Electronic Supplementary Material (ESI) for Nanoscale.

1D Copper nanowires for flexible printable electronics and high ampacity wires.

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Supporting Information

The additional SEM images of the Cu nanocrystals synthesized with different molar ratio of $CuCl_2$:glucose:HDA:KBr were shown in Figure S1. With a molar ratio of HDA:Br^- larger than the optimal ratio 3:1, a mixture of CuNWs and Cu nanoparticles were obtained (3:0.25, 3:0.5 and 4.5:1), indicating an insufficient capping on Cu seeds. For these cases, the smaller concentration of Br^- increased the chances that multi-twinned seeds develop to single-crystal seeds. In contrast, overdosing Br^- in the precursor solution caused unwanted capping on {110} and {111} facets, which produced Cu plates as demonstrated using a HDA:Br^- ratio of 2.5:2. An additional SEM image with lower magnification for 1:1:3:1 was also included.

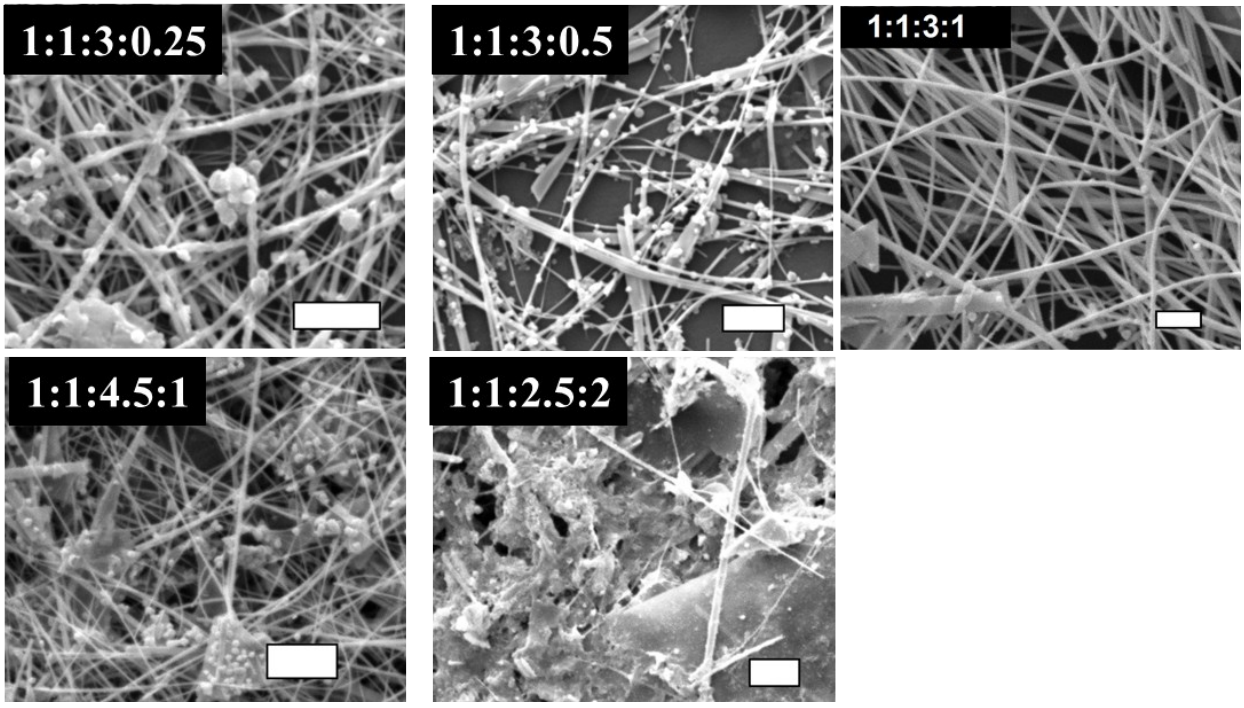

Figure S1. SEM images of the Cu nanocrystals synthesized with different molar ratio of $CuCl_2$:glucose:HDA:KBr. Bar = 2μm.

Contribution of Pt Contact resistance:

Figure S2a shows the resistance of the CuNW1, CuNW2 and CuNW3 as a function of their length. Figure S2b shows the IV curves of these nanowires. The x-intercept in Figure S2a is 11Ω. If the resistance value of CuNW1, which has a slightly larger diameter than CuNW 1 and CuNW2, is not fit, the contact resistance is 9Ω (dashed line). The use of 11Ω can overestimate the contact resistance. Therefore, for more realistic calculation, the conductivity values shown in Table 1 are obtained using 9Ω Pt contact resistance. From S2b, the resistance of CuNW1, CuNW2 and CuNW3 are 34.8Ω, 29.6Ω, and 20.4Ω respectively. After subtracting the 9 Ω contact resistance, the resistances of only the copper nanowires CuNW1, 2 and 3 are 25.8 Ω, 20.6 Ω and 11.4 Ω respectively. Using the relation $\sigma = L/R(\pi r^2)$, where L is the length and r is the radius of the CuNW. the electrical conductivity of CuNW1, 2 and 3 are 3.5×10^5 S/cm, 3.4×10^5 S/cm, and 3.4×10^5 S/cm, respectively.

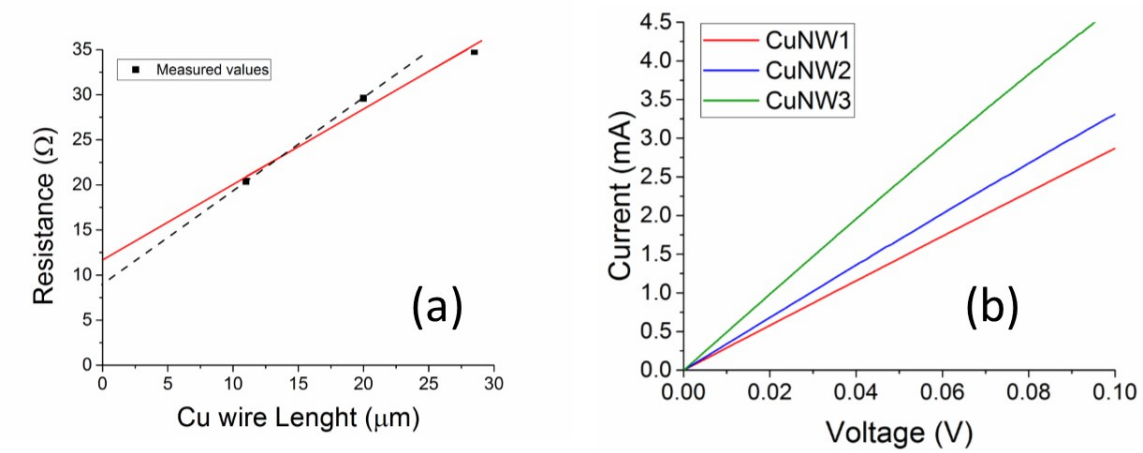

Figure S2. (a) Resistance vs CuNW length for devices CuNW1, CuNW2 and CuNW3. (b) IV curves of CuNW1, CuNw2 and CuNW3.

FIB deposited Pt:

To find the electrical conductivity of the Focused Ion Beam (FIB) deposited Pt contact pads, a 1 um wide and 200nm thick Pt wire was deposited between the gold electrodes using FIB, as shown in figure S3b. The distance between the gold electrodes is 24.3um. The resistance and the electrical conductivity of the Pt wire are 2.6kOhm and $4.7x10^2$ S/cm respectively.

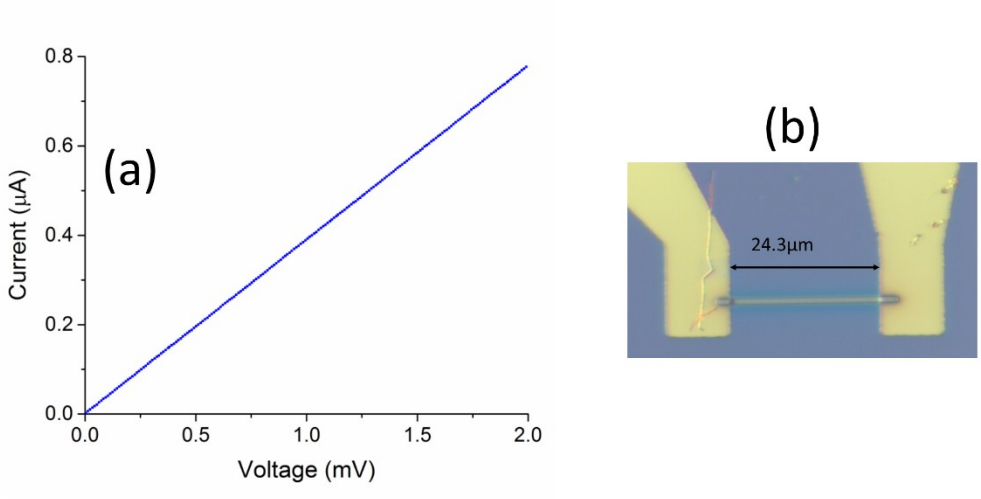

Figure S3: (a) IV curve of the Pt wires, shown in (b). (b) Pt wires deposited between gold electrodes. Length 24.3um, width 1um, thickness 200nm.