Electronic Supplementary Information

Controlled aqueous synthesis of ultra-long copper nanowire for stretchable transparent conducting electrode

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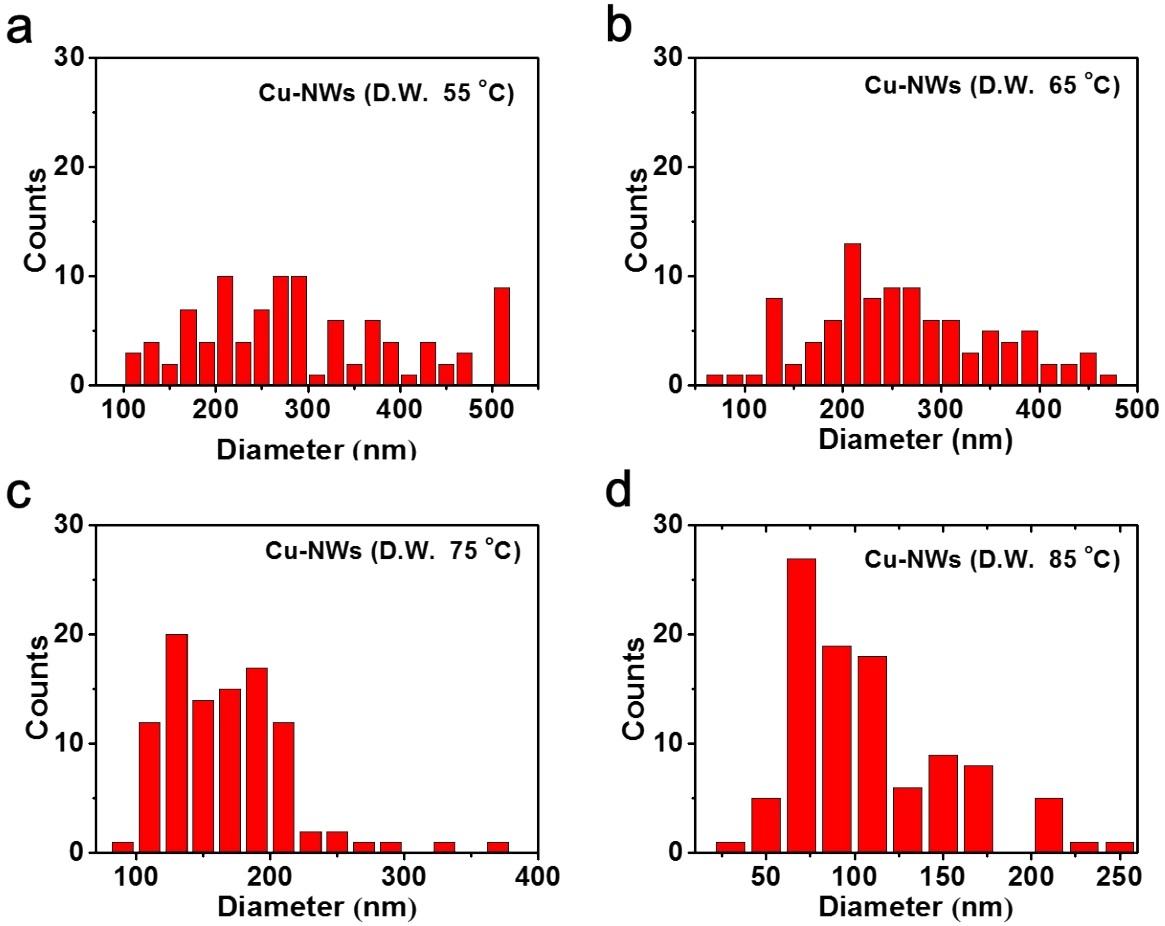

Figure S1. Diameter distribution of copper nanowires synthesized at (a) 55 °C, (b) 65 °C, (c) 75 °C, and (d) 85 °C in distilled water.

Table S1. Statistical data of copper nanowires synthesized in distilled water with different reaction temperatures.

Temp. (oC)	Avg. Diameter (nm)	Std. Dev.
55	297.3	123.2
65	264.9	97
75	166.4	48.3
85	109.9	45.3

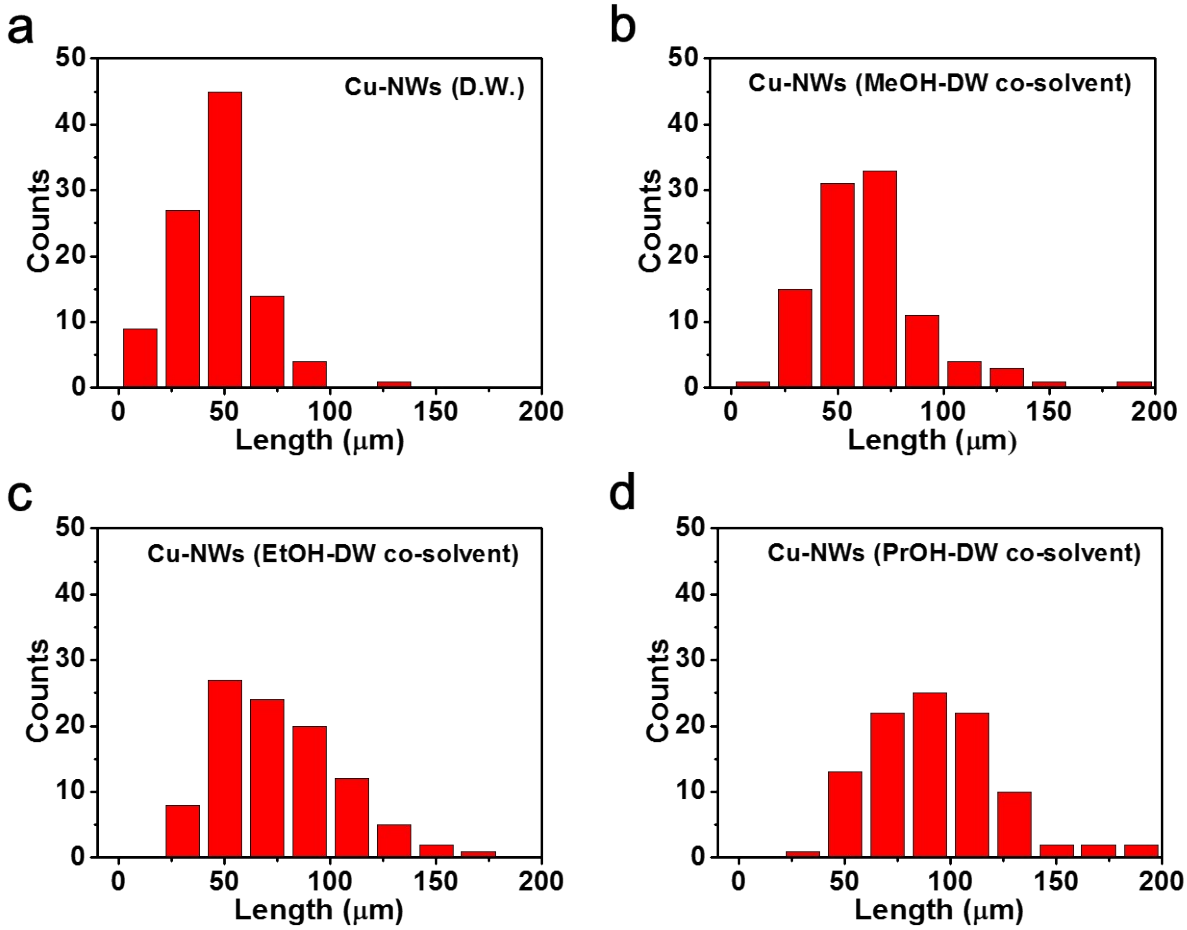

Figure S2. Length distribution of copper nanowires synthesized with different co-solvents. (a) DW, (b) methanol-DW, (c) ethanol-DW, and (d) n-propanol-DW.

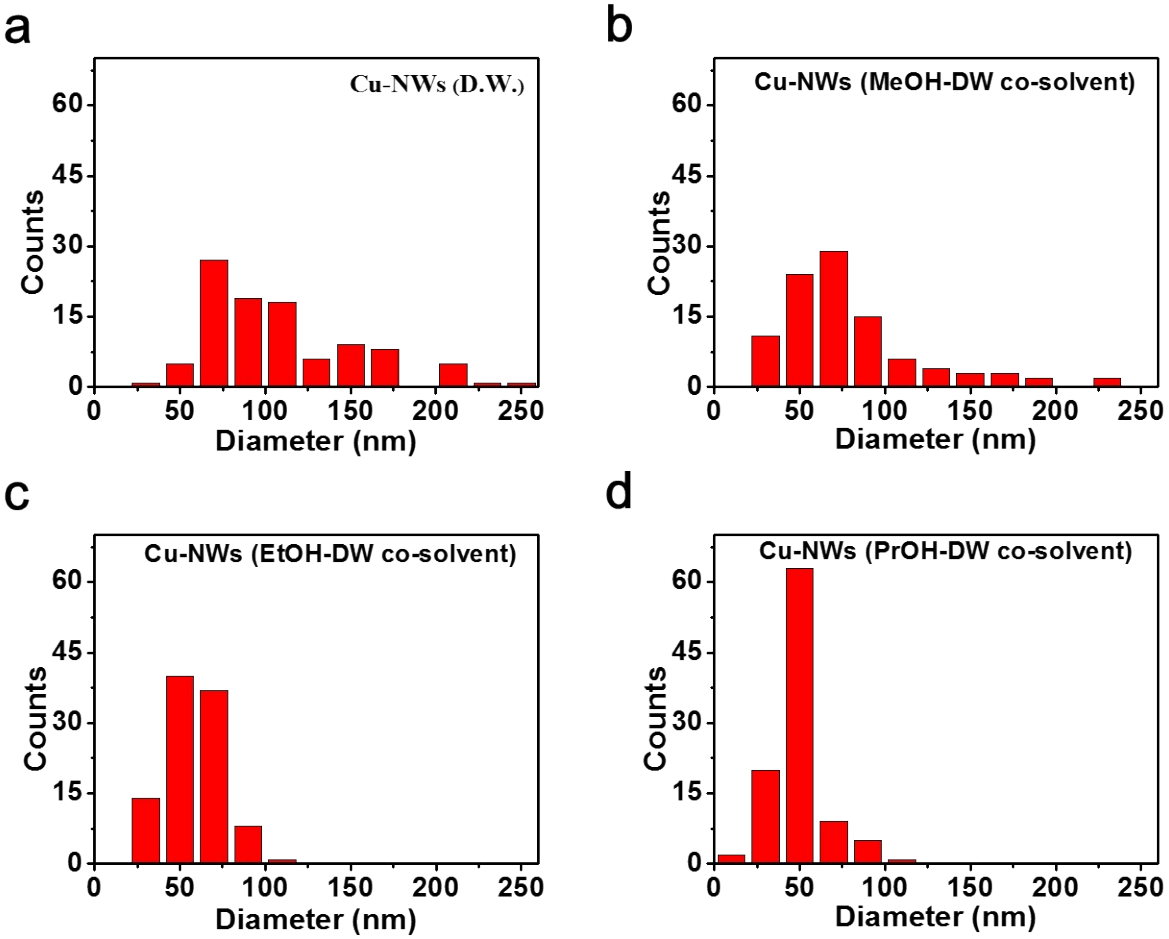

Figure S3. Diameter distribution of copper nanowires synthesized with different co-solvents. (a) DW, (b) methanol-DW, (c) ethanol-DW, and (d) n-propanol-DW.

Table S2. Statistical data of copper nanowires synthesized with different co-solvents.

Solvent Condition	Diameter (nm)		Length (μm)		Aspect Ratio
	Avg.	Std. dev.	Avg.	Std. dev.	
D.W.	109.9	45.3	46.4	19.9	422
MeOH-D.W.	78.5	38.1	65.6	28.4	836.1
EtOH-D.W.	63.6	29	80.4	35.1	1264.3
PrOH-D.W.	46.8	2.1	92.5	31.2	1976.9

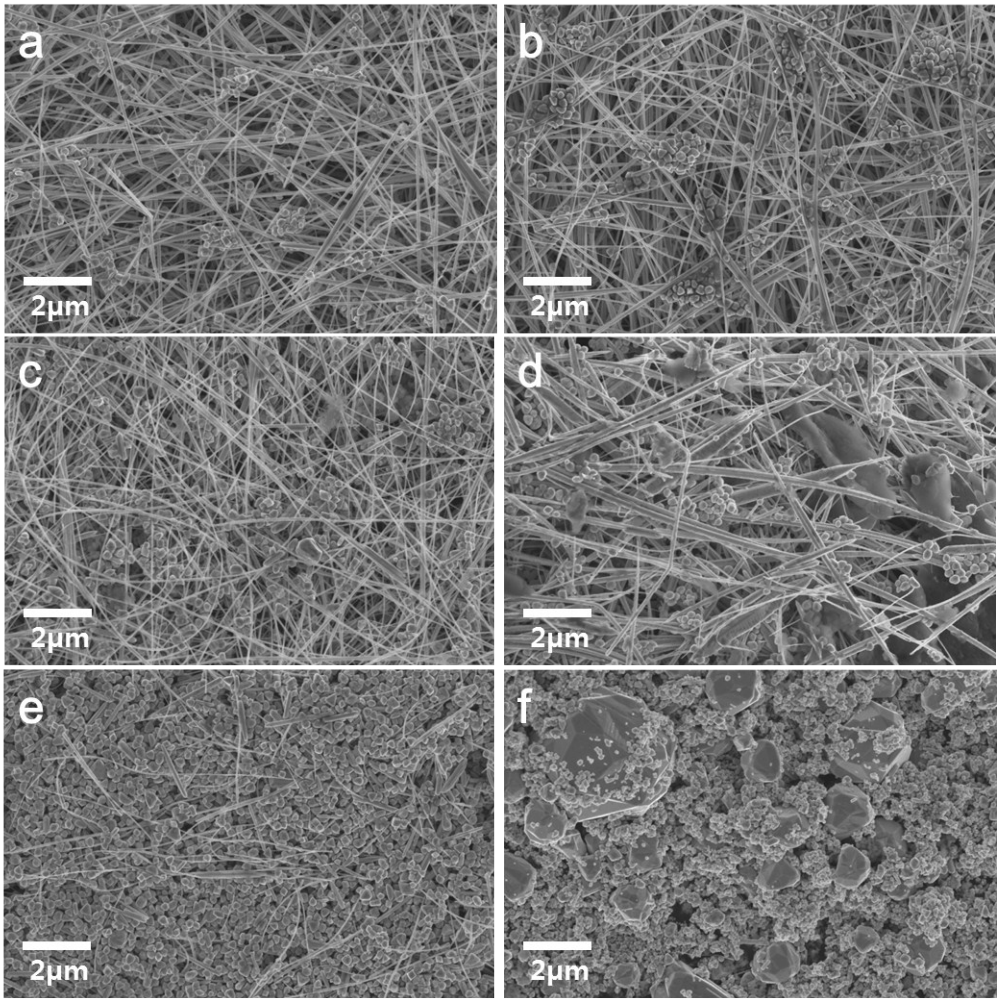

Figure S4. FESEM image of the copper nanowires synthesized with the hydrophobicity controlled co-solvent. (a-b) 10 vol% (a) and 15vol% (b) methanol, (c-d) 10 vol% (c) and 15 vol% (b) ethanol, (e-f) 10 vol% (e) and 15 vol% (f) n-propanol were mixed with distilled water as co-solvents.

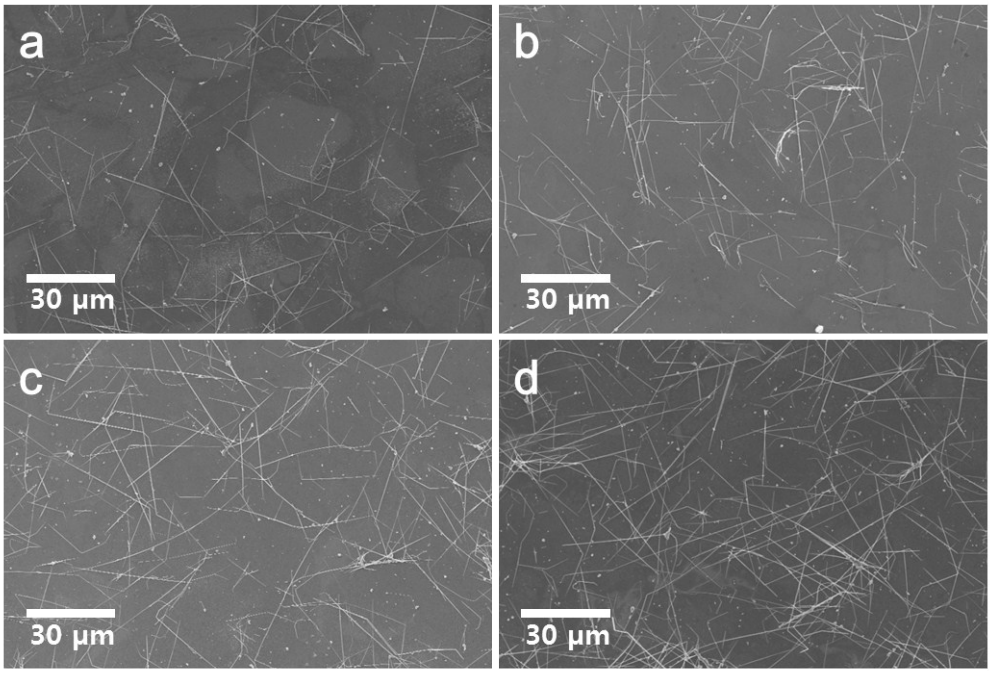

Figure S5. FESEM images of fabricated copper nanowires transparent conductive electrode using spray coating method. T_{550} values of electrodes are 95.7 % (a), 90.7 % (b), 88.7 % (c), and 84.1 % (d).

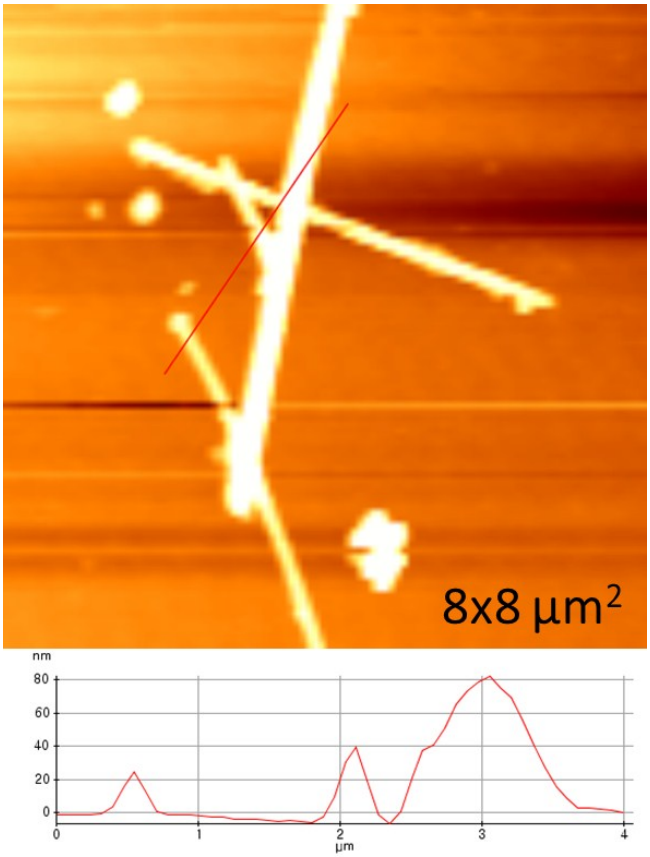

Figure S6. The atomic force microscopy (AFM) images of the copper nanowires transparent conductive electrode using spray coating method.

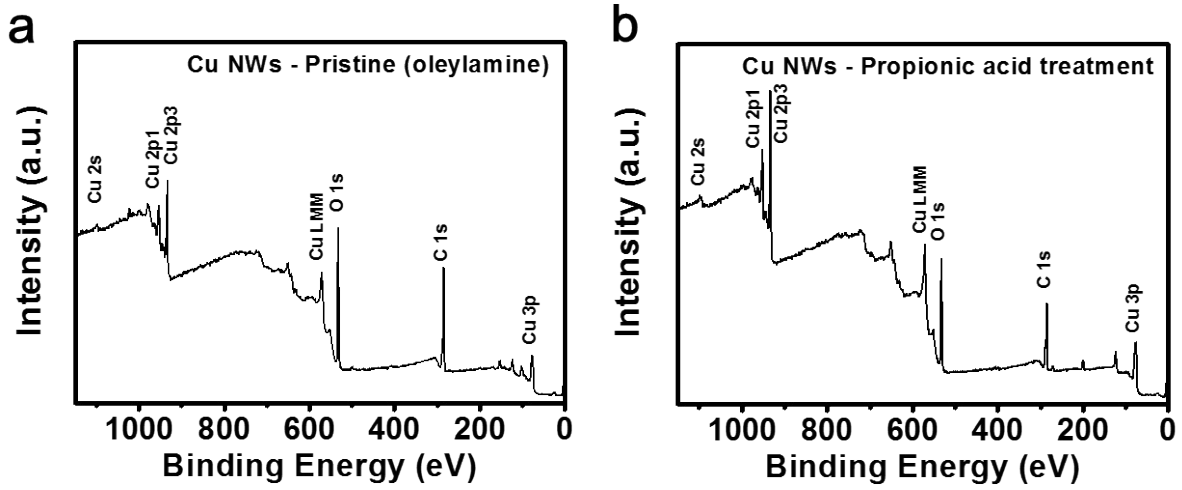

Figure S7. XPS spectra of as-prepared Cu NWs (a) and propionic acid treated Cu NWs (b).

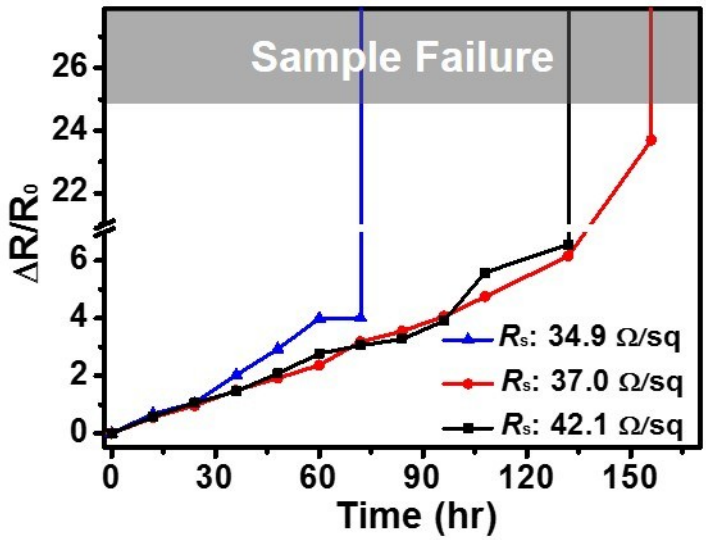

Figure S8. The plot $\Delta R/R_0$ vs time for CuNWs TCE with 60 ^{o}C storage condition for accelerated test.

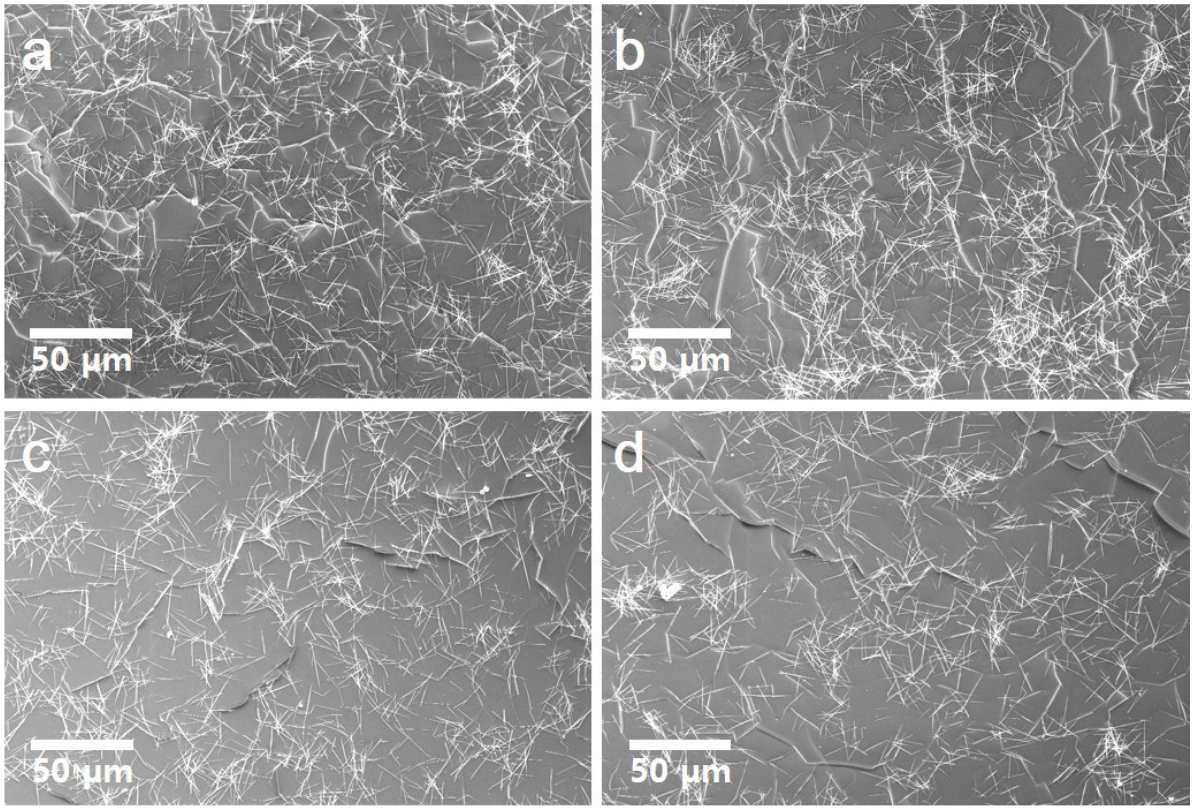

Figure S9. FESEM images of strained copper nanowires transparent conductive electrodes. The mechanical strain values of electrodes are 0 % (a), 20 % (b), 30 % (c), and 50 % (d), respectively.