Supporting Information

for *Adv. Funct. Mater.*, DOI: 10.1002/adfm. 201102325

Three-Dimensional Kelvin Probe Microscopy for Characterizing In-Plane Piezoelectric Potential of Laterally Deflected ZnO Micro-/Nanowires

Dylan J. Bayerl and Xudong Wang *

DOI: 10.1002/adfm.201102325

Supporting information

Three-Dimensional Kelvin Probe Microscopy for Characterizing In-Plane Piezoelectric Potential of Laterally-Deflected ZnO Micro-/Nanowires

By *Dylan J. Bayerl* and *Xudong Wang**

Mr. D.J. Bayerl, Prof. X.D. Wang
Department of Materials Science and Engineering
University of Wisconsin-Madison
Madison, Wisconsin 53706 (USA)

Email: xudong@engr.wisc.edu

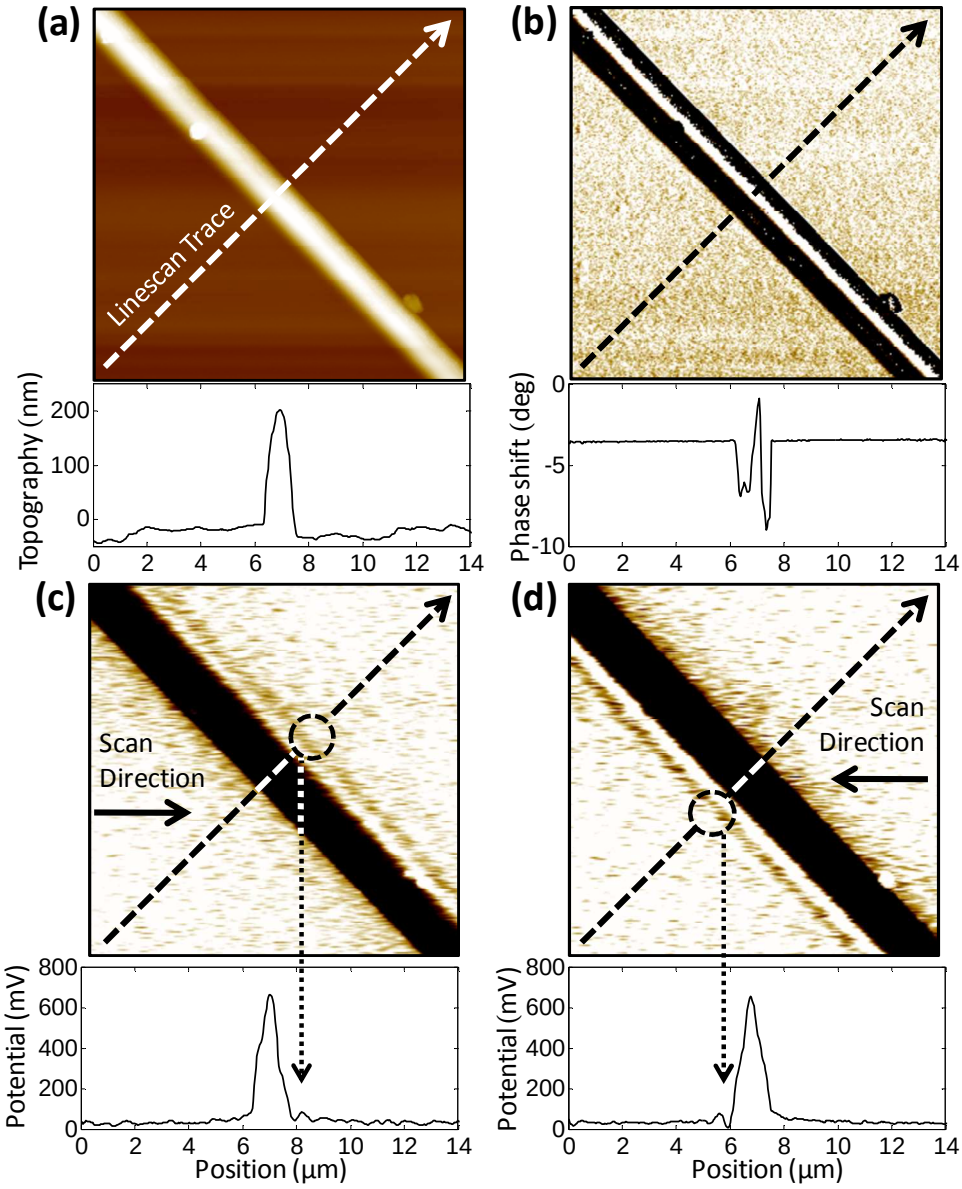

Figure S1. Typical feedback loop tracking errors in SKPM. **(a)** Topography image of ZnO NW with trace of the linescan plot (**below**) indicated. (**b)** Phase shift image showing negative spikes at NW edges indicating surface contact error. **(c)** and **(d)** Surface potential images scanning from left-to-right and right-to-left (respectively) showing feedback loop tracking errors in potential at NW edge. A pulse in potential appears on alternating sides of the NW depending on scan direction. The shape of the central peak also depends on scan direction with unknown error due to the tip contacting the NW, as indicated by spikes in the phase shift. All image dimensions are 10x10 mm^2

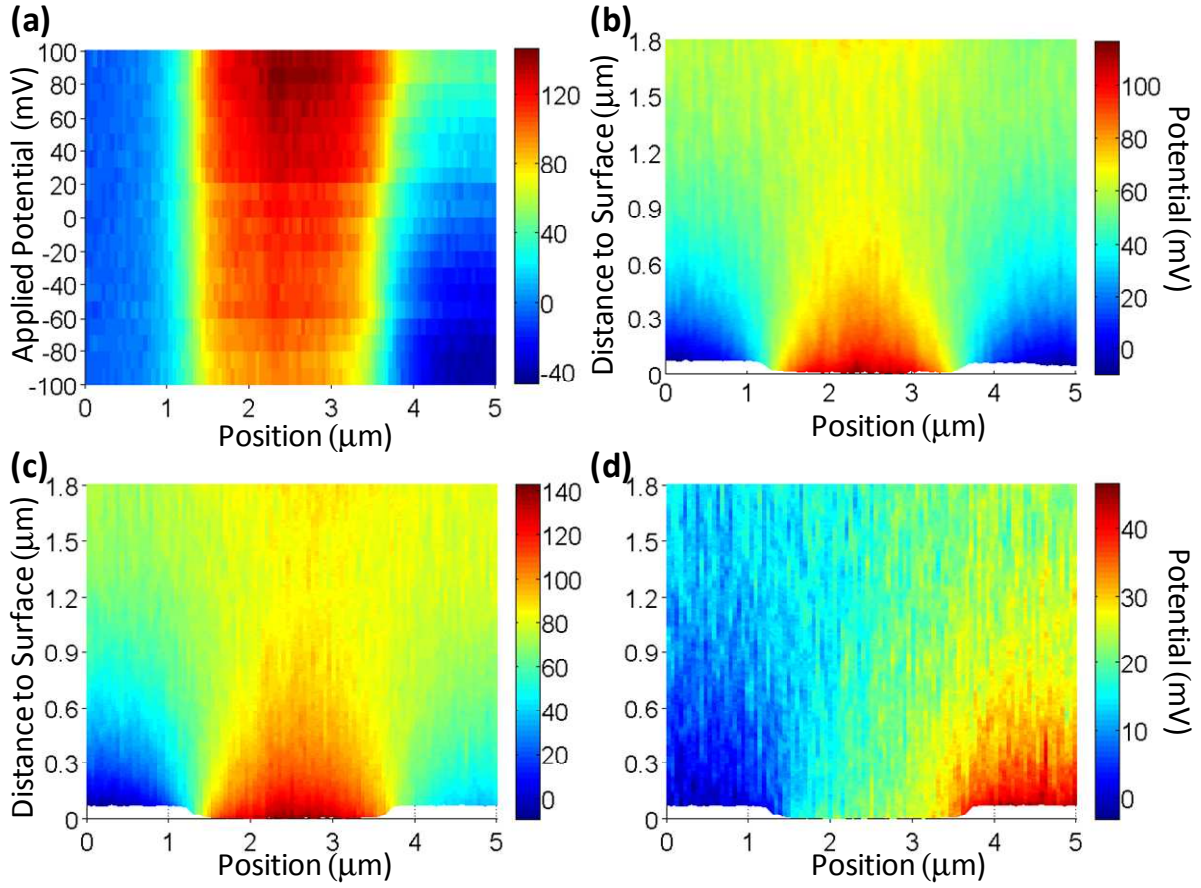

Figure S2. Subtracting GaAs work function contribution from 3DKPM potential map. **(a)** Analog of *V*s map of Fig. 2c without GaAs work function contribution $(c_{tip} - c_s)$ subtracted. The high *V*s between Au electrodes (between 1.25 and 3.75 mm) is due to nonzero $(c_{tip} - c_s)$ between GaAs and conductive AFM tip. **(b)** Spatial potential distribution *V(z)* between Au electrodes with zero bias applied to right-side Au electrode. Electrode potentials are equal and the majority *V(z)* contribution is from $G(z)(c_{tip} - c_s)$. Superposition of electrostatic potential allows removal of $G(z)(c_{tip} - c_s)$ from *V(z)* by subtraction of this zero-bias *V(z)* map, yielding $V(z) = G(z)V_{abs}$. Spatial potential distribution with 100 mV applied bias before **(c)** and after **(d)** subtraction of zero-bias *V(z)* map (**b**). Subtraction of zero-bias *V(z)* map from all *V(z)* constituting (**a)** yields the corrected *V*s map of Fig. 2c.

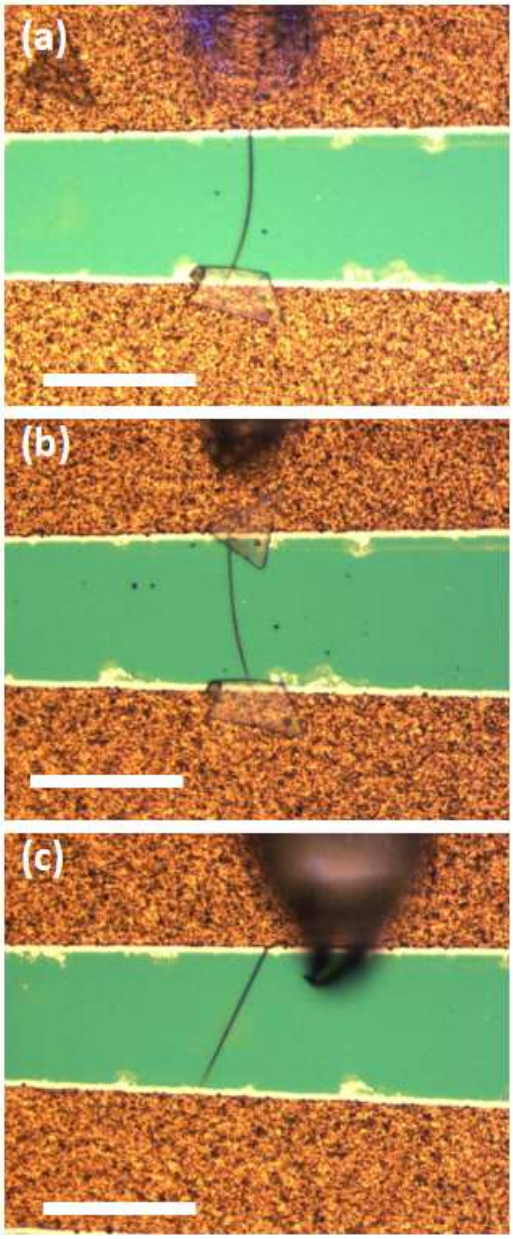

Figure S3. Optical images of ZnO MW bending conditions. **(a, b and c)** Bend 1, Bend 2, and Straight bending conditions, respectively, on the Au channel substrate. Au electrode bars are visible on the top and bottom of the images. All scale bars are 100 mm.