Supporting Information Available.

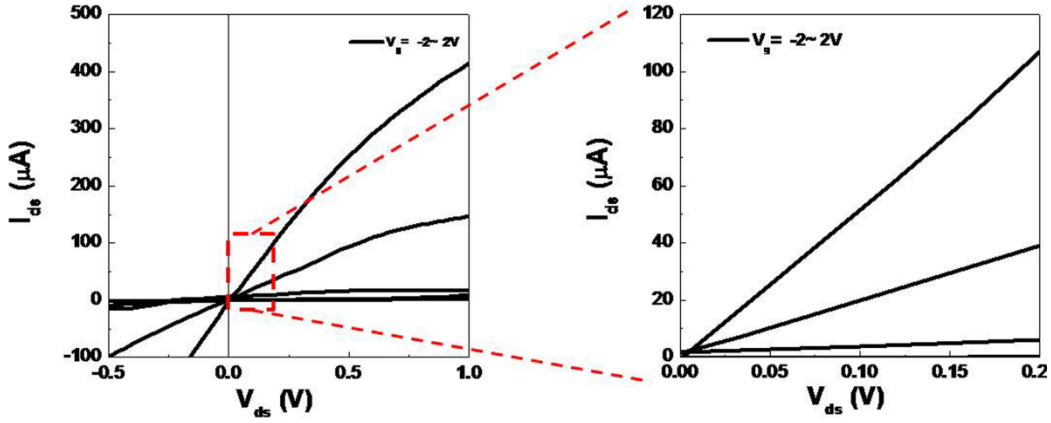

Figure S1. Output characteristic characteristic of the top-gate network device of ZnO NRs embedded in the ion-gel dielectric layer on the PET substrate. The right side of Figure S1 shows the magnified image of I_{ds}-V_{ds} characteristic.

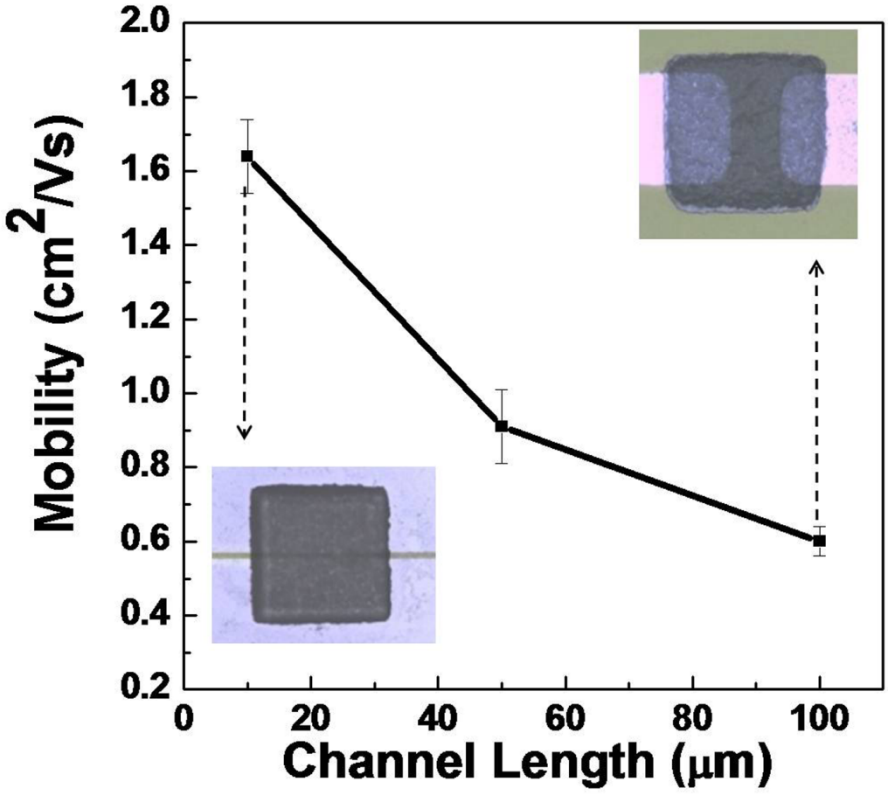

Figure S2. The plot of the average field-effect mobility as a function of the length between electrodes in top-gate devices. The average values from five devices are shown in the figure.

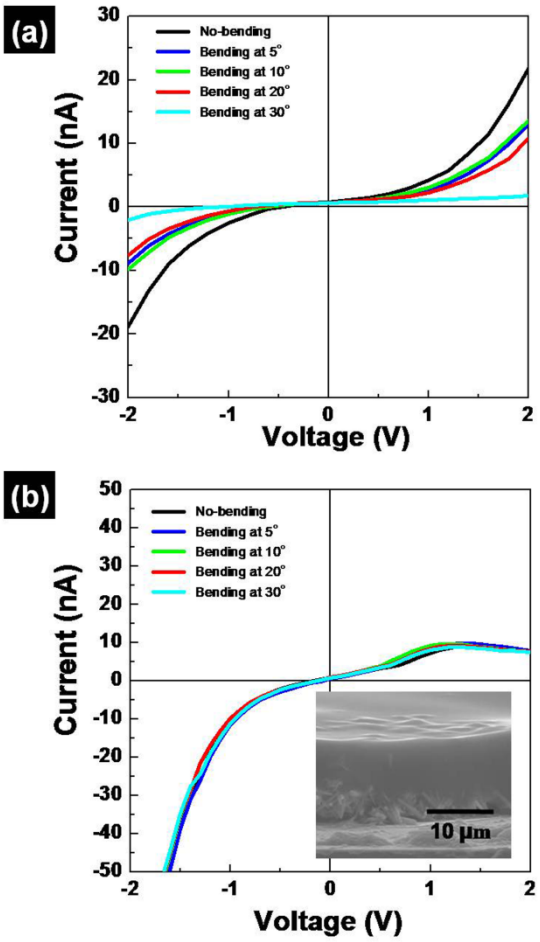

Figure S3. *I*–*V* characteristics of (a) non-embedded and (b) embedded (ion-gel) ZnO NR network devices with bending at different angles relative to the horizontal. The inset shows the representative SEM image of the embedded ZnO NR network.

The current degradation of the devices with non-embedded NR networks is mainly due to the decrease in the electrical pathway by the collapse of nanojunctions during bending of the substrate. (Figure S3a) However, no performance degradation was observed in devices with embedded NR networks. (Figure S3b) We believe that the network structure embedded in a cross-linked polyelectrolyte fixes the configuration of NRs in the structure and thus helps to maintain those electrical paths intact on a flexible substrate.

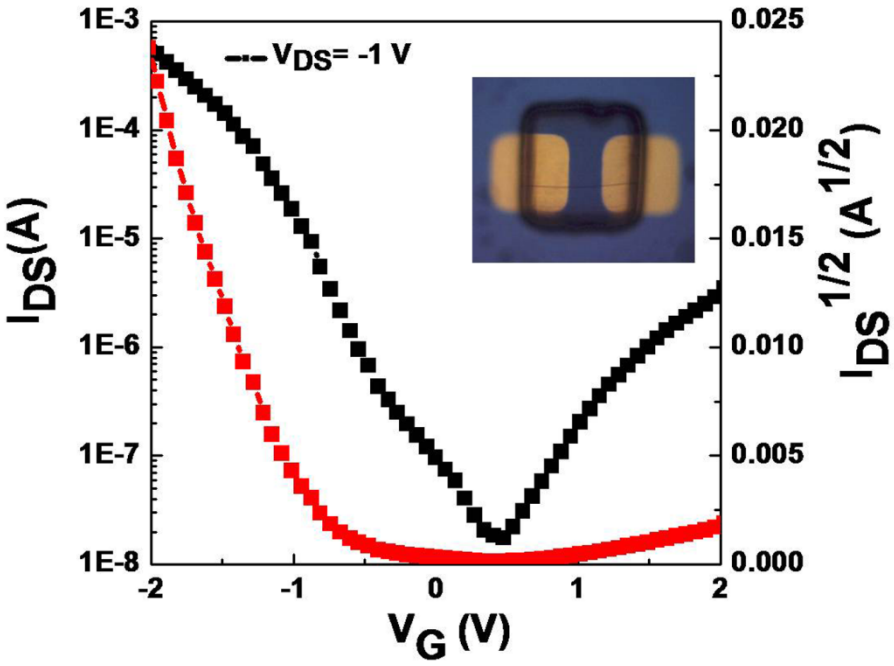

Figure S4. Transfer characteristics (I_{DS} vs V_G) of the devices containing one P3HT fiber and the corresponding optical microscope image (inset).

This figure shows the transfer (I_{DS}−V_G) characteristics with a single P3HT fiber at V_{DS}= −1 V. The average field-effect mobility and on/off current ratios were calculated to be ~5.3 cm^2/Vs and ~10^4, respectively. The turn-on voltage was −0.7 V.