Supporting Information for "Facile Patterning Using Dry Film Photo-Resist for Flexible Electronics: Ag Nanowire Network and Carbon Nanotube Network"

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Supporting information 01.

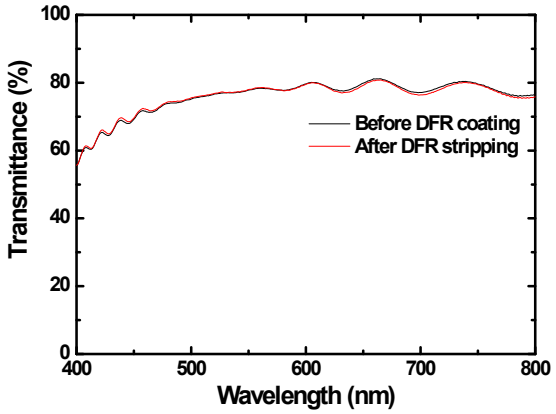

Figure S1. Changes in optical transmittance of Ag nanowire networks before and after developing of DFR with 1.0 wt.% Na_2CO_3 solution.

Supporting information 02.

To further confirm the feasibility of the DFR patterning on Ag nanowire network, the conductivity was measured for the single line of the patterned Ag nanowire networks. By measuring the resistance of the patterned Ag nanowire networks, the sheet resistance (R_s) can be calculated by using the equation, $R_s=R(W/L)$, where R is the measured resistance at the two ends of patterned Ag nanowire network, and W and L are width and length of the patterns, respectively. The sheet resistance of the patterned Ag nanowire networks with a 40 um width, was estimated as a ~12.9 ohm/sq, while the un-patterned Ag nanowires showed a ~12.6 ohm/sq. The experimentally determined sheet resistance of the un-patterned Ag nanowire networks by 4-point-probe was ~15.0 ohm/sq. The similar values of the sheet resistance of Ag nanowire networks before and after patterning confirmed that there was no harmful effect on the Ag nanowire networks during patterning using DFR.

Supporting information 03.

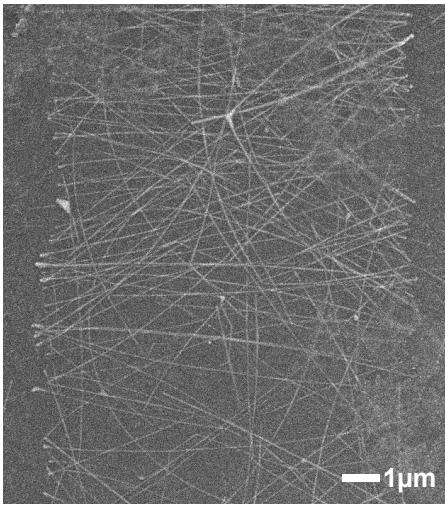

Figure S2. SEM image of the patterned Ag nanowire network with 10 μm width.

Supporting information 04.

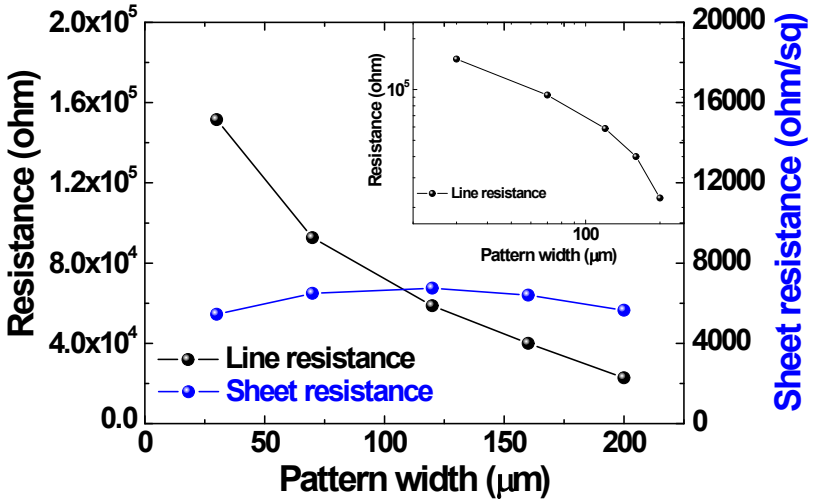

Figure S3. The resistance and the calculated sheet resistance change of the patterned CNT networks as a function of the pattern widths. Inset is the logarithmically rescaled results. CNTs showed the higher resistance values compared to those of Ag nanowire networks. Likely to the Ag nanowire networks, however, the patterned CNTs also followed the percolation theory, where the resistance increased as the pattern widths decreased, as well as showed the constant sheet resistance values. Therefore, it was also confirmed that there was no significant damage on CNTs during the patterning process using DFR.

Supporting information 05.

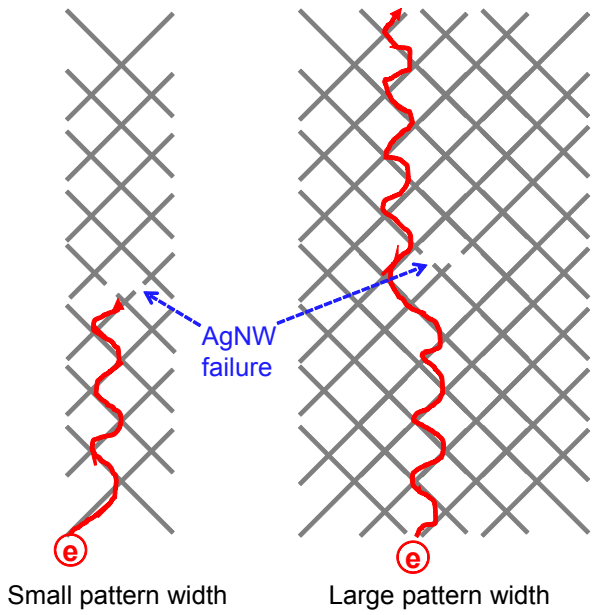

Figure S4. Illustrations of the electrical current flow in the Ag nanowire networks with different pattern widths. Once the failures occurred in the nanowire network under bendings, the current flow was highly interfered by the failure in the network with small pattern width, while the network with large pattern width had the alternative paths for the conduction, thereby keeping its conductivity high.

Supporting information 06.

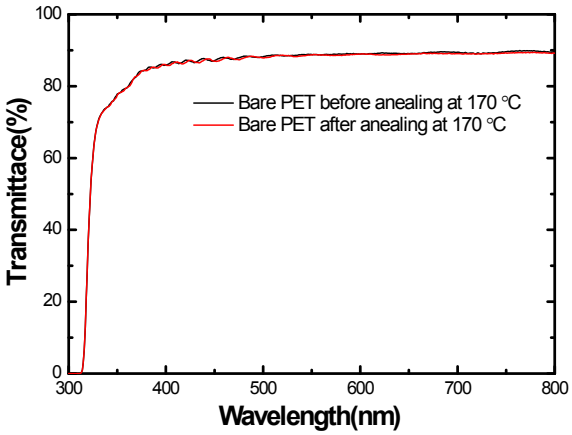

Figure S5. Optical transmittance of the PET substrates before and after the annealing by using hot plate at 170 °C for 5 min.