Supporting information

Passivation of defective states in single crystal MAPbBr3 and their optoelectronic properties study

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Table S1. XPS stoichiometry analysis for MAPbBr3 seeds and large single crystal.

[Stoichiometry](http://www.dictall.com/indu60/48/6048959FA2D.htm) analysis for MAPbBr3 seeds.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Name | Start BE | Peak BE | End BE | FWHM eV | Area (P) CPS.eV | Area (N) TPP-2M | Atomic % |
| N1s | 409.98 | 401.64 | 392.18 | 1.25 | 7576.36 | 68.55 | 15.28 |
| Pb4f | 152.98 | 138.31 | 133.18 | 1.16 | 141869.85 | 54.29 | 12.1 |
| Br3d | 75.98 | 68.47 | 62.18 | 1.96 | 39425.2 | 178.19 | 39.73 |
| C1s | 297.98 | 285.5 | 279.18 | 2.25 | 10273.7 | 144.13 | 32.14 |

The stoichiometry ratio between Pb and Br is 1:3 (Area (N) TPP-2M value).

Stoichiometry analysis for MAPbBr3 seeds.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Name | Start BE | Peak BE | End BE | FWHM eV | Area (P) CPS.eV | Area (N) TPP-2M | Atomic % |
| N1s | 409.98 | 401.26 | 392.18 | 1.29 | 21342.41 | 193.05 | 14.53 |
| Pb4f | 152.98 | 137.75 | 133.18 | 1.09 | 412726.92 | 157.88 | 11.88 |
| Br3d | 75.98 | 67.78 | 62.18 | 1.91 | 107732.63 | 486.74 | 36.63 |
| C1s | 297.98 | 285.02 | 279.18 | 2.44 | 34567.24 | 484.78 | 36.48 |

The stoichiometry ratio between Pb and Br is 1:3 (Area (N) TPP-2M value).



Figure S1. SEM image of as-prepared MAPbBr3 single crystal with different magnification.



Figure S2. Optical image of as-prepared MAPbBr3 single crystal and MAPbBr3 crystal fabrication with 0.5wt% PEA additives.



Figure S3. Temporal response of the MAPbBr3 single crystals without and with 0.5wt% and 2wt% PEA additives based detectors under low dose (~3.4 mSv) X-ray illumination.