Nitrogen-doped carbon and iron carbide nanocomposites as cost-effective counter electrodes of dye-sensitized solar cells

Hongxia Xu,‡[a] Chuanjian Zhang,‡[a] Zaiwei Wang,[ab] Shuping Pang,[a] Xinhong Zhou,*[c]

Zhongyi Zhang,[a] Guanglei Cui*[a]

[a]The Qingdao Key Lab of solar energy utilization and energy storage technology, Qingdao Institute of Bioenergy and Bioprocess Technology, Chinese Academy of Sciences, Qingdao 266101, P. R. China

[b]University of Chinese Academy of Sciences, Beijing, 100049, P. R. China

[c]Qingdao University of Science and Technology, Qingdao, 266101, P. R. China

‡ These authors contributed equally to this work.

* Corresponding author. E-mail: cuigl@qibebt.ac.cn

SUPPORTING INFORMATION

Table of Contents

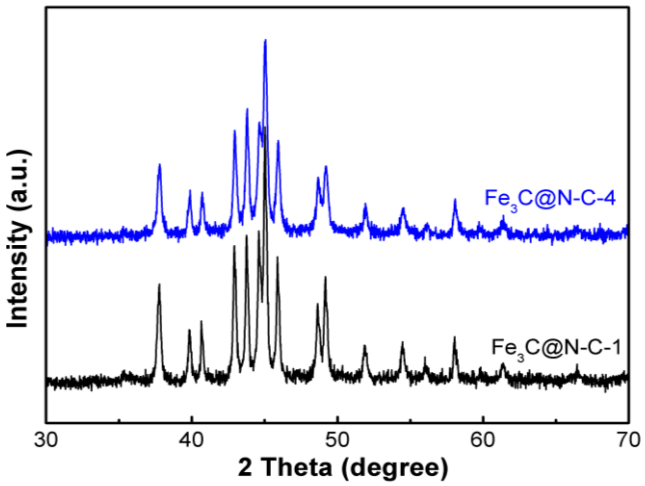

Fig. S1 XRD patterns of Fe_3C@N-C nanocomposites with different FeC_2O_4/NH_2CN ratio.

Table S1 Element analysis results of Fe_3C@N-C with different FeC_2O_4/NH_2CN ratio.

Sample	Fe_3C/wt%	C/wt%	N/wt%
Fe_3C@N-C-1	77.66	20.78	1.56
Fe_3C@N-C-2.5	87.49	11.98	0.53
Fe_3C@N-C-4	90.34	9.55	0.11

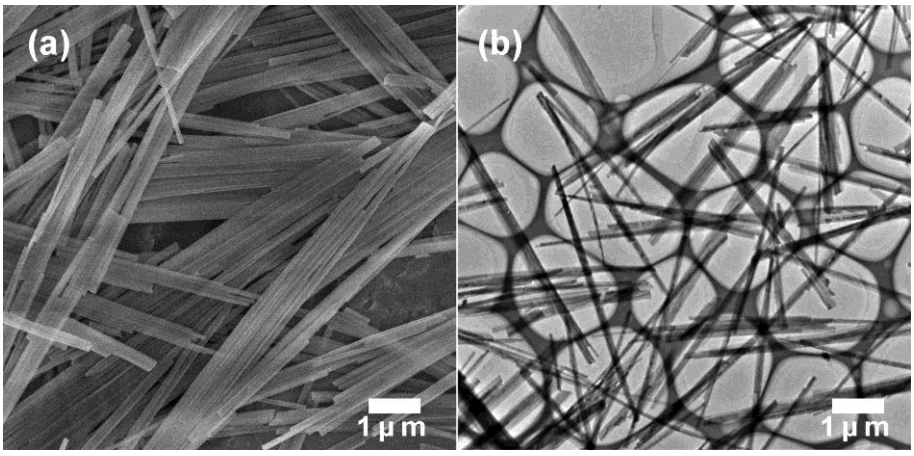

Fig. S2 SEM and TEM images of FeC_2O_4 nanowires.

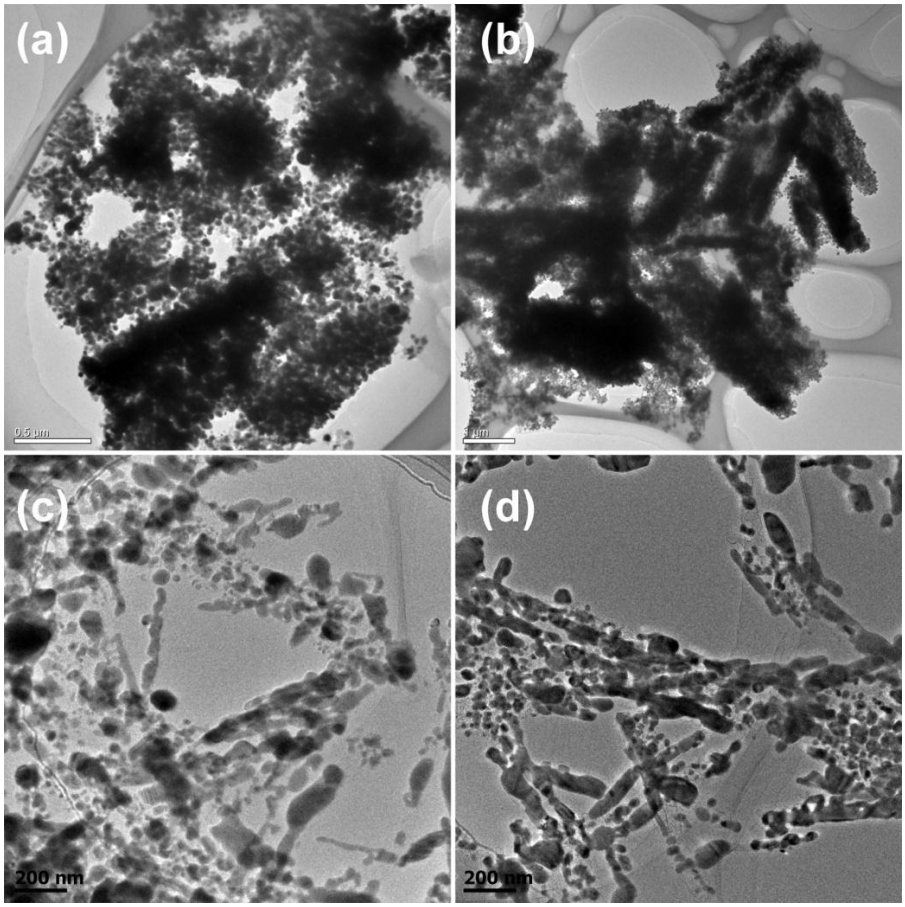

Fig. S3 TEM images of Fe_3C synthesized by different FeC_2O_4/ NH_2CN ratio

(a) and (b) R=1, (c) and (d) R=4.

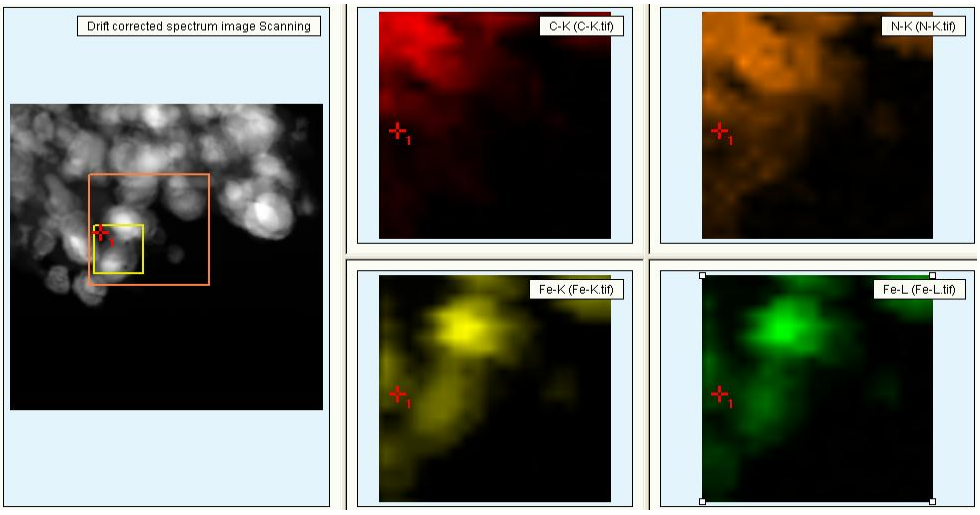

Fig. S4 Elemental mapping of Fe_3C@N-C nanocomposites

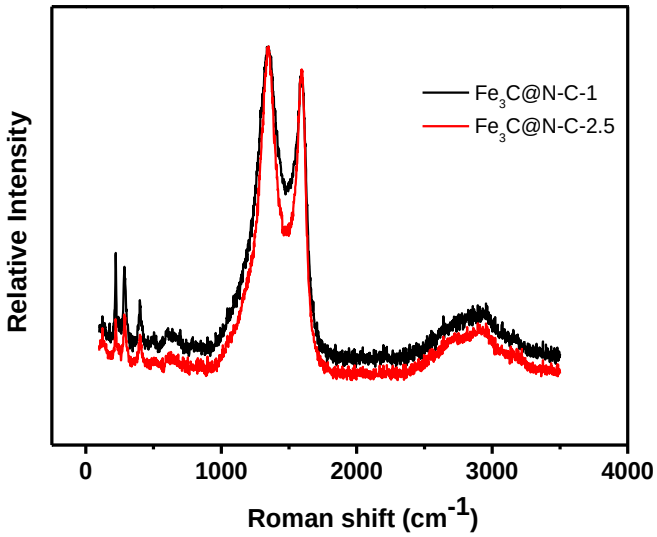

Fig. S5 Raman spectra of Fe_3C@N-C

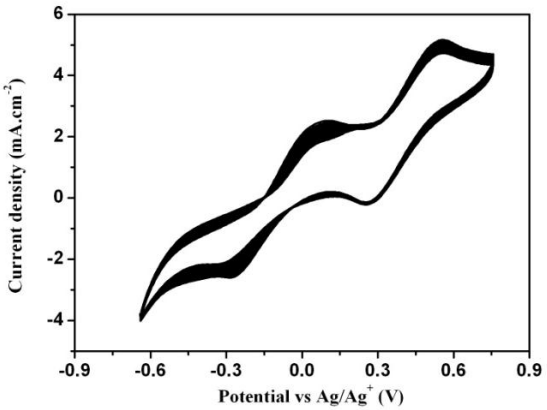

Fig. S6 Consecutive 100 cyclic voltammograms for the Fe_3C@N-C-2.5 CE at a scan rate of 20 mV s^{-1}.

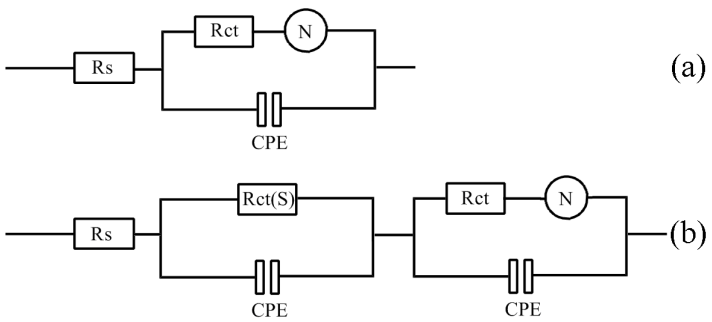

Fig. S7 equivalent circuits for the symmetric cells consisted of platinum electrodes (a) Fe_3C@N-C (b)

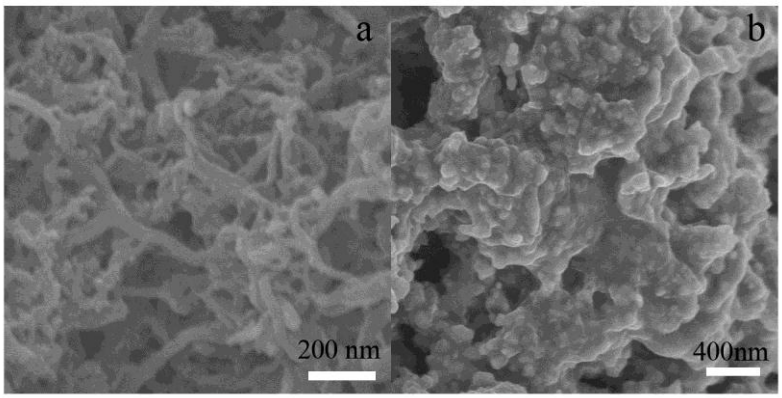

Fig. S8 SEM images of nearly pure N-C (a) and non-1D configuration Fe_3C@N-C-2.5 (b)

Table S2 Characteristics of the *J-V* curves of the DSSCs fabricated using nearly pure N-C and non-1D configuration Fe3C@N-C-2.5

Counter Electrode	J_{sc}(mA/cm^2)	V_{oc} (mV)	FF(%)	η (%)
nearly pure N-C	14.66	741	58.70	6.38 ± 0.01
non-1D configuration Fe_3C@N-C-2.5	14.05	740	63.03	6.55 ± 0.02