Supplementary Information

All-Solid-State Asymmetric Supercapacitors Based on Cobalt Hexacyanoferrate Derived CoS and Activated Carbon†

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Supplementary Figures:

Table S1. Recent development of cobalt sulfide based electrode materials with different morphology

S. No	Materials	Method	Morphology	Reference
1	Co_9S_8	Atomic layer deposition	Nanoparticles	[1]
2	CoS/Graphene	Hydrothermal	Nanoparticles	[2]
3	$CoS_{1.097}$	Ostwald ripening	Hierarchitectures	[3]
4	CoS_x/CNT	Hydrothermal	Core/shell	[4]
5	CoS	Hydrothermal	Nanowires	[5]
6	Graphene/CoS	Hydrothermal	Nanoparticles	[6]
7	$CoS_{1.097}$	Solvothermal	Nanotube	[7]
8	CoS	Hydrothermal	Nanotube	[8]
9	Co_9S_8	Hydrothermal	Nanoflake	[9]
10	Co_9S_8	Hydrothermal	Octahedra	[9]
11	CoS	Solvothermal	Dumb-bells	This work

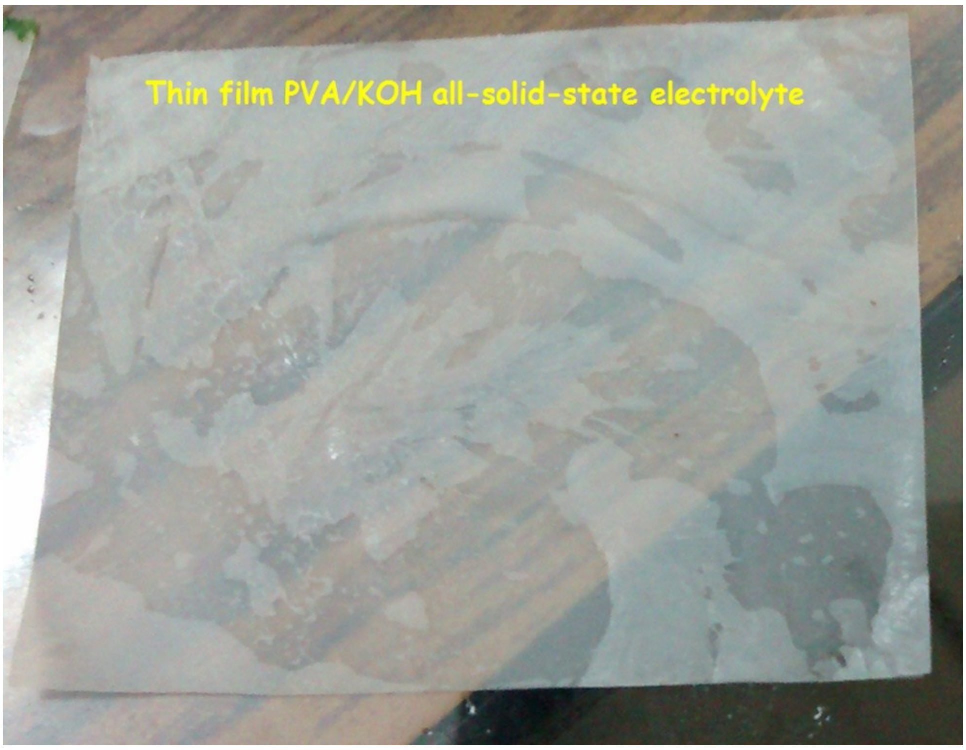

Figure S1. Fabricated PVA/KOH all-solid-state electrolyte thin film.

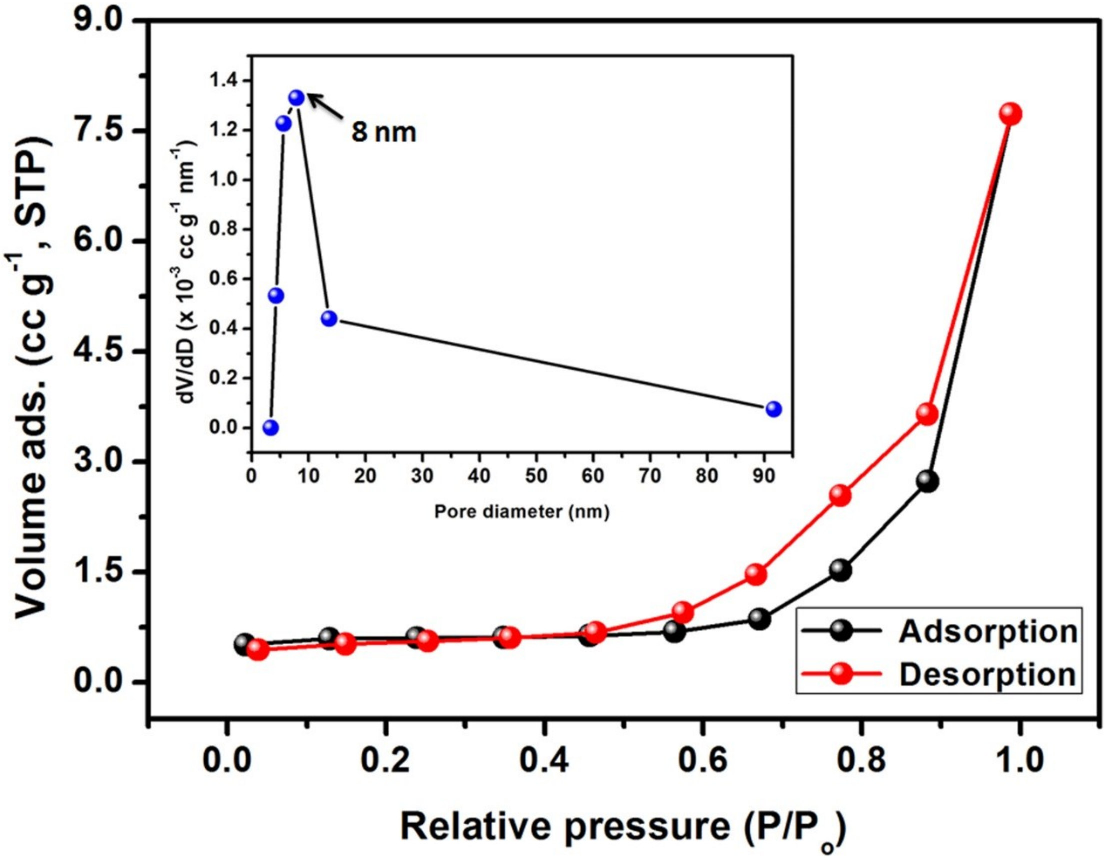

Figure S2. BET nitrogen adsorption/desorption isotherm and its corresponding pore-size distribution curve (inset) of CoS nanoparticles.

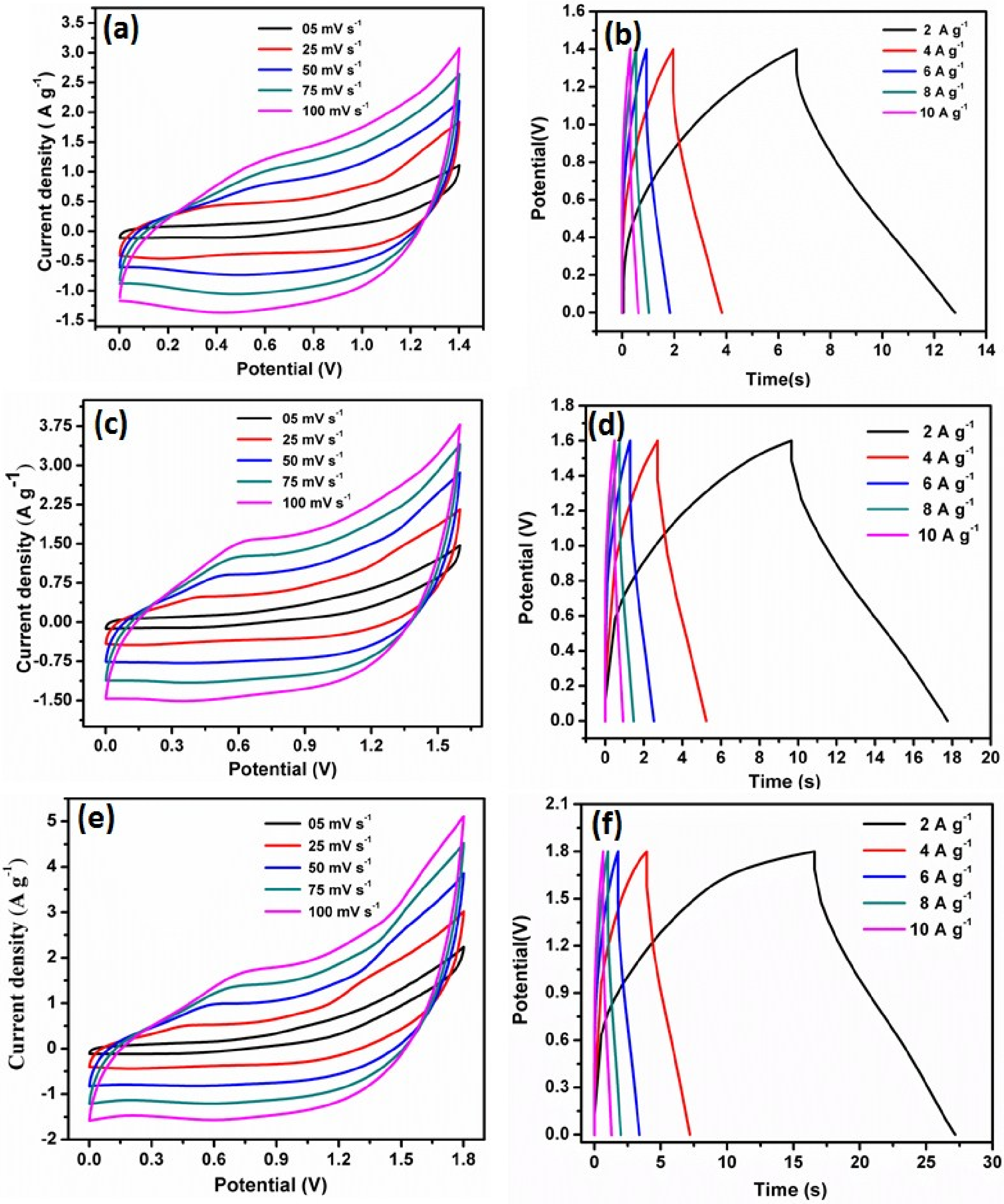

Figure S3. CV and CD profile of a flexible ASC cell in (a & b) 1.4, (c & d) 1.6 and (e & f) 1.8 V cell voltage at different scan rate and current density, respectively.

Table S2. Comparison of metal oxide/sulfide based all-sloid-state asymmetric supercapacitors

S. No.	Cathode	Anode	Cell Voltage (V)	Current density (A/g)	C_{sp} (F/g)	Cycle life (No. of cycle	Energy density (Wh/kg)	Power density (W/kg)	Journal name	Reference
1.	Co_9S_8 nanoflake	AC	1.6	1.25	83	89.5% (5000)	31.4	200	*J. Mater. Chem. A*	9
2.	Co_9S_8 octahedra	AC	1.6	1.25	18.6	65% (5000)	7	230	*J. Mater. Chem. A*	9
3.	CoS_x nanostrip	graphene	1.5	0.001	46.2	84% (3000)	14.68	369	*Energy Technol.*	10
4.	$Co(OH)_2$ nanowires	NTAC	1.6	0.0012	38.9	-	13.6	153	*J. Power Sources*	11
5.	Co_3O_4 nanowires	Carbon aerogel	1.5	1	57.4	85% (1000)	17.9	750	*J. Power Sources*	12
6.	MnS	AC	1.6	1	110.4	89.87% (5000)	37.6	181.2	*Sci. Rep.*	13
7.	$Cu(OH)_2$	AC	1.6	4	26.4	90% (5000)	3.68	1253	*J. Mater. Chem. A*	14
8.	Fe_3O_4/ Carbon	porous carbon	1.4	1	58.5	70.8% (5000)	18.3	351	*ACS Appl. Mater. Interfaces*	15
9.	Ni-Co-S	graphene	1.8	2	133	82.2% (20000)	60	1800	*J. Mater. Chem. A*	16
10.	**CoS**	**AC**	**1.8**	**2**	**47**	**92% (5000)**	**5.3**	**1800**	**-**	**This work**

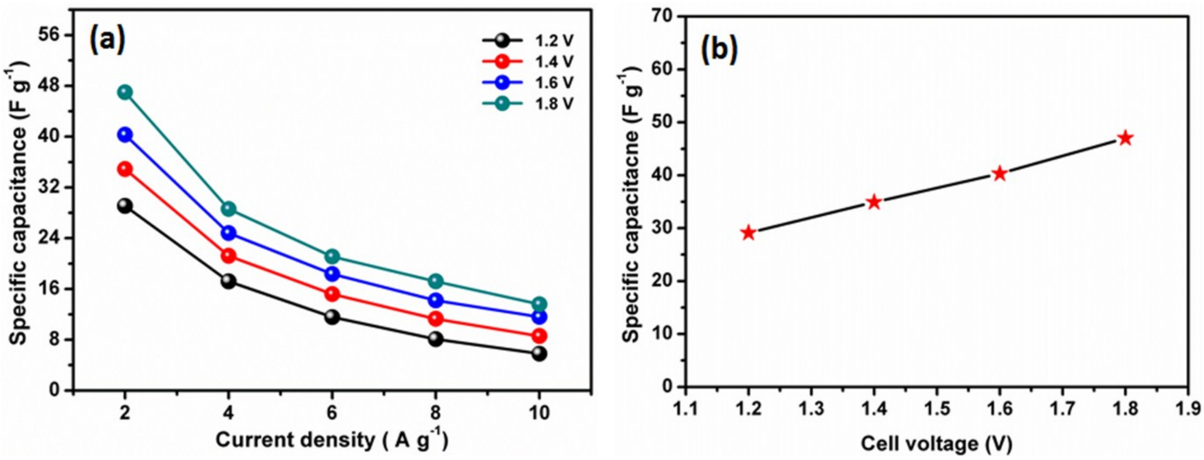

Figure S4. Specific capacitance of fabricated flexible all-solid-state ASC as a function of (a) different current density and (b) cell voltage.

Table S3. Specific capacitance of fabricated flexible all-solid-state ASC with different cell voltage at various current densities.

Cell voltage (V)	Specific capacitance C_{sp} (F g^{-1})				
	2 A g^{-1}	4 A g^{-1}	6 A g^{-1}	8 A g^{-1}	10A g^{-1}
1.2	29.1	17.2	11.6	8.1	5.8
1.4	34.9	21.3	15.2	11.3	8.6
1.6	40.3	24.8	18.4	14.2	11.6
1.8	47	28.6	21.1	17.2	13.6

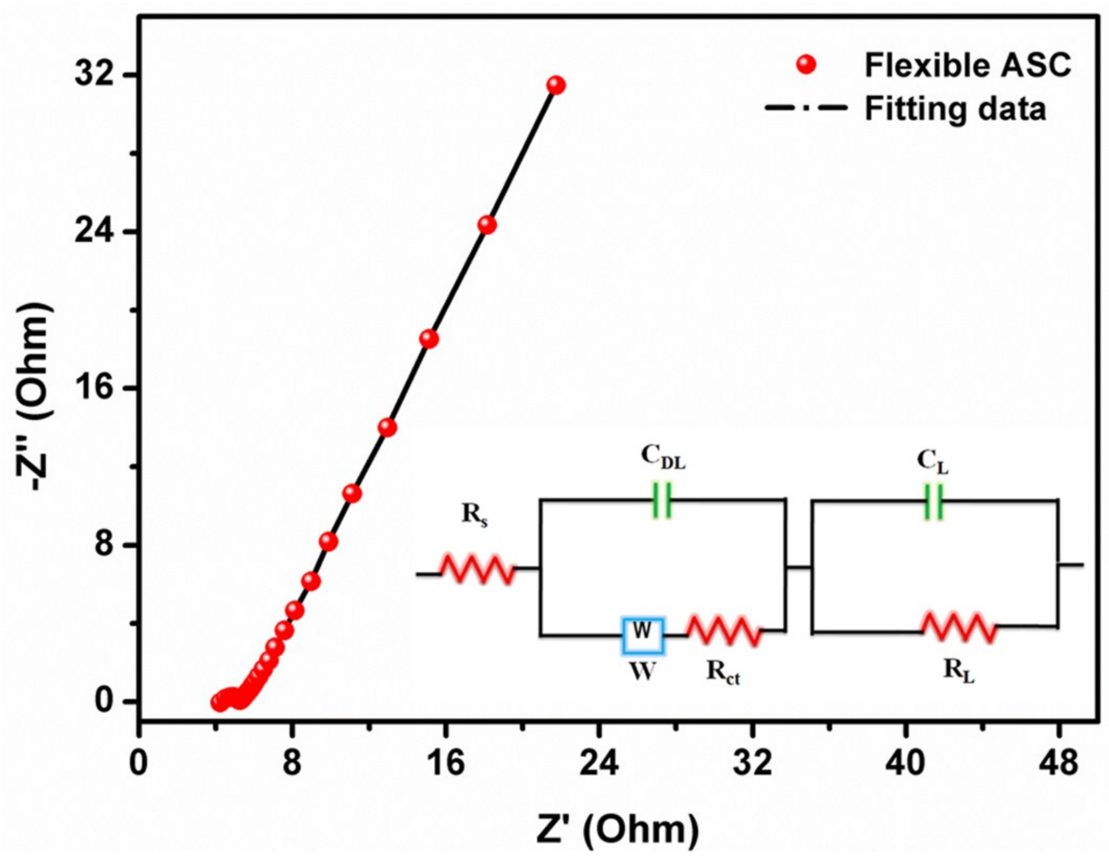

Figure S5. EIS Nyquist plots of fabricated flexible all-solid-state ASC and its corresponding equivalent circuits. (inset)

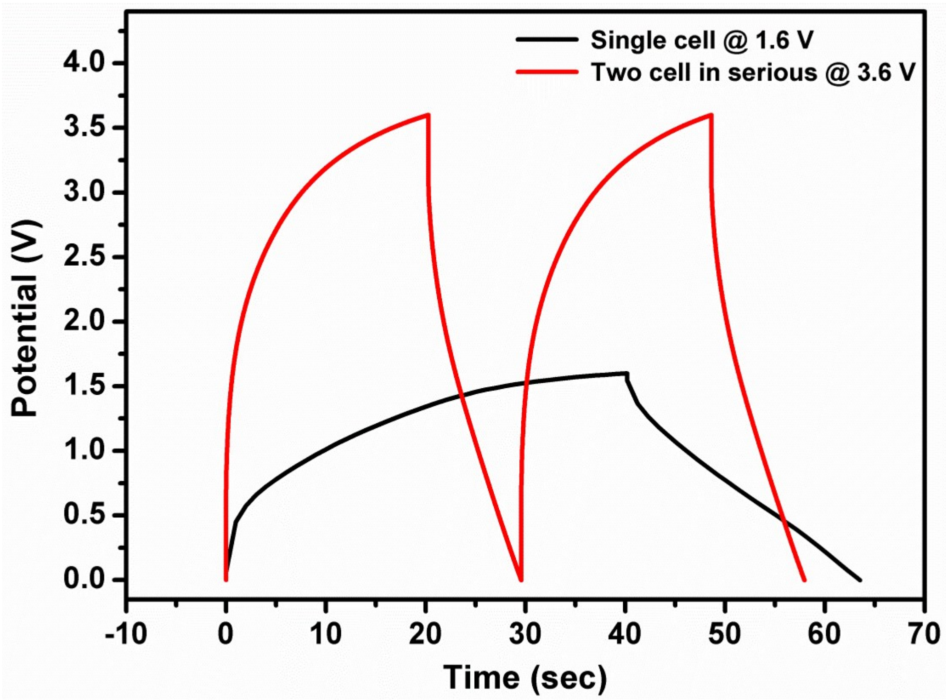

Figure S6. CD profile of single asymmetric cell (1.6 V) and two asymmetric cells were connected in series (3.6 V) at 1 A g^{-1} current density.

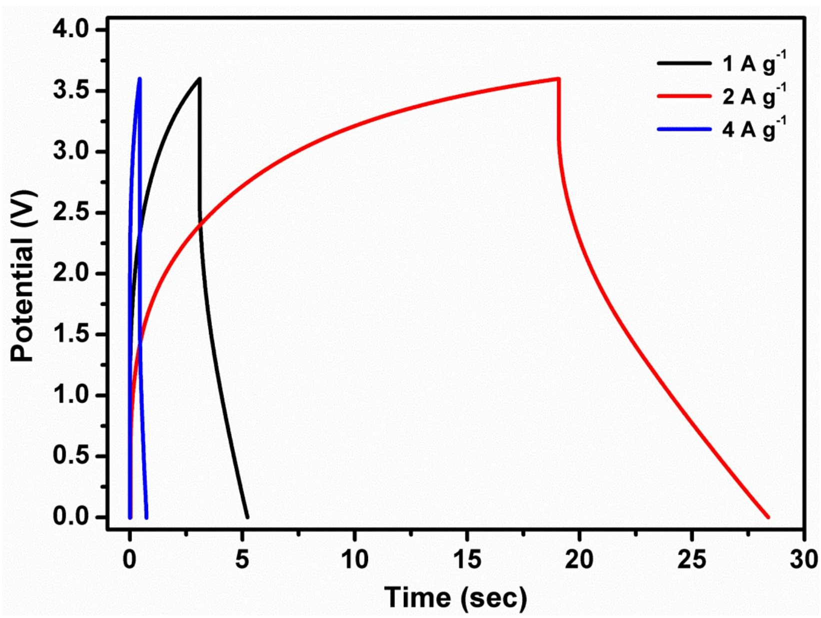

Figure S7. CD profile of two asymmetric cells connected in series for 3.6 V at different current densities.

Reference

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