Supplementary Information

Nanochain-structured mesoporous tungsten carbides and its superior electrocatalysis

Yi Wang, a Shuqin Song, a Pei Kang Shen,* a Chunxian Guo b and Chang Ming Li*b

aState Key Laboratory of Optoelectronic Materials and Technologies, School of Physics and Engineering, Sun Yat-Sen University, Guangzhou, 510275 China. E-mail: stsspk@mail.sysu.edu.cn (P. K. Shen); Tel.: +86 20 84036736; Fax: +86 20 84113369.
bSchool of Chemical and Biomedical Engineering, Nanyang Technological University, Singapore, 637457 Singapore. E-mail: ecmli@ntu.edu.sg (C.M. Li); Tel.: +65 67904485; Fax: +65 67911761.

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 WOₓ 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\textit{m}-NCTC (a, b) and Pt/C (c). The inset images in Figure S3 (b) and (c) are the EDS patterns of Pt\textit{m}-NCTC and Pt/C, respectively.

Fig. S4 XRD patterns of as-prepared (a) Pt/C and (b) Pt\textit{m}-NCTC catalysts (o--WC, ▽--Pt).
Table S1 Electrocatalytic performance of various catalysts for methanol oxidation

<table>
<thead>
<tr>
<th>Catalysts</th>
<th>ESA (m²/g)</th>
<th>Mass activity (A/g Pt)</th>
<th>Onset potential (V)</th>
<th>Backward peak potential (V)</th>
</tr>
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<tbody>
<tr>
<td>Pt/C</td>
<td>37.2</td>
<td>196</td>
<td>0.38</td>
<td>0.42</td>
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<tr>
<td>Pt/m-NCTC</td>
<td>48.1</td>
<td>323</td>
<td>0.26</td>
<td>0.48</td>
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References: