Supplementary Materials

New acidic precursor and acetone-based solvent for fast perovskite processing via proton-exchange reaction with methylamine

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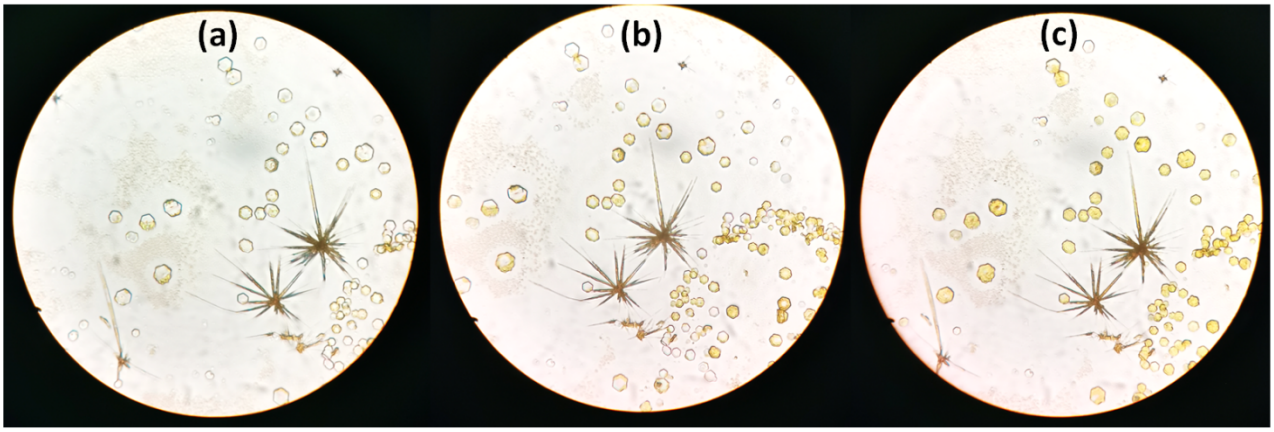


Figure S1. Optical microscopy photos of the crystals of the adduct: freshly grown (a), aged in 1 minute (b), aged in 2 minutes (c).

Assumptions about the crystal structure of Phase-1 and refinement.

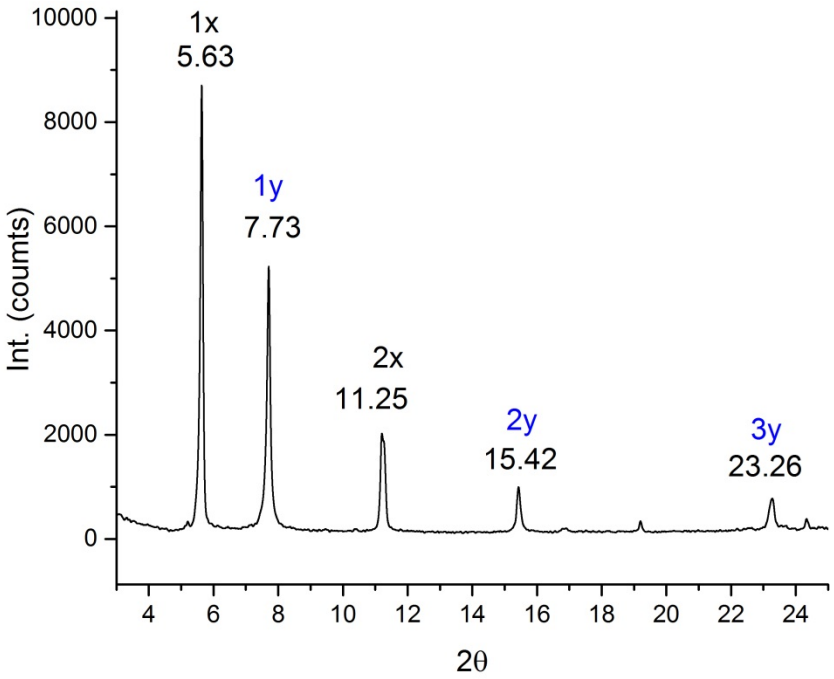


Figure S2. Diffraction pattern of the Phase-1 powder. The captions indicate the positions of reflections, symbols "x" and "y" indicate the affiliation for one of the two distinct groups of reflections.

Assuming the structure with a single chains of octahedrons connected along the faces for the Phase-1, we consider two possible variants of unit cells and chain location: the first for the case of orthorhombic unit cell with chain orientation along c axis and the second one for the case of monoclinic unit cell ($\beta > 90$) with the same chain orientation.

Table S1. The best fitted refined lattice parameters of the Phase-1 within assumption of orthorhombic unit cell.

Space group	*Pbcm* (№57)
a, Å	15.809(1)
b, Å	16.832(5)
c, Å	7.8732(9)
α, °	90
β, °	90
γ, °	90
	GOF = 2.64 Rp = 9.36 wRp = 13.34

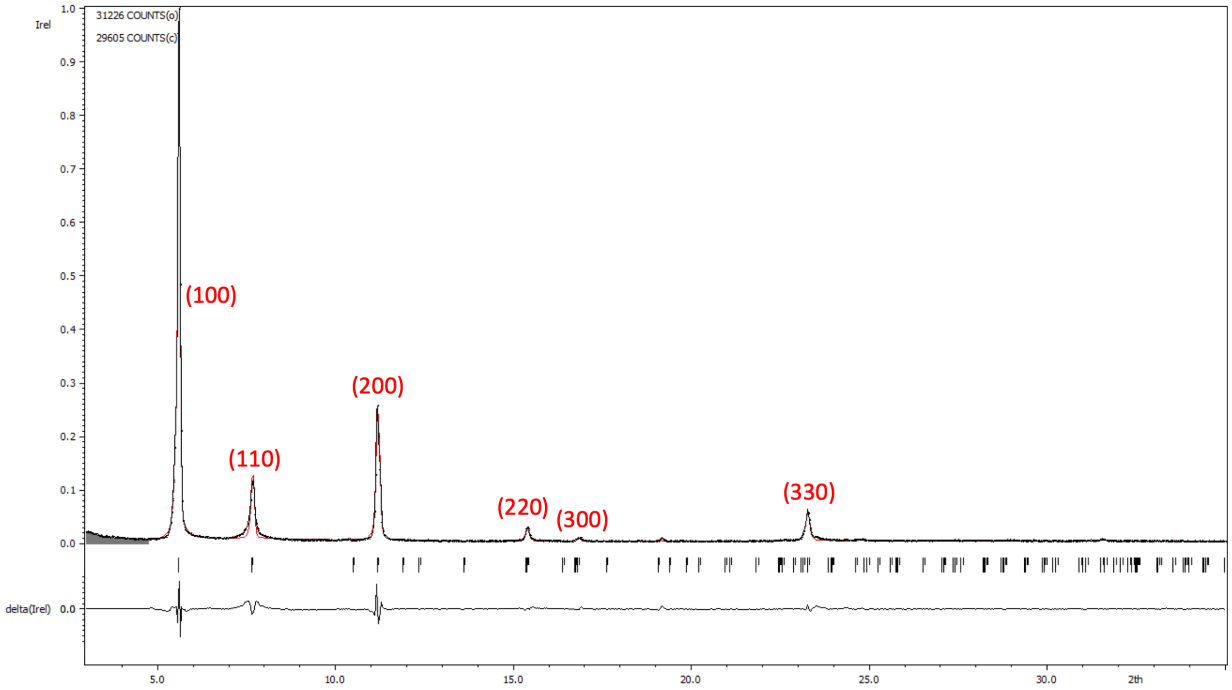


Figure S3. Diffraction pattern of the Phase-1 in *P*bcm space group (parameters listed in Table S2): experimental (black) and simulated (red).

Table S2. The best fitted refined lattice parameters of the Phase-1 within assumption of monoclinic unit cell.

Space group	*P*21/*c* (№14)
a, Å	16.252(8)
b, Å	16.83(1)
c, Å	8.14(1)
α, °	90
β, °	103.4(1)
γ, °	90
	GOF = 2.74 Rp = 9.99 wRp = 13.83

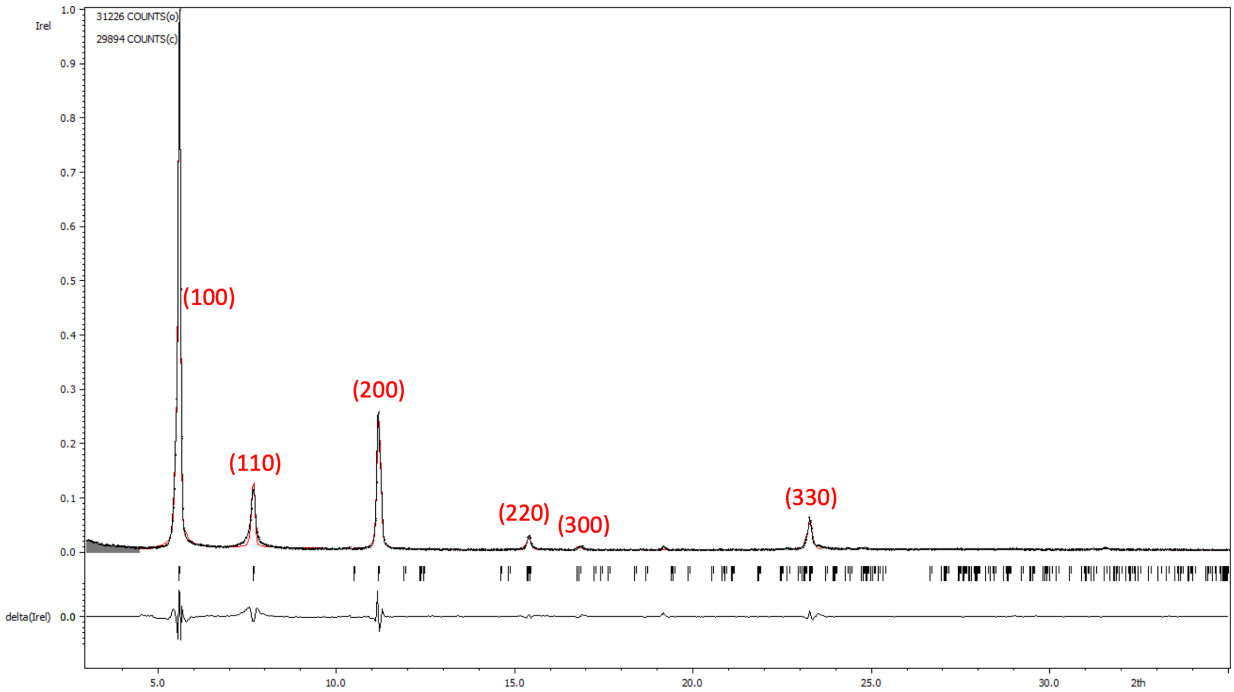
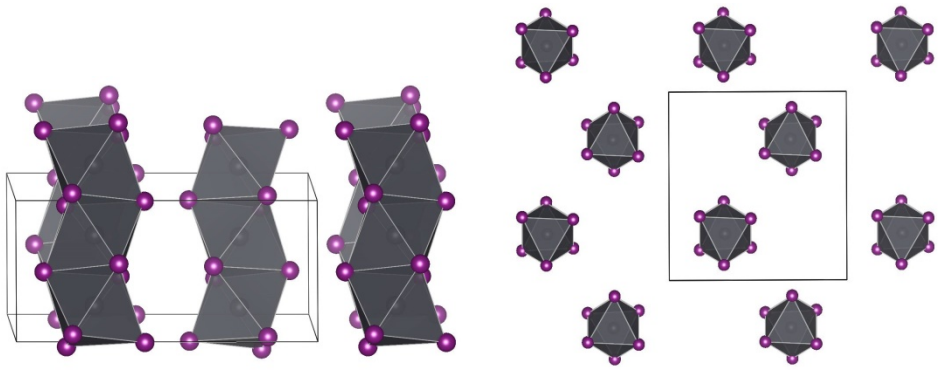


Figure S4. Diffraction pattern of the Phase-1: with *P*21/*c* space group (parameters listed in Table S2): experimental (black) and simulated (red).



(a) *(b)*

Figure S5. Probable crystal structure of Phase-1 (space group *Pbcm*) with a single chains of PbI_6 octahedra in *yz* (a) and *xy* (b) projections.