

## Supplementary Information

### Mechanistic insights of the key role of methylammonium iodide in the stability of perovskite material

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Table S1: History of studies related to MAI

|                       |           | PbI <sub>2</sub> /MAI | Additive                                      | Condition  | Ref.   | Year           |
|-----------------------|-----------|-----------------------|---|--|--------|----------------|
| Methylammonium iodide | Precursor | 1, 1                  | H <sub>2</sub> O <sub>(Trace)</sub>           | MAI <sub>Assay</sub> (H <sub>4</sub> P <sub>2</sub> O <sub>6</sub> ) dipping | 1, 2 3 | 2016-2017-2016 |
|                       |           | 1,1, 1                | HI, CH <sub>3</sub> I                         | MAI <sub>loading time</sub> , co-evaporation                                 | 2, 4 5 | 2016-2015-2016 |
|                       |           | 1/3                   | DMSO  | MAI <sub>Vapor-based</sub>   | 6 7    | 2021-2020      |
|                       |           | 1                     |   | MAI <sub>Purity, Vapor-Phase</sub>   | 8      | 2022           |
|                       |           | 1                     |   | PbI <sub>2</sub> powder+MAI  | 9      | 2016           |
|                       |           | 1/4                   |   | Precursor Temperature, one step  | 10     | 2021           |
|                       |           | 1/2, 1/3, 1/5         |   | MAI <sub>time of dipping</sub>   | 11     | 2018           |
|                       |           | 1                     |   | MAI-based co-evaporation   | 12     | 2019           |
|                       |           | 1                     |   | MAI aged   | 13     | 2021           |
|                       |           | 1                     |   | MAI co-evaporation   | 14     | 2016           |
|                       |           | -                     |   | Computational details  | 15     | 2019           |
|                       |           | 1                     |   | PbI <sub>x</sub> :MAAc:MAI   | 16     | 2017           |
|                       |           | 1                     |   | BAI:MAI:PbI <sub>2</sub> :NH <sub>4</sub> SCN                                | 17     | 2017           |
|                       |           | 1                     |   | Synchrotron source   | 18     | 2022           |
|                       |           | 1                     |   | Thermal co-evaporation   | 2      | 2016           |
|                       | 1         |                       | Phase diagram one step                        | 19   | 2017   |                |
|                       | Post-syn  | 10%                   | MAI <sub>excess</sub> + CsPbI <sub>2</sub> Br |  | 20     | 2020           |
|                       |           | -10% to 10%           |   | MAI <sub>extra-stoichiometric</sub>  | 21     | 2019           |
|                       |           | (10,30)mM             |   | MAI <sub>post-treatment</sub>  | 22 23  | 2019-2022      |
|                       |           | Partial pressure      |   | MSGG   | 24     | 2021           |

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