

Supporting Information

Thermal-induced interface degradation in perovskite light-emitting diodes

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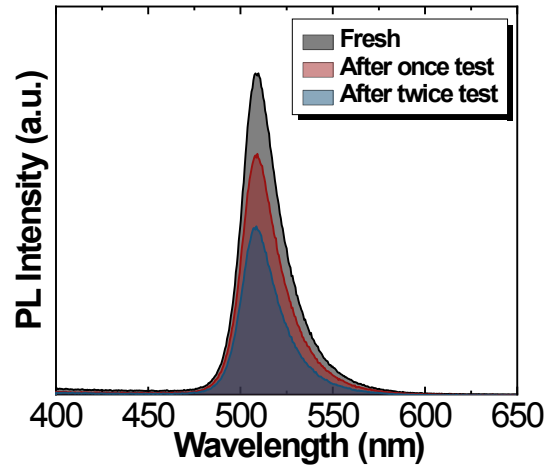


Fig. S1 PL intensity of perovskite films with different testing cycles.

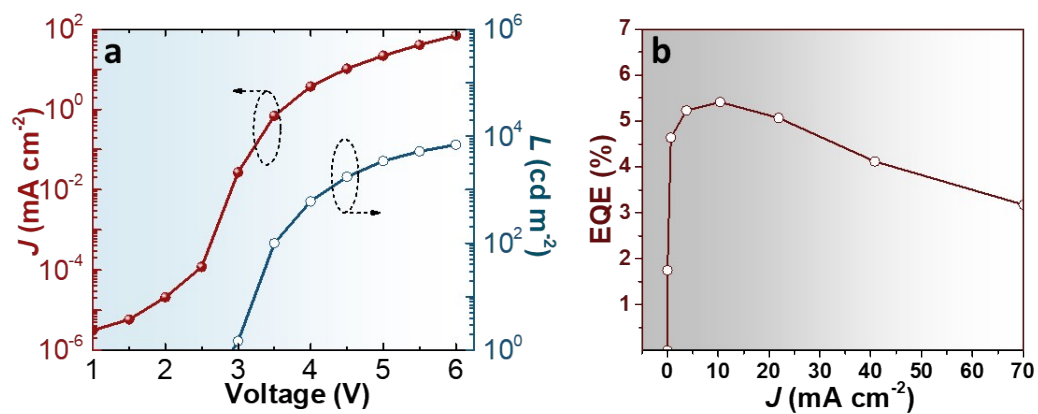


Fig. S2 Device performance of a PeLED after two scans from 0-6 V. (a) *J-V-L* curve. (b) *EQE-J* curve. The LED was tested in ambient (temperature, 30 °C; humidity, 60%) with epoxy encapsulation.

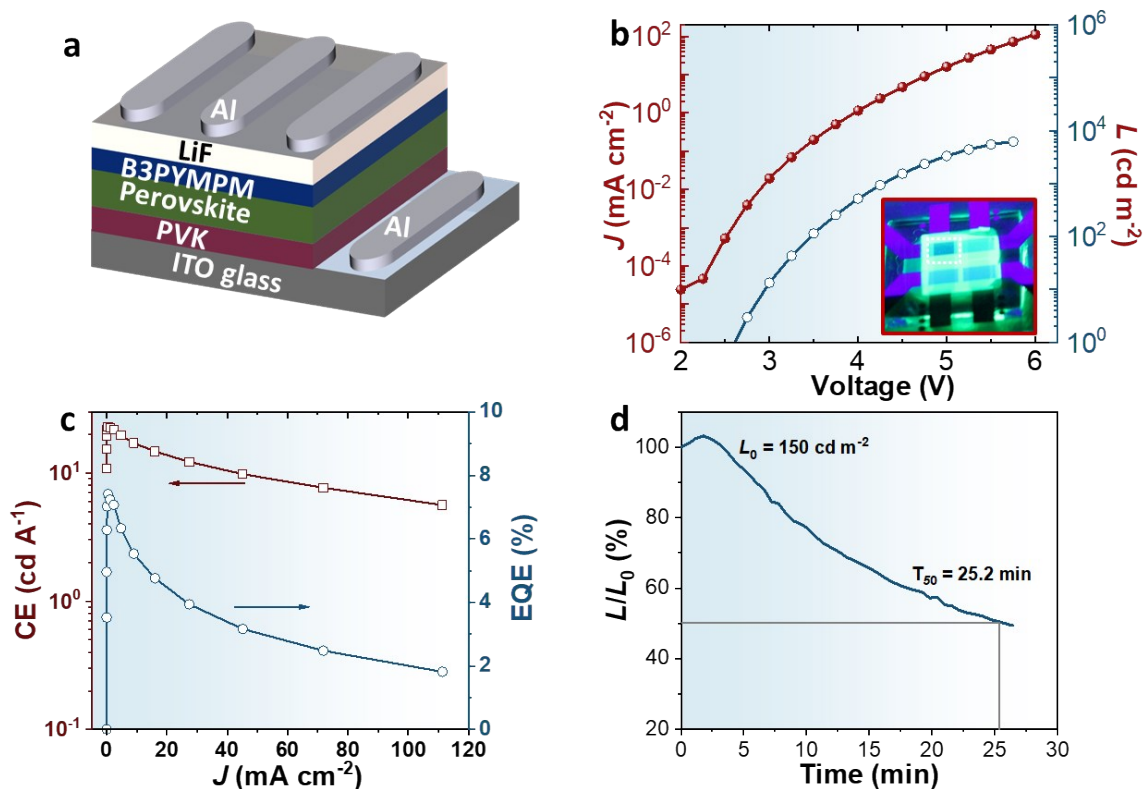


Fig. S3 Device performance of PeLED with B3PYMPM as ETL. (a) Schematic device structure. (b) J - V - L curve, the pixel in dash white rectangle has been scanned from 0 to 6 V. (c) EQE - J curve. (d) Operational lifetime measurement with an initial luminescence of approximately 150 cd m⁻². The LED was tested in ambient (temperature, 30 °C; humidity, 60%) with epoxy encapsulation.

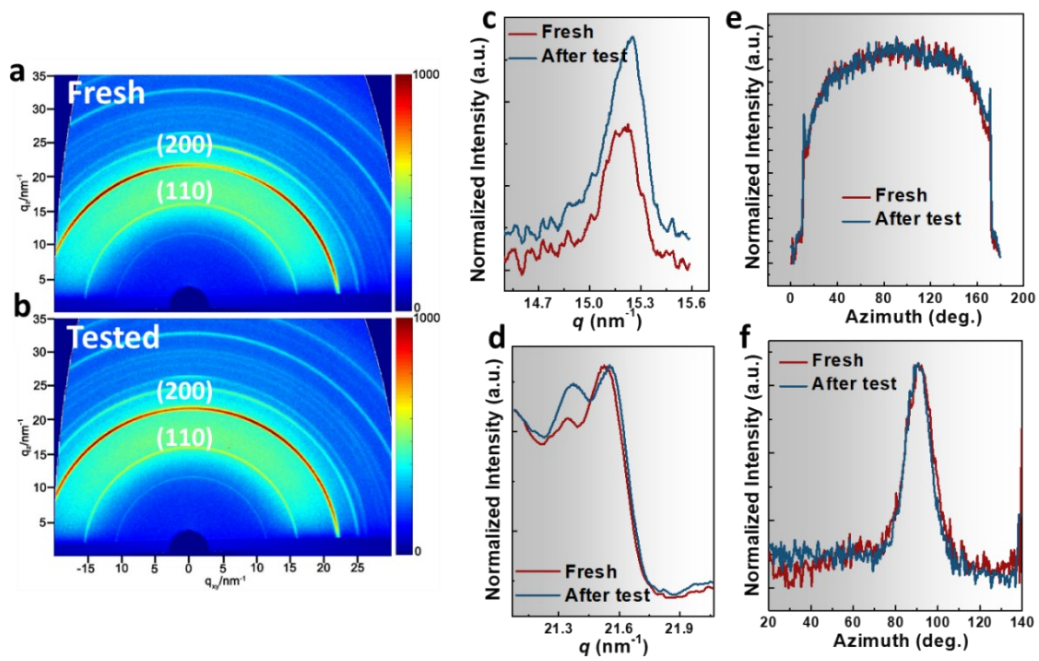


Fig. S4 GIXRD measurement of perovskite film in (a) fresh device and (b) bias tested device. Crystallinity (c) and orientation (e) analysis of (110) plane of perovskite films. Crystallinity (d) and orientation (f) analysis of (200) plane of perovskite films.

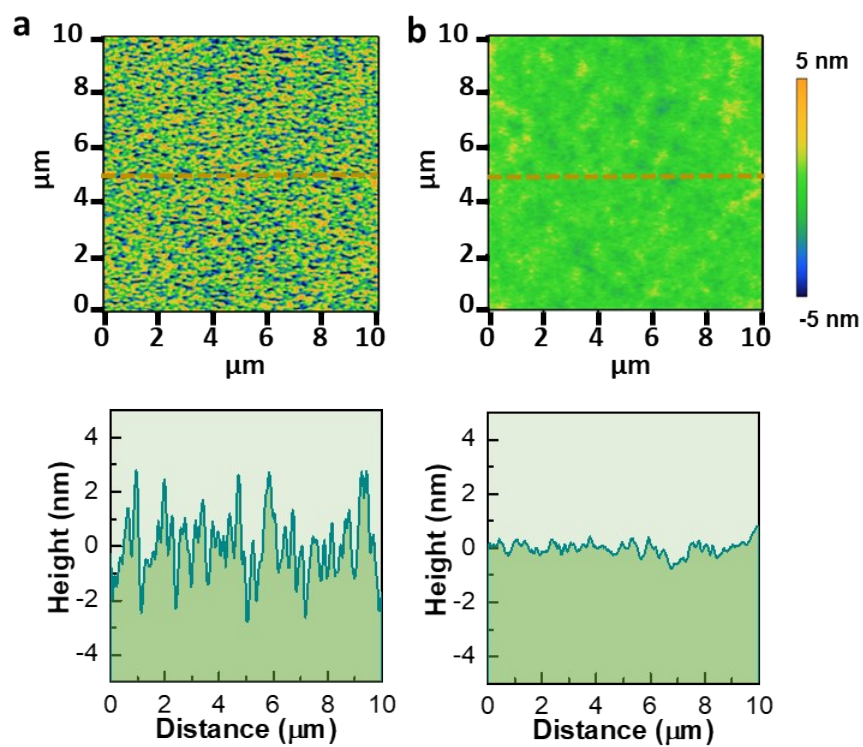


Fig. S5 Morphology of TPBi films deposited on ITO/PVK substrate. (a) Without annealing. (b) Annealed at 100 °C for 5 min. The bottom images are the corresponding line-scan profile in AFM height images.

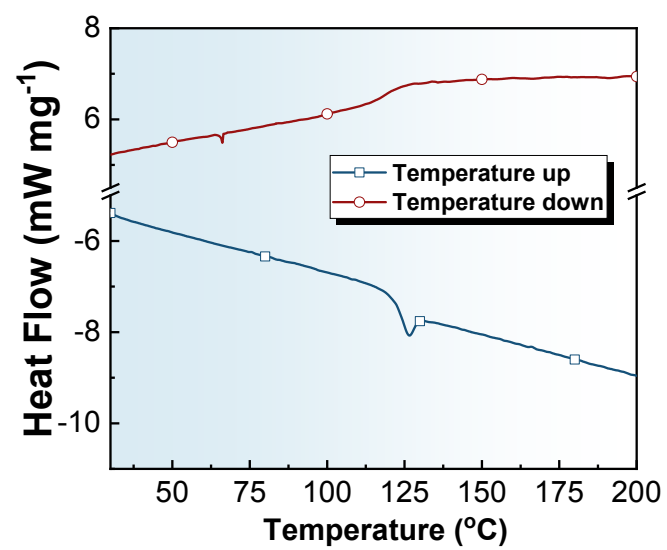


Fig. S6 Differential thermal analysis spectra of TPBi powder.

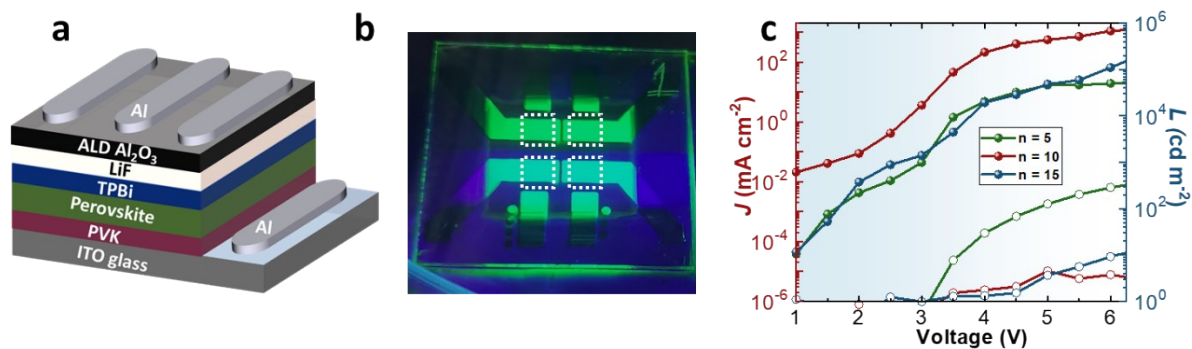


Fig. S7 Device performance of PeLED with thin ALD Al₂O₃ layer on the top of TPBi layer. (a) Schematic device structure. (b) A completed PeLED device with ALD Al₂O₃ annealed at 100 °C for 5 min. The white dash rectangles show the four active pixel. (c) *J-V-L* curve. *n* represents the ALD cycle for Al₂O₃ layer, film with one cycle ALD is estimated to be approximately 0.1 nm. The LEDs were tested in ambient (temperature, 30 °C; humidity, 60%) with epoxy encapsulation.