Supporting Information

Near-bandgap emission in $[HOC_2H_4NH_3]_2PbI_4$ perovskite under hydrostatic pressure: Emission of a free exciton and a polaronic exciton

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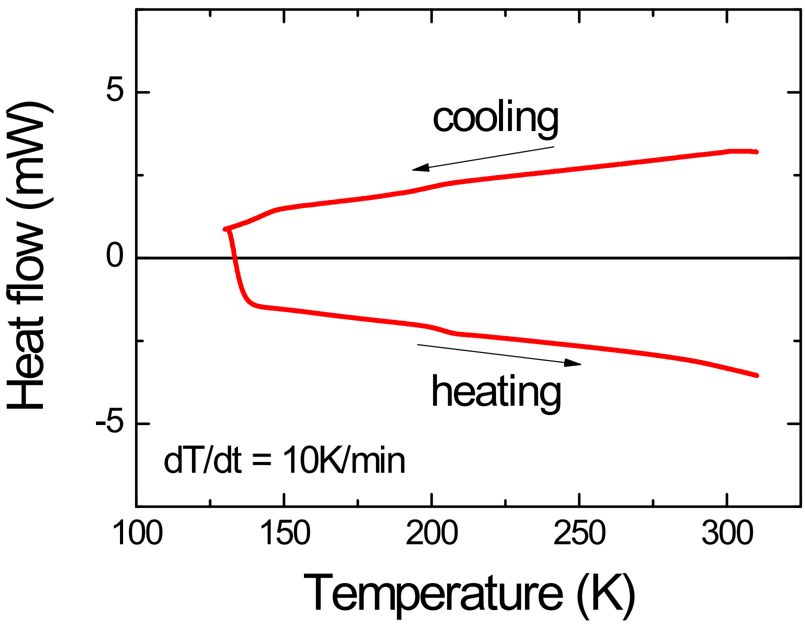

Figure S1. Differential scanning calorimetry measurements for EA_2PbI_4.

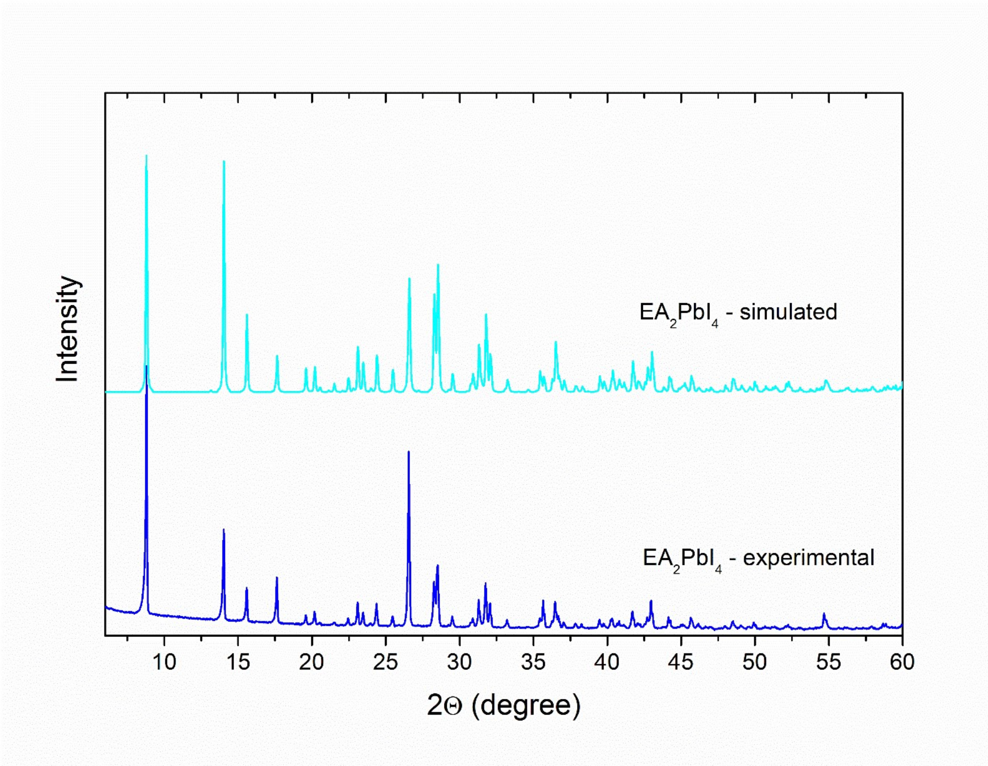

Figure S2. Experimental and theoretical powder X-ray diffraction patterns of EA_2PbI_4.

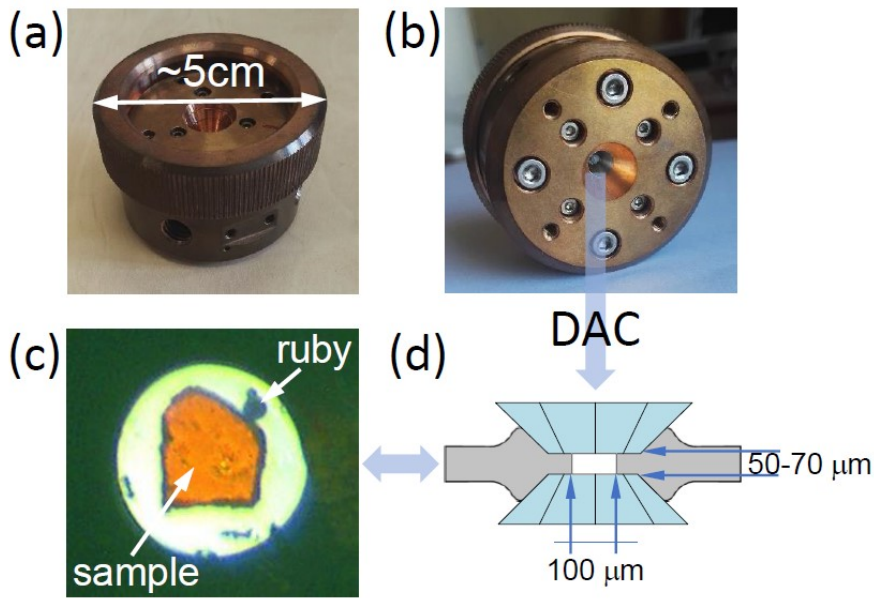

Figure S3. Photos of DAC system for measurements at low temperatures (a) and (b). (c) Photo of ruby sphere and sample inside the DAC. (d) Schematic illustration of pressure cell between diamonds and gasket with characteristic sizes.

Table S1. Fitting parameters of the broadening of FE and FEP transitions with formula 2.

Transition	γ_0 [meV]	γ_{AC} [meV]	γ_{LO} [meV]	Θ_{LO} [meV]
FE (R)	14±2	0.04±0.02	158±40	65±10
FE (PL)	10±2	0.07±0.03	136±20	53±6
FEP (PL)	10±4	0.42±0.12	250±30	48±4

The broadening γ_0 related to the crystal quality is comparable for FE and FEP, but the constants describing the coupling with acoustic and optical phonons, γ_{AC} and γ_{LO}, respectively, are much larger for the FEP transition, which can be attributed to the polaronic nature of the FEP transition. The average optical phonon energy Θ_{LO} for the FE and FEP transitions is comparable and means that the same phonons participate in these transitions, which is to be expected.