Supporting information

Characterization of 2D-PEA_2SnI_4 perovskite thin films grown by sequential physical vapor deposition

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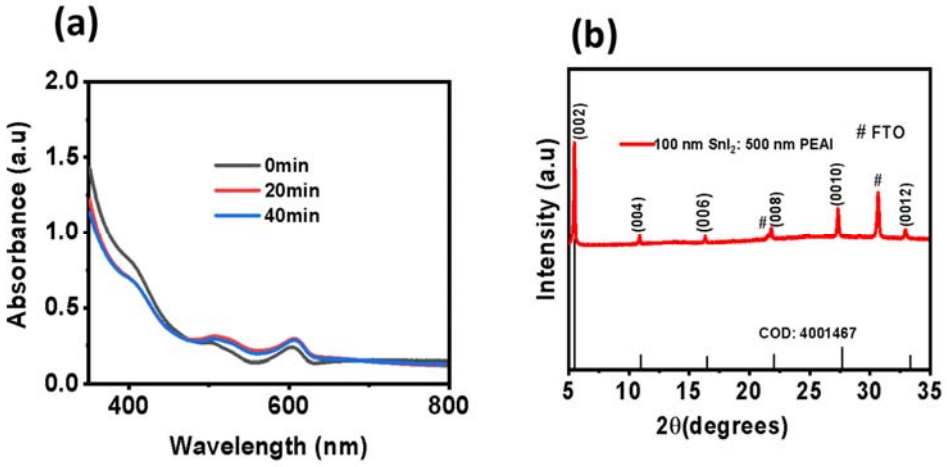

Figure S1: (a) UV-Vis absorption spectra of PEA_2SnI_4 Perovskite thin film with 40 nm PEAI thickness for different annealing times; (b) XRD spectra for the deposited 2D PEA_2SnI_4 film and the COD:4001467 cif file for PEA_2SnI_4 from crystallographic database

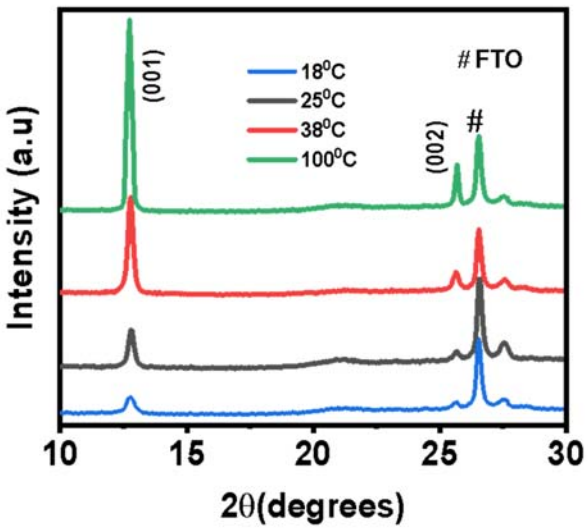

Figure S2: XRD spectra of SnI_2 thin films at different temperatures of 18, 25, 38 and 100°C.

Table S1: Bandgap for PEA_2SnI_4 thin films at different annealing times.

Annealing time (min)	Band gap (eV)
0	1.991
20	1.982
40	1.973
60	1.970
120	1.987

Table S2: Bandgap for annealed PEA_2SnI_4 thin films for different substrate PEAI thickness.

PEAI thickness (nm)	Band gap (eV)
40	1.983
100	1.980
300	1.971
500	1.970

Table S3: Bandgap for annealed PEA_2SnI_4 thin films at different substrate held at different temperatures

Substrate Temp (°C)	Annealing time (min)	Band gap (eV)
18	60	1.970
25	60	1.972
38	60	1.972

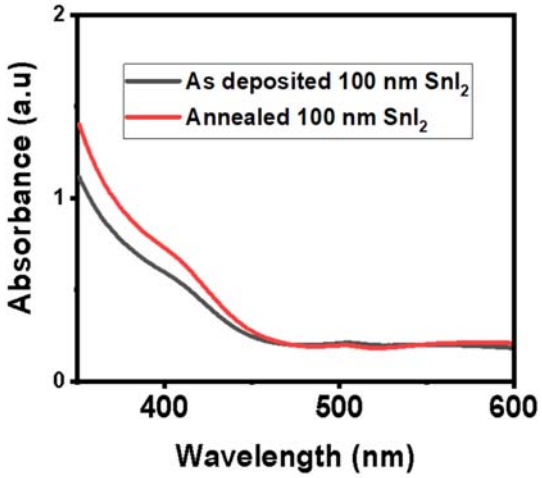

Figure S3: UV-Vis absorption spectra of 100 nm of SnI_2-only film.

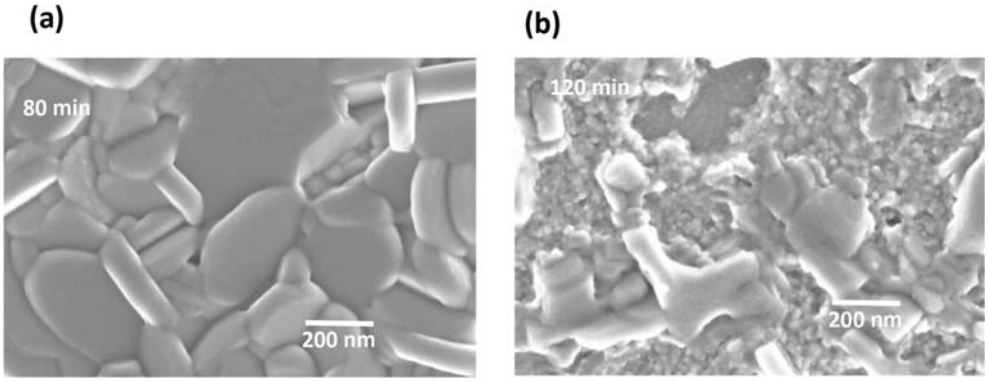

Figure S4: SEM image of PEA_2SnI_4 with 500 nm PEAI thickness annealed for (a) 80 and (b) 120 min.

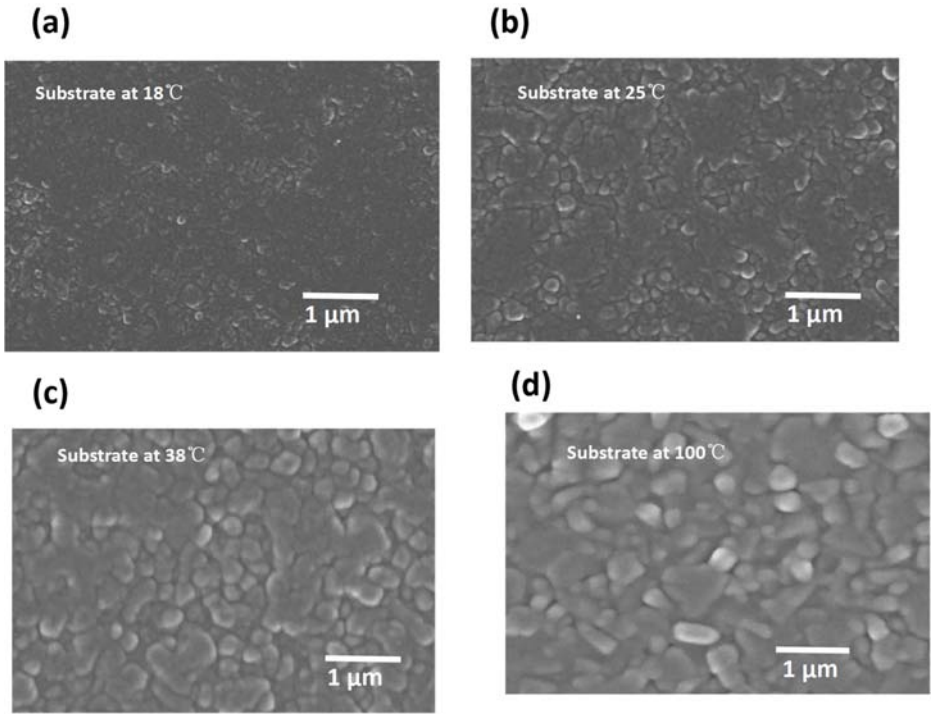

Figure S5 : FE-SEM images of as-deposited SnI_2 films with substrate at (a) 18℃; (b) 25℃; (c) 38℃; and (d) 100℃.