

Supplementary Information

Confined oriented growth of FeSe₂ on porous graphene film as binder-free anodes for high-rate lithium-ion batteries

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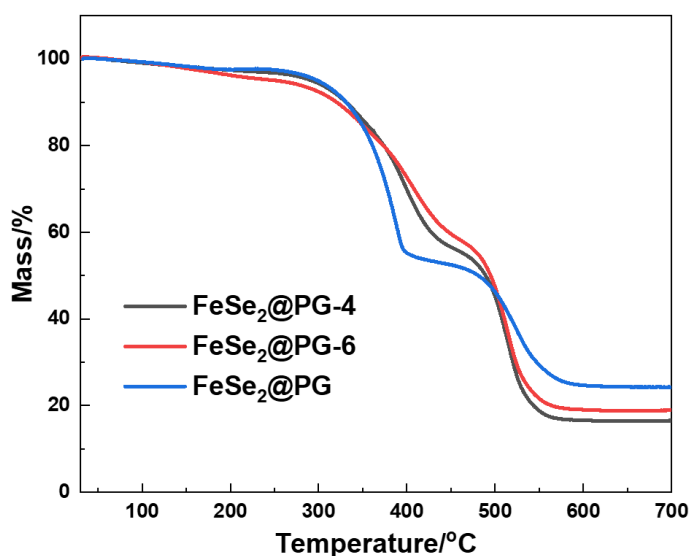


Fig. S1 TG curves of FeSe₂@PG-4, FeSe₂@PG-6, and FeSe₂@PG.

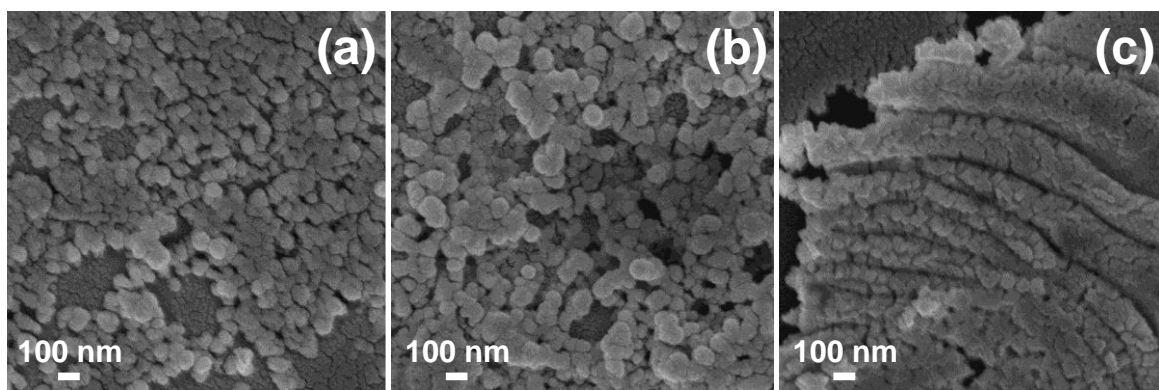


Fig. S2 SEM images of (a) FeSe₂@PG-4, (b) FeSe₂@PG-6, and (c) FeSe₂@PG electrodes after cycling.

Table S1 The area of C=C/C-C, C-Se, C-O, and C=O in C1s spectra of FeSe₂@PG-4, FeSe₂@PG-6, and FeSe₂@PG.

| | FeSe ₂ @PG-4 | FeSe ₂ @PG-6 | FeSe ₂ @PG |
|--------------------------------|-------------------------|-------------------------|-----------------------|
| Area of C=C/C-C in C1s spectra | 73724.09 | 82562.79 | 58849.23 |
| Area of C-Se in C1s spectra | 16359.72 | 25150.84 | 23045.96 |
| Area of C-O in C1s spectra | 11312.03 | 7604.015 | 5164.088 |
| Area of C=O in C1s spectra | 7785.473 | 8036.601 | 4746.244 |

Table S2 The area of Se-Se, Se-Fe-Se, Fe-Se, Se-O, C-Se-Fe, and C-Se-C in Se 3d spectra of FeSe₂@PG-4, FeSe₂@PG-6, and FeSe₂@PG.

| | FeSe ₂ @PG-4 | FeSe ₂ @PG-6 | FeSe ₂ @PG |
|-----------------------------------|-------------------------|-------------------------|-----------------------|
| Area of Se-Se in Se 3d spectra | 4816.495 | 4834.59 | 3890.376 |
| Area of Se-Fe-Se in Se 3d spectra | 2931.876 | 3452.356 | 3007.696 |
| Area of Fe-Se in Se 3d spectra | 1192.594 | 1767.92 | 2057.808 |
| Area of Se-O in Se 3d spectra | 4402.071 | 4799.897 | 4903.049 |
| Area of C-Se-Fe in Se 3d spectra | 1167.308 | 1998.7 | 2085.992 |
| Area of C-Se-C in Se 3d spectra | 329.547 | 503.768 | 297.381 |

Table S3 The area ratio of C=C/C–C, C–Se, C–O, and C=O in C1s spectra of FeSe₂@PG-4, FeSe₂@PG-6, and FeSe₂@PG.

| | FeSe ₂ @PG-4 | FeSe ₂ @PG-6 | FeSe ₂ @PG |
|--------------------------------|-------------------------|-------------------------|-----------------------|
| Area of C=C/C–C in C1s spectra | 67.5 % | 66.9 % | 64.1 % |
| Area of C–Se in C1s spectra | 15.0 % | 20.4 % | 25.1 % |
| Area of C–O in C1s spectra | 10.4 % | 6.2 % | 5.6 % |
| Area of C=O in C1s spectra | 7.1 % | 6.5 % | 5.2 % |

Table S4 The area ratio of Se–Se, Se–Fe–Se, Fe–Se, Se–O, C–Se–Fe, and C–Se–C in Se 3d spectra of FeSe₂@PG-4, FeSe₂@PG-6, and FeSe₂@PG.

| | FeSe ₂ @PG-4 | FeSe ₂ @PG-6 | FeSe ₂ @PG |
|-----------------------------------|-------------------------|-------------------------|-----------------------|
| Area of Se–Se in Se 3d spectra | 32.5 % | 27.8 % | 24.0 % |
| Area of Se–Fe–Se in Se 3d spectra | 19.8 % | 19.9 % | 18.5 % |
| Area of Fe–Se in Se 3d spectra | 8.0 % | 10.2 % | 12.7 % |
| Area of Se–O in Se 3d spectra | 29.7 % | 27.7 % | 30.2 % |
| Area of C–Se–Fe in Se 3d spectra | 7.8 % | 11.5 % | 12.8 % |
| Area of C–Se–C in Se 3d spectra | 2.2 % | 2.9 % | 1.8 % |

Table S5 The electrolyte resistance, SEI film resistance, and charge-transfer resistance of FeSe₂@PG-4, FeSe₂@PG-6, and FeSe₂@PG.

| | FeSe ₂ @PG-4 | FeSe ₂ @PG-6 | FeSe ₂ @PG |
|--------------------------------|-------------------------|-------------------------|-----------------------|
| The electrolyte resistance | 5.601 | 3.825 | 3.374 |
| The SEI film resistance | 9.241 | 9.209 | 6.866 |
| The charge-transfer resistance | 42.1 | 39.17 | 29.26 |