# **Supporting Information**

Synthesis, piezoelectric property and domain behaviour of the vertically aligned  $K_{1-x}Na_xNbO_3$  nanowire with a morphotropic phase

#### boundary

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Figure S1 the FT-IR spectrum of KNN gel powder and KNN powders after various reaction periods at 190 °C and 220 °C.



Fig. S2 SEM images of of KNN nanowire arrays via hydrothermal at 190 °C for 3h in top-down view (a), 45° tilt view (b) ; for 6h in top-down view (c) and 45° tilt view (d); for 12h after ultrasonic treatment in top-down view (e) and 45° tilt view (f).



Fig. S3 XRD patterns (black lines) and the Rietveld fit (red plus sign) curves of KNN powder via hydrothermal at 220 °C for 12h. Refinement was carried out using tetragonal *P4mm* space group (pink vertical tick marks), the rhombohedral *R3m* space group (dark cyan vertical tick marks), and the blue line is the difference between the observed and calculated patterns. The lattice parameters of tetragonal were a = b = 3.97942 Å and c = 4.04230 Å. The lattice parameters of rhombohedral were a = 4.01878 Å and  $\alpha = 89.5918^{\circ}$ .



Fig. S4 SEM images of of KNN nanowire arrays via hydrothermal at 220 °C for 3h in top-down view (a), 45° tilt view (b) ; for 6h in top-down view (c) and 45° tilt view (d); for 12h after ultrasonic treatment in top-down view (e) and 45° tilt view (f).



Fig. S5 The schematic illustration of PFM experiment.