak potential (V)
Pt/C	37.2	196	0.38	0.42
Pt/ <i>m</i> -NCTC	48.1	323	0.26	0.48

References:

S1 P. K. Shen and Z. Q. Tian, *Electrochim. Acta*, 2004, **49**, 3107.

S2 S. Song, Y. Wang and P. K. Shen, *J. Power Sources*, 2007, **17**, 46.