Electronic Supplementary Information

Ultrafine cobalt selenide nanowires tangled with MXene nanosheets as highly-efficient electrocatalysts toward the hydrogen evolution reaction

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Supplementary Results

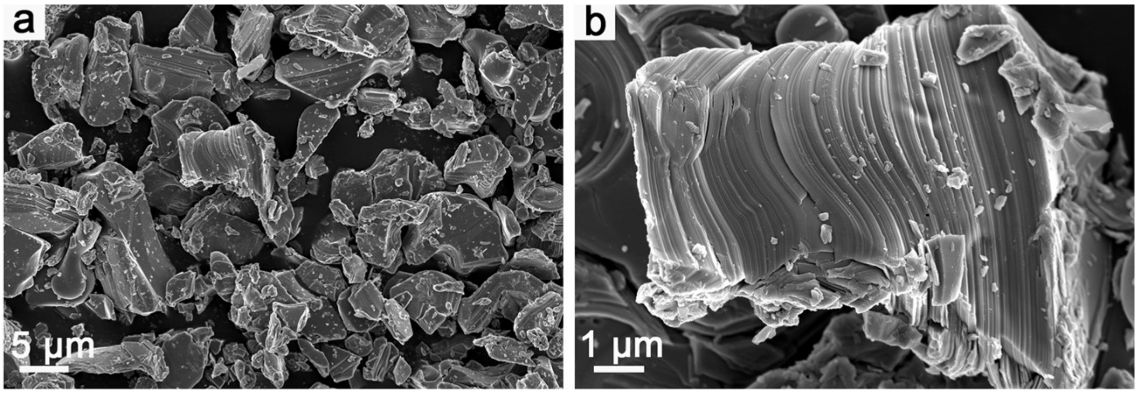

Fig. S1 Representative SEM images of bulk Ti_3AlC_2 at different magnifications.

Fig. S2 The Tyndall phenomenon of the as-obtained $Ti_3C_2T_x$ MXene suspension.

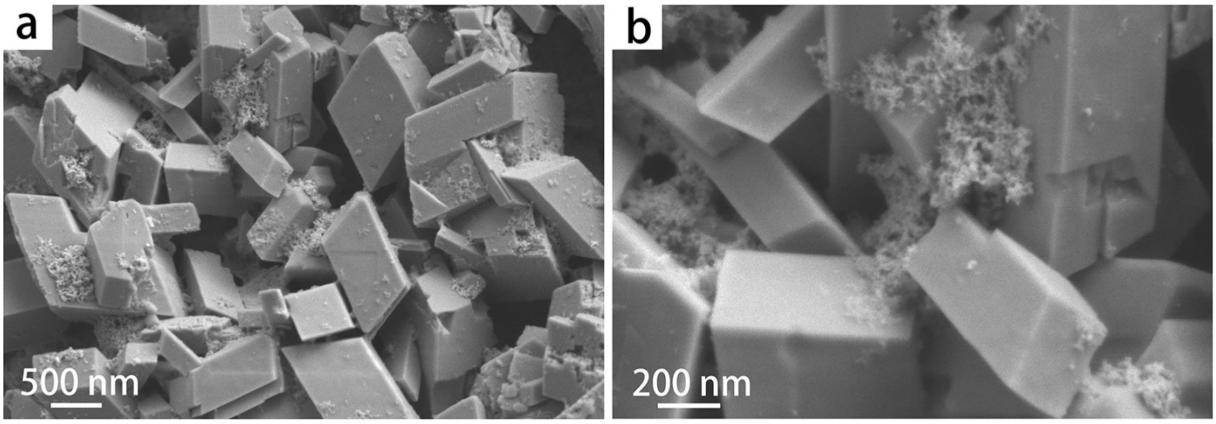

Fig. S3 Representative SEM images of bare CoSe at different magnifications.

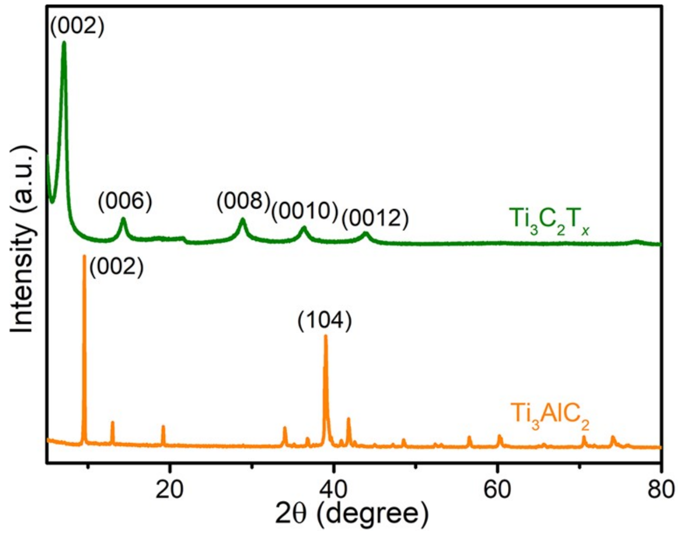

Fig. S4 Typical XRD patterns of $Ti_3C_2T_x$ nanosheets and Ti_3AlC_2 powder.

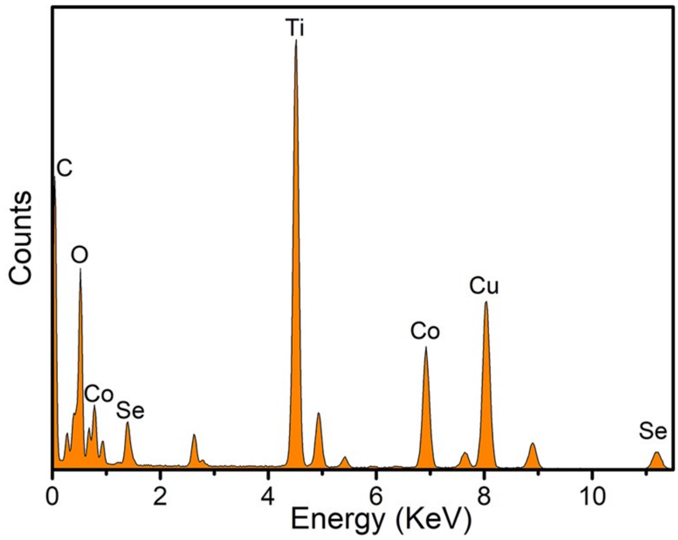

Fig. S5. EDX spectrum of the CoSe NW/$Ti_3C_2T_x$ nanoarchitecture on copper mesh discloses the presence of Ti, C, Se and Co components in the composite.

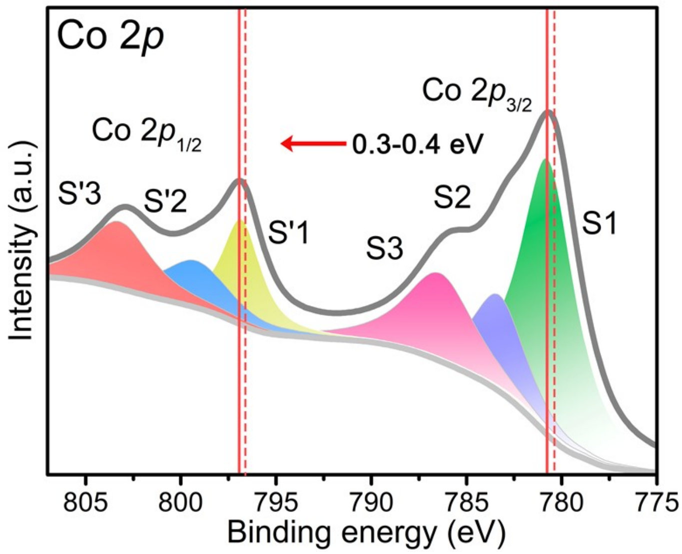

Fig. S6. The comparison of Co 2*p* XPS peaks of CoSe NW/$Ti_3C_2T_x$ with that of bare CoSe.

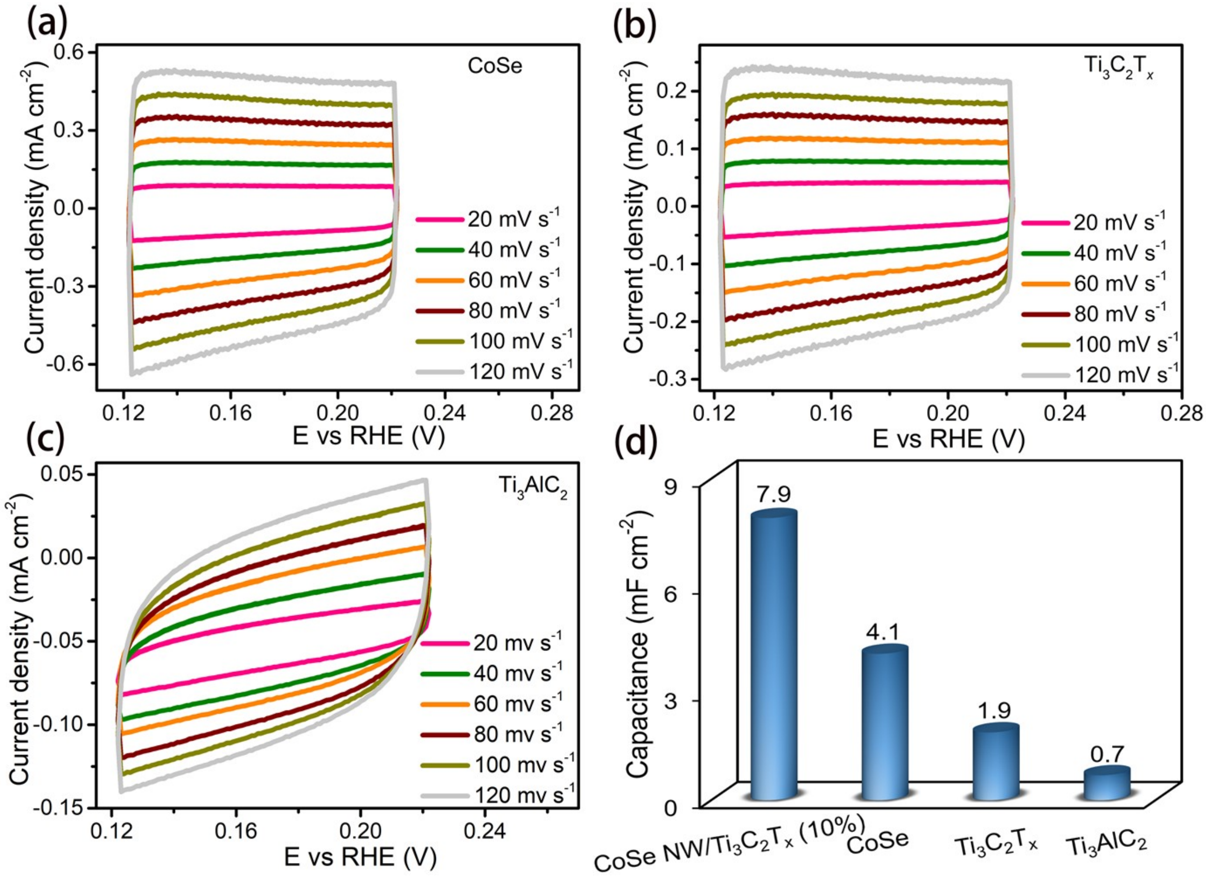

Fig. S7. The CV curve for (a) CoSe, (b) $Ti_3C_2T_x$ and (c) Ti_3AlC_2 at potential from 120 mV to 220 mV vs. RHE at scan rates from 20 to 120 mV s^{-1}. (d) The electrochemical double layer capacitance (C_{dl}) value of CoSe NW/$Ti_3C_2T_x$(5%), CoSe, $Ti_3C_2T_x$ and Ti_3AlC_2.

Table S1. Comparison of hydrogen evolution reaction activity for the CoSe NW/$Ti_3C_2T_x$(10%) catalyst with recent state-of-the-art .

Type of electrocatalyst	Electrolyte	Onset potential (mV)	Tafel slope (mV dec^{-1})	Ref.
CoSe NW/$Ti_3C_2T_x$	0.5 M H_2SO_4	84	56	This work
$MoSe_{2-x}$	0.5 M H_2SO_4	N.A.	98	S1
$Co_{0.9}Ni_{0.1}Se$	0.5 M H_2SO_4	N.A.	58	S2
$Co_{0.8}Mo_{0.2}Se$	0.5 M H_2SO_4	N.A.	~59	S3
CoSe/$MoSe_2$	0.5 M H_2SO_4	N.A.	62	S4
$MoSe_2$/NiSe	0.5 M H_2SO_4	150	56	S5
$CoSe_2$/CNT	0.5 M H_2SO_4	N.A.	98	S6
Pt/$Ti_3C_2T_x$	0.5 M H_2SO_4	N.A.	79	S7
$Ti_3C_2T_x$ nanofibers	0.5 M H_2SO_4	~100	97	S8

References

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