

Simultaneous Passivation on Both A and X Sites of Halogen Perovskite with Magnesium Benzoate

Chenxin Xu^a, Lujie Liu^a, Yurong Huang^b, Fei Zhang^b, Hui Cao^{a*}

- a. School of Chemistry and Materials Science, Nanjing University of Information Science and Technology, Nanjing 210044, People's Republic of China.
- b. School of Environmental Science and Engineering, Nanjing University of Information Science and Technology, Nanjing 210044, People's Republic of China.

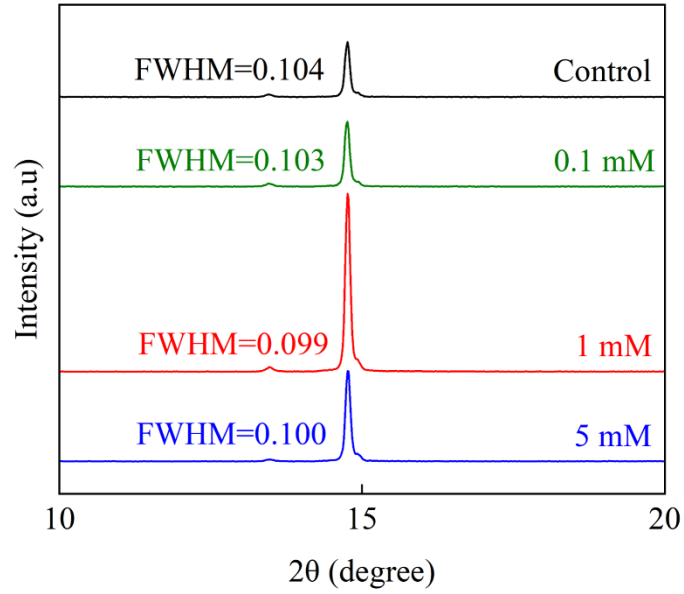


Fig. S1. The full width at half-maximum (FWHM) of the (100) peak.

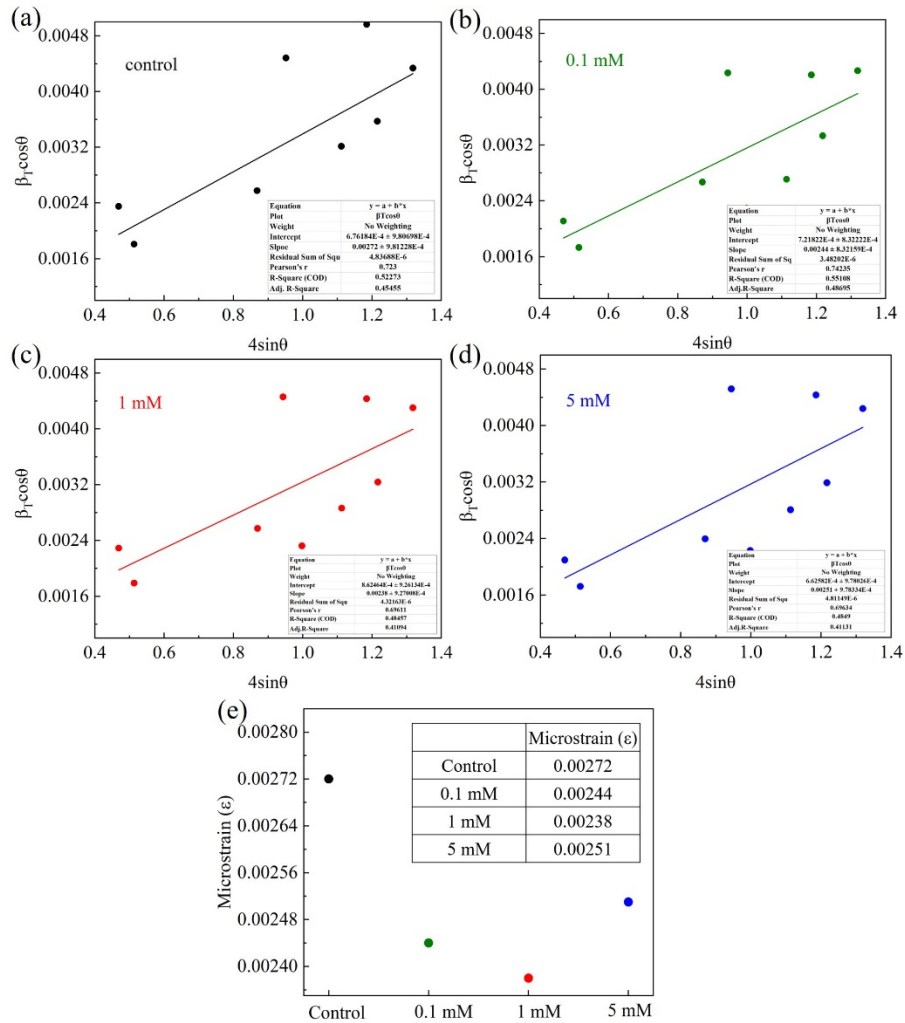


Fig. S2. (a)-(d) Williamson-Hall plots with different MgBE-modified in FAPbI₃ and control. (e) Strain obtained from the XRD patterns of different concentrations of perovskite film.

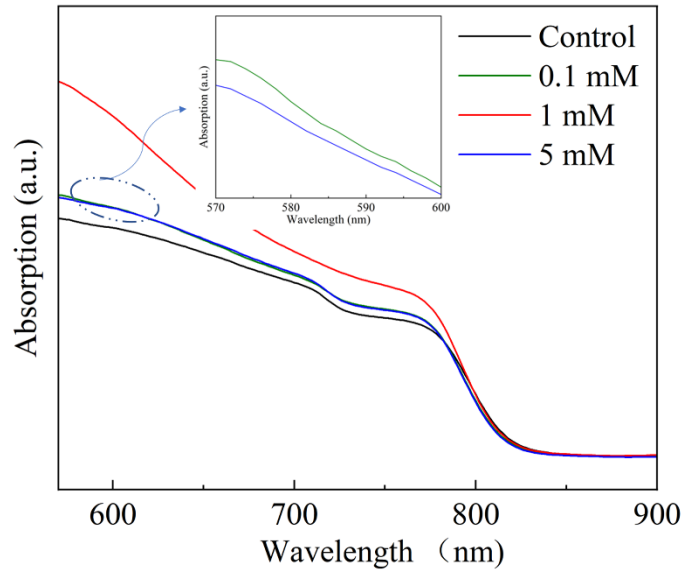


Fig. S3. Other UV-vis absorption spectra of different concentrations MgBEN-modified perovskite films.

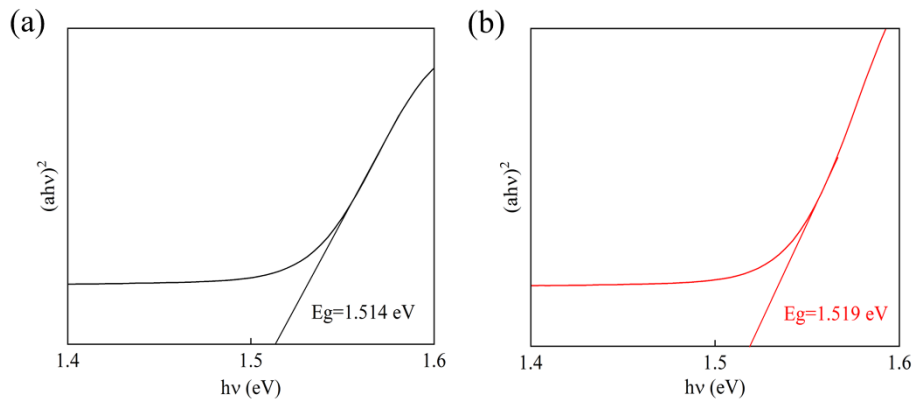


Fig. S4. Tauc plot of (a) control, (b) 1 mM MgBEN-modified perovskite film.

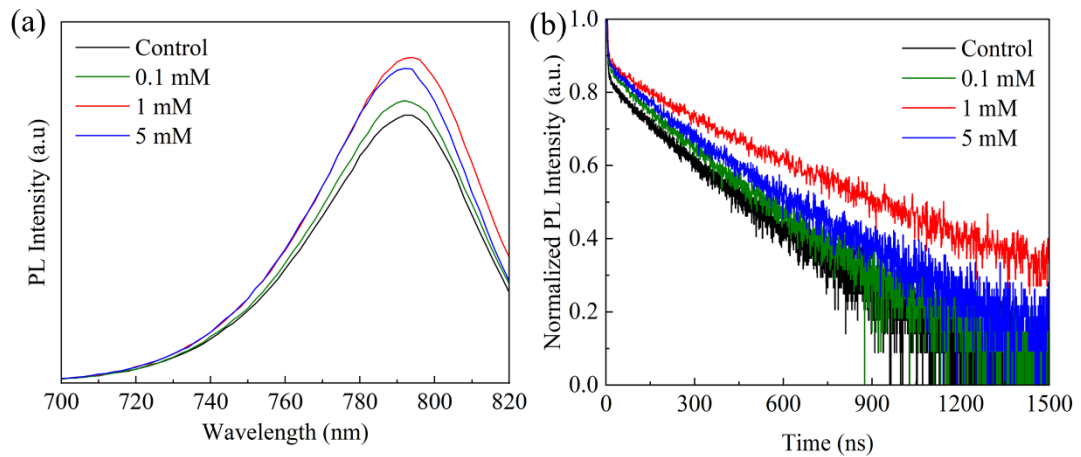


Fig. S5. Other concentrations of PL (a) and TRPL (b).

Table S1. TRPL parameters of perovskite films of different concentrations MgBEN - modified.

| Samples | A_1 (%) | τ_1 (ns) | A_2 (%) | τ_2 (ns) | τ_{ave} (ns) |
|---------|-----------|---------------|-----------|---------------|-------------------|
| Control | 71.09 | 1.622 | 28.91 | 161.28 | 157.43 |
| 0.1 mM | 67.50 | 2.33 | 32.50 | 175.25 | 170.60 |
| 1 mM | 56.72 | 3.40 | 43.28 | 293.28 | 288.94 |
| 5 mM | 60.76 | 2.58 | 39.24 | 202.24 | 198.37 |

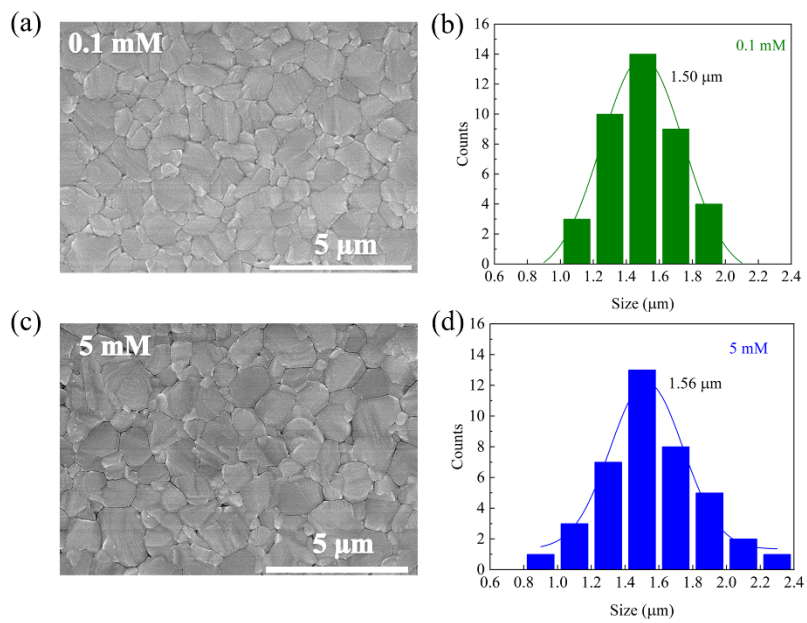


Fig. S6. Top-view SEM images of the 0.1 mM (a), 5 mM MgBEN-modified (c) perovskite films. Histograms of grain size distributions of the 0.1 mM (b), 5 mM MgBEN-modified (d) perovskite films, respectively.

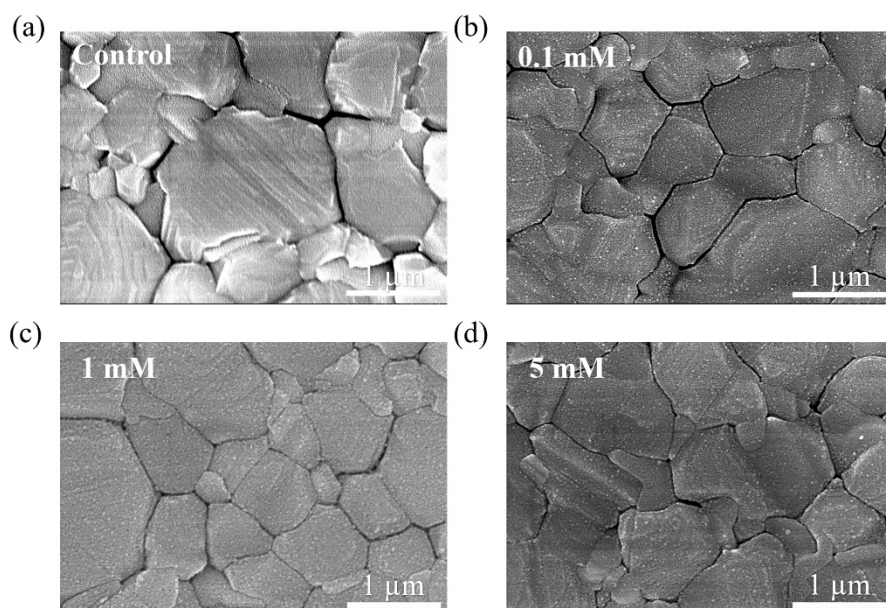


Fig. S7. Top-view SEM images of the control (a), 0.1 mM (b), 1mM (c) and 5 mM (d) MgBEN-modified perovskite films.

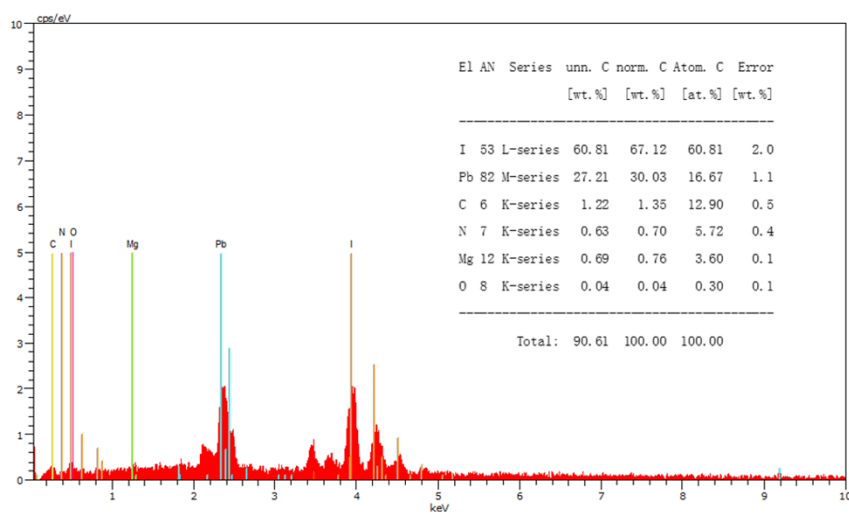


Fig. S8. EDS of 1 mM MgBEN-modified perovskite film.

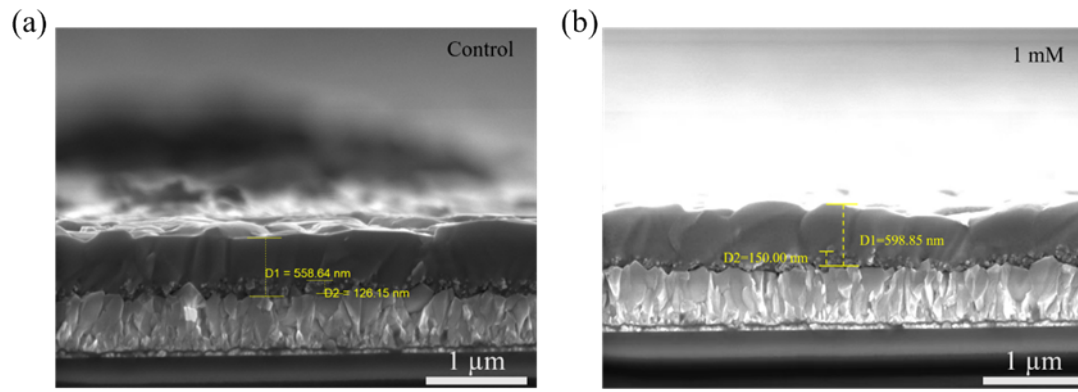


Fig. S9. Cross-sectional SEM images of the (a) control and (b) MgBEN-modified perovskite film.