The growth of CH$_3$NH$_3$PbI$_3$ thin film by simplified close space sublimation for efficient and large dimensional perovskite solar cells

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Figure S1. X-ray diffraction (XRD) pattern of perovskite films deposited on the FTO/PEDOT:PSS substrate (annealed for 2.5 h) with the sublimation distance of 0.4 and 0.6 mm, respectively.
Figure S2. AFM (5µm×5µm) and top-view SEM (inset image with scale bar of 1µm) images of perovskite films annealed for 2.5 h with the sublimation distance of 0.4 (a, c) and 0.6 mm (b, d), respectively.
Figure S3. Current-voltage (J-V) characteristic curve of the champion cell (4 mm$^2$).

Figure S4. Current-voltage (J-V) characteristic curves of perovskite devices with the sublimation space of 0.4 and 0.6 mm.
Figure S5. Thickness of PEDOT:PSS layer, PbI\(_2\) film and CH\(_3\)NH\(_3\)PbI\(_3\) film deposited on PEDOT:PSS substrate measured by Dektak XT profilometer.
Figure S6. Current-voltage ($J-V$) characteristic curves of perovskite device (100 mm$^2$) fabricated with FTO glass with sheet resistance of 7 Ω/sq.
Figure S7. (a) Current-voltage ($J-V$) characteristic curves and (b) External quantum efficiency (EQE) curve of perovskite devices with the CH$_3$NH$_3$PbI$_3$ film grown in standard atmosphere.