Supplementary Information

Facile and Scalable Fabrication of Flexible Micro-supercapacitor with High Volumetric Performance Based on Ultrathin $Co(OH)_2$ Nanosheets

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Experimental section

Preparation of PVA/KOH gel electrolyte:

2.5 g of polyvinyl alcohol (PVA) was first dissolved in 25 ml of distilled water under constant stirring at 60°C until a transparent and clear solution formed. Next, 2 M of KOH was added dropwise into the PVA polymer solution under continuous stirring. This solution was stirred at room temperature to get a homogeneous and viscous gel electrolyte.

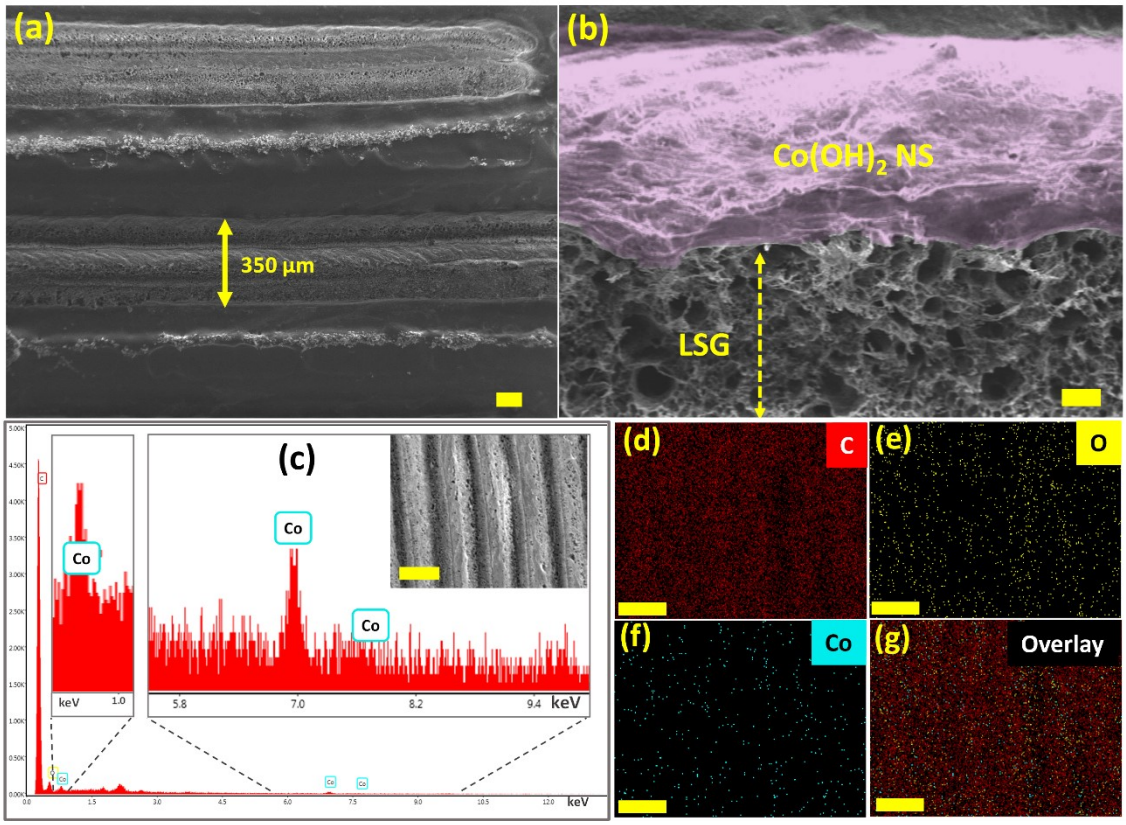

Fig. S1. FESEM images of CN-LSG MSC: (a) Low-magnification (b) Cross-sectional FESEM image showing uniform coverage of $Co(OH)_2$ NS on LSG (c) EDS spectrum, inset: EDS showing the presence of Co and FESEM image of $Co(OH)_2$ NS on LSG (d-g) elemental mapping showing uniform distribution of elements. Scale bar: (a) 100 µm, (b) 10 µm, (c-g) 200 µm.

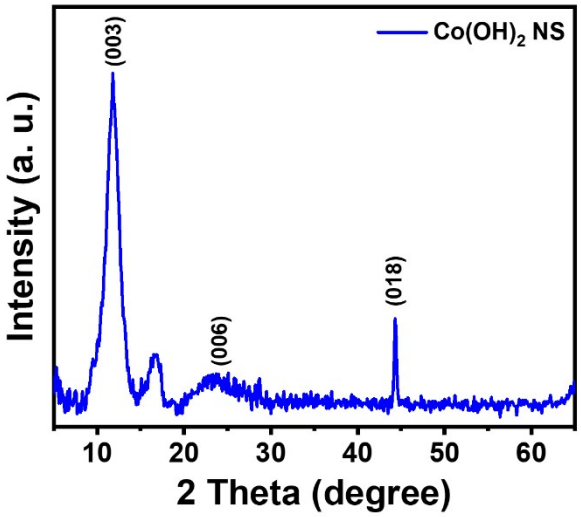

Fig. S2. XRD pattern of $Co(OH)_2$ nanosheet.

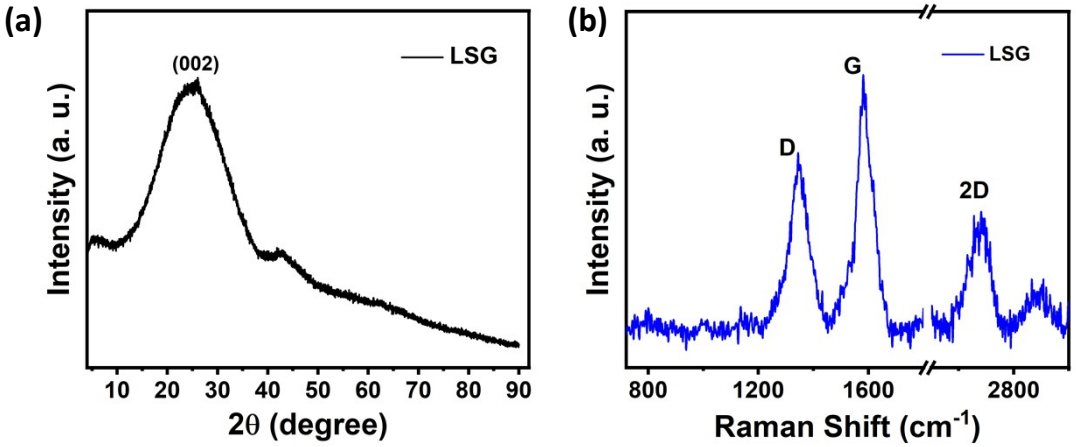

Fig. S3. (a) XRD and (b) Raman spectrum of laser-scribed graphene (LSG)

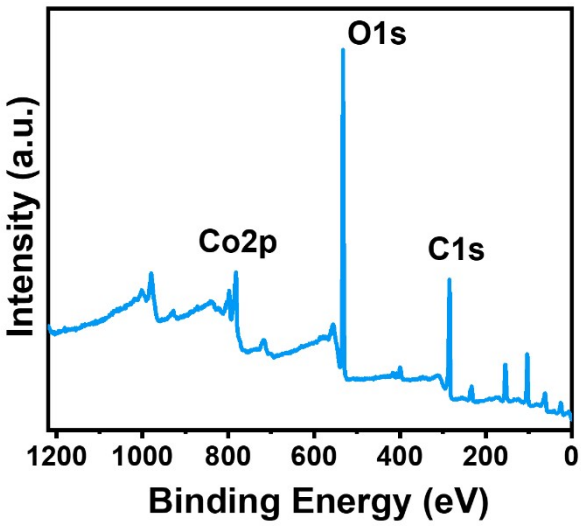

Fig. S4. XPS Survey spectrum of $Co(OH)_2$ nanosheet.

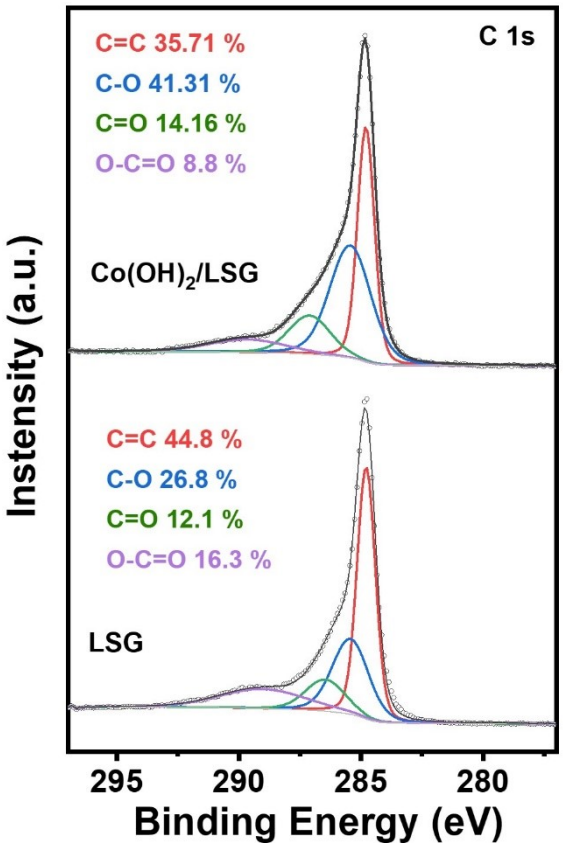

Fig. S5. (a) XPS spectrum of C1s of LSG

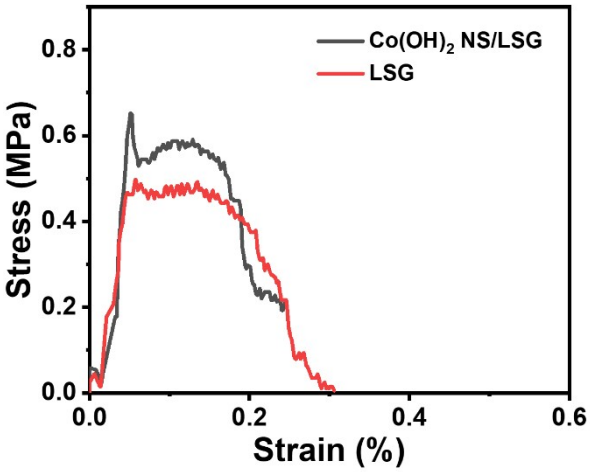

Fig. S6. Tensile stress-strain curve of LSG and $Co(OH)_2$/LSG

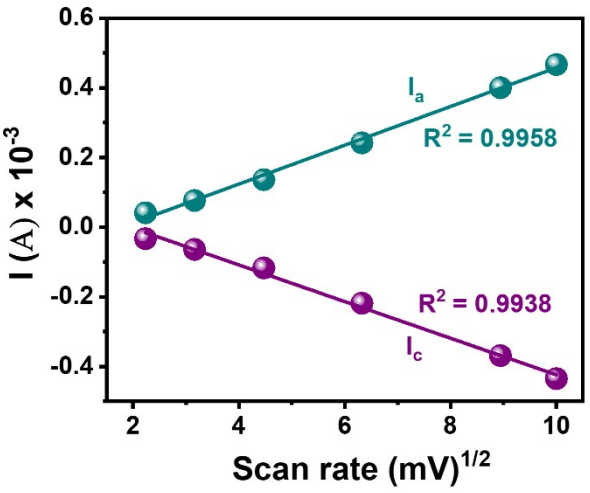

Fig. S7. Plot of the anodic (I_a) and cathodic (I_c) peak currents vs square root of scan rates.

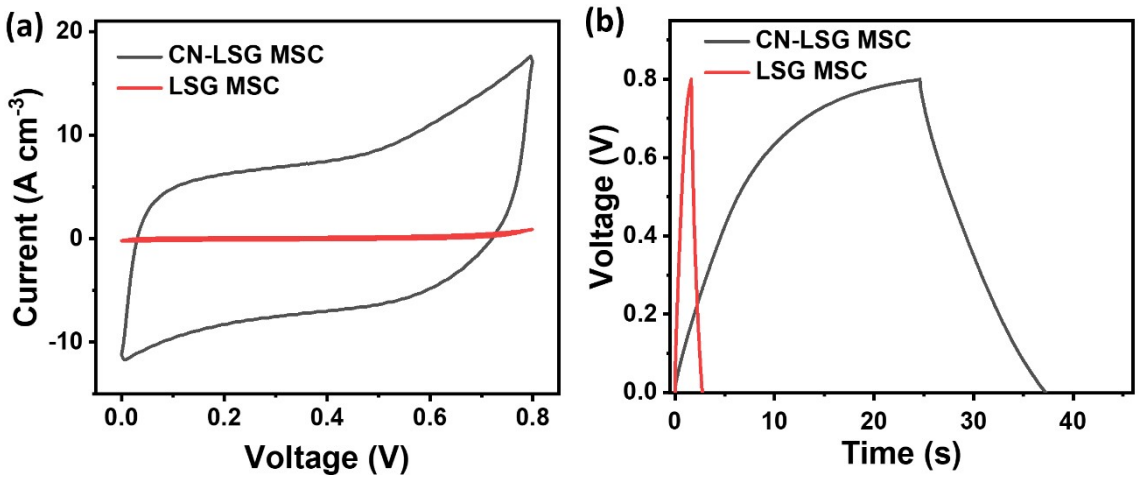

Fig. S8. Electrochemical performance of CN-LSG MSC and LSG MSC (a) CV at a scan rate of 100 mV s^{-1}, and (b) GCD at the current density of 13 A cm^{-3}.

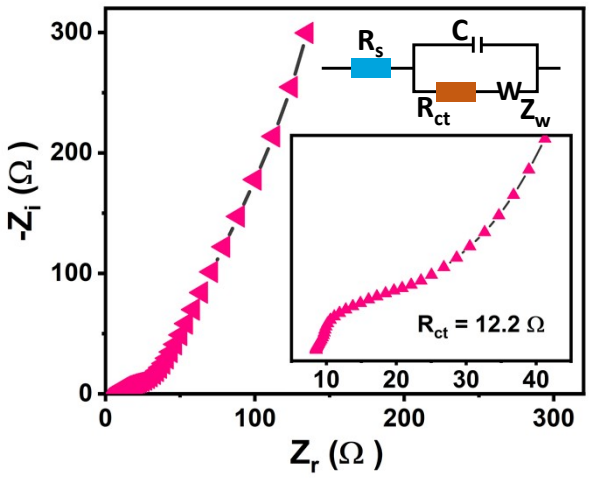

Fig. S9. Nyquist plot of CN-LSG MSC. Inset is a zoomed image showing an R_{ct} value of 12.2 Ω.

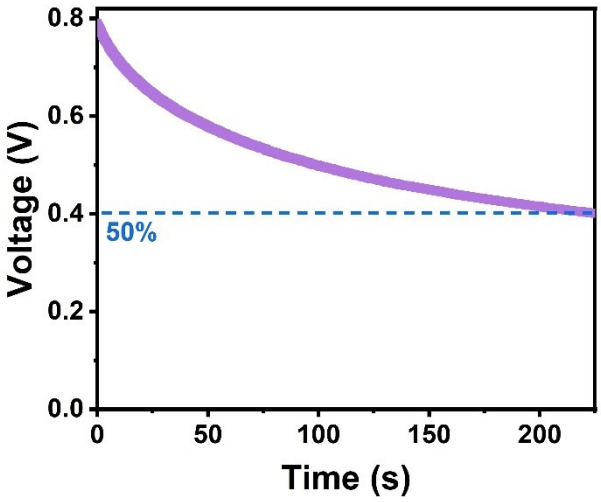

Fig. S10. Self-discharge characteristic of CN-LSG MSC: Voltage versus time after charging MSC at a constant current density of 13 A cm^{-3} up to a potential of 0.8 V.

Table S1: Mechanical properties of LSG and $Co(OH)_2$ NS /LSG electrodes.

Electrode	Maximum Load (N)	Ultimate Stress (MPa-N/mm^2)	Displacement at Maximum Load (mm)	Tensile Strength (MPa)
$Co(OH)_2$ NS /LSG	21.125	6.392	0.51	6.401
LSG	12.625	4.876	0.57	4.874

Table S2: Comparison of performance of CN-LSG MSC with recently reported MSCs.

Material	C_{Vol} (F cm^{-3})	Energy density (mWh cm^{-3})	Cyclic stability (%) / cycles	Reference
PPY-hs@CoS	-	25.6	86/5,000	[1]
S-doped CoZnNi-OH/CuCoP/CW	290	9.73	93/5,000	[2]
Graphene/$Co(OH)_2$/Ni	21	18.6	94/10,000	[3]
Co-Ni/rGO	3.85	0.63	90/3,000	[4]
α$Co(OH)_2$/rGO	130	20	99/2000	[5]
$Co(OH)_2$	39.7	12.4	84/10,000	[6]
$Co(OH)_2$/rGO	54	6	77/5,000	[7]
CuO@CoFe LDH	-	1.85	99/2,000	[8]
CN-LSG	**258**	**22**	**96/20,000**	**This work**

References

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