**Supporting information** for

# Structure–Performance Correlation Inspired Platinum-Assisted Anode with a Homogeneous Ionomer Layer for Proton Exchange Membrane Water Electrolysis

Feng Cheng 1,2,†, Tian Tian 1,3,†, Rui Wang 1,3,*, Hao Zhang 3, Liyan Zhu 3 and Haolin Tang 1,3,*

1 National Energy Key Laboratory for New Hydrogen-Ammonia Energy Technologies, Foshan Xianhu Laboratory, Foshan 528200, China; cf1987416@163.com (F.C.); ttcx@whut.edu.cn (T.T.)
2 Wuhan Institute of Hydrogen and Fuel Cell Industrial Technology, 555 Cultural Avenue, Hongshan District, Wuhan 430070, China
3 State Key Laboratory of Advanced Technology for Materials Synthesis and Processing, Wuhan University of Technology, Wuhan 430070, China; zhanghaoxs2023@163.com (H.Z.); z1028@whut.edu.cn (L.Z.)
* Correspondence: rwang@whut.edu.cn (R.W.), thln@whut.edu.cn (H.T.)
† These authors contributed equally to this work.

The single cell set-up was conducted as follow: The gas diffusion layer on the anode side uses platinum-coated titanium felt and titanium mesh to form a gradient diffusion structure. The current collecting plate uses a three-snake platinum-coated titanium plate. The gas diffusion layer on the cathode side is made of carbon paper (Freudenberg, E20H), and the current collecting plate is made of three-snake graphite plate. The bolt assembly pressure is 6 ~ 8 N*m. After assembly, the air tightness test is carried out. After passing the test, it is installed on the test bench for testing.

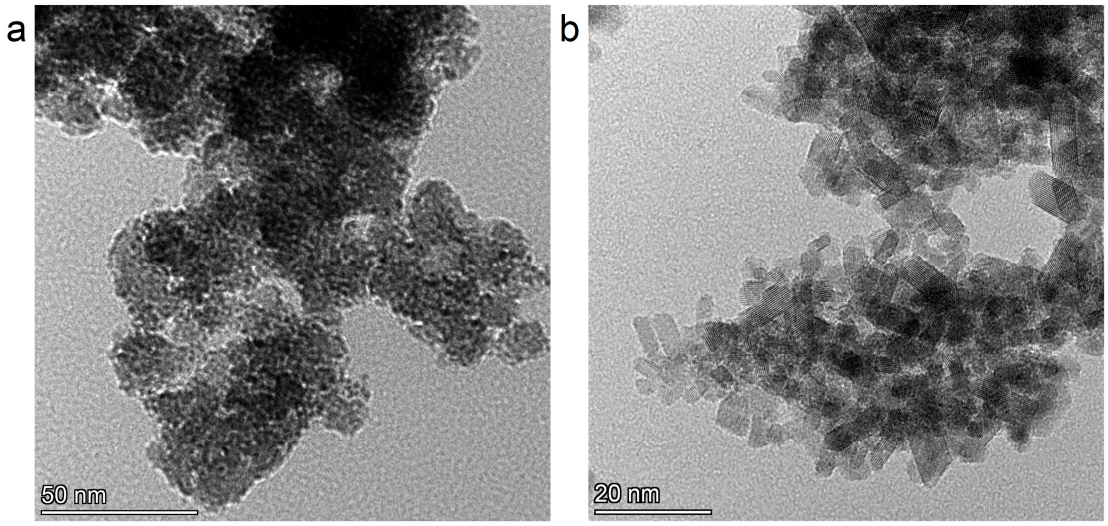


Figure s1. Low-resolution TEM images of the a) $IrO_x \cdot nH_2O$ and b) $IrO_2$ catalysts.

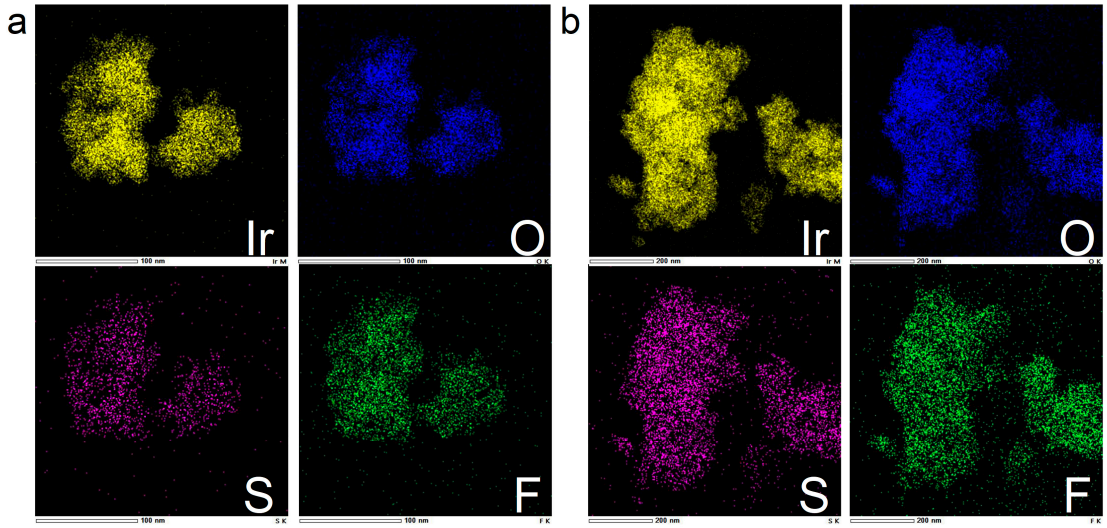


Figure s2. Elemental mapping images of element Ir, S, O, and F of a) $IrO_x \cdot nH_2O$ and b) $IrO_2$.

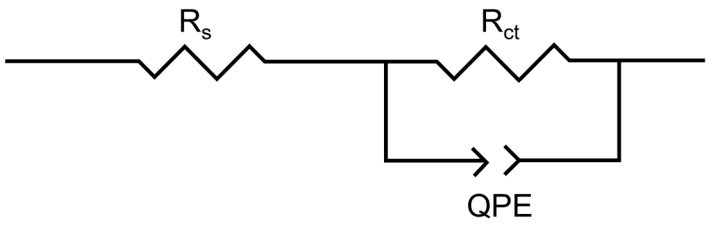


Figure s3. The equivalent circuit for the catalysts.

Table s1. Fitting results of the equivalent circuit for the catalysts

| Catalyst | $IrO_x \cdot nH_2O$ | $IrO_2$ |
|---|---|---|
| $R_s$ (ohm) | 12.47 | 12.27 |
| $R_{ct}$ (ohm) | 16.19 | 17.59 |

Table s2. The ratio of Ir (0), Ir ($3^+$), and Ir ($4^+$), for $IrO_x \cdot nH_2O$ and $IrO_2$

| Valence | $IrO_x \cdot nH_2O$ | $IrO_2$ |
|---|---|---|
| Ir (0) | / | 18.2% |
| Ir ($3^+$) | 40% | 25.4% |
| Ir ($4^+$) | 60% | 56.4% |