

ARTICLE

Voltage Bias Stress Effects in Metal Halide Perovskites are Strongly Dependent on Morphology and Ion Migration Pathways

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Supplementary Information

J-V characteristics of the large sweep range in the forward direction; Hour long bias stress studies; Bias stress experiments with different voltage pulsed times; Details on morphological differences with AFM; Hysteresis in mixed halide and triple cation perovskite solar cell devices.

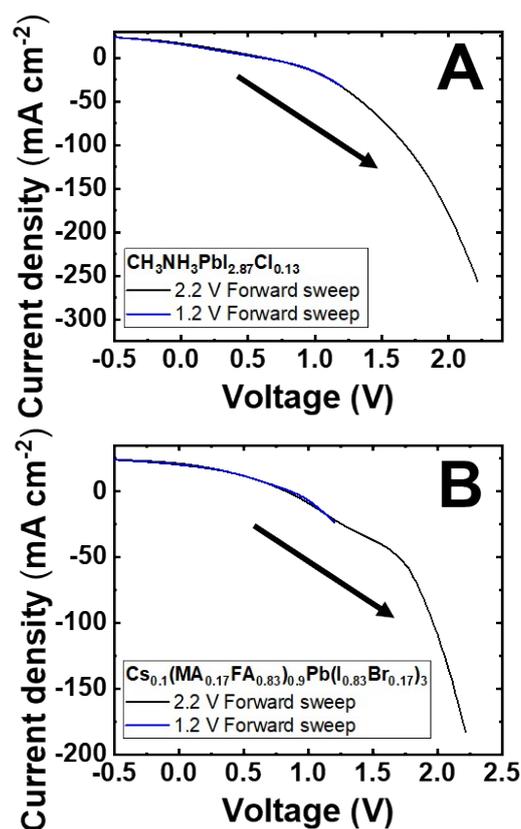


Figure S1. J-V curves as a function of increased sweep range in the forward direction for **A)** the mixed halide MHP and **B)** triple cation MHP devices. In the forward direction no bias dependent effect is observed. Black arrows represent sweep direction.

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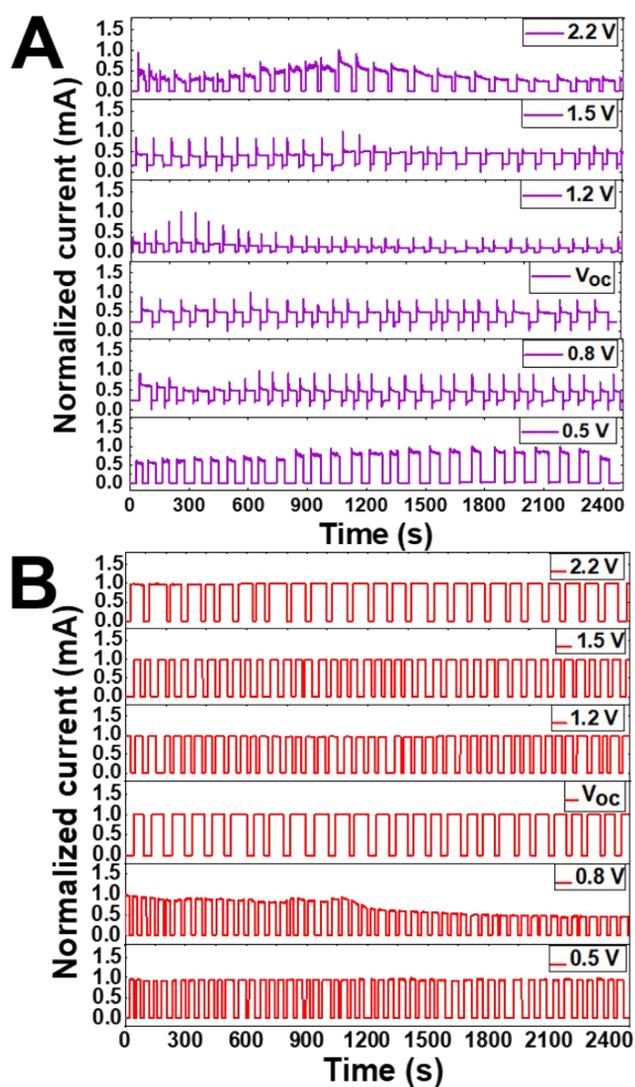


Figure S2. Extended pulsed voltage experiments for **A)** the mixed halide MHP and **B)** the triple cation MHP devices. The applied voltage bias range goes from 0.5 V to 2.2 V.

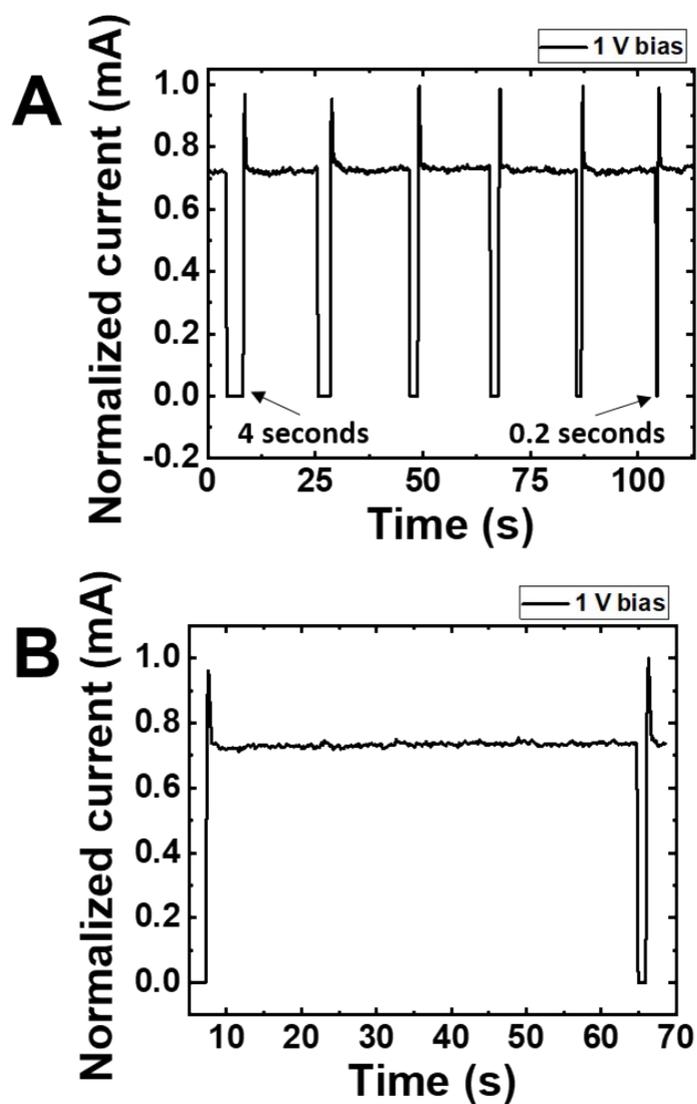


Figure S3. Bias stress experiments for the mixed halide MHP devices to display that **A)** shortened pulse frequencies and **B)** an extended voltage bias period does not affect the current trends. The applied voltage bias used for these measurements was 1.0 V.

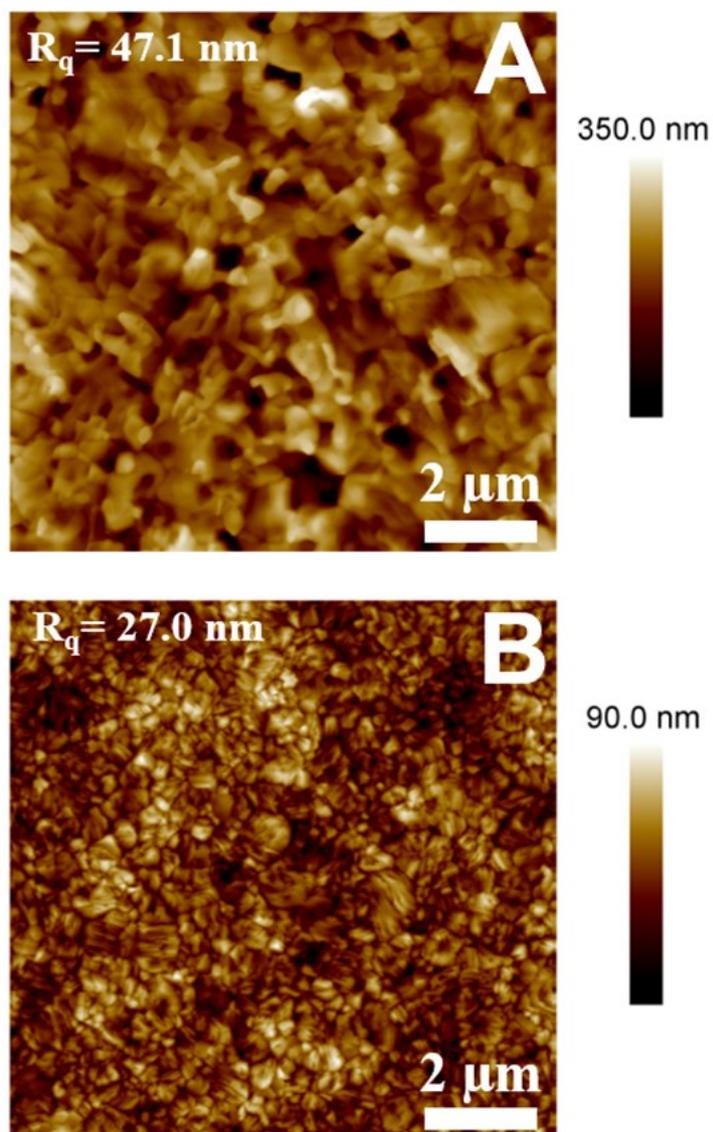


Figure S4. AFM of **A)** the mixed halide MHP **B)** and the triple cation MHP displaying the differences in domain sizes and roughness (R_q) values.

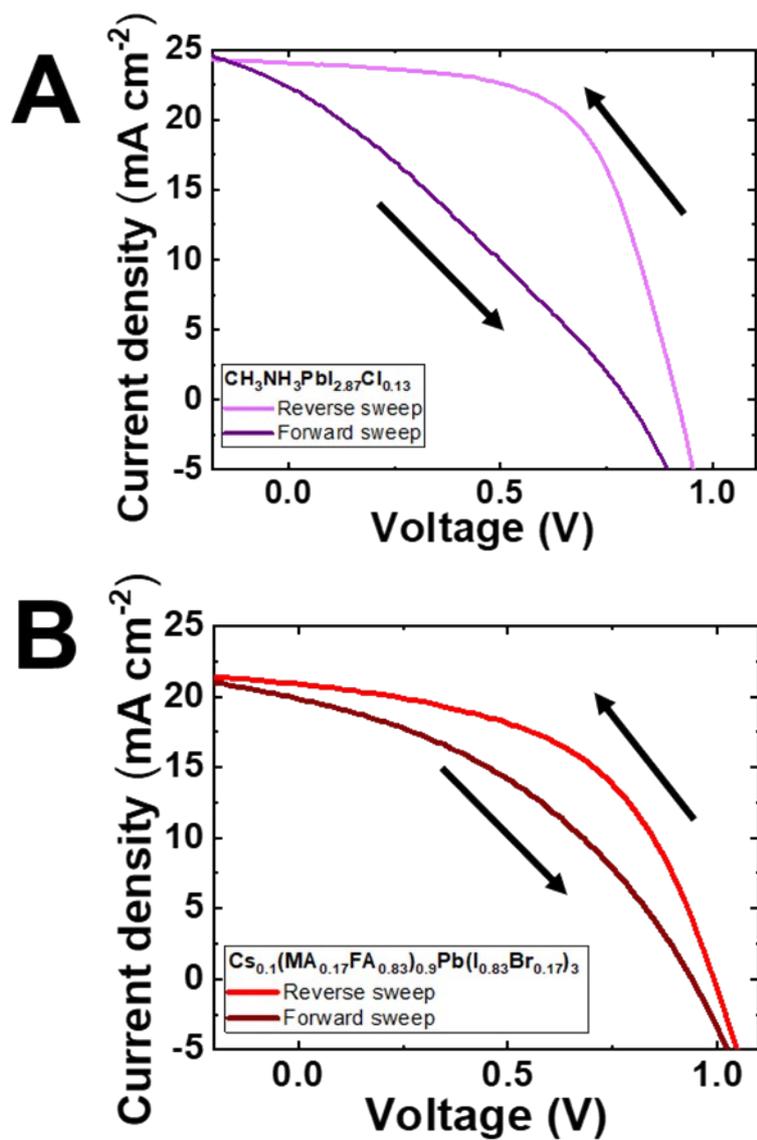


Figure S5. J-V curves of the **A)** mixed halide MHP and **B)** triple cation MHP in both forward and reverse sweep directions displaying differences in hysteresis. Large black arrows represent sweep direction of the respective curves.