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Supporting Information

Perovskite light-emitting devices with metal-insulator-semiconductor structure and carrier tunnelling

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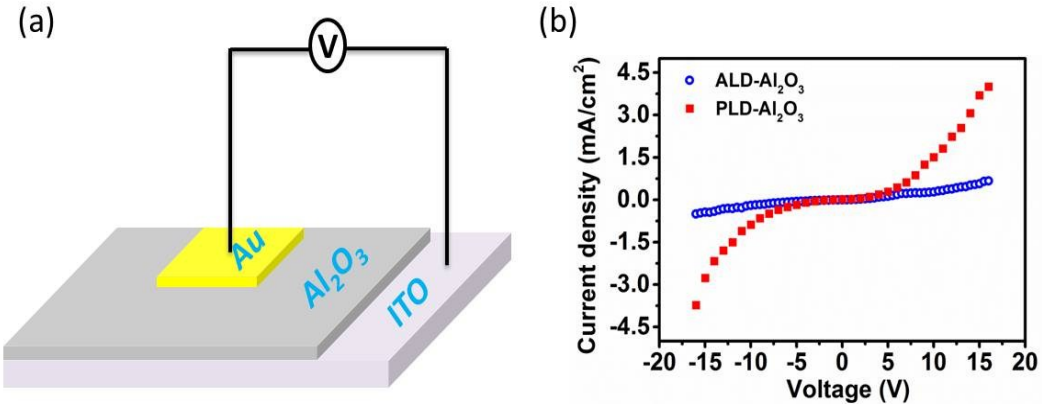

Figure S1. (a) Schematic structure of the MIM (ITO/Al_2O_3/Au) device. (b) The Current (I)-Voltage (V) curves of this MIM device, the low current density confirms the good insulation of both the ALD-Al_2O_3 and PLD-Al_2O_3 films.

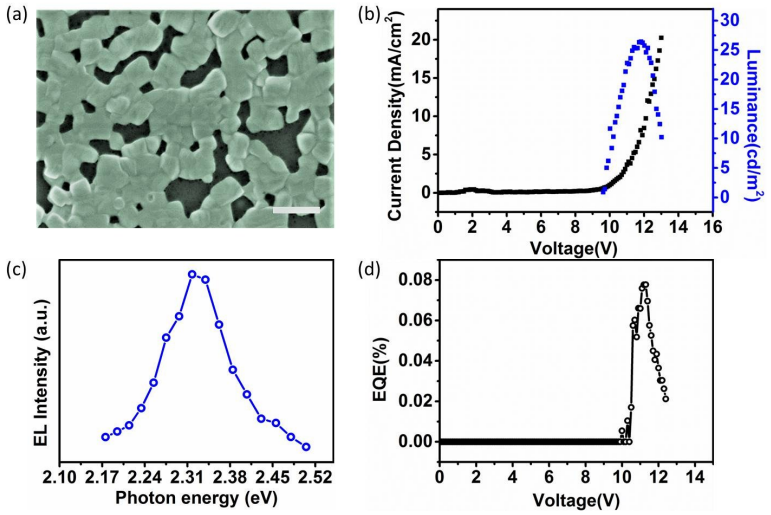

Figure S2. Fundamental characterization of perovskite-based MIS-LED device. (a) SEM image of $CH_3NH_3PbBr_3$ perovskite thin film prepared on ALD-Al_2O_3 film, which contains some pinholes. Scale bar: 600 nm. (b) The current density (J)–voltage (V) and luminance (L)–voltage (V) curves of the MIS device, showing a turn-on bias voltage of ~9-10 V. (c) The electroluminescence spectra of the MIS device under a voltage bias of 11 V. (d) The external quantum efficiency (EQE)–voltage (V) curve of the best MIS device with the highest EQE ~0.077%.