

Sandwiched spherical tin dioxide/graphene with a three-dimensional interconnected closed pore structure for lithium storage

Bing Zhao,^{a,b} Zhixuan Wang,^a Shanshan Wang,^a Jinlong Jiang,^a Jian Si,^a Shoushuang Huang,^a Zhiwen Chen,^a Wenrong Li^{*,b} and Yong Jiang^{*,a}

^a School of Environmental and Chemical Engineering, Shanghai University, Shanghai, 200444, China. E-mail: jiangyong@shu.edu.cn

^b Institute for Sustainable Energy, Shanghai University, Shanghai 200444, China. E-mail: liwenrong@shu.edu.cn

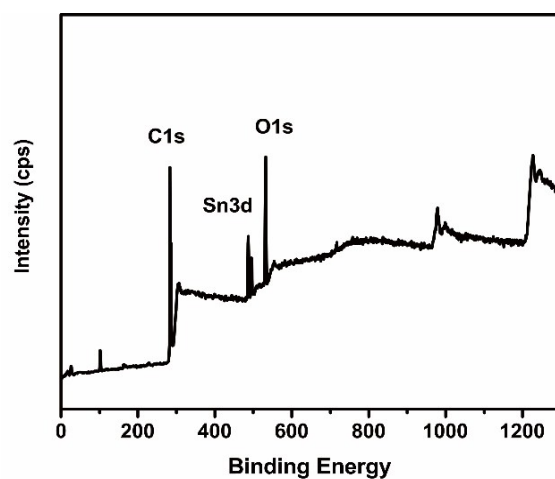


Fig. S1. Typical XPS survey spectrum of sandwich-SnO₂/GS.

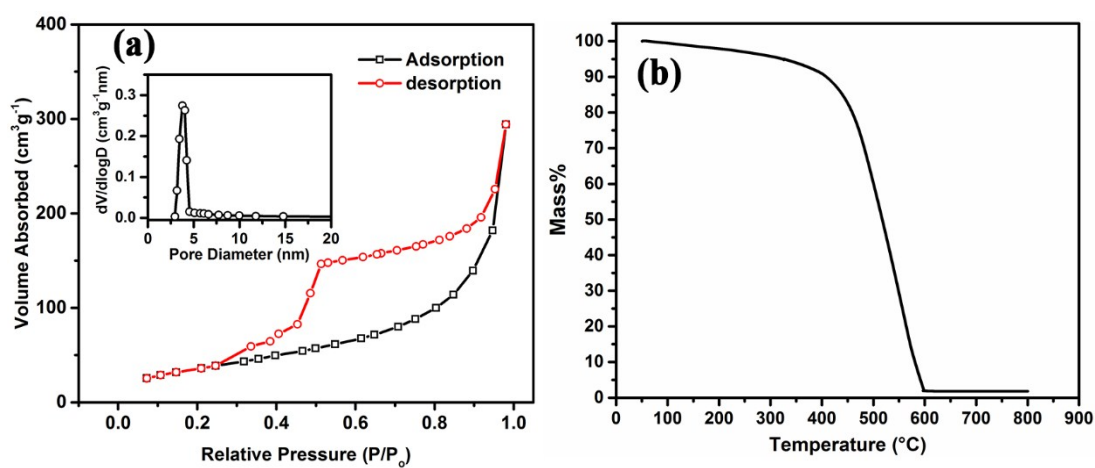


Fig. S2. (a) BET of SnO₂/GA and (b) TGA of pure spherical graphene without SnO₂

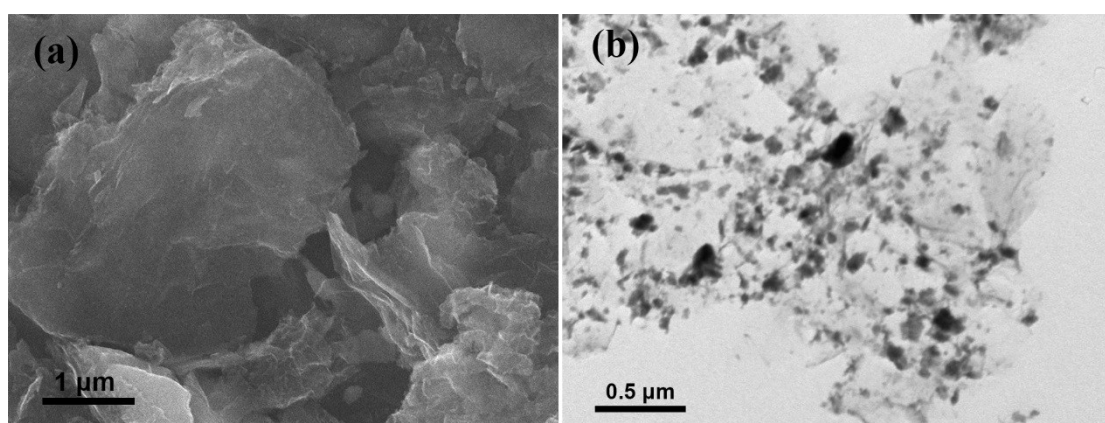


Fig. S3 (a) SEM and (b) TEM images of SnO₂/rGO without PS template.

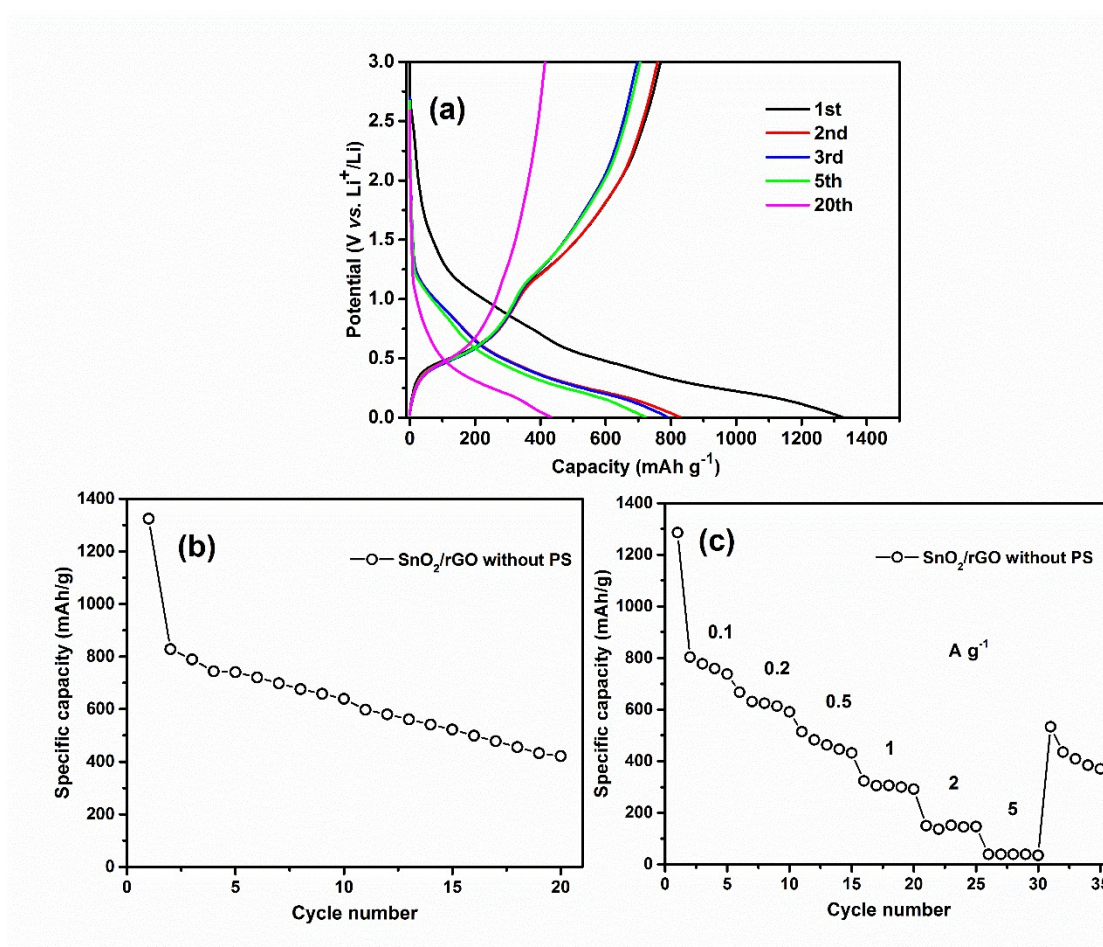


Fig. S4. (a) Charge and discharge voltage profiles at 100 mA g^{-1} , (b) cycling performances at 100 mA g^{-1} and (d) rate capabilities of SnO_2/rGO without PS.

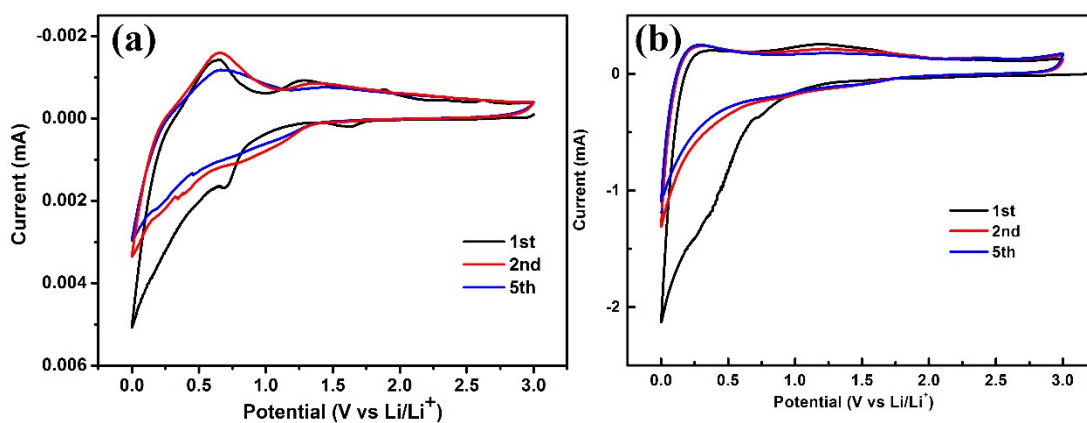


Fig. S5. Cyclic voltammogram curves of (a) SnO_2/GA and (b) pure spherical graphene without SnO_2 .

Table S1. Comparison of the capacity retention ratio between Sandwich-SnO₂/GS in this work and others reported SnO₂/C in the literature.

Sample	Current density (mA g ⁻¹)	Capacity (mAh g ⁻¹)	Cycle number	Capacity retention ratio	Reference
Sandwich-SnO ₂ /GS	100	915	100	93%	This work
	2000	564	200	83%	This work
SnO ₂ -GNS	100	800	50	73%	[32]
H-SnO ₂ @rGO	100	1107	100	82%	[35]
	1000	552	500	58%	[35]
3D hierarchical SnO ₂ -x/N-rGO	500	500	100	66%	[38]
SnO ₂ @CNTs	200	600	100	58%	[36]
C@SnO ₂ @C HNSs	100	950	50	85%	[37]
C-SnO ₂ /CNT	1000	950	150	63%	[40]
Honeycomb-like SnO ₂ @C	100	900	100	70%	[22]
SnO ₂ @G-SWCNT	100	800	100	78%	[27]
	1000	580	300	58%	[27]
p-SnO ₂ @PPy NTs	200	850	100	68%	[24]

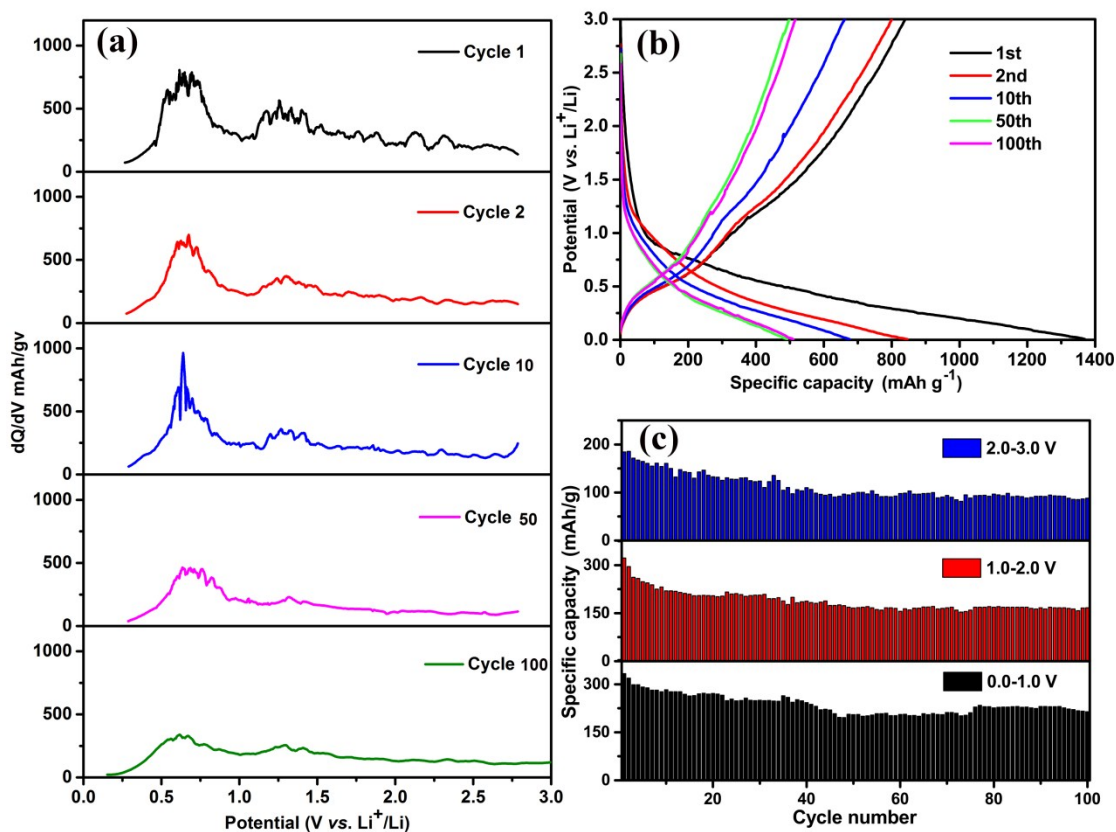


Fig. S6. (a) Differential charge-capacity plots of the SnO_2/GA at the 1st, 2nd, 10th, 50th and 100th cycle. (b) Charge and discharge voltage profiles at 100 mA g^{-1} . (c) Reversible charge capacities versus cycle number separated into potential ranges of 0.01–1.0, 1.0–2.0, and 2.0–3.0 V.

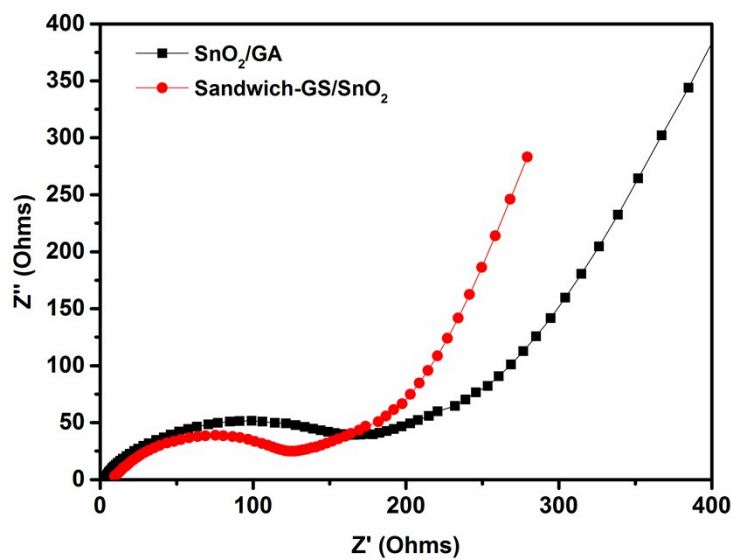


Fig. S7. EIS spectra comparison of sandwich- SnO_2/GS and SnO_2/GA composites.