Electronic Supplementary Material (ESI) for Dalton Transactions.

Supporting Information

Bimetallic $CoSe_2/FeSe_2$ hollow nanocuboids assembled by nanoparticles as positive electrode material for a high-performance hybrid supercapacitor

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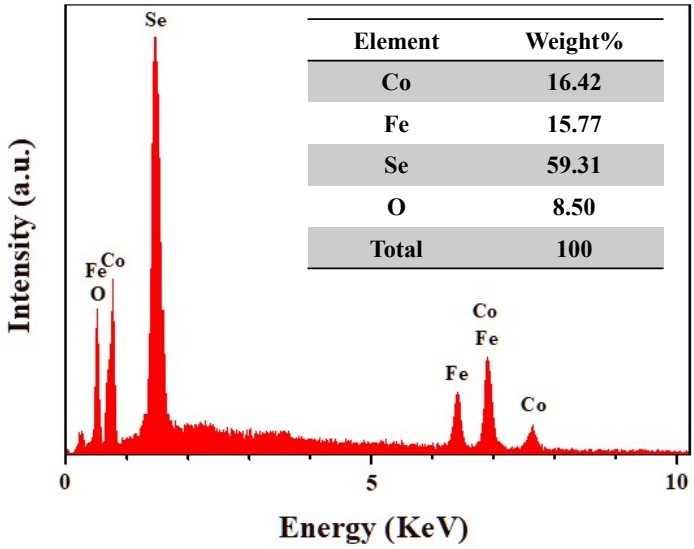

Element	Weight%
Co	16.42
Fe	15.77
Se	59.31
O	8.50
Total	100

Figure S1. EDX spectrum of the $CoSe_2/FeSe_2$ HNCs sample.

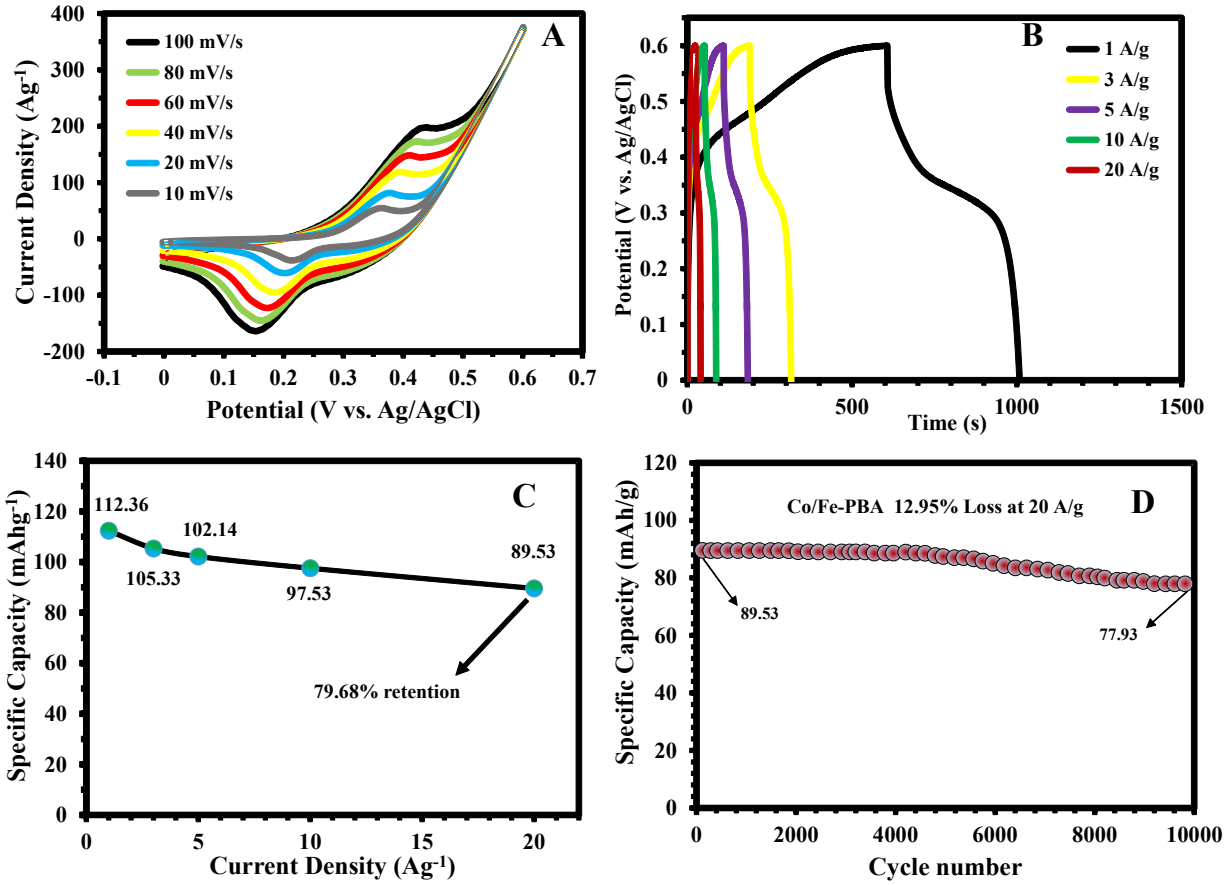

Figure S2. (A) CV curves of the Co/Fe-PBA@NiF electrode at various scan rates of 10-100 mVs^{-1}. (B) GCD curves of the Co/Fe-PBA@NiF electrode at various current densities of 1-20 Ag^{-1}. (C) Specific capacity ($mAhg^{-1}$) vs. current density (Ag^{-1}) of the Co/Fe/PBA@NiF electrode. (D) Durability of the Co/Fe-PBA@NiF electrode at 20 Ag^{-1}.

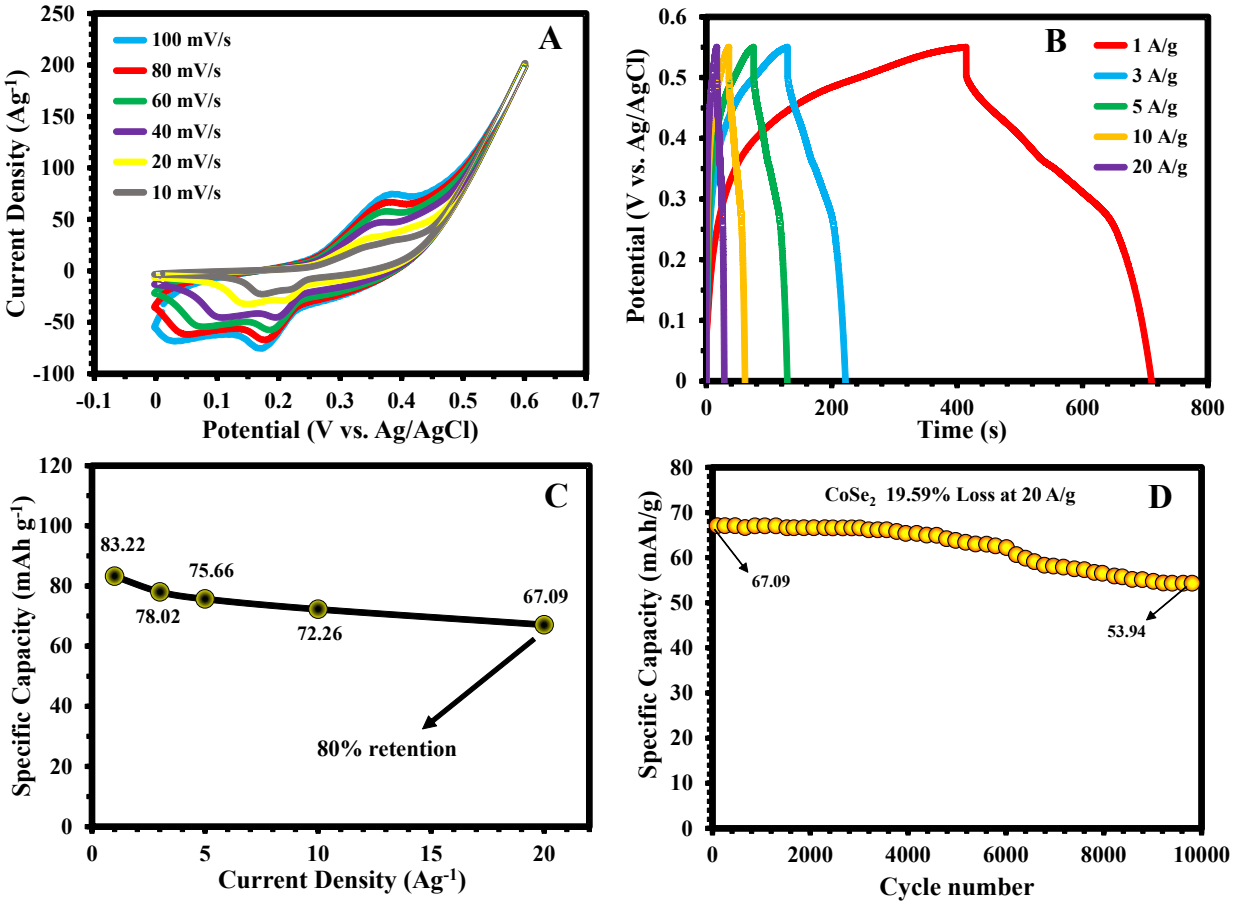

Figure S3. (A) CV curves of the $CoSe_2$@NiF electrode at various scan rates of 10-100 mVs^{-1}. (B) GCD curves of the $CoSe_2$@NiF electrode at various current densities of 1-20 A g^{-1}. (C) Specific capacity ($mAhg^{-1}$) vs. current density (Ag^{-1}) of the $CoSe_2$@NiF electrode. (D) Durability of the $CoSe_2$@NiF electrode at 20 Ag^{-1}.

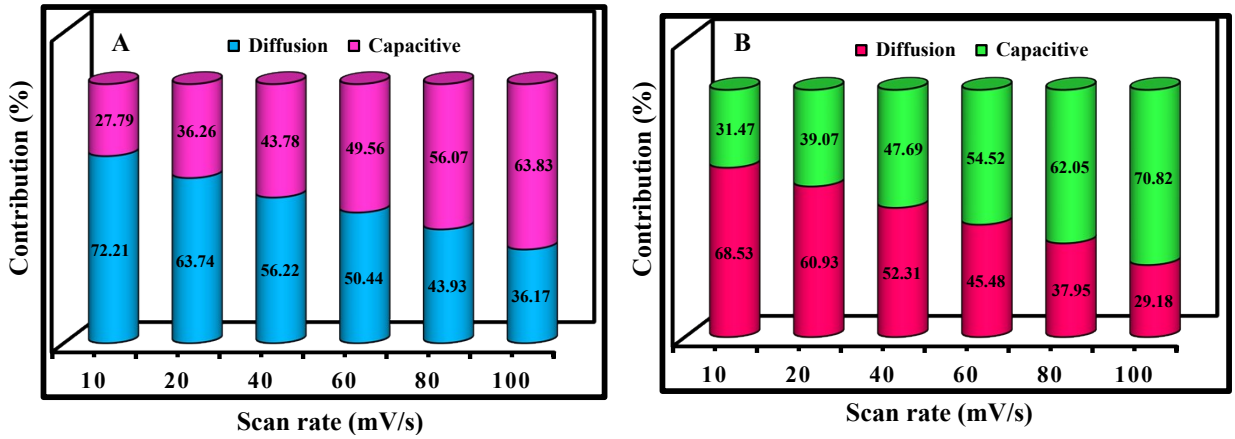

Figure S4. Relative contribution of the capacitive and diffusion-controlled charge storage at different scan rates of (A) Co/Fe-PBA@NiF and (B) $CoSe_2$@NiF electrodes.

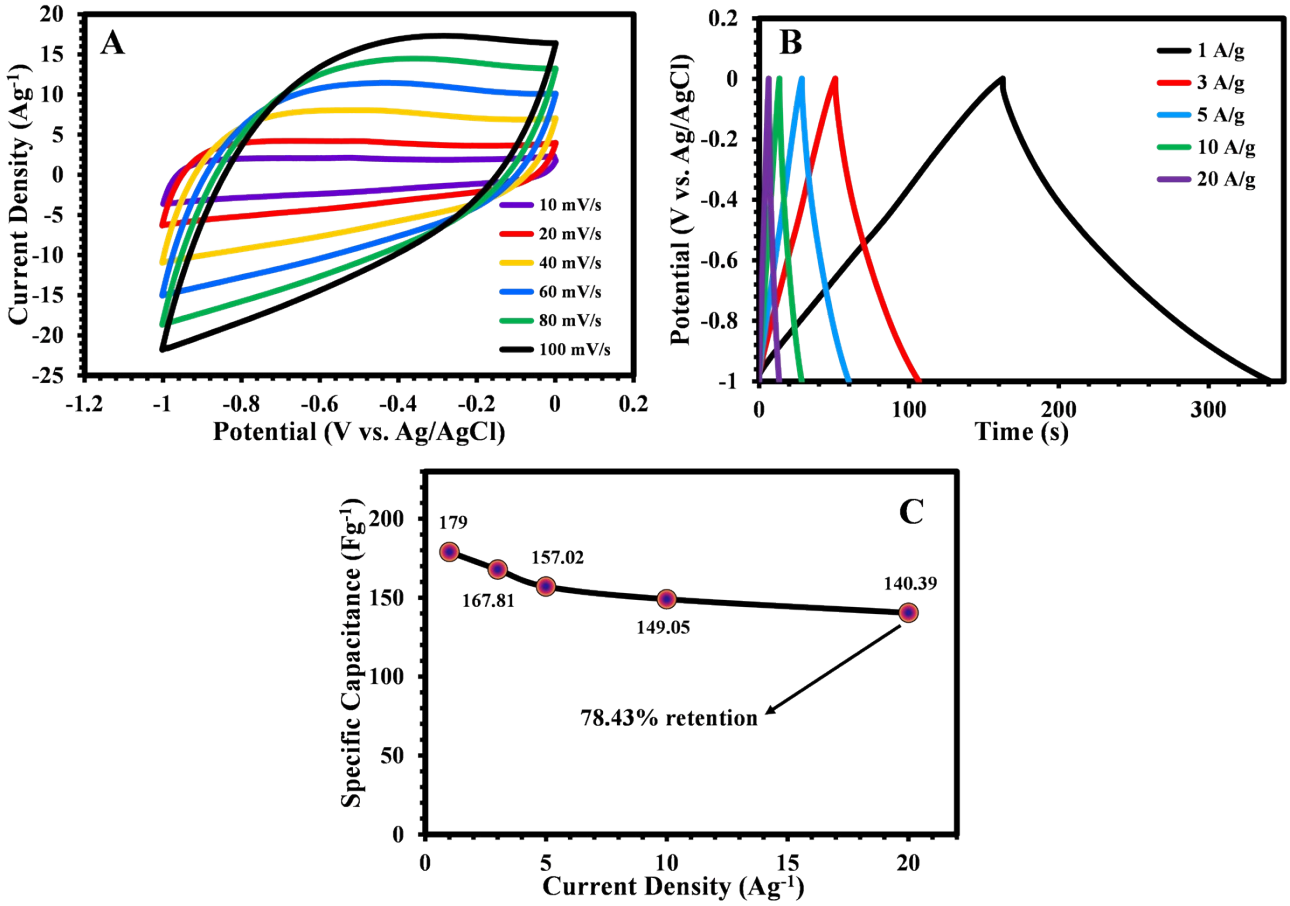

Figure S5. (A) CV curves of the active carbon-based electrode at various scan rates of 10-100 mVs^{-1}. (B) GCD curves of the active carbon-based electrode at various current densities of 1-20 A g^{-1}. (C) Specific capacitance (Fg^{-1}) vs. current density (Ag^{-1}) of the active carbon-based electrode.

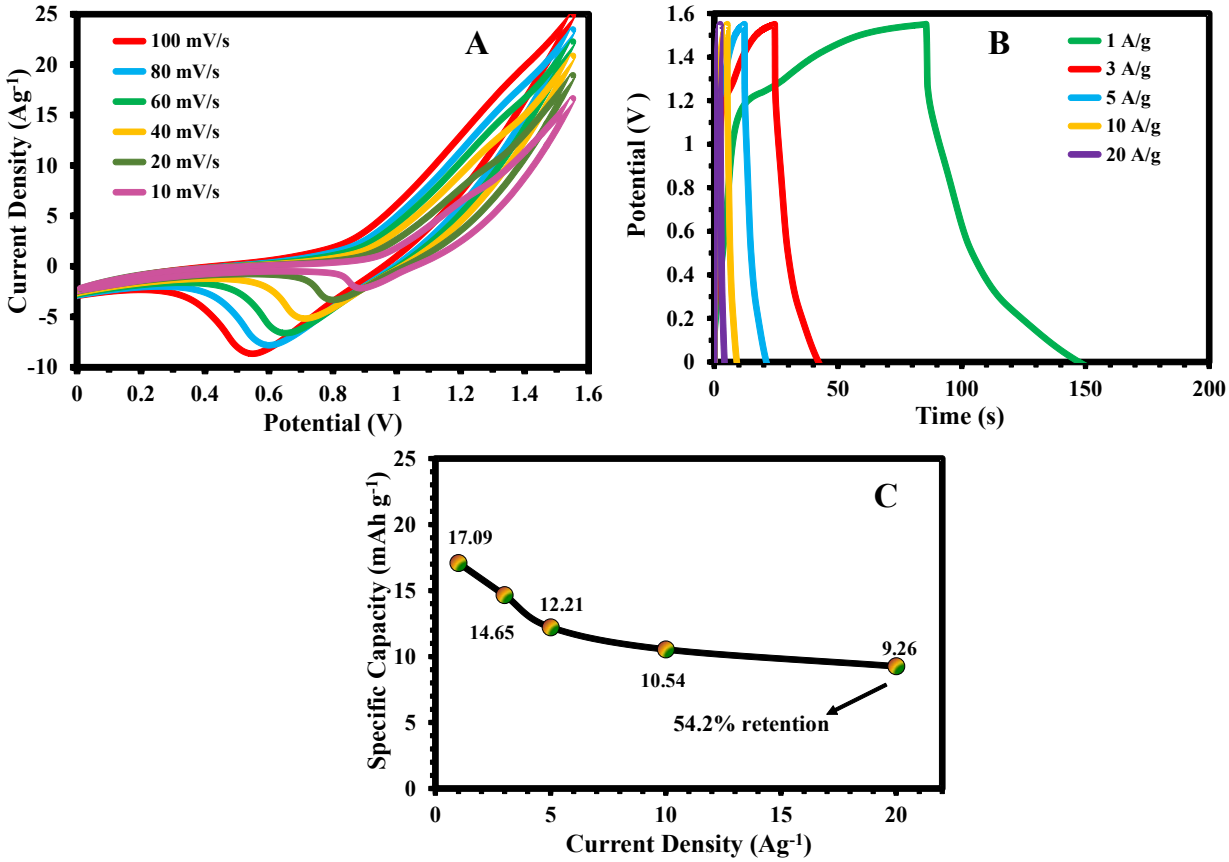

Figure S6. (A) CV curves of the $CoSe_2$@NiF||AC@NiF device at various scan rates of 10-100 mVs^{-1}. (B) GCD curves of the $CoSe_2$@NiF||AC@NiF device at various current densities of 1-20 A g^{-1}. (C) Specific capacity ($mAhg^{-1}$) vs. current density (Ag^{-1}) of the $CoSe_2$@NiF||AC@NiF device.

Table S1. Comparison of the electrochemical performance of the $CoSe_2$@$FeSe_2$ HNCs electrode material in three and two electrode systems with other previously reported Se-based electrode materials.

Electrode materials	Capacitance	Cycle,	ED	Ref.

	(2 and 3 Electrodes) (F/g)	retention	(Wh/Kg)	
$CoSe_2@NiSe_2$	1434 (3E) 57.5 (2E)	20000, 87.5% 20000, 86.6%	20.4	1
$NiCo_2Se_4$	1762.1 (3E) 67.3 (2E)	10000, 82% 10000, 90%	24.03	2
CuSe@NiSe	1478 (3E) 333 (2E)	10000, 81.7% 10000, 79.3%	18.65	3
$(Ni_{0.75}Co_{0.25})Se_2@NC$	766.57 (3E) 73.6(2E)	- 5000, 88.7%	26.2	4
$NiSe_2/CoSe_2$	1029 (3E) 165 (2E)	5000, 109.8% 5000, 92.2%	53.7	5
$CoSe_2@FeSe_2$ HNCs	1996.5 (3E) 177.86 (2E)	10000, 91.47% 10000, 91.14%	63.62	This work

References

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