Electronic Supplementary Information

Low Thermal Budget, Photonic-Cured Compact TiO_2 Layer for High-Efficiency Perovskite Solar Cells

Sanjib Das,[a] Gong Gu,[a] Pooran C. Joshi,[b] Bin Yang,[c] Tolga Aytug,[d] Christopher M Rouleau,[c] David B. Geohegan,[c] and Kai Xiao*, [c]

[a]Department of Electrical Engineering and Computer Science, University of Tennessee, Knoxville, TN 37996, USA.

[b]Materials Science and Technology Division, Oak Ridge National Laboratory, Oak Ridge, TN 37831, USA.

[c] Center for Nanophase Materials Sciences, Oak Ridge National Laboratory, Oak Ridge, TN 37831, USA.

[d]Chemical Sciences Division, Oak Ridge National Laboratory, Oak Ridge, TN 37831, USA.

Email: xiaok@ornl.gov

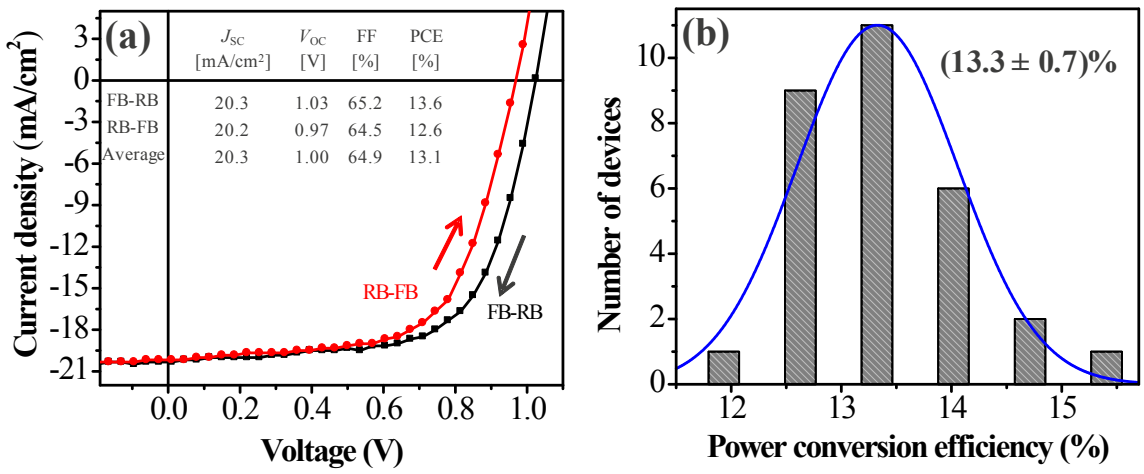

Fig. S1. *J–V* curves of a typical device with furnace-annealed TiO_2 layer, scanned at both directions under standard illumination (100 mW cm^{-2}). (b) Histogram of PCEs measured for 30 devices, fabricated with furnace annealed (500 °C) compact TiO_2 as electron transport layer.

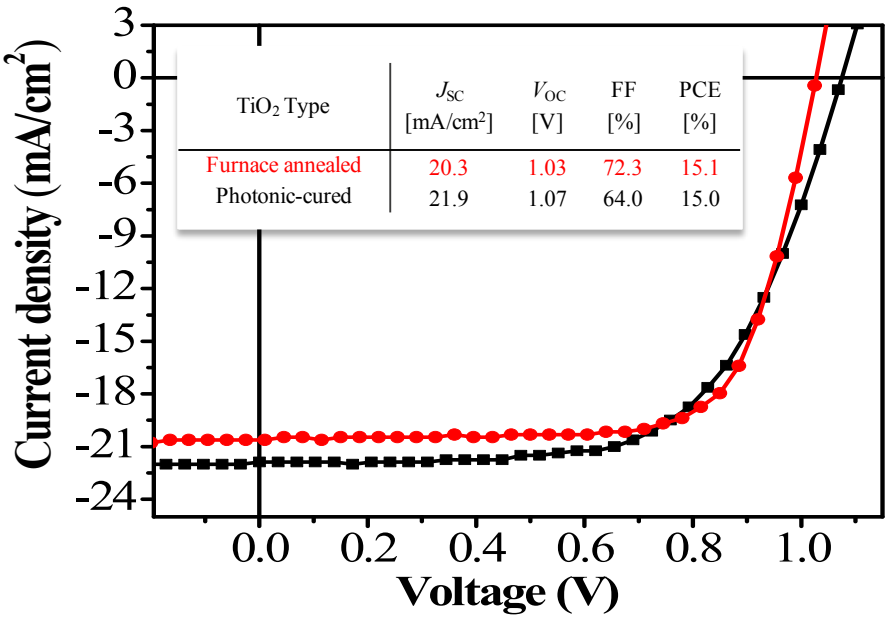

Fig. S2. *J–V* curves of the champion PSCs with furnace-annealed and photonic-cured TiO_2 layers under standard illumination (100 mW cm^{-2}).

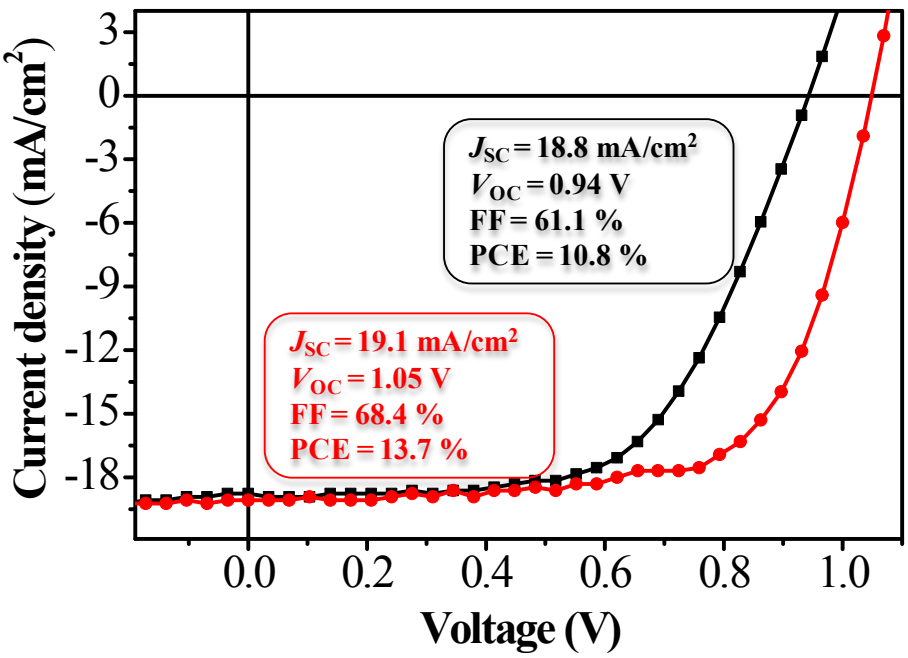

Fig. S3. Comparison of performances of devices with perovskite films annealed in N2 (black) and air (red).

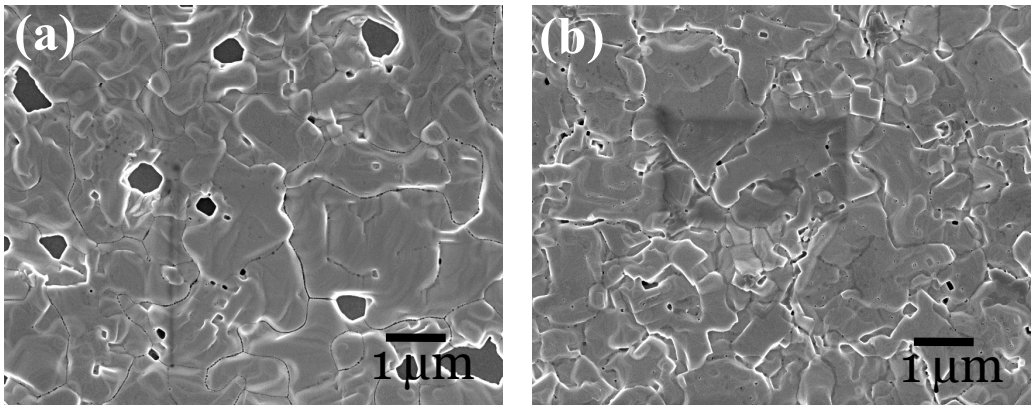

Fig. S4. Scanning electron microscope (SEM) image of perovskite films on ITO/TiO_2 substrates after annealing for 70 minutes in (a) N_2 and (b) air.