

Supporting Information

Enhanced Perovskite Crystallization by Polyvinylpyrrolidone Additive for High Efficiency Solar Cells

Jin Yan^{a,b}, Nan Li^{a,b}, Yuqian Ai^a, Zenggui Wang^a, Weichuang Yang^{a,b}, Min Zhao^a, Chunhui Shou^c, Baojie Yan^a, Jiang Sheng^{a*}, and Jichun Ye^{a,b*}

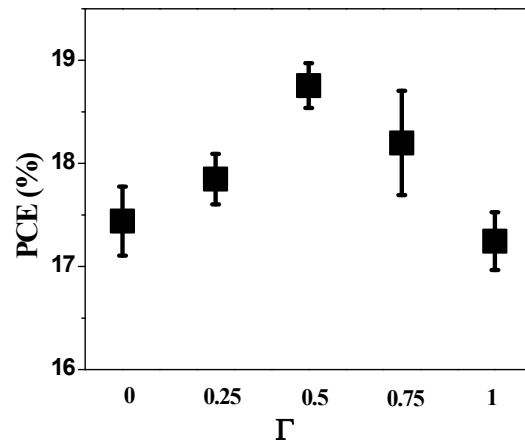


Figure S1. The box chart of *PCEs* of the PSCs with the different PVP concentrations (Γ -0, Γ -0.25, Γ -0.5, Γ -0.75 and Γ -1), where the number of total samples accounted for statistics is 50.

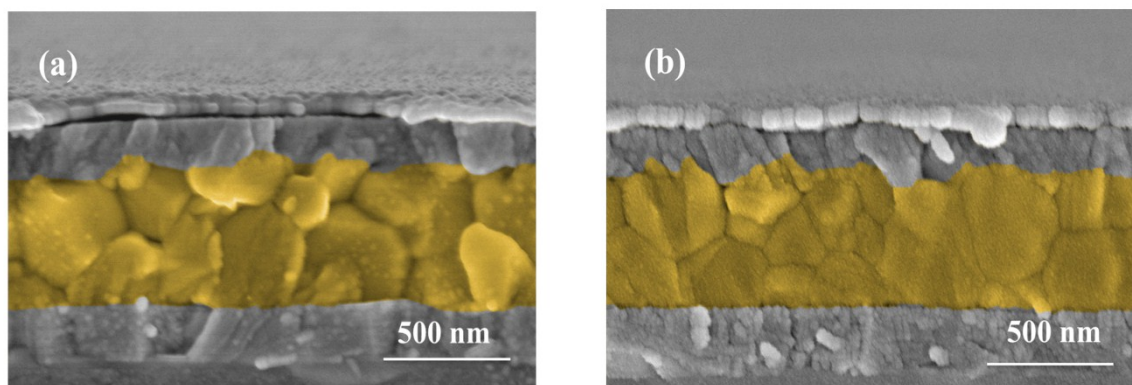


Figure S2. The samples of Γ -0 and Γ -0.5 have the similar perovskite film thickness for (a) and (b) respectively.

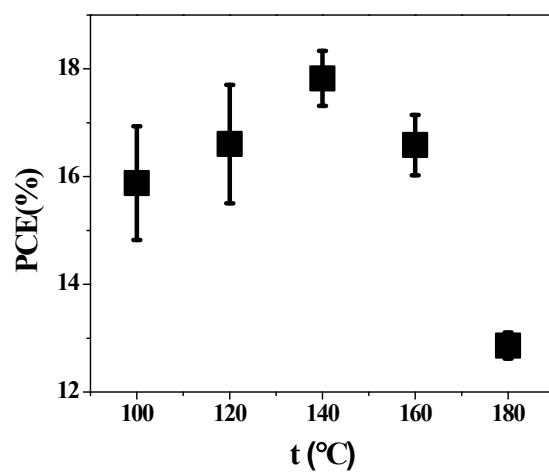
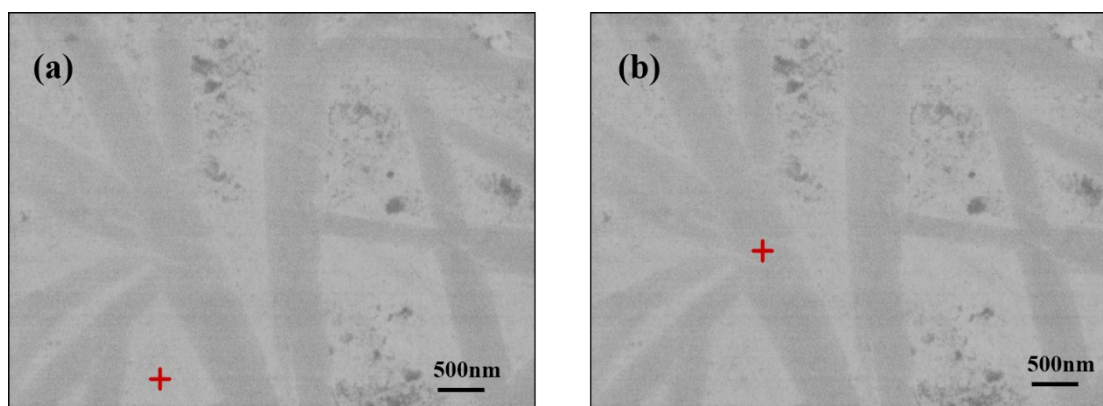


Figure S3. The data of PCEs of the PSCs based on Γ -0.5 under different annealing temperature.



<i>Element</i>	<i>Wt%</i>	<i>At%</i>
<i>NK</i>	03.33	25.68
<i>BrL</i>	09.64	13.01
<i>PbM</i>	38.40	19.99
<i>IL</i>	48.63	41.33
<i>Matrix</i>	Correction	ZAF

<i>Element</i>	<i>Wt%</i>	<i>At%</i>
<i>NK</i>	06.32	39.55
<i>BrL</i>	11.75	12.88
<i>PbM</i>	33.62	14.22
<i>IL</i>	48.31	33.35
<i>Matrix</i>	Correction	ZAF

Figure S4. Elemental analysis of different points of the sample (Γ -0) characterized by Energy Dispersive Spectrometer (EDS).

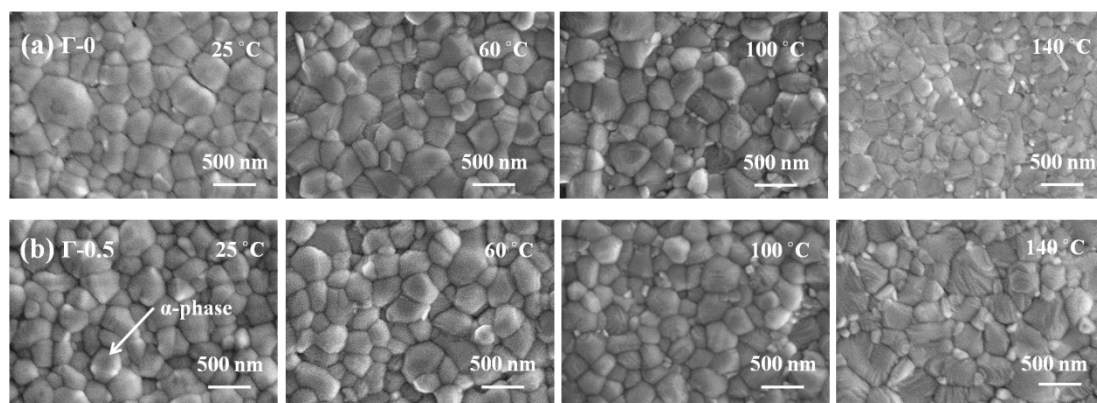


Figure S5. The SEM images of the perovskite films of (a) $\Gamma-0$ and (b) $\Gamma-0.5$ under the different annealing temperature of 25 °C, 60 °C, 100 °C, 140 °C, respectively.

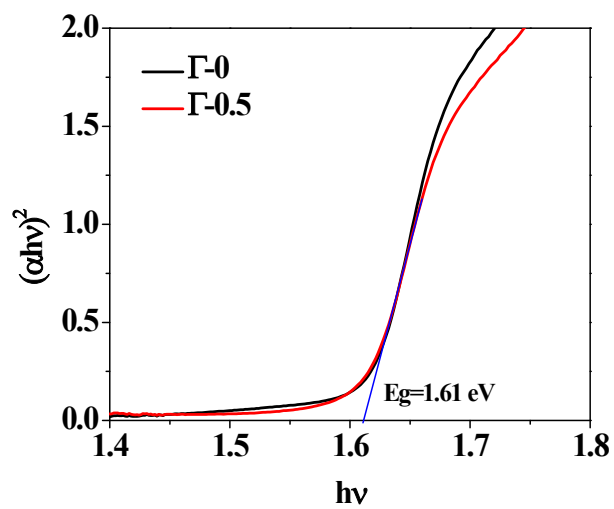


Figure S6. The samples of $\Gamma-0$ and $\Gamma-0.5$ have the same band gap (1.61 eV).

