Electronic Supplementary Information for the manuscript

Construction of Inorganic-Organic 2D/2D WO_3/*g*-C_3N_4 Nanosheet Arrays toward Efficient Photoelectrochemical Splitting of Natural Seawater

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1. Experimental Section

Bulk *g*-C_3N_4 was synthesized by directly heating melamine on the basis of the previous work. In detail, 5 g of melamine was put into the crucible with a cover, and heated to 550 ^{o}C in a muffle furnace for 4 h at a heating rate of 10 ^{o}C/min to obtain bulk *g*-C_3N_4.

2. Supplemental Figures and Tables

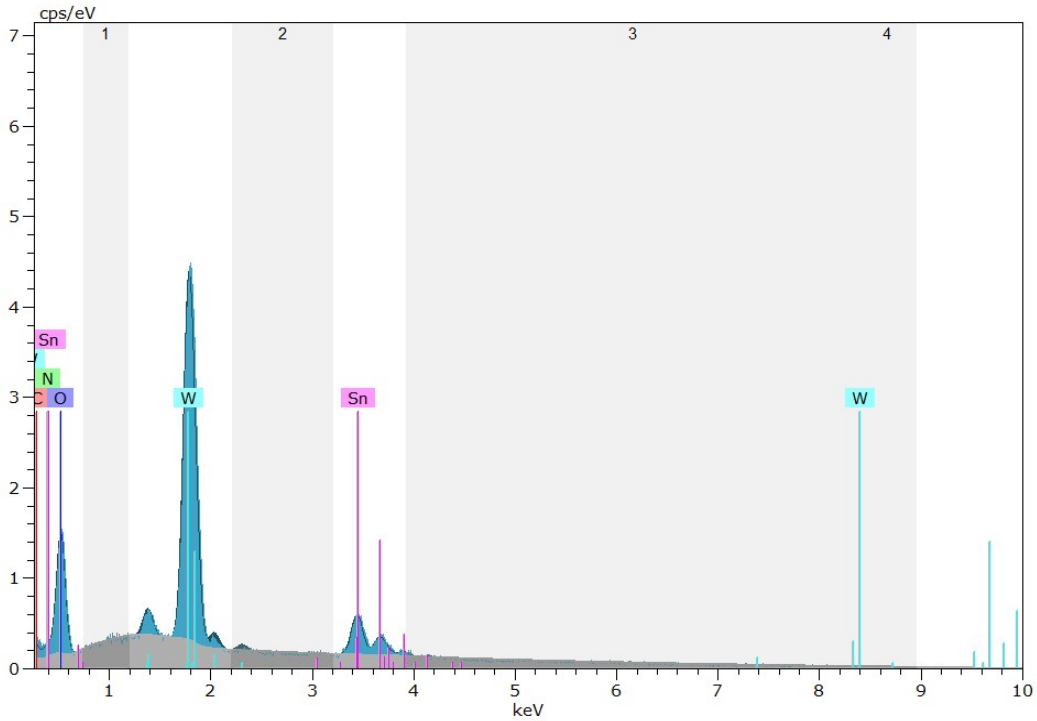


Fig. S1 The EDX spectrum of the WO_3/*g*-C_3N_4 NSAs.

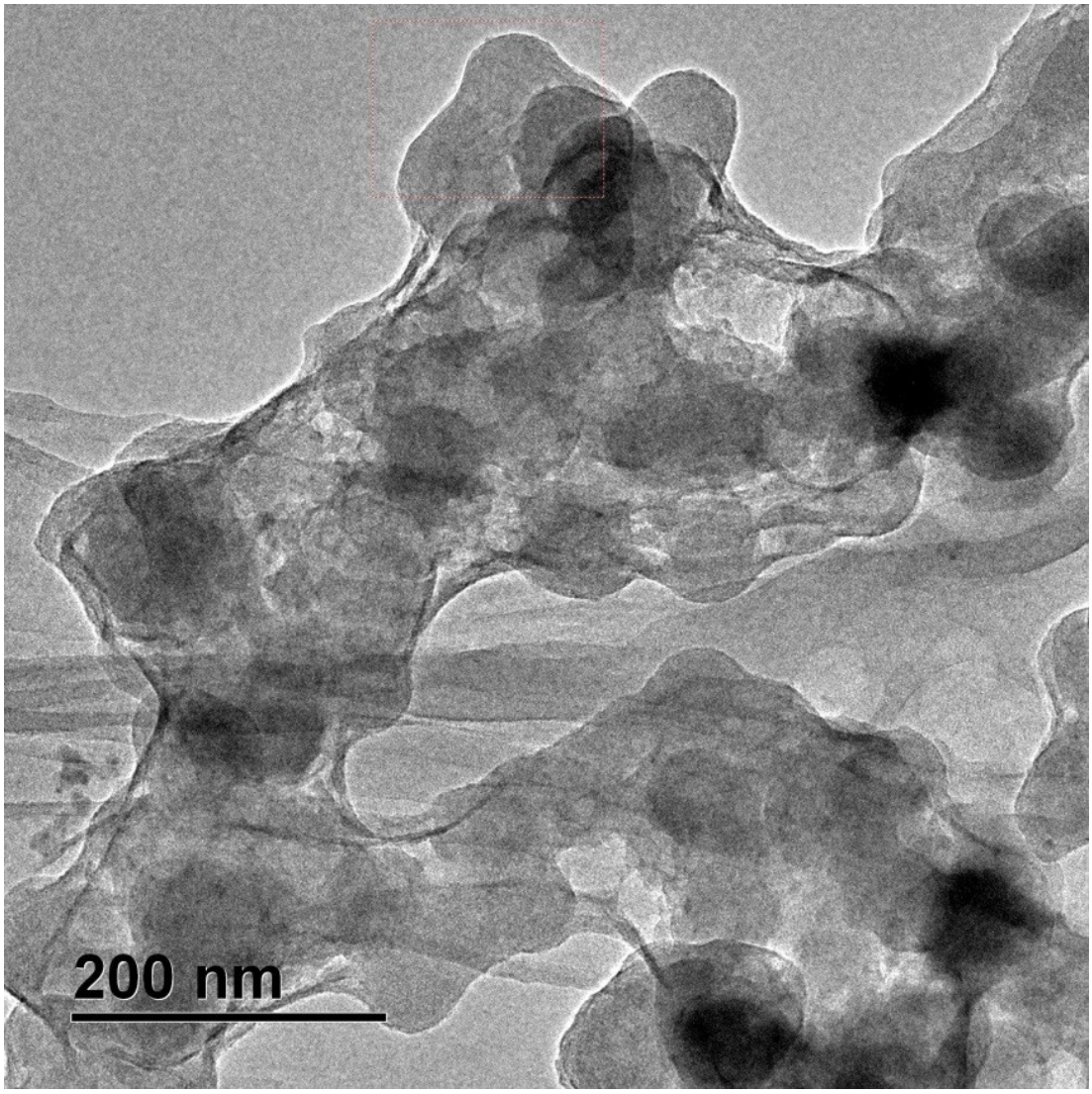


Fig. S2 TEM image of *g*-C_3N_4 NS.

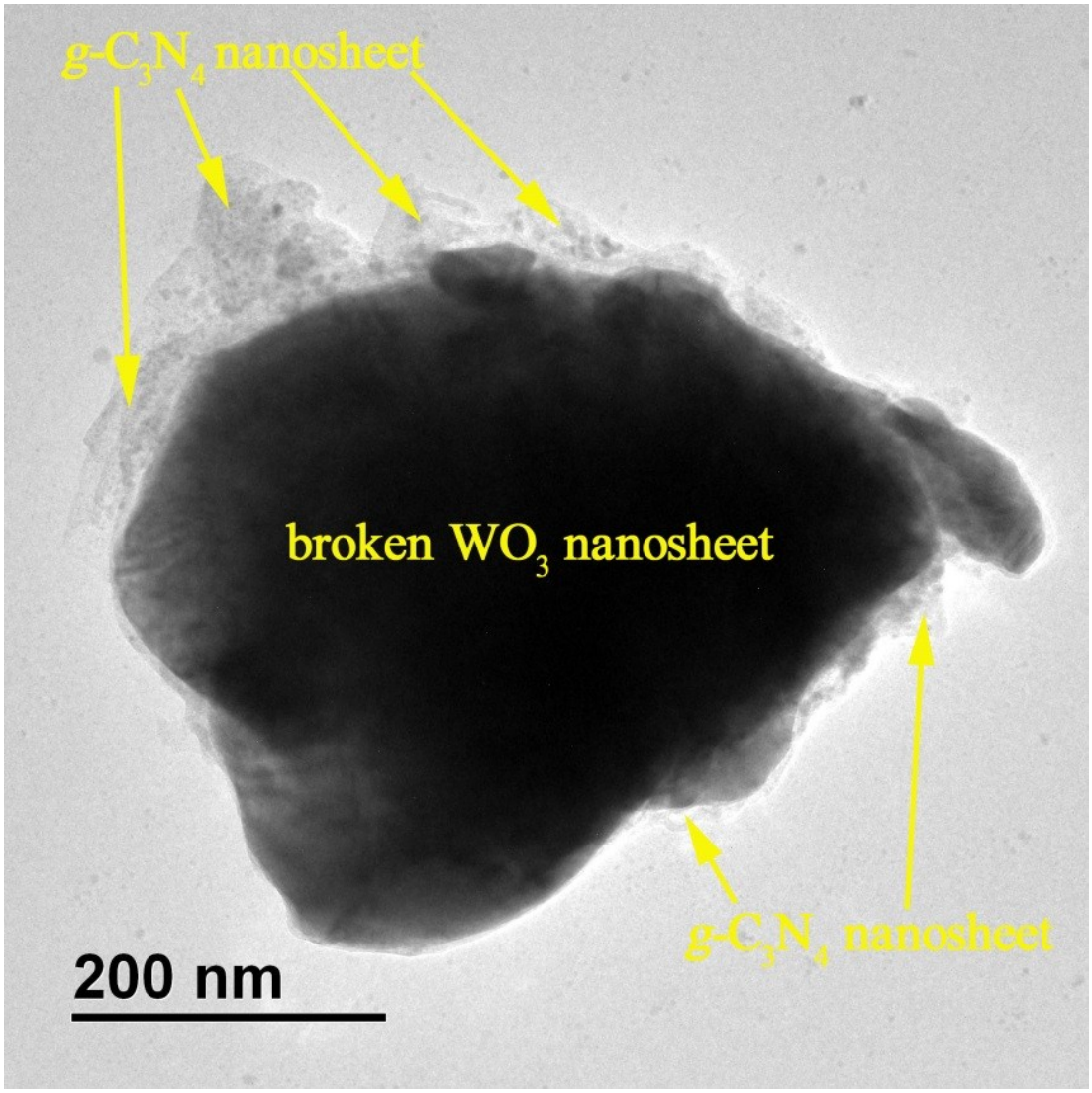


Fig. S3 The enlarged TEM image of the WO_3/*g*-C_3N_4 NSAs.

Table S1 The fitted values of R_s and R_{ct} for different samples.

Sample	R_s	R_{ct}
WO_3 NSAs	27.27 Ω	1063 Ω
WO_3/*g*-C_3N_4 NSAs	27.35 Ω	515.9 Ω

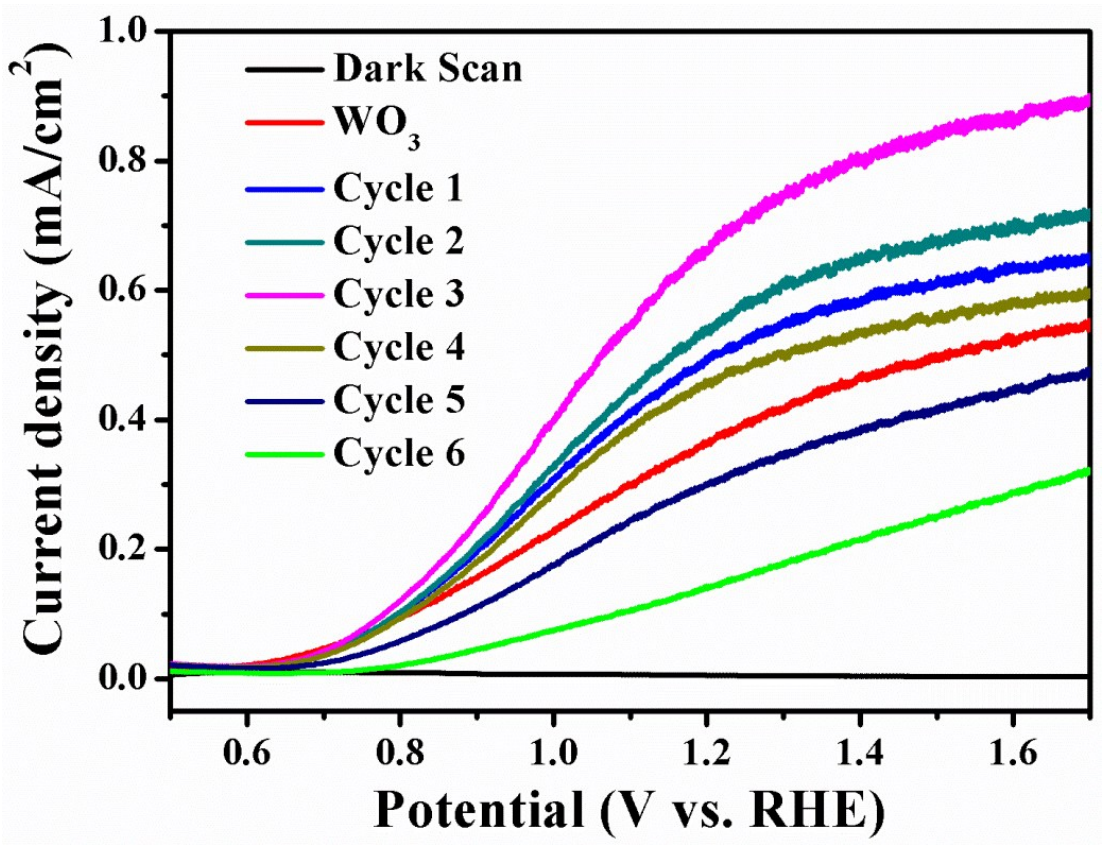


Fig. S4 *I-V* curves of the WO_3/*g*-C_3N_4 NSAs obtained with different cycle times of *g*-C_3N_4 deposition.

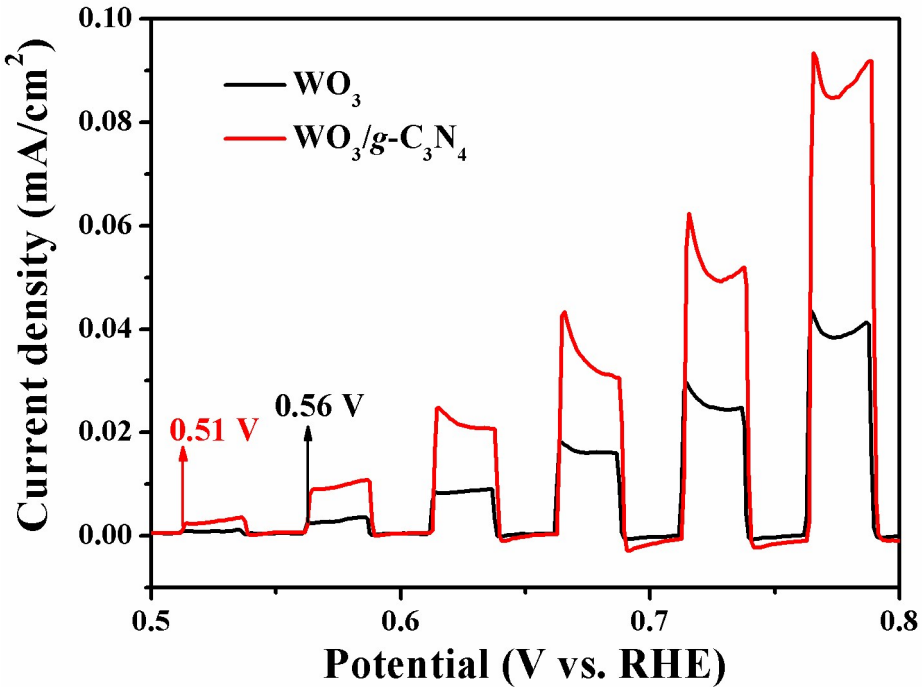


Fig.S5 The magnified *I-V* curves for WO_3 NSAs and WO_3/*g*-C_3N_4 NSAs

in the range from 0.5 V to 0.8 V.

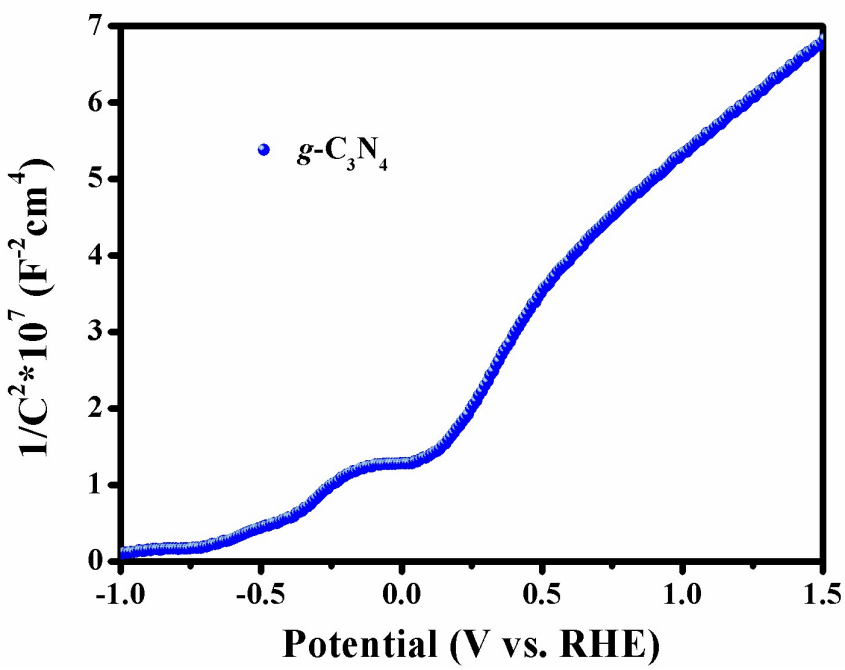


Fig.S6 Mott-Schottky plots of the g-C_3N_4.

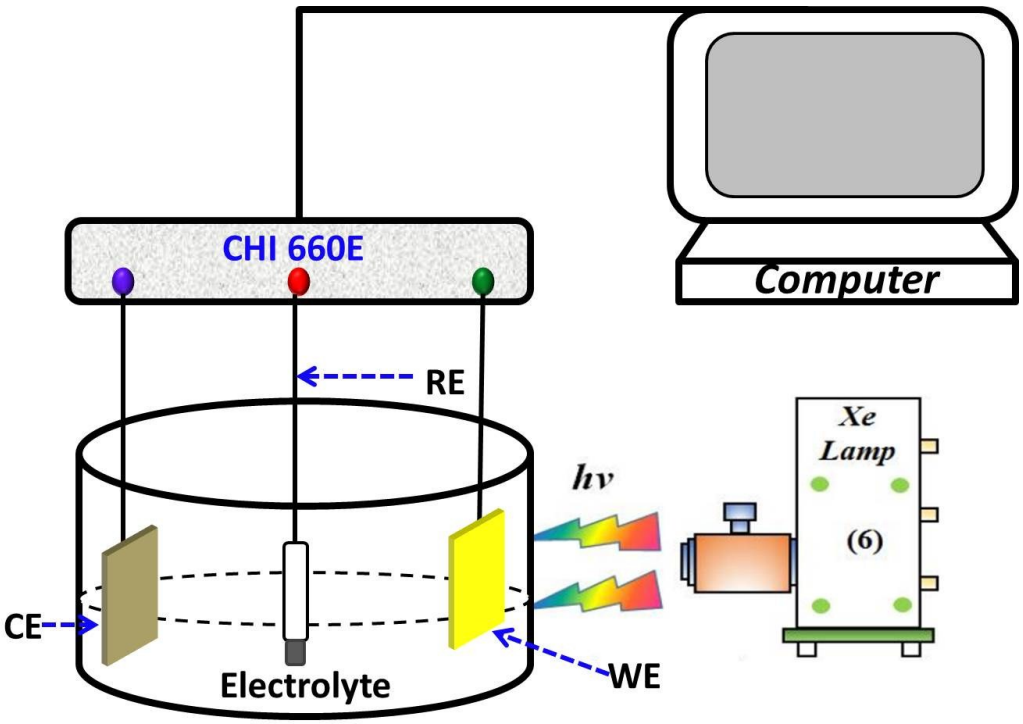
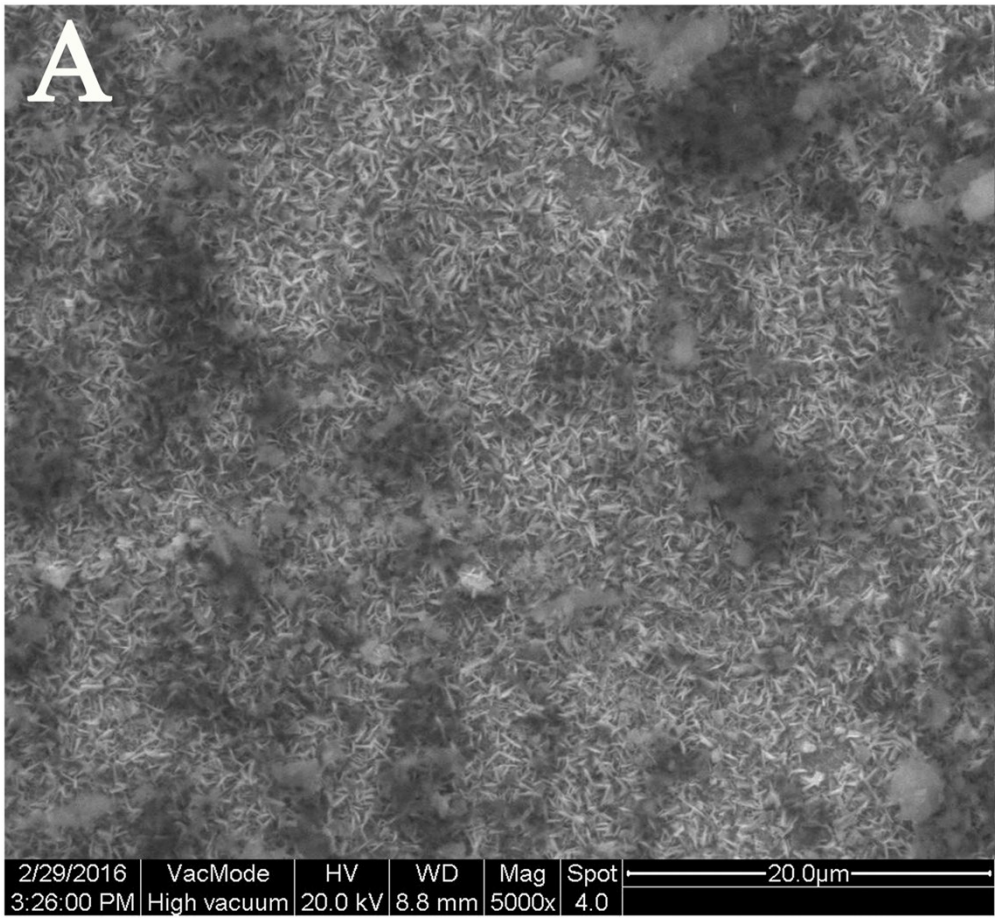


Fig.S7 The schematic illustration for the geometry and design of PEC

reactor.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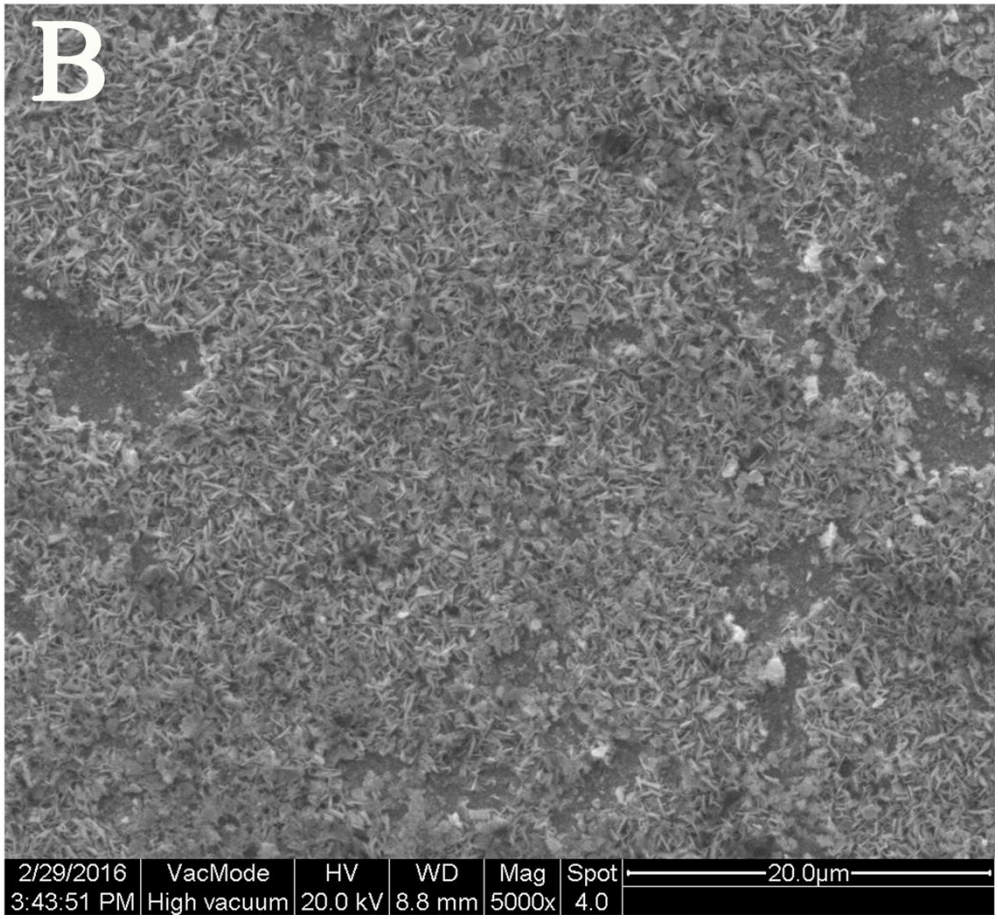
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High vacuum
HV
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WD
8.8 mm
Mag
5000x
Spot
4.0
20.0µm

Fig.S8 SEM images of WO_3/*g*-C_3N_4 NSAs before and after experiment.

Note. It is clearly observed that WO_3 NS of some area on the FTO substrate have dropped due to photocorrosion after experiment.

Note. The mechanism of seawater oxidation and reduction under illumination as follows.

Photoanode reaction: $2Cl^- + 2h^+ = Cl_2$ (1)

$$Cl_2 + H_2O = H^+ + Cl^- + HClO \quad (2)$$

$$HClO = H^+ + Cl^- + 1/2O_2 \quad (3)$$

Cathode reaction: $2H^+ + 2e^- = H_2$

The above mechanism of seawater oxidation and reduction under illumination is in accordance with the previous works.[57,58]

57. W. Luo, Z. Yang, Z. Li, J. Zhang, J. Liu, Z. Zhao, Z. Wang, S. Yan, T. Yu and Z. Zou, *Energy Environ. Sci*., 2011, **4**, 4046-4051.

58. K. Maeda, H. Masuda and K. Domen, *Catalysis Today*, 2009, **147**, 173-178.