

Supplementary Information

Facile Preparation of Flexible Binder-Free Graphene Electrodes for High-Performance Supercapacitors

Shiqi Lin^{a,b}, Jie Tang^{a,b,*}, Wanli Zhang^{a,b}, Kun Zhang^a, Youhu Chen^a, Runsheng Gao^a,
Hang Yin^{a,b}, Xiaoliang Yu^a, Lu-Chang Qin^c

^a *National Institute for Materials Science, 1-2-1 Sengen, Tsukuba, Ibaraki 305-0047,
Japan*

^b *University of Tsukuba, 1-1-1 Tennodai, Tsukuba, Ibaraki 305-0006, Japan*

^c *Department of Physics and Astronomy, University of North Carolina at Chapel Hill,
Chapel Hill, NC 27599-3255, USA*

Corresponding author: Jie Tang, tang.jie@nims.go.jp

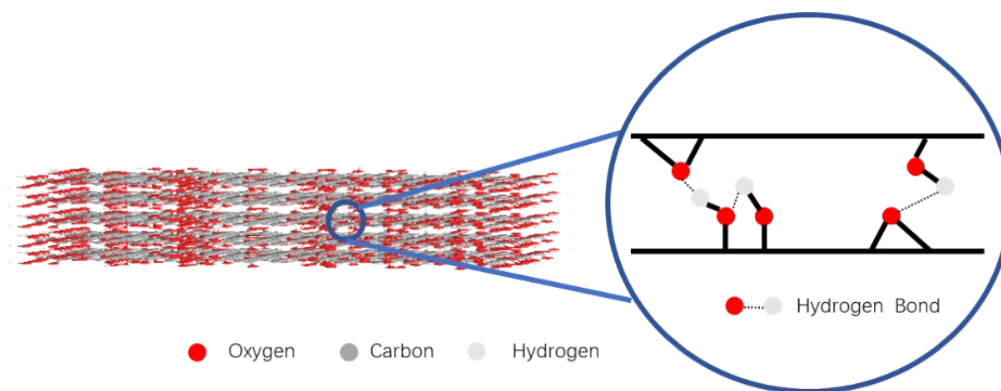


Fig. S1. Schematic illustration of hydrogen bonds in graphene oxide (GO).

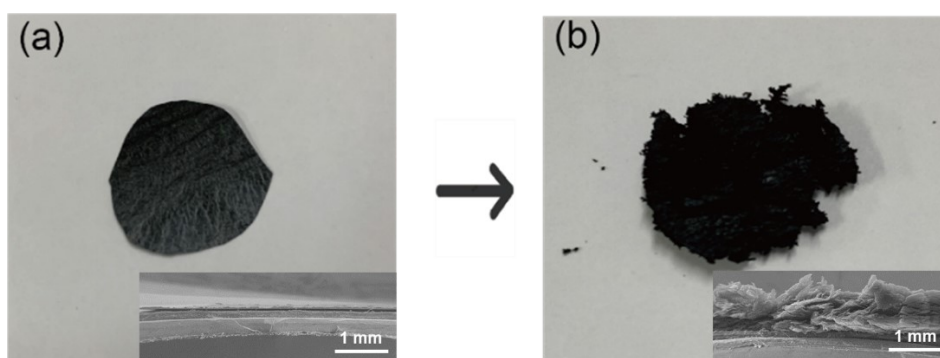


Fig. S2. Optical and SEM (inset) images of (a) GO film and (b) Reduced GO film prepared by thermal treatment at 500 °C.

Table S1 Raman Peaks of GO film, GO/TRGO film and reduced-GO/TRGO film.

Sample	Peak Index	Raman Shift (cm ⁻¹)	I _D /I _G Central Peak Ratio
GO film	D	1364.	0.93
	G	1584	
GO/TRGO film	D	1370	0.96
	G	1588	
reduced-GO/TRGO film	D	1359	0.98
	G	1586	

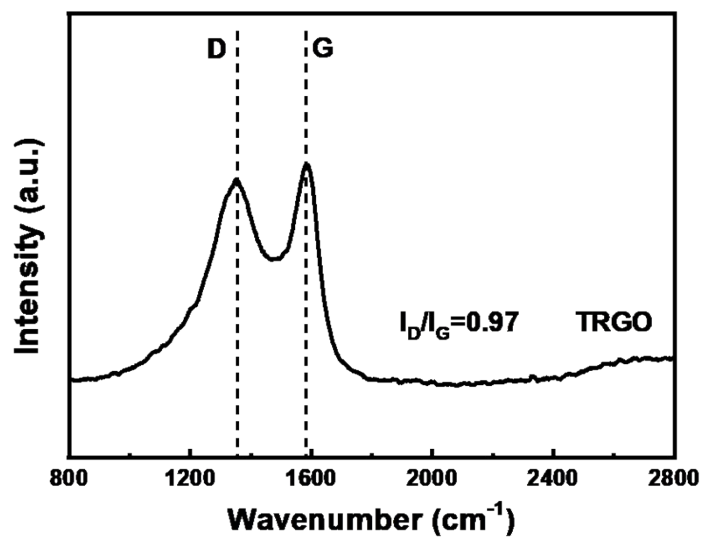


Fig. S3. Raman spectrum of TRGO.

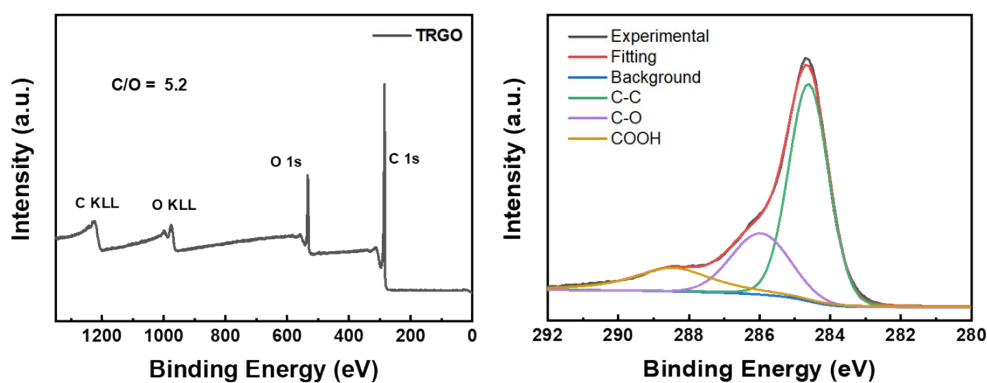


Fig. S4. (a) XPS survey spectra and (b) XPS high-resolution C 1s spectra of TRGO.

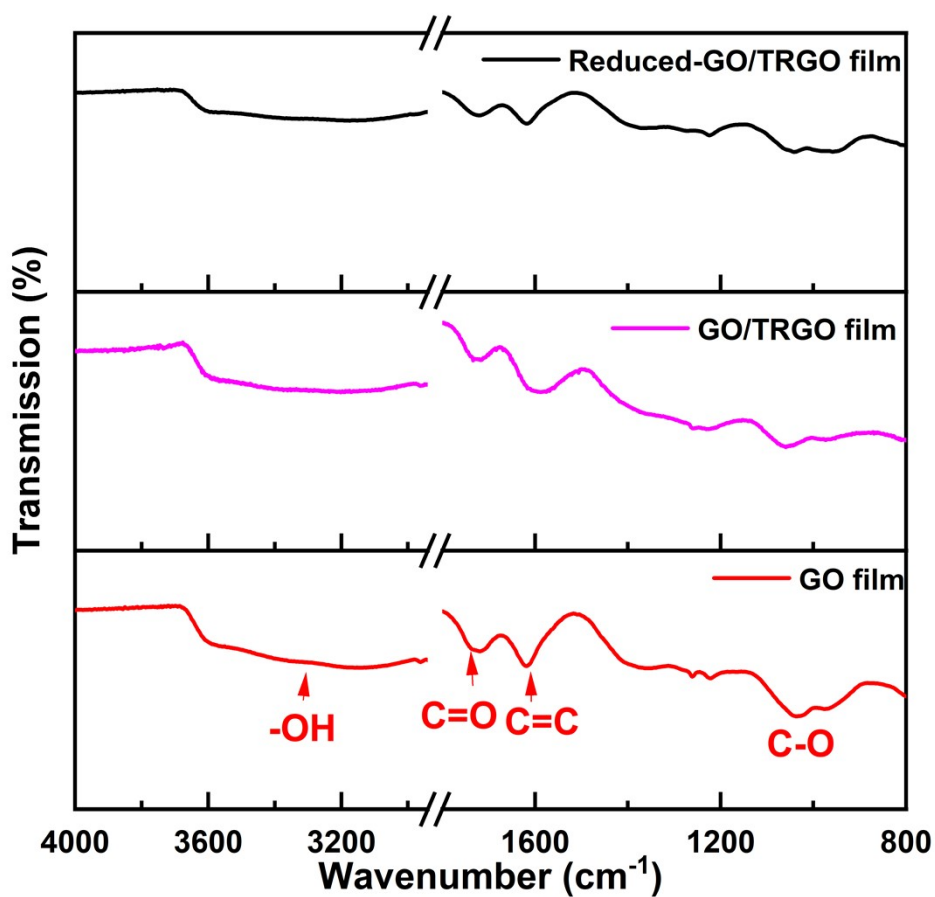


Fig. S5. FTIR spectra of GO, GO/TRGO, and reduced-GO/TRGO films.

Table S2 Specific surface area of GO/TRGO films before and after reduction.

GO/TRGO Film	
GO/TRGO (Mass ratio)	Specific Surface Area (m ² /g)
1:0	8.9
3:1	97.5
1:1	218.0
1:3	253.1
0:1	357

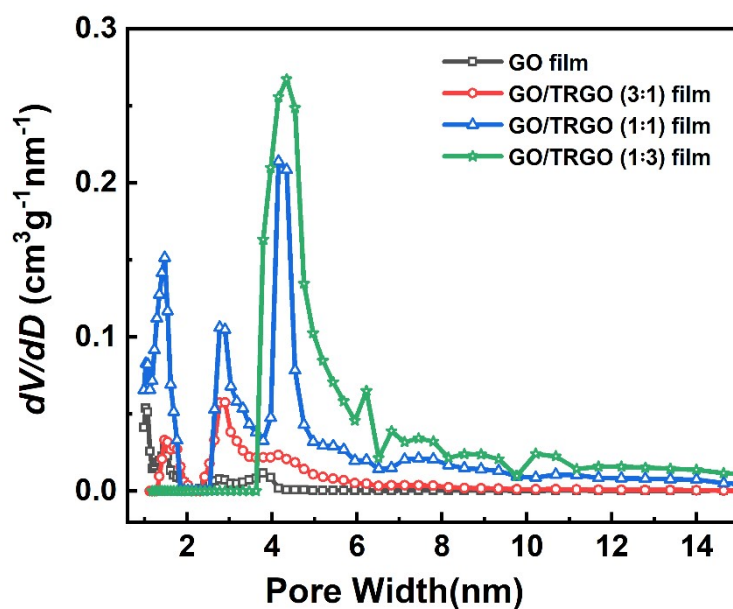


Fig. S6. Pore size distribution of GO film and GO/TRGO films with different composition (1:0, 3:1, 1:1, 1:3).

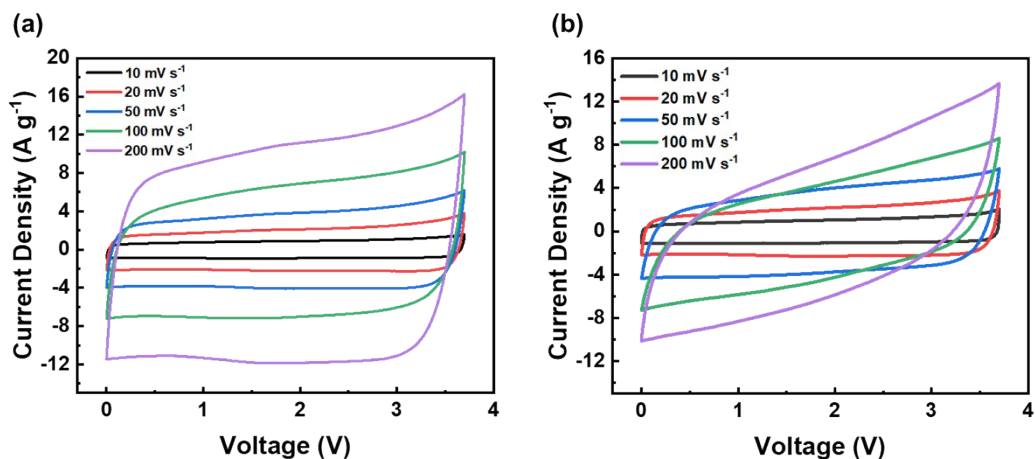


Fig. S7. CV curves of supercapacitors with (a) free-standing reduced-GO/TRGO (1:1) film and (b) filtered TRGO film electrodes at various scanning rate from 10 to 200 $mV s^{-1}$.

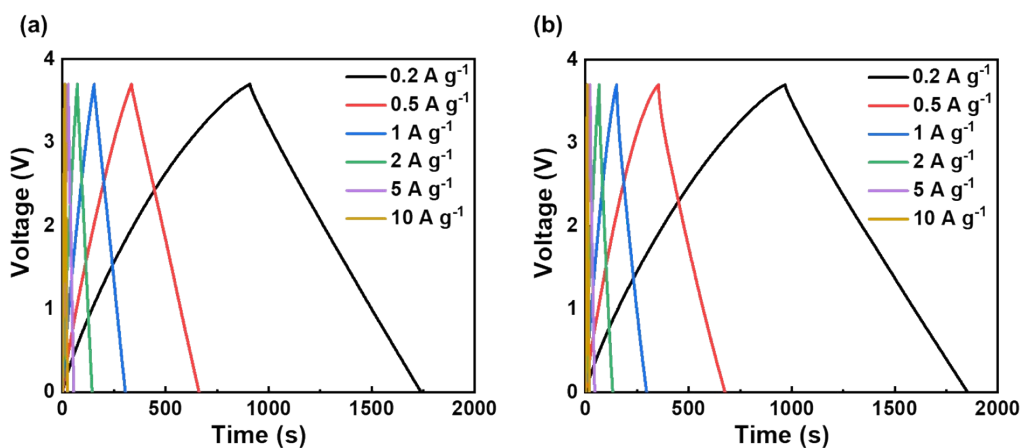


Fig. S8. Galvanostatic charge–discharge curves of supercapacitors with (a) free-standing reduced-GO/TRGO (1:1) film and (b) filtered TRGO film electrodes at different current densities from 0.2 to 10 $A g^{-1}$.

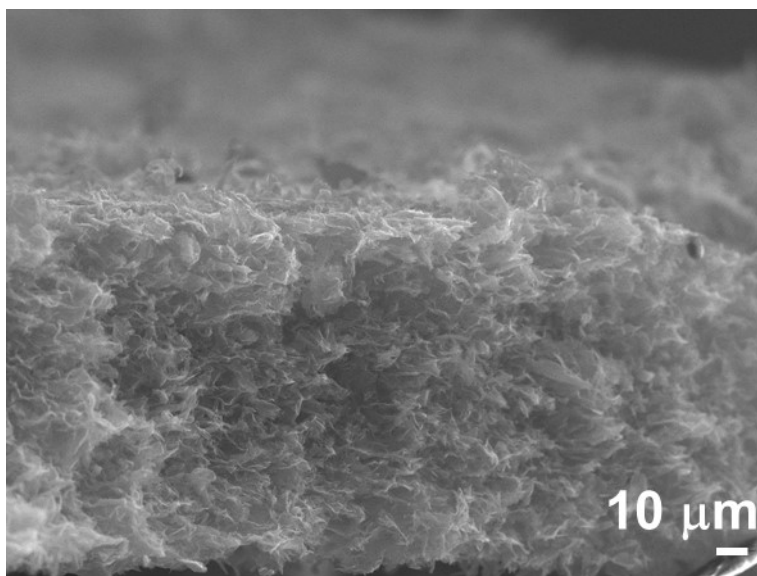


Fig. S9. Cross-sectional SEM image of filtered TRGO film.

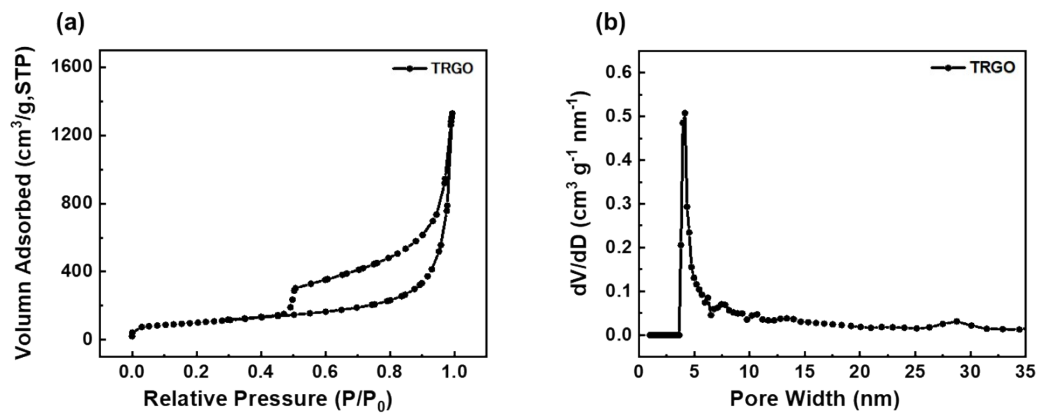


Fig. S10. (a) Nitrogen adsorption/desorption isotherms and (b) Pore size distribution of filtered TRGO film.



Fig. S11. Photograph of fabricated solid state supercapacitor.

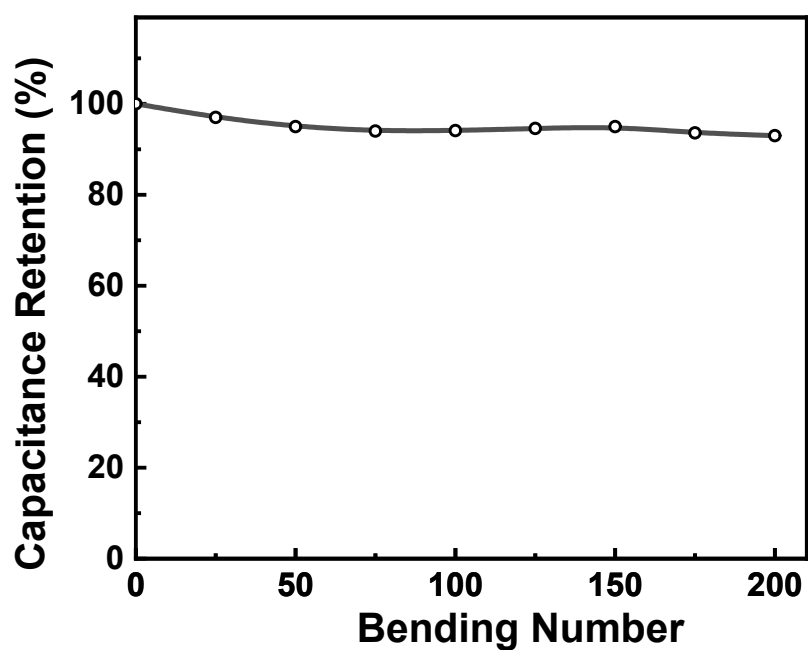


Fig. S12. Capacitance retention of solid state supercapacitor with free-standing reduced-GO/TRGO (1:1) film at bend angle of 180° under different bending cycle.

Table S3 Comparison of electrochemical performance with relevant graphene-based materials reported in literature.

Material	Electrolyte	Test Condition	Specific Capacitance (F g ⁻¹)	Energy Density (Wh kg ⁻¹)	Reference
RGO/AC/CNT	Organic (1M LiClO ₄ EC/DEC)	0.2 A/g	101	30	Ref. 2
N-doped holey graphene aerogel	EMIMTFSI	1 A/g	142.3	60.5	Ref. 3
PCSG-60	TEABF ₄	1 A/g	221	38.2	Ref. 4
IL-induced RGO	BMIMPF ₆	0.5 A/g	150	25.3	Ref. 5
EDA/RGO	BMIMBF ₄	2 mV/s	119	51	Ref. 6
N-doped graphene	BMIMBF ₄	1 A/g	137	55	Ref. 7
N/O co-doped hierarchical porous carbon	EMIBF ₄	1 A/g	51.9	22.1	Ref. 8
UHFG	TEABF ₄	1 A/g	182	46	Ref. 9
Flexible graphene	EMIBF₄	0.2 A/g	180	85.6	This work

References

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