Hybridization State Transition-Driven Carbon Quantum Dots (CQDs)-based Resistive Switches for Bionic Synapses

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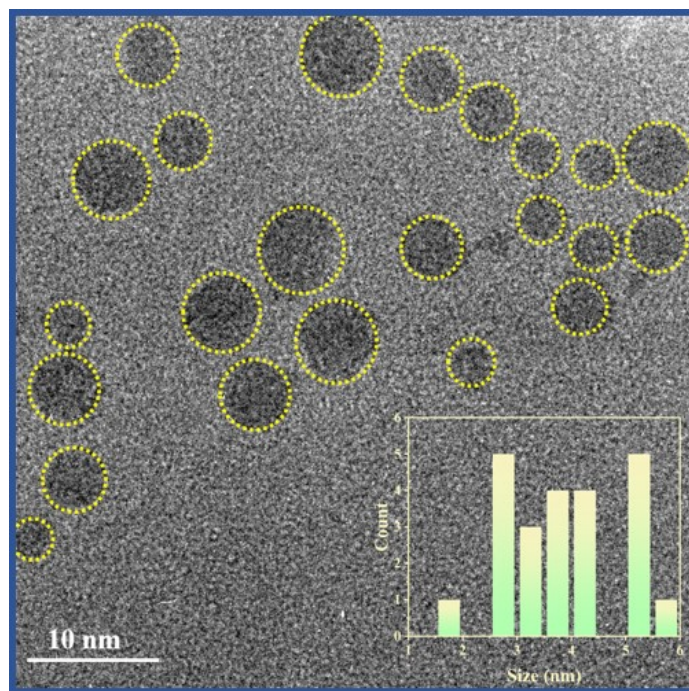**Fig. S1** The optical photographs of the prepared CQDs solution.
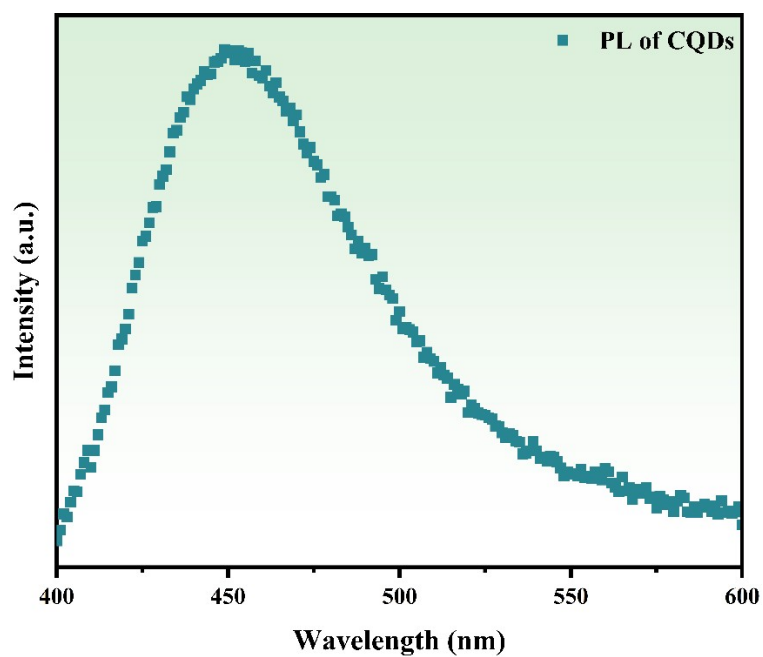
Fig. S2 The TEM image of CQDs at a scale of 10 nm.
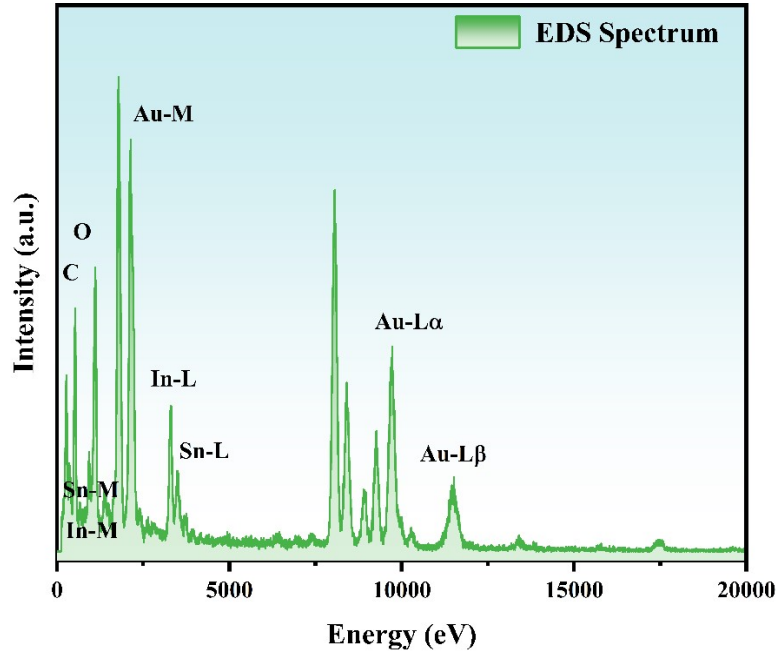

Fig. S3 The PL spectrum of CQDs.

Fig. S4 The EDS spectrum of Au/CQDs/ITO memristor

Table S1 Comparison with previously reported devices

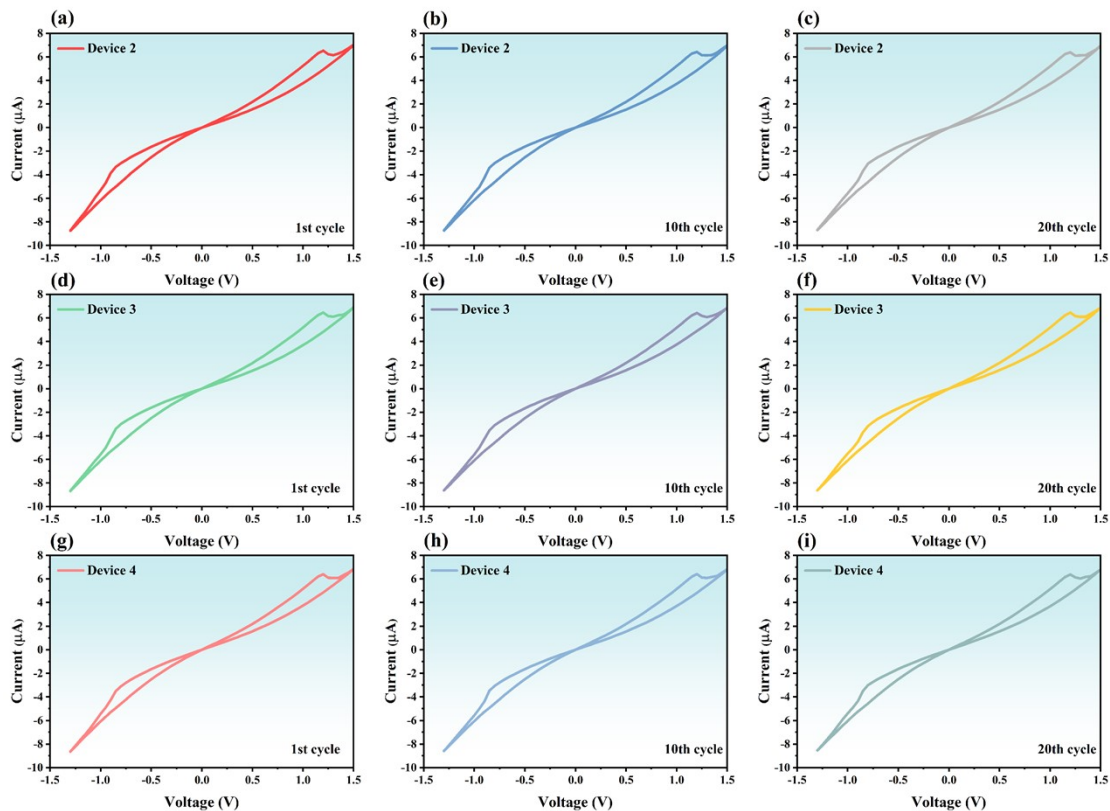| No	Memristor	V_{Set} (V)	V_{Reset} (V)	C_V of V_{Set}	C_V of V_{Reset}	Ref.
1	**ITO/CQDs/Au**	**-0.83**	**1.20**	**-1.55%**	**0.08%**	**Our work**
2	Ti/PdSeO$_x$/PdSe$_2$/Au	0.7	-0.9	4.8%	-3.6%	1
3	Pt/Ti/SiO$_2$/Ni/Cr	1.6	-0.77	11.3%	-13%	2
4	TiN/HfO$_2$/Pt	-1.31	1.54	-11.5%	17.5	3
5	Ta/TaO$_x$/Pt	-0.55	0.94	-10.9%	5.3%	4
6	Ti/a-BN/Si	3.1	-1.7	3.2%	-12.2%	5
7	Au/MoS$_2$Au	1	-1.25	N	N	6
8	Au/h-BN/Au	2.7	-0.9	2.0%	-9.6%	7
9	Pt/HfO$_2$/Al$_2$O$_3$/W	1.43	-0.54	18.9%	-12.9%	8
10	ITO/TiO$_2$/HfO$_2$/Pt	3.1	-1.8	2.8%	-2.7%	9
11	Ag/ZnO/WS$_2$/Al	1.4	-1.4	N	N	10
12	Ag/WS$_2$/Pt	3.12	-2.93	22.1%	-23.9%	11
13	Graphene/MoS$_2$–xOx/Graphene	1.2	-1	N	N	12

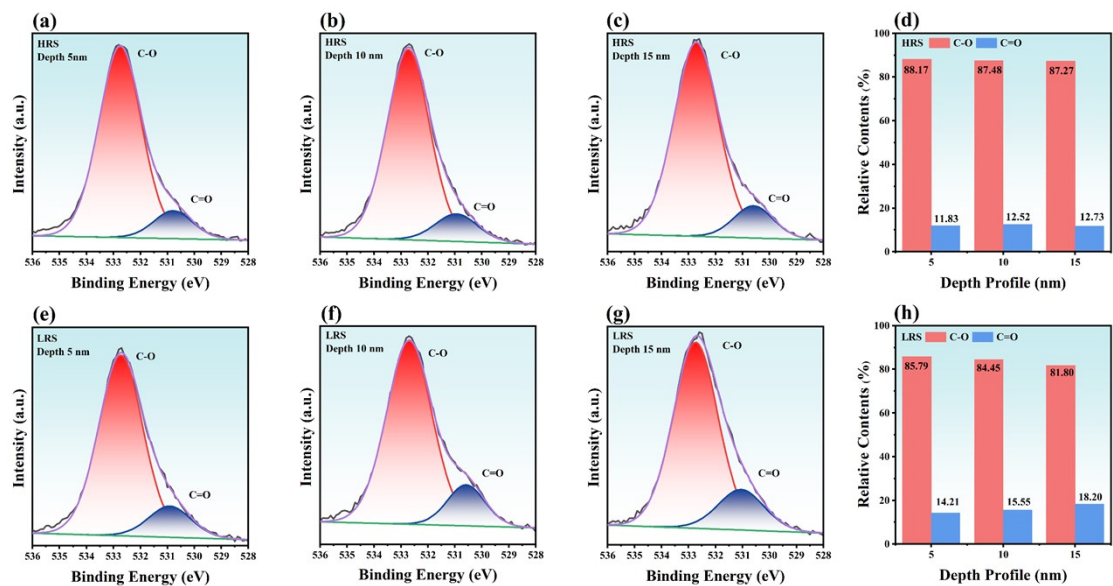**Fig. S5** I-V curves of different devices from the same batch.

Fig. S6 (a, b, c) XPS of O1s in CQDs film at different depths (5 nm, 10 nm and 15 nm) of HRS. (e, f, g) XPS of O1s in CQDs film at different depths (5 nm, 10 nm and 15 nm) of LRS. (d, h) The schematic diagrams of the percentage content of functional group at each analysis depth of HRS and LRS.
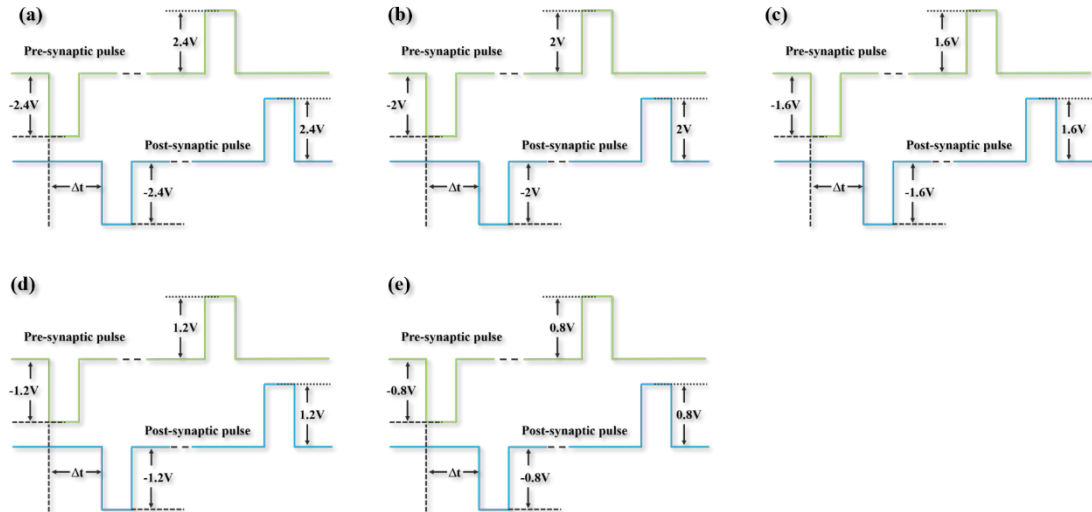
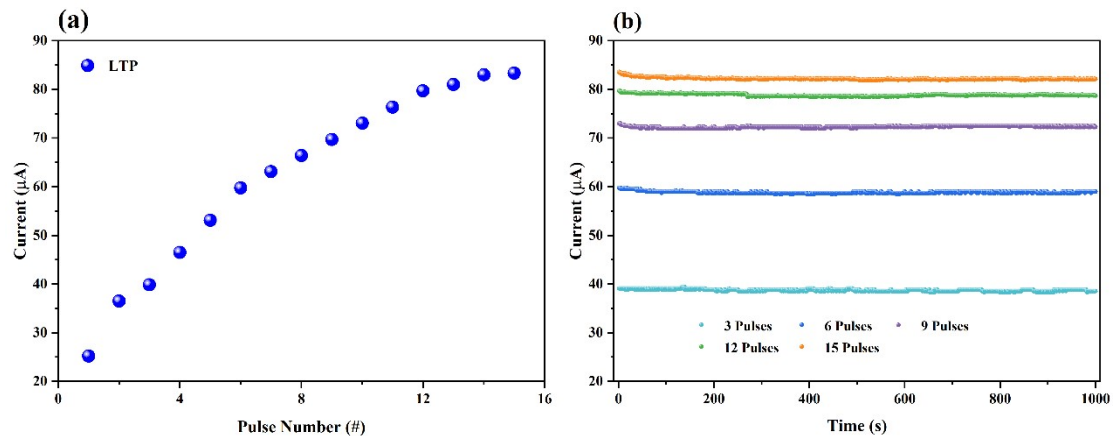**Fig. S7** Pulse waveform used to measure STDP.

Fig. S8 (a) The LTP characteristic curve for resistive switching. (b) The retention time characteristic curve.

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