

## Supporting information

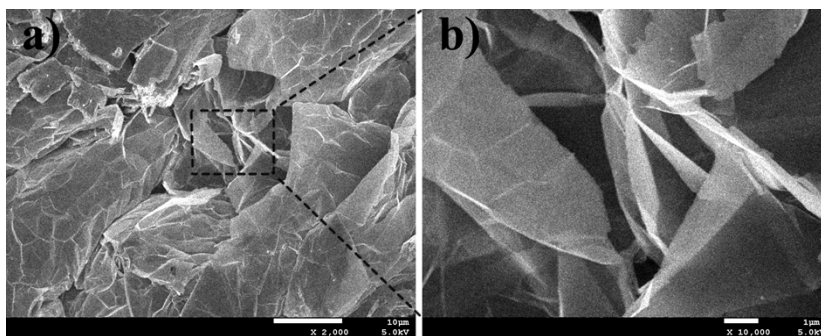


Fig. S1 Morphology of the untreated expanded graphite.

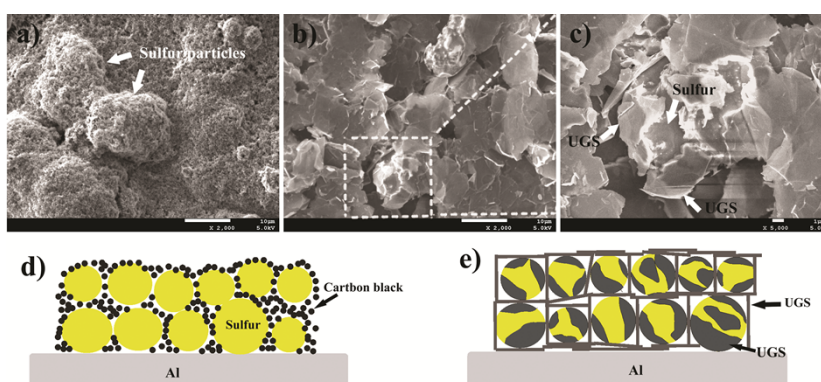


Fig. S2 Morphology and schematic illustration of the pristine sulfur cathodes with carbon black (a, d) and UGS (b, c, e).

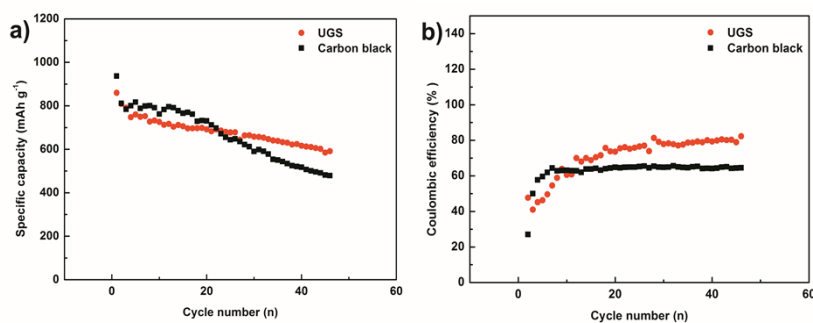


Fig. S3 The Cycle performances (a) and coulombic efficiencies (b) of the sulfur cathodes with UGS and carbon black at 0.2 C.

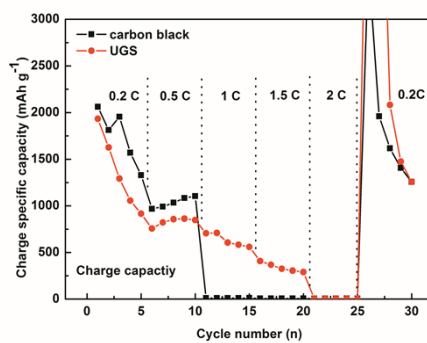


Fig. S4 The charge capacities of the sulfur cathodes charged at various rates and discharged at 0.2 C.

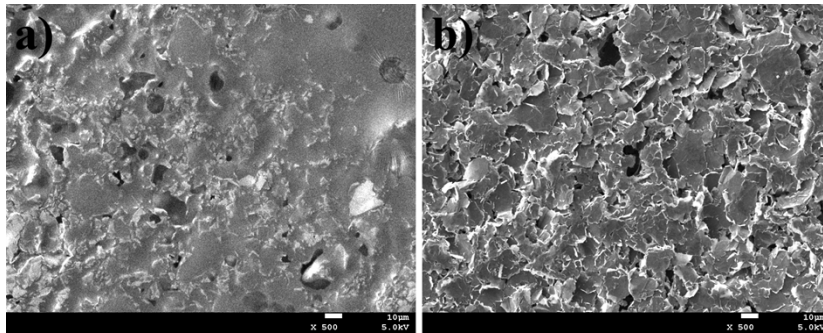


Fig. S5 Morphology of the sulfur/UGS cathode after 1<sup>st</sup> discharge (a) and 1<sup>st</sup> charge (b).

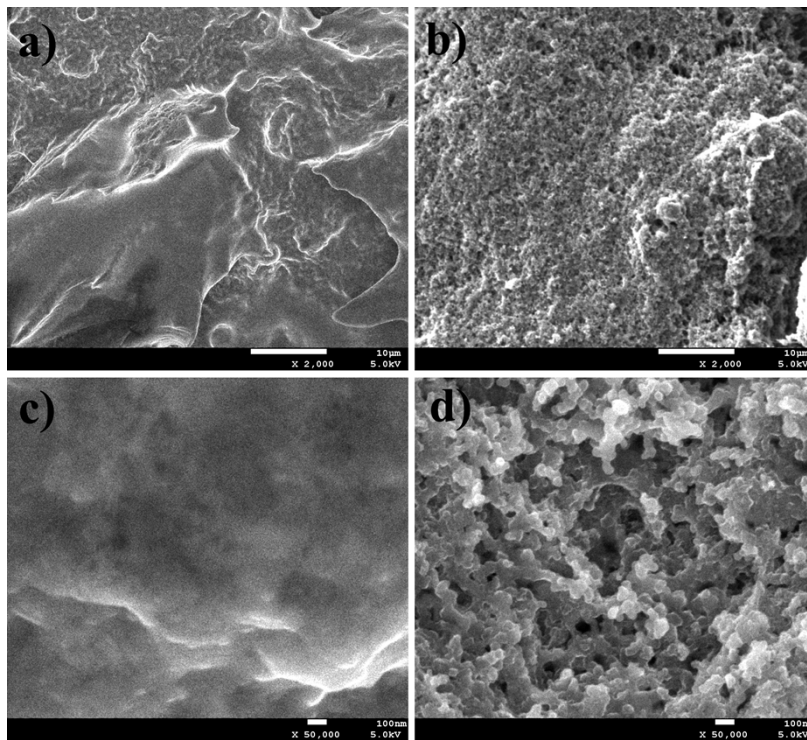


Fig. S6 Morphology of the sulfur/carbon black cathode after 1<sup>st</sup> discharge (a, c) and 1<sup>st</sup> charge (b, d).