Supporting Information

$Fe(CN)_6^{3-}$ ions confined into pillared-porous carbon nanosheets for high energy density supercapacitors

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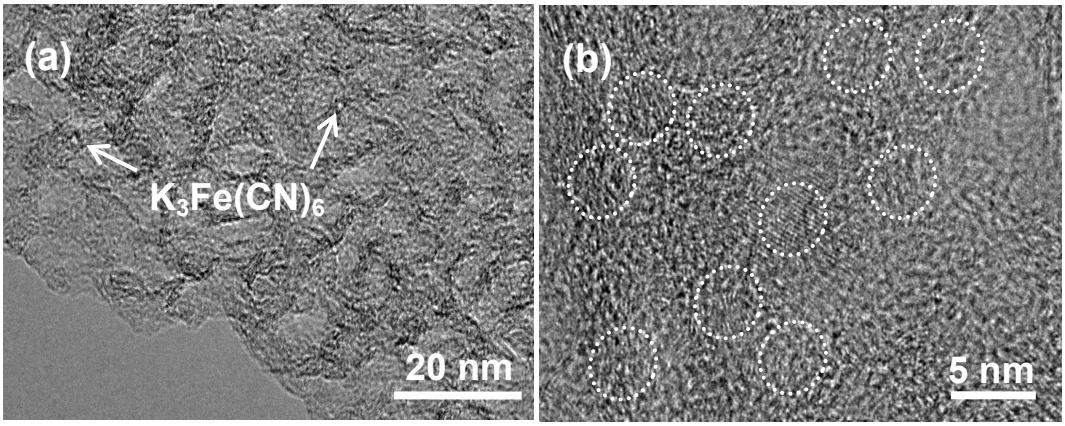

Figure S1. (a, b) TEM images of the F-OPPCNs.

Table S1. Pore characteristics of the PPCNs and OPPCNs.

Sample	S_{BET} (m^2 g^{-1})	S_{meso} (m^2 g^{-1})	V_{total} (cm^3 g^{-1})	V_{meso} (cm^3 g^{-1})	V_{meso}/V_{total}
PPCNs	843	814	2.179	2.118	97.20%
OPPCNs	772	770	2.043	1.997	97.75%

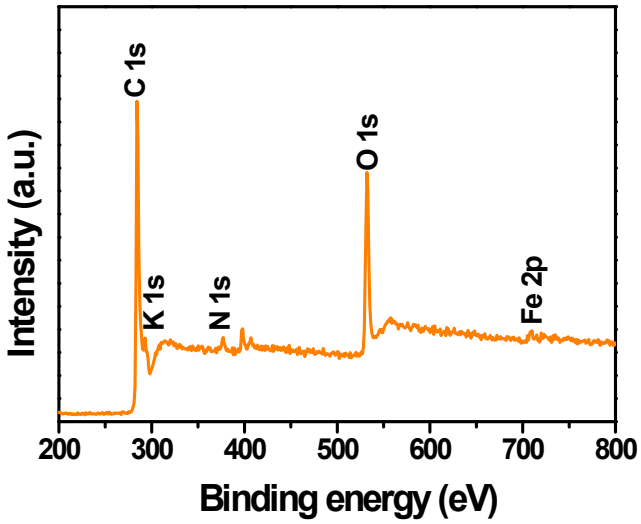

Figure S2. XPS spectra of the F-OPPCNs.

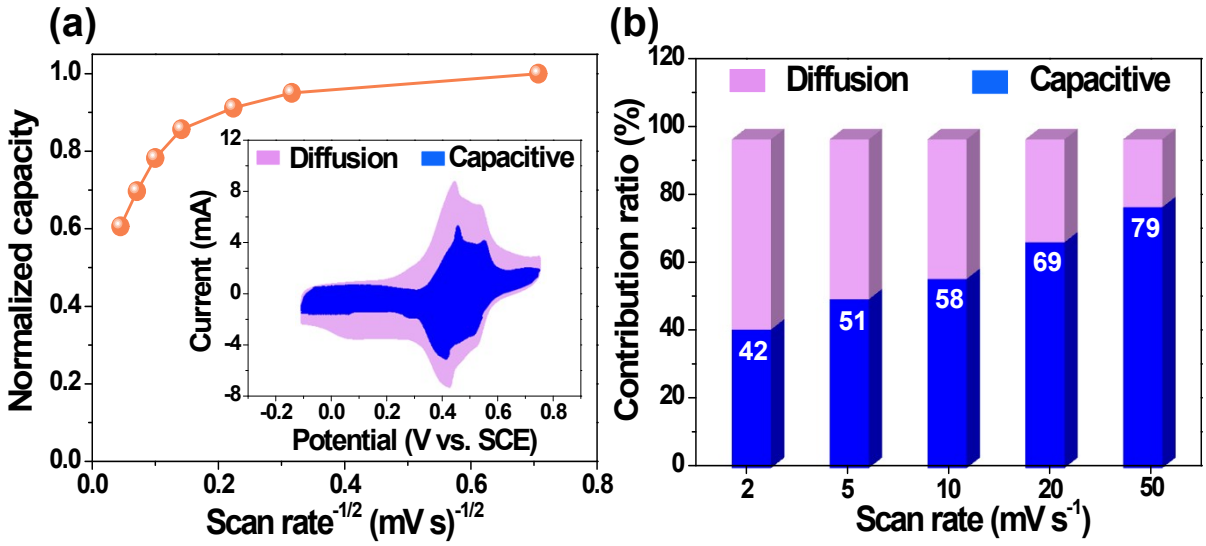

Figure S3. (a) The normalized capacity versus $v^{-1/2}$ (inset: separation of the capacitive (blue) and diffusion currents (purple) at a scan rate of 10 mV s^{-1}). (b) Capacitive ratio of the F-OPPCNs at different scan rates.

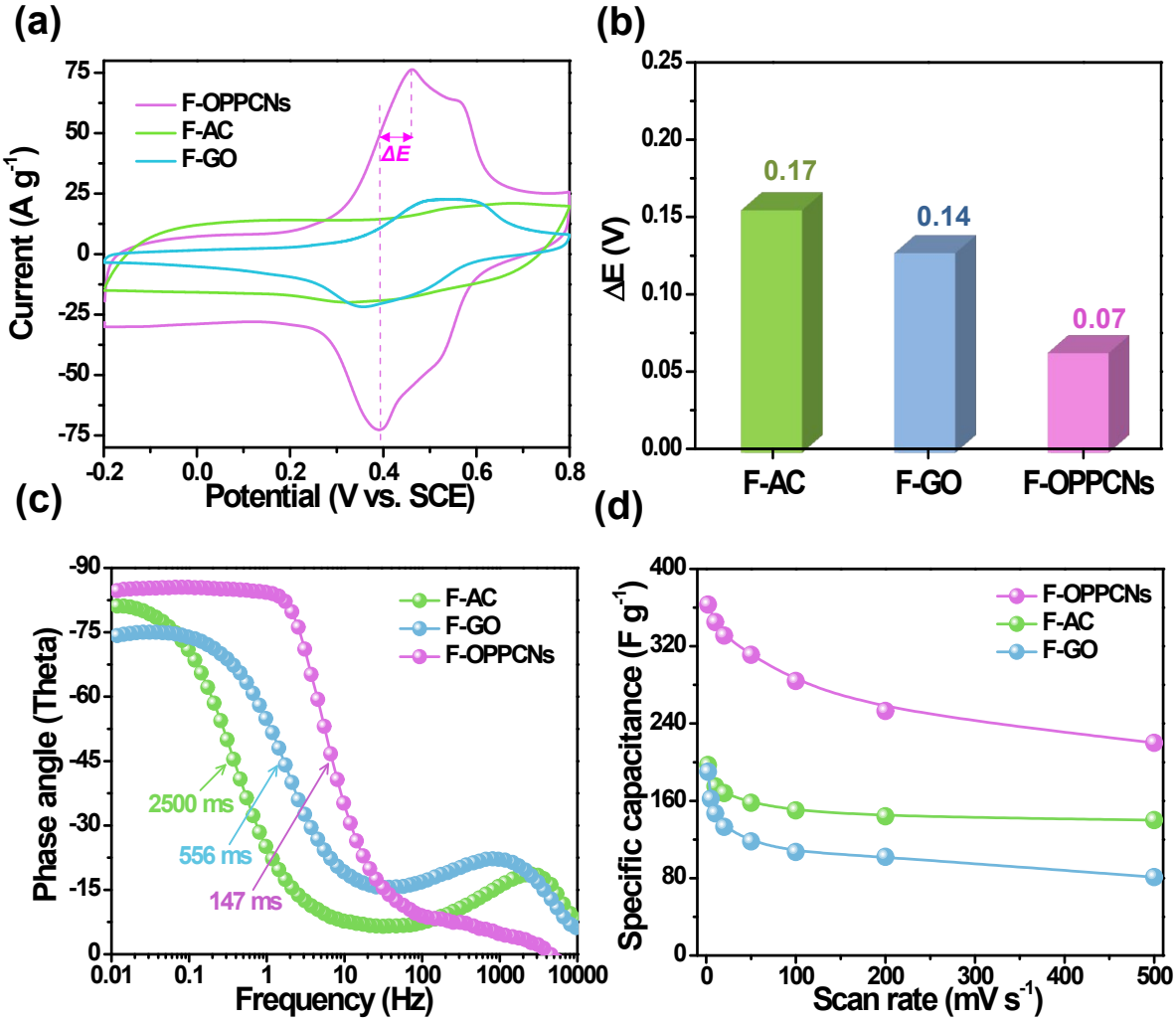

Figure S4. (a) CV curves at 100 mV s^{-1} and (b) peak separation average values (ΔE) of the F-OPPCNs, F-AC and F-GO electrodes. (c) Bode plots of phase angle versus frequency. (d) Specific capacitances of the as-prepared electrodes.

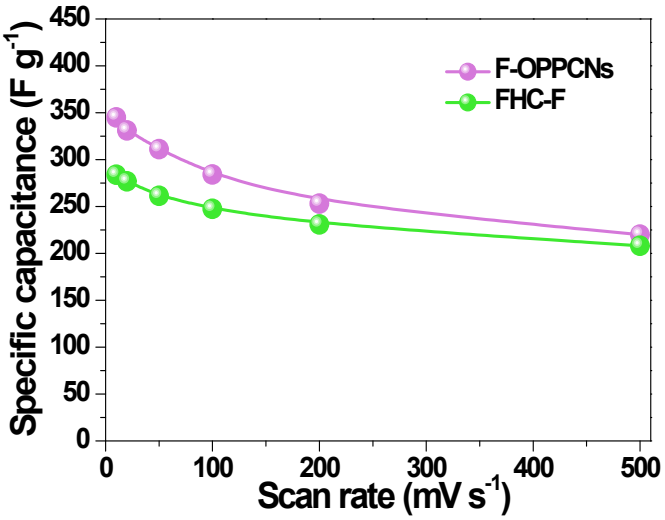

Figure S5. The specific capacitance of the F-OPPCNs and FHC-F.

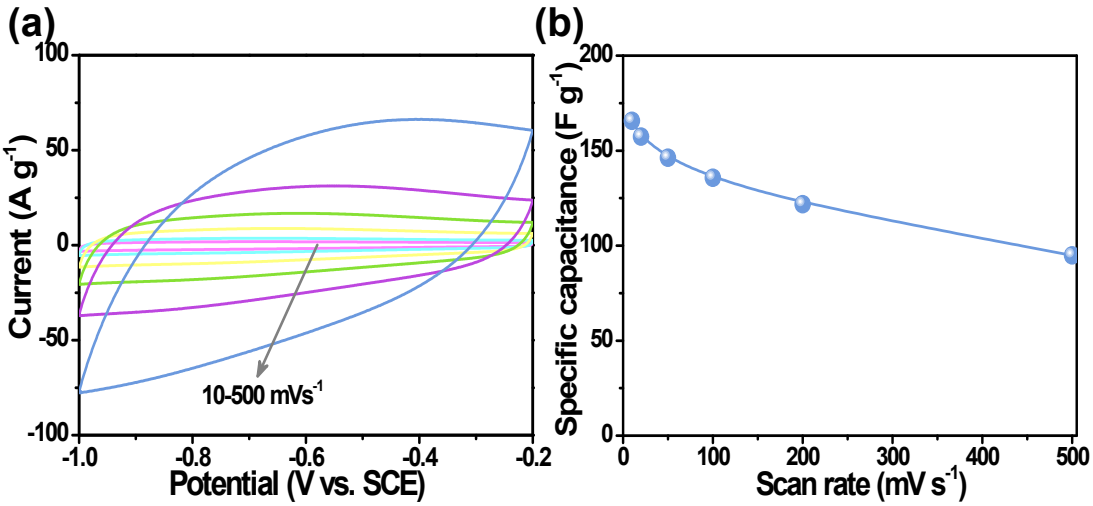

Figure S6. Electrochemical performances of the SGC electrode measured n 1 M Na_2SO_4 electrolyte within a potential window of -1 to -0.2 V (vs SCE). (a) CV curves of SGC at various scan rates from 10 to 500 mV s^{-1} and (b) the corresponding specific capacitances.

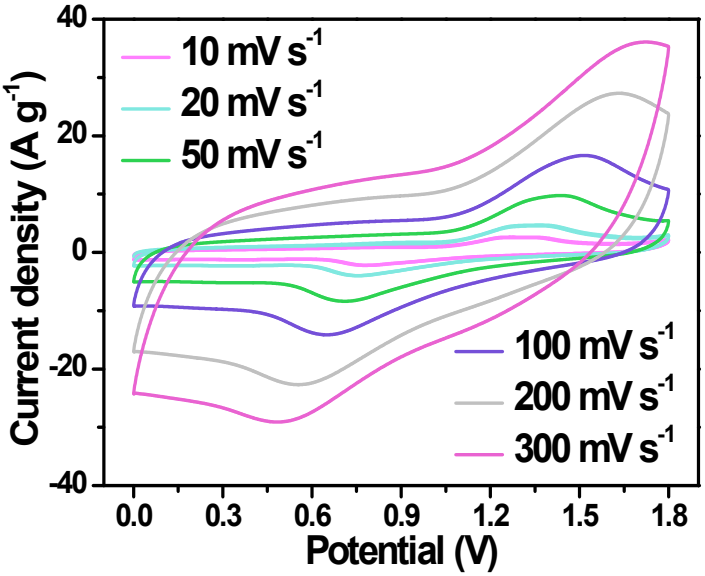

Figure S7. CV curves of the SGC//F-OPPCN supercapacitor at different scan rates.

Table S2. Comparison of the performances for previously reported ASCs.

Electrode materials		Voltage (V)	Electrolyte	Energy density (Wh kg^{-1})	Power density (W kg^{-1})	Ref.
positive electrode	negative electrode					
Co_3O_4 nanorods	G-16/P-C	1.6	6 M KOH	50.1	400	1
$Ni_{0.32}Co_{0.68}(OH)_2$	rGO	1.6	1 M NaOH	24	1000	2
α-$Ni(OH)_2$/ rGO	rGO	1.6	1 M KOH	42	400	3
MnO_2 nanosheets on Ni foam	exfoliated GO	1.6	1 M KOH	25.8	200	4
nickel cobaltite-C	AC	1.6	6 M KOH	36	852	5
$Ni_3(VO_4)_2$	AC	1.6	6 M KOH	25.3	240	6
RGO-nickel foam	AC	1.6	6 M KOH	38.6	69.5	7
NiCo-S/Ni foam	nitrogen-doped graphene	1.6	2 M KOH	58.1	796	8
Ni-Co-Mn-OH/rGO	PPD/rGO	1.6	2 M KOH	74.7	1680	9
MnO_2/C	CNT/V_2O_5	1.6	1 M Na_2SO_4	75	16	10
MnO_2 nanowire/graphene	graphene	2	1 M Na_2SO_4	30.4	100	11
MnO_2/GO	carbon	2	1 M Na_2SO_4	46.7	100	12
silicon diatom@MnO_2	active GO	1.6	1 M Na_2SO_4	23.2	102	13
MnO_2/3D-NRGO	3D-NRGO	2	1 M Na_2SO_4	35.3	200	14
RGO/MnO_2	RGO/MoO_3	2	1 M Na_2SO_4	42.6	276	15
MnO_2	PPy	1.7	1 M Na_2SO_4	27.2	850	16
F-OPPCNs	SGC	1.8	1 M Na_2SO_4	48	960	**This work**

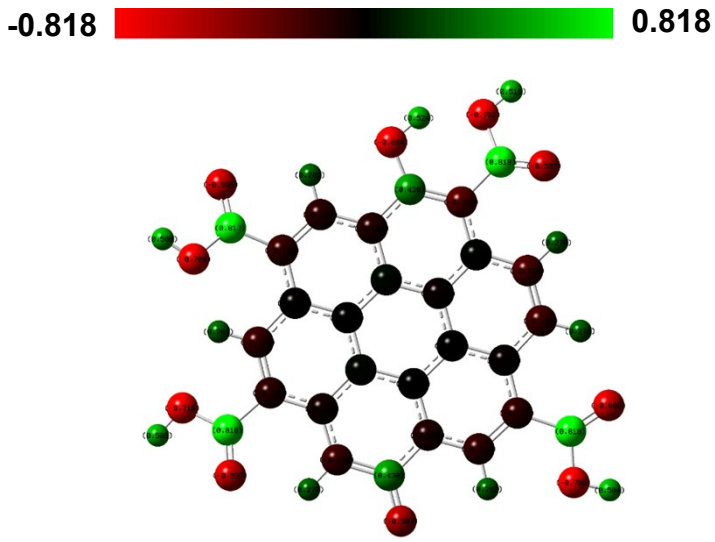

Figure S8. The charge distribution and XYZ coordinate of the optimized structure of OPPCNs.

Standard orientation:

Center Number	Atomic Number	Atomic Type	Coordinates (Angstroms) X	Y	Z
1	6	0	-3.822328	0.000000	0.000000
2	6	0	-3.131864	-1.211940	0.000000
3	6	0	-1.730112	-1.238243	0.000000
4	6	0	-1.011093	0.000000	0.000000
5	6	0	-1.730112	1.238243	0.000000
6	6	0	-3.131864	1.211940	0.000000
7	6	0	-0.985825	-2.470535	0.000000
8	6	0	0.409496	0.000000	0.000000
9	6	0	1.129068	-1.247459	0.000000
10	6	0	0.372757	-2.476245	0.000000
11	6	0	2.515932	-1.235477	0.000000
12	1	0	3.086444	-2.160019	0.000000
13	6	0	3.267247	0.000000	0.000000
14	6	0	2.515932	1.235477	0.000000
15	6	0	1.129068	1.247459	0.000000
16	6	0	0.372757	2.476245	0.000000
17	6	0	-0.985825	2.470535	0.000000
18	1	0	-1.540479	3.405589	0.000000
19	1	0	0.922269	3.413892	0.000000
20	1	0	-1.540479	-3.405589	0.000000
21	1	0	-4.908827	0.000000	0.000000
22	1	0	-3.679459	-2.151000	0.000000
23	1	0	-3.679459	2.151000	0.000000
24	1	0	0.922269	-3.413892	0.000000
25	1	0	3.086444	2.160019	0.000000
26	8	0	4.528983	0.000000	0.000000

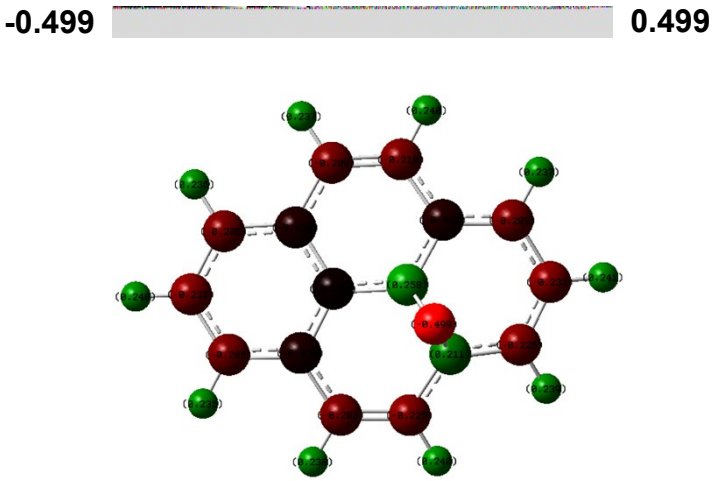

Figure S9. The charge distribution and XYZ coordinate of the optimized structure of carbon with epoxide group (O-C-O).

Standard orientation:

Center Number	Atomic Number	Atomic Type	Coordinates (Angstroms) X	Y	Z
1	6	0	-3.610917	-0.076573	-0.132153
2	6	0	-2.966755	1.159062	-0.121287
3	6	0	-1.567048	1.234100	-0.024107
4	6	0	-0.829074	0.032766	0.090002
5	6	0	-1.470007	-1.225435	0.005634
6	6	0	-2.871773	-1.257869	-0.088107
7	6	0	-0.856887	2.500617	-0.050908
8	6	0	0.620766	0.111931	0.285046
9	6	0	1.316745	1.380656	0.026484
10	6	0	0.499996	2.566473	-0.056076
11	6	0	2.682384	1.372580	-0.139237
12	1	0	3.204106	2.321107	-0.245426
13	6	0	3.416659	0.165889	-0.369063
14	6	0	2.826442	-1.064276	-0.380196
15	6	0	1.461977	-1.244902	0.092335
16	6	0	0.669671	-2.444044	-0.226186
17	6	0	-0.678661	-2.437850	-0.161087
18	1	0	-1.227328	-3.357468	-0.352600
19	1	0	1.206147	-3.342797	-0.521302
20	1	0	-1.447259	3.411112	-0.116495
21	1	0	-4.694398	-0.120274	-0.201362
22	1	0	-3.544471	2.077466	-0.191306
23	1	0	-3.377050	-2.218572	-0.150567
24	1	0	1.002765	3.527533	-0.136389
25	1	0	3.343663	-1.925331	-0.796608
26	1	0	4.457882	0.257288	-0.668375
27	8	0	1.151854	-0.658602	1.359235

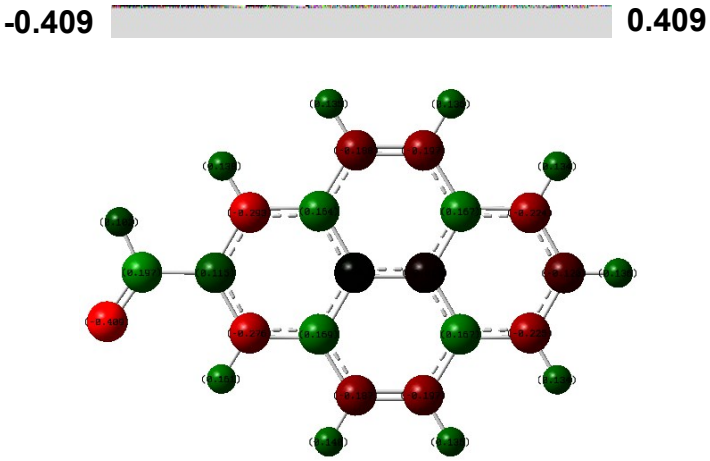

Figure S10. The charge distribution and XYZ coordinate of the optimized structure of carbon with aldehyde group (C=O).

Standard orientation:

Center Number	Atomic Number	Atomic Type	Coordinates (Angstroms) X	Y	Z
1	6	0	4.154793	-0.193617	-0.000011
2	6	0	3.391863	-1.360933	-0.000006
3	6	0	1.989895	-1.301865	0.000000
4	6	0	1.350813	-0.023683	0.000000
5	6	0	2.139900	1.167496	-0.000005
6	6	0	3.539667	1.056784	-0.000011
7	6	0	1.169542	-2.483599	0.000006
8	6	0	-0.071974	0.062368	0.000006
9	6	0	-0.862120	-1.131885	0.000012
10	6	0	-0.188605	-2.403771	0.000011
11	6	0	-2.255997	-1.025404	0.000019
12	1	0	-2.881012	-1.913954	0.000025
13	6	0	-2.877561	0.230099	0.000017
14	6	0	-2.109838	1.398943	0.000010
15	6	0	-0.709511	1.341920	0.000006
16	6	0	0.110460	2.522826	0.000000
17	6	0	1.469174	2.438889	-0.000005
18	1	0	2.075510	3.341389	-0.000009
19	1	0	-0.381524	3.492313	0.000000
20	1	0	1.662842	-3.452487	0.000006
21	1	0	5.239332	-0.259945	-0.000015
22	1	0	3.881276	-2.331720	-0.000006
23	1	0	4.142636	1.961409	-0.000015
24	1	0	-0.794926	-3.305903	0.000016
25	1	0	-2.606389	2.367764	0.000008
26	6	0	-4.354705	0.326797	0.000025
27	1	0	-4.749701	1.367523	0.000101
28	8	0	-5.112852	-0.624320	-0.000070

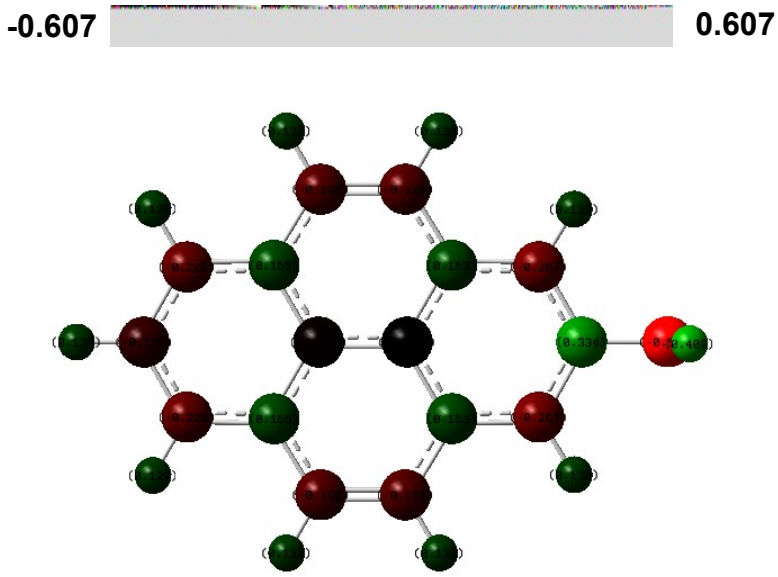

Figure S11. The charge distribution and XYZ coordinate of the optimized structure of carbon with hydroxy group (C-OH).

Standard orientation:

Center Number	Atomic Number	Atomic Type	Coordinates (Angstroms) X	Y	Z
1	6	0	-3.874813	0.000000	0.011980
2	6	0	-3.183540	-1.210485	0.008780
3	6	0	-1.779783	-1.236127	0.002800
4	6	0	-1.063907	0.000000	0.000542
5	6	0	-1.779783	1.236127	0.002800
6	6	0	-3.183540	1.210485	0.008780
7	6	0	-1.030575	-2.463005	-0.002469
8	6	0	0.362096	0.000000	-0.004234
9	6	0	1.079204	-1.235598	-0.008918
10	6	0	0.330995	-2.463607	-0.008833
11	6	0	2.482197	-1.212702	-0.012133
12	1	0	3.048218	-2.140035	-0.025843
13	6	0	3.170237	0.000000	-0.009698
14	6	0	2.482197	1.212702	-0.012133
15	6	0	1.079204	1.235598	-0.008918
16	6	0	0.330995	2.463607	-0.008833
17	6	0	-1.030575	2.463005	-0.002469
18	1	0	-1.579521	3.401772	-0.002201
19	1	0	0.880418	3.401861	-0.014310
20	1	0	-1.579521	-3.401772	-0.002201
21	1	0	-4.961448	0.000000	0.016316
22	1	0	-3.730192	-2.150491	0.010328
23	1	0	-3.730192	2.150491	0.010328
24	1	0	0.880419	-3.401861	-0.014310
25	1	0	3.048218	2.140035	-0.025843
26	8	0	4.558841	0.000000	-0.066518
27	1	0	4.909214	-0.000001	0.837619

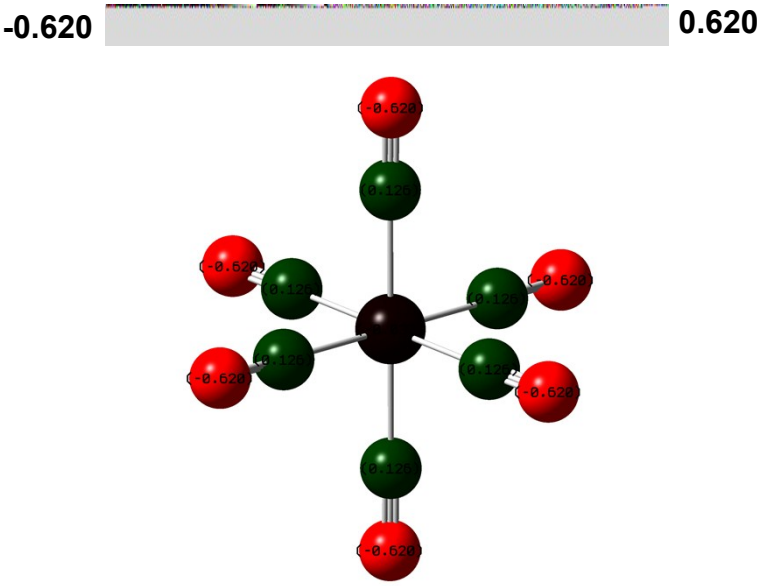

Figure S12. The charge distribution and XYZ coordinate of the optimized structure of $K_3Fe(CN)_6$.

Standard orientation:

Center Number	Atomic Number	Atomic Type	Coordinates (Angstroms) X	Y	Z
1	26	0	0.000038	-0.000034	-0.000037
2	6	0	1.037983	1.276116	-1.118326
3	6	0	1.623835	-0.255865	1.119963
4	6	0	0.590745	-1.539008	-1.113288
5	6	0	-1.623879	0.255856	-1.119852
6	6	0	-1.037981	-1.276252	1.118139
7	6	0	-0.590695	1.539179	1.113444
8	7	0	-0.936207	2.439226	1.783406
9	7	0	2.573328	-0.405290	1.794067
10	7	0	0.936310	-2.438997	-1.783271
11	7	0	-1.645107	-2.022209	1.791361
12	7	0	-2.573435	0.405241	-1.793876
13	7	0	1.644962	2.022132	-1.791615

Notes and references

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