

## Supplementary Information

### MXene-BiFeO<sub>3</sub>-ZnO nanocomposite photocatalyst served as a high-performance supercapacitor electrode

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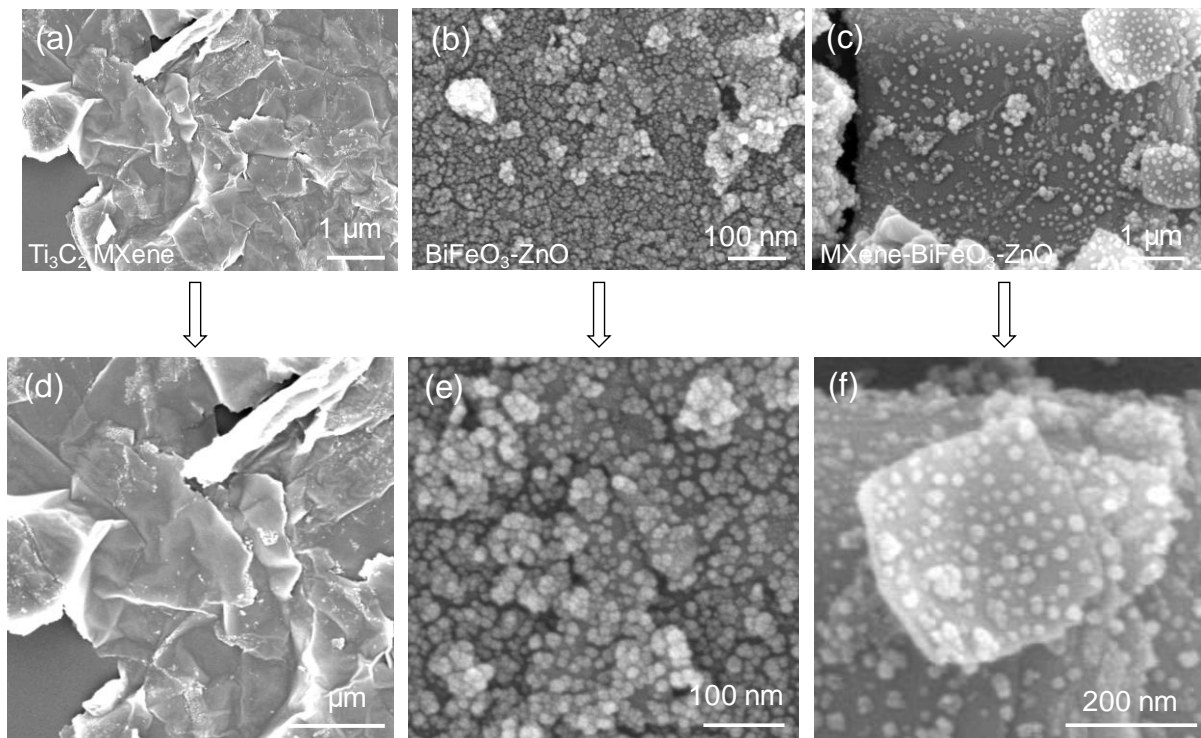
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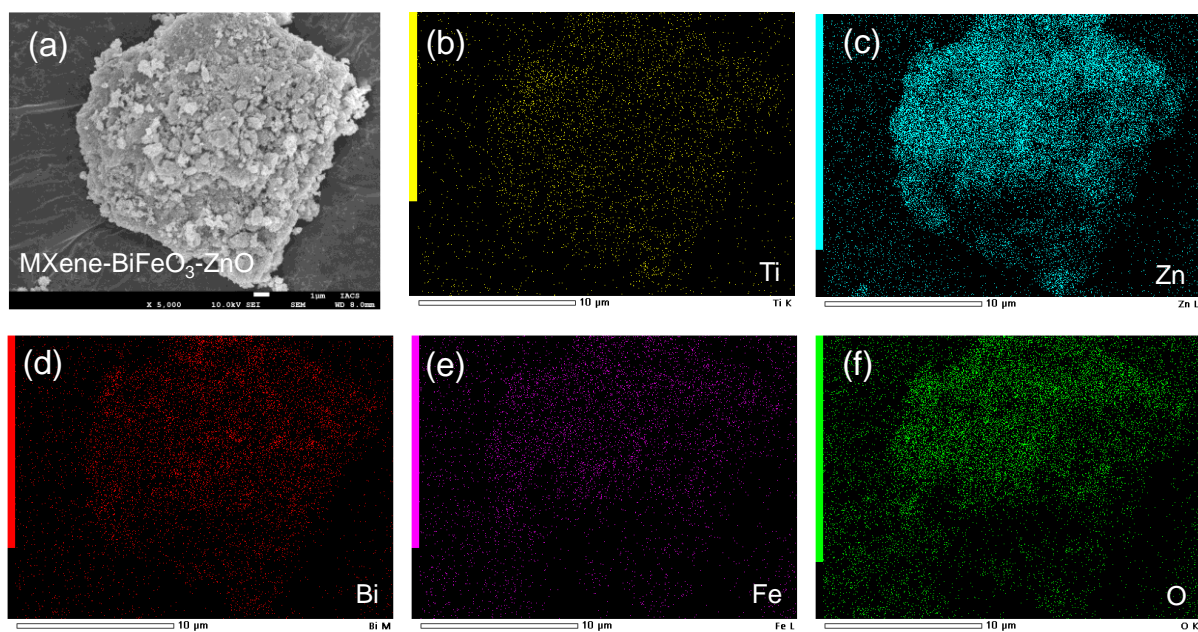
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## A. FESEM study



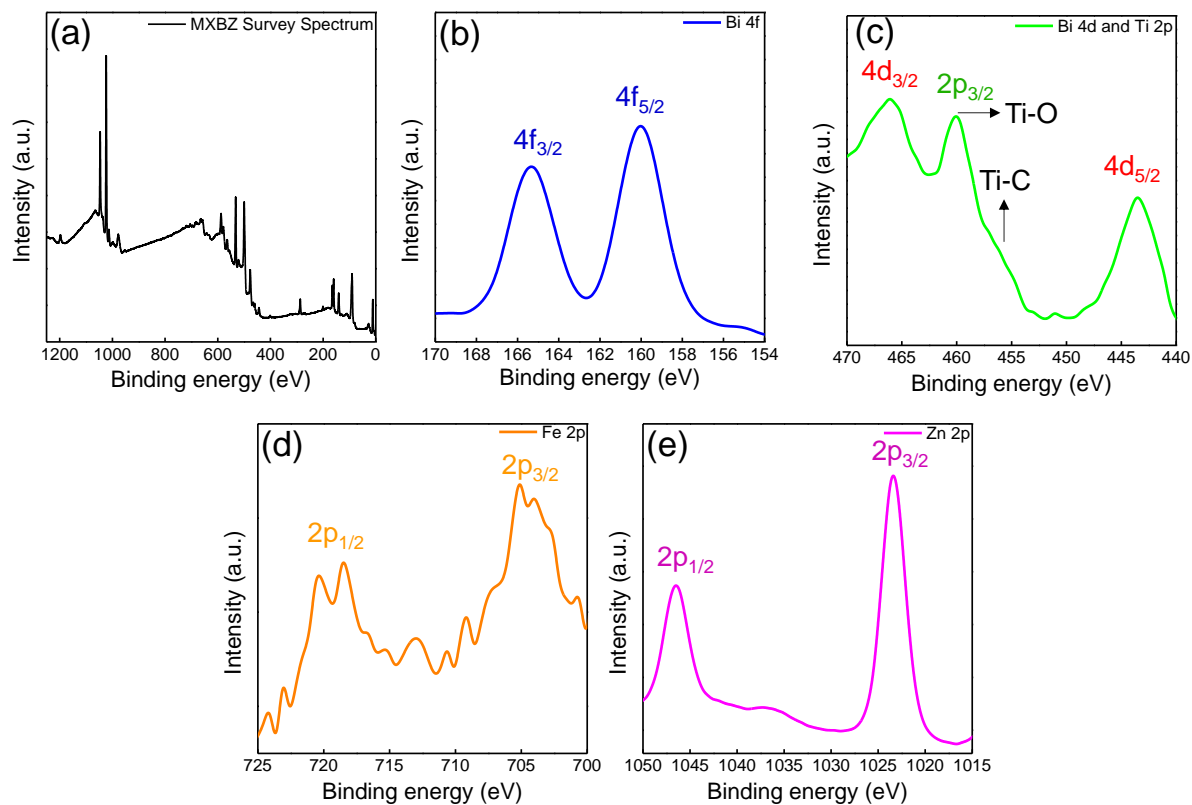
**Fig. S1.** FESEM image of MXBZ: (a-c) Large scale and (d-f) corresponding zoom-in region of pristine MXene nanosheets (a,d),  $\text{BiFeO}_3\text{-ZnO}$  (b,e), and MXene- $\text{BiFeO}_3\text{-ZnO}$  nanocomposite (c,f).

## B. FESEM elemental mapping of MXBZ



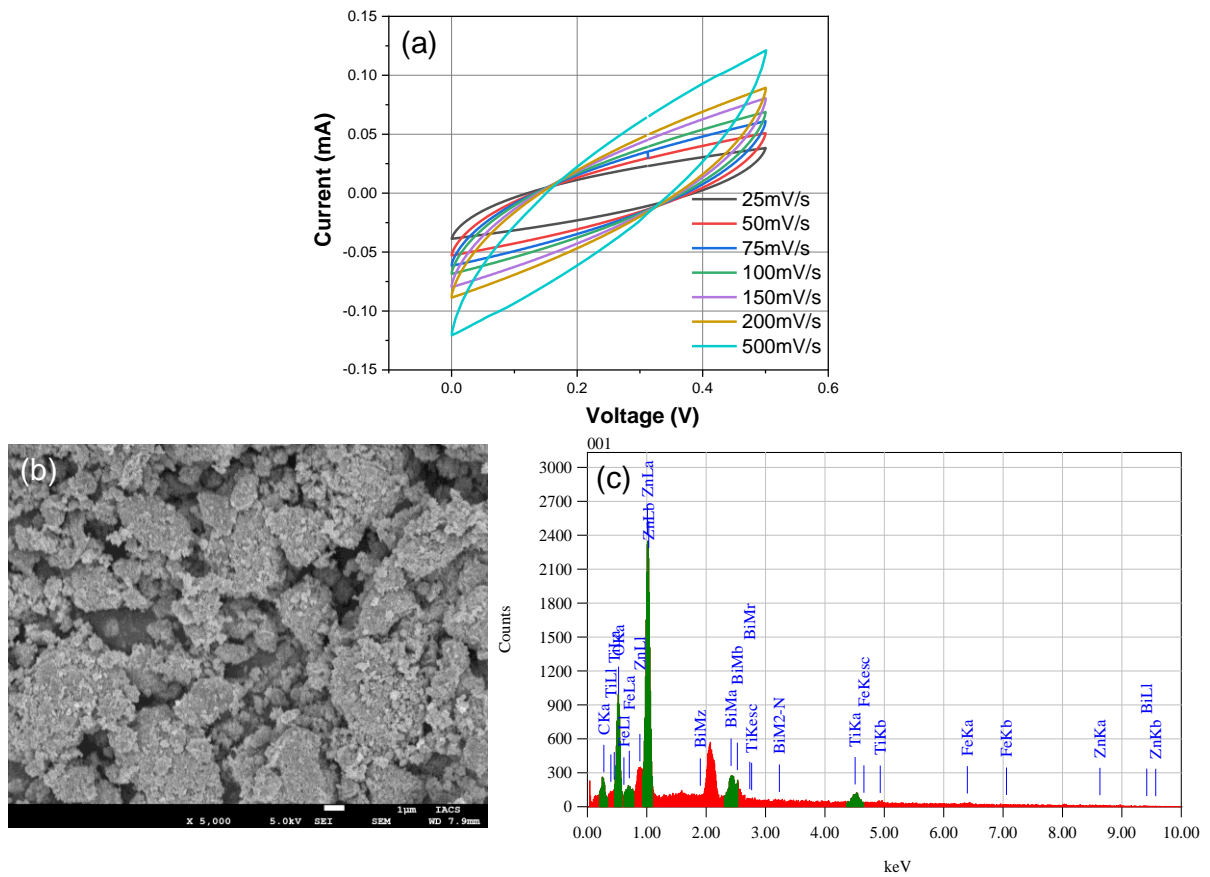
**Fig. S2.** Elemental mapping of MXBZ nanocomposite: (a) FESEM image and (b-f) corresponding elemental mapping. The colour codes for different elements are represented in the inset.

## 2. XPS analysis of MXBZ film:



**Fig. S3:** XPS analysis of MXBZ nanocomposite: (a) Survey spectrum. (b-e) Core level spectra of individual elements. The oxidation states of different elements are assigned in the peaks.

### 3. Device performance after usage



**Fig. S4.** Electrolyte performance after usage: (a) CV data after the 8000<sup>th</sup> charging-discharging cycle. (b) FESEM image and corresponding (c) EDS analysis of MXBZ nanocomposite film after 8000<sup>th</sup> charging-discharging cycles.

#### 4. Comparison of the electrochemical performance:

**Table S1:** Comparison table of supercapacitor electrode

Electrode	Electrolyte	Specific capacitance	Energy density	Cyclic stability	Reference
BiFeO <sub>3</sub>	1 M NaOH	81 F/g at 1 mA	6.6832 J g <sup>-1</sup>	1000	1
ZnO (Photo supercapacitor)	-	1.65 mF/g	78.1 mWh kg <sup>-1</sup>	3000	2
NiO/ZnO	1M Na <sub>2</sub> SO <sub>4</sub>	469 F/g at 1 mA/g	91.14 Wh/kg <sup>-1</sup>	5000	3
3D graphene-ZnO nanorod	-	554.23 F/g at 5 mV/s	-	2300	4
BiFeO <sub>3</sub> -TiO <sub>2</sub>	0.5 M Na <sub>2</sub> SO <sub>4</sub>	440 F/g at 1.1 A/g 350 F/g at 2.5 A/g	46.5 Wh/kg <sup>-1</sup>	1200	5
BiFeO <sub>3</sub> -Graphene	1 M Na <sub>2</sub> SO <sub>4</sub>	17-4 mF/cm <sup>2</sup> at 5-100 mV/s	-	2000	6
BFO/graphene	1 M Na <sub>2</sub> SO <sub>4</sub>	9 mF/ cm <sup>2</sup> at 0-0.9 V	0.2-0.6 Wh/kg.	1000	7
BiFeO <sub>3</sub> /Cr <sub>2</sub> CT <sub>x</sub>	1 M KOH	671.2 C g <sup>-1</sup> At 1 A g <sup>-1</sup>	-	3000	8
CoFe <sub>2</sub> O <sub>4</sub> /MXene	1 M KOH	1268.75 F/g at 1 A/g	-	5000	9
WO <sub>3</sub> -MXene	0.5 M H <sub>2</sub> SO <sub>4</sub>	297 F/g at 1 A/g	-	5000	10
NiFe-LDH/MXene	1 M KOH	720.2 F/g at 1 A/g	42.4 Wh kg <sup>-1</sup>	1000	11
NiCoFe-LDH/Ti <sub>3</sub> C <sub>2</sub>	1 M KOH	1990 F/g at 1 A/g	54.4 Wh kg <sup>-1</sup>	5000	12
Ti <sub>3</sub> C <sub>2</sub> T <sub>x</sub> /RGO	PVA-H <sub>2</sub> SO <sub>4</sub>	18.6 mF/cm <sup>2</sup> at 1 A/g	-	10000	13
<b>MXBZ</b>	<b>Sodium Sulfate + NaCMC polymer</b>	<b>142.8 mF/cm<sup>2</sup> at 7 μA/cm<sup>2</sup></b>	<b>1.65 μWh/cm<sup>2</sup></b>	<b>8000</b>	<b>This work</b>

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