Supporting Information:

A dual protection strategy for stable lithium metal anode by Ag nanoseeds decorated F-doped porous graphene current collector

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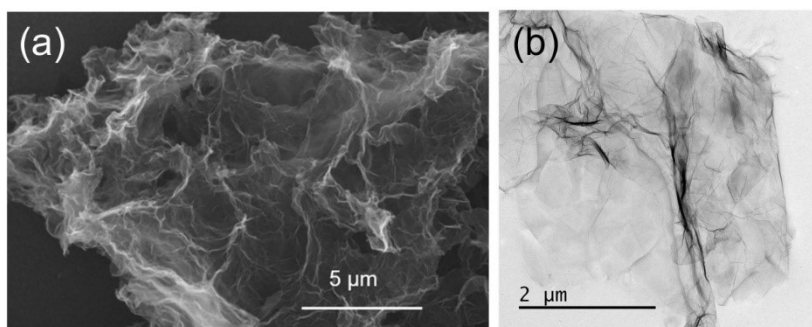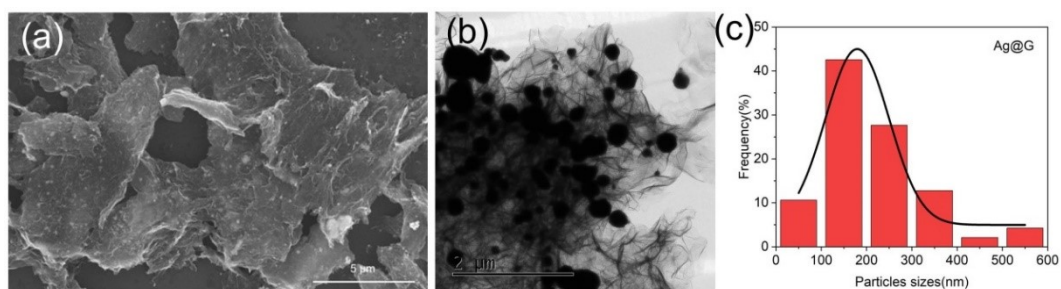
Fig. S1 (a) SEM image and (b) TEM image of FG

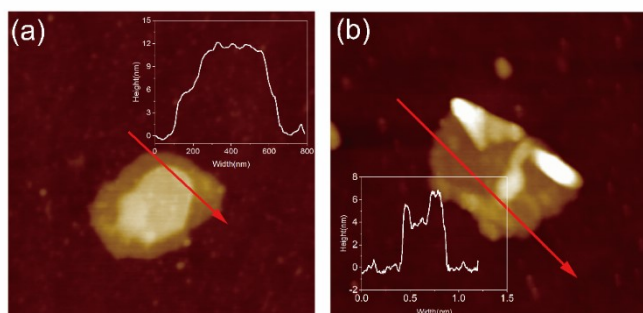**Fig. S2** (a) SEM image, (b) TEM image and (c) the particles size distribution of

Ag@G

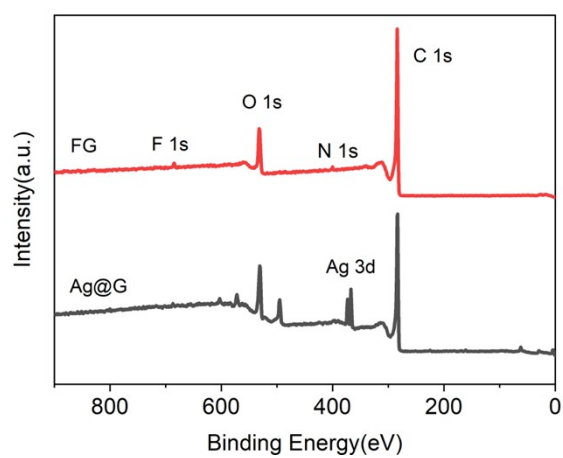**Fig. S3** AFM images of (a) FG and (b) Ag@G

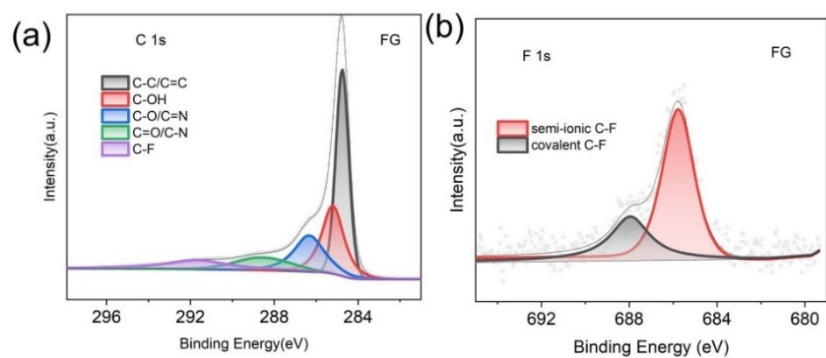**Fig. S4** XPS spectra of Ag@G and FG

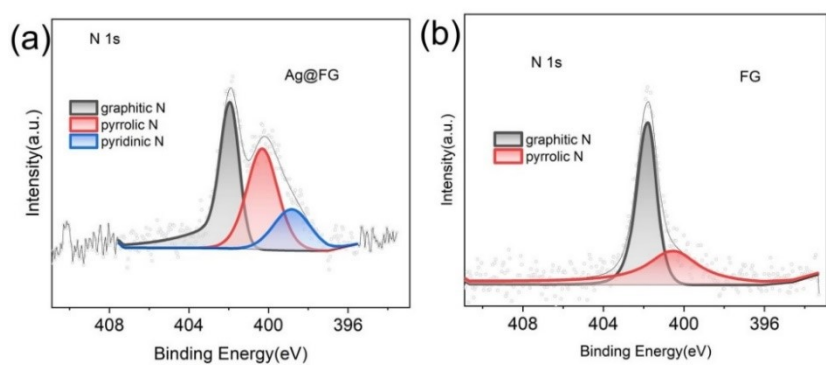**Fig. S5** High-resolution spectra of (a) C 1s (b) F 1s for FG

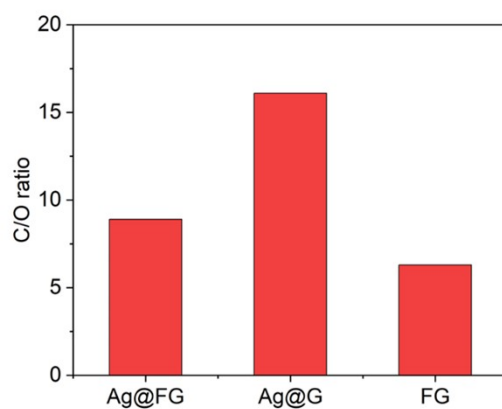**Fig. S6** High-resolution N 1s spectra of (a) Ag@FG and (b) FG

Fig. S7 The C/O ratio of the Ag@FG, Ag@G and FG
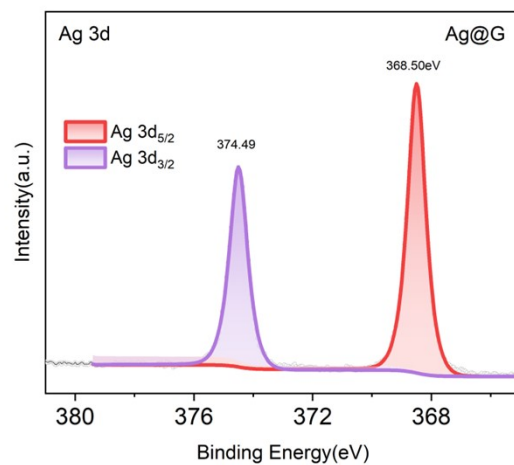
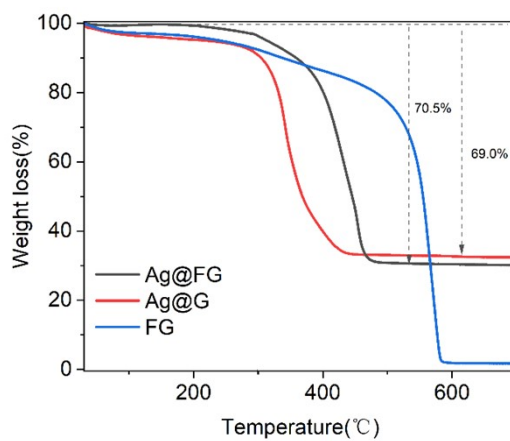**Fig. S8** High-resolution Ag 3d spectra of the Ag@G

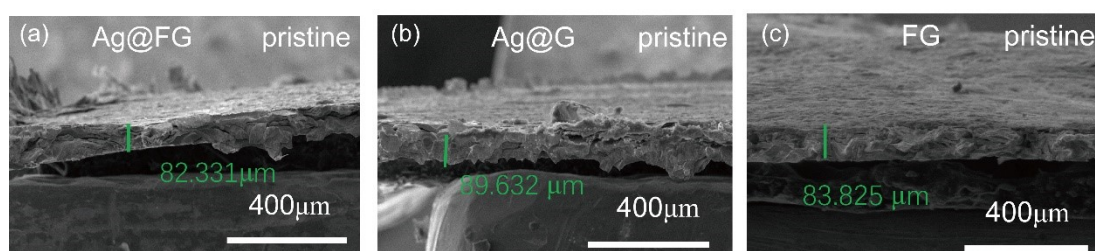**Fig. S9** The TGA curves of the Ag@FG, Ag@G and FG

Fig. S10 Cross-section SEM images before Li deposition (a) Ag@FG, (b) Ag@G, (c) FG
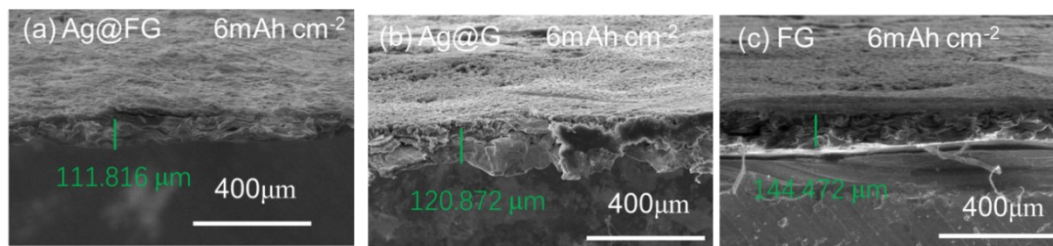
Fig. S11 Cross-section SEM images after depositing 6 mAh cm^{-2} Li at 0.5 mA cm^{-2} and (a) Ag@FG, (b) Ag@G, (c)FG
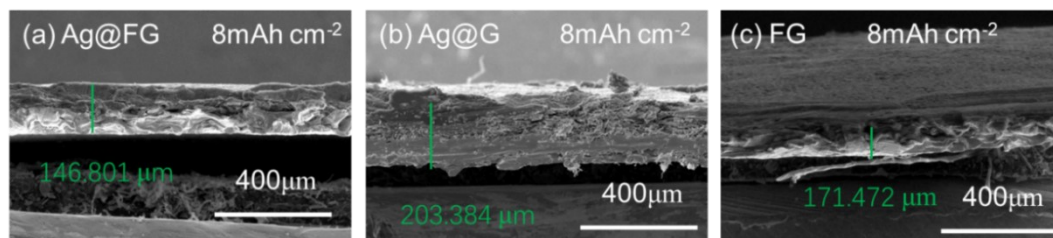

Fig. S12 Cross-section SEM images after depositing 8 mAh cm^{-2} Li deposition at 0.5 mA cm^{-2} (a) Ag@FG, (b) Ag@G, (c)FG
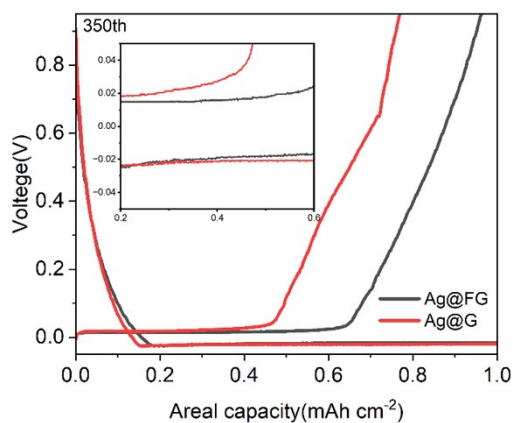

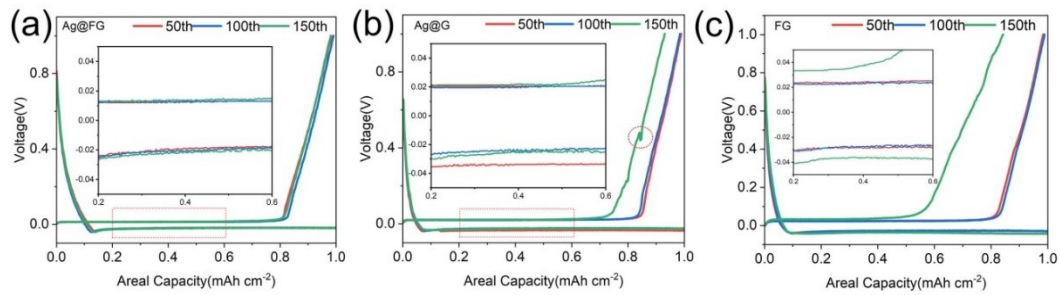**Fig. S13** Galvanostatic voltage profiles of the Ag@FG and Ag@G electrodes at 350 th at 0.5 mA cm^{-2} for 1.0 mAh cm^{-2}

Fig. S14 (a)-(c) Galvanostatic voltage profiles of the Ag@FG, Ag@G, FG electrodes at 50 th, 100 th, 150 th at 1.0 mA cm^{-2} for 1.0 mAh cm^{-2}
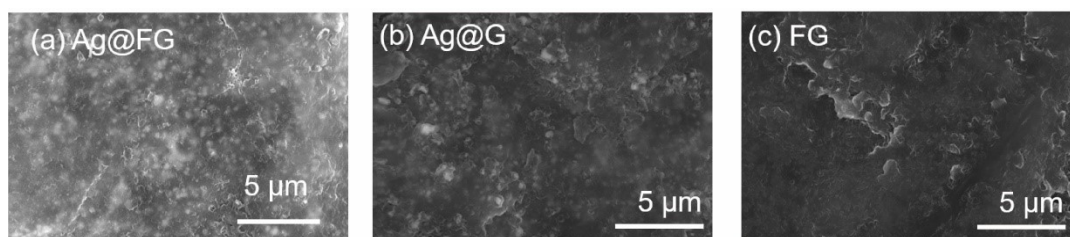

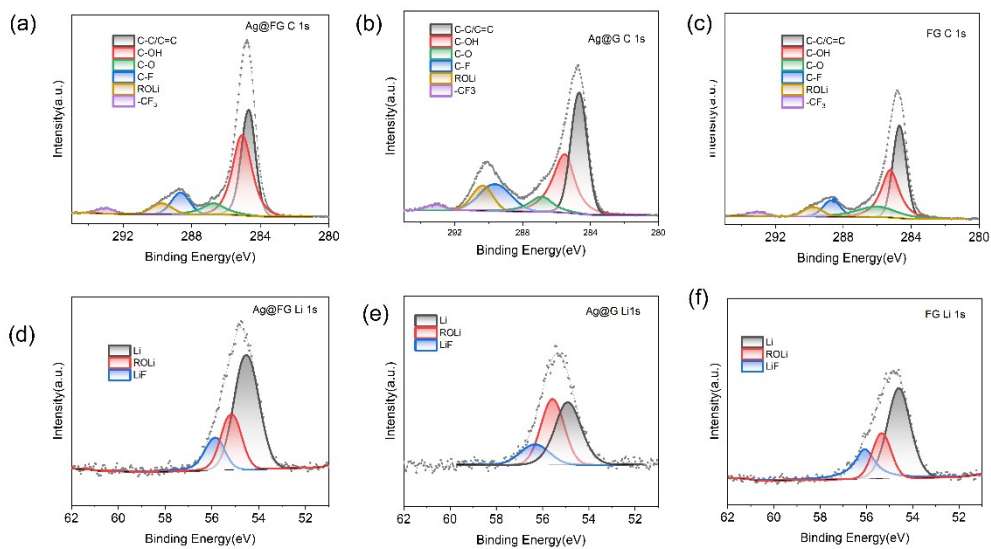**Fig. S15** SEM images of (a)Ag@FG, (b)Ag@G, (c)FG electrodes after 150 cycles

Fig. S16 C 1s XPS spectra of (a)Ag@FG, (b)Ag@G, (c)FG electrodes after 150 cycles; Li 1s XPS spectra of (d)Ag@FG, (e)Ag@G, (f)FG electrodes after 150 cycles
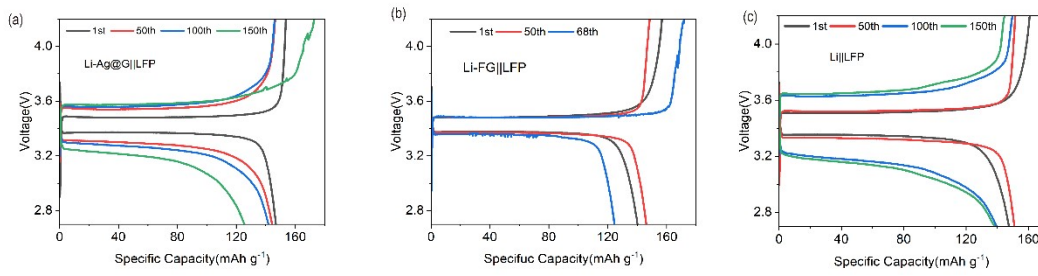
Fig. S17 Charge and discharge profile of (a) Li-Ag@G‖LFP, (b) Li-FG‖LFP, (c) Li‖LFP at 0.5 C
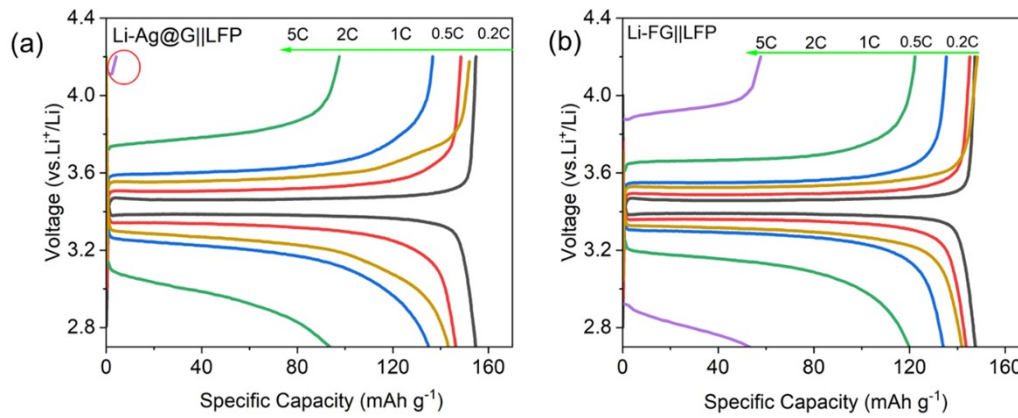

Fig. S18 Charge and discharge profile of (a) Li-Ag@G‖LFP and (b) Li-FG‖LFP at 0.2 C, 0.5 C, 1 C, 2 C, 5 C

Table S1. Coulombic efficiency of Ag@FG host compared with other previously-reported current collector for Li anode

substrates	Current (mA cm^{-2})	Capacity (mAh cm^{-2})	CE (%)	Cycle	Reference
This work	1	1	97.29	200	
3D porous Cu current collector	1	1	97	140	[55]
Interconnected hollow carbon nanosphere	1	1	97.5	150	[56]
3D N-doped porous carbon nanoflake	1	1	98	150	[57]
N-doped graphene	1	1	98	190	[58]
Ni foam decorated with cobalt nitride nanobrush	0.5	1	98.3	200	[59]