Supporting Information

Enhanced photovoltaic response of lead-free ferroelectric solar cells based on the (K,Bi)(Nb,Yb)O_3 films

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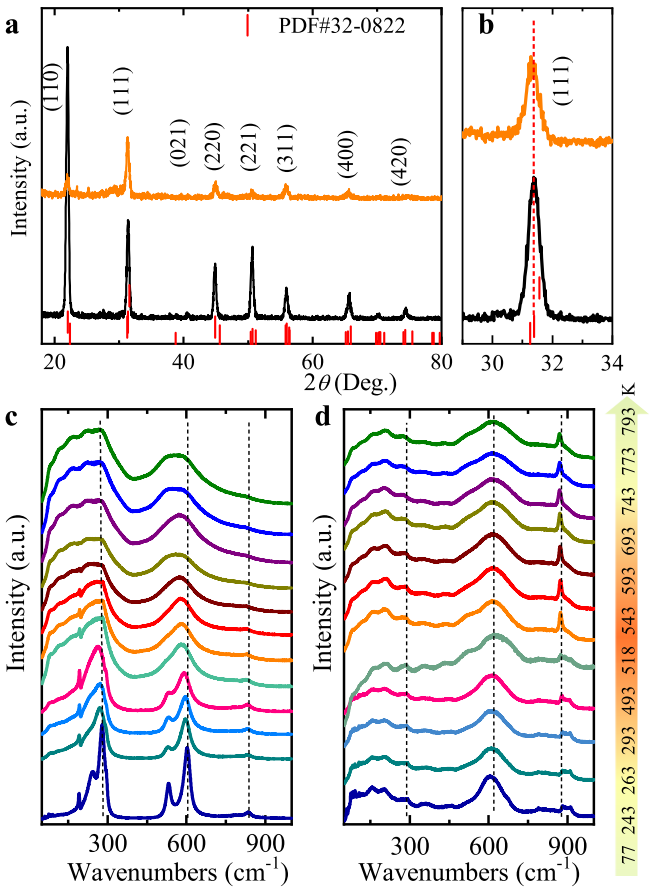

Figure S 1: **Crystalline quality measurements. a** The XRD patterns and **b** Enlarged patterns of the end number KN and doped KNBY films at room temperature. Raman scattering spectra of **c** KN and **d** KNBY films at selected temperature. Note that phase transitions become more evident in KN films.

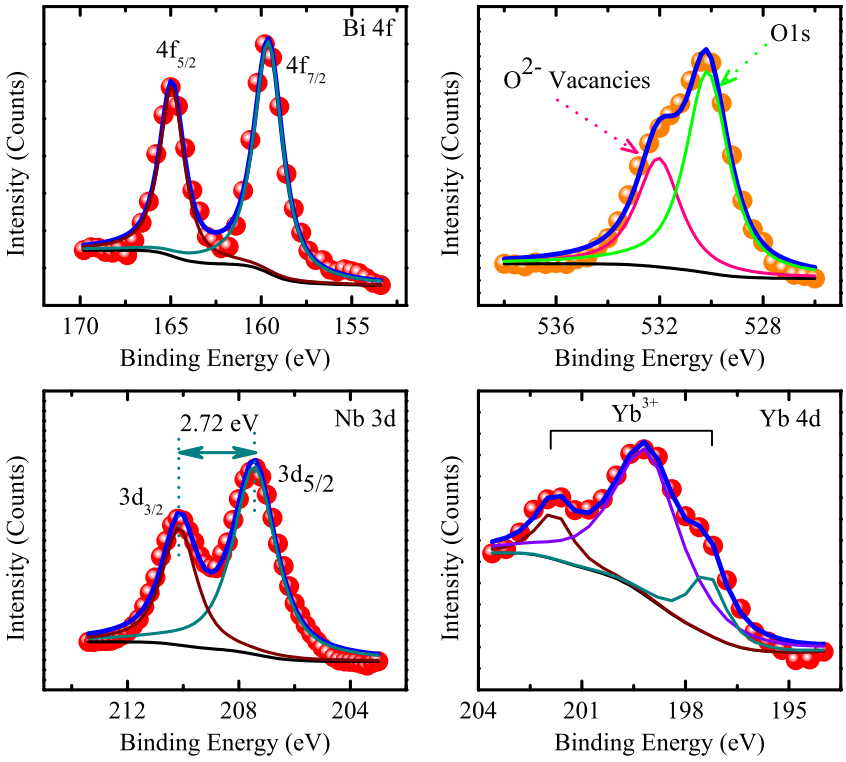

Figure S 2: **The reasonable chemical states of the as-grown KNBY films.** X-ray photoemission spectroscopy (XPS) spectra, **a** Bi 4f, **b** O 1s, **c** Nb 3d, **d** Yb 4d regions of the KNBY thin films. Note that the dotted and solid lines indicate the experimental data and fitting results, respectively.

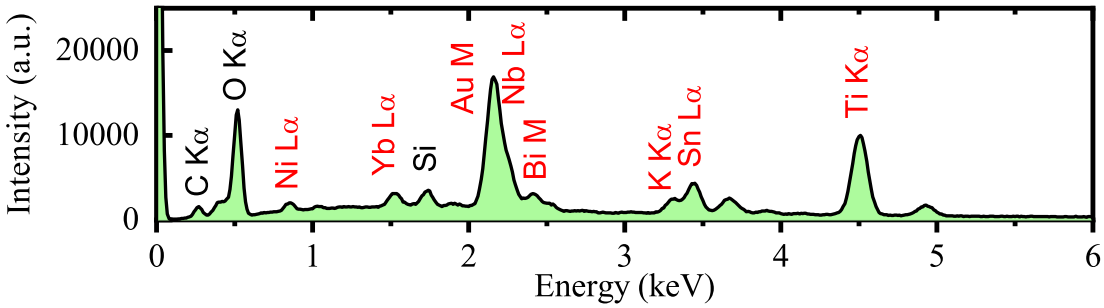

Figure S 3: **Device EDX measurements.** EDX spectrum measured from the meso-structured FTO/TiO_2/KNBY/p-type NiO/Au device. The peaks used for elementary line scans are highlighted by red letters.

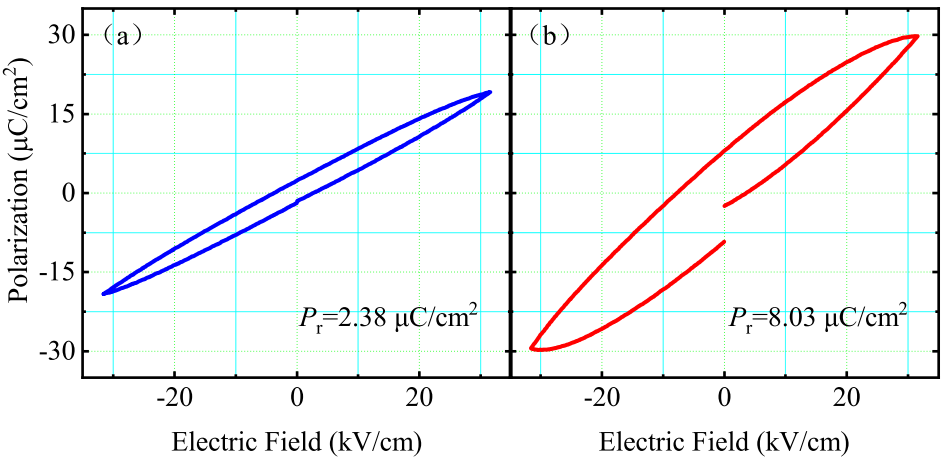

Figure S 4: **P-E hysteresis analysis of KNBY solar cells.** Room temperature P-E hysteresis loops for the laminated **a** FTO/TiO_2/KN/p-type NiO/Au and **b** FTO/TiO_2/KNBY/p-type NiO/Au samples.

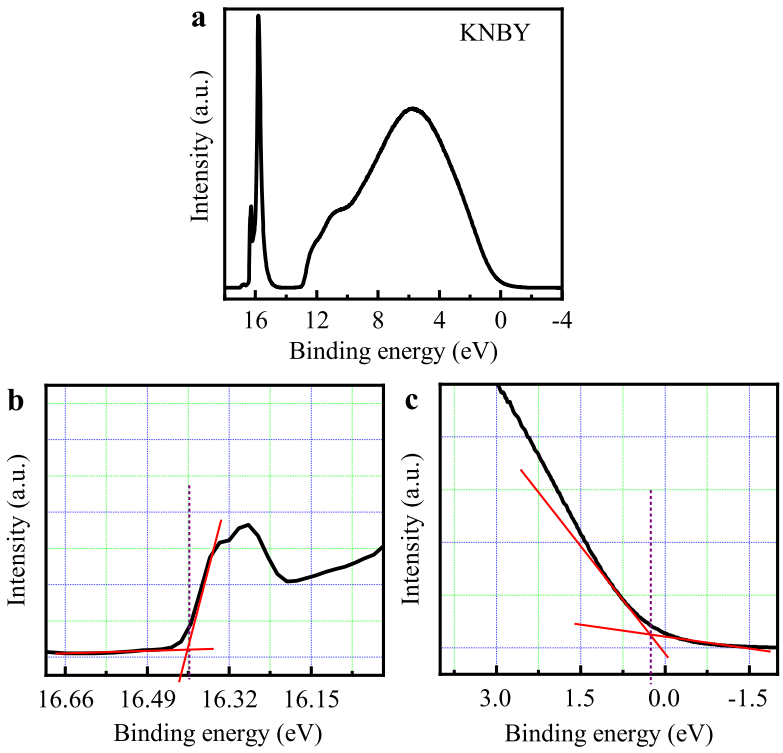

Figure S 5: **UPS analysis of KNBY light-absorbing layers. a** UPS spectrum of KNBY films. **b** UPS secondary cutoff region and **c** UPS valence band region.

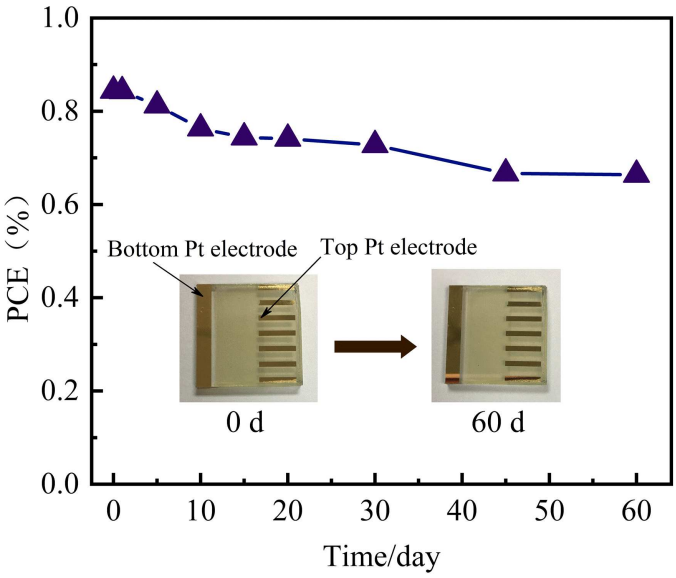

Figure S 6: **Stability test of KNBY solar cells.** PCE plots of KNBY mesostructured solar cells under an air atmosphere for 0 (left) and 60 days (right).

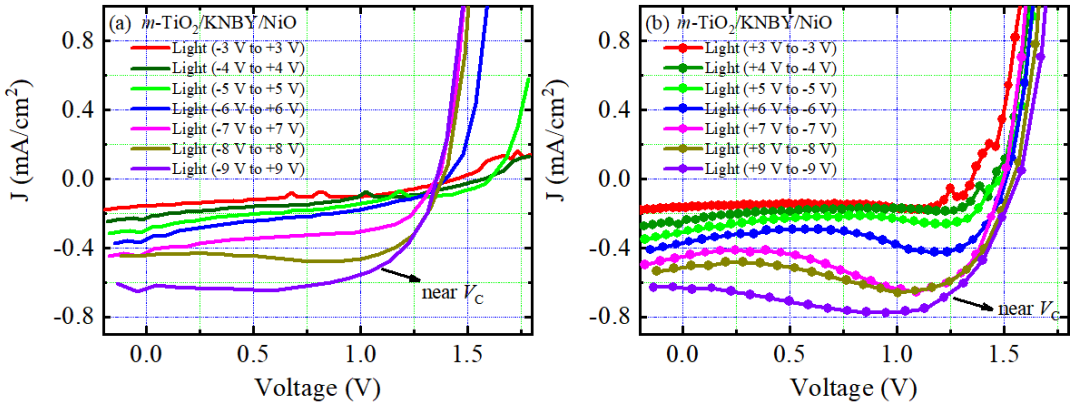

Figure S 7: Photocurrent analysis of KNBY solar cells. $J-V$ curves of KNBY devices at **a** forward scan from -Vm to +Vm and **b** reverse scan from +Vm to -Vm.