Electronic Supplementary Information

Cupronickel-based micromesh film for use as a high-performance and low-voltage transparent heater

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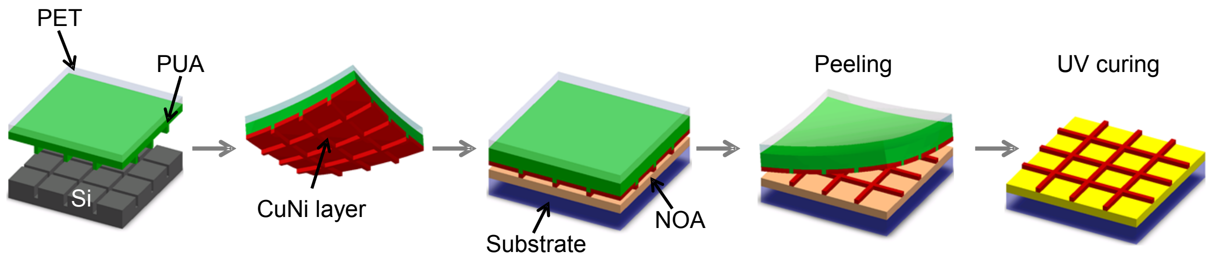

Fig. S1 Schematic showing the stages in fabricating a CuNi micromesh film on a glass or polymer substrate.

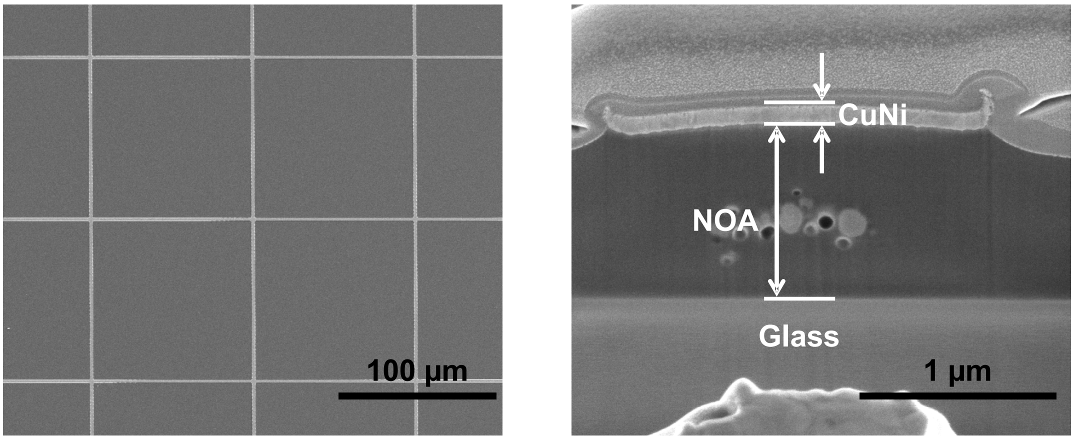

Fig. S2 Surface and cross-sectional FE-SEM images of CuNi micromesh film on NOA-coated glass.

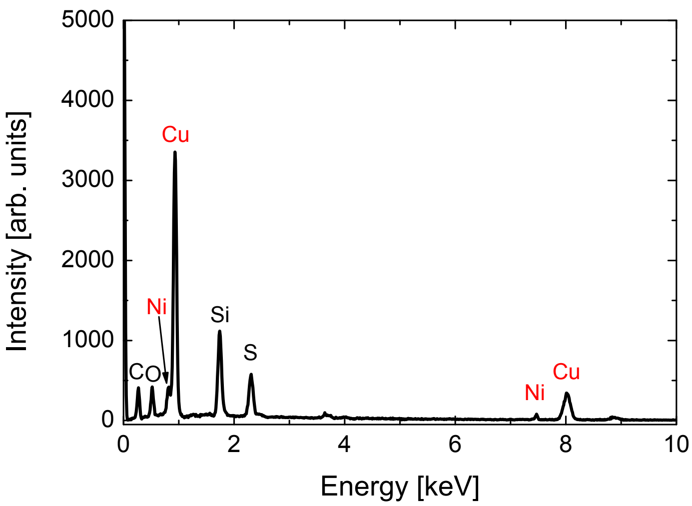

Fig. S3 Energy-dispersive spectroscopy (EDS) spectrum of a CuNi micromesh film on a glass substrate.

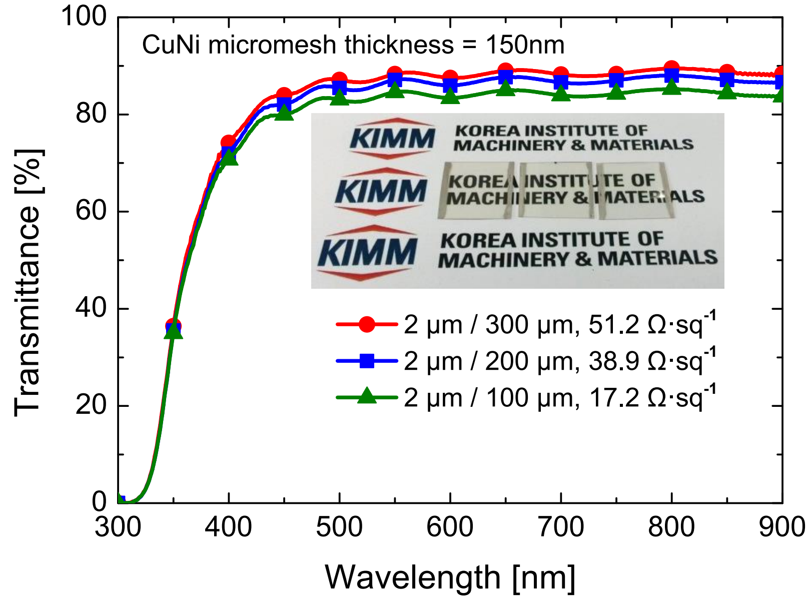

Fig. S4 Plot of transmittance for CuNi micromesh films on a polymer (PES) substrate.

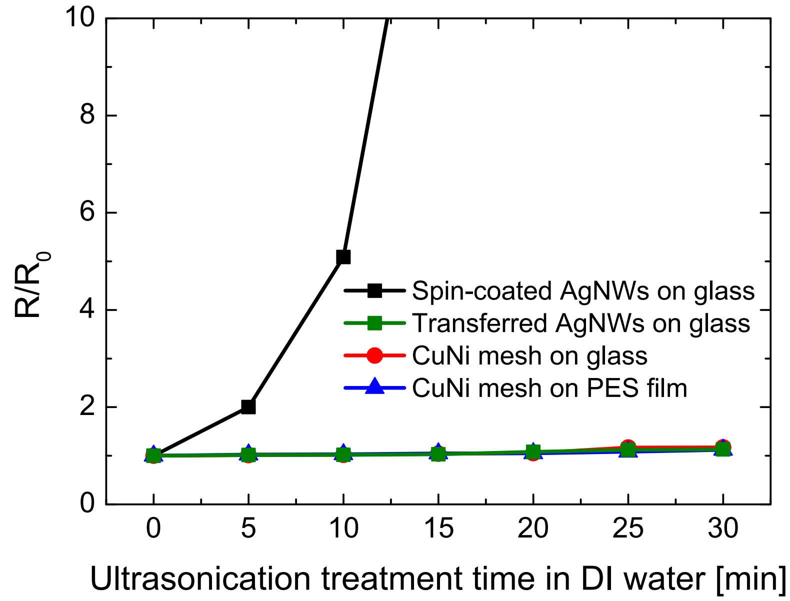

Fig. S5 Change in sheet resistance with ultrasonication for CuNi micromesh films on glass and PES substrates, and AgNW networks (spin-coated AgNWs and transferred AgNWs) on a glass substrate.

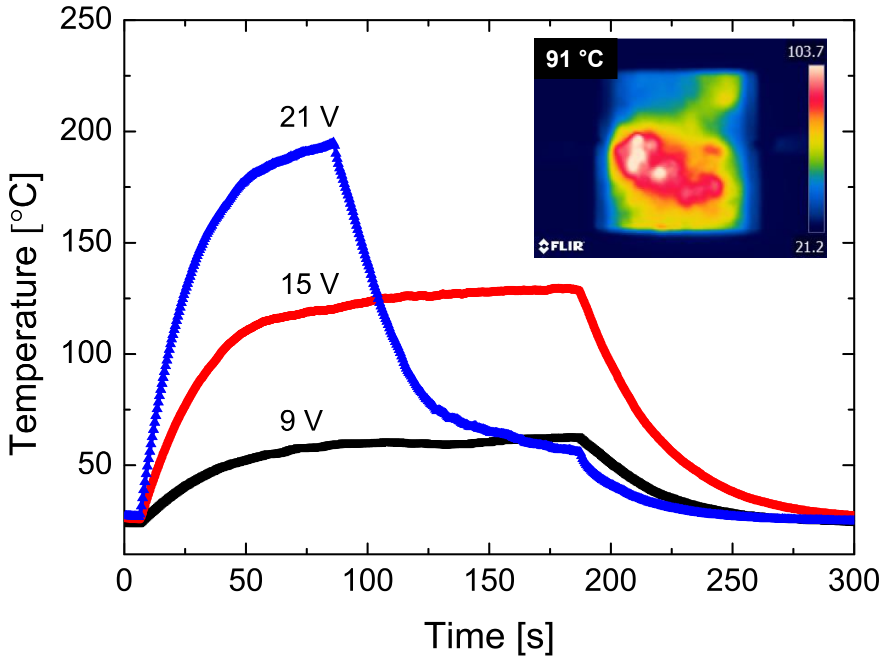

Fig. S6 Temperature profile of the spin-coated AgNWs transparent heater as a function of time at applied voltages of 9, 15 and 21 V.

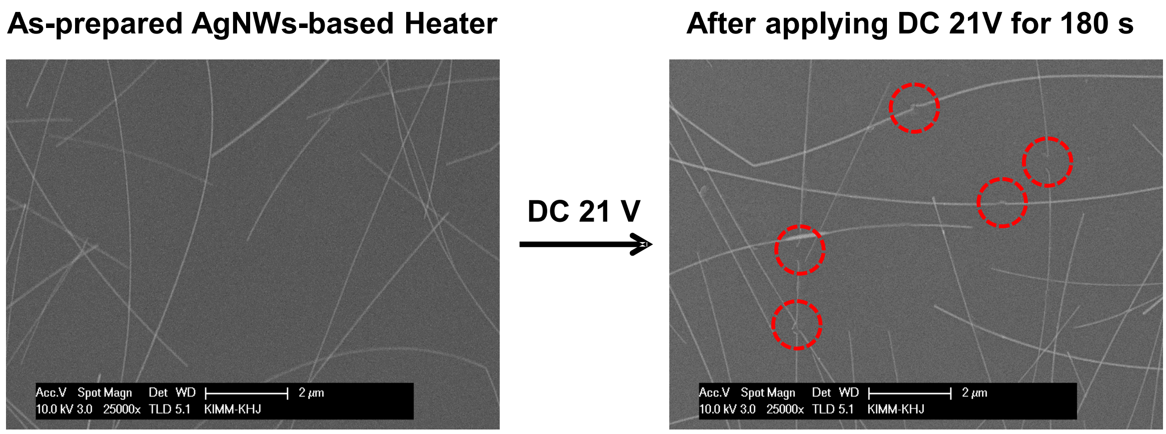

Fig. S7 FE-SEM images of a AgNWs-based transparent heater before and after heating test (DC 21V, 180s). The dashed circles in red indicate broken AgNWs.

We measured the temperature of ITO at low input voltages (6 and 9V) for 600 seconds to achieve equilibrium, and depicted the results in the Fig. S8. As shown in Fig. S8, ITO did not attain a higher temperature than the metal mesh, despite equilibrium for ITO. The results indicated that the ITO films exhibited more quickly convective heat loss than that of the metal mesh due to large heat transfer coefficient of oxide.[25, 26]

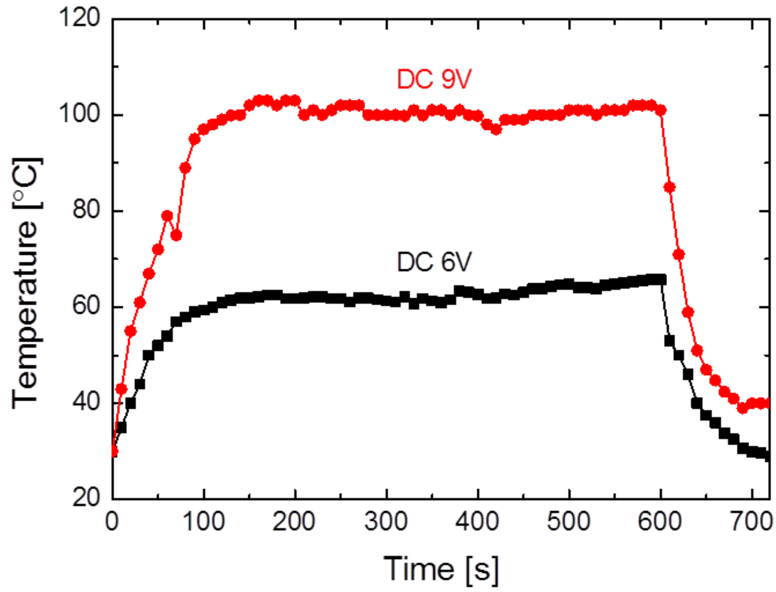

Fig. S8 Temperature measured as a function of time for ITO/glass (10 Ω·sq^{-1}) at input voltage of DC 6 and 9 V.

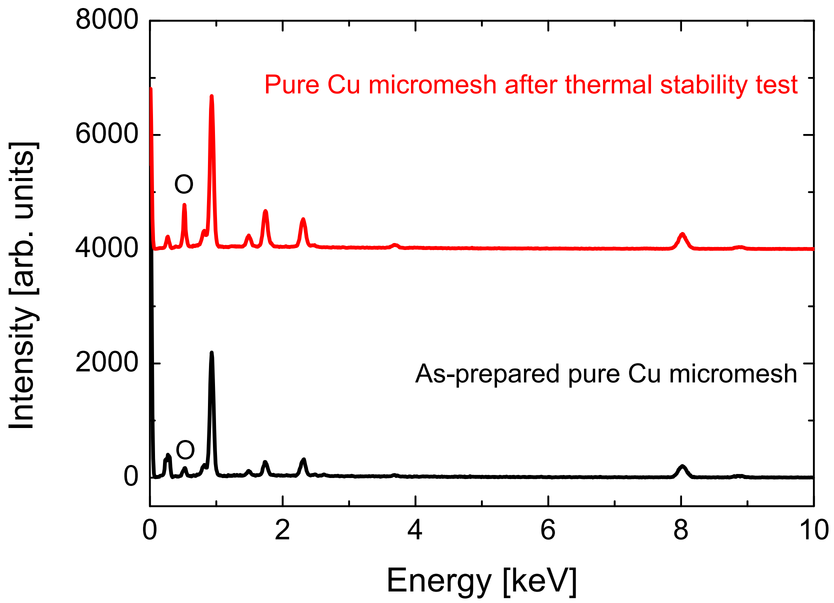

Fig. S9 EDS measurement of a Cu micromesh film on a glass substrate before and after thermal stability testing.