Electronic Supplementary Material (ESI) for Nanoscale.


Supporting Information

# Stretchable and Conformable Synapse Memristors for Wearable and Implantable Electronics

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## TPU:Ag NPs solution.

Compared with the SEM images of the polymer film (TPU) (Fig. S1a), we found that Ag NPs is uniformly dispersed in the TPU (Fig. S1b). And, we can observed the transparency and uniformity of the TPU:Ag NPs solution (Fig. S1c), and hence it can be concluded that the dispersion of Ag NPs is very good.

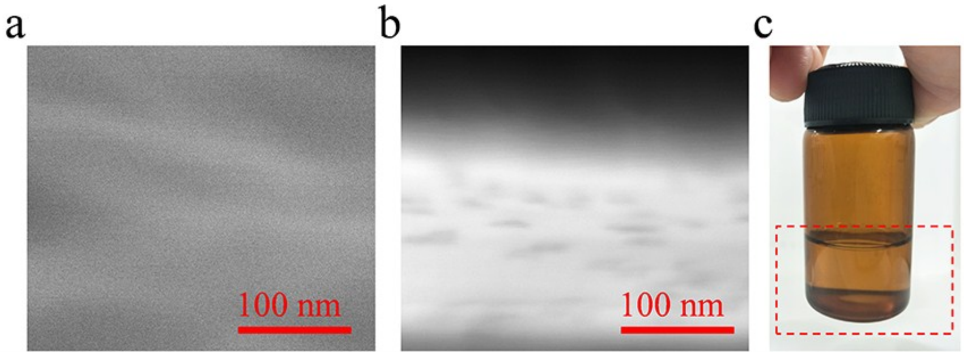


**Fig. S1** (a-b) SEM images of polymer(TPU) film (a) and the medium layer (TPU:Ag NPs) film (b). (c) Photographs of the solution.

a

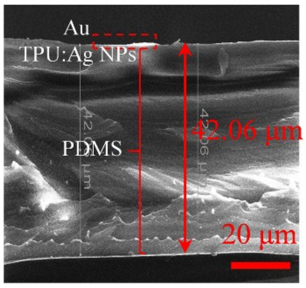


**Fig. S2** (a) Cross-section SEM image of the memristor.

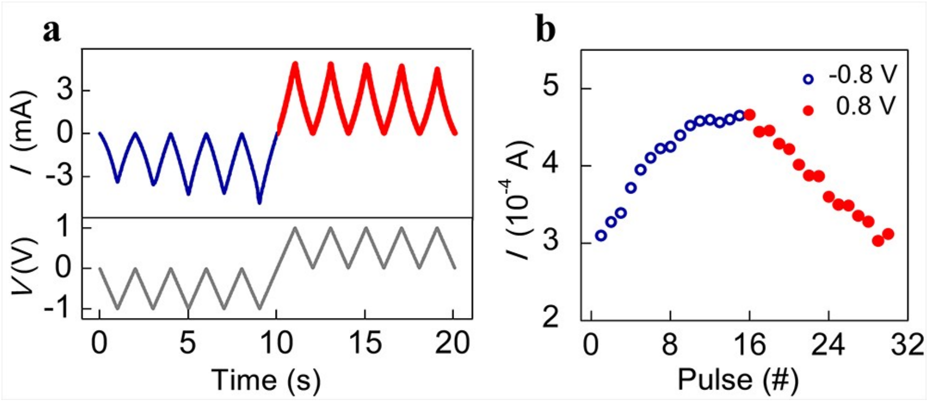


**Fig. S3** (a-b) *I-t*, *V-t* characteristics and (c) synaptic potentiation/depression characteristics of device after repeated stretching (35%) for 300 times.

**Applying the stretched-exponential function ($I_t = I_e + A\exp(-(t/\tau)^{\beta})$) to fit synaptic weight.**

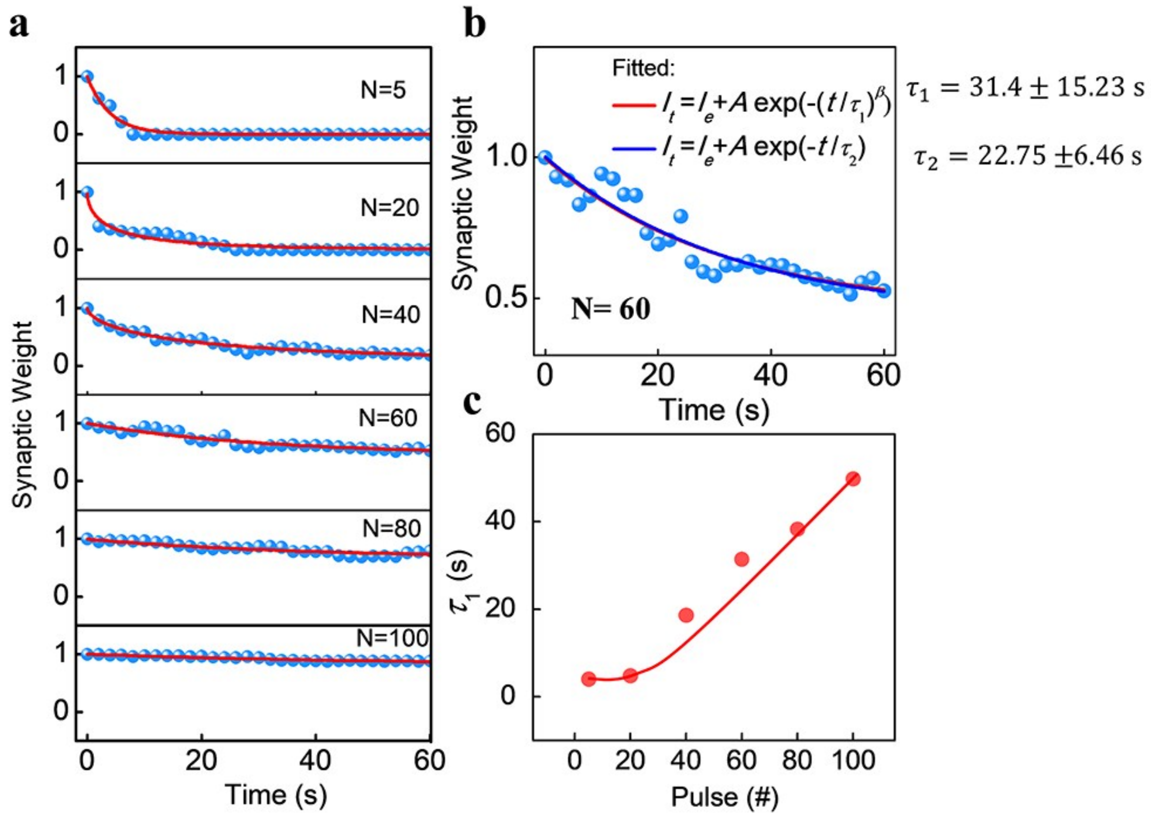


**Fig. S4** (a) Relaxed behaviours of the synaptic weight recorded after different numbers of identical stimuli. The solid curves represent the result of fitting with the stretched-exponential function. (b) Comparison of the results of the two curve fittings (N=60). (c) characteristic relaxation time $\tau_1$ obtained with the stretched-exponential function.

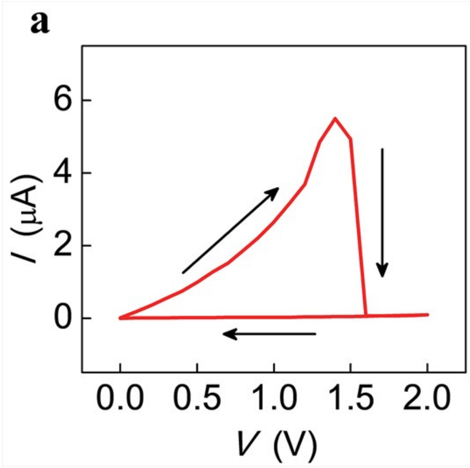


**Fig. S5** (a) *I*-*V* characteristics of the device with the same inside surface roughness ($R_q$ = 2.81 nm) for the Au top and bottom electrodes.

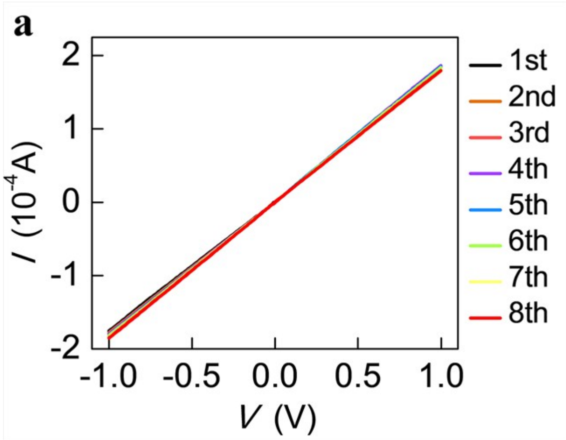


**Fig. S6** (a) *I*-*V* characteristics of the device with the same inside surface roughness ($R_q$ = 0.378 nm) for the Au top and bottom electrodes.