Supporting Information

Stability and Photocurrent Enhancement of Photodetectors by Core/Shell Structured $CsPbBr_3/TiO_2$ Quantum Dot and 2D Materials

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Synthesis of $CsPbBr_3$ in Cs_4PbBr_6 QDs

Figure S1 shows XRD and absorbance curves of $CsPbBr_3$ in Cs_4PbBr_6 QDs, when CsBr: $PbBr_2$ molar ratio was 1:1.

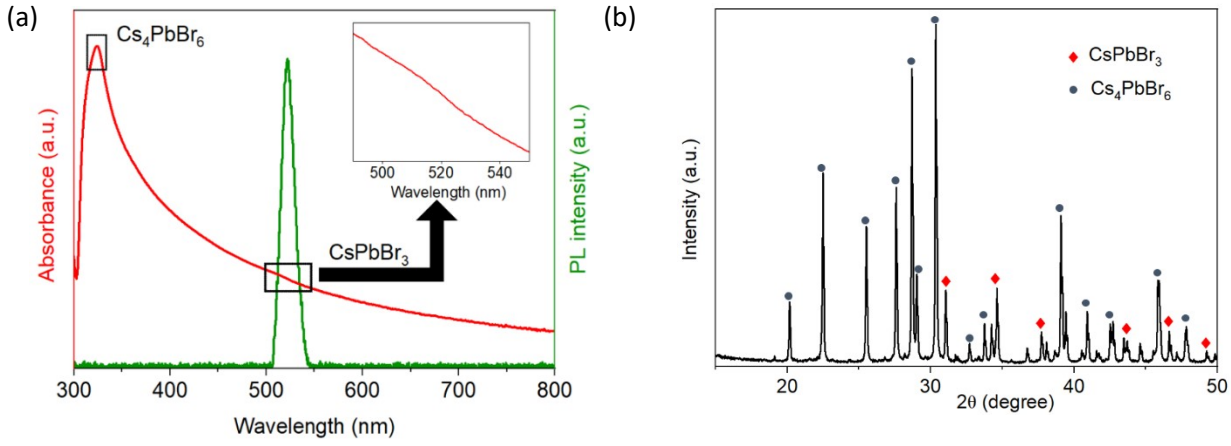

Figure S1: (a) Absorption and emission (b) XRD spectrum of $CsPbBr_3$ in Cs_4PbBr_6 QDs.

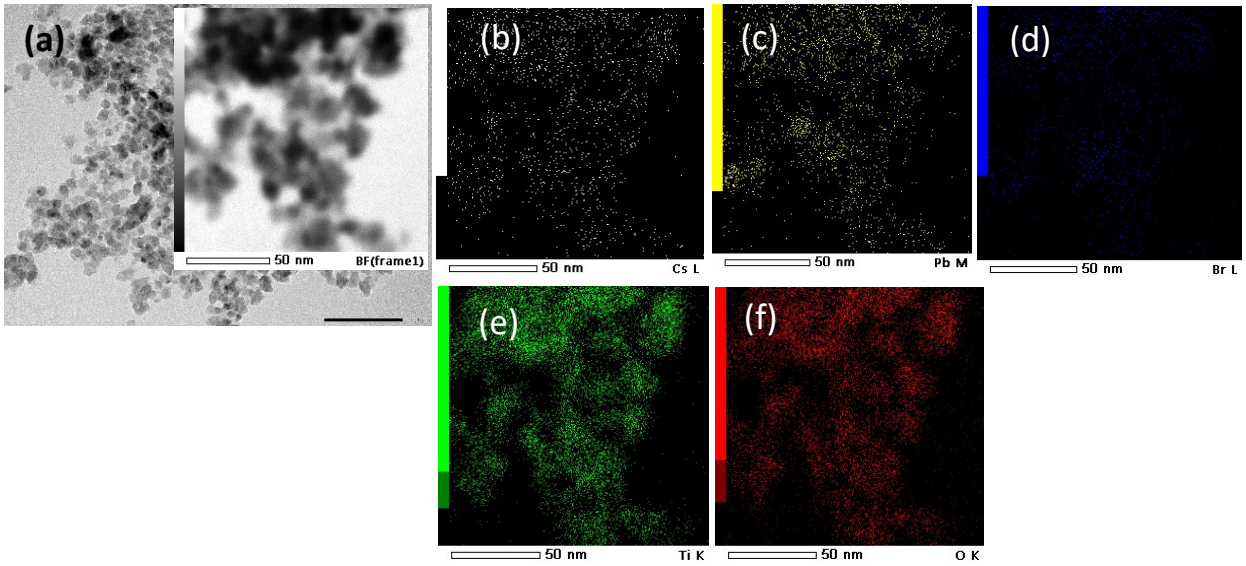

Figure S2: (a) TEM image of $CsPbBr_3/TiO_2$ – core/shell structure along with the energy dispersive X-ray (EDX) elemental mapping profiles of (b-f) Cs, Pb, Br, Ti and O

$$Responsivity\ (R)(A/W) = \frac{I_{light} - I_{dark}}{P_{inc} \times A_{active\ cross\ section}}$$

$$P_{inc} = laser\ power\ density$$

$$EQE = \frac{h \times c \times R}{e \times \lambda}$$

$$D^* = \sqrt{\frac{A}{2e \times I_{dark}}} \times R$$

Table S1: Device performance of three PDs at 5 V.

PD	I_{ill}	I_{dark}	ΔI_{ph}	Response time (seconds)	Responsivity (R) (A/W)	EQE(%)	Detectivity (Jones)
$CsPbBr_3$ QDs PD	8 ± 0.5 nA	0 ± 0.5 nA	8.5 ± 0.5 nA	2.63	0.1	2.89×10^{-1}	3.9×10^{13}
$CsPbBr_3/TiO_2$ PD	38 ± 0.5 nA	20 ± 0.5 nA	18 ± 0.5 nA	3.63	0.22	6.12×10^{-1}	6.8×10^{12}
$CsPbBr_3/TiO_2$/ MXene PD	750 ± 1 µA	450 ± 1 µA	300 ± 1 µA	2.59	3696	1.02×10^4	7.6×10^{14}

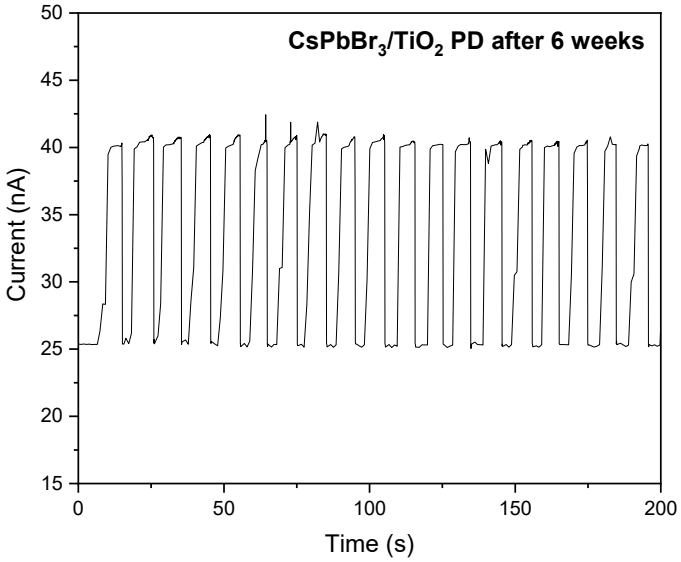

Figure S3 photocurrent – time response of the CsPbBr3/ TiO2 photodetector measured in the dark and under illumination of blue laser with 200s alternatively pulse after storage in nitrogen box for six weeks.

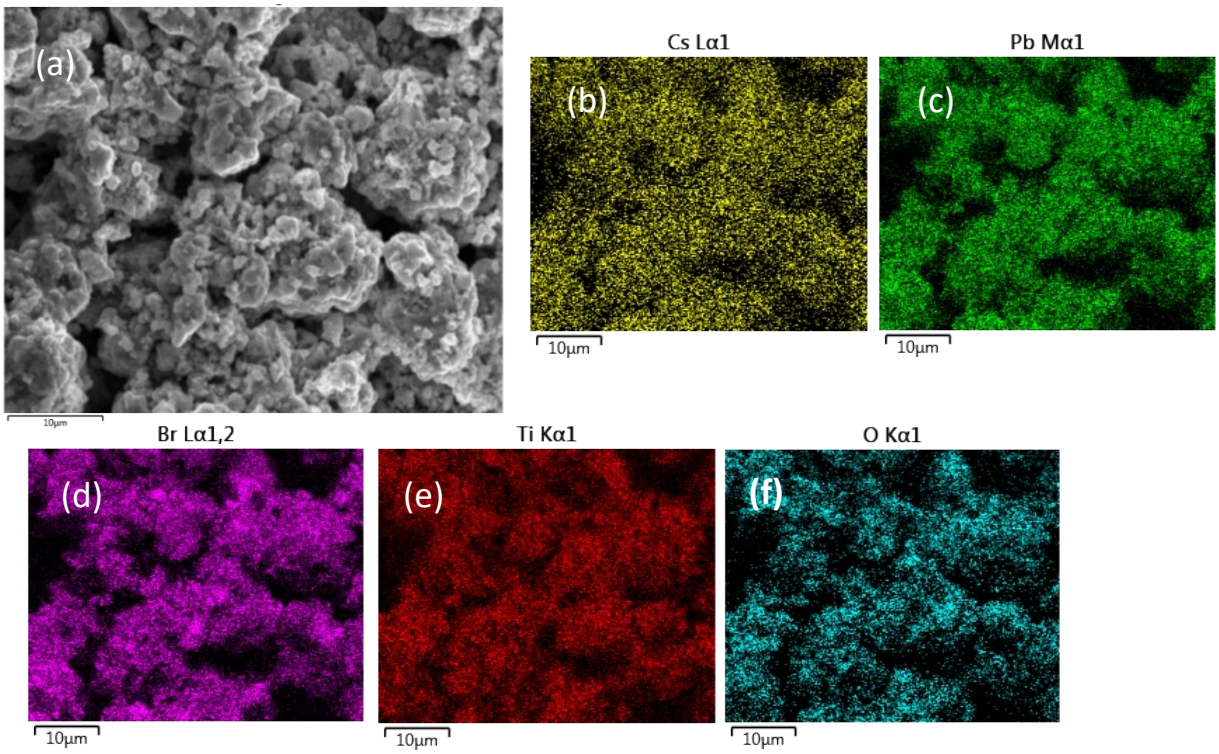

Figure S4: (a) SEM image of $CsPbBr_3/TiO_2$ PD along with the energy dispersive X-ray (EDX) elemental mapping profiles of (b-f) Cs, Pb, Br, Ti and O

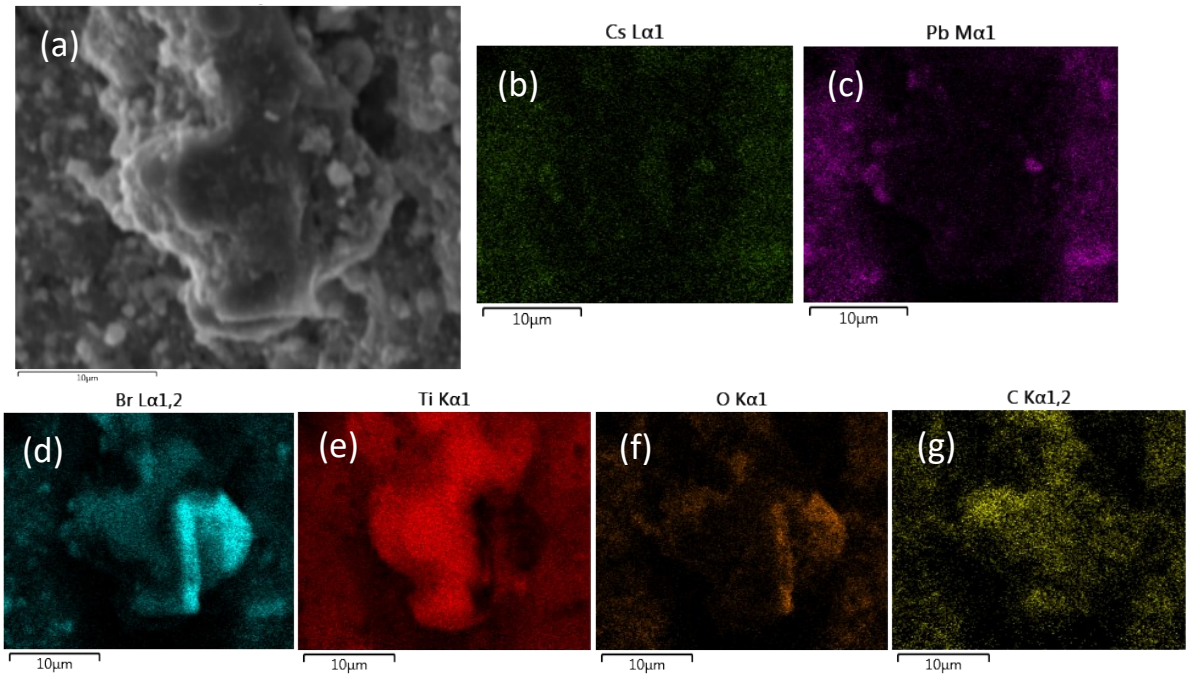

Figure S5: (a) SEM image of CsPbBr3/ TiO_2/MXene PD along with the energy dispersive X-ray (EDX) elemental mapping profiles of (b-g) Cs, Pb, Br, Ti, O and C