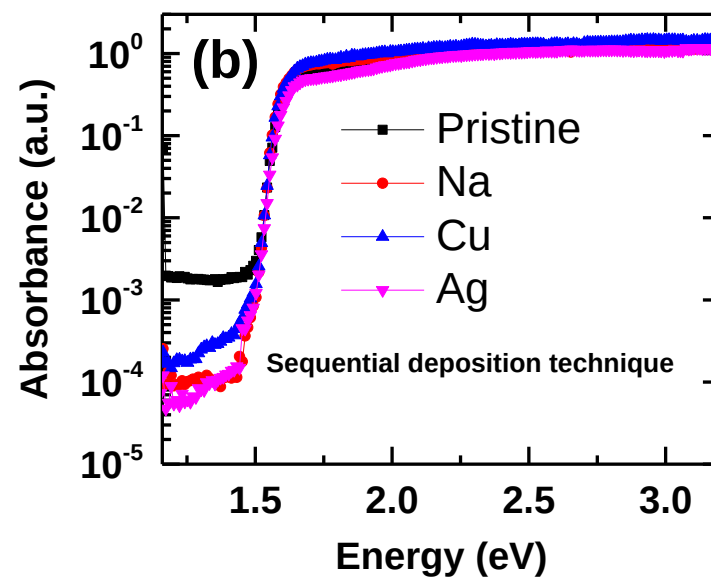
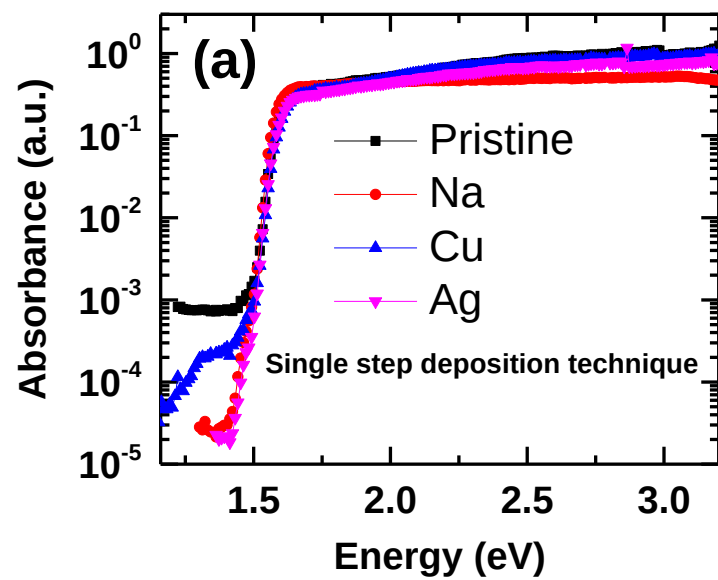




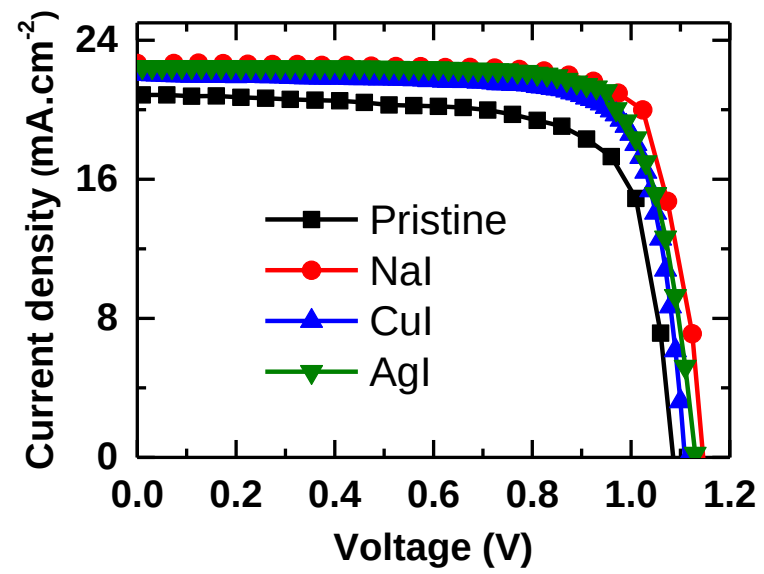
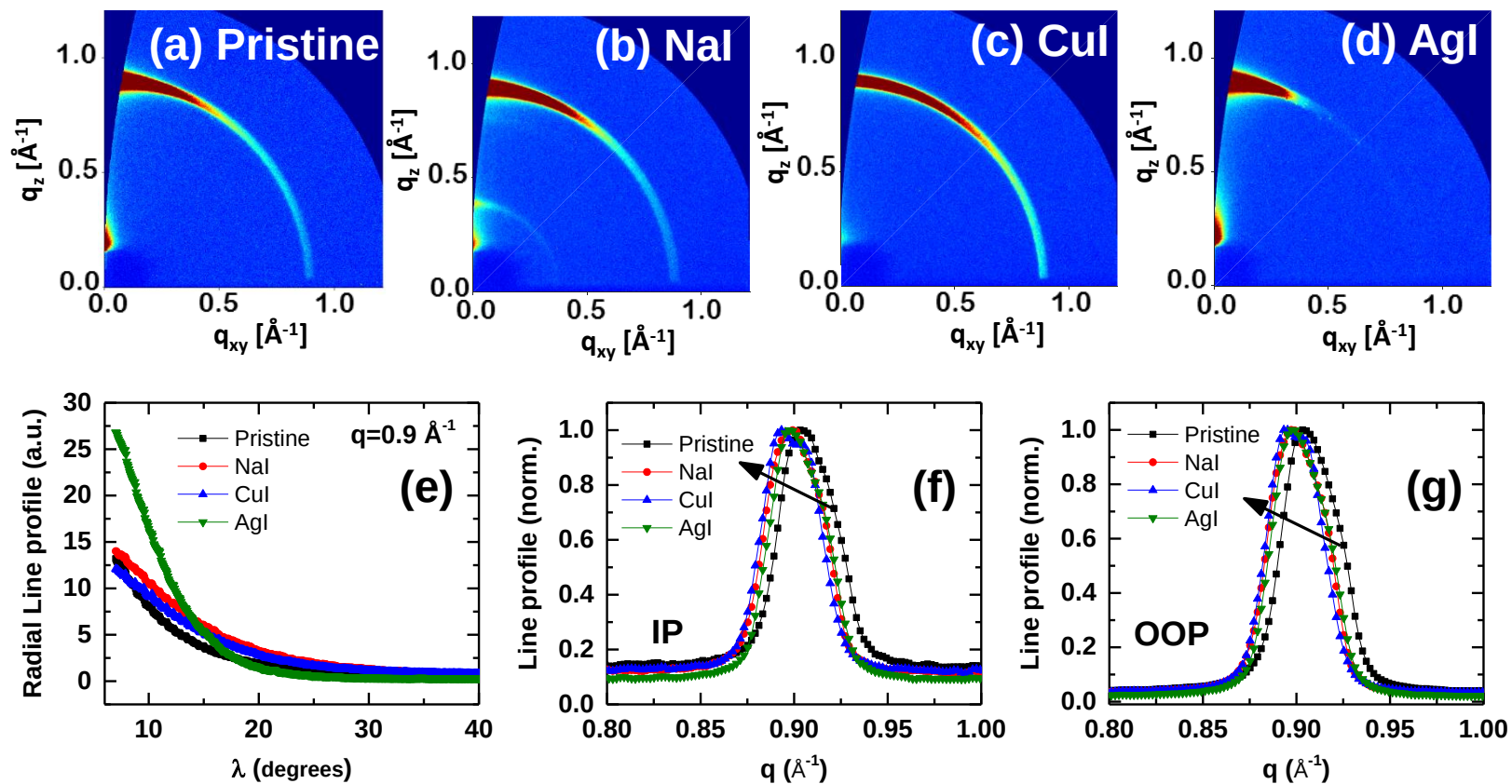
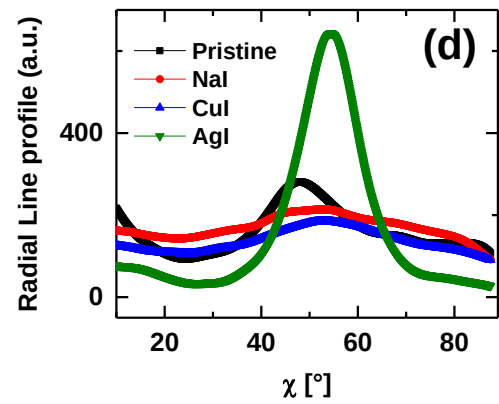
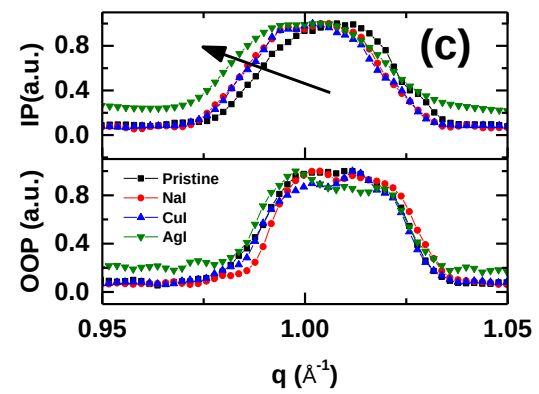
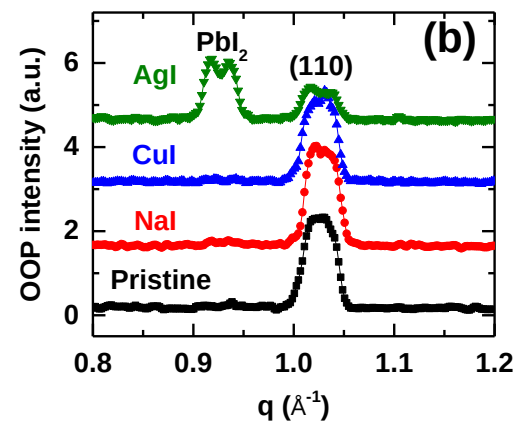
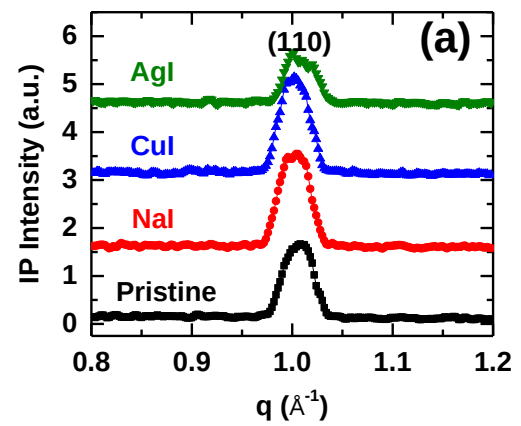
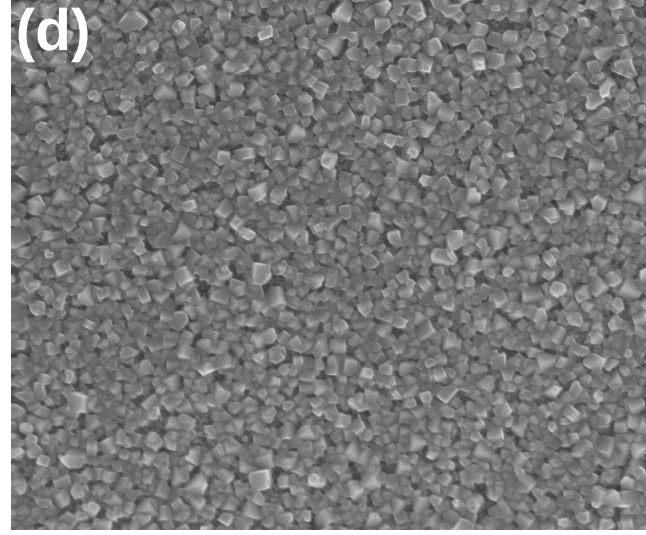
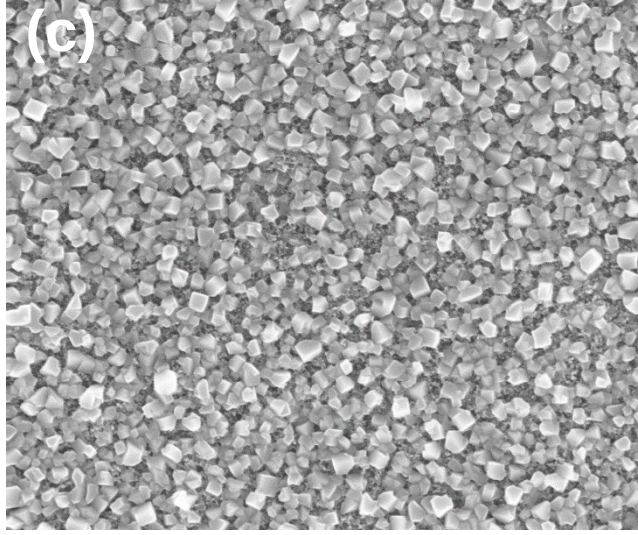
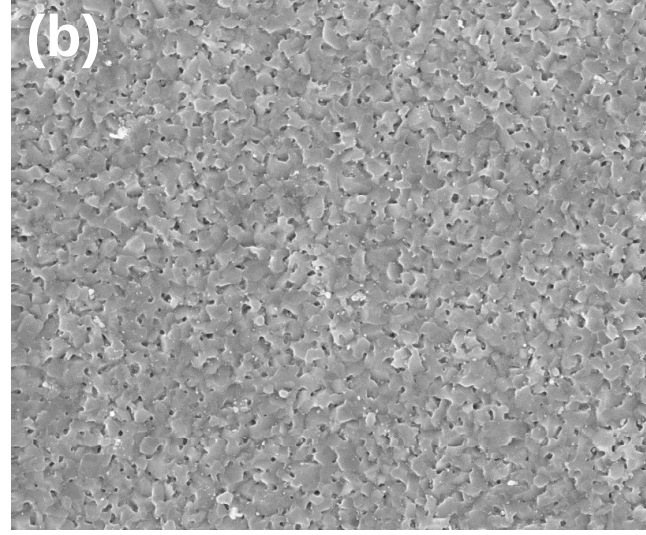
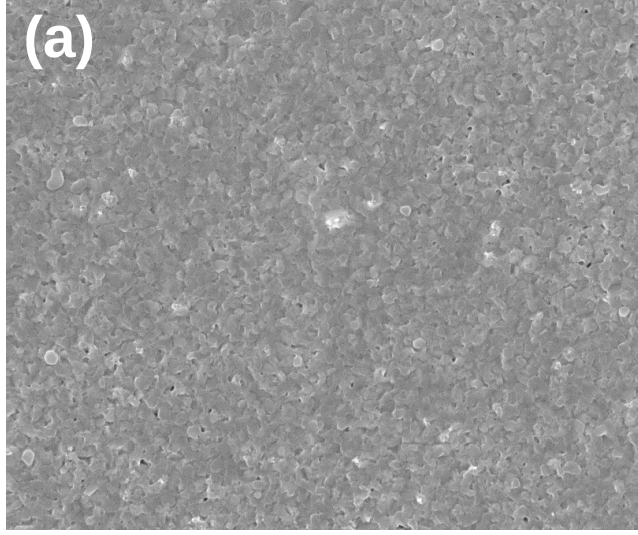
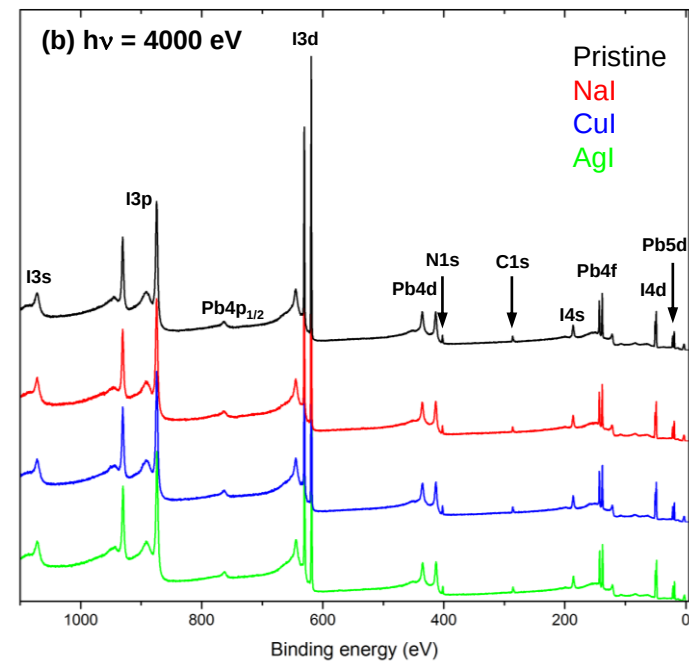
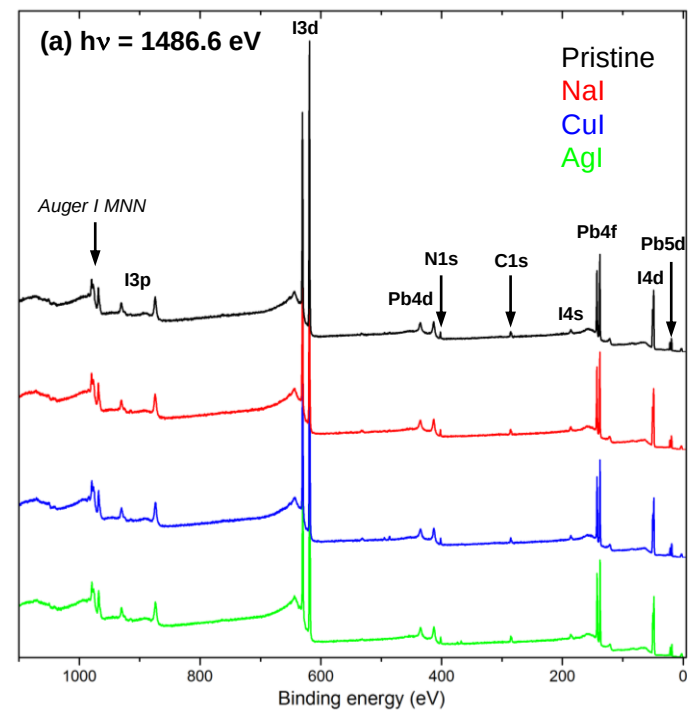


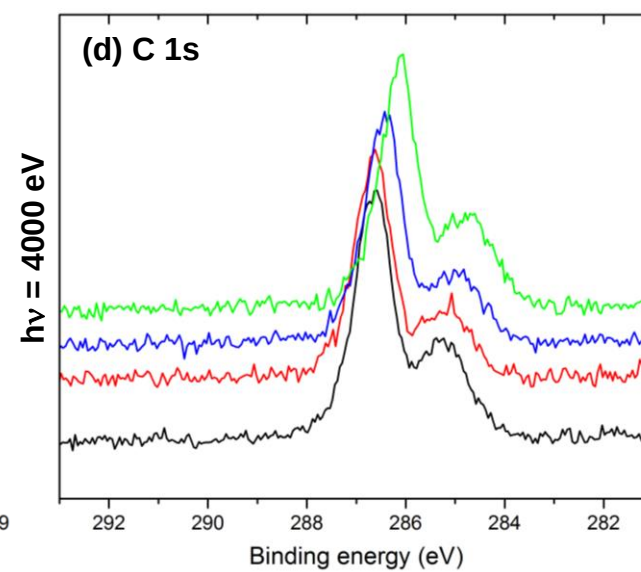
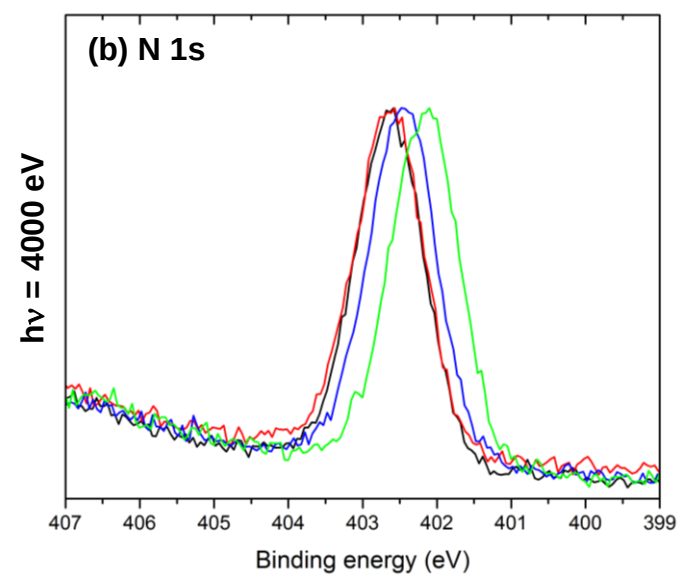
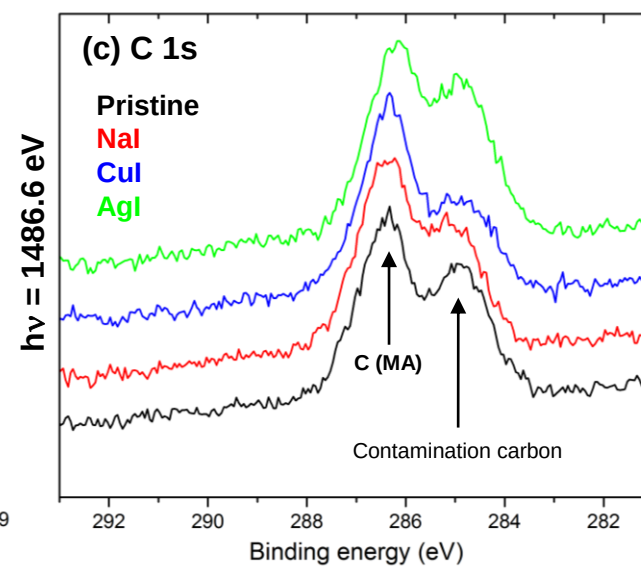
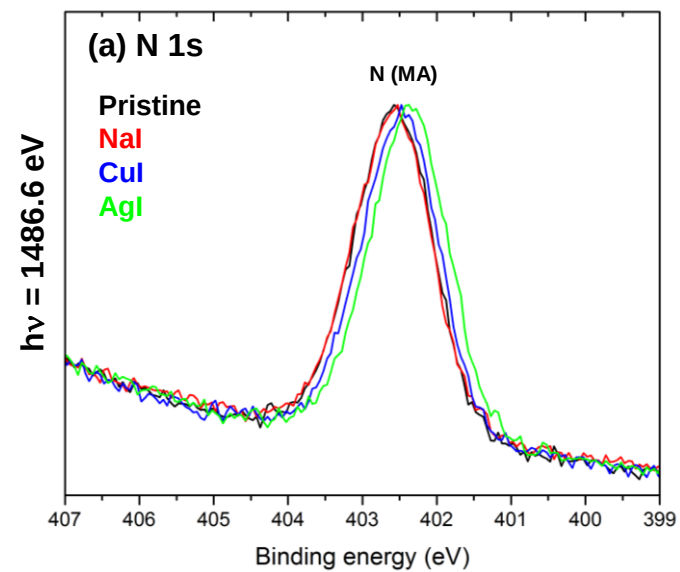
Figure S2. GIWAX_PbI2

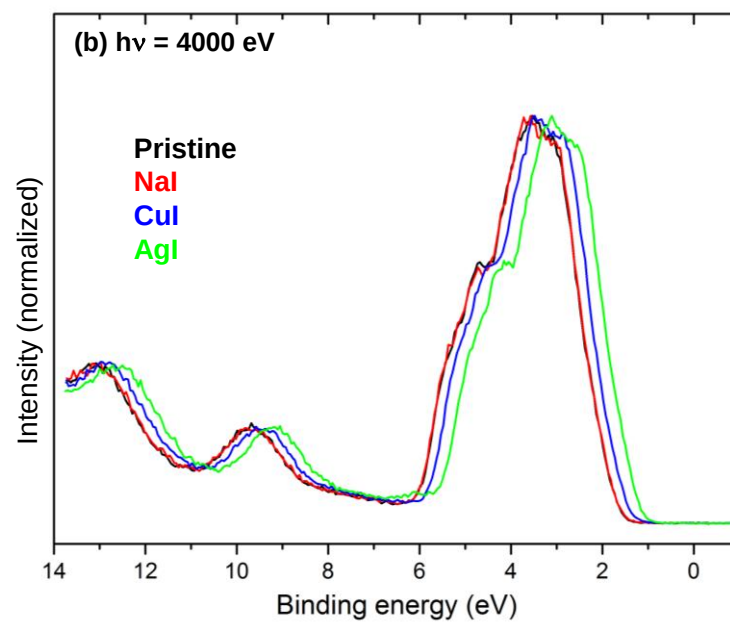
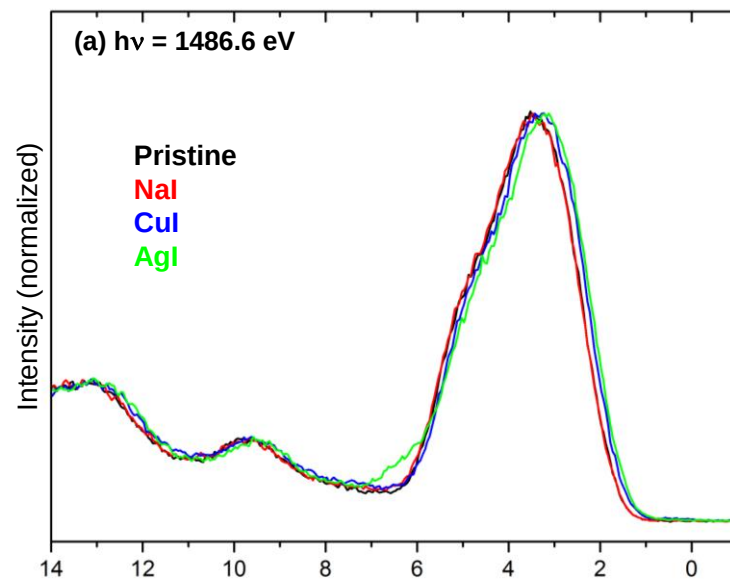


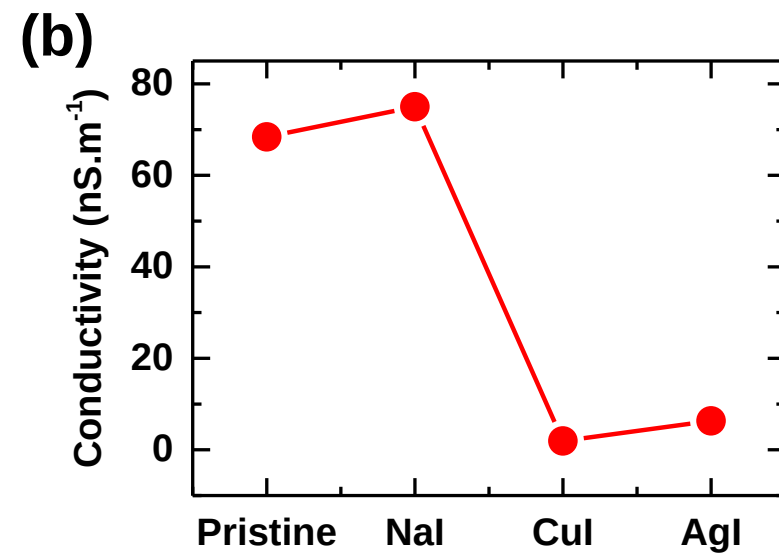
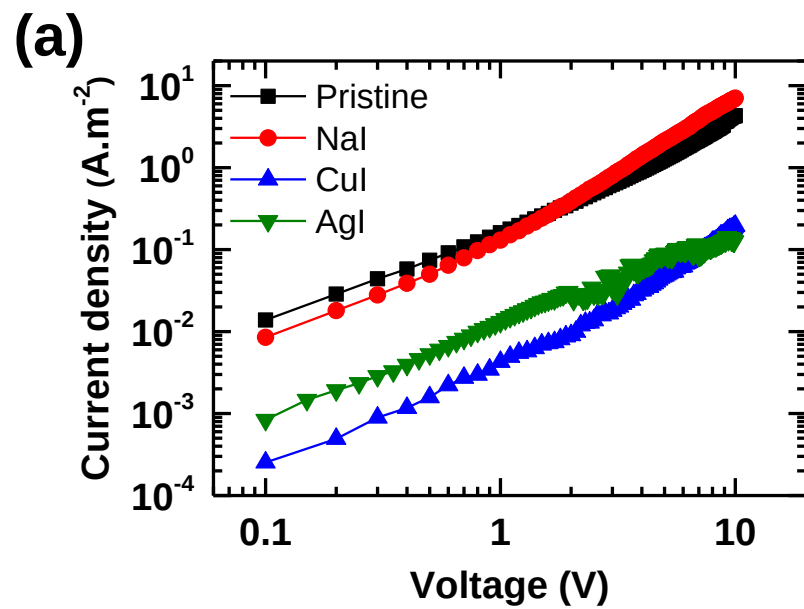


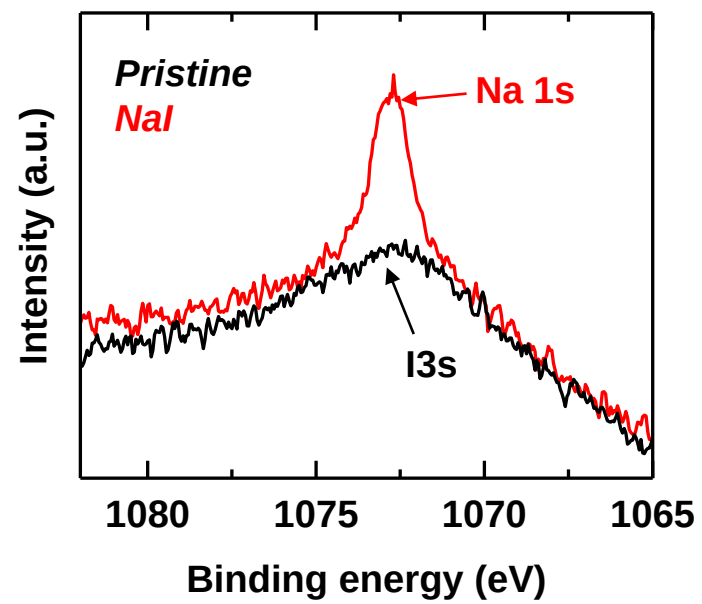


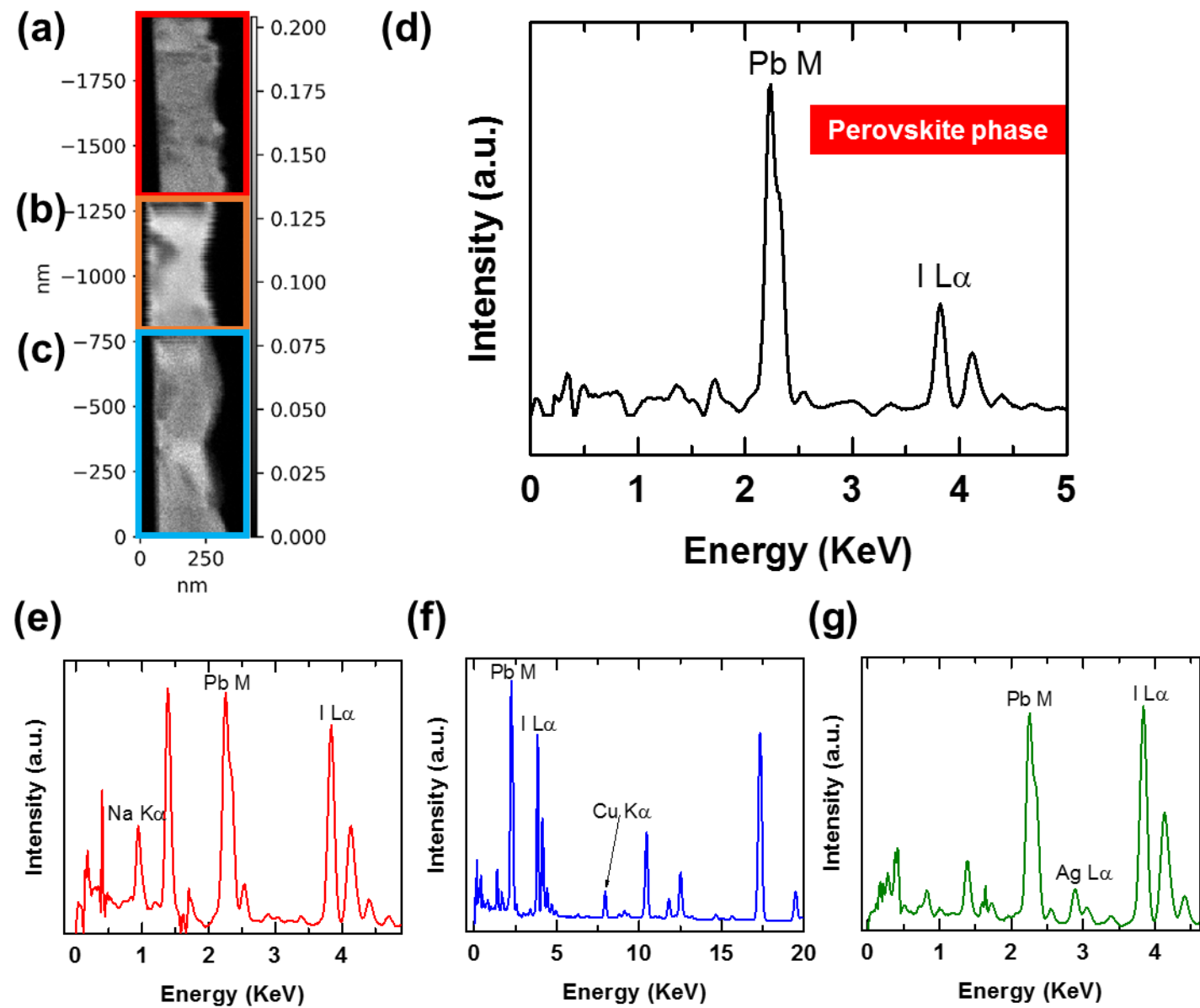




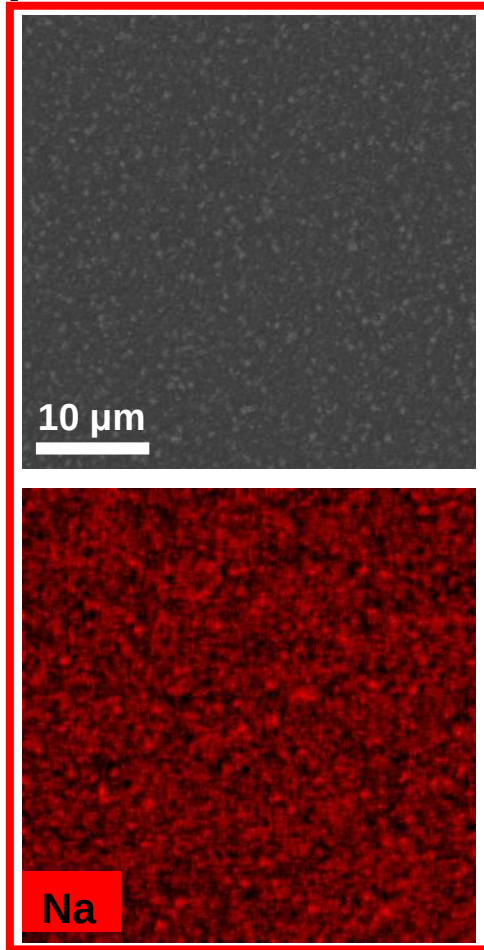




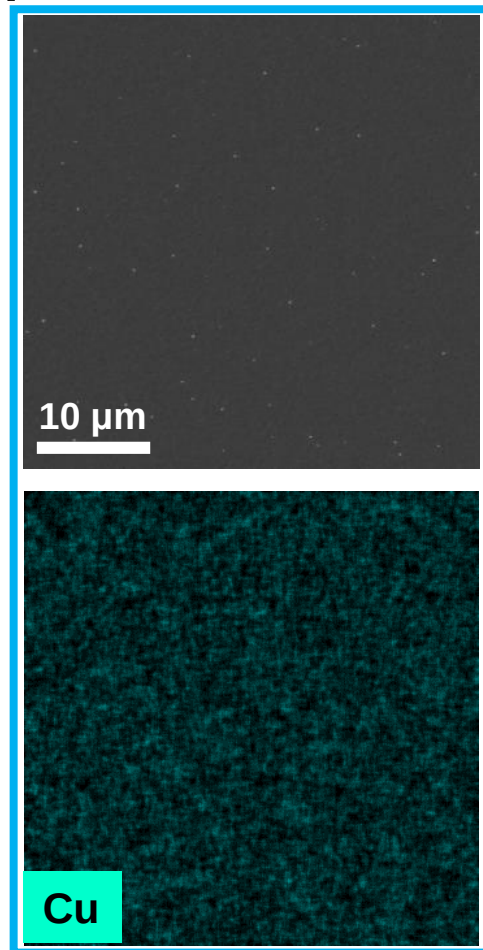




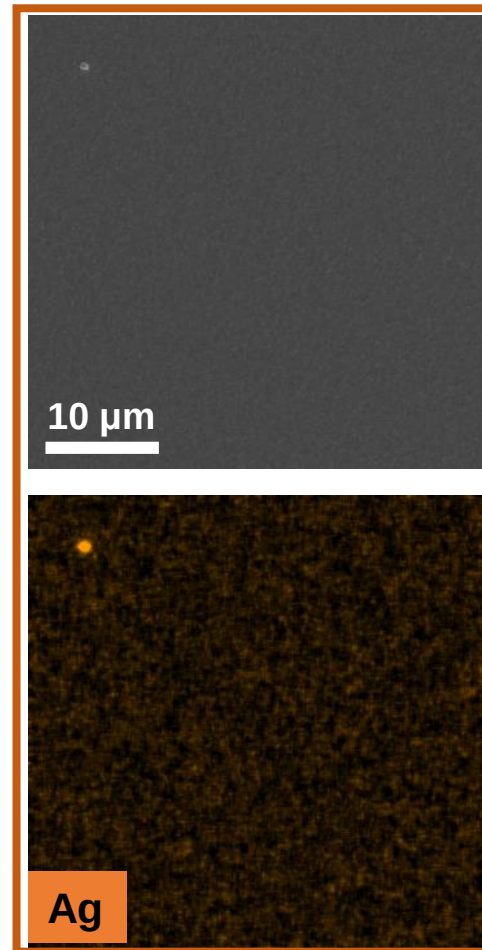
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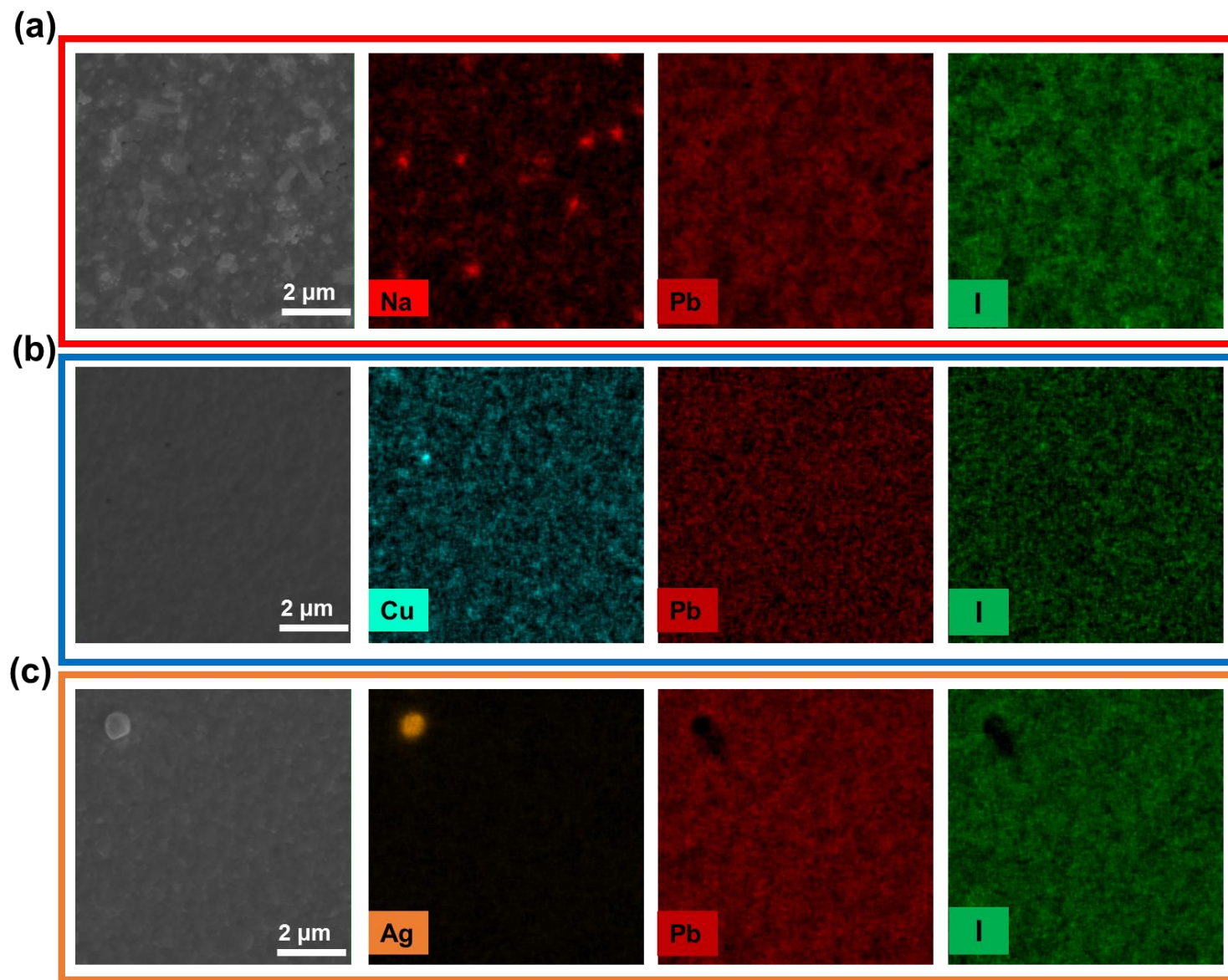


(b)

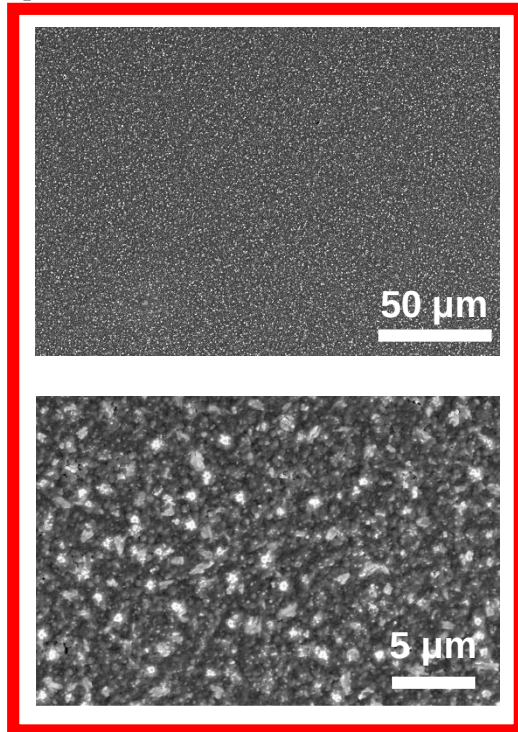


(c)

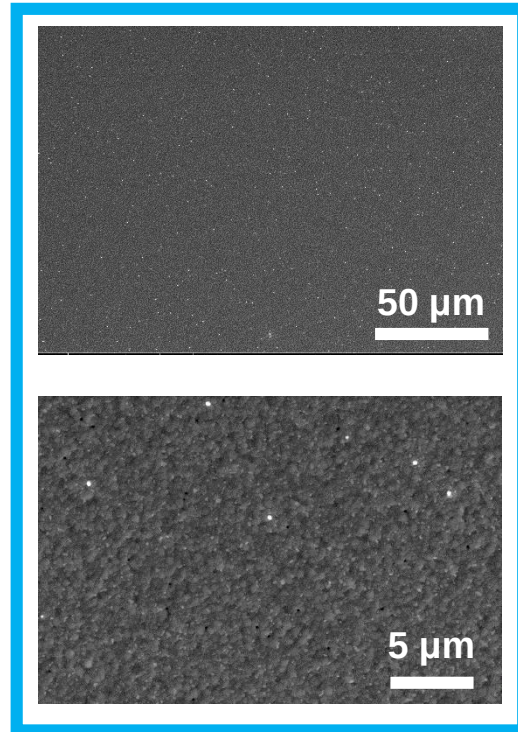




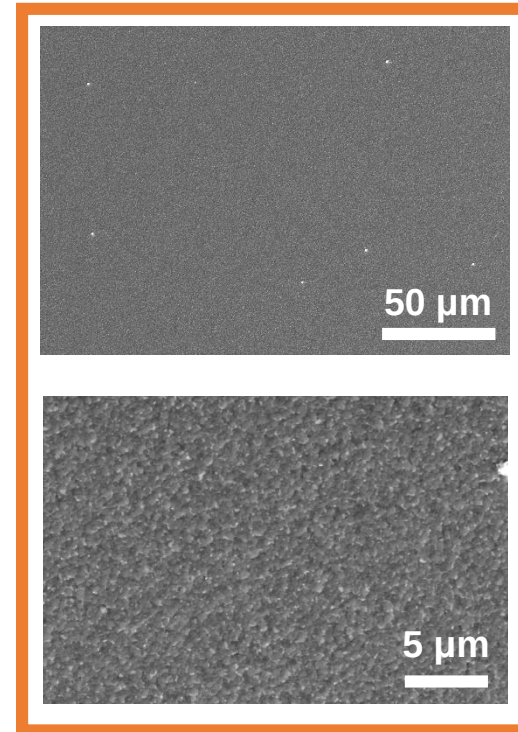
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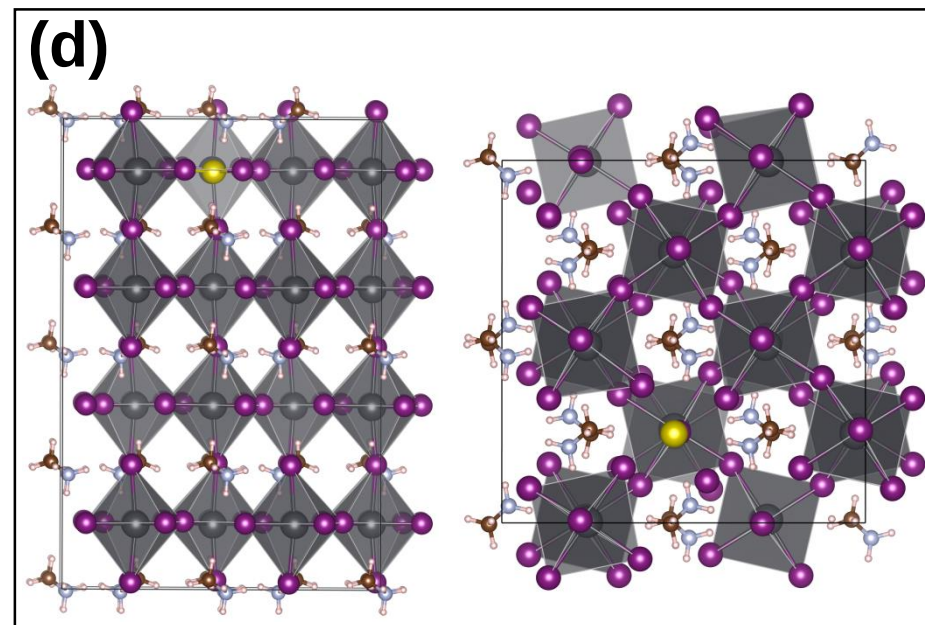
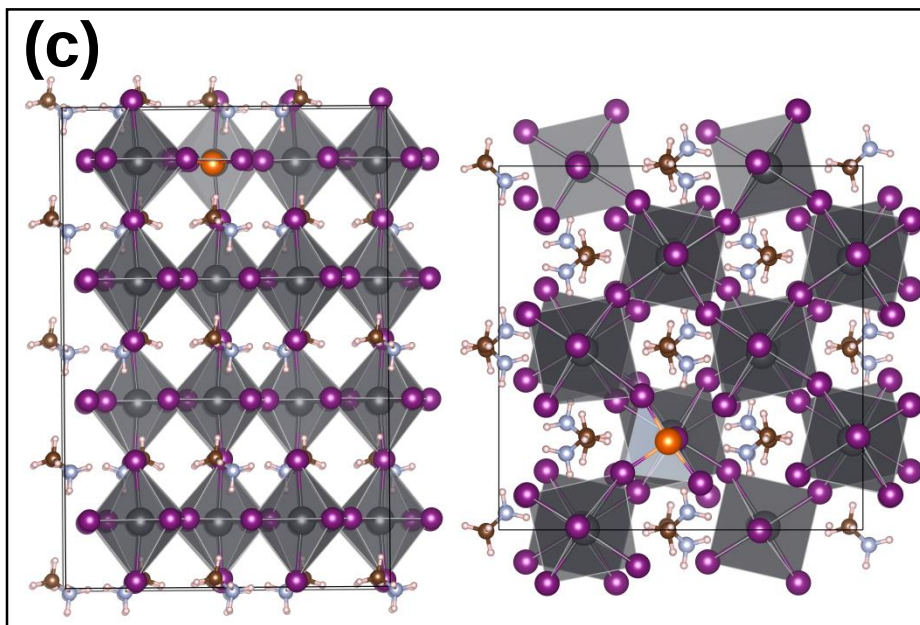
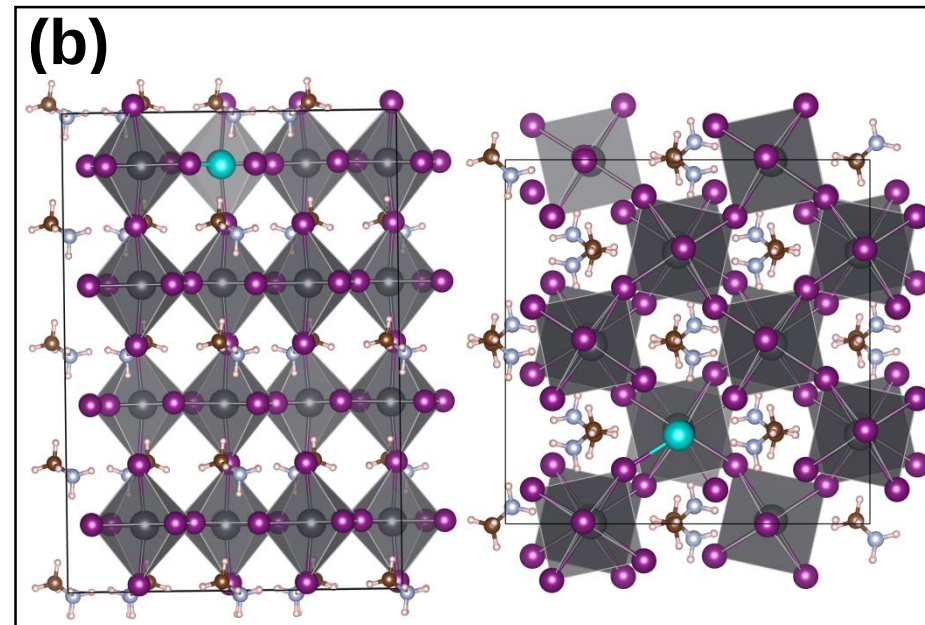
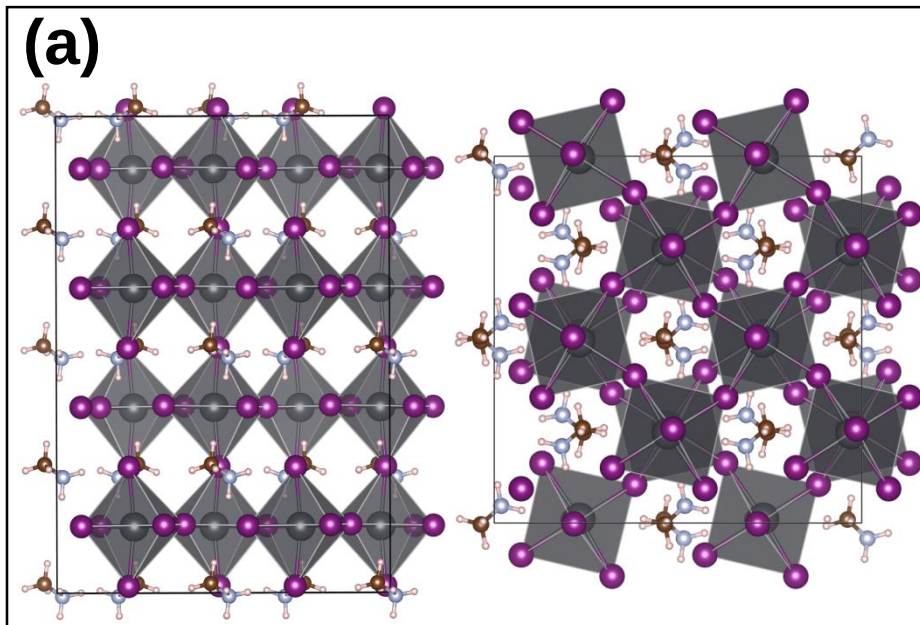


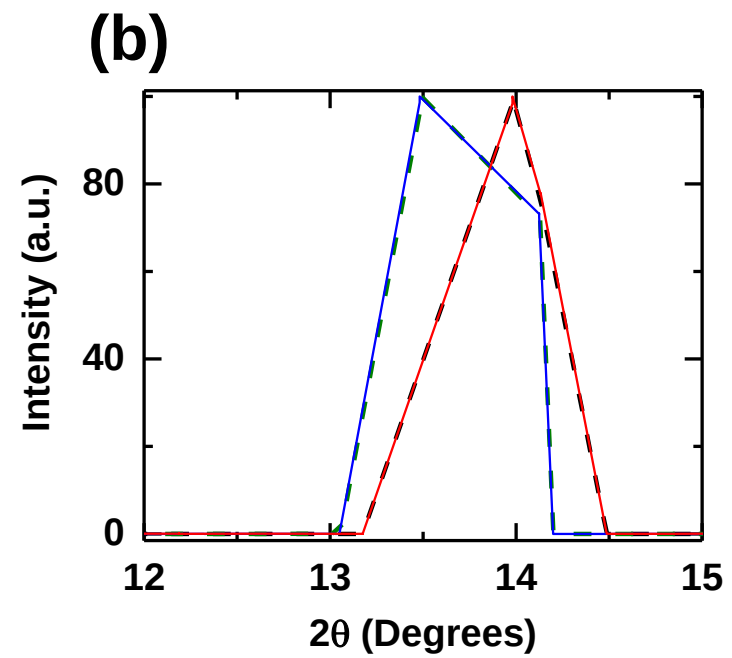
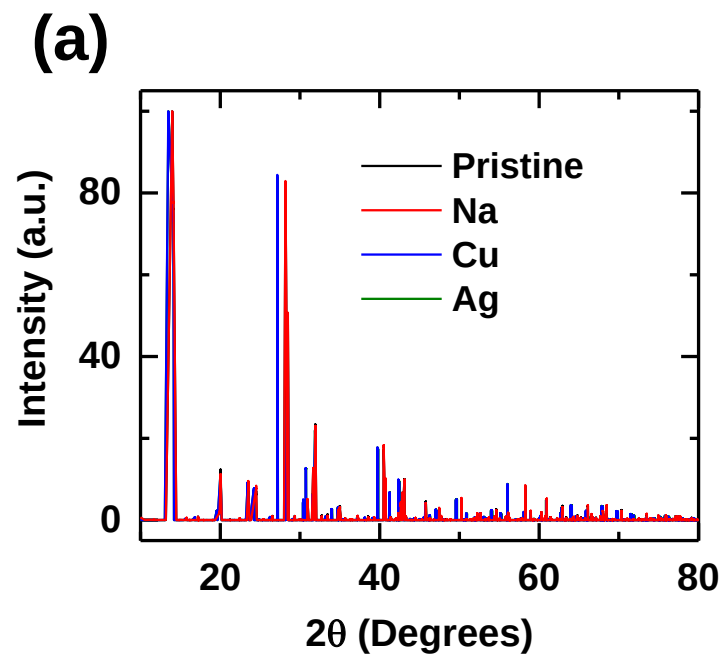
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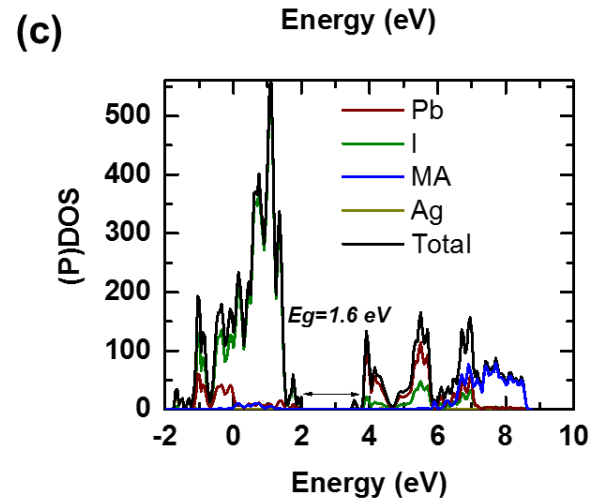
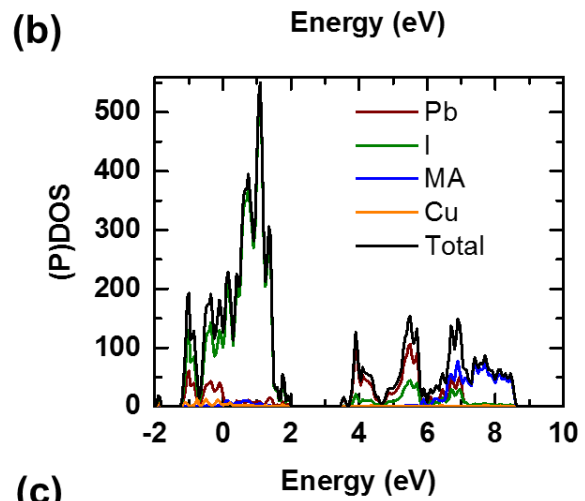
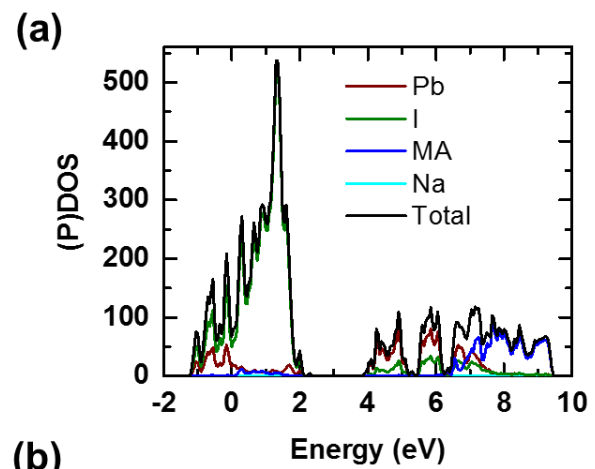


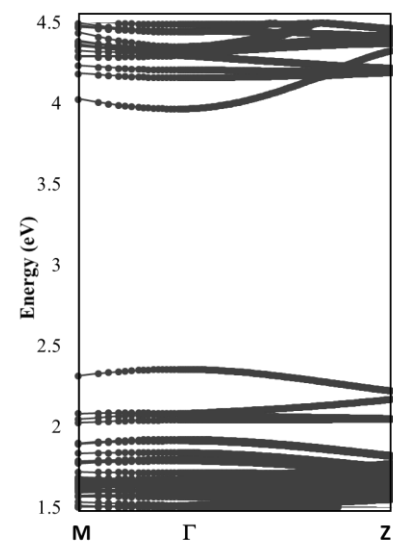
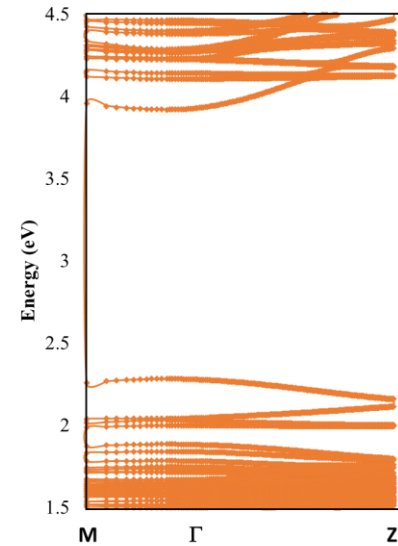
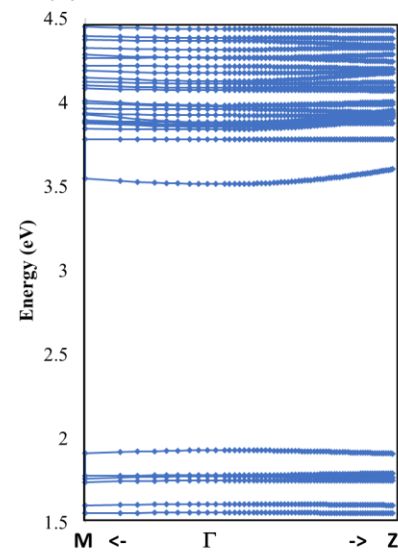
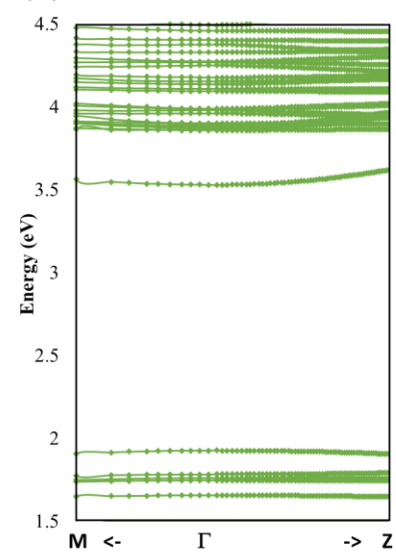
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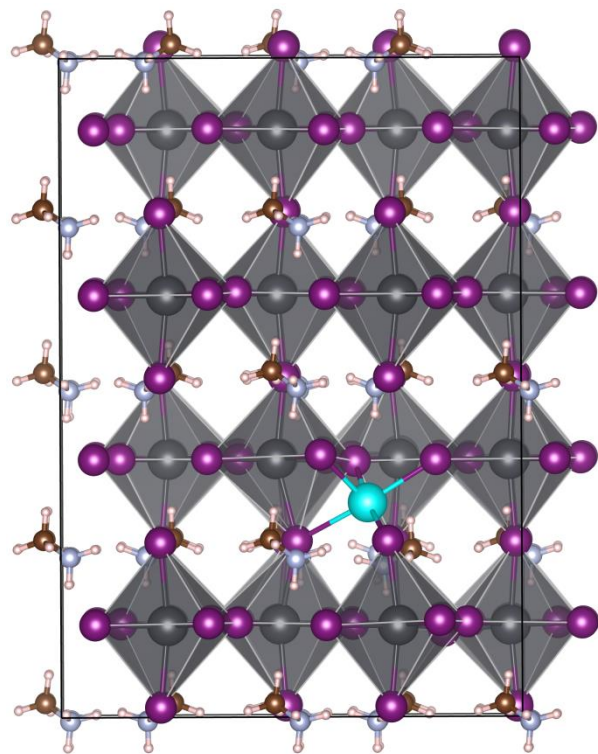




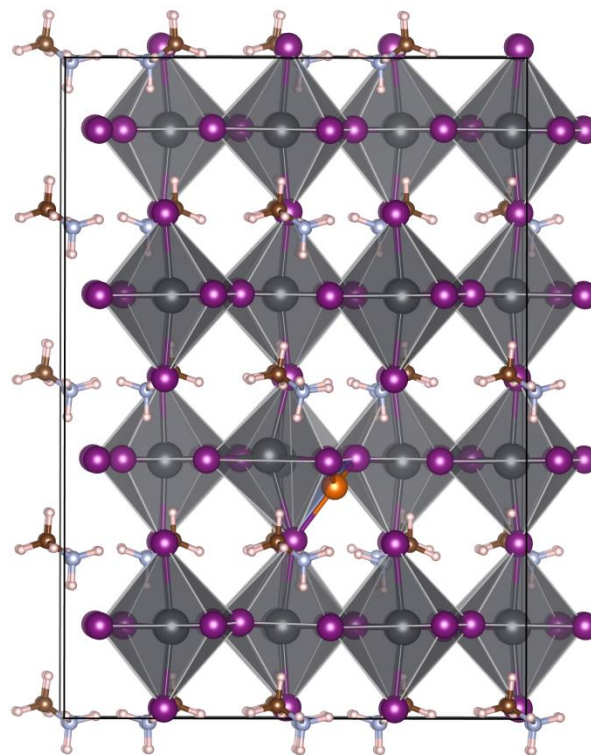


(a)**(b)****(c)****(d)**

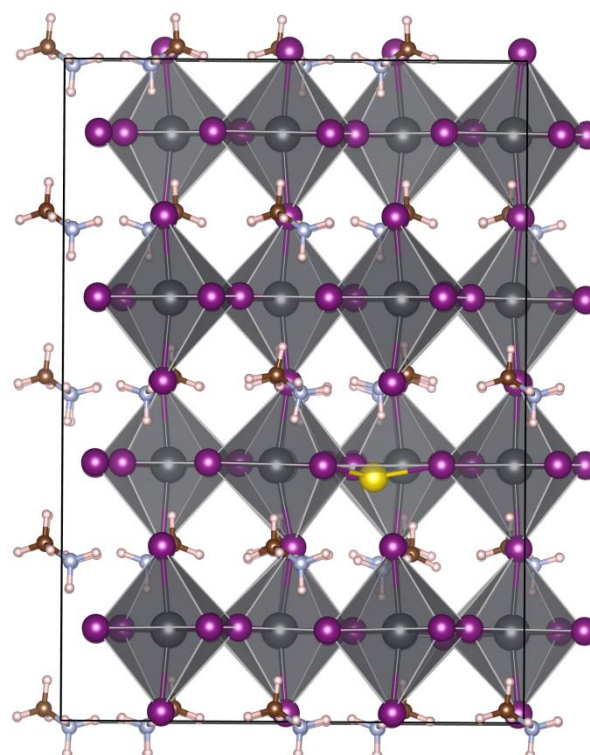
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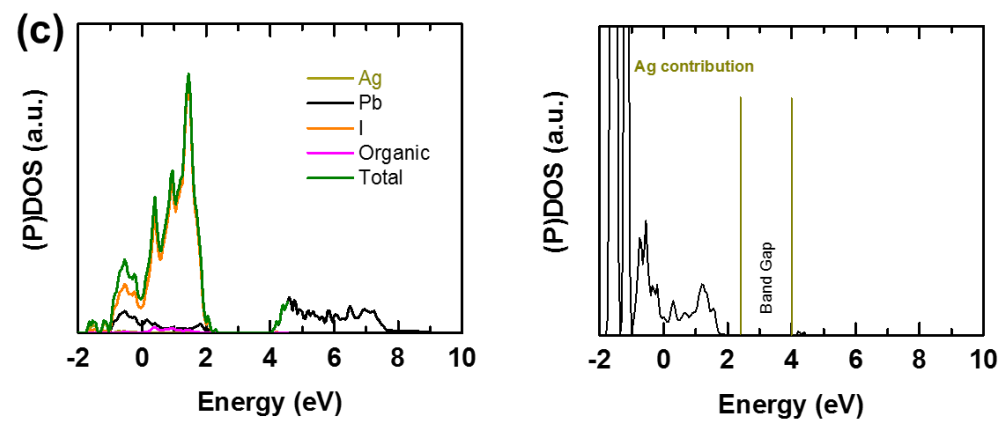
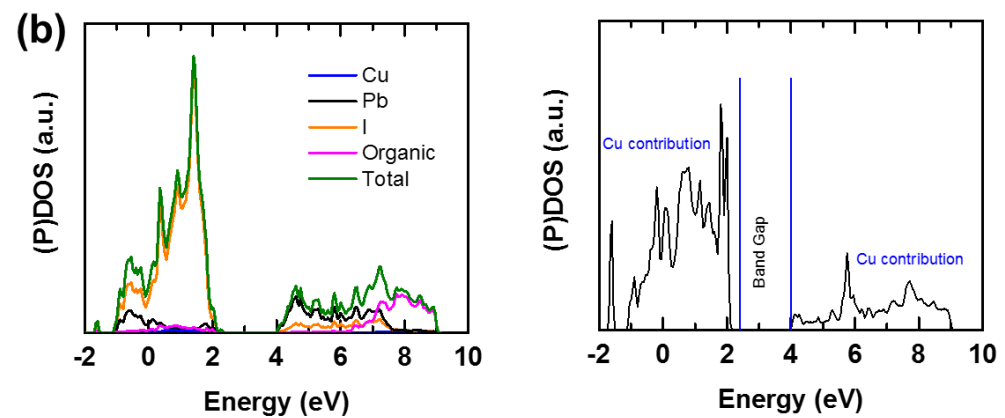
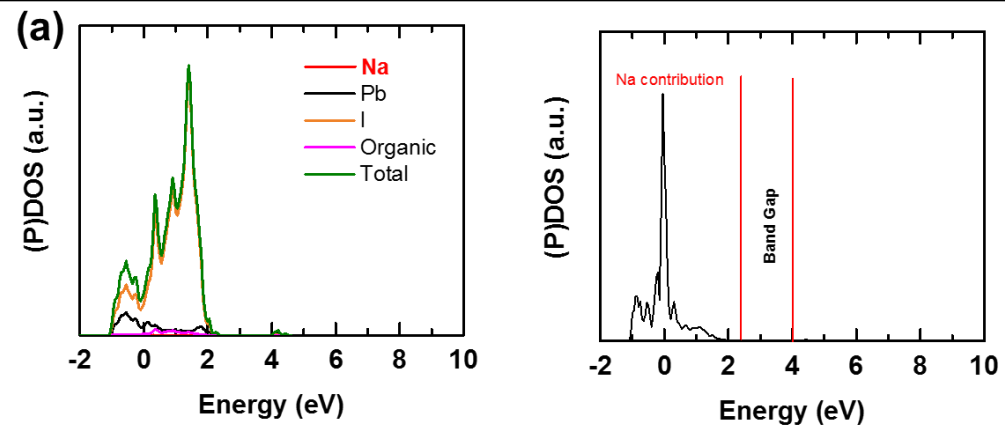


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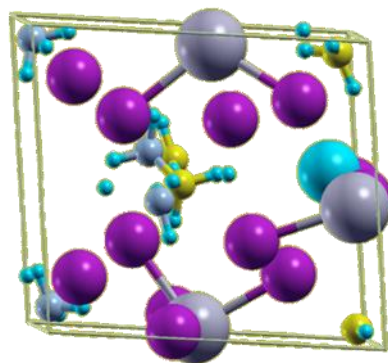


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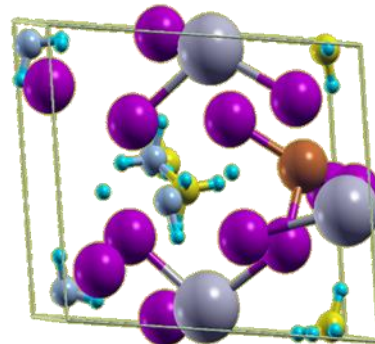




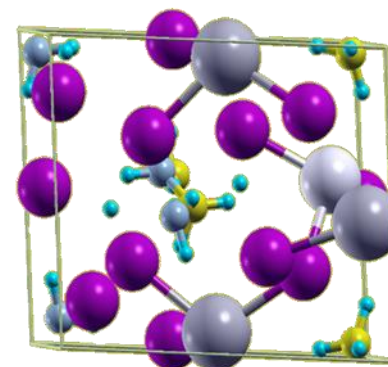
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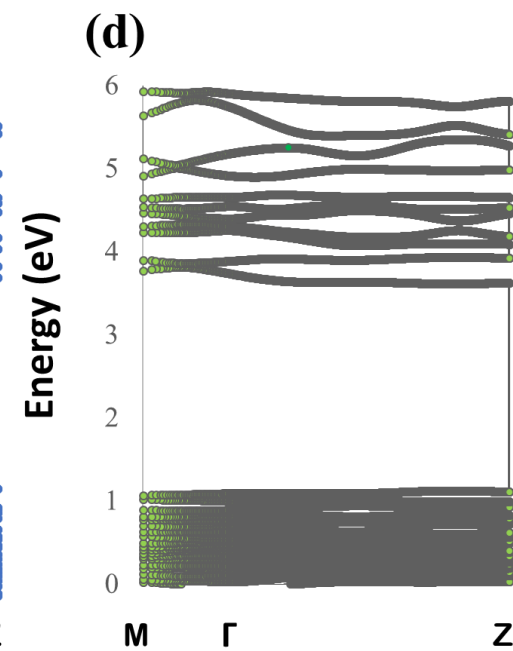
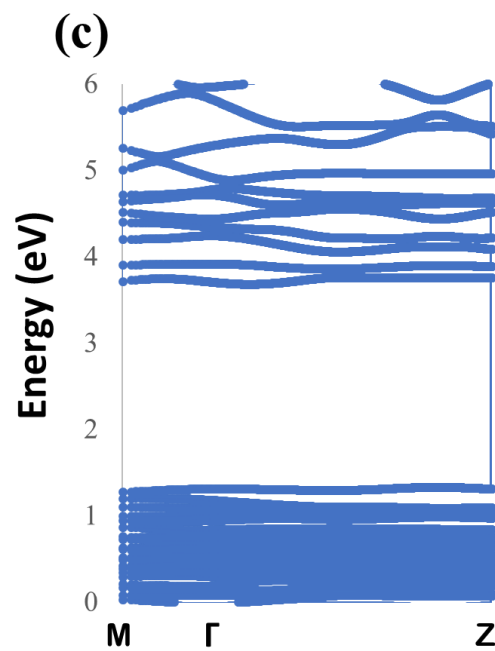
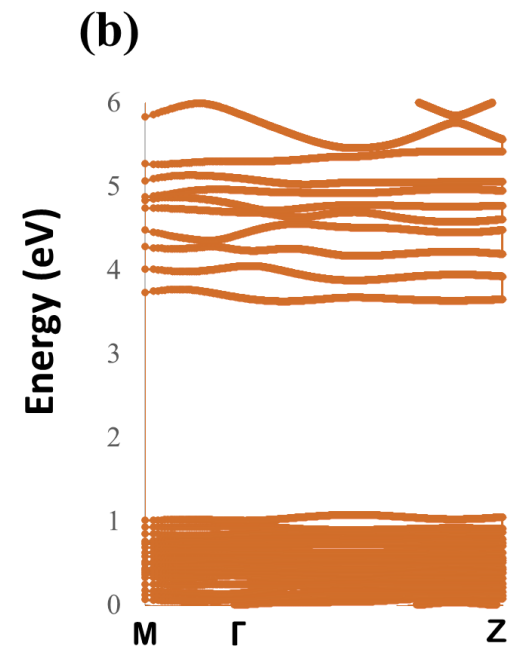
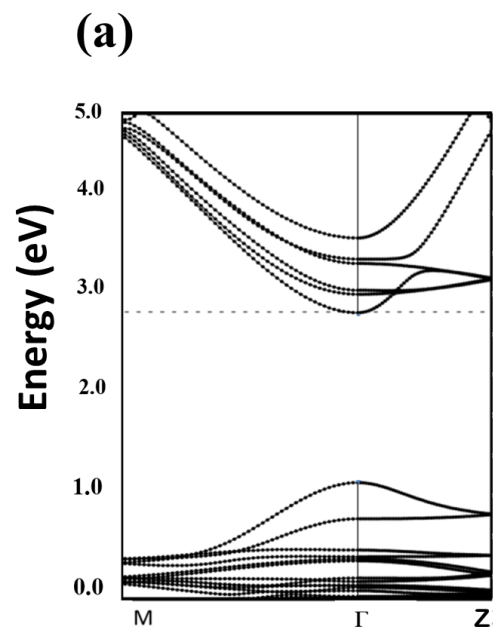


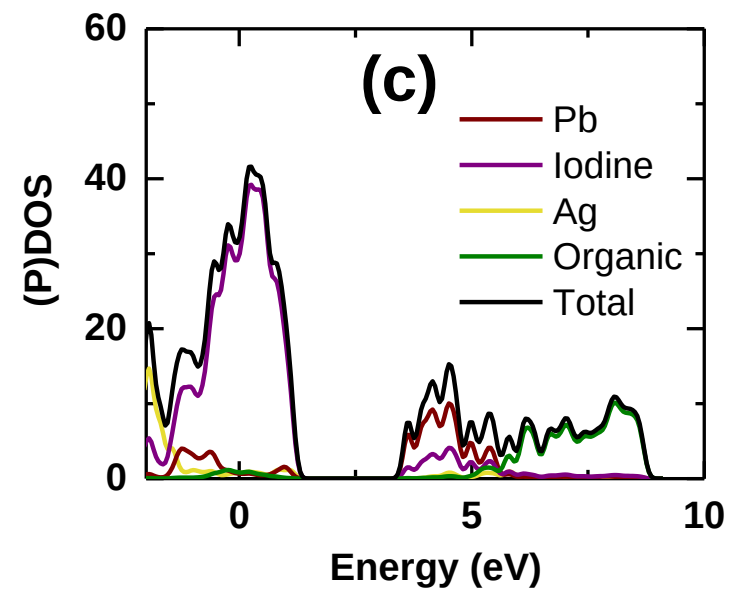
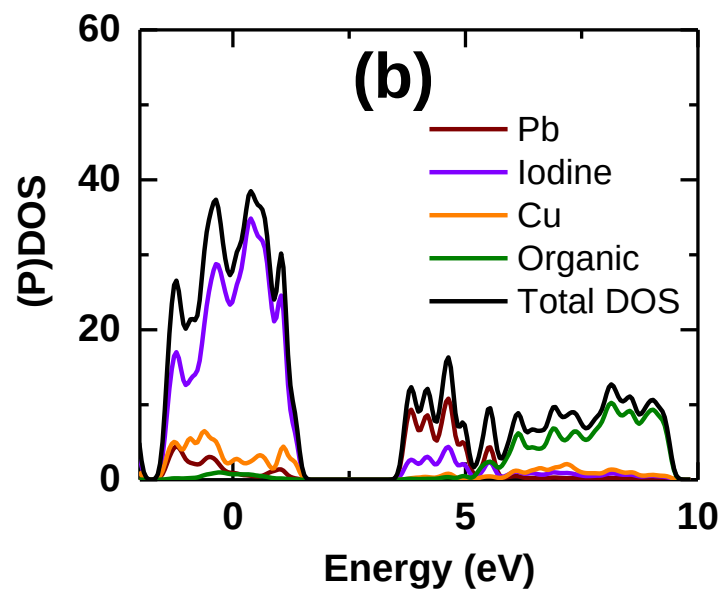
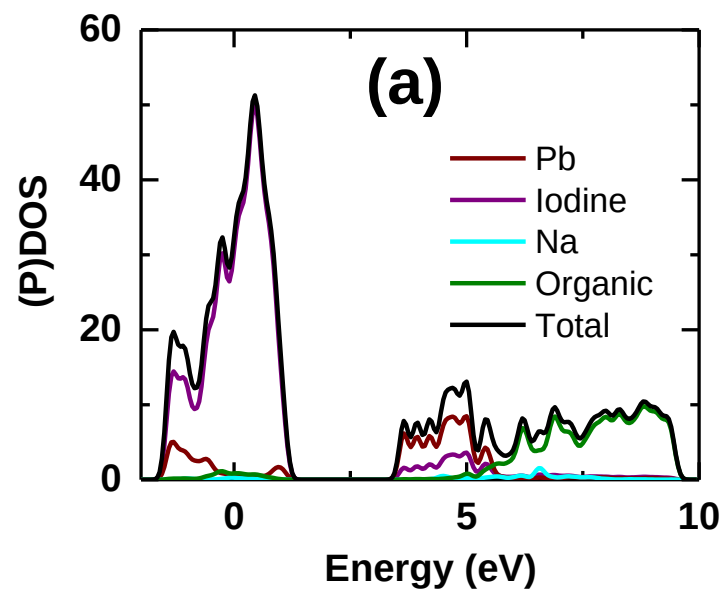
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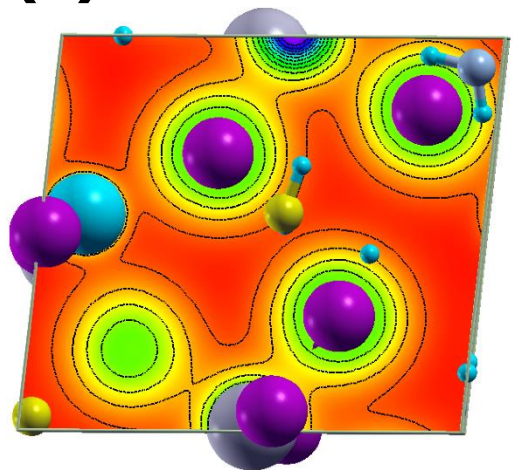
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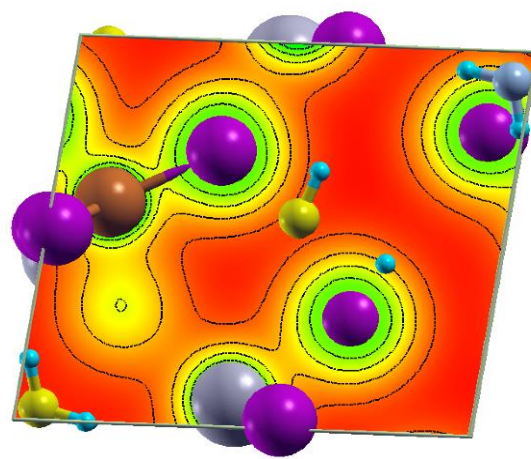




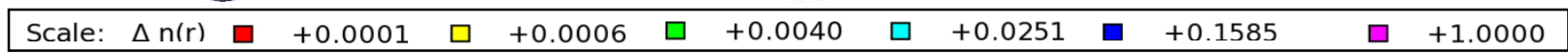
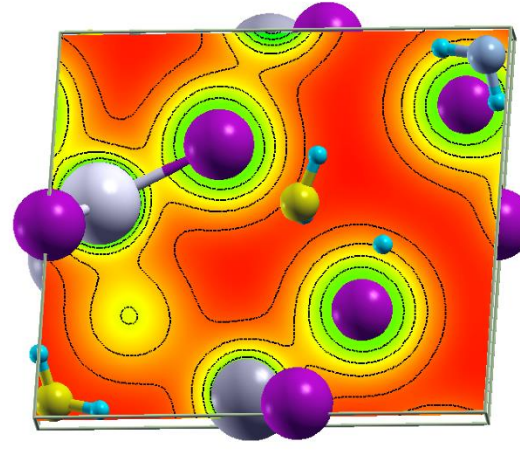
(a)



(b)



(c)



	J_{sc} [mA.cm⁻²]	V_{oc} [V]	FF	PCE [%]
Pristine	20.86	1.076	0.74	16.66
NaI	22.65	1.142	0.79	20.47
CuI	22.07	1.108	0.78	19.15
AgI	22.46	1.128	0.79	20.01

Gamma to M	Pristine	Ag doped	Cu doped	Na doped
m^*e/m^*0	0.18	0.24	0.24	0.20
m^*h/m^*0	0.21	0.21	0.26	0.17
Gamma to Z				
m^*e/m^*0	0.17	0.14	0.14	0.11
m^*h/m^*0	0.23	0.37	0.42	0.19

Lattice parameters	Na-doped	Cu-doped	Ag-doped
a	$1.090 \mathbf{i} - 0.055 \mathbf{j} + 0.042 \mathbf{k}$	$1.085 \mathbf{i} - 0.066 \mathbf{j} + 0.080 \mathbf{k}$	$1.108 \mathbf{i} - 0.041 \mathbf{j} + 0.065 \mathbf{k}$
b	$-0.055 \mathbf{i} + 0.977 \mathbf{j} - 0.019 \mathbf{k}$	$-0.067 \mathbf{i} + 0.941 \mathbf{j} - 0.008 \mathbf{k}$	$-0.040 \mathbf{i} + 0.943 \mathbf{j} - 0.008 \mathbf{k}$
c	$0.066 \mathbf{i} - 0.031 \mathbf{j} + 1.466 \mathbf{k}$	$0.117 \mathbf{i} - 0.013 \mathbf{j} + 1.546 \mathbf{k}$	$0.100 \mathbf{i} - 0.014 \mathbf{j} + 1.532 \mathbf{k}$

Sample	Pb-I(H)	Pb-I(V)	X-I(H)	X-I(V)	<I-Pb-I(V)	<I-Pb-I(H)	<I-X-I(V)	<I-X-I(H)
Pristine	3.21	3.18	-	-	168.7	176.3	-	-
Na-doped	3.09	3.27	3.2	3.28	162.0	161.2	146.2	152.0
Ag-doped	3.08	3.30	2.82	2.90	153.9	161.7	140.2	105.0
Cu-doped	3.15	3.35	2.62	2.65	158.1	160.0	135.0	103.7