Supporting Information

Boosting the energy density of supercapacitors by encapsulating multi-shelled zinc-cobalt-selenide hollow nanospheres cathode and yolk-double shell cobalt-iron-selenide hollow nanospheres anode in graphene network

Akbar Mohammadi Zardkhoshoui* and Saied Saeed Hosseiny Davarani*

Department of Chemistry, Shahid Beheshti University, G. C., 1983963113, Evin, Tehran, Iran.

Corresponding authors: *Tel: +98 21 22431661; Fax: +98 21 22431661; E-mail: ss-hosseiny@sbu.ac.ir (S.S.H. Davarani); and mohammadi.bahadoran@gmail.com (A. Mohammadi Zardkhoshoui)

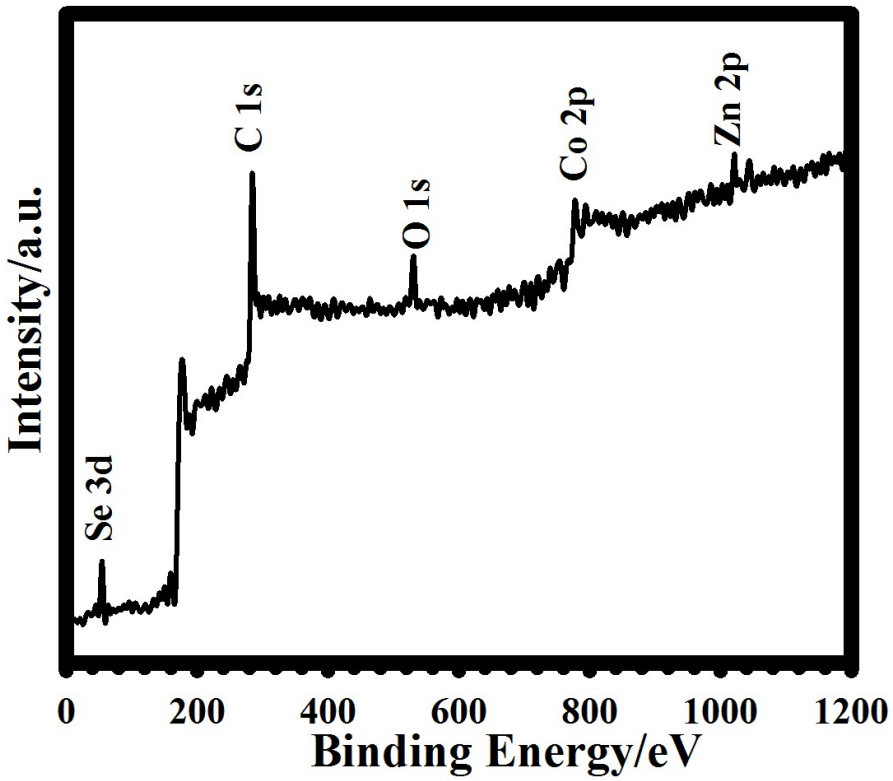

Fig. S1. Survey spectrum of the G/MSZCS-HS.

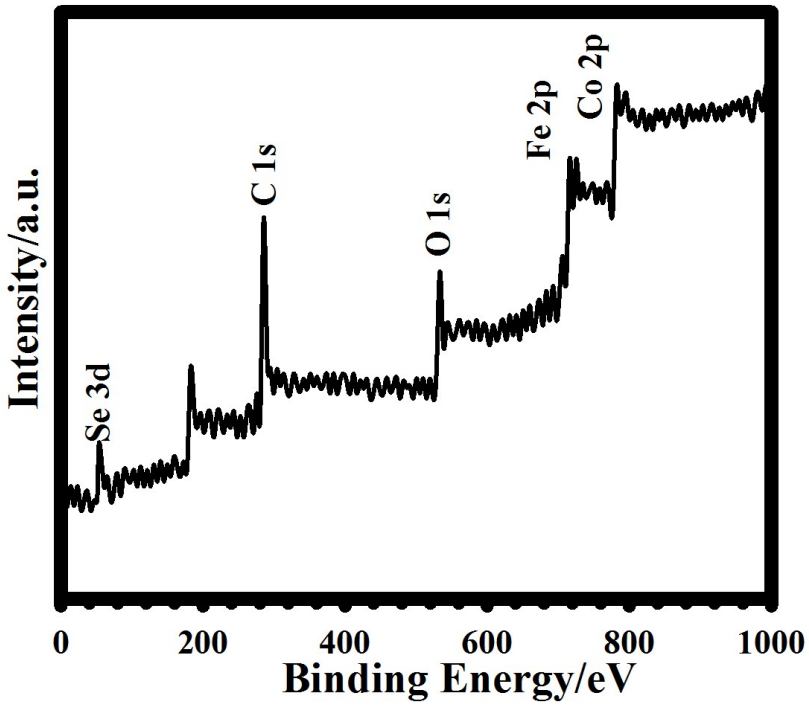

Fig. S2. Survey spectrum of the G/YDSCFS-HS.

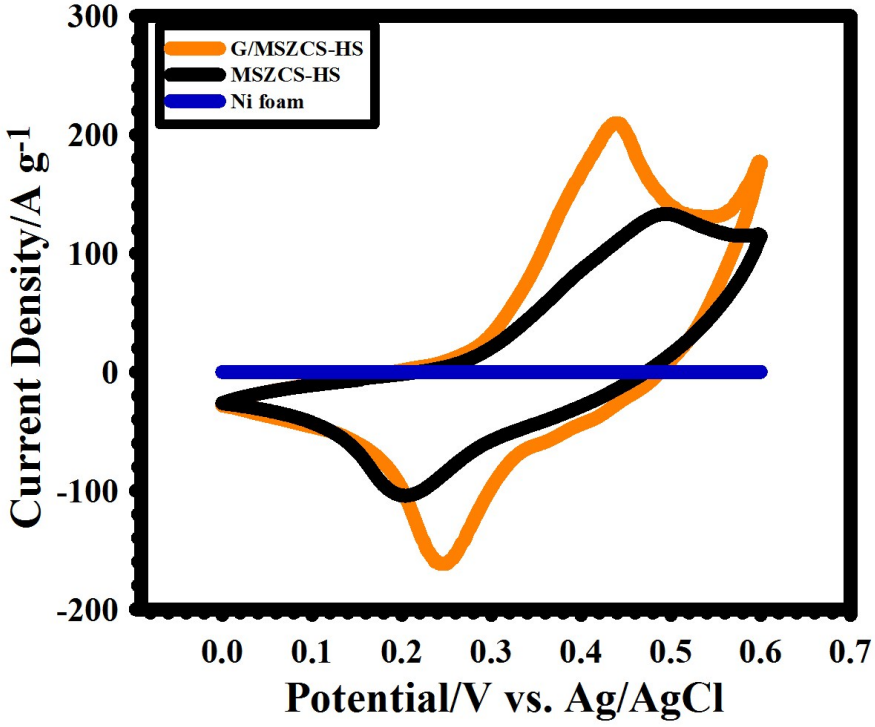

Fig. S3. CV graphs of bare NF, MSZCS-HS and G/MSZCS-HS electrodes at 60 mV s^{-1}.

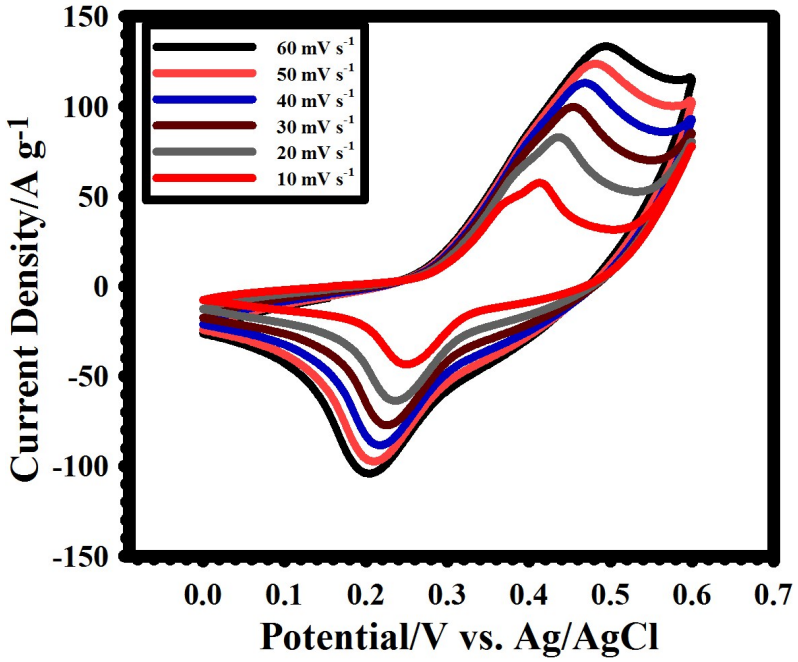

Fig. S4. CV graphs of the MSZCS-HS electrode at various scan rates.

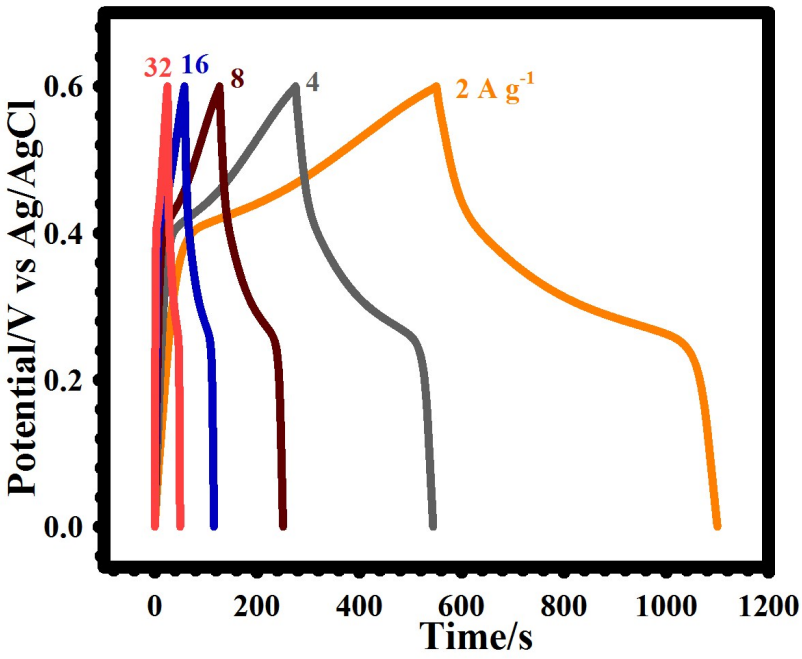

Fig. S5. GCD graphs of the MSZCS-HS electrode at various current densities.

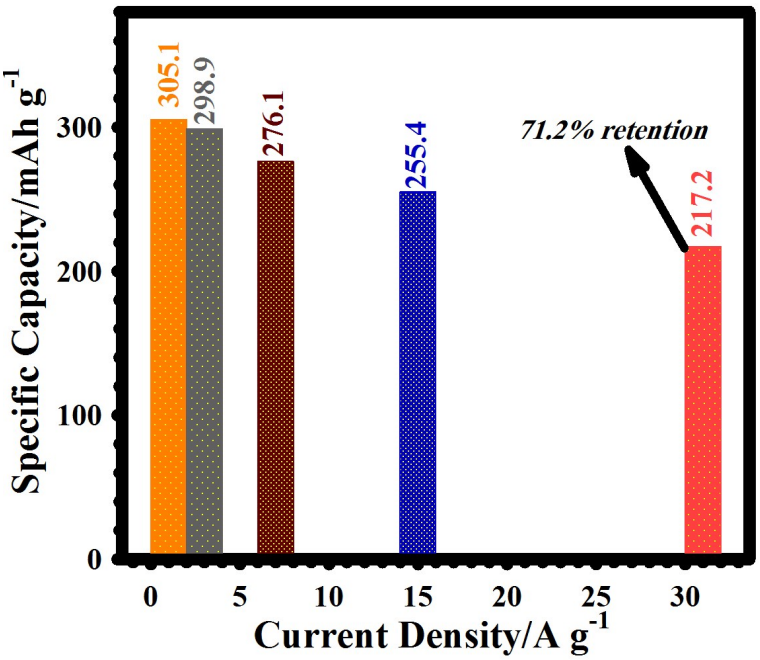

Fig. S6. Rate performance of the MSZCS-HS electrode.

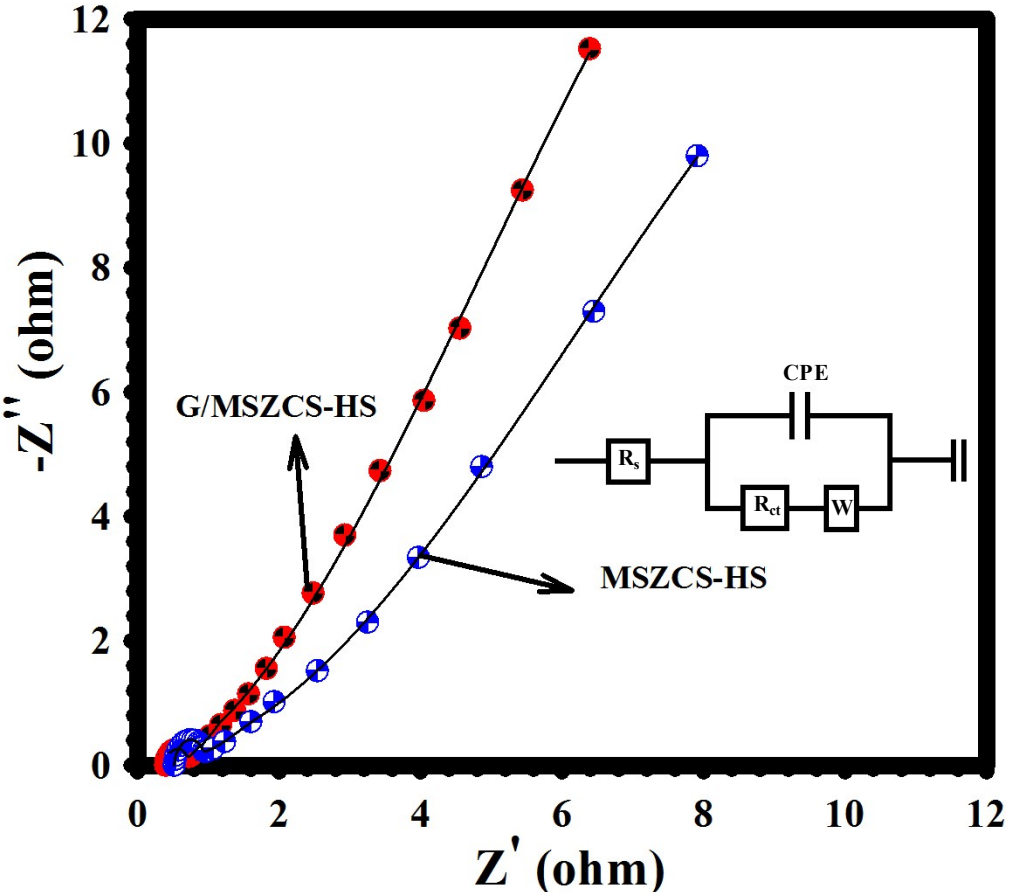

Fig. S7. Nyquist graphs of MSZCS-HS and G/MSZCS-HS electrodes.

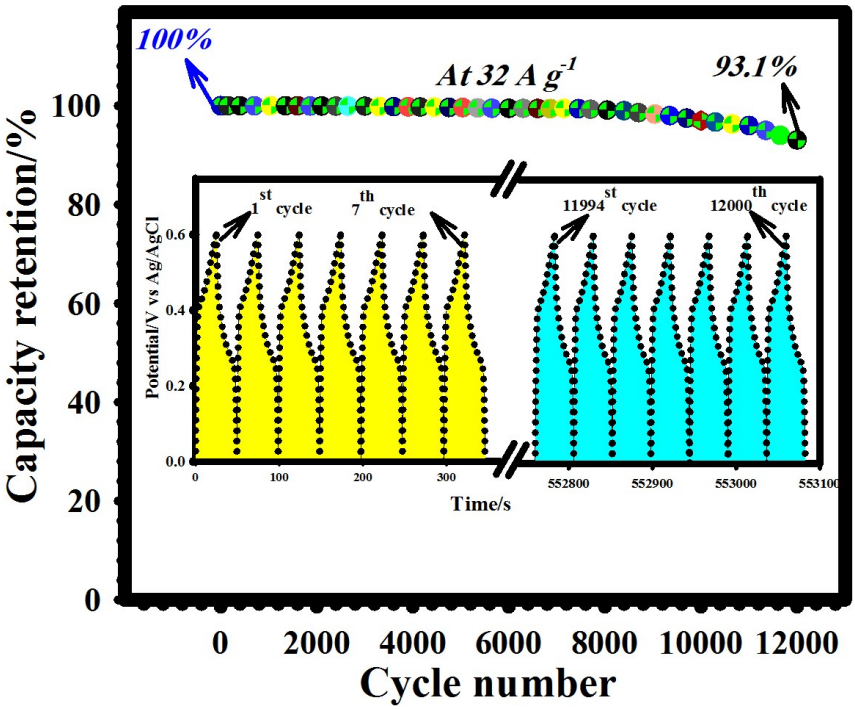

Fig. S8. Durability of the MSZCS-HS electrode.

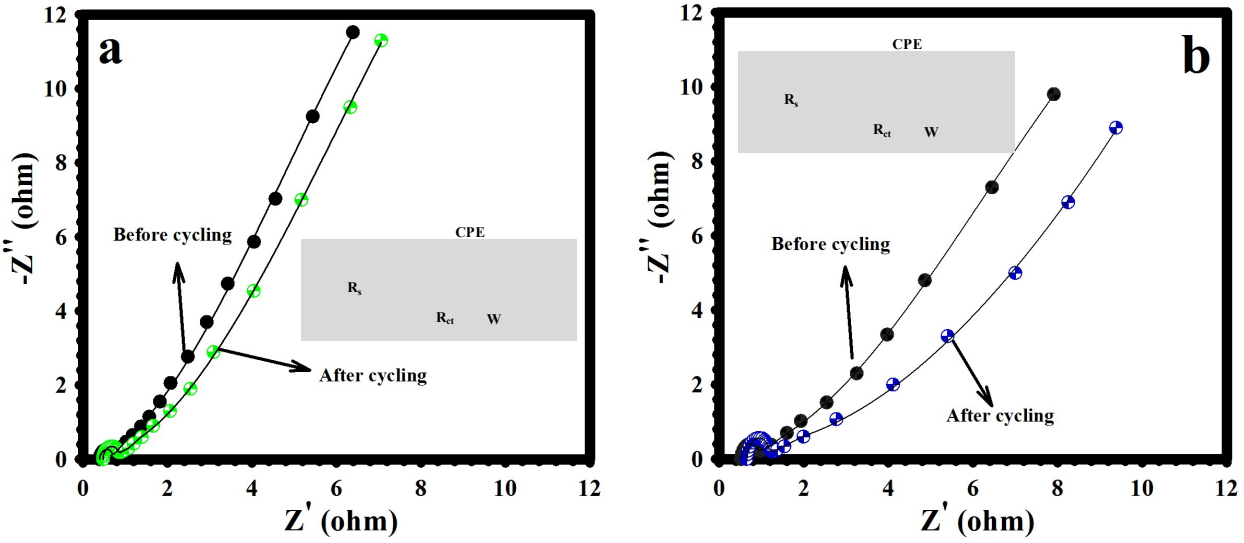

Fig. S9. (a) Nyquist graphs of the G/MSZCS-HS electrode before and after cycling. (b) Nyquist graphs of the MSZCS-HS electrode before and after cycling.

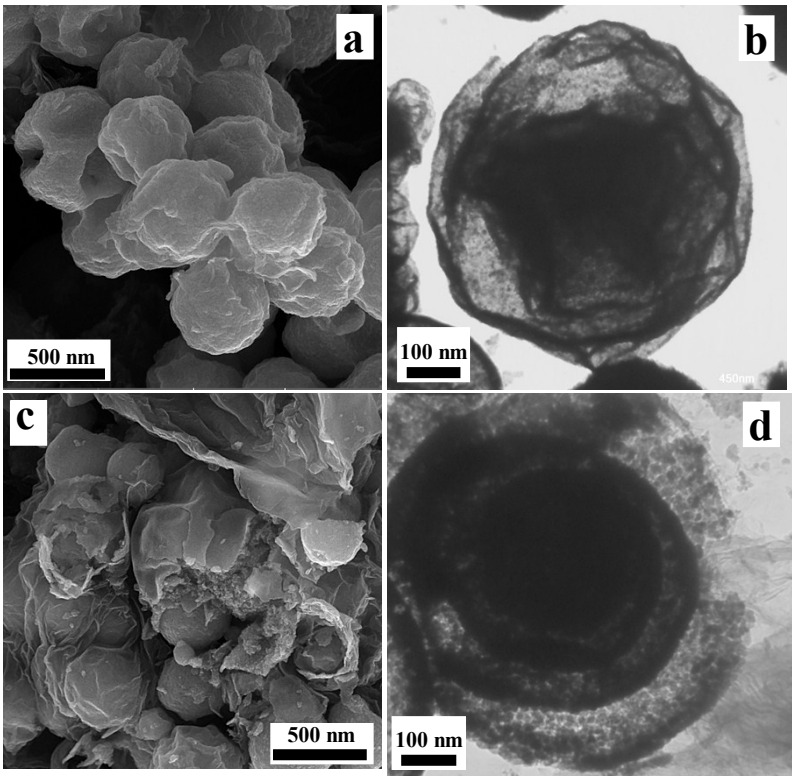

Fig. S10. (a) FE-SEM image of the MSZCS-HS electrode after cycling. (b) TEM image of the MSZCS-HS electrode after cycling. (c) FE-SEM image of the G/MSZCS-HS electrode after cycling. (d) TEM image of the G/MSZCS-HS electrode after cycling.

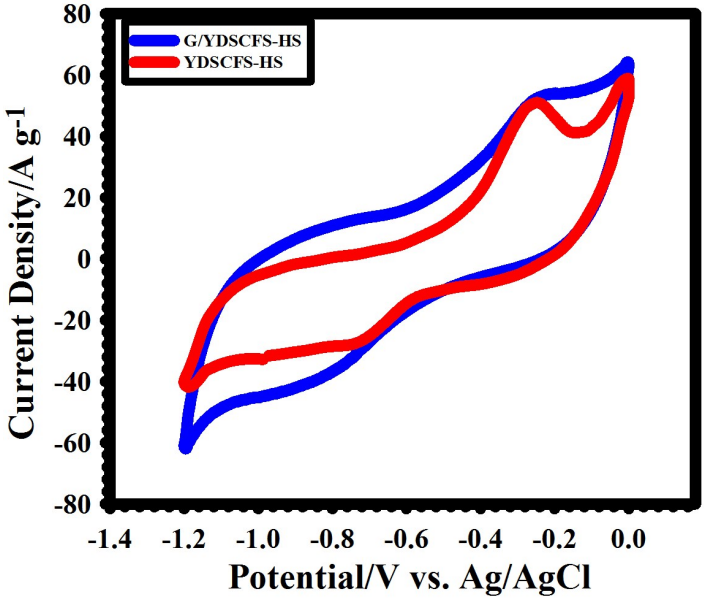

Fig. S11. CV curves of G/YDSCFS-HS and YDSCFS-HS.

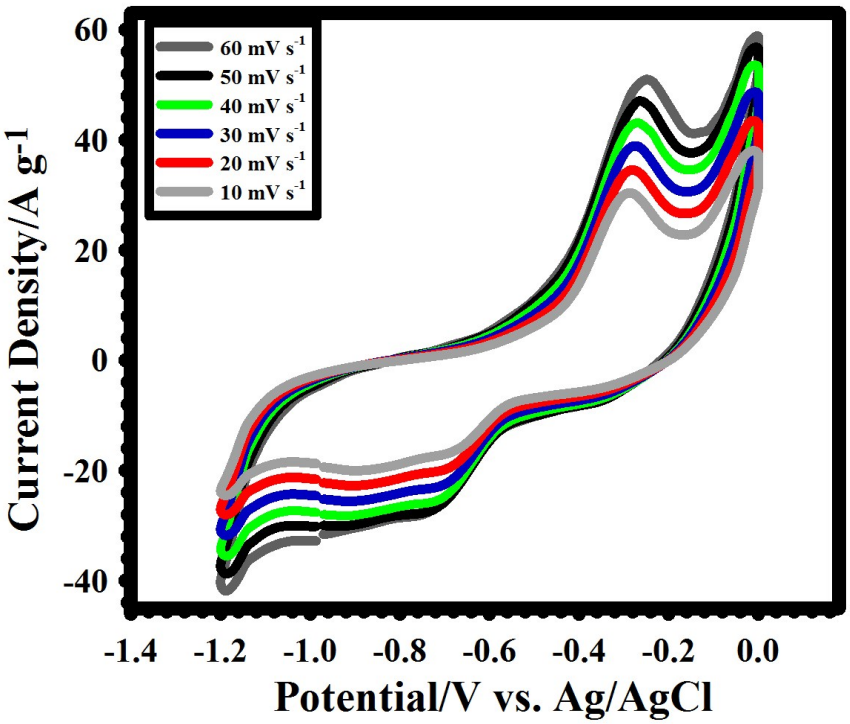

Fig. S12. CV curves of the YDSCFS-HS at various scan rates.

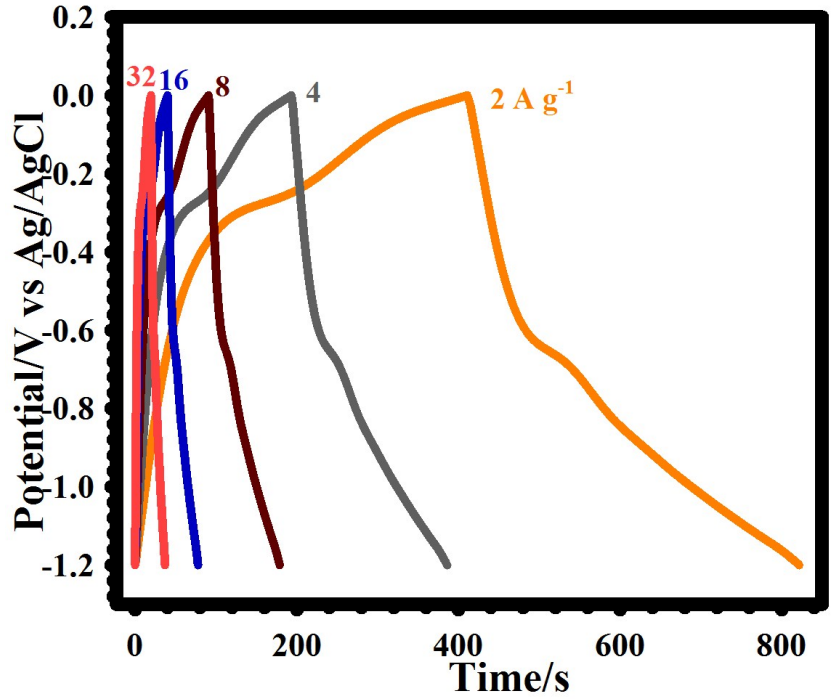

Fig. S13. GCD curves of the YDSCFS-HS at various current densities.

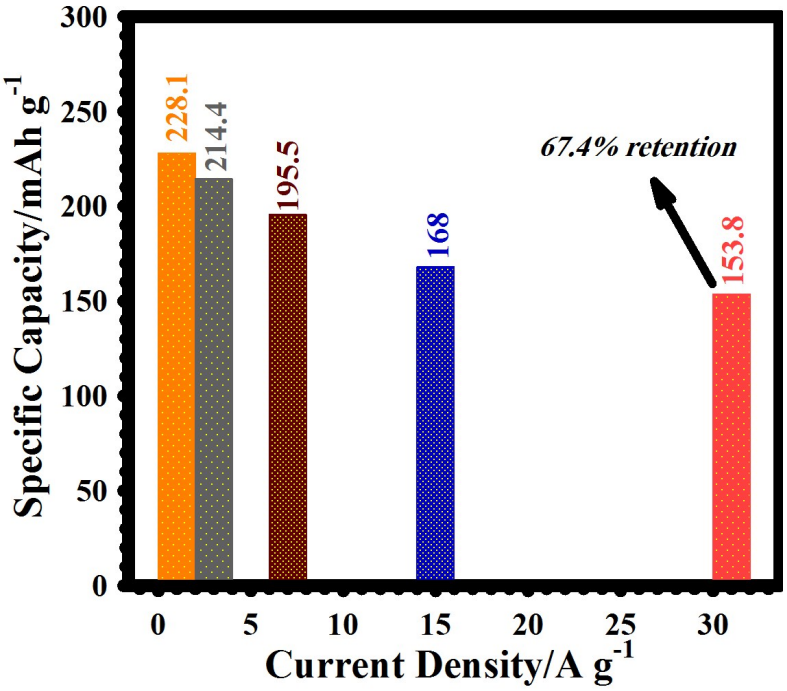

Fig. S14. Rate performance of the YDSCFS-HS.

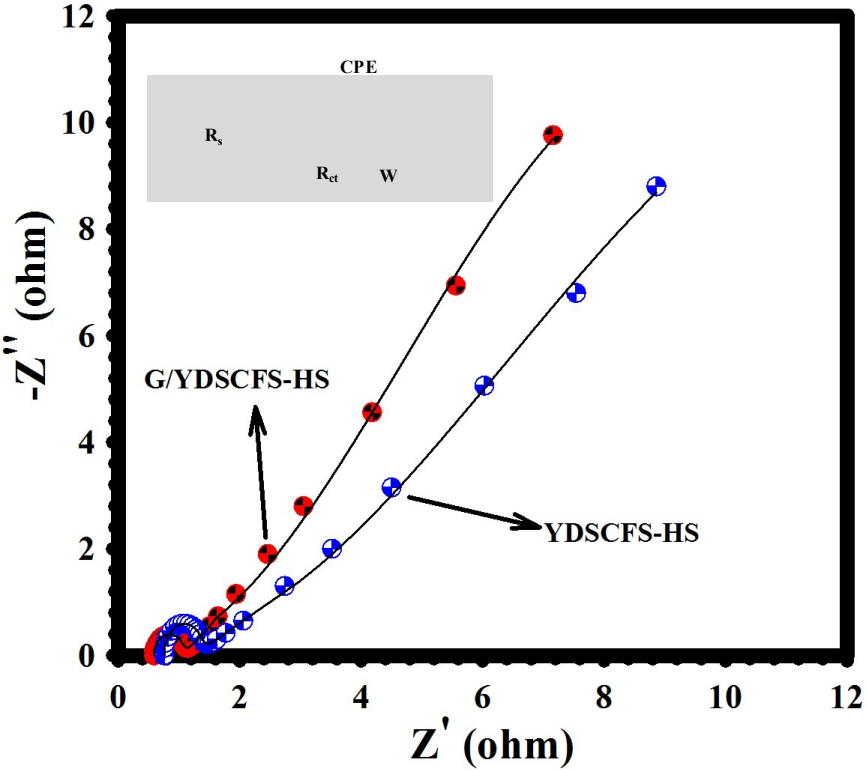

Fig. S15. Nyquist graphs of G/YDSCFS-HS and YDSCFS-HS electrodes.

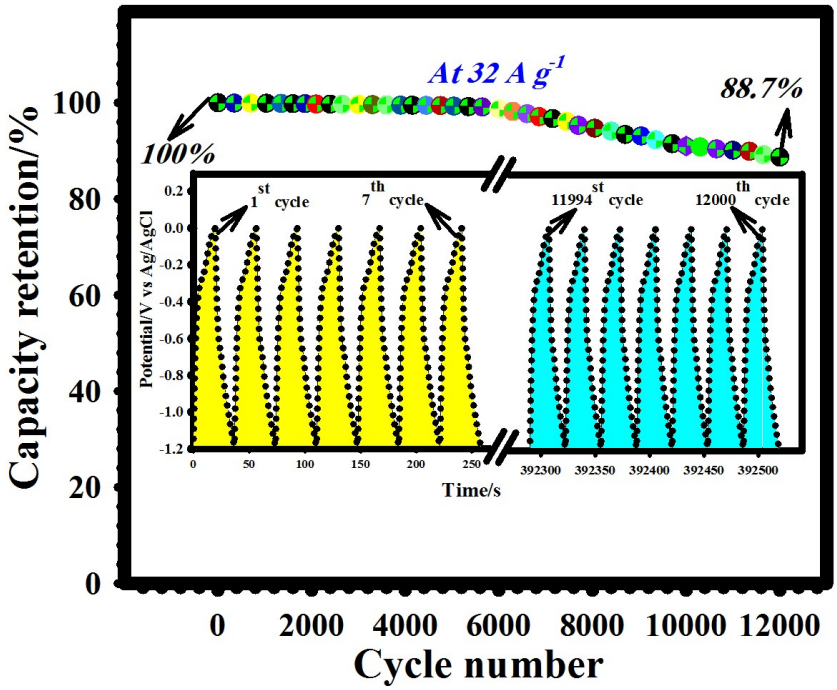

Fig. S16. Durability of the YDSCFS-HS electrode.

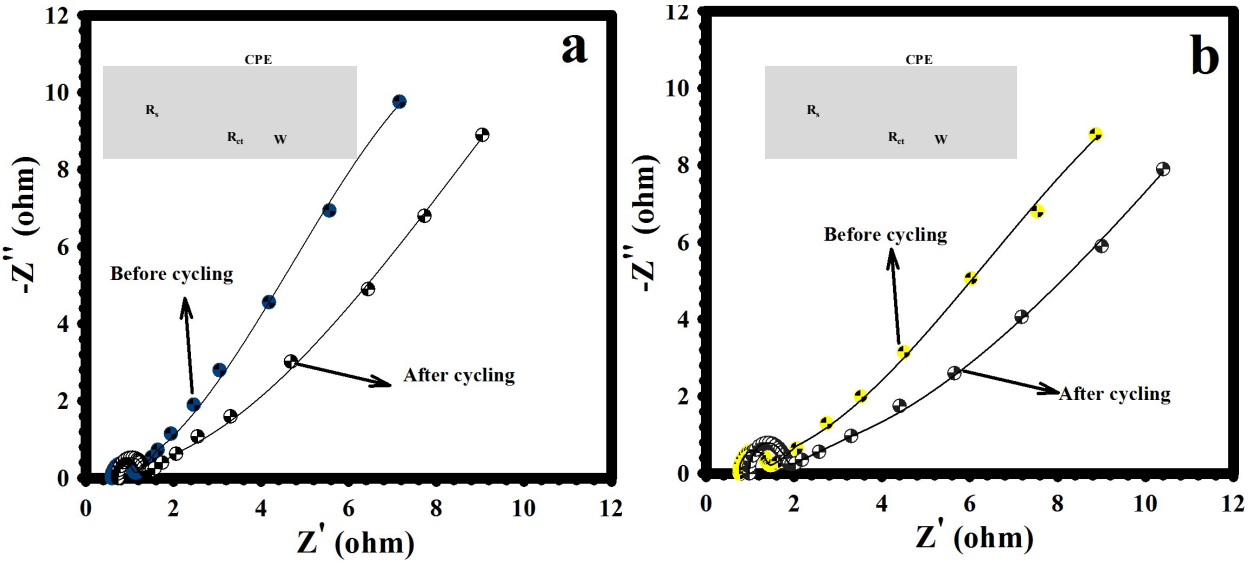

Fig. S17. (a) Nyquist graphs of the G/YDSCFS-HS electrode before and after cycling. (b) Nyquist graphs of the YDSCFS-HS electrode before and after cycling.

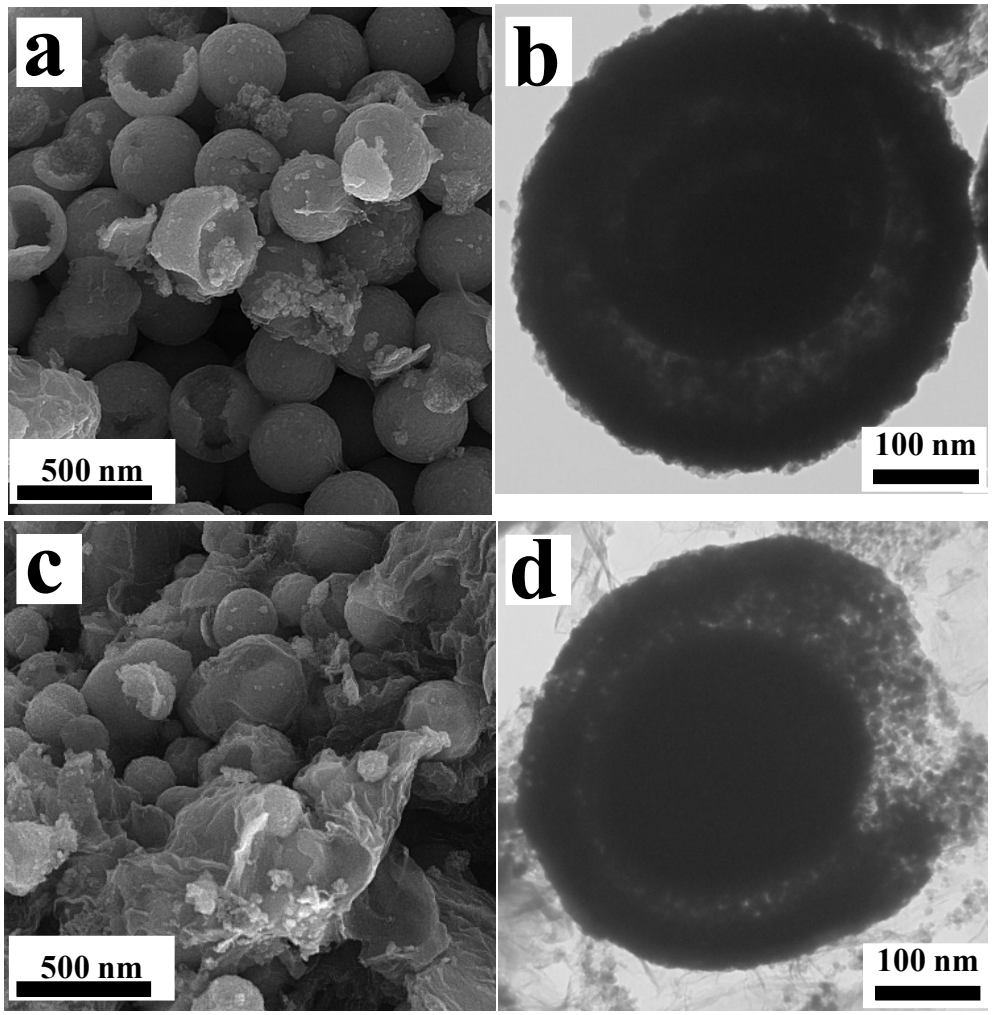

Fig. S18. (a) FE-SEM image of the YDSCFS-HS electrode after cycling. (b) TEM image of the YDSCFS-HS electrode after cycling. (c) FE-SEM image of the G/YDSCFS-HS electrode after cycling. (d) TEM image of the G/YDSCFS-HS electrode after cycling.

Table S1. Comparison of the electrochemical performance of G/MSZCS-HS electrode in three and two electrode systems with other previously reported electrodes.

Composition	*Capacity 3 and 2 electrodes (mAh g^{-1})*	Cycles, retention 2 and 3 electrode	ED (W h kg^{-1}) 2 Electrode	Reference
$MnCo_2O_{4.5}$@$Ni(OH)_2$	*318 at 3 A g^{-1} (3 E)* *70.67 at 1 A g^{-1} (2 E)*	*5000, 87.7% (3 E* *3000, 90.4% (2 E)*	*56.53*	1
Co_3O_4	*209 at 1 A g^{-1} (3 E)*	*3000, 90 (3 E)*	41.4	2
$NiCo_2S_4$	*301.1 at 2 A g^{-1} (3 E)* *80.56* at 1 A g^{-1} *(2 E)*	*5000, 93.85% (2 E)*	*48.65*	3
Ni-MOF	*123.5 at 1 A g^{-1} (3 E)*	*3000, 90.6% (2 E)*	*55.8*	4
$ZnCo_2O_4$	78.89 at 1 A g^{-1} (3 E) 34.7 at .2 A g^{-1} (2 E)		27.78	5
$Co_3O_4/Co(OH)_2$	184.9 at 1 A g^{-1} (3 E) 58.9 at 4 A g^{-1} (2 E)	5000, 90% (3 E) 5000, 91% (2 E)	37.6	6
Co-Cd-Se	192 (3 E) at 1 A g^{-1} 85 (2 E) at 1 A g^{-1}	1000, 95.2% (3 E) 1000, 80.9% (2 E)	57.6	7
G/MSZCS-HS	**376.75 at 2 A g^{-1} (3 E)** **140.3 at 1 A g^{-1} (2 E)**	**12000, 96.8 (3 E)** **12000, 91.7 (2 E)**	**126.3**	**This work**

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