

# Supporting Information

## Enhancing Metal-Support Interaction by in-situ Ion-Exchanging Strategy for High Performance Pt catalysts in Hydrogen Evolution Reaction

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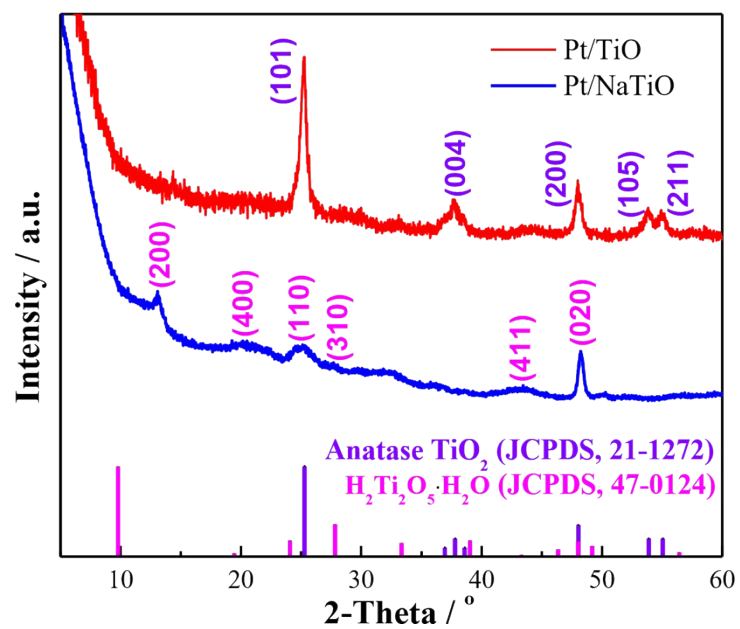


Fig. S1 XRD patterns of Pt/TiO and Pt/NaTiO catalysts

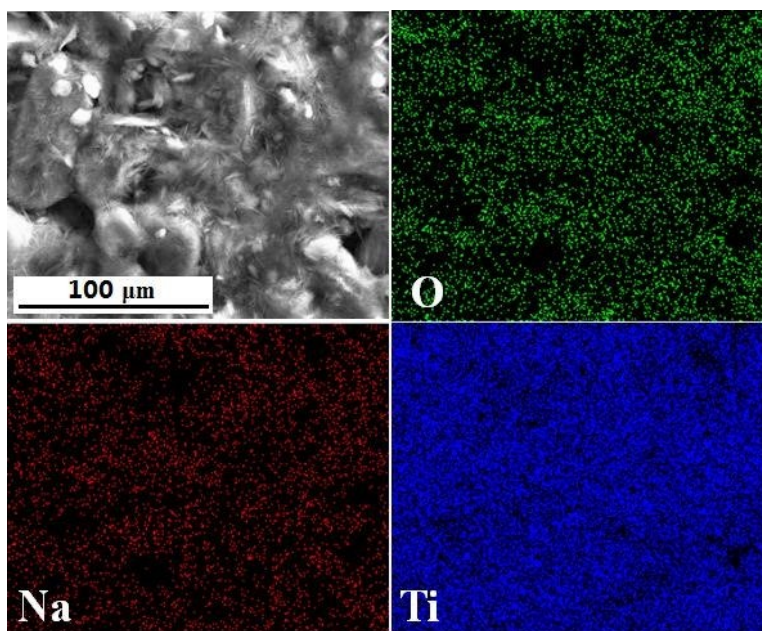


Fig. S2 EDS mapping of Pt/NaTiO

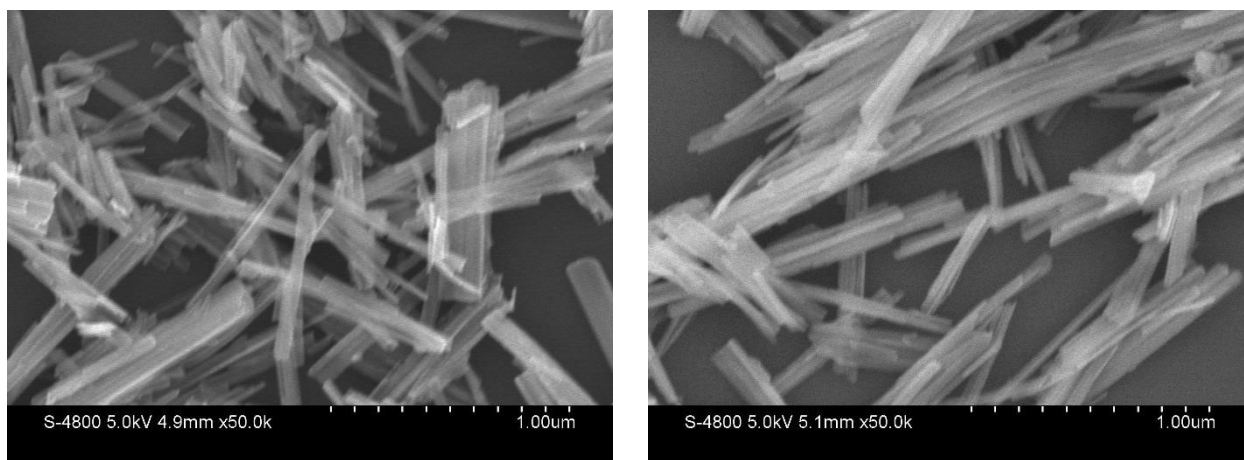


Fig. S3 SEM images of Pt/TiO and Pt/NaTiO catalysts.

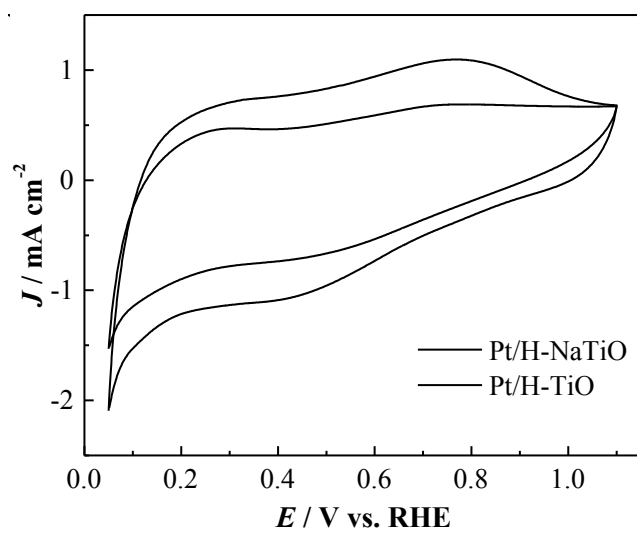


Fig. S4 CV curves of Pt/H-NaTiO and Pt/H-TiO catalysts.

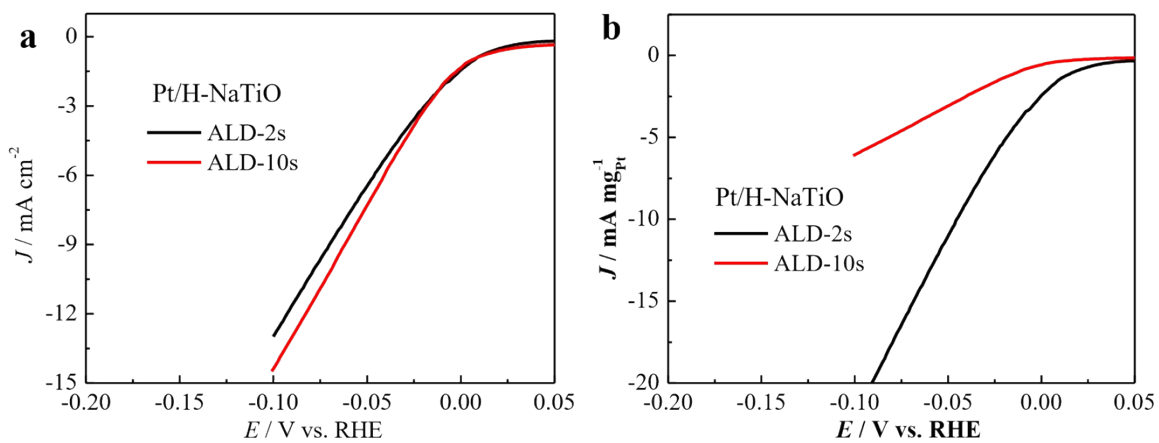


Fig. S5 Polarization curves of Pt/H-NaTiO with ALD time of 2s (Pt 0.23 wt%) and 10s (Pt 0.93 wt%) in acidic electrolyte. (a) normalized by electrode area; (b) normalized by Pt mass.

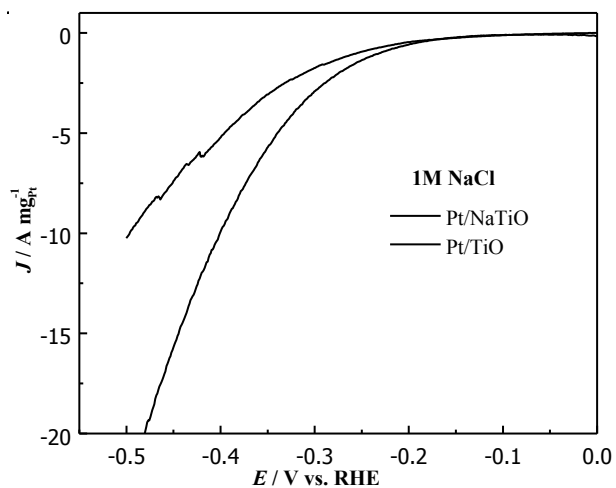


Fig. S6 HER polarization curves for Pt/NaTiO and Pt/TiO catalysts normalized by Pt mass in 1M NaCl electrolyte.

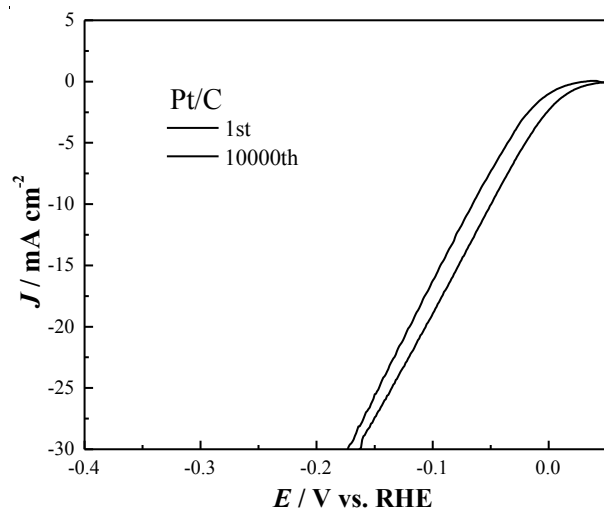


Fig. S7 HER stability after 10000 cycles for commercial Pt/C

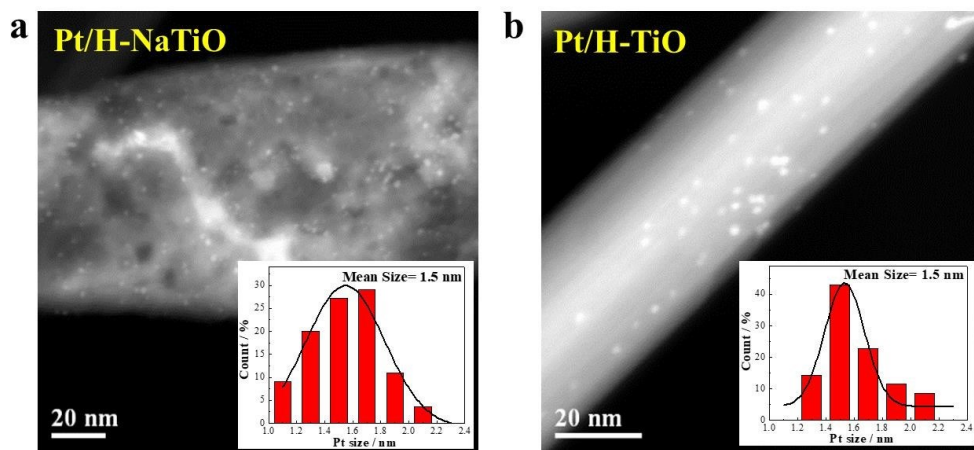


Fig. S8 TEM images for Pt/H-NaTiO and Pt/NaTiO catalysts after stability test.

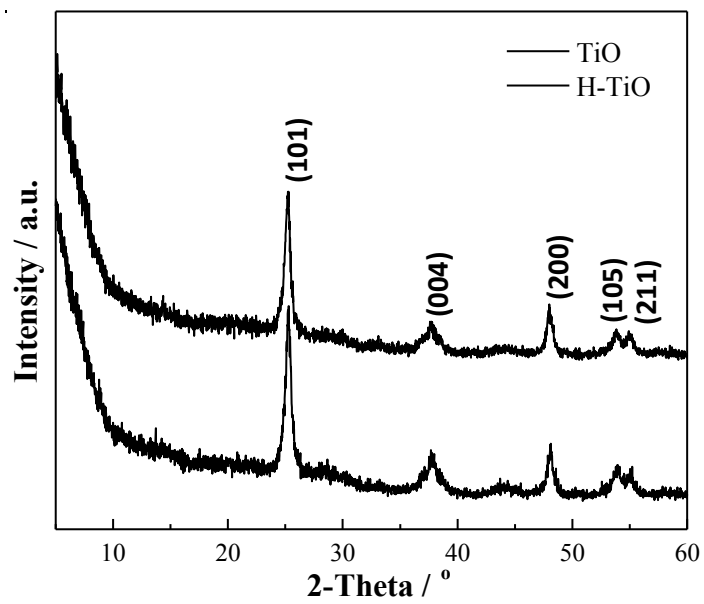


Fig. S9 XRD of Pt/TiO and Pt/H-TiO.

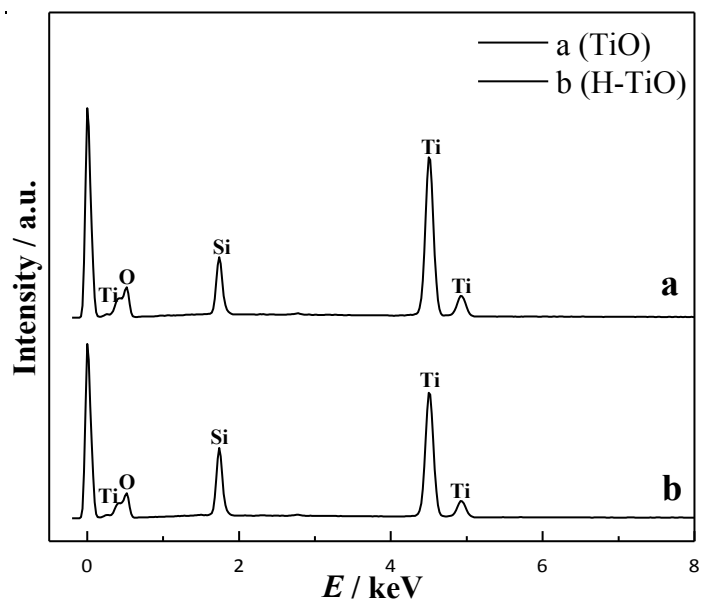


Fig. S10 EDS of Pt/TiO and Pt/H-TiO

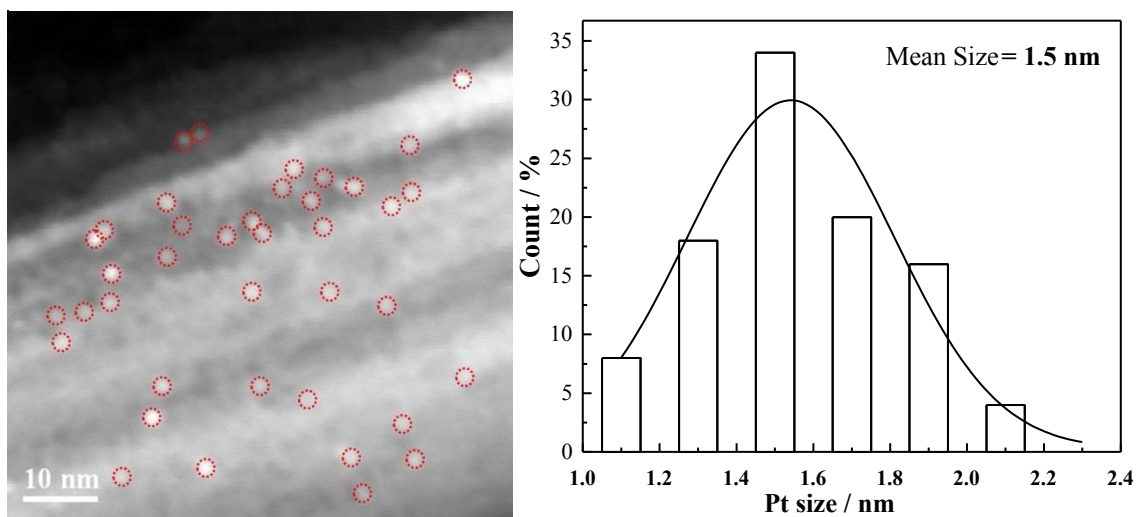


Fig. S11 HAADF-STEM image (a) of Pt/H-NaTiO and the related Pt size statistic.

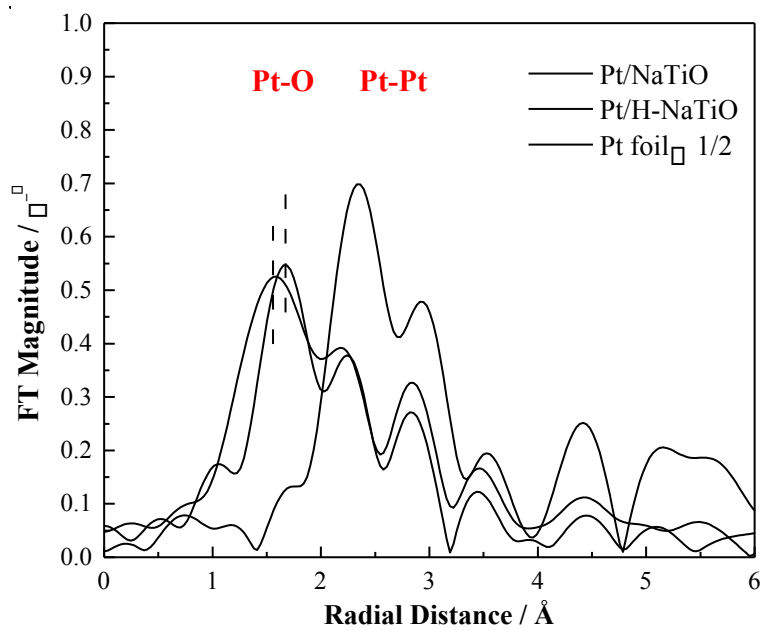


Fig. S12 Pt L<sub>3</sub>-edge EXAFS Fourier transformed (FT) spectra

Table S1 Comparison of HER performance with state-of-art Pt catalysts in literature

Samples	Electrolyte	Overpotential / mV	Mass activity / A·mg <sup>-1</sup> Pt	Supplementary references
Pt NPs/NaTiO	0.1 M HClO <sub>4</sub>	50	10.3	This work
ALD50Pt/NGNs	0.5 M H <sub>2</sub> SO <sub>4</sub>	50	10.1	1
Pt@DNA-GC	0.5 M H <sub>2</sub> SO <sub>4</sub>	50	1.33	2
Pt <sub>1</sub> /MC	0.5 M H <sub>2</sub> SO <sub>4</sub>	65	10	3
Pt <sub>3</sub> Ni <sub>2</sub> NWs-S/C	0.05 M H <sub>2</sub> SO <sub>4</sub>	70	~5.8	4
PtSA-NT-NF	1 M PBS	50	0.07	5
Pt-GDY2	0.5 M H <sub>2</sub> SO <sub>4</sub>	50	~5	6
PtNi-O/C	1 M KOH	70	7.23	7
Pt islands/Ni	0.1 M KOH	70	7.7	8
CDs/Pt-PANI	0.5 M H <sub>2</sub> SO <sub>4</sub>	50	~3	9



Table S2 Elemental contents for Pt/TiO, Pt/H-TiO, Pt/NaTiO and Pt/H-NaTiO

Samples	Na	Ti	O	Si
	Atomic%			
Pt/TiO	0	23.87	69.02	7.11
Pt/H-TiO	0	22.82	67.16	10.02
Pt/NaTiO	6.74	24.38	67.84	1.04
Pt/H-NaTiO	2.46	18.79	62.42	16.34

## Supplementary References

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