Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supporting Information

Plasma-induced on-surface sulfur vacancies in $NiCo_2S_4$ enhance energy storage performance of supercapatteries

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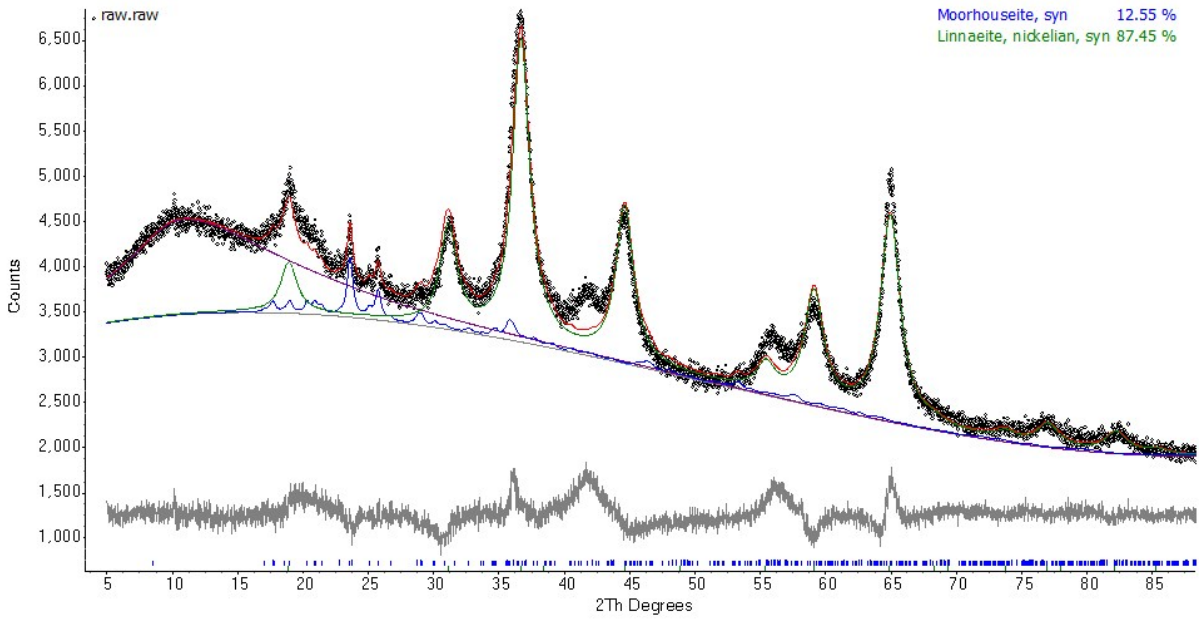


Fig. S1 Fitted XRD pattern of pristine NiCoS-12

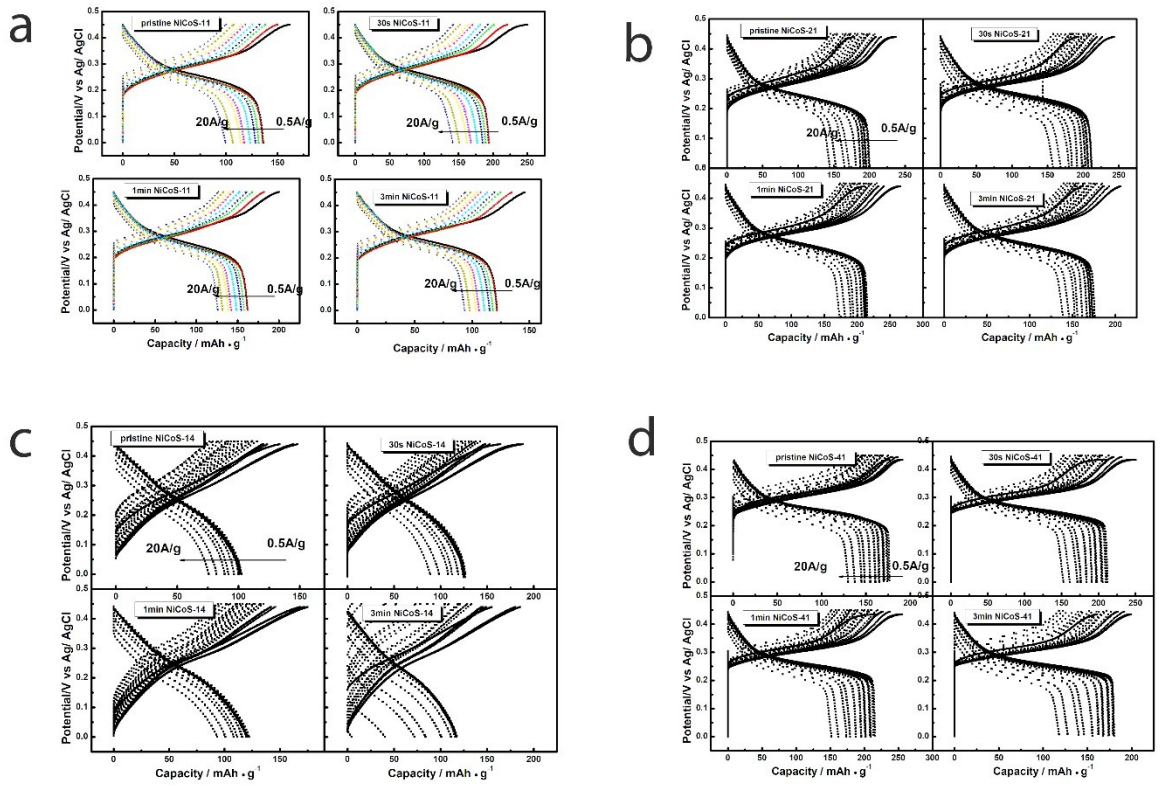
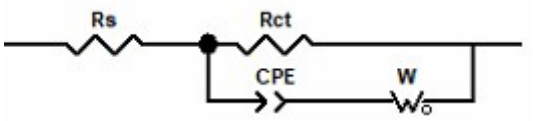


Fig. S2 voltage vs. specific capacity of comparison group (various ratio of Ni/Co) with different plasma treatment duration **a,** NiCoS-11/CFC; **b,** NiCoS-21/CFC; **c,** NiCoS-14/CFC; **d,** NiCoS-41/CFC;

Table S1. EIS fitting results and equivalent circuit

sample	Rs (Ω)	Rct (Ω)
Pristine NiCoS-12	2.491	0.378
30s NiCoS-12	1.809	0.555
1min NiCoS-12	2.248	1.434
3min NiCoS-12	2.003	0.577



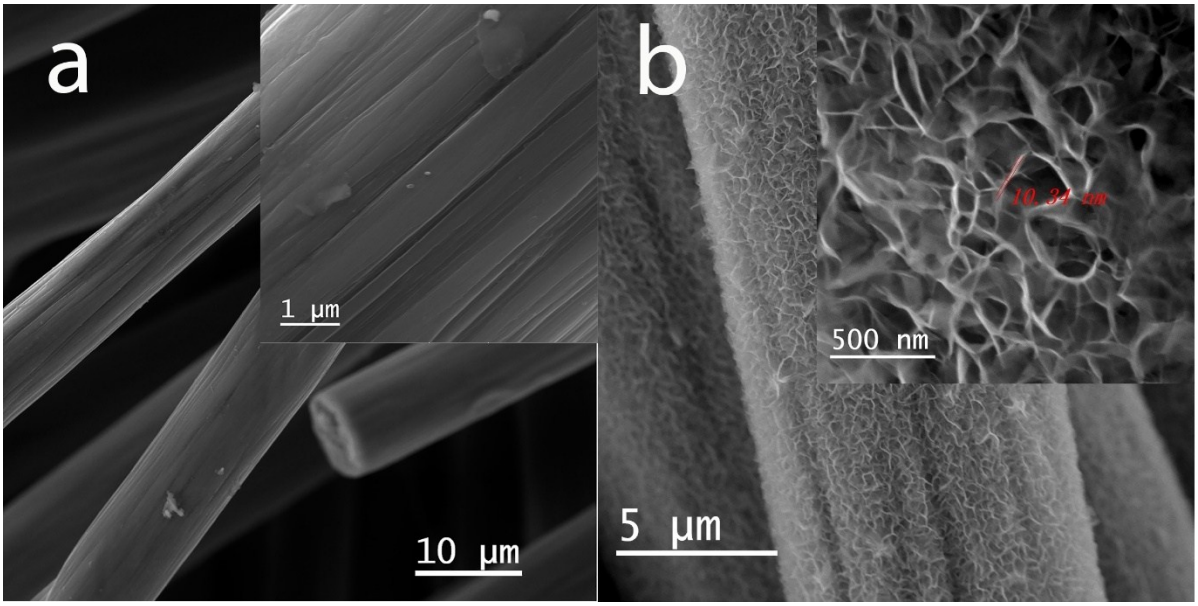


Fig. S3 SEM images of **a,** bare CFC **b**, NiCoLDHs/CFC

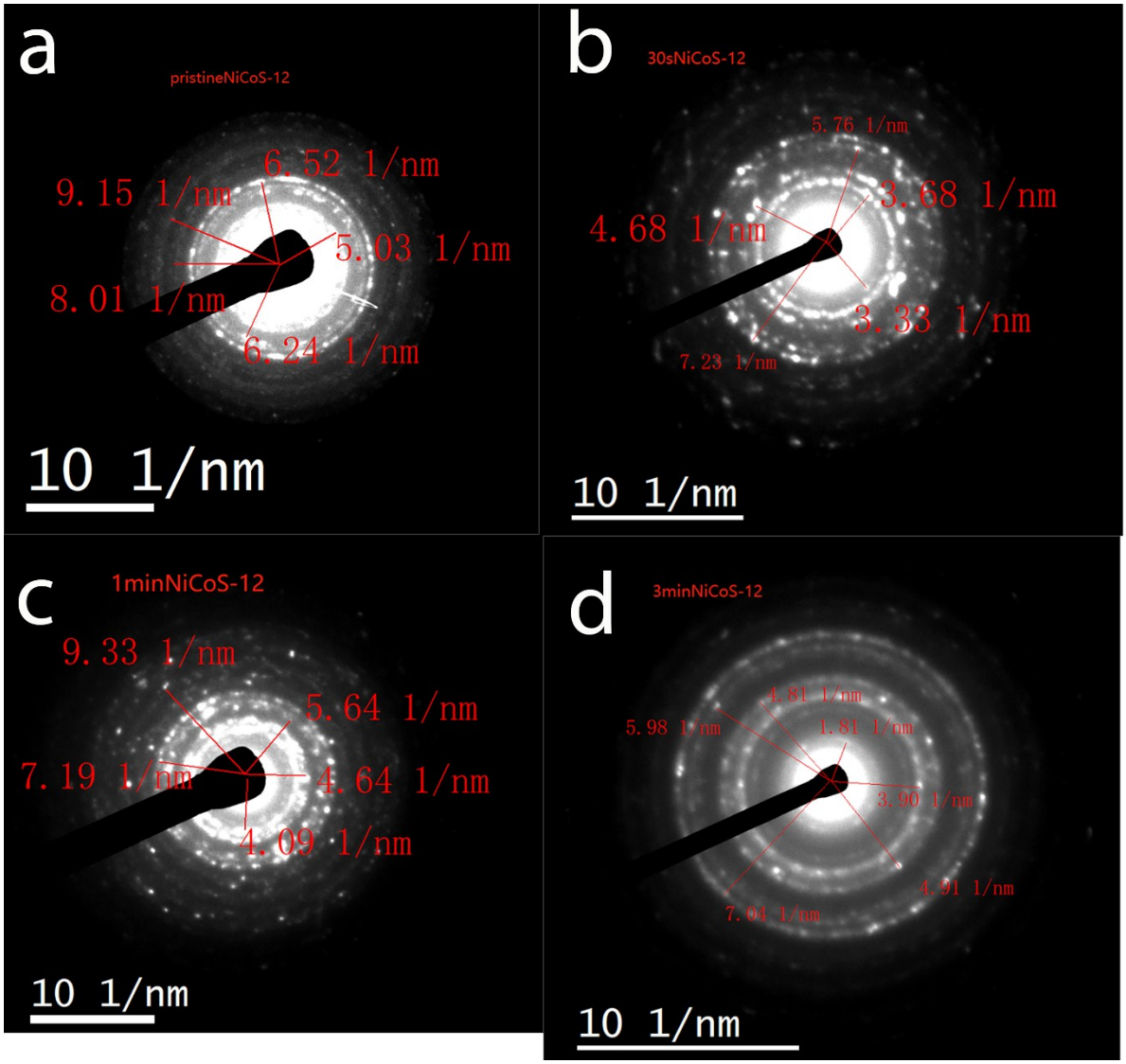


Fig. S4 a-d SAED pattern of pristine NiCoS-12/CFC, 30s NiCoS-12/CFC, 1min NiCoS-12/CFC, 3min NiCoS-12/CFC

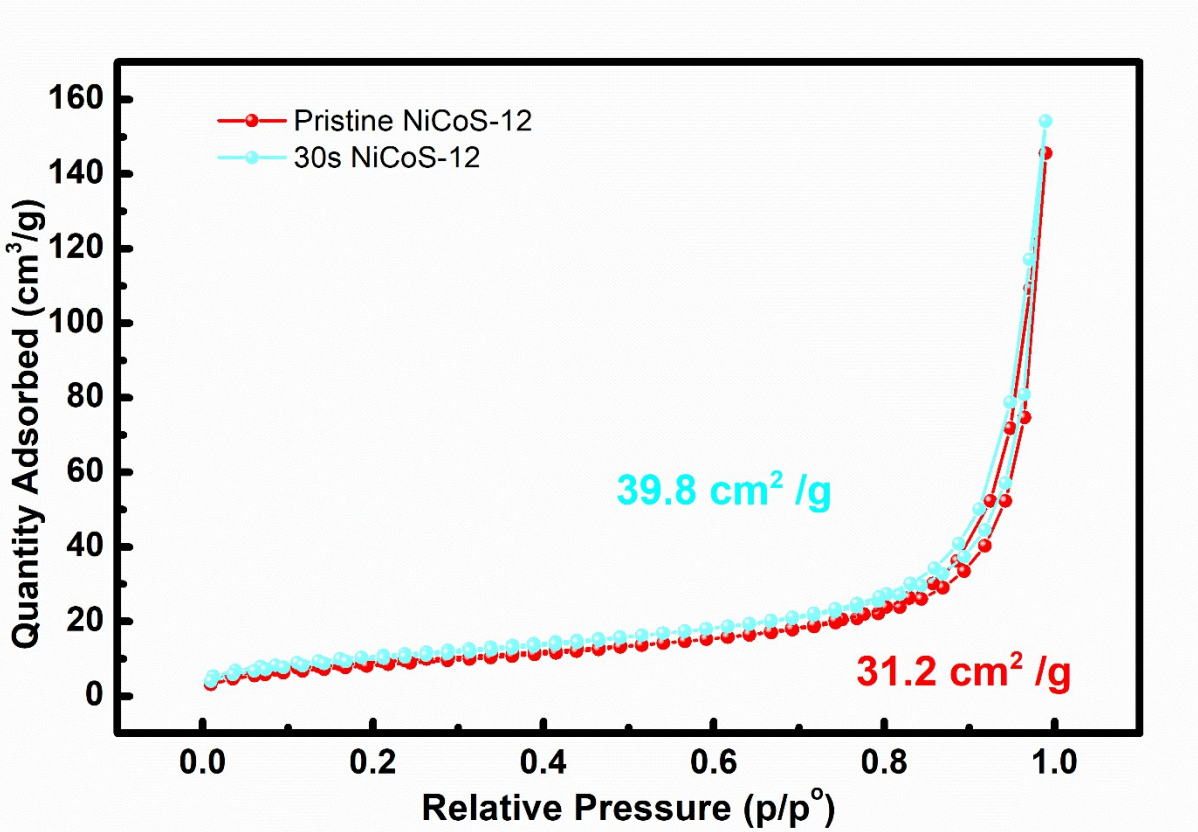


Fig. S5 N2 sorption isotherms of pristine and 30s NiCoS-12

Table S2. XPS survey spectrum of the NiCoS-12/ CFC with different duration plasma treatment and the elements atomic ratios.

XPS elements Atomic ratio in sample	Pristine NiCoS-12	30s NiCoS-12	1min NiCoS-12	3min NiCoS-12
Ni (%)	2.79	2.85	2.87	1.63
Co (%)	5.86	5.64	5.04	3.28
S (%)	**38.92**	**27.12**	**25.59**	**19.59**
C (%)	27.24	39.07	37.69	55.06
O (%)	25.18	25.32	28.82	20.44

Table S3. Compositional ratio of Ni^{2+} / Ni^{3+} and Co^{2+} / Co^{3+} calculated from fitted Ni, Co HRXPS spectra

Fitted compositional areal ratio	Pristine NiCoS-12	30 s NiCoS-12	1 min NiCoS-12	3 min NiCoS-12
Ni^{2+} / Ni^{3+}	1.329	1.371	1.484	1.820
Co^{2+} / Co^{3+}	1.078	1.231	1.272	1.344

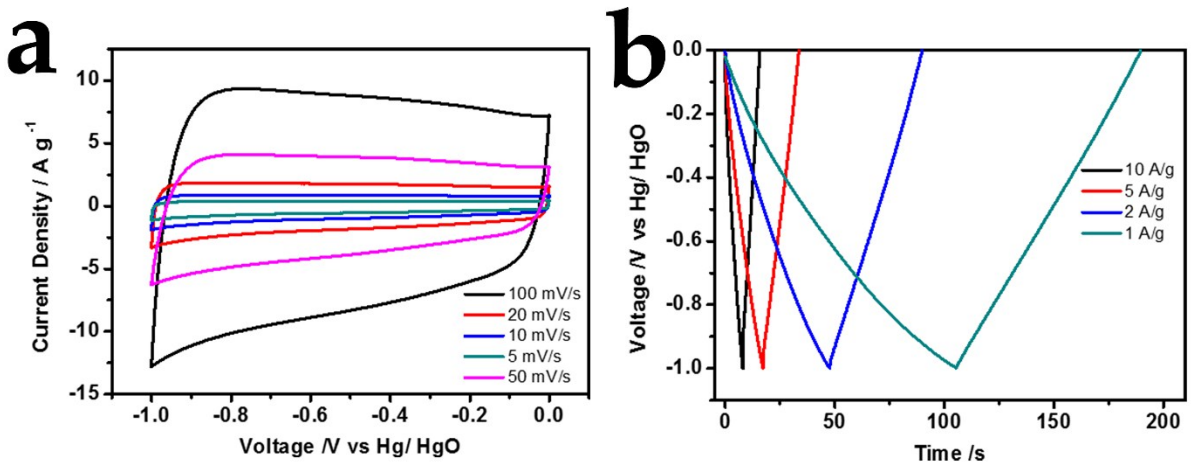


Figure S 6. a, CVs and **b,** GCD plots of negative material YP-50F commercial carbon.