Electronic Supplementary Inofrmation

Freestanding $CoSeO_3 \cdot H_2O$ Nanoribbon/Carbon Nanotube Composite Paper for 2.4 V High-Voltage, Flexible, Solid-State Supercapacitors

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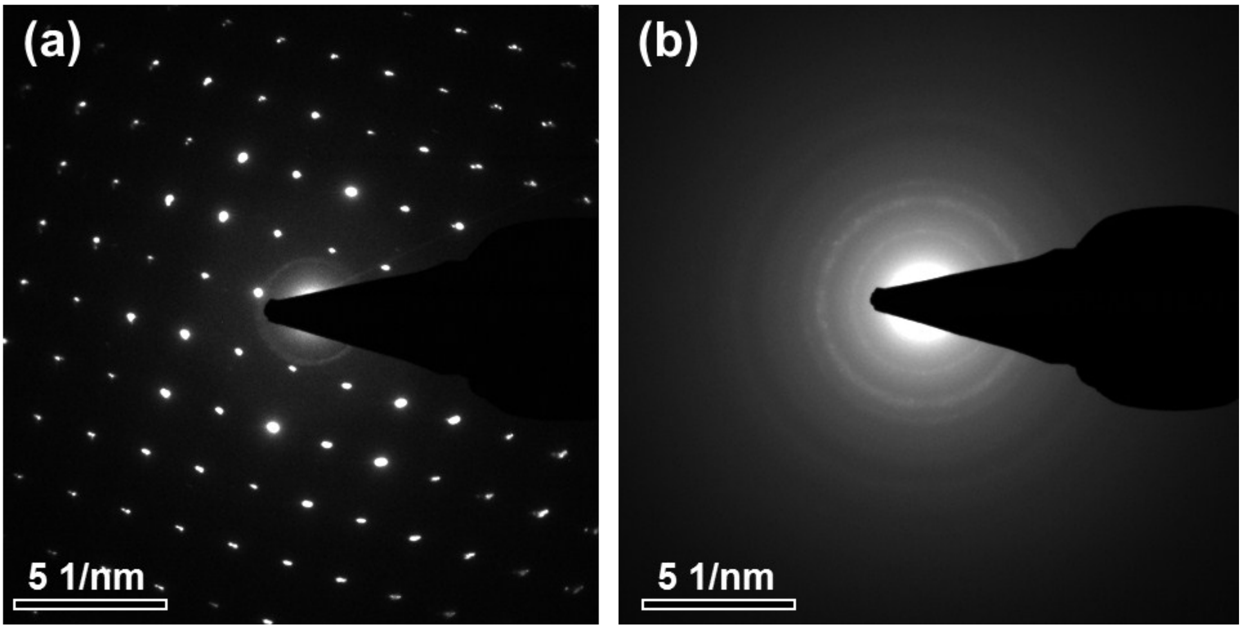

Figure S1. SAED patterns taken from the same place of an individual $CoSeO_3 \cdot H_2O$ nanoribbon at initial stage (a) and (b) after a few seconds of electron beam irradiation .

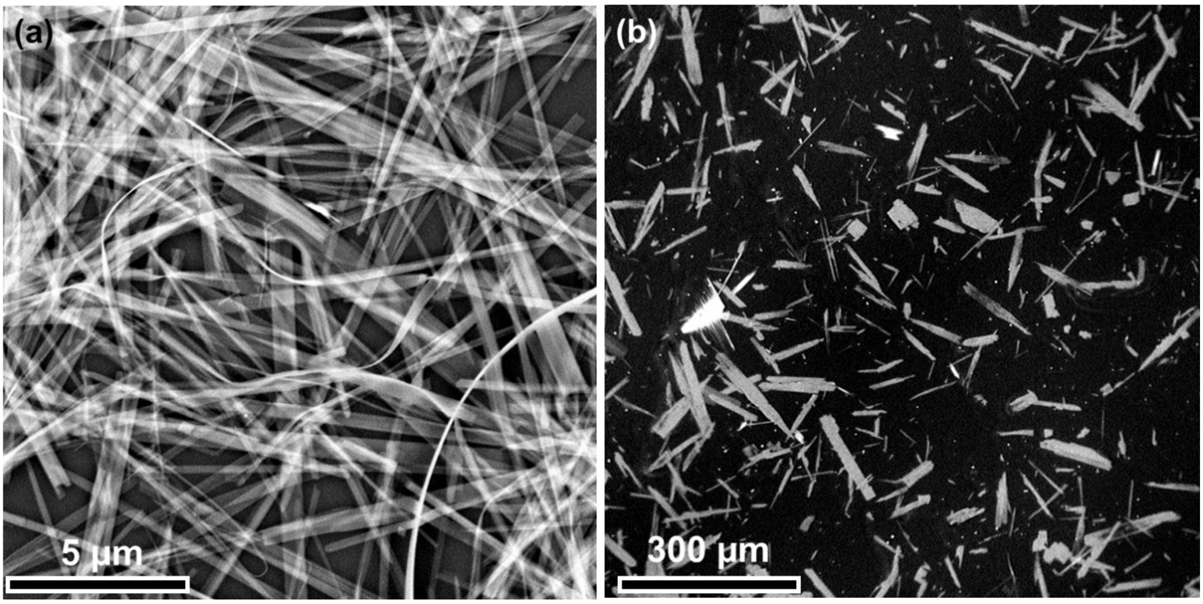

Figure S2. The SEM images of the product with the (a) presence and (b) absence of 3.0 g of PVP surfactant.

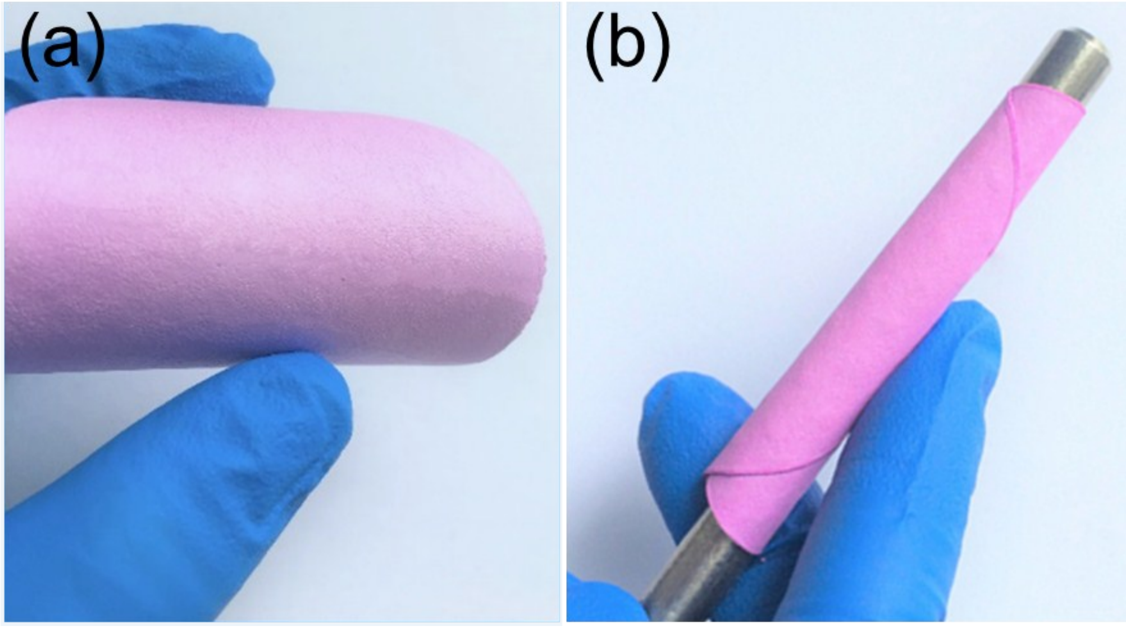

Figure S3. The photographs of the as-prepared $CoSeO_3 \cdot H_2O$ paper with high flexibility.

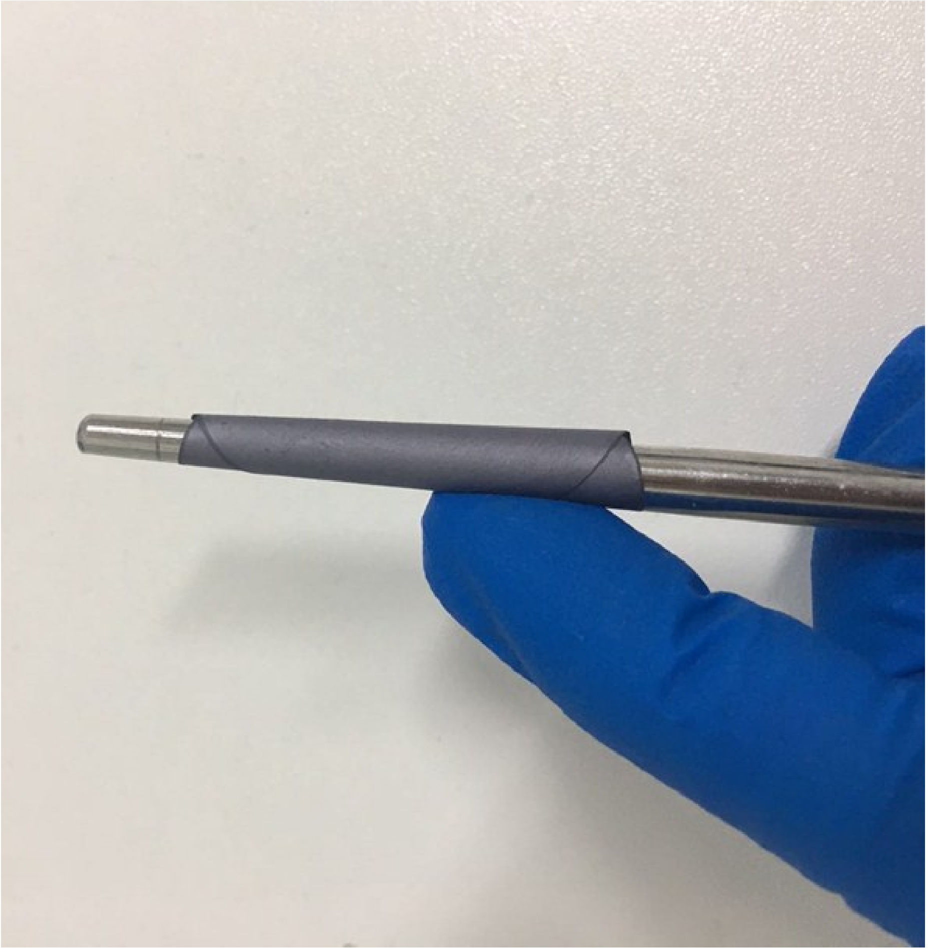

Figure S4. The photograph depicts excellent flexible performance of the as-prepared $CoSeO_3 \cdot H_2O$, HWCNTs paper by a glass rod.

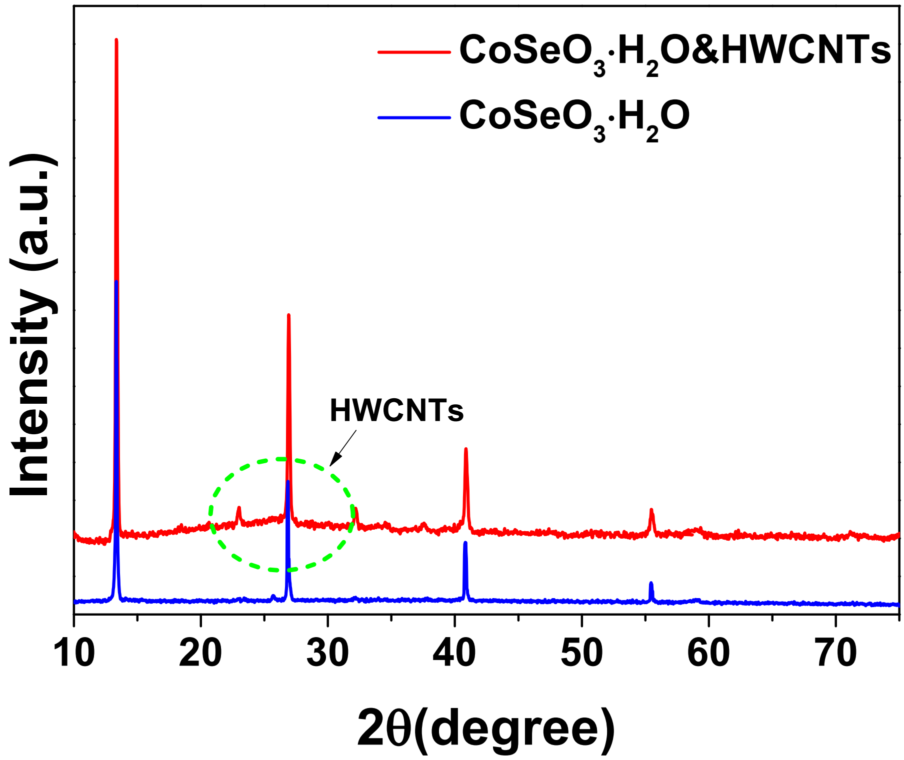

Figure S5. Typical XRD patterns of $CoSeO_3{\cdot}H_2O$ /HWCNTs paper and $CoSeO_3{\cdot}H_2O$ power.

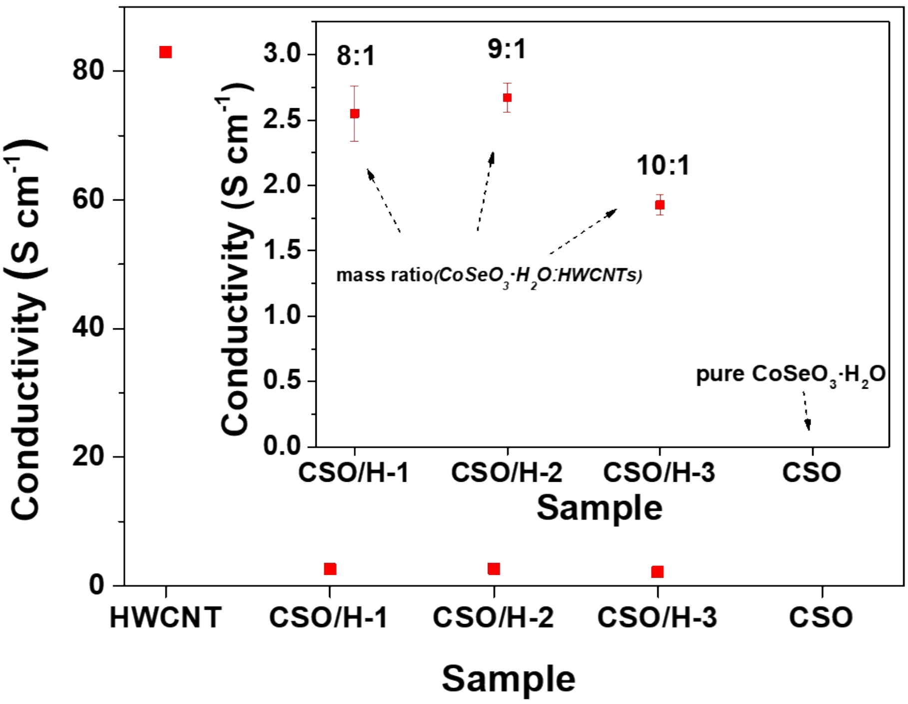

Figure S6. The electronic conductivity of pure HWCNTs paper, CSO/H-1, CSO/H-2, CSO/H-3 composite papers, and $CoSeO_3 \cdot H_2O$ paper.

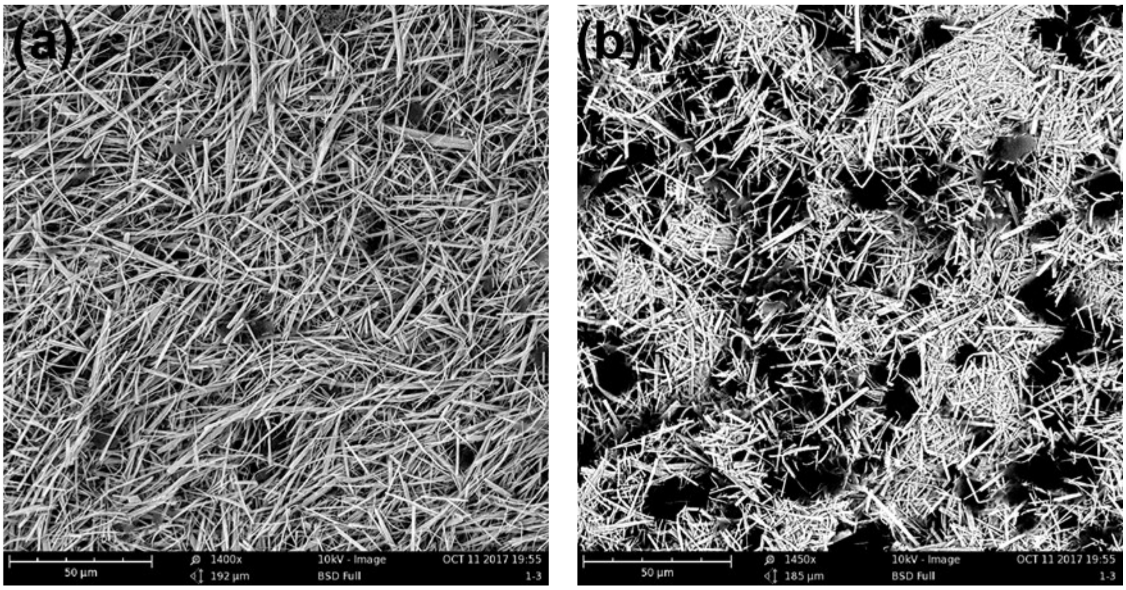

Figure S7. In-plane SEM images of representative $CoSeO_3 \cdot H_2O$/HWCNTs paper with different mass ratio at (a) 9:1 and (b) 10:1.

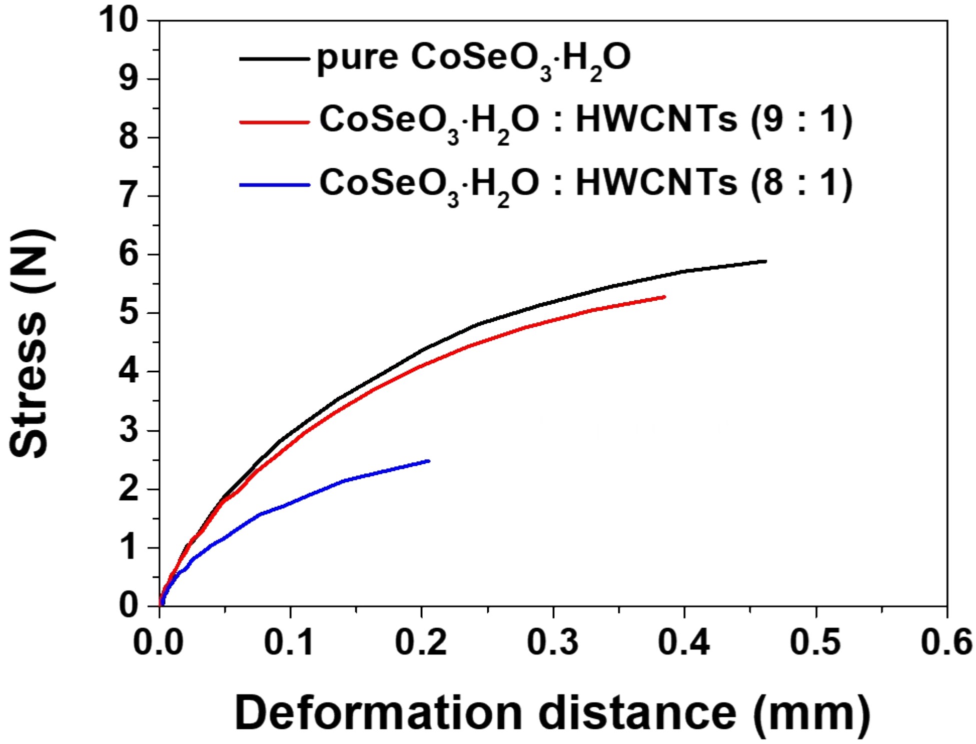

Figure S8. Typical strain–stress curves of pure $CoSeO_3 \cdot H_2O$ paper, $CoSeO_3 \cdot H_2O$ /HWCNTs (9:1) and $CoSeO_3 \cdot H_2O$ /HWCNTs (8:1) composite papers.

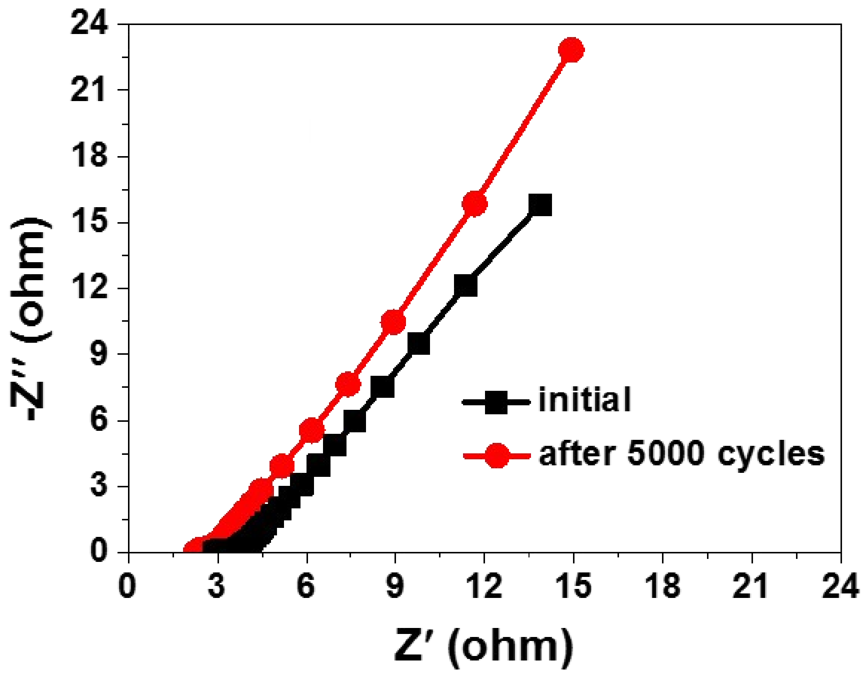

Figure S9. Electrochemical impedance spectra of the $CoSeO_3 \cdot H_2O$/HWCNTs paper electrode at the initial state and after 5,000 cycles, respectviely.

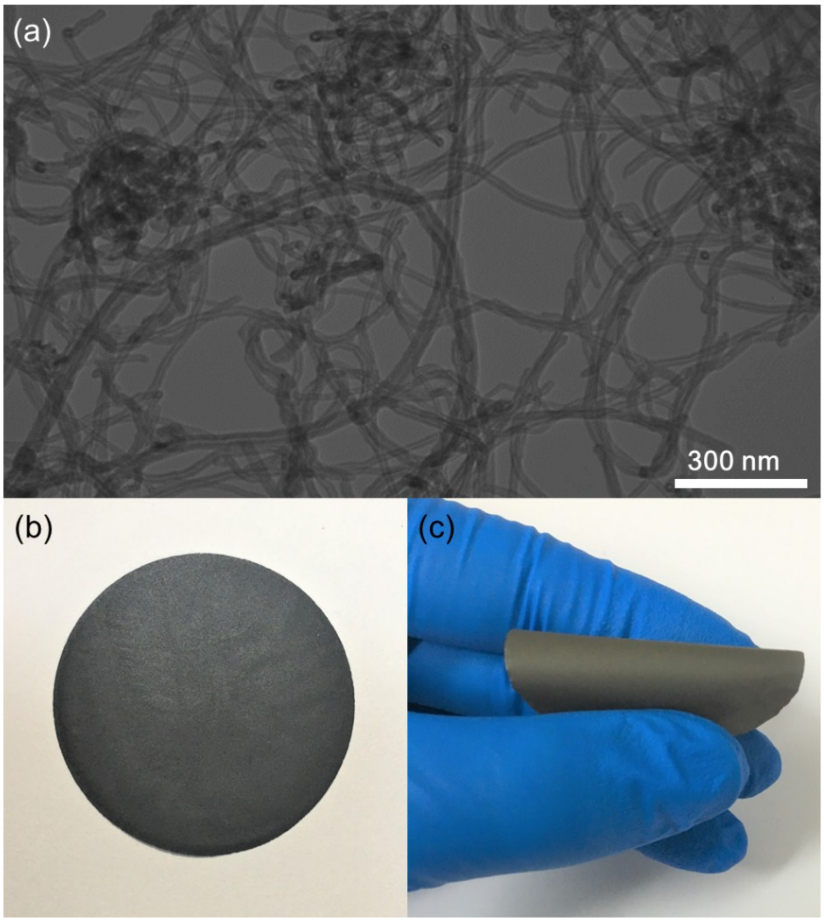

Figure S10. (a) Typical TEM image of HWCNTs. (b, c) The photograph of the as-prepared HWCNTs film with high flexiblity.

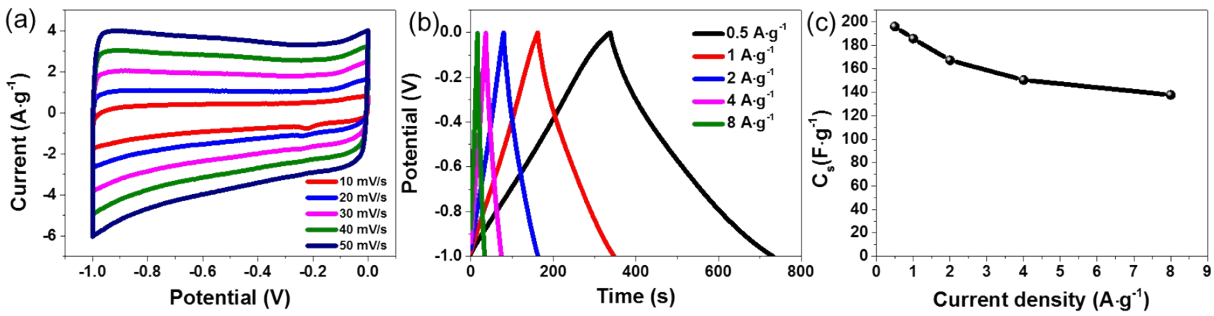

Figure S11. (a) Characteristic CV curves of the HWCNTs@Ni foam electrode in aqueous KOH electrolyte at different scan rates. (b) Galvanostatic charge–discharge curves. (c) C_s of HWCNTs@Ni foam electrode at different current densities. The capacitance of the activated carbon is 186 F g^{-1} for the applied current density of 1 A g^{-1}.

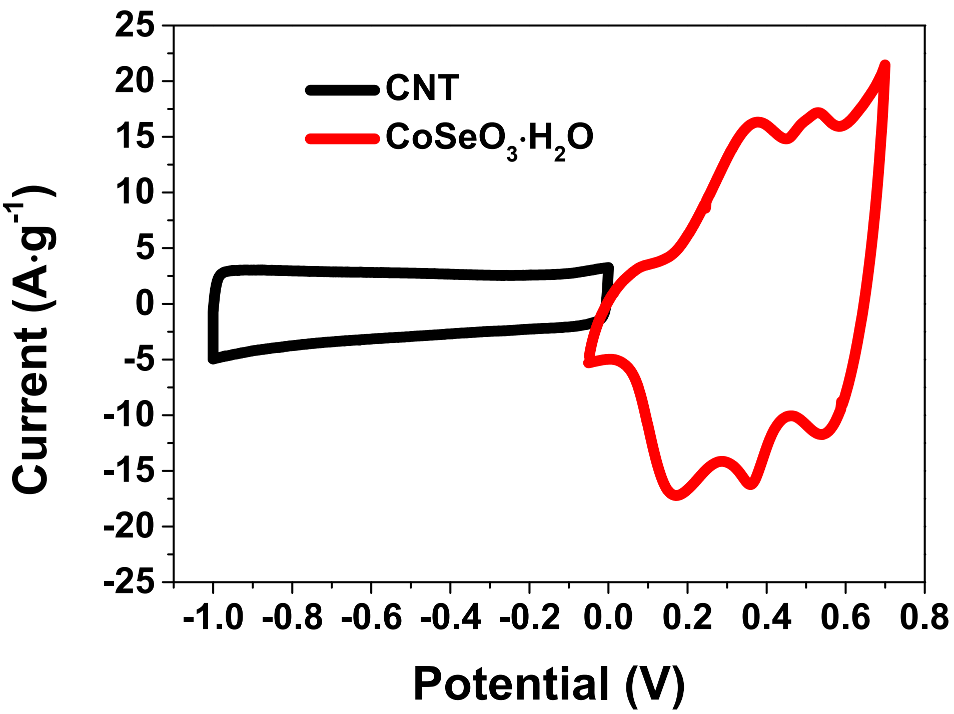

Figure S12. Cyclic voltametry (CV) of the $CoSeO_3 \cdot H_2O$ @ Ni foam and HWCNTs@ Ni foam in aqueous KOH electrolyte at a scan rate of 15 mV s^{-1}.

Table S1. Summary of the performance metrics of various freestanding paper-based asymmetrical supercapacitors previously reported and the present device.

Electrode materials (paper-like ASCs)	**working Potential (V)**	**Specific capacitance ($F\ g^{-1}$)**	**maximum Energy density ($Wh\ kg^{-1}$)**	**maximum power density ($kW\ kg^{-1}$)**	**Cyclic performance (retention)**	**Ref.**
RGO/MnO_2 // RGO	1.5	30.5	9.48	1.027	3600 (93%)	[1]
CoO@NiO/Activated carbon textiles // Activated carbon textiles /graphene	1.6	147.6	52.26	9.53	2000 (97.53%)	[2]
3D MnO_2 network// Activated carbon	1.7	762	40.2	6.23	8000 (90%)	[3]
MnO_2/graphene // Carbon nanotubes/grphene	1.8	69.4	31.8	9.19	10000 (84.4%)	[4]
H-TiO_2@$Ni(OH)_2$// N-doped carbon Nanowires	1.8	150.6	70.9	20.9	5000 (90%)	[5]
NiMn-LDH/ Carbon nanotubes // RGO/ Carbon nanotubes	1.7	221	88.3	17.2	1000 (94%)	[6]
$NiCo_2O_4$/ Carbon cloth// 3D porous graphene paper	1.8	71.32	60.9	11.36	5000 (96.8%)	[7]
RuO_2-IL-CMG// IL-CMG(ionic liquid functionalized-chemically modified graphene)	1.8	175	19.7	6.8	2000 (79.4%)	[8]
$CoSeO_3\cdot H_2O$/HWCNTs //HWCNTs	**2.4**	**165.3**	**132.3**	**13.17**	**10000 (94.5%)**	**our work**

Reference

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