

Electronic Supporting Information

Enhancing the Stability of Organolead Halide Perovskite Films Through Polymer Encapsulation

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1. Chemical Structures of the Polymer Encapsulants

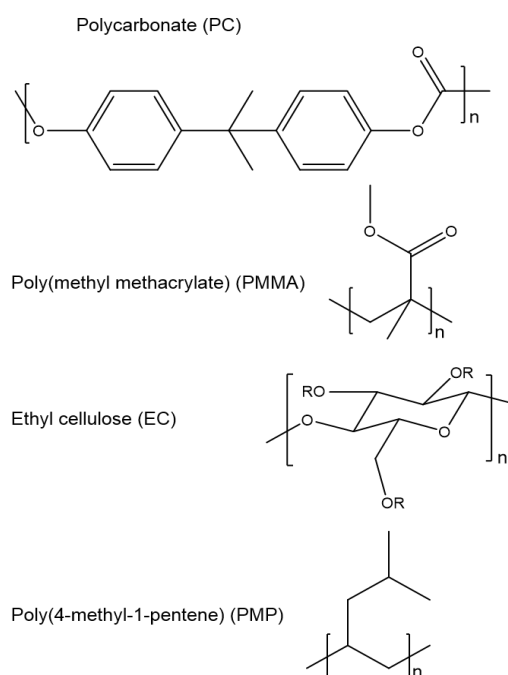


Figure S1. Chemical structures of the polymer encapsulants.

2. Powder X-Ray Diffraction of $\text{CH}_3\text{NH}_3\text{PbI}_{3-x}\text{Cl}_x$ Films

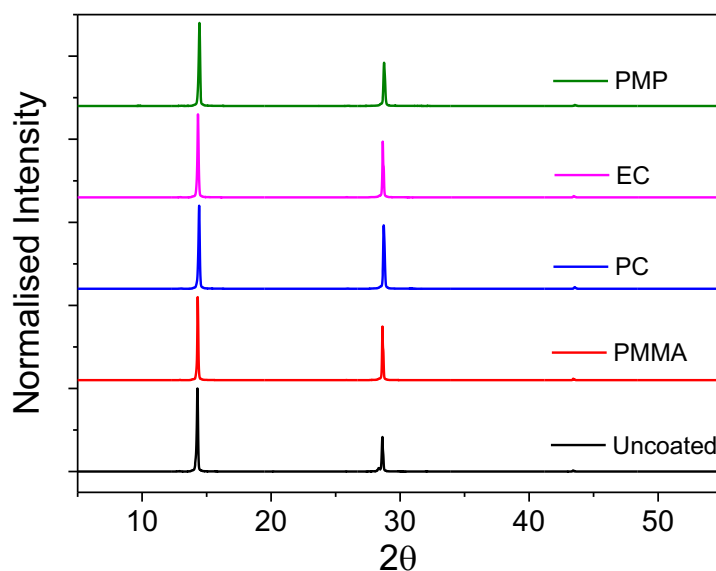


Figure S2. Powder X-Ray Diffraction (PXRD) patterns of pristine and polymer encapsulated $\text{CH}_3\text{NH}_3\text{PbI}_{3-x}\text{Cl}_x$ films before thermal degradation.

3. UV/Vis Absorption Studies of Perovskite and Polymer Layers

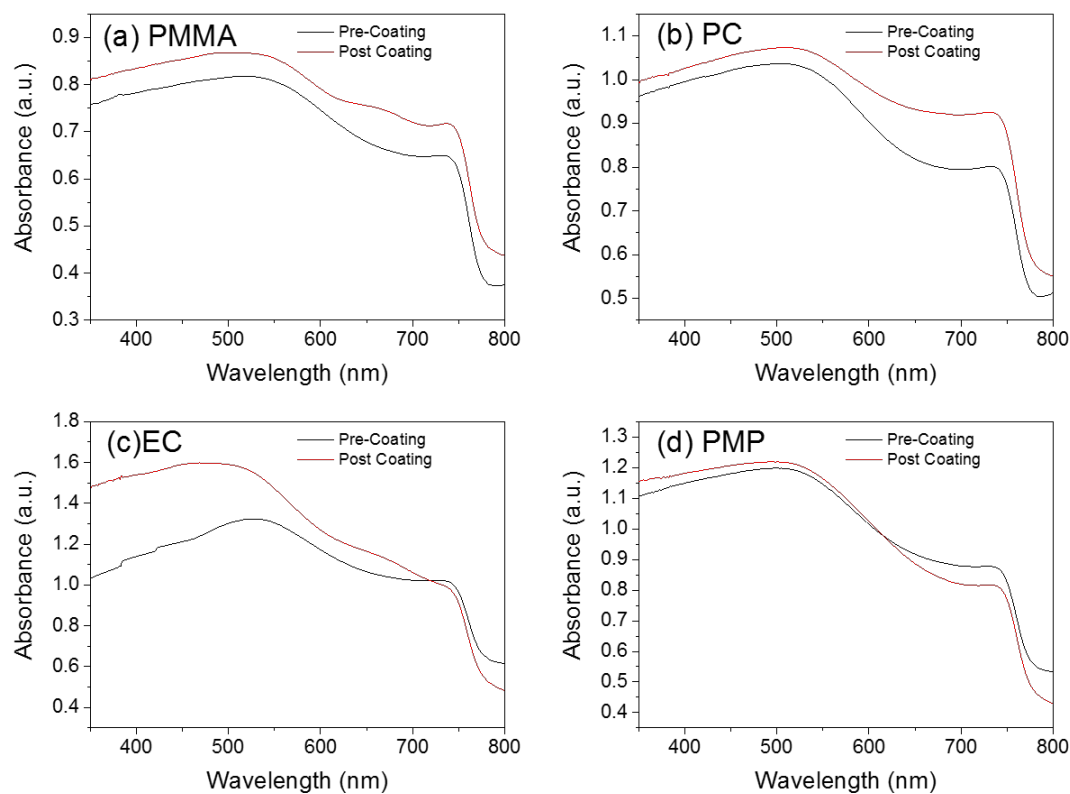


Figure S3. UV/Vis absorption spectra of $\text{CH}_3\text{NH}_3\text{PbI}_{3-x}\text{Cl}_x$ layers before and after coating with (a) PMMA, (b) PC, (c) EC and (d) PMP polymer thin films.

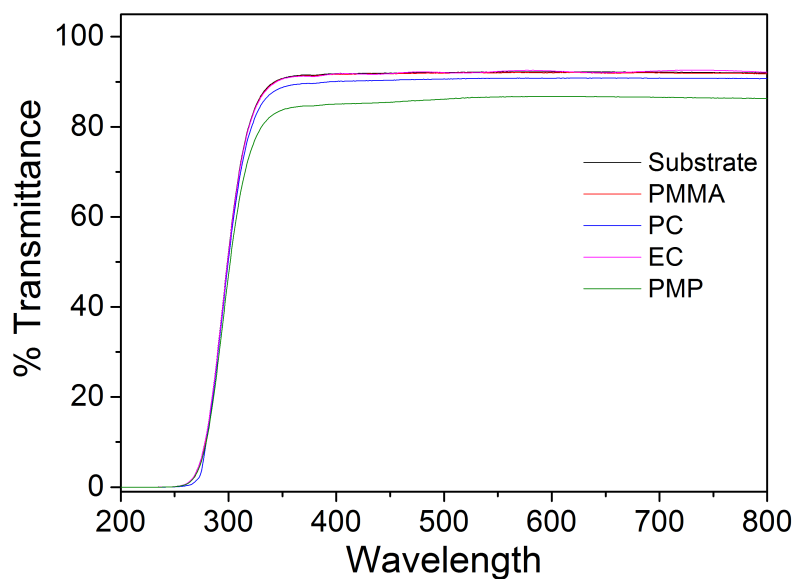


Figure S4. Light transmittance of polymer thin films (~800 nm) coated on glass substrates

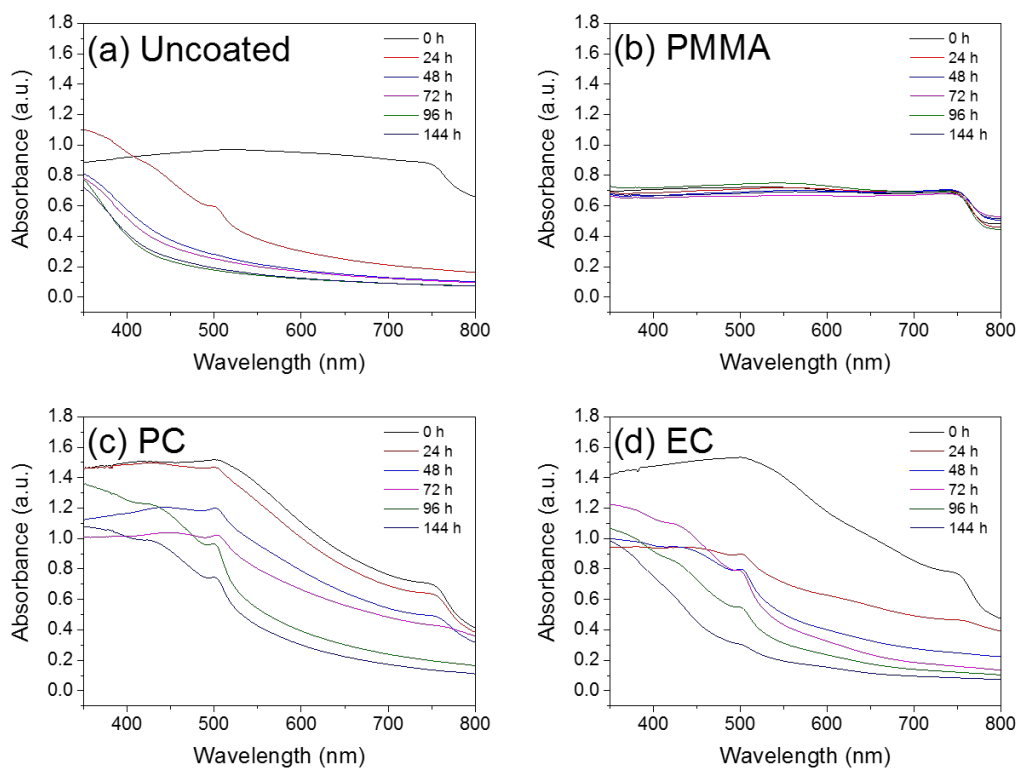


Figure S5. UV/Vis absorption spectra of $\text{CH}_3\text{NH}_3\text{PbI}_{3-x}\text{Cl}_x$ films degraded at 80°C as a function of time (a) uncoated, (b) PMMA coated, (c) PC coated and (d) EC coated.

4. Photographs of Pristine and Degraded $\text{CH}_3\text{NH}_3\text{PbI}_{3-x}\text{Cl}_x$ film

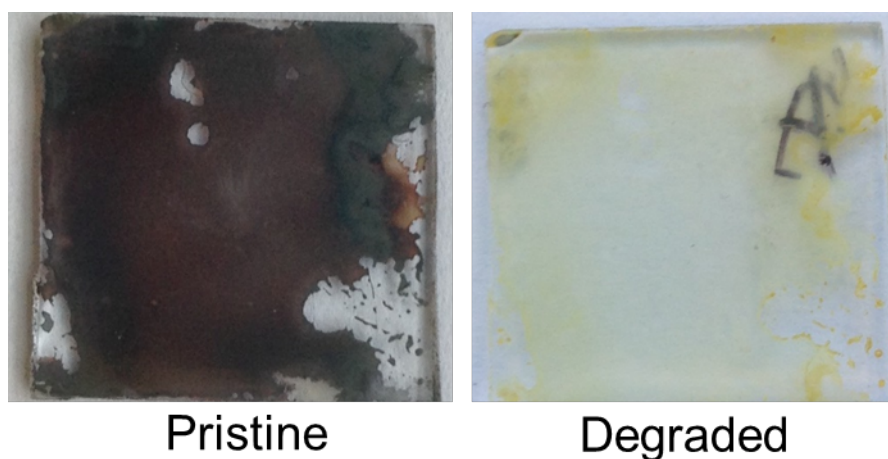


Figure S6. Photograph of uncoated $\text{CH}_3\text{NH}_3\text{PbI}_{3-x}\text{Cl}_x$ film before and after 432 h degradation at 60 °C in air.

5. Fluorescence Microscopy Studies of $\text{CH}_3\text{NH}_3\text{PbI}_{3-x}\text{Cl}_x$ Degradation

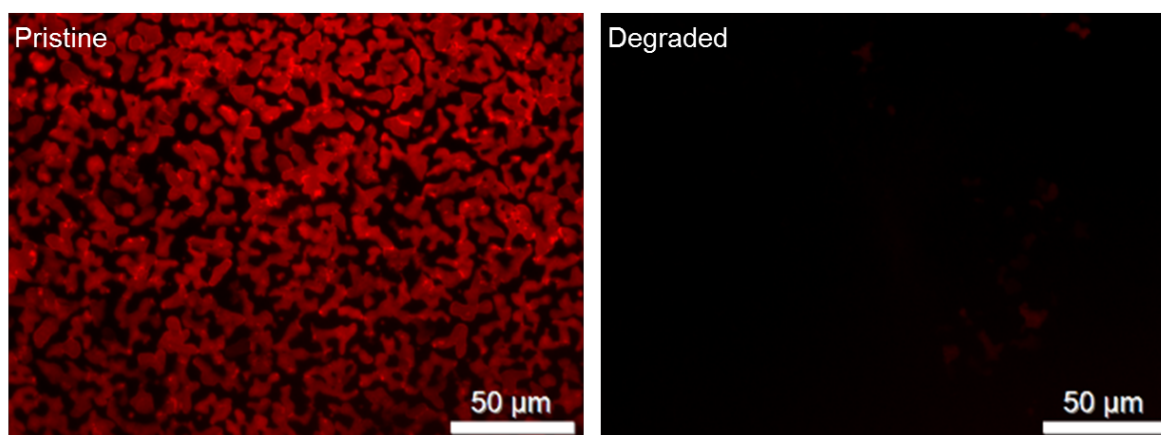


Figure S7. Fluorescence microscopy images of uncoated perovskite before and after thermal degradation at 60 °C for 48 h.

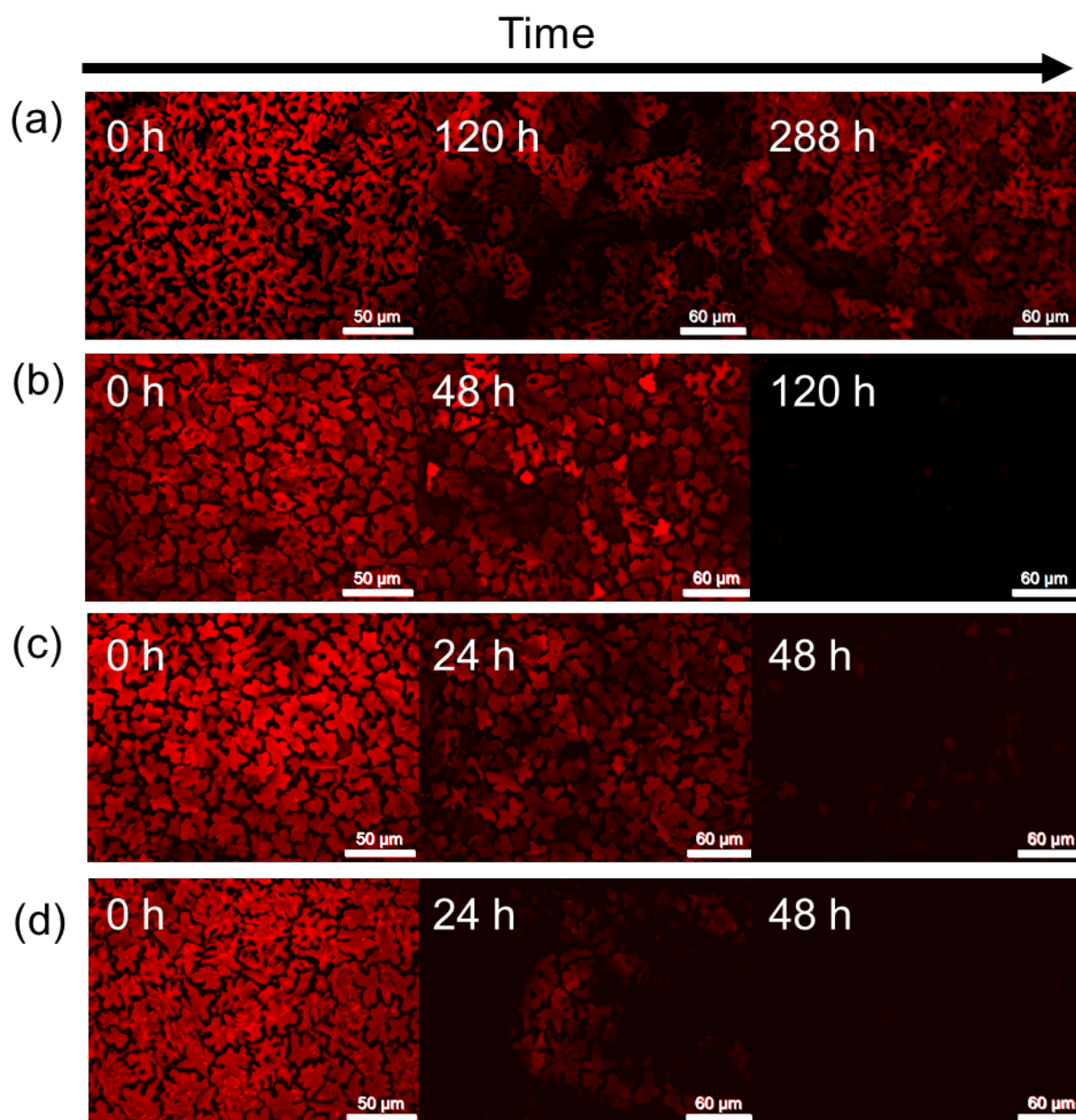


Figure S8. Thermal degradation of polymer encapsulated $\text{CH}_3\text{NH}_3\text{PbI}_{3-x}\text{Cl}_x$ films at $80\text{ }^\circ\text{C}$ as a function of time monitored by fluorescence microscopy. $\text{CH}_3\text{NH}_3\text{PbI}_{3-x}\text{Cl}_x$ degradation is accompanied by a decrease in emission intensity and hence darkening of the image. (a) PMMA showing degradation onset after 120 h, (b) PC after 48 h, (c) EC after 24 h and (d) PMP after 24 h.

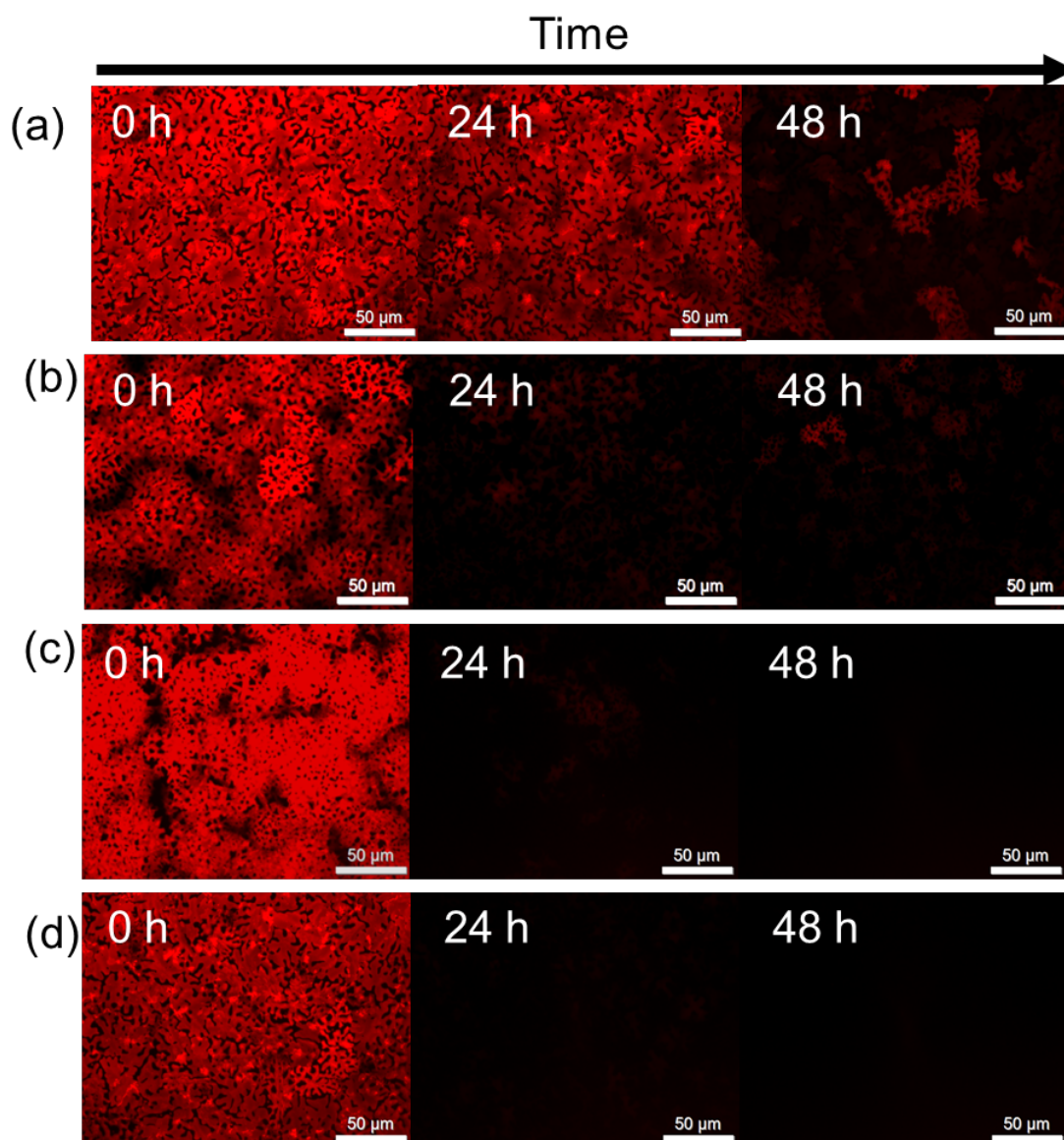


Figure S9. Thermal degradation of polymer encapsulated $\text{CH}_3\text{NH}_3\text{PbI}_{3-x}\text{Cl}_x$ films at $100\text{ }^\circ\text{C}$ as a function of time monitored by fluorescence microscopy. $\text{CH}_3\text{NH}_3\text{PbI}_{3-x}\text{Cl}_x$ degradation is accompanied by a decrease in emission intensity and hence darkening of the image. (a) PMMA showing degradation onset after 24 h, (b) PC showing complete degradation after 24 h, (c) EC showing complete degradation after 24 h and (d) PMP showing complete degradation after 24 h.