Supporting Information

Quantum Dot:MXene Interacted Bulk Heterojunction for Efficient Infrared Self-powered Photodetector

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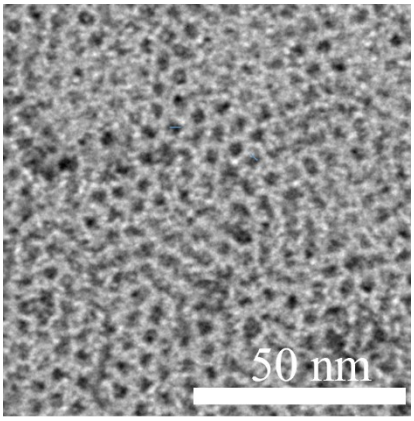

Figuere S1. TEM image of PbS QDs.

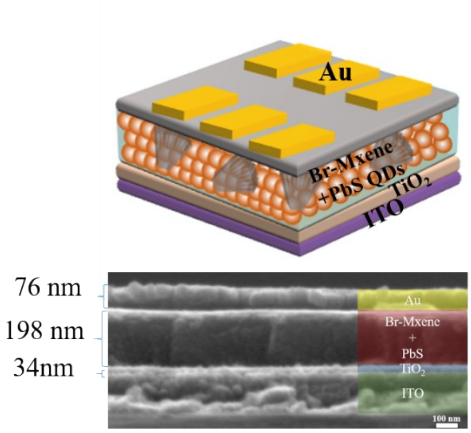

Figure S2. Skeleton of photovoltaic self-powered photodetector and the thickness of each layer extracted from cross-sectional SEM image of the device.

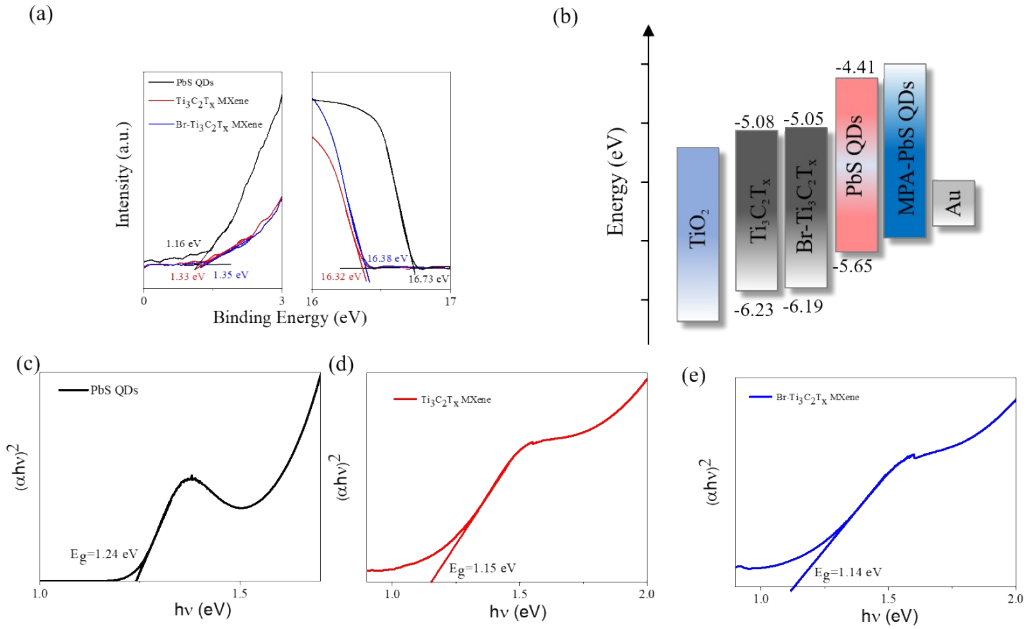

Figure S3. (a) UPS spectra of different films; (b) Schematic illustration of energy level diagram of different; Tauc plot of the (c) PbS QDs film, (d) $Ti_3C_2T_X$ MXene film and (e) Br-$Ti_3C_2T_X$ MXene film.

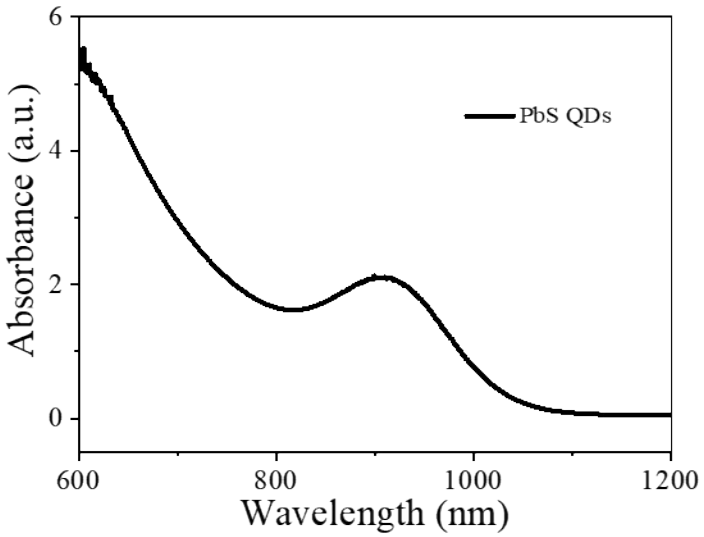

Figure S4. UV-vis-NIR absorption spectra of the PbS QDs.

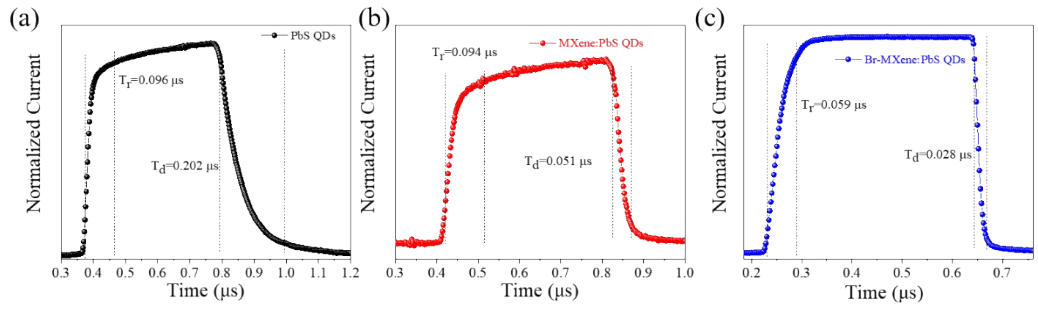

Figure S5. Rising and falling edges of one response cycle for determining the response time of the (a) PbS QDs PDs, (b) MXene: PbS QDs PDs and (c) Br-MXene: PbS QDs PDs.

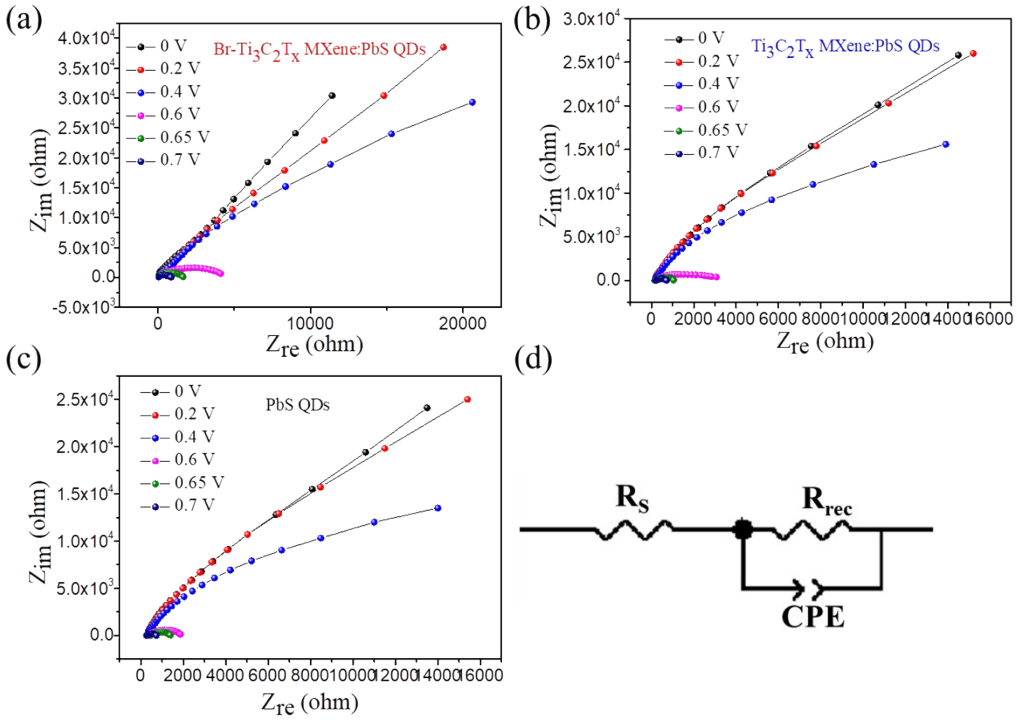

Figure S6. (a) EIS spectra of the Br-$Ti_3C_2T_x$ MXene:PbS QDs BHJ based device under different bias; (b) EIS spectra of the $Ti_3C_2T_x$ MXene:PbS QDs BHJ based device under different bias; (c) EIS spectra of the pure PbS QDs device under different bias; (d) The equivalent circuit model.

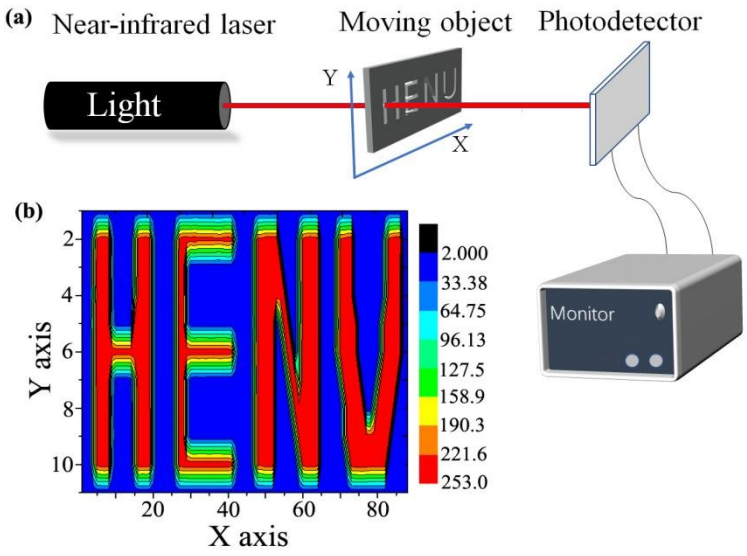

Figure S7. (a) Schematic illustration of the imaging process. (b) The imaging result with the symbol "HENU" as the detecting object.

Table S1 Photovoltaic parameters of the three devices

	V_{OC} (V)	J_{SC} (mA cm^{-2})	FF (%)	PCE (%)
PbS QDs	0.632	13.5	50.87	4.3
MXene:PbS QDs	0.645	15.9	54.75	5.6
Br- MXene:PbS QDs	0.653	17.3	61.12	6.9

Table S2. Fitting results for the three films shown in Fig. 2d

Samples	A_1	τ_1 (ns)	A_2	τ_2 (ns)	τ_{ave} (ns)
PbS QDs	1.44	20.50	1.79	20.50	20.50
MXene:PbS QDs	2.21	16.97	1.83	16.97	16.97
Br-MXene:PbS QDs	1.99	14.30	3.02	14.30	14.30