Electronic Supplementary Material (ESI) for Sustainable Energy & Fuels.

Supporting Information

$CrSe_2/Ti_3C_2$ MXene 2D/2D Hybrids as a Promising Candidate for Energy Storage Applications

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S1. Calculations

Three electrode configuration-

Areal capacitance (C_{Areal}) from cyclic voltammetry;

$$C_{Areal} = \frac{Area\ of\ CV\ curve}{2 * s * \vartheta * \Delta V} \quad \text{(S1)}$$

Where, s is the active area of the electrode, ν is the scan rate and ΔV is the potential window.

Areal capacitance (C_{Areal}) from galvanostatic charge discharge;

$$C_{Areal} = \frac{i * \Delta t}{s * \Delta V} \quad \text{(S2)}$$

Where, i is the applied current, Δt is the discharge time.

Areal capacitance (C_{Areal}) of ASSS from galvanostatic charge discharge;

$$C_{Areal} = \frac{i * \Delta t}{s * \Delta V} \quad \text{(S3)}$$

Energy density of ASSS;

$$E_D = \frac{1}{2} C V^2 \quad \text{(S4)}$$

Where, C is areal capacitance of ASC, V is the working window of ASC.

Power density of ASSS;

$$P_D = \frac{E_D}{\Delta t} \qquad \text{(S5)}$$

S2. Supporting Figures

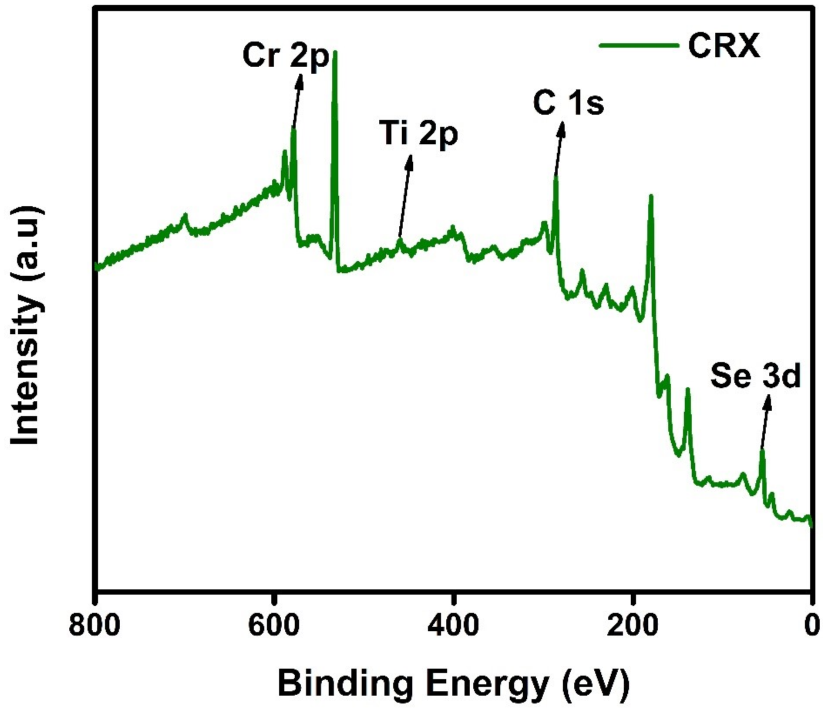

Figure S1: XPS survey spectra of CRX.

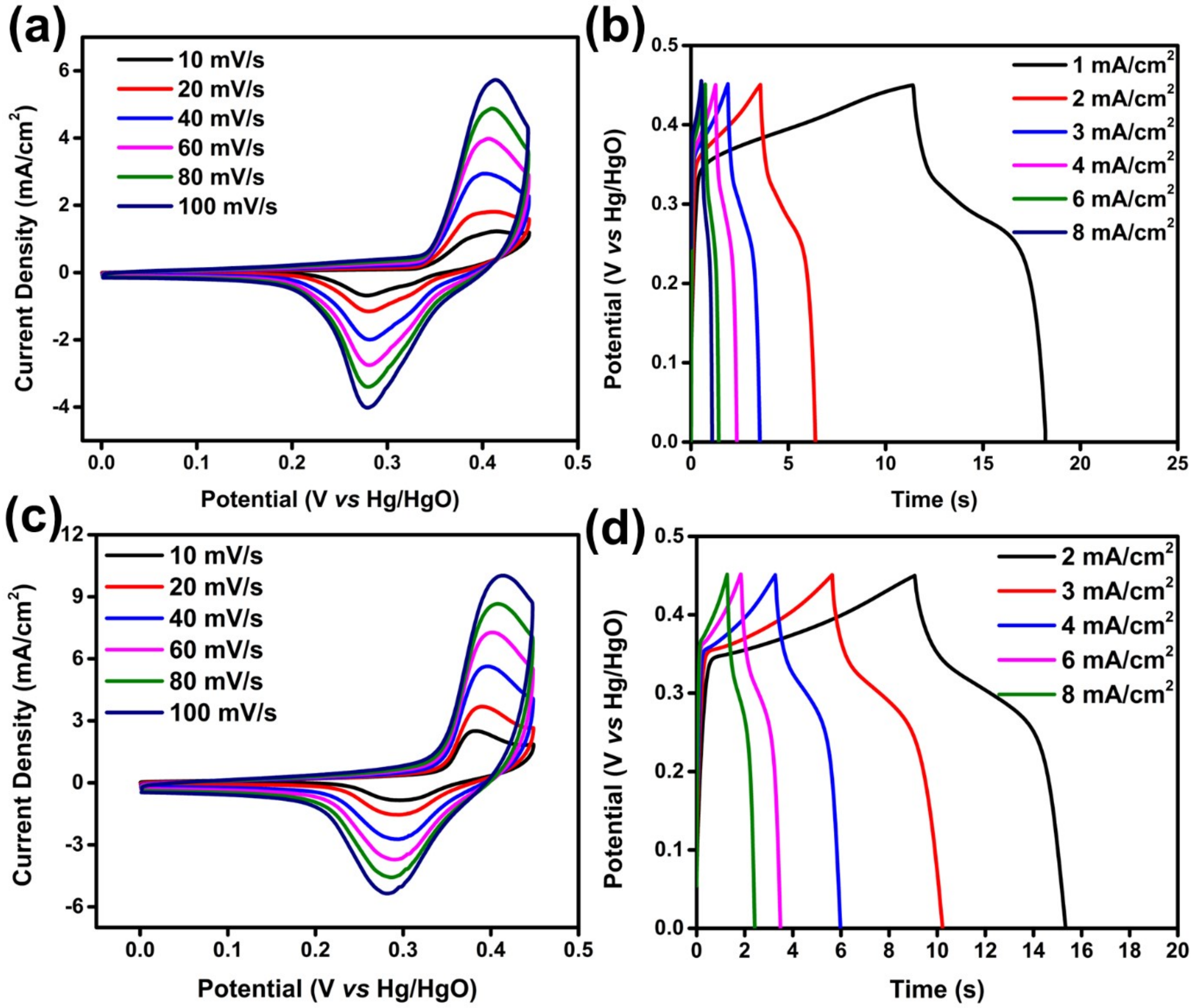

Figure S2: Three electrode analysis of $CrSe_2$ and MXene electrodes in 3M KOH. (a) CV profile and (b) GCD profile of $CrSe_2$ electrode, (c) CV profile and GCD profile of MXene electrode.

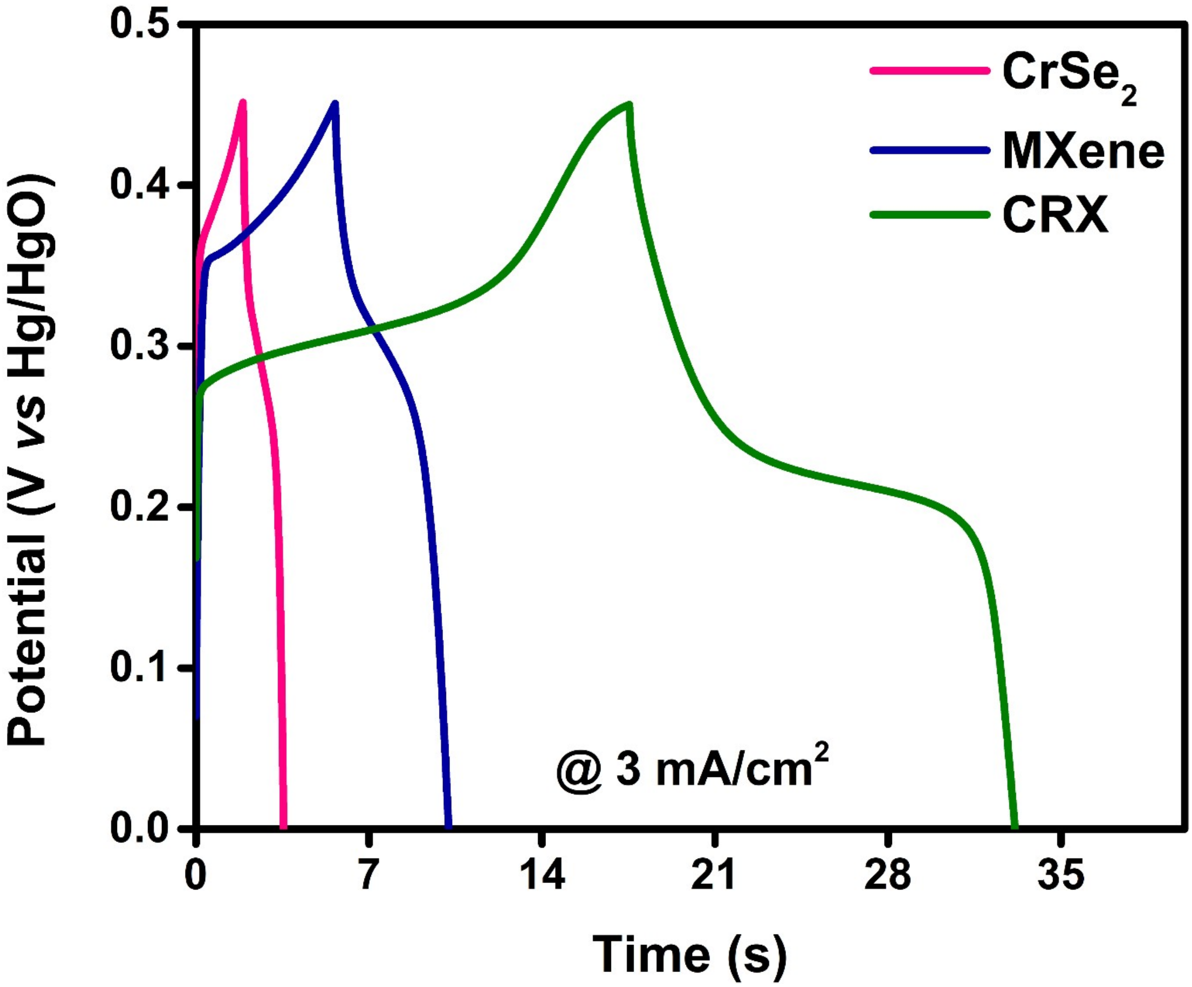

Figure S3: Comparative GCD performance of $CrSe_2$, MXene and CRX electrodes at current density of 3 mA/cm^2.

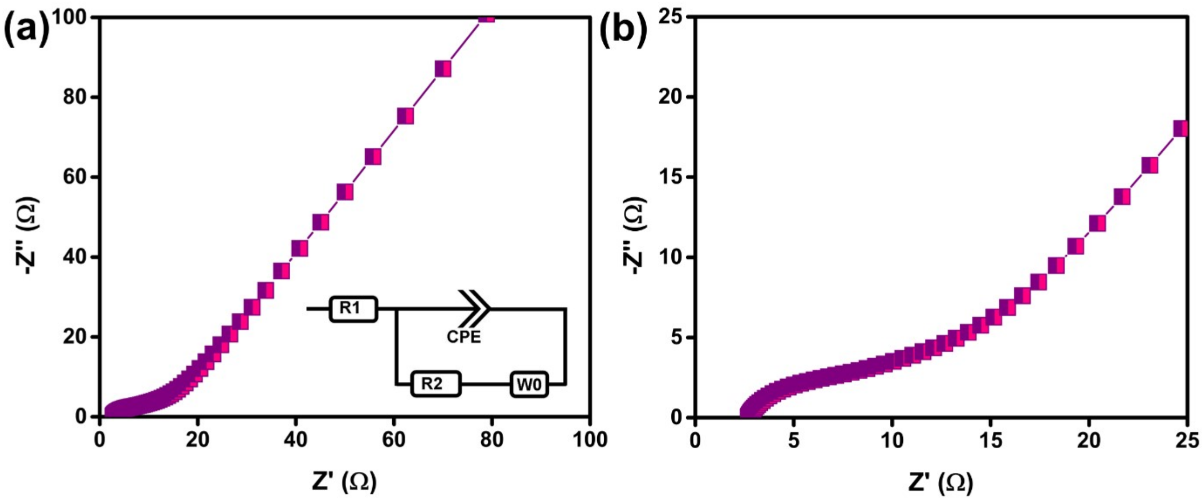

Figure S4: (a, b) Nyquist plot of the ASSS.

Table S1

Electrode	**Electrolyte**	**Energy Density and Power Density**	**Cyclic Stability**	**Ref**
PEDOT-GO/U-C	PVA/H_3PO_4	2.2 μWh/cm^2 at 200 μW/cm^2	89% (1000 cycles)	[1]
Ti@MnO_2 PDWS	PVA/LiCl	1.4 μWh/cm^2 at 580 μW/cm^2	88% (3500 cycles)	[2]
CF/MnO_2//CF/MoO_3 (asymmetric)	PVA/KOH	2.7 μWh/cm^2 at 530 μW/cm^2	89% (3000 cycles)	[3]
rGO-Ni-yarn	PVA/H_3PO_4	1.6 μWh/cm^2	96% (10000 cycles)	[4]
3D graphene	PVA/H_2SO_4	2.4 μWh/cm^2 at 25 μW/cm^2		[5]
Ti_3C_2 MXene	PVA/KOH	1.25 μWh/cm^2	92% (10000 cycles)	[6]
Graphene Film	PVA/H_2SO_4	0.0028 μWh/cm^2 and 2 μW/cm^2	98% (10000 cycles)	[7]
PANI-ZIF-67-CC	PVA/H_3PO_4	4.4 μWh/cm^2	80% (2000 cycles)	[8]
MoS_2@Ni-mesh//MnO_2@Ni-mesh (Asymmetric)	PVA-LiCl	0.86 μWh/cm^2 at 16 μW/cm^2	88% (10000 cycles)	[9]
Cu@Ni@NiCoS	PVA-KOH	0.48 μWh/cm^2 at 11.15 μW/cm^2	92% (10000 cycles)	[10]
$CrSe_2$/Ti_3C_2	**PVA/KOH**	**7.11 μWh/cm^2 at 355**	**82% (5000**	**This**

MXene		**μW/cm²**	**cycles)**	**Work**

Supporting References

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