Supporting Information for

Wide-bandgap perovskites for multijunction solar cells: improvement of crystalline quality of $Cs_{0.1}FA_{0.9}PbI_{1.4}Br_{1.6}$ by using lead thiocyanate

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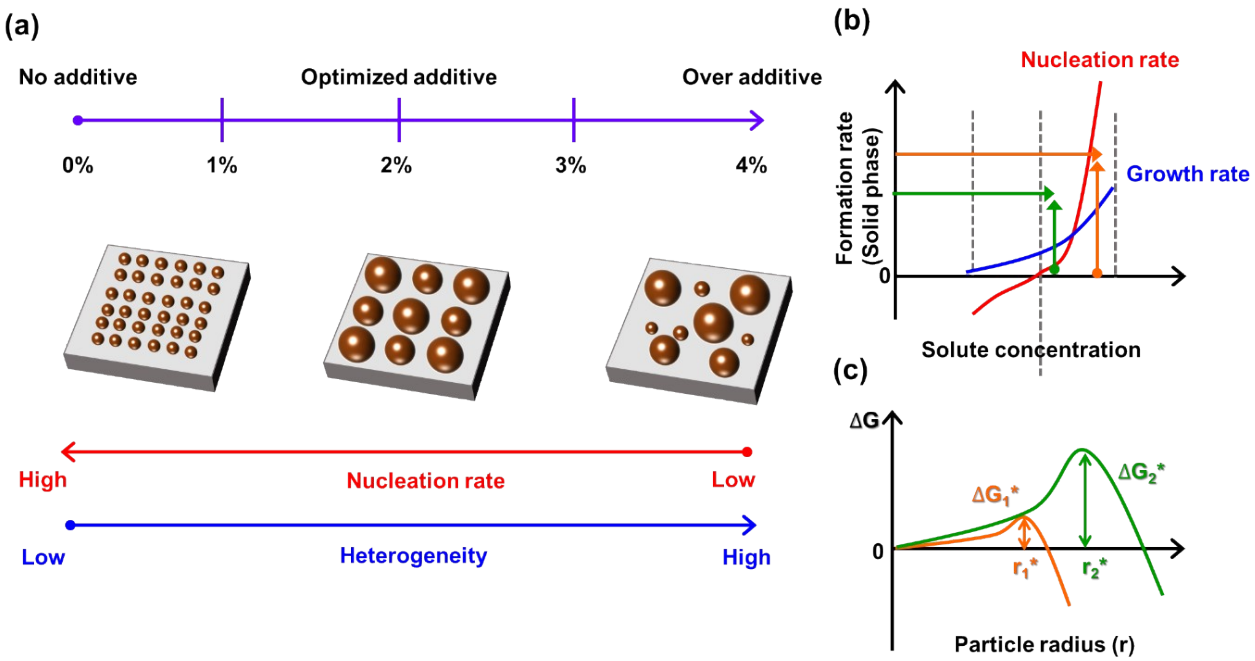

Figure S1. (a) Schematic diagram of perovskite grain growth during annealing by $Pb(SCN)_2$ concentrations. (b) Relations between the nucleation and growth rate and the concentration of growth species. (c) Comparison of critical radius and free energy difference.

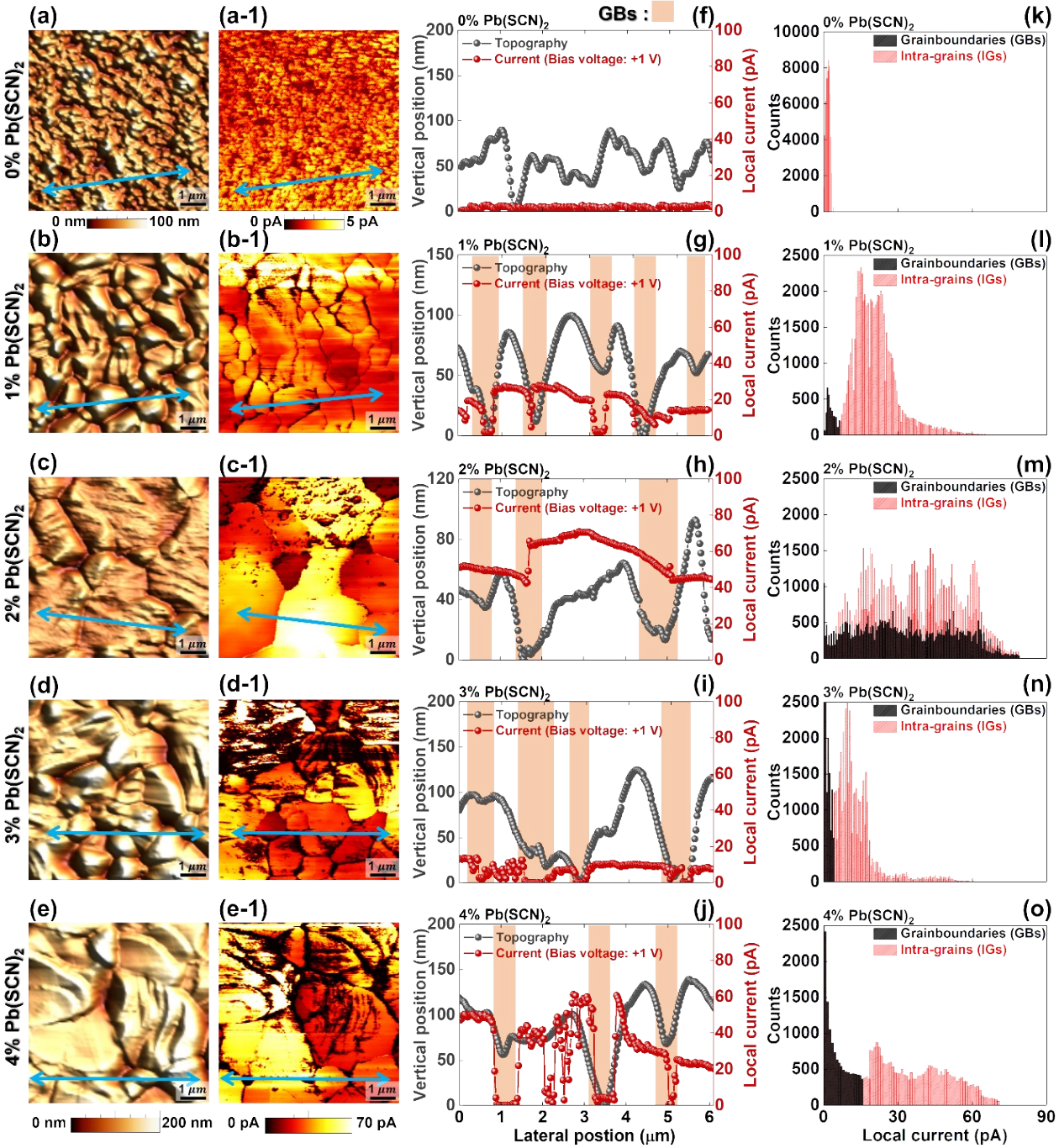

Figure S2. (a-e) Surface topography images, (a-1-e-1) local current maps, (f-j) line profiles, and (k-o) statistical characterization of the local current by c-AFM for the GBs and IGs in the $Pb(SCN)_2$-added perovskite thin films.

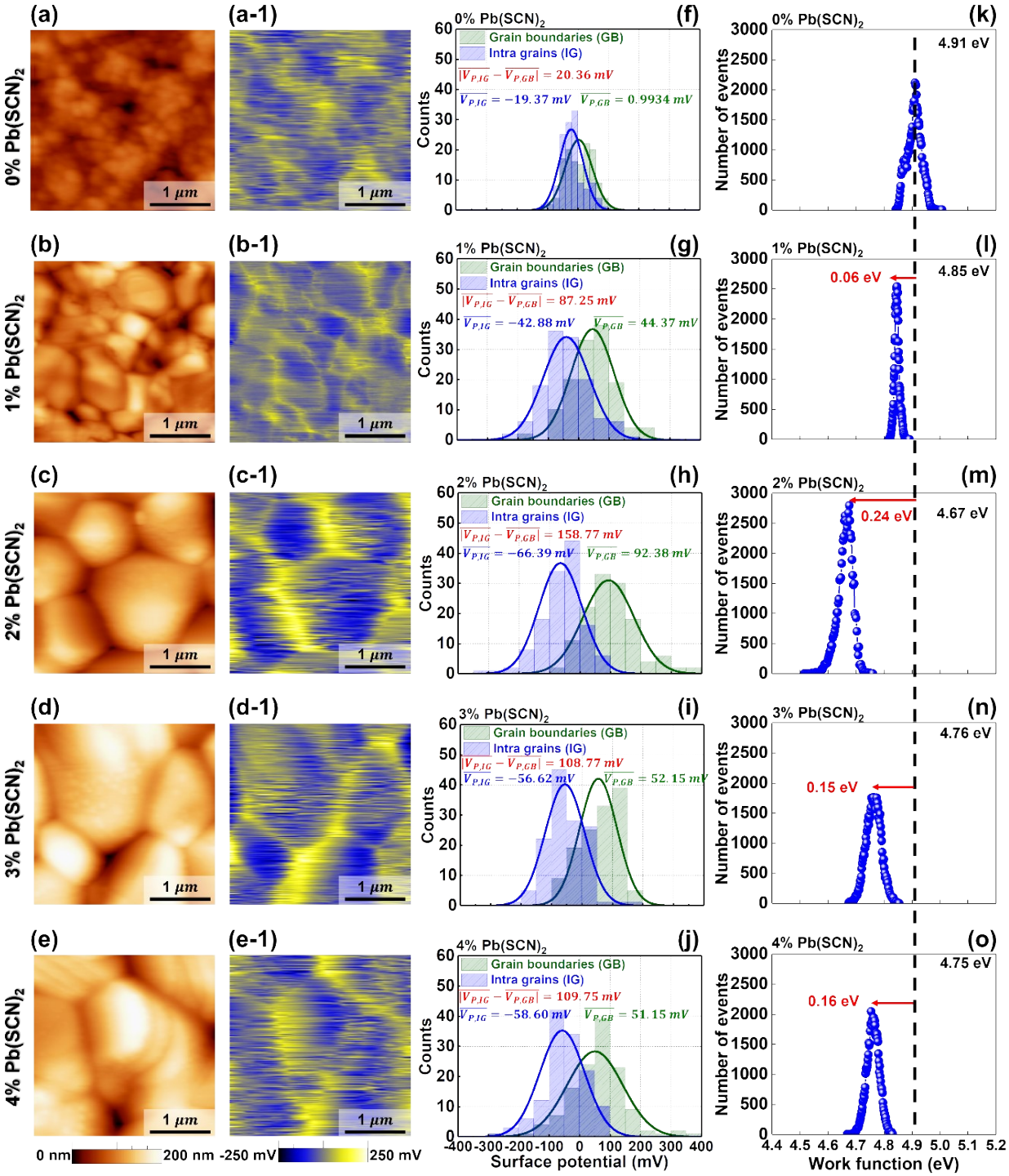

Figure S3. KPFM results of the $Cs_{0.1}FA_{0.9}PbI_{1.4}Br_{1.6}$ thin films: (a-e) topography, (a-1-e-1) surface potential maps, (f-j) statistical characterization, and (k-o) work function determined from the surface potential maps.