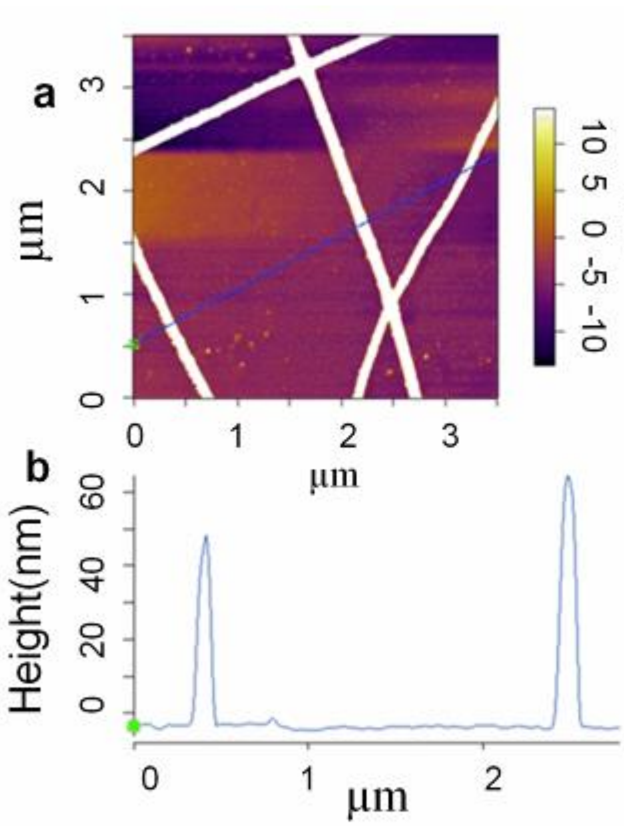
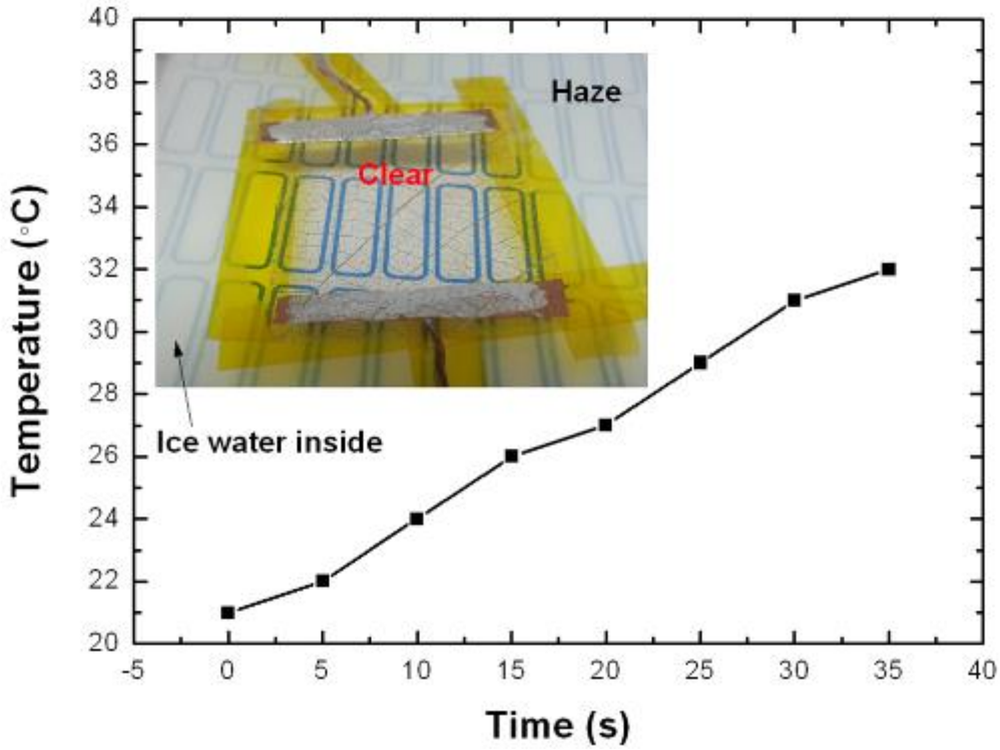


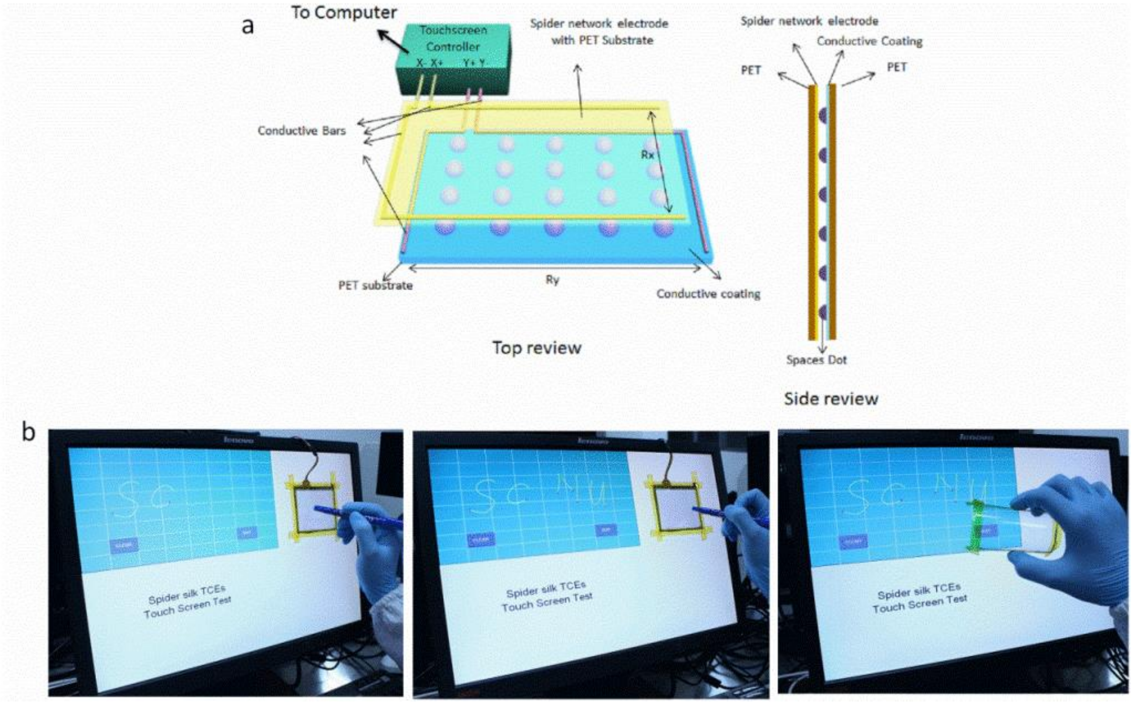
Supplementary Figure 1: Atomic Force Microscopy (AFM) characterization of the surface morphology of the spider silk web network. (a) AFM 2D image, and (b) the profile scan alone the blue line in (a).

SSW network was also studied by using the atomic force microscopy (AFM), which allows for precise measurements of the fiber dimensions. **Supplementary Figure 1 (a)** shows a small area of the SSW network placed on silicon, with color encoded elevation of surface features. In addition, an elevation profile scan along the blue line in (a), is shown in **Supplementary Figure 1 (b).**



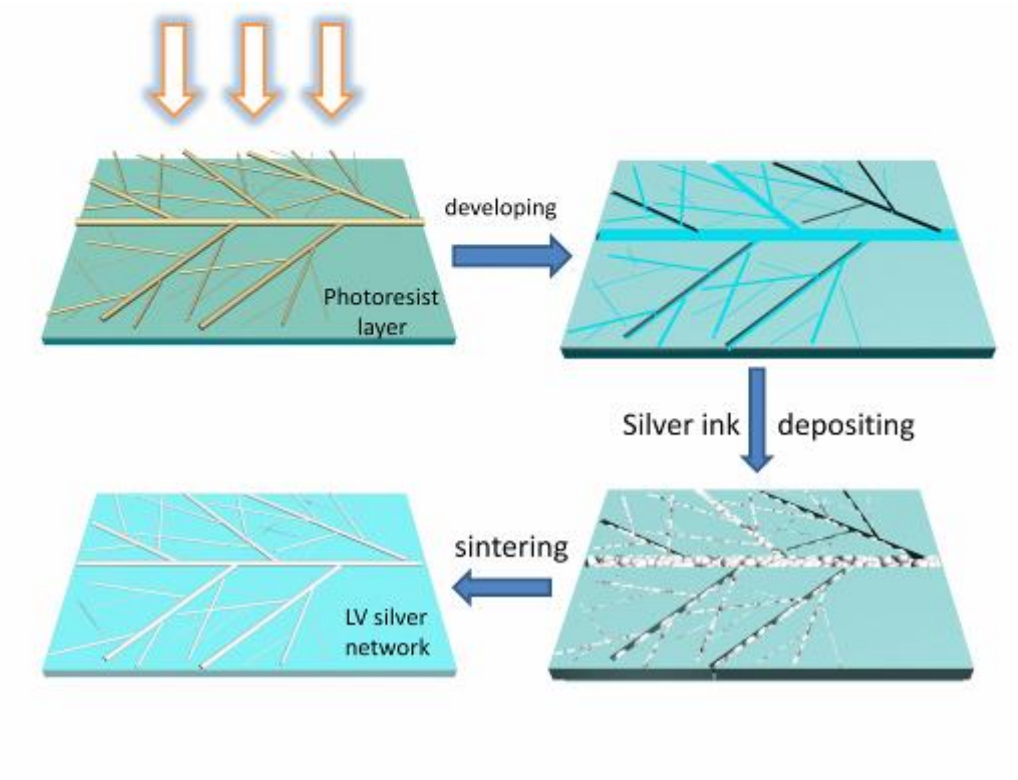
Supplementary Figure 2: Demonstration of the flexible surface heater. Plot of the temperature versus time for a heater based on the leaf venation (LV) network. The inset shows the image of the surface heater.

Transparent heaters assure clear visibility of various windows and displays, such as avionic displays, outdoor displays, and periscope and vehicle windows[1-4]. The inset in **Supplementary Figure 2** shows a transparent, flexible and stretchable heater based on our LV network. An LV network based heater is attached to a piece of plastic, and then placed on a container filled with ice-water. Current flow through the heater de-fogs the heater area. The area attached to the transparent heater is clear, but the outside remains hazy. The increased temperature as a function of time is shown in the **Supplementary Figure 2**.



Supplementary Figure 3: Demonstration of a touch screen based on spider silk (SSW) network. (a) Schematic diagram of the resistive touch screen. (b) Working prototype of a mechanically flexible resistive touch screen display based on our SSW network, demonstrating the touch-screen writing capability

Transparent and conducive films have been extensively studied for their potential application in touch-screen displays[5-6]. We used SSW network to fabricate a model of a touch screen device based on a commercial product (TOP TOUCH Inc.). The 3.5-inch device consisted of a parallel ITO electrode on a PET sheet and a piece of ITO glass. In-between there was a square array of polymer spacer dots. In our experiment, the ITO coating on PET was replaced with our SSW network. The circuit was interfaced with a computer, and its performance tested by a commercial controller, which was provided by the vendor. **Supplementary Figure 3** shows a working prototype of a mechanically flexible touch screen display based on our network (letters “SCNU” were written). We note that our network is hydrophobic, which promotes self-cleaning.



Supplementary Figure 4 Schematic of a contact photolithography method based on a LV network.

Our contact photolithography method consisted of four steps shown schematically in **Supplementary Figure 4**. A continuous photoresist layer was deposited on a flat substrate by a spin coating method. Subsequently LV was placed on the photoresist and exposed to UV light. After removal of LV and the photoresist development, the photoresist under the LV structure was removed. Next silver ink was deposited on the surface and sintered. Finally a lift-off resulted in a silver LV structure print.

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