

Electronic supplementary information

Table S1† The composition of IM-Pt₂Si-MS electrode before and after CV

Element	Atom%	Std.Dev. Proc.-Calc.	Line	Int.(cps/uA)	Thickness/nm
IM-Pt ₂ Si-MS					
Pt	63.359	(0.299) Quan-FP	PtLa	5.0963	74
Si	36.641	(1.883) Quan-FP	SiKa	0.0230	
IM-Pt ₂ Si-MS (after CV 1000 cycles in H ₂ SO ₄)					
Pt	64.270	(0.299) Quan-FP	PtLa	5.1267	73
Si	35.730	(1.917) Quan-FP	SiKa	0.0223	

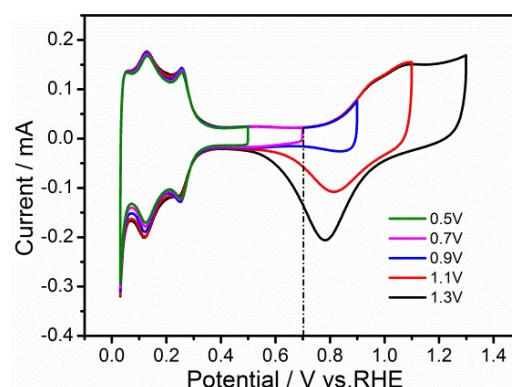


Fig. S1† Cyclic voltammograms with different potential ranges of IM-Pt₂Si-MS electrode in 0.5 mol·L⁻¹ H₂SO₄ solution at a sweeping rate of 100 mV·s⁻¹

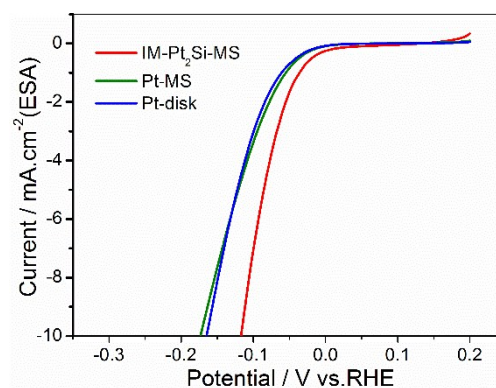


Fig. S2† Linear sweep voltammetry curves of IM-Pt₂Si-MS, Pt-MS and Pt-disk electrodes in 1.0 mol·L⁻¹ KOH solution at a sweeping rate of 5 mV·s⁻¹ in electrochemical active surface areas (ESA).

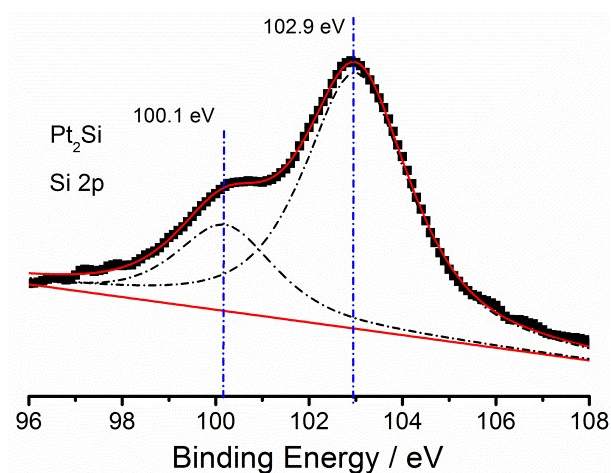


Fig. S3† The fine XPS spectrum analysis of Si in IM-Pt₂Si-MS electrode

Table S2† The surface composition of IM-Pt₂Si-MS electrode before and after CV

Name	Atomic %	
	Pt	Si
IM-Pt ₂ Si-MS	37.81	62.19
IM-Pt ₂ Si-MS (after CV 1000 cycles in H ₂ SO ₄)	37.96	62.04

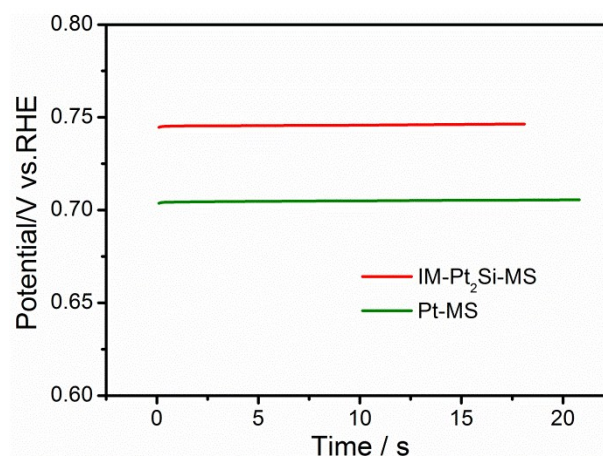


Fig. S4† Open circuit potentials of IM-Pt₂Si-MS and Pt-MS electrodes in 0.5 mol·L⁻¹ H₂SO₄ solution.

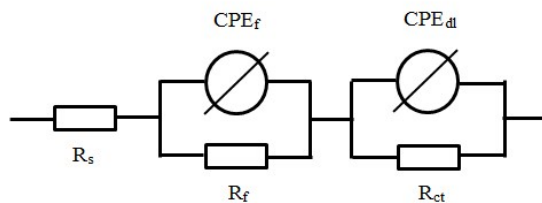


Fig. S5† The equivalent circuit of the impedance of IM-Pt₂Si-MS and Pt-MS electrodes

Table S3† Impedance parameters of IM-Pt₂Si-MS and Pt-MS electrodes obtained by fitting the experimental data to $R_s(R_fQ_f)(R_{ct}Q_{dl})$ equivalent circuit

Electrocatalyst	R_s / $\Omega \cdot \text{cm}^2$	R_f / $\Omega \cdot \text{cm}^2$	C_f / $\mu\text{F} \cdot \text{cm}^{-2}$	n_f	R_{ct} / $\Omega \cdot \text{cm}^2$	C_{dl} / $\mu\text{F} \cdot \text{cm}^{-2}$	n_{dl}
IM-Pt ₂ Si-MS	0.9089	0.5848	2.56	0.96301	1.454	54.8	0.81479
Pt-MS	0.9087	0.5584	2.87	0.87169	3.215	45.4	0.84617

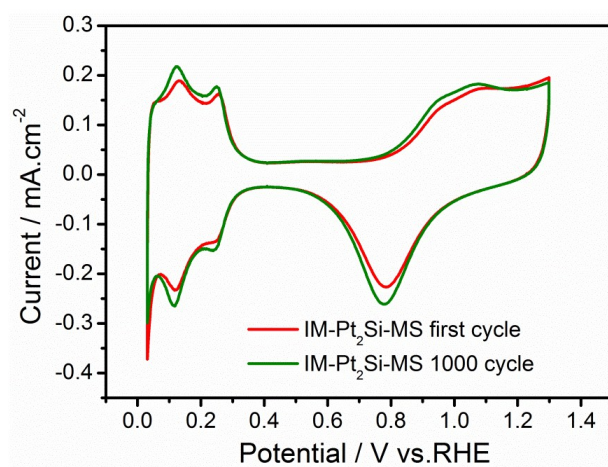


Fig. S6† The long-term cyclic voltammograms stability test for IM-Pt₂Si-MS electrode in 0.5 mol·L⁻¹ H₂SO₄ solution at a sweeping rate of 100 mV·s⁻¹.

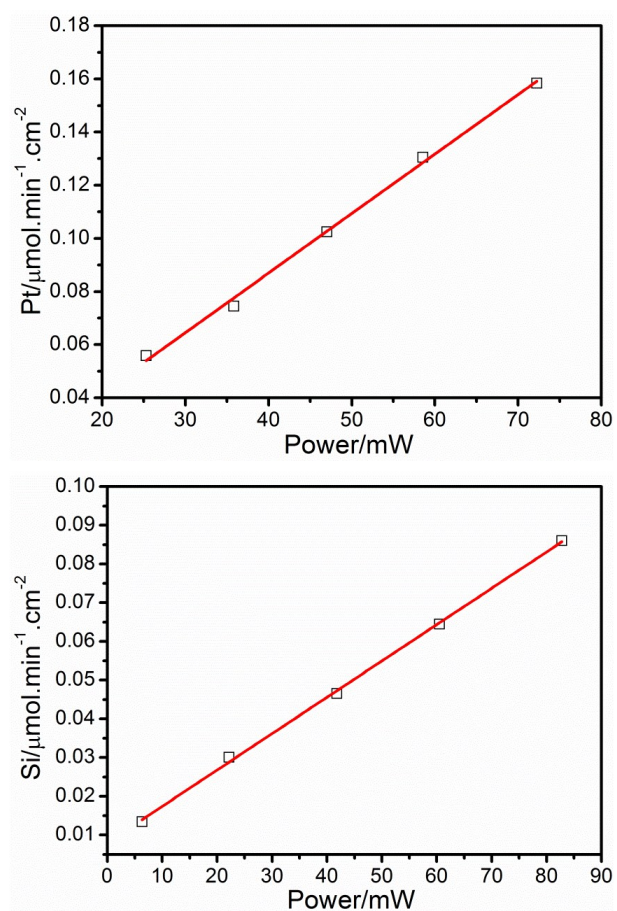


Fig. S7† A plot of sputtering power and deposition rate of Pt (a) and Si (b).