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

Supporting Information

Formamidinium Iodide for Instantaneous and Fluorescent Detection of Pb^{2+} in Water

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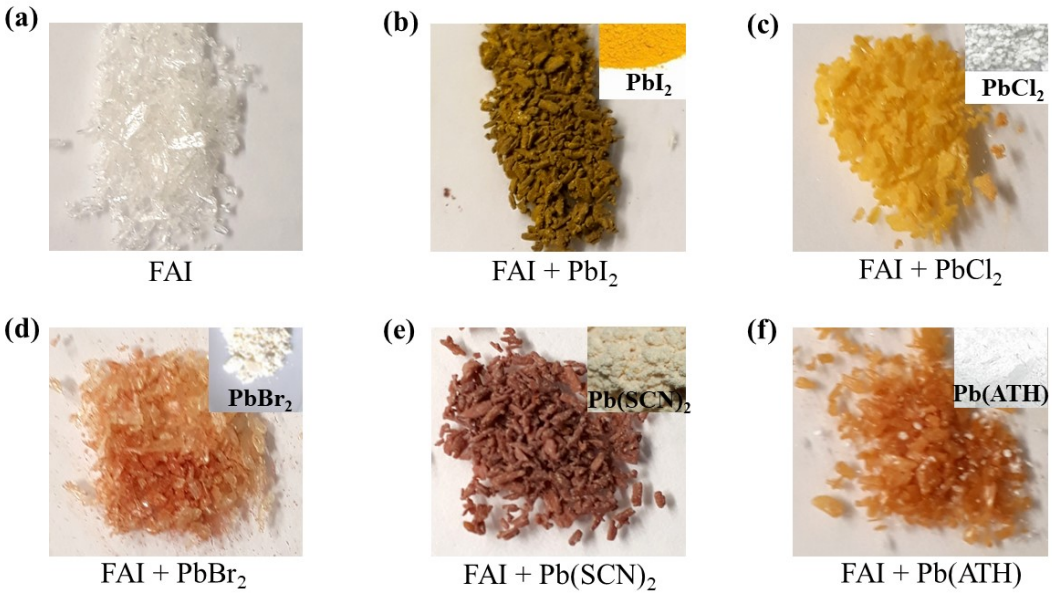

Figure S1. a) FAI powder. b-f) Photographs of FAI after mixing (5:1) with different Pb^{2+} species like PbI_2, $PbCl_2$, $PbBr_2$, $Pb(SCN)_2$, $Pb(CH_3COO)_2 \cdot 3H_2O$. Here Pb(ATH) stands for Lead (II) Acetate Trihydrate or $Pb(CH_3COO)_2 \cdot 3H_2O$.

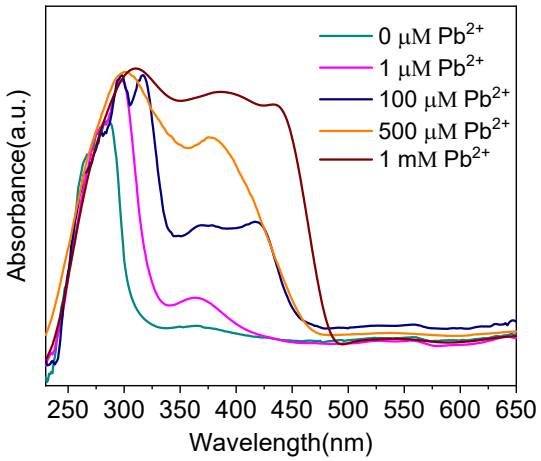

Figure S2. UV-Vis absorbance spectra of sensing solutions with different concentrations of Pb^{2+}.

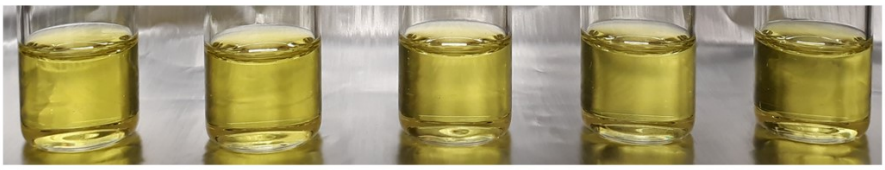

Figure S3. Images of sensing solutions with 1 mM Pb^{2+} from different source compounds.

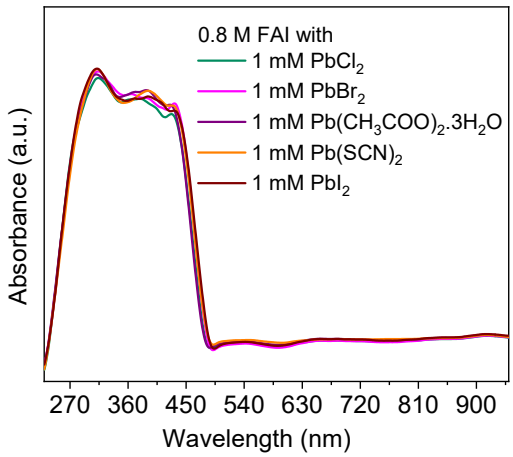

Figure S4. UV-Vis absorbance spectra of sensing solutions with 1 mM Pb^{2+} from different source compounds.

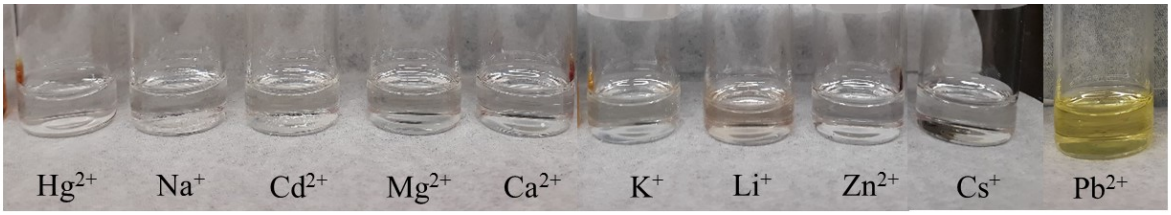

Figure S5. Images of sensing solutions with different metal ions at 500 µM.

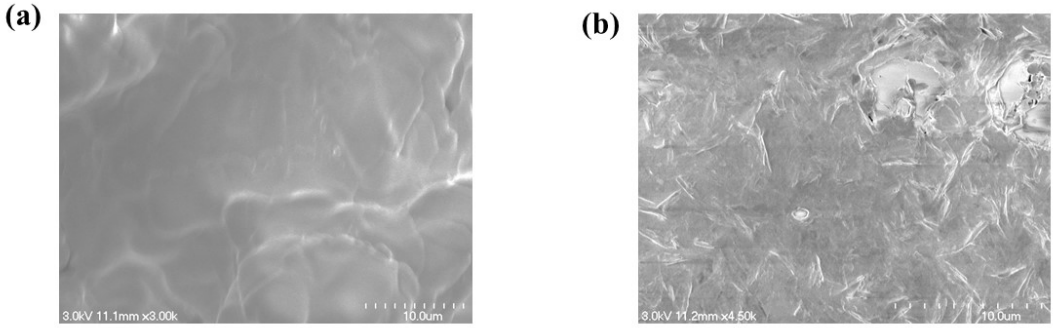

Figure S6. SEM images of a) FAI b) PbI_2.

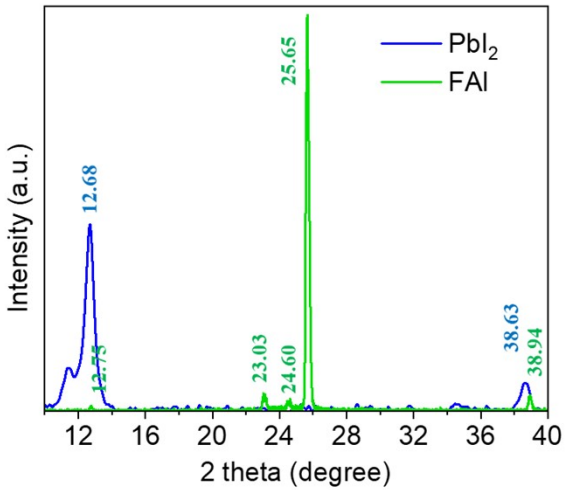

Figure S7. XRD of FAI and PbI_2.

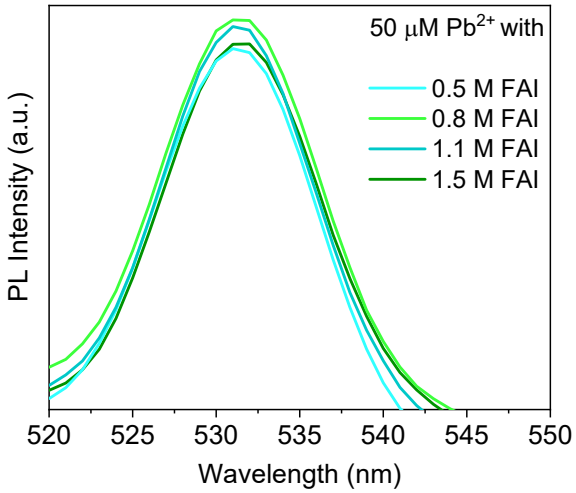

Figure S8. PL spectra of $FAPbI_3$ solutions at different FAI concentrations.

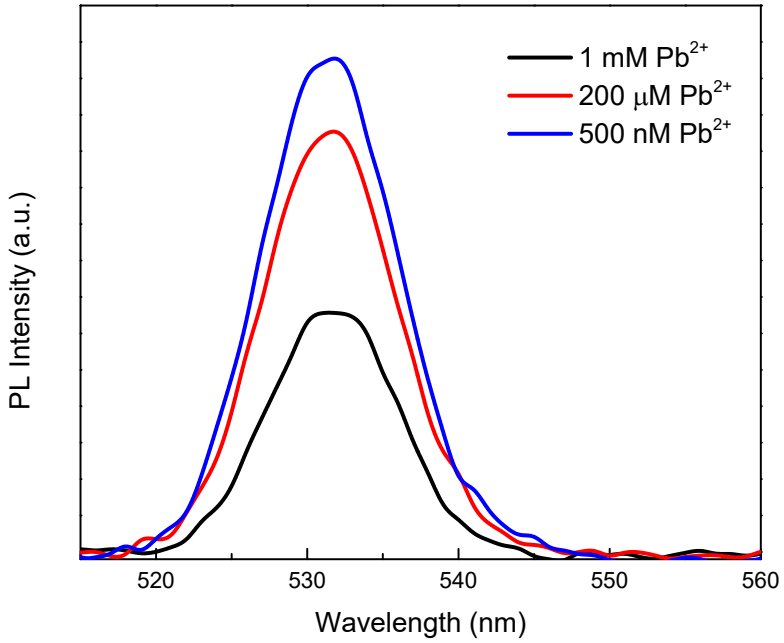

Figure S9. PL spectra of $FAPbI_3$ solutions with tap water samples

Table S1: Electrostatic potential (ESP) of FA^+ under vacuum, DMF, and water

Material	Atom	Vacuum (kJ/mol)	DMF (kJ/mol)	Water (kJ/mol)
FA^+	N-C-N[a]	735.258	740.369	740.814

[a]Electrons are delocalized on the resonance structure of N-C-N

Table S2. Comparison of sensing performance among different Pb^{2+} sensors.

Modifications	LOD (nM)	LDR (nM)	Methods	References
$FAPbI_3$ perovskite	100 nM	100 nM - 1 mM	Colorimetric and Fluorometric	This work
$CH_3NH_3PbBr_3$ perovskite	1.6 mM	1.6 - 200 mM	Fluorometric	[1]
AlGaN/GaN	0.0576 nM	0.5 - 20 nM	HEMT	[2]
1T and 2H MoS_2	0.031 nM	-	Electrochemical	[3]

Metal-organic framework (MOF)	7.7 pM	-	Fluorometric	[4]
Delonix regia leaf-derived CQDs	3.3 nM	10 - 180 µM	Electrochemical	[5]
Ga_2O_3NPs	84 nM	0.3 - 80 µM	Electrochemical	[6]
TiO_2@Gum Arabic-Carbon Paste Electrode	101.2 nM	5 - 50 nM	Electrochemical	[7]

HEMT: High electron mobility transistor; MoS_2: Molybdenum disulfide; NPs: Nanoparticles; CQDs: Carbon quantum dots.

References

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