

Supplementary Materials

Unravelling the Formation of 2-Phenylethylammonium 2D Perovskites by *In Situ* GIWAXS

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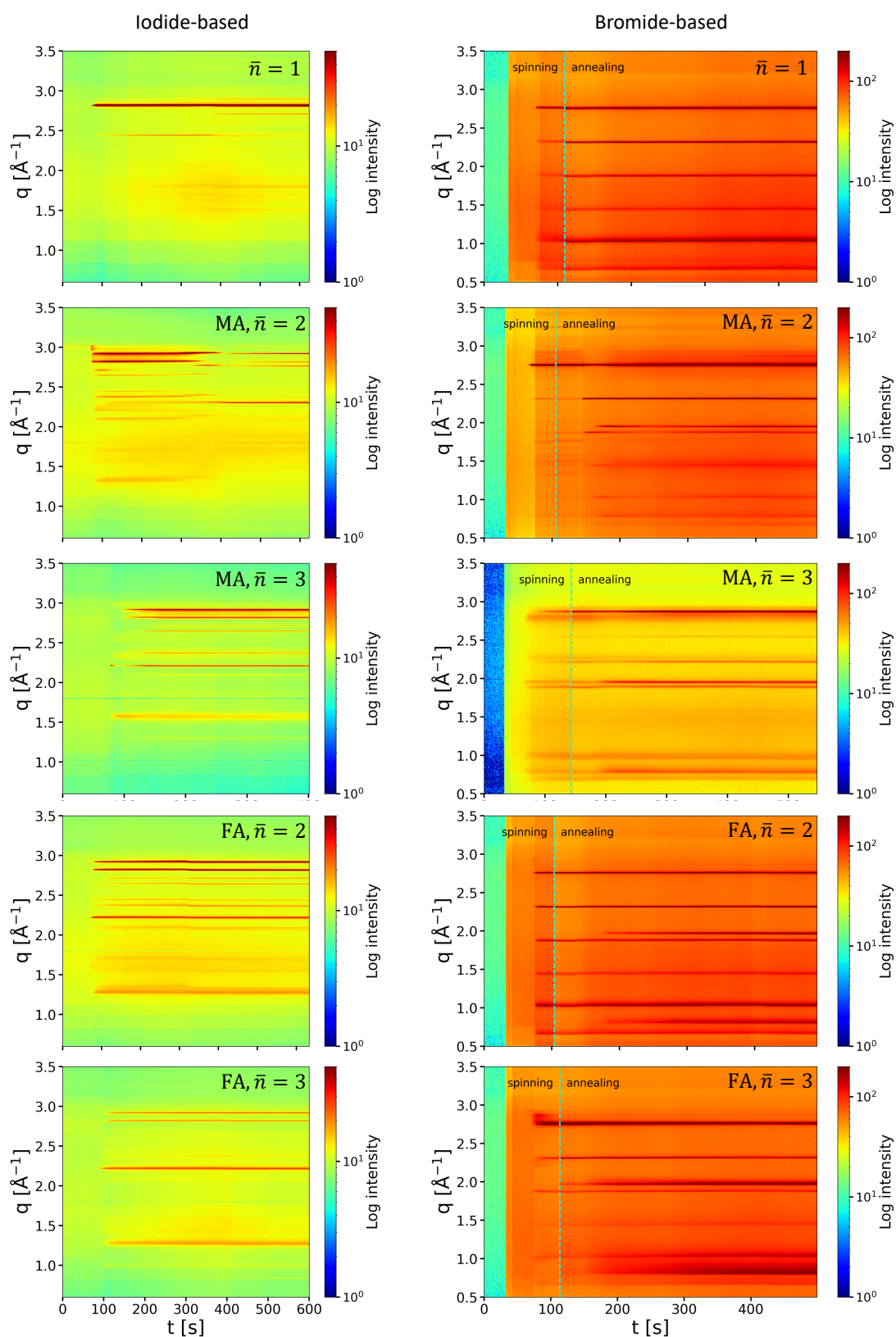


Figure S1. Colormaps of $I(q, t)$ for the *In-situ* GIWAXS patterns from the samples with different cations (MA⁺ or FA⁺) and target dimensionalities $\bar{n} = 1, 2, 3$. Left column shows annealing of the iodide-based samples and right column shows spinning and annealing of the bromide-based samples.

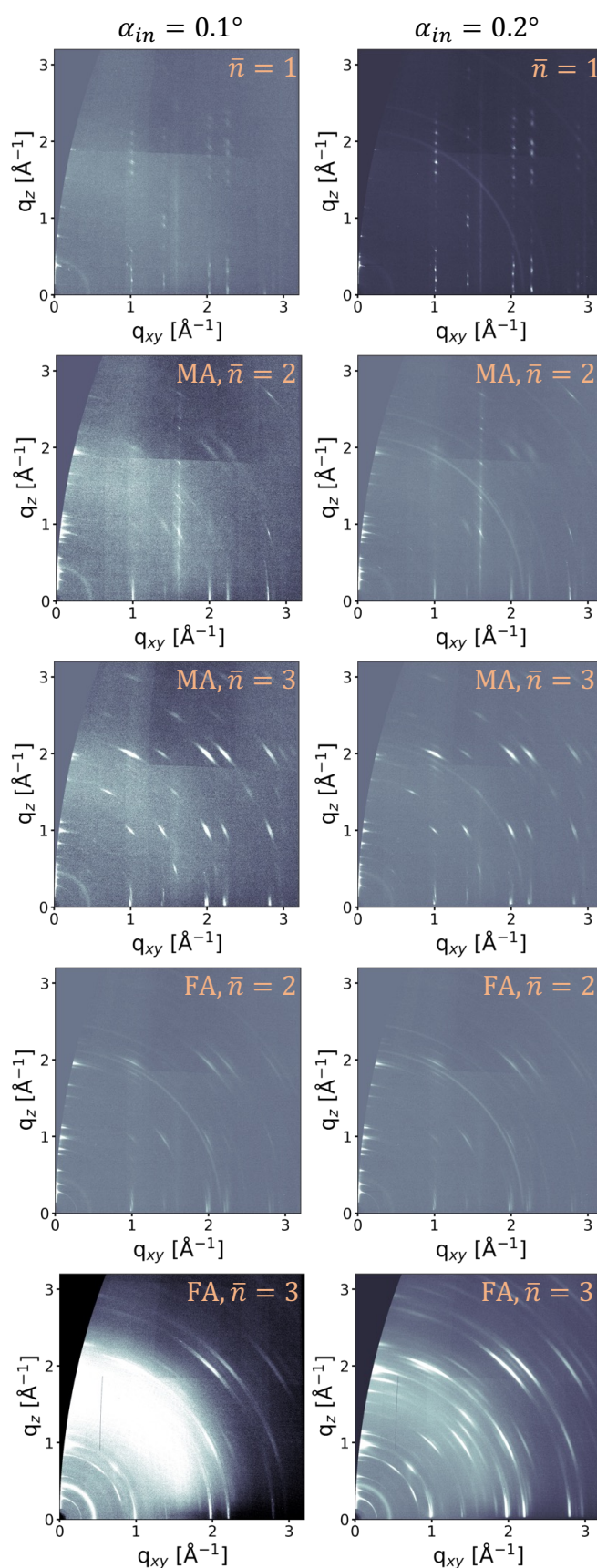


Figure S2. *Ex-situ* GIWAXS patterns from the samples with iodide anion with different cations (MA^+ or FA^+) and target dimensionalities $\bar{n} = 1, 2, 3$. Left column shows data measured at the incidence angle $\alpha_{in} = 0.1^\circ$ and right column at $\alpha_{in} = 0.2^\circ$.

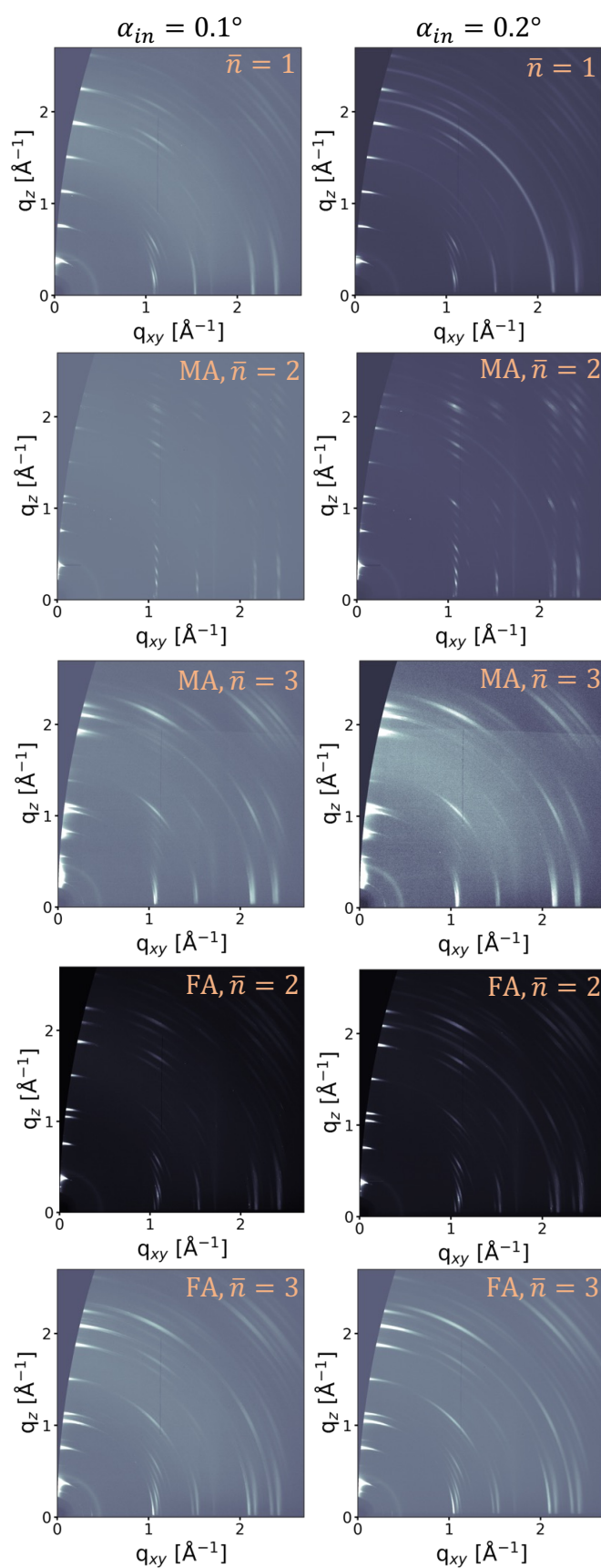


Figure S3. *Ex-situ* GIWAXS patterns from the samples with bromide anion with different cations (MA^+ or FA^+) and target dimensionalities $\bar{n} = 1, 2, 3$. Left column shows data measured at the incidence angle $\alpha_{in} = 0.1^\circ$ and right column at $\alpha_{in} = 0.2^\circ$.