Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting Information

Passivating the Vacancy Defects of $CsPbCl_3$ Polycrystalline Films by a Cl-Containing Ionic Liquid for Self-Powered, Charge-Transport-Layer-Free UV Photodetectors

Siyi Cheng[a], Xin Zheng[c], Zeliang Hou[a], Ruyi Hu[a], Shulan Jiang[a], Shuang Xi[b], Guojun Wen[a]*, Xingyue Liu[a]*

[a] *School of Mechanical Engineering and Electronic Information, China University of Geosciences (Wuhan), Wuhan 430074, China*

[b] *School of Mechanical and Electronic Engineering, Nanjing Forestry University, Nanjing 210037, China*

[c] *Michael Grätzel Center for Mesoscopic Solar Cells, Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology, Wuhan, Hubei, China*

** Address correspondence to (X. Liu) liuxingyue@cug.edu.cn; (G. Wen) wenguojun@cug.edu.cn.*

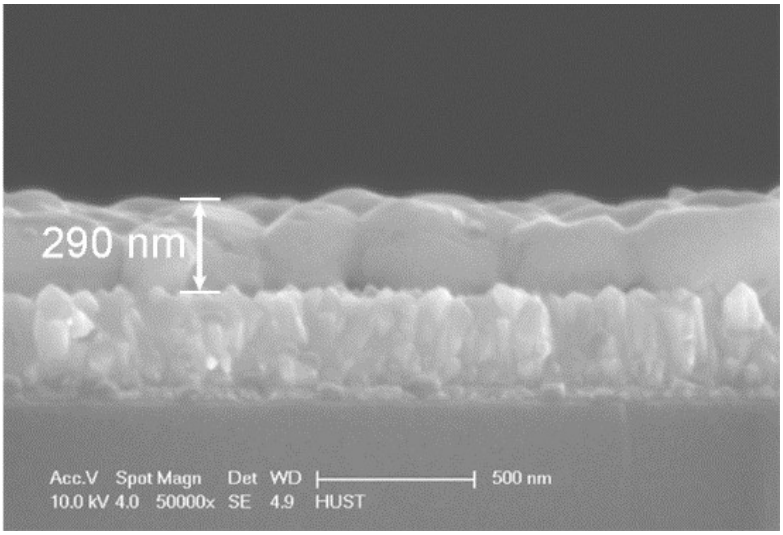

Fig. S1 The cross-sectional SEM image of the $CsPbCl_3$ film.

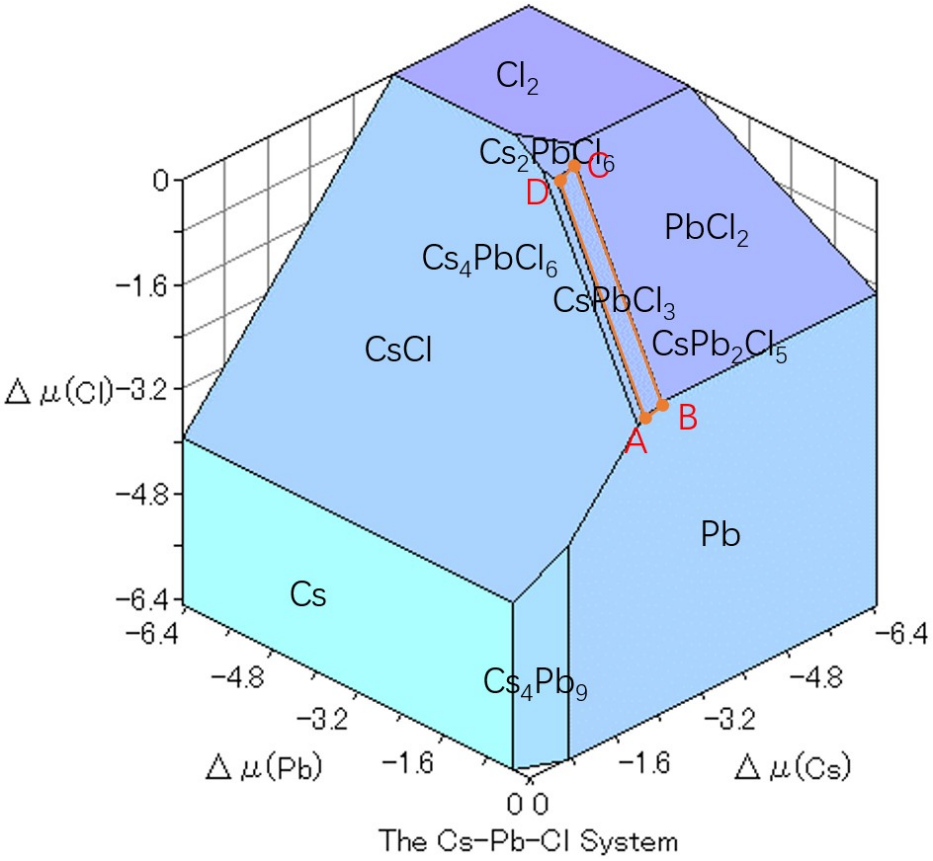

Fig. S2 The calculated chemical phase diagram of the Cs-Pb-Cl system.

Table S1 The total energies (E_{total}), crystal system, and space group of Cs-Pb-Cl and possible phases.

Formula	E_{Bulk} (eV)	Crystal system	Space Group
Cs	-0.843	Cubic	$Im3m$ (229)
Pb	-3.550	cubic	Fm3m [225]
Cl_2(g)	-1.838	-	-
CsCl	-6.639	cubic	Fm3m [225]
$PbCl_2$	-10.719	tetragonal	$P4_2/mnm$ [136]
Cs_4Pb_9	-38.201	monoclinic	$P2_1/c$ [14]
$CsPbCl_3$	-17.620	tetragonal	P4/mbm [127]
Cs_2PbCl_6	-28.415	cubic	Fm3m [225]
$CsPb_2Cl_5$	-28.347	tetragonal	I4/mcm [140]
Cs_4PbCl_6	-37.666	trigonal	R3c [167]

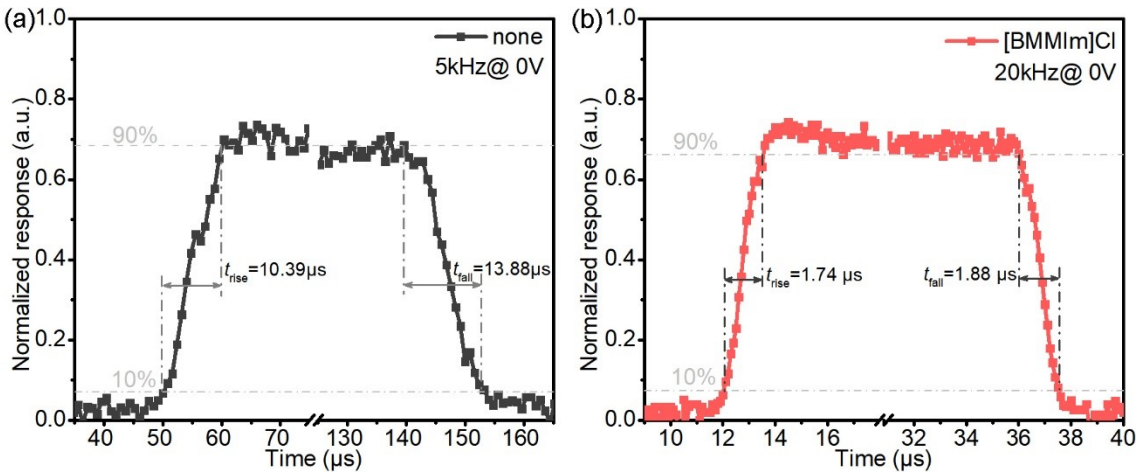

Fig. S3 The amplified $I_{ph\text{-}t}$ curves of the (a) non-modified and (b) [BMMIm]Cl-modified photodetectors.

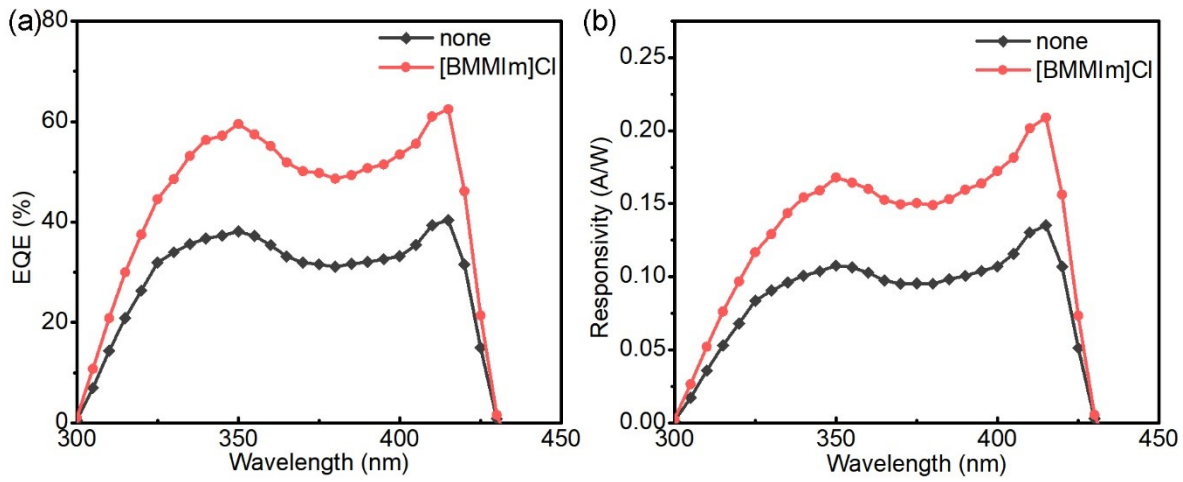

Fig. S4 (a) The EQE and (b) calculated responsivity of the non-modified and [BMMIm]Cl-modified PDs.