

Fig. S1. The preparation process of Screen printing ink.

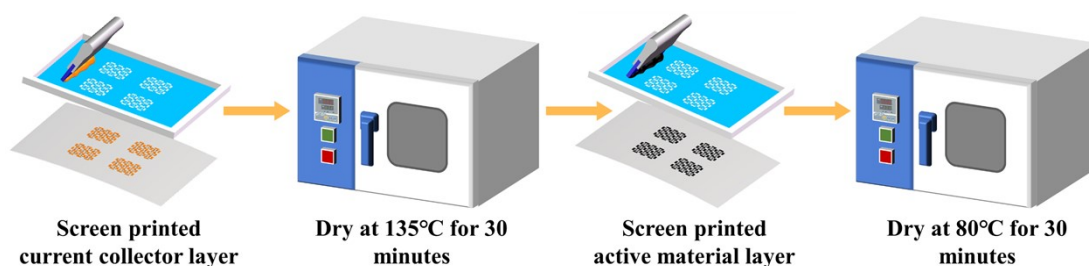


Fig. S2. The preparation process of flexible electrodes for supercapacitors.

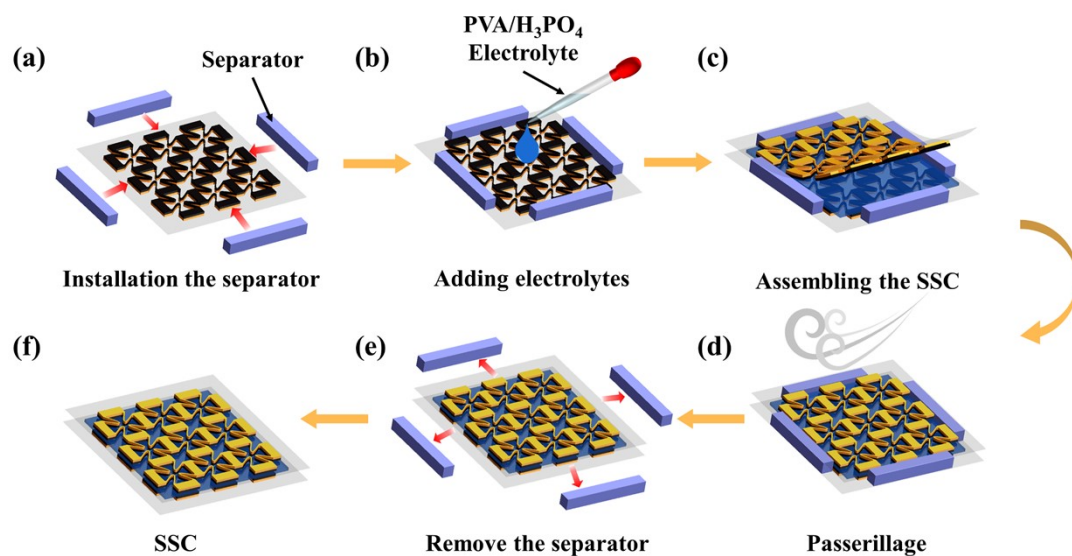


Fig. S3. Assembly process diagram of SSC with NPR structure flexible electrode. (a) The separator is placed around the flexible electrode with NPR structure. (b) The self-made PVA/H₃PO₄ electrolyte was poured onto the surface of the flexible electrode. (c) Cover a layer of flexible electrode. (d) Allow SSC to air dry overnight. (e) Remove Separator. (f) Prepared SSC.

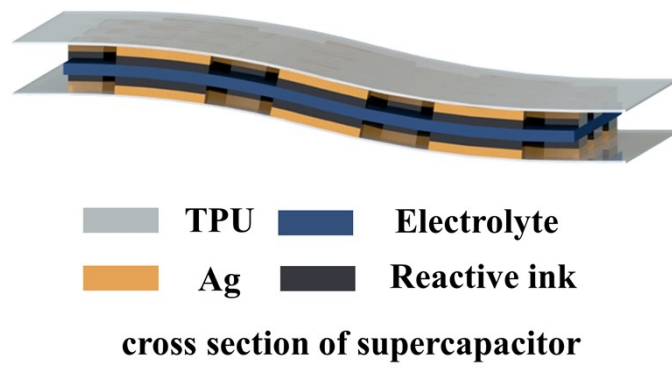


Fig. S4. The cross section of SSC with the NPR structure flexible electrode.

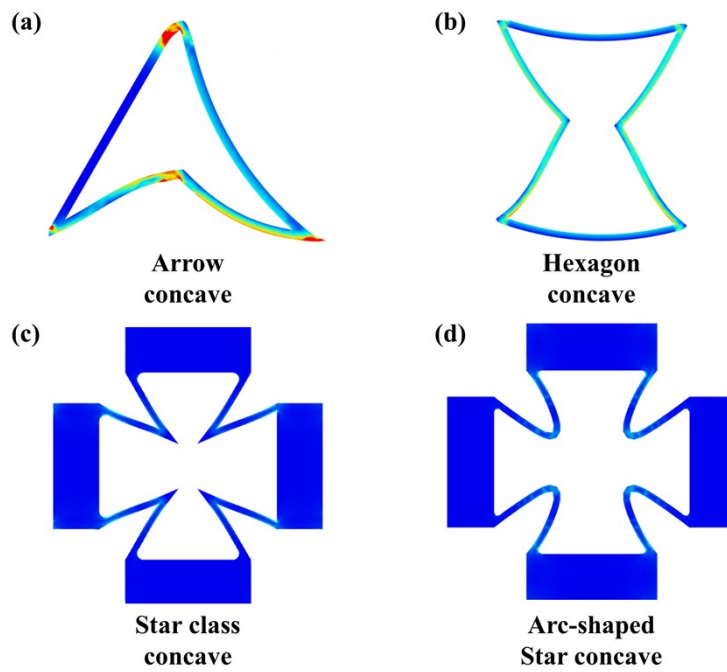


Fig. S5. Enlarged view of FEA characterization results of four NPR structure units in 10% tensile state.

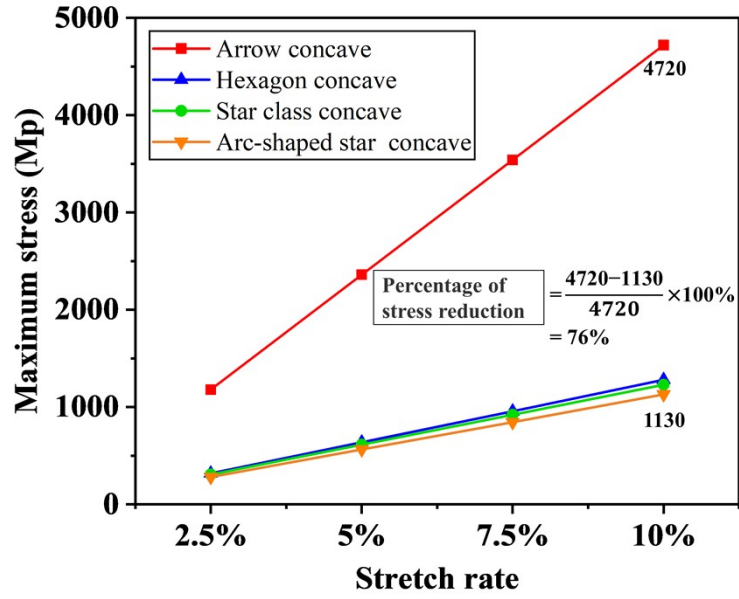


Fig. S6. Maximum tensile stress changes of four NPR structures attached to the substrate under different tensile deformation.

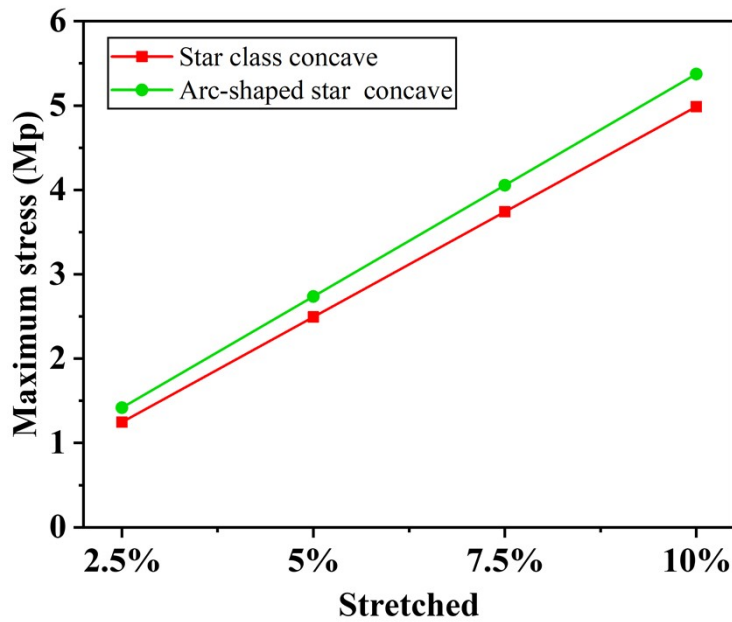


Fig. S7. Variation of maximum tensile stress of star class concave, and arc-shaped star concave under different tensile deformation.

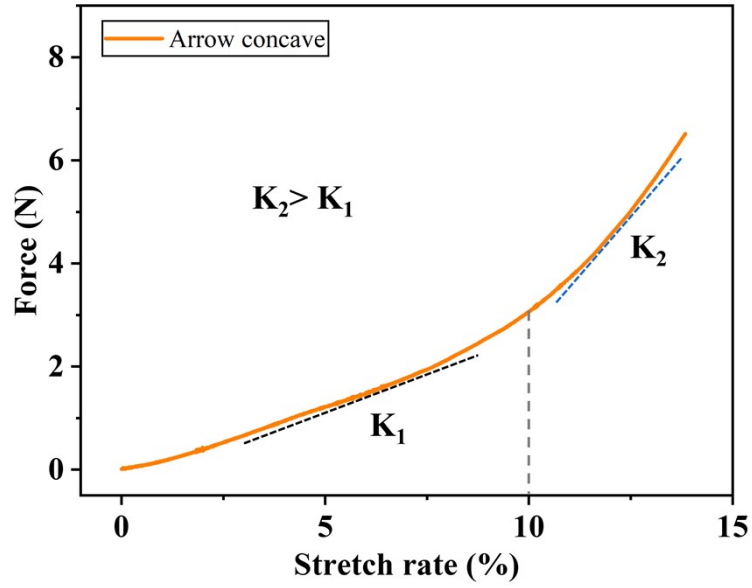


Fig. S8. Displacement-force curves of arrow concave structure.

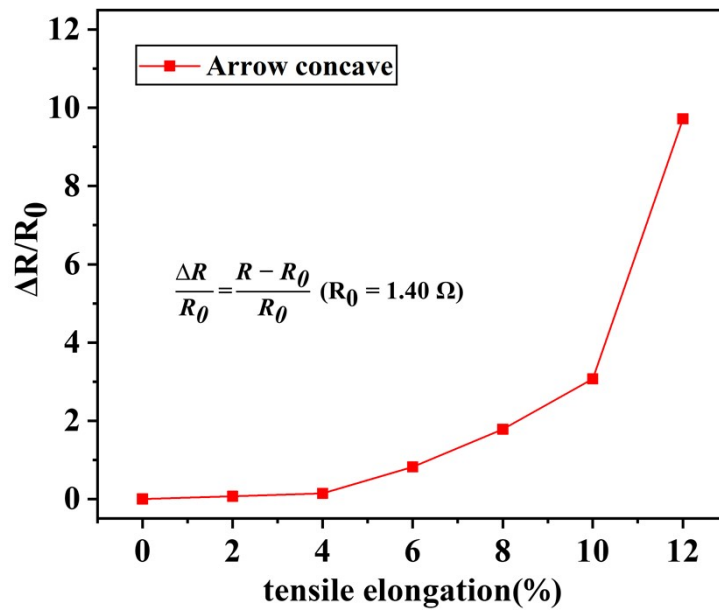


Fig. S9. The change of relative resistance of concave arrow structure in tensile state.

Table S1. The R_0 of different NPR structures.

NPR structures	Arrow concave	Hexagonal concave	Star class concave	Arc-shaped Star concave
R_0	3.29 Ω	3.65 Ω	1.38 Ω	1.42 Ω

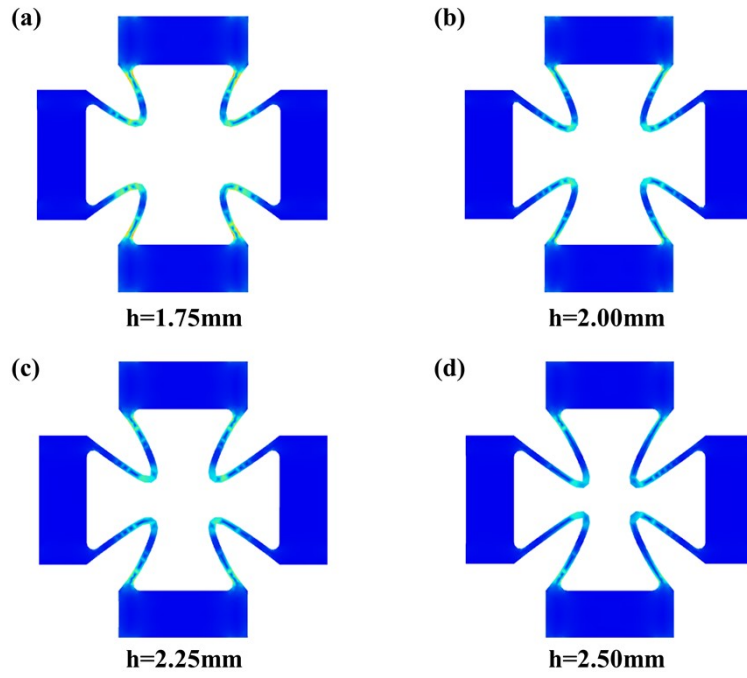


Fig. S10. Enlarged view of FEA characterization results of four different sizes of arc-shaped star concave structures units in 40% tensile state.

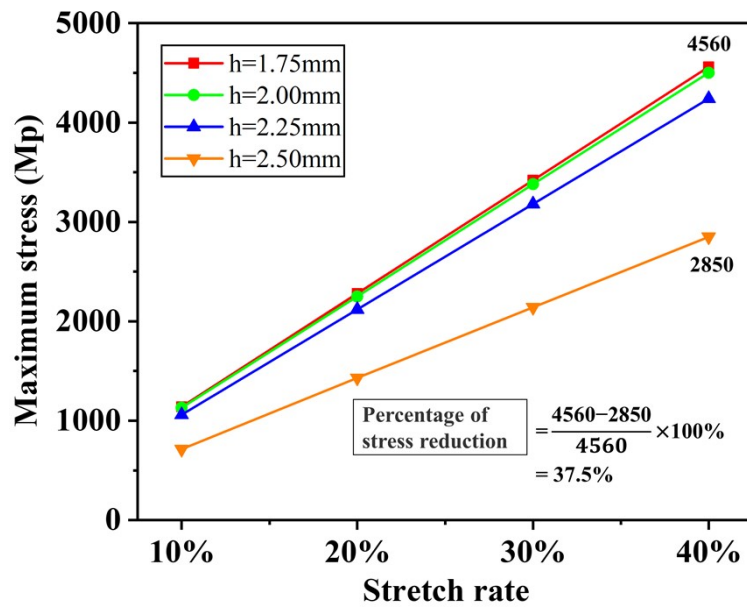


Fig. S11. Maximum tensile stress changes of four different sizes of arc-shaped star concave structures attached to the substrate under different tensile deformation.

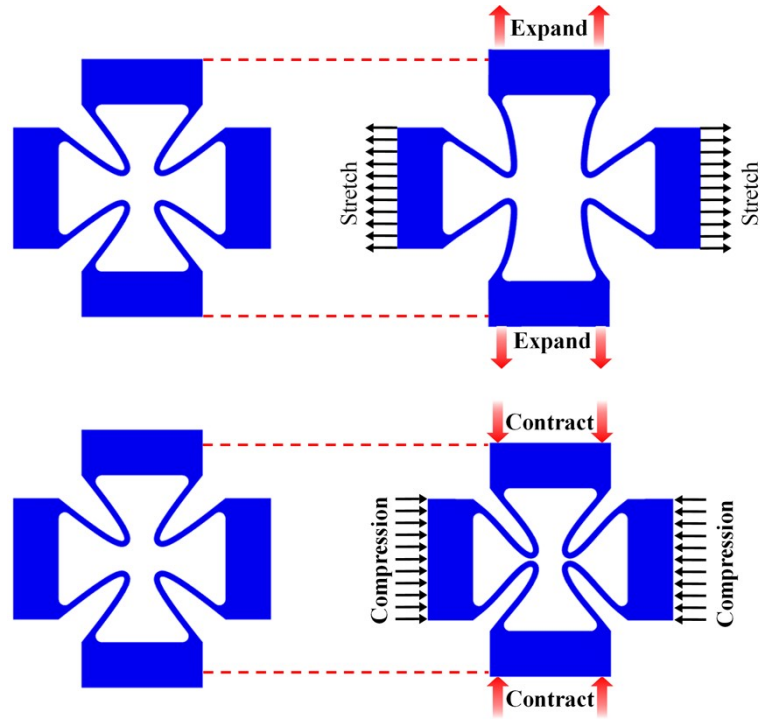


Fig. S12. Schematic Diagram of NPR Structure Tension and Compression.

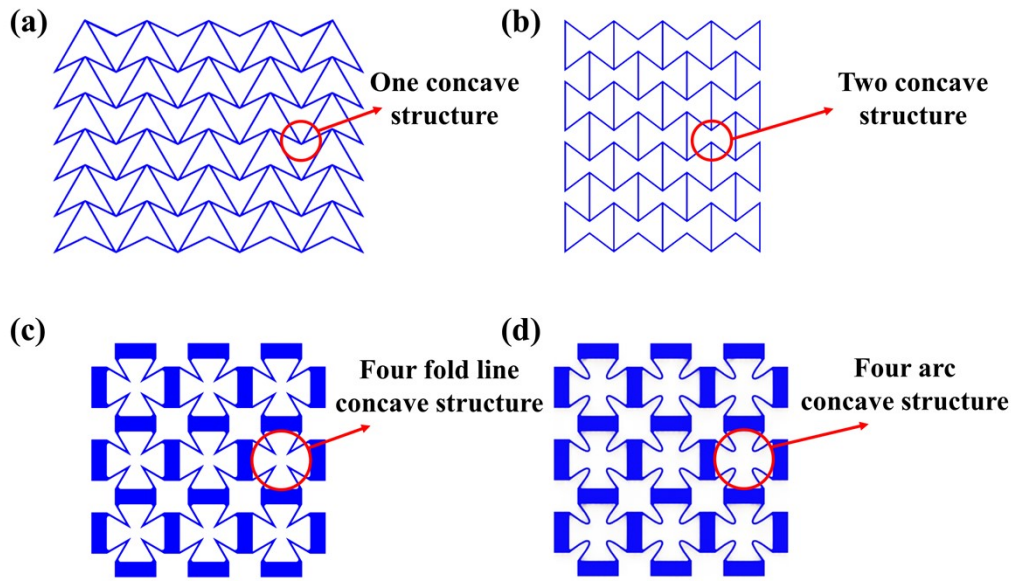


Fig. S13. Schematic diagram of four NPR structures.

Table S2. The R_0 of arc-shaped star concave structures with different sizes.

NPR structures	h=1.75mm	h=2.00mm	h=2.25mm	h=2.50mm
R_0	1.29 Ω	1.42 Ω	1.52 Ω	1.48 Ω

Table S3. More details of fabrication process.

Object	Thickness (mm)	Post-treatment method
TPU film	0.05	Deashing
Collector layer	0.1	135 °C for 30 min
Active material layer	0.05	135 °C for 30 min
Electrolyte layer	0.2	Air dry overnight