Electronic Supplementary Information for the manuscript

Construction of Inorganic-Organic 2D/2D WO₃/g-C₃N₄ Nanosheet Arrays toward Efficient Photoelectrochemical Splitting of Natural Seawater

Yuangang Li,¹,* Xiaoliang Wei,¹ Xiangyang Yan, b Jiangtao Cai, a
Anning Zhou, a Mengru Yang, a Kaiqiang Liu b

¹ College of Chemistry and Chemical Engineering, Xi’an University of Science and Technology, Xi’an 710054, China
b Key Laboratory of Applied Surface and Colloid Chemistry, Ministry of Education, School of Chemistry and Chemical Engineering, Shaanxi Normal University, Xi’an 710119, China

Corresponding Author: E-mail: Yuangang_Li@163.com.

1. Experimental Section

Bulk g-C₃N₄ 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 °C in a muffle furnace for 4 h at a heating rate of 10 °C/min to obtain bulk g-C₃N₄.

2. Supplemental Figures and Tables
Fig. S1 The EDX spectrum of the WO$_3$/g-C$_3$N$_4$ NSAs.
Fig. S2 TEM image of g-C$_3$N$_4$ NS.
Fig. S3 The enlarged TEM image of the WO$_3$/g-$C_3$N$_4$ NSAs.

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

<table>
<thead>
<tr>
<th>Sample</th>
<th>$R_s$</th>
<th>$R_{ct}$</th>
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<tbody>
<tr>
<td>WO$_3$ NSAs</td>
<td>27.27 $\Omega$</td>
<td>1063 $\Omega$</td>
</tr>
<tr>
<td>WO$_3$/g-$C_3$N$_4$ NSAs</td>
<td>27.35 $\Omega$</td>
<td>515.9 $\Omega$</td>
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Fig. S4 $I-V$ curves of the WO$_3$/g-C$_3$N$_4$ NSAs obtained with different cycle times of g-C$_3$N$_4$ deposition.

Fig. S5 The magnified $I-V$ curves for WO$_3$ NSAs and WO$_3$/g-C$_3$N$_4$ NSAs
in the range from 0.5 V to 0.8 V.

Fig.S6 Mott-Schottky plots of the g-C$_3$N$_4$.

Fig.S7 The schematic illustration for the geometry and design of PEC
reactor.
**Fig.S8** SEM images of WO$_3$/g-C$_3$N$_4$ 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: $2\text{Cl}^- + 2h^+ = \text{Cl}_2$ (1)

$$\text{Cl}_2 + \text{H}_2\text{O} = \text{H}^+ + \text{Cl}^- + \text{HClO}$$ (2)

$$\text{HClO} = \text{H}^+ + \text{Cl}^- + \frac{1}{2}\text{O}_2$$ (3)

Cathode reaction: $2\text{H}^+ + 2e^- = \text{H}_2$

The above mechanism of seawater oxidation and reduction under illumination is in accordance with the previous works.$^{57,58}$
