# Facile control of copper nanowire dimensions via the Maillard reaction: Using food chemistry for fabricating largescale transparent flexible conductors

(ESM)

*Kevin Moe, Lim Y. R. Gregory, Ghim Wei Ho*

Department of Electrical and Computer Engineering,

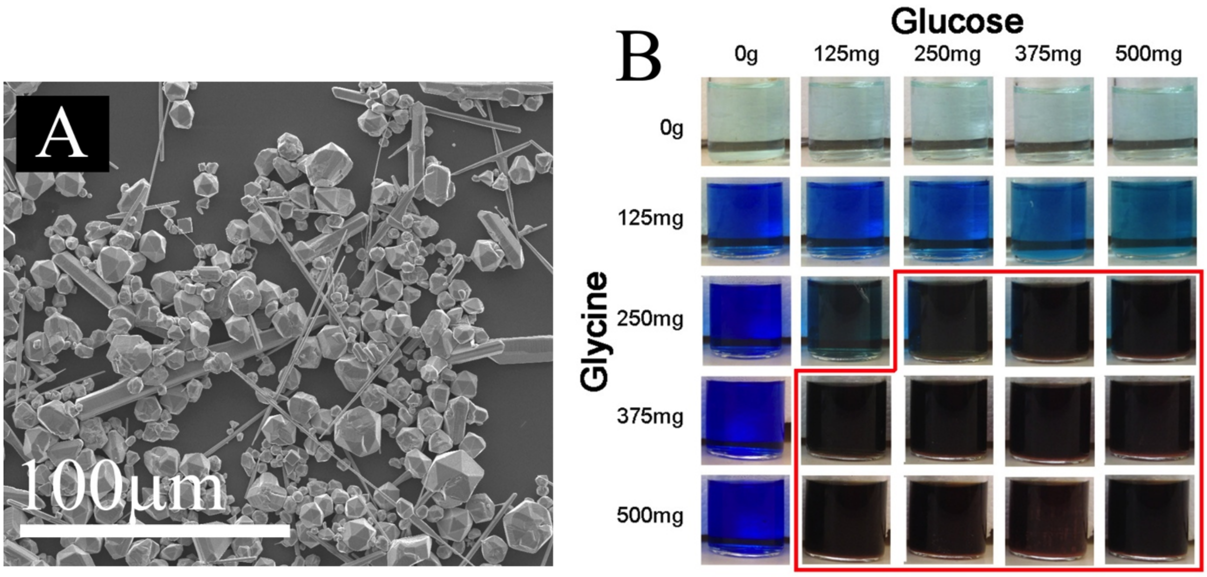
National University of Singapore

4 Engineering Drive 3

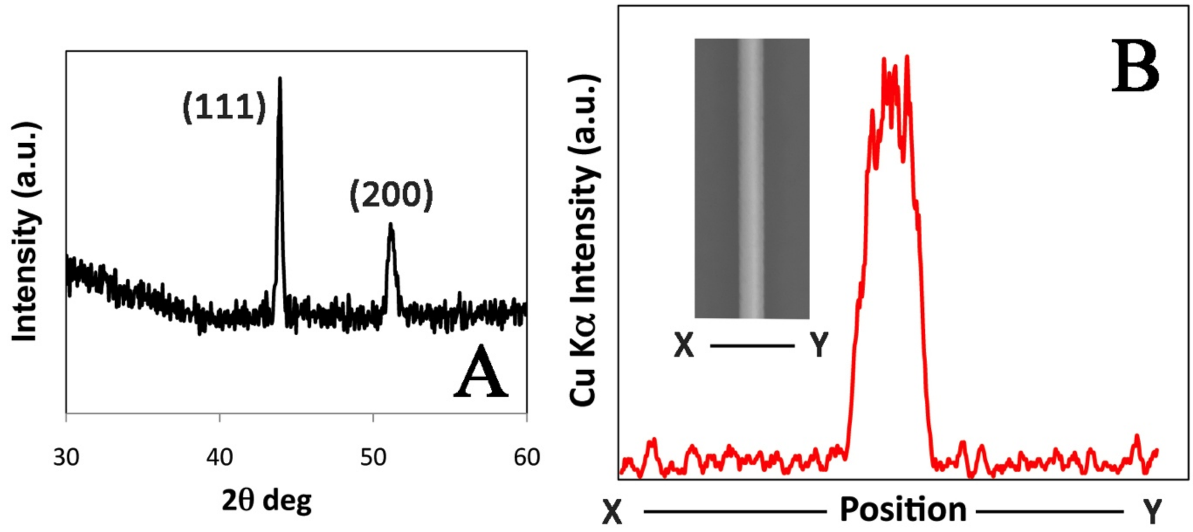
EA-07-37

Singapore 117576

E-mail: elehgw@nus.edu.sg




**S1.A:** Cu crystals obtained from reducing $Cu^{2+}$ cations using a 500mg of glycine and 500mg of glucose. No HDA was used during this reduction. **S1.B:** 2-dimensional matrix of samples using different mass combinations of glycine and glucose to reduce $Cu^{2+}$. The samples enclosed in red contained metallic Cu precipitates, demonstrating that glycine and glucose, when present in sufficient quantities, were able to reduce $Cu^{2+}$.




**S2.A** XRD spectra of Cu NWs grown with glycine showing (111) and (200) diffraction peaks; **S2.B** intensity of Cu K$\alpha$ from a spatially resolved EDX of a Cu NW (inset).

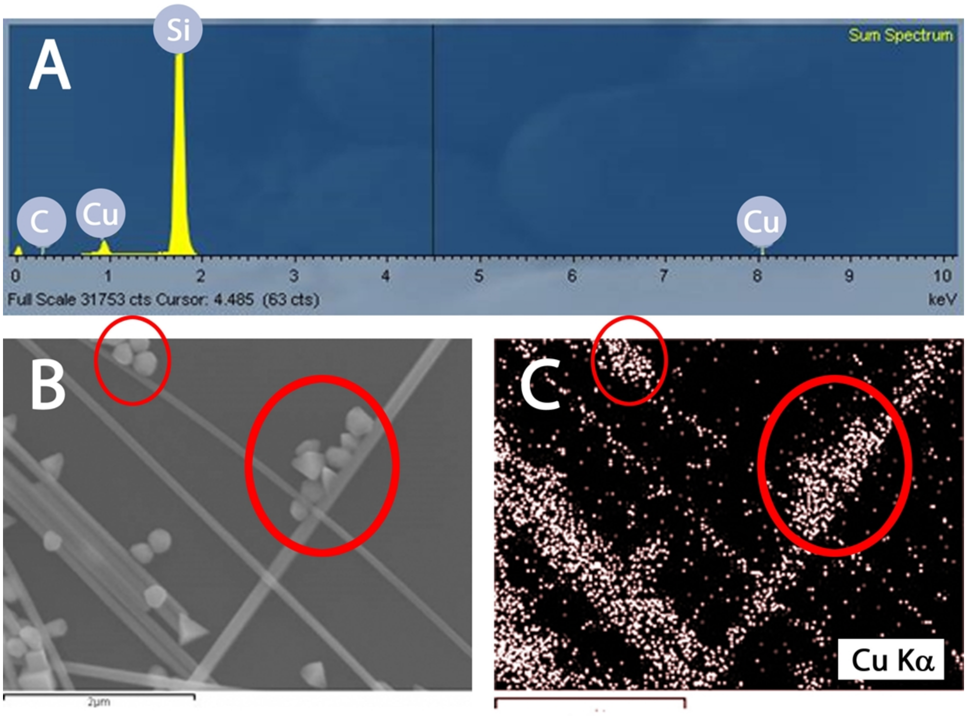
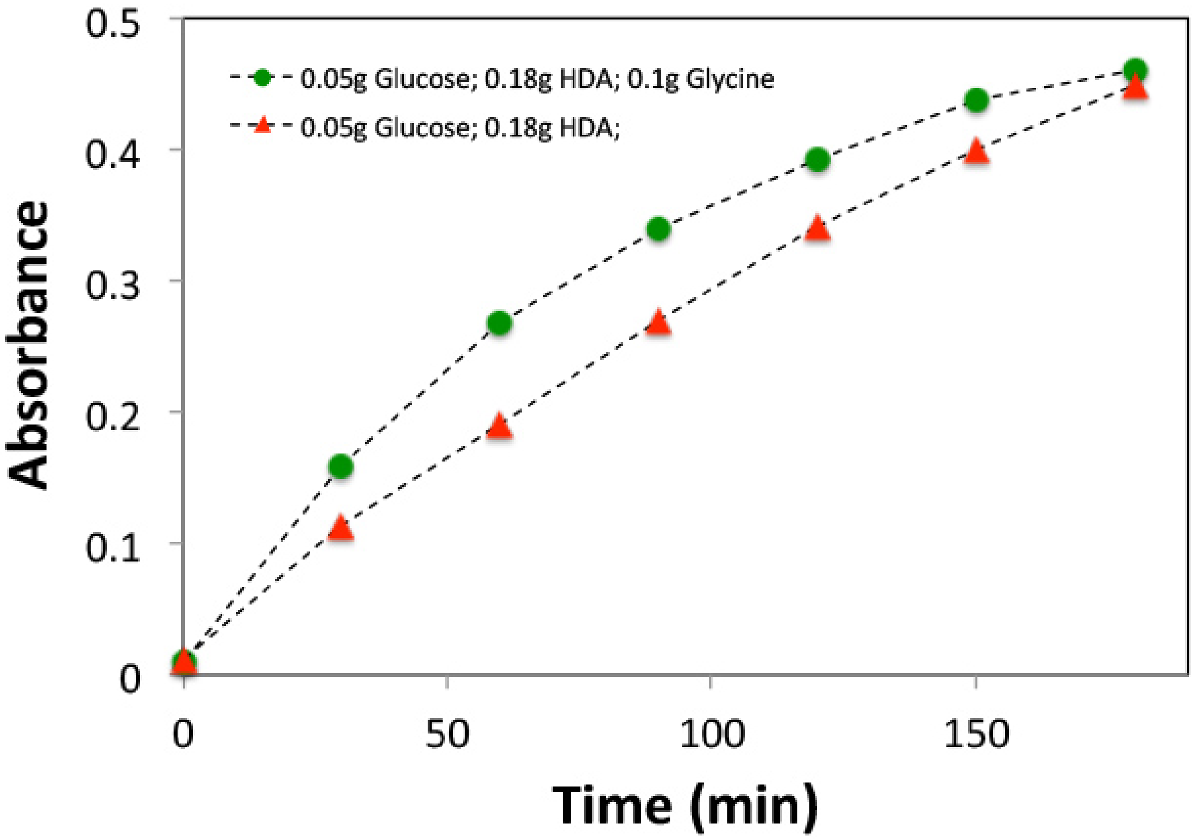
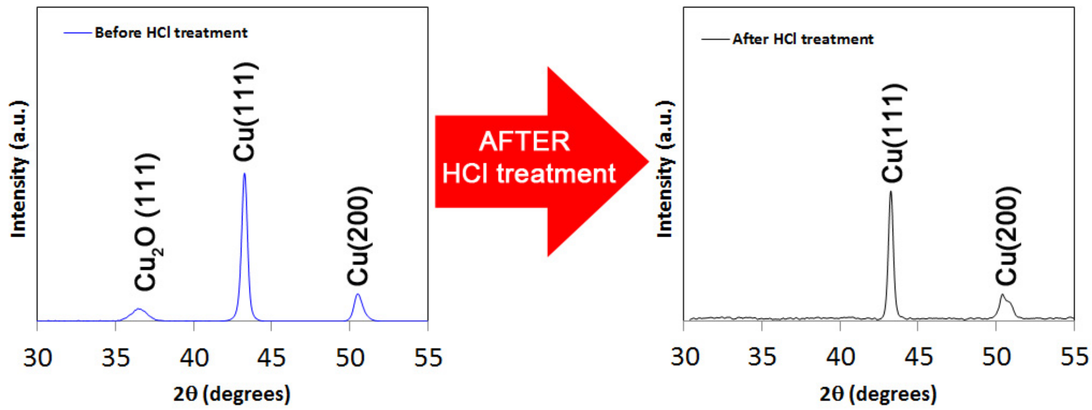



**Fig.S3A** shows the EDX spectra of the area scanned in **Fig.S3.B**. Only Si (substrate), Cu and adventitious carbon were detected. This suggests that the Cu entities are metallic in nature. No oxygen was detected.

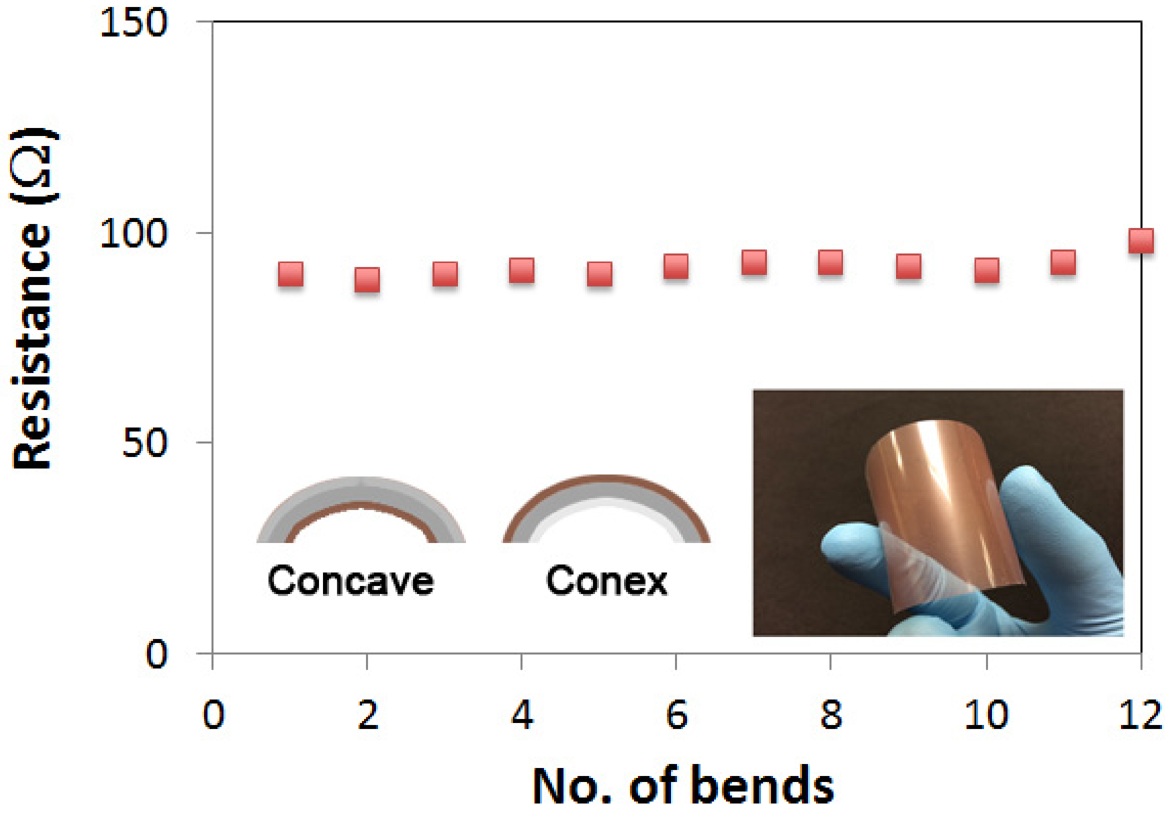
**Fig.S3.C** shows the Cu Kα map corresponding to the SEM image in **Fig.S3.B**. The portions circled in red show that the particles encapsulated in the NWs space also consisted of Cu.



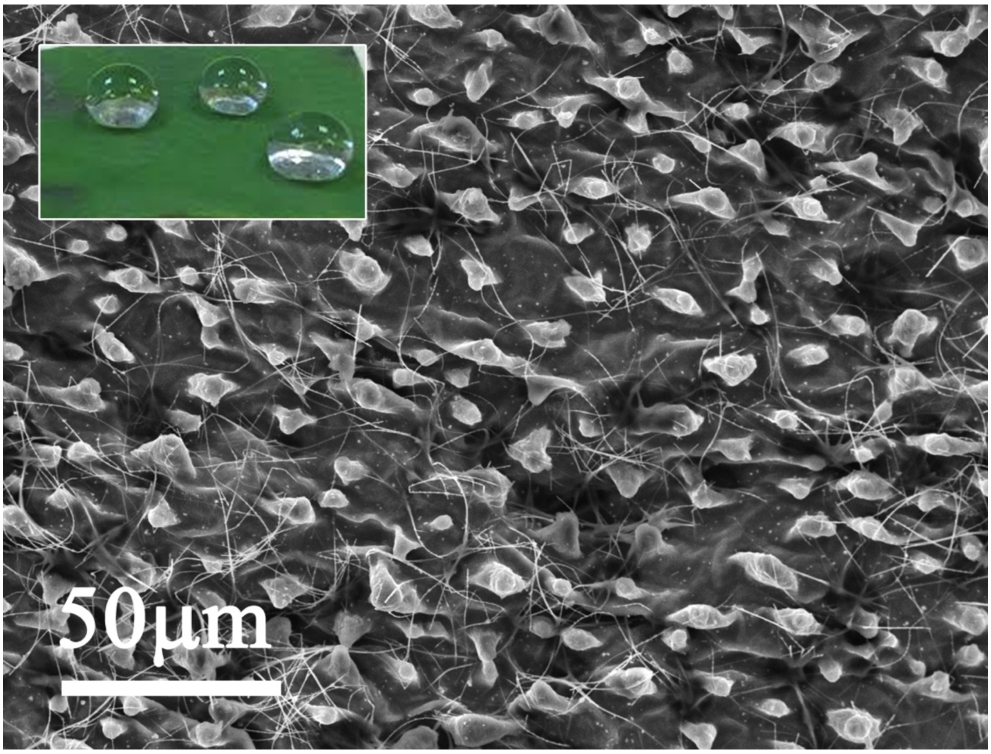

**S4.** A comparison of the absorbance at 700nm for the reducing strength assays with and without 0.1g of glycine. The presence of glycine gives greater reducing strength.




**S5.** XRD spectra of Cu NWs before and after HCl treatment. HCl removes the native $Cu_2O$ layer, leaving pure metallic copper.




**S6.** Resistance of Cu NW coated on PET substrate after several convex-concave bending cycles. Measurements were performed after each cycle.




**S7.** A proof of concept showing Cu NWs deposited onto a superhydrophobic lotus leaf using an airbush (inset figure shows water beads on the leaf surface). The extreme roughness of the lotus leaf did not permit good connectivity between the Cu NWs.