Supporting Information for
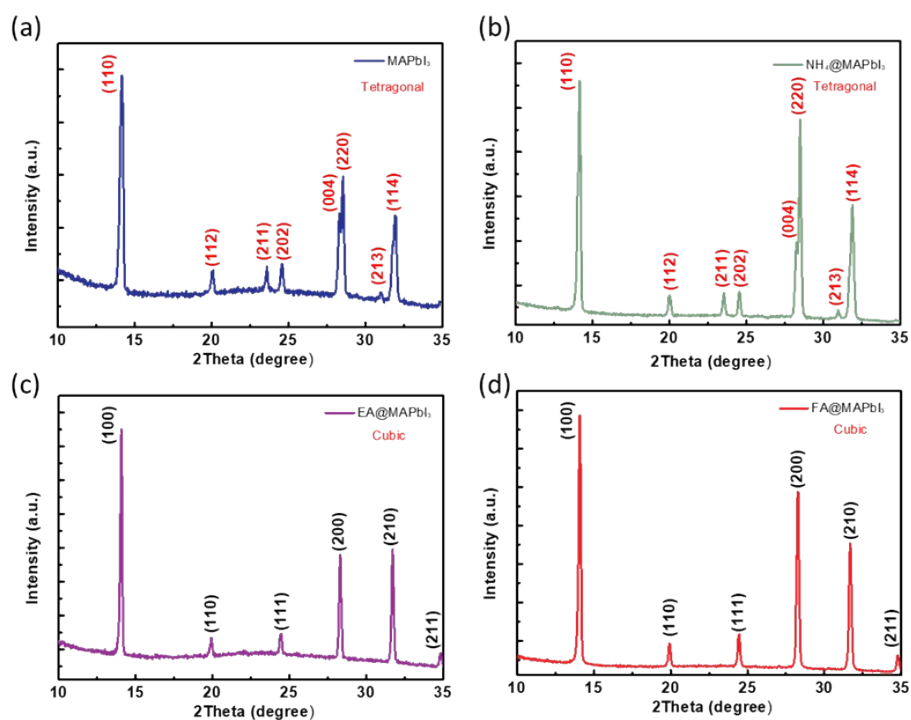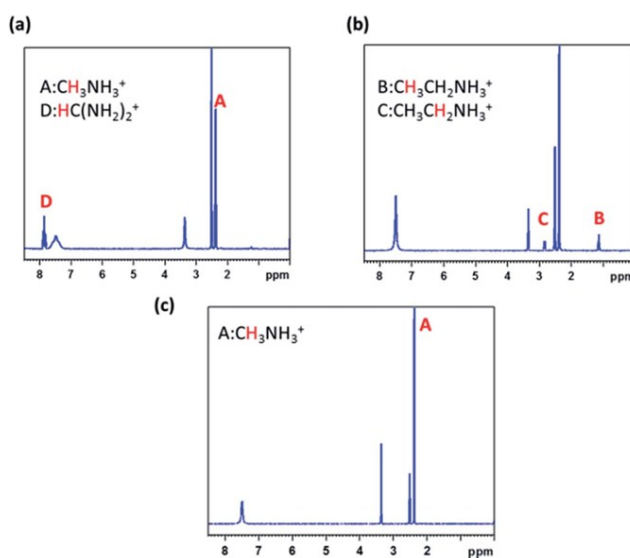
A Study on the Effects of Mixed Organic Cations on the Structure and Properties in Lead Halide Perovskite
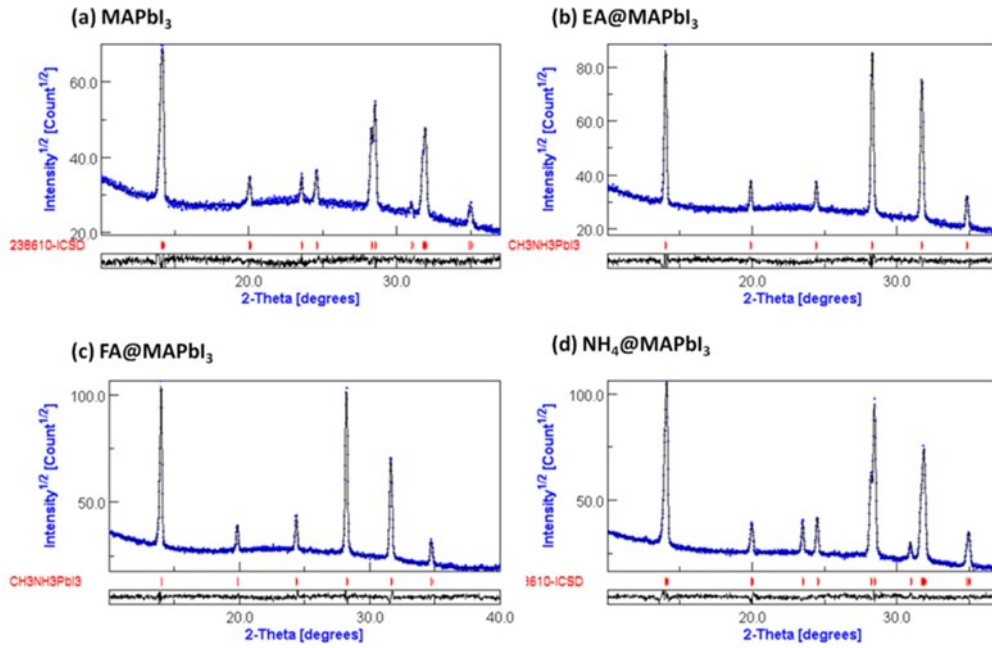
Figure S1. Powder XRD patterns of the perovskite crystals (a) $MAPbI_3$; (b) $NH_4@MAPbI_3$; (c) $EA@MAPbI_3$; (d) $FA@MAPbI_3$

SFigure 2. ^{1}H NMR spectra of the samples, (a) $EA@MAPbI_3$; (b) $FA@MAPbI_3$; (c) $MAPbI_3$.

SFigure 3. Rietveld refinements output plot using MAUD of samples (a) MAPbI$_3$; (b) NH$_4$@MAPbI$_3$; (c) EA@MAPbI$_3$; (d) FA@MAPbI$_3$.

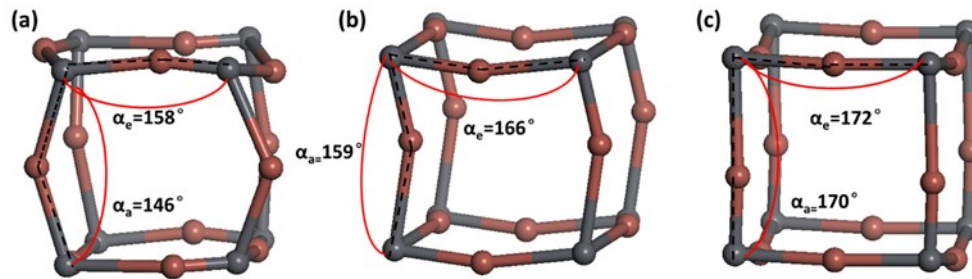**SFigure 4.** Structure diagram of (a) NH$_4$@MAPbI$_3$; (b) MAPbI$_3$; and (c)EA@MAPbI$_3$ crystals.

Table1. Fittingfrom Rietveld refinements with XRD data for the four samples determined by MAUD.

Parameter	MAPbI$_3$	NH4@ MAPbI$_3$	EA@ MAPbI$_3$	FA@ MAPbI$_3$
Symmetry	Tetragonal	Tetragonal	Cubic	Cubic
Space group	I4/mcm	I4/mcm	Pm-3m	Pm-3m
a (Å)	8.931	8.879	6.308	6.328
b (Å)	8.931	8.879	6.308	6.328
c (Å)	13.032	12.664	6.308	6.328
sig	1.19	1.57	1.64	1.44
R$_w$(%)	4.04	4.56	5.43	4.91
R$_p$(%)	3.39	2.28	3.91	3.43