

Supporting information

IrO₂-TiO₂ electrocatalyst for the hydrogen evolution reaction in acidic water electrolysis without activation

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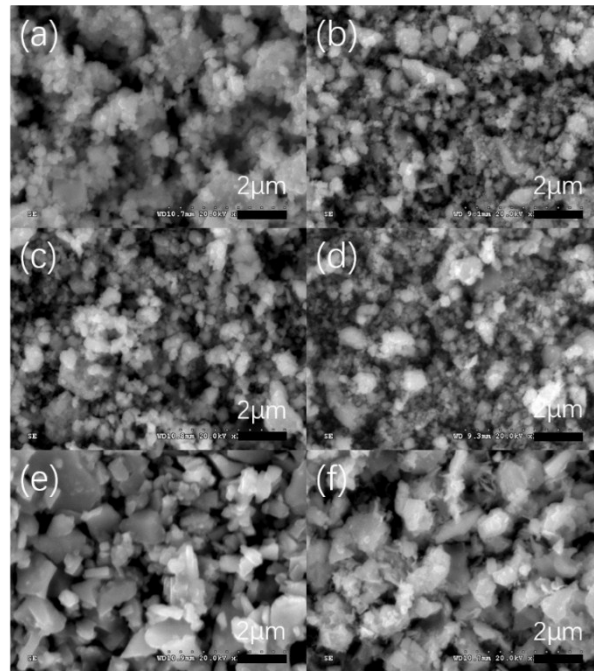


Fig. S1† SEM diagrams of IrO₂-TiO₂ composite oxides (TiO₂ mol%=14%) and IrO₂ oxides with different calcination temperature. IrO₂-TiO₂: (a) 450 °C, (b) 500 °C, (c) 550 °C, (d) 600 °C; IrO₂: (e) 450 °C, (f) 550 °C.

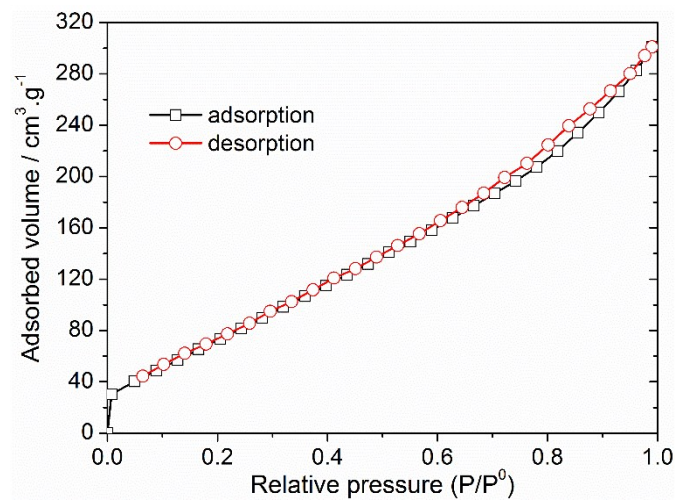


Fig. S2† N₂ adsorption/desorption isotherms of IrO₂-TiO₂ composite oxide (TiO₂ mol%=14%, Calcination temperature 550 °C).

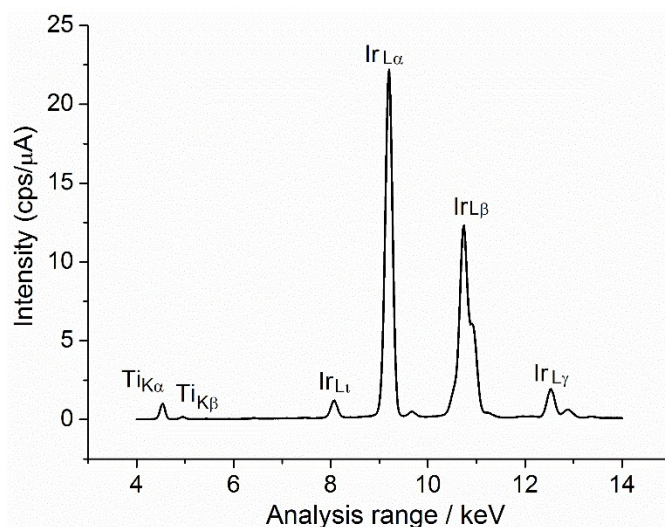


Fig. S3+ X-ray fluorescence spectrometry of Ir and Ti in $\text{IrO}_2\text{-TiO}_2$ composite oxide (TiO_2 mol%=14%, Calcination temperature 550°C).

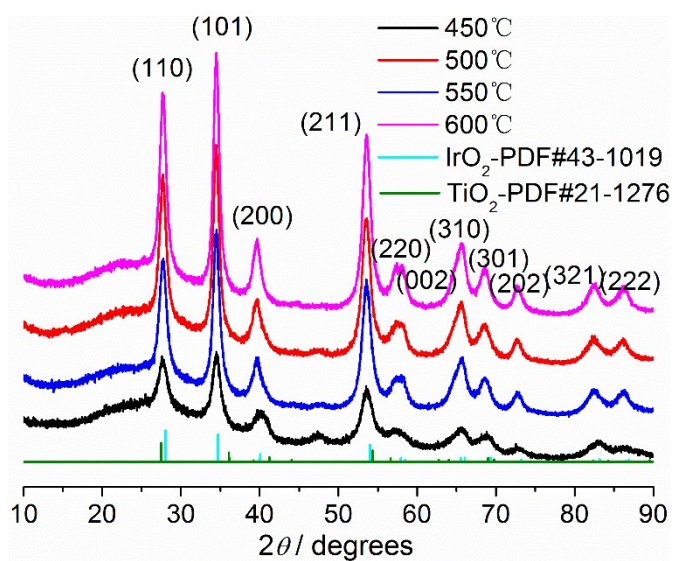


Fig. S4+ XRD diagrams of $\text{IrO}_2\text{-TiO}_2$ complex oxides (TiO_2 mol%=14%) with different calcination temperature.

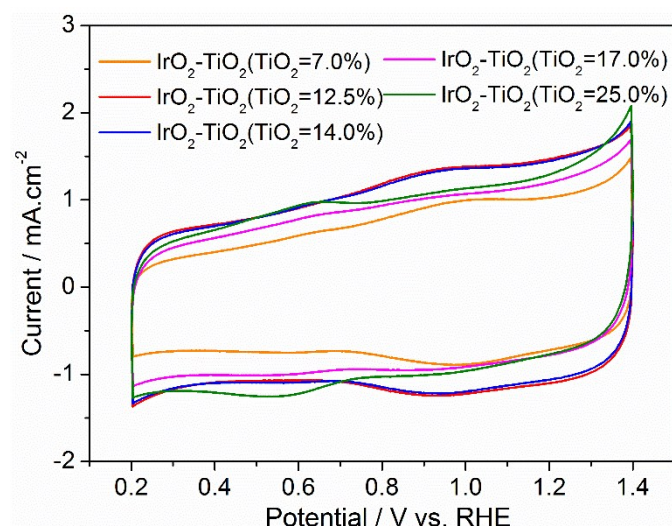


Fig. S5† Cyclic voltammograms in 0.5 mol·L⁻¹ H₂SO₄ solution at a sweeping rate of 100 mV·s⁻¹ for IrO₂-TiO₂ electrodes with different mole fraction TiO₂ at the calcined temperature 550°C.

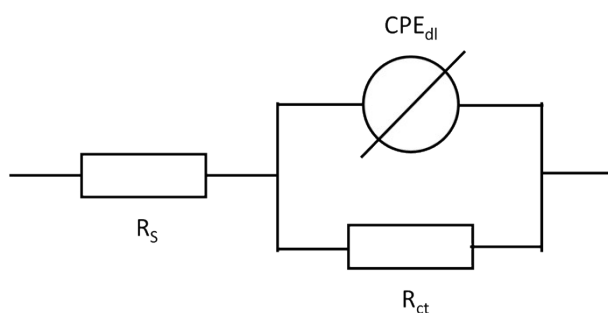


Fig. S6† The equivalent circuit of the impedance of IrO₂-TiO₂ and IrO₂ electrodes.

Table S2† Impedance parameters of IrO₂-TiO₂ and IrO₂ electrodes obtained by fitting the experimental data to $R_s(R_{ct}C_{dl})$ equivalent circuit.

Electrocatalyst	R_s / $\Omega \cdot \text{cm}^2$	R_{ct} / $\Omega \cdot \text{cm}^2$	C_{dl} / $\text{mF} \cdot \text{cm}^{-2}$	n_{dl}	R_f
IrO ₂	11.32	198.7	1.13	0.77671	56.5
IrO ₂ -TiO ₂	9.281	48.00	2.70	0.92944	135

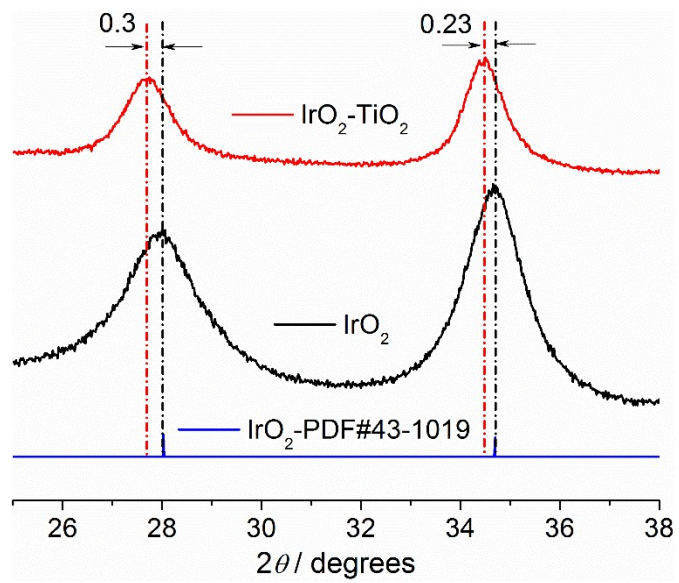


Fig. S7+ XRD diagram of $\text{IrO}_2\text{-TiO}_2$ complex oxide (TiO_2 mol%=14%, calcination temperature 550°C) and IrO_2 (calcination temperature 550°C).