

## Supplementary Materials

Article

# Binder-Free Three-Dimensional Porous Graphene Cathodes via Self-Assembly for High-Capacity Lithium–Oxygen Batteries

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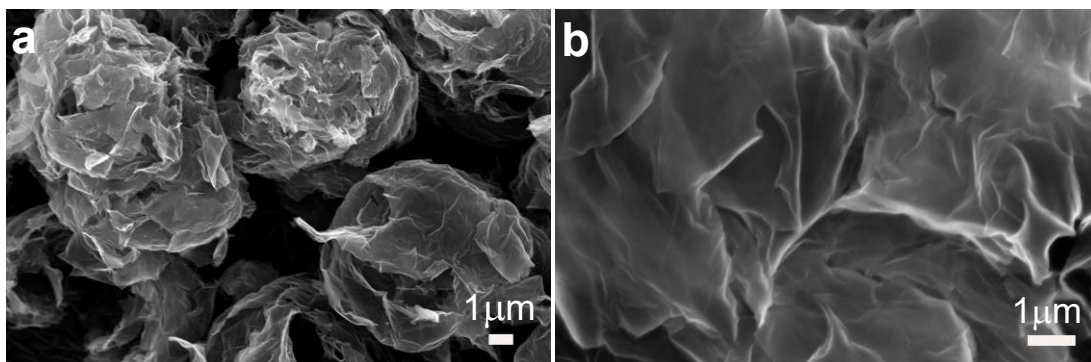
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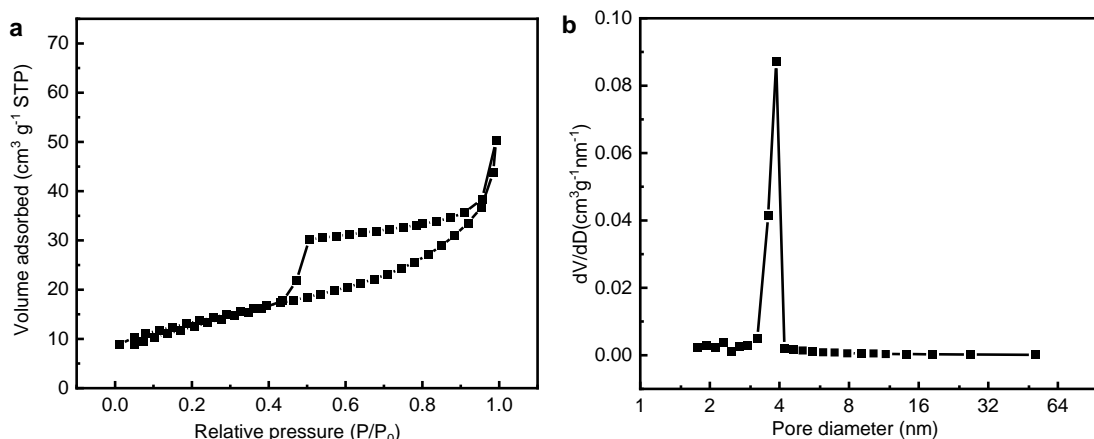
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**Figure S1.** The SEM images of rGO.

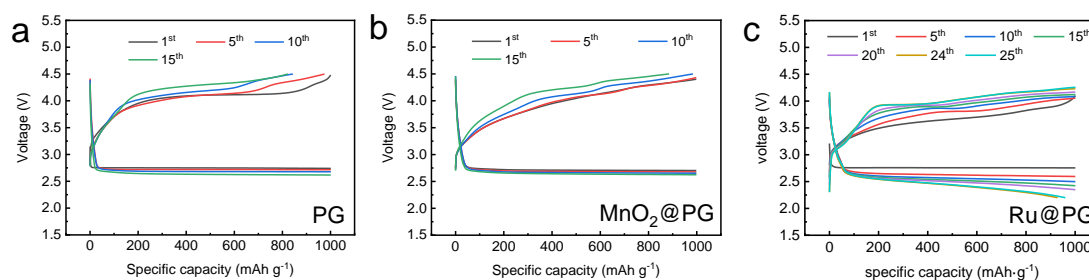


**Figure S2.** (a) The nitrogen sorption isotherm and (b) BJH pore size distribution of

PG cathode.

**Table S1.** Discharge capacity comparison of binder-free freestanding carbonaceous oxygen cathodes for LOBs.

Materials	Synthesis	Discharge capacity (discharge rate)	Year [Reference]
3D porous graphene	Self-assembling with F127 templates	10300 mAh g <sup>-1</sup> (200 mA g <sup>-1</sup> , 0.1 mA cm <sup>-2</sup> )	The present work
Graphene foam	electrochemical leavening of the graphite papers	340 mAh g <sup>-1</sup> (100 mA g <sup>-1</sup> at the 20 <sup>th</sup> cycle)	2013 [1]
3D graphene aerogel	Hydrothermal route	236 mAh g <sup>-1</sup> (50 mA g <sup>-1</sup> )	2014 [2]
Graphene paper	vacuum-assisted technique by mixing graphene with poly(4-styrenesulfonic acid) stabilizers	6910 mAh g <sup>-1</sup> (200 mA g <sup>-1</sup> )	2015 [3]
Graphene aerogel	Hydrothermal route	10000 mAh g <sup>-1</sup> (0.1 mA cm <sup>-2</sup> )	2016 [4]
Graphene foam	Carbonized melamine foam	3200 mAh g <sup>-1</sup> (100 mA g <sup>-1</sup> )	2016 [5]
CNTs-grafted graphene foam	Chemical vapor deposition	10300 mAh g <sup>-1</sup> (0.1 mA cm <sup>-2</sup> )	2018 [6]
Freestanding carbon nanotube films	Conversion from superaligned CNT arrays	4050 mAh g <sup>-1</sup> (0.1 mA cm <sup>-2</sup> )	2018 [7]
Graphite foam	polyacrylonitrile graphitization	1.2 mAh cm <sup>-2</sup> (0.1 mA cm <sup>-2</sup> )	2021 [8]
Hierarchically porous graphene	Al <sub>2</sub> O <sub>3</sub> hard template and CVD method	6300 mAh g <sup>-1</sup> 0.4 mA cm <sup>-2</sup>	2024 [9]



**Figure S3.** The voltages profiles of (a) PG, (b) MnO<sub>2</sub>@PG, and (c) Ru@PG at 200 mA g<sup>-1</sup> with a curtailed capacity of 1000 mAh g<sup>-1</sup>.

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