Supporting Information

3D Porous Graphene Aerogel Cathode with High Sulfur Loading and Embedded TiO_2 Nanoparticles for Advanced Lithium-Sulfur Batteries

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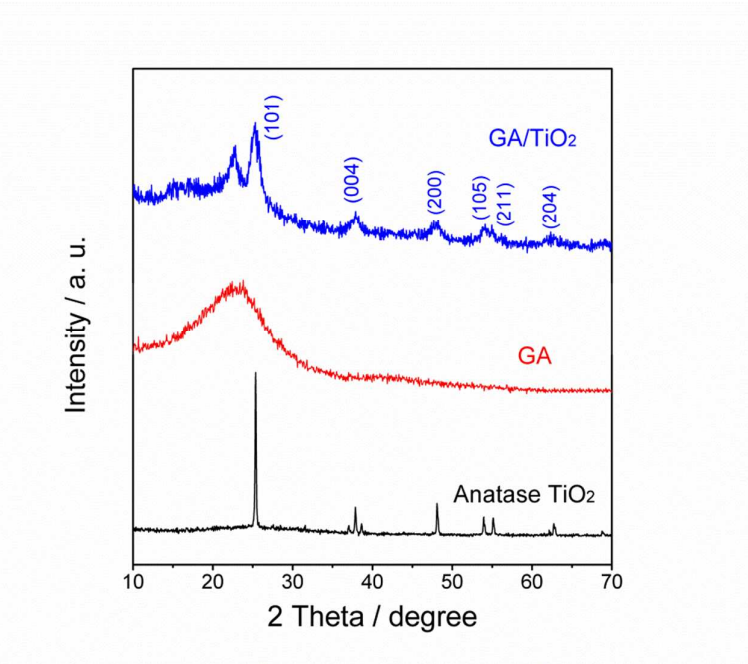

Figure S1. XRD patterns of neat TiO_2, neat GA and GA/TiO_2 composite.

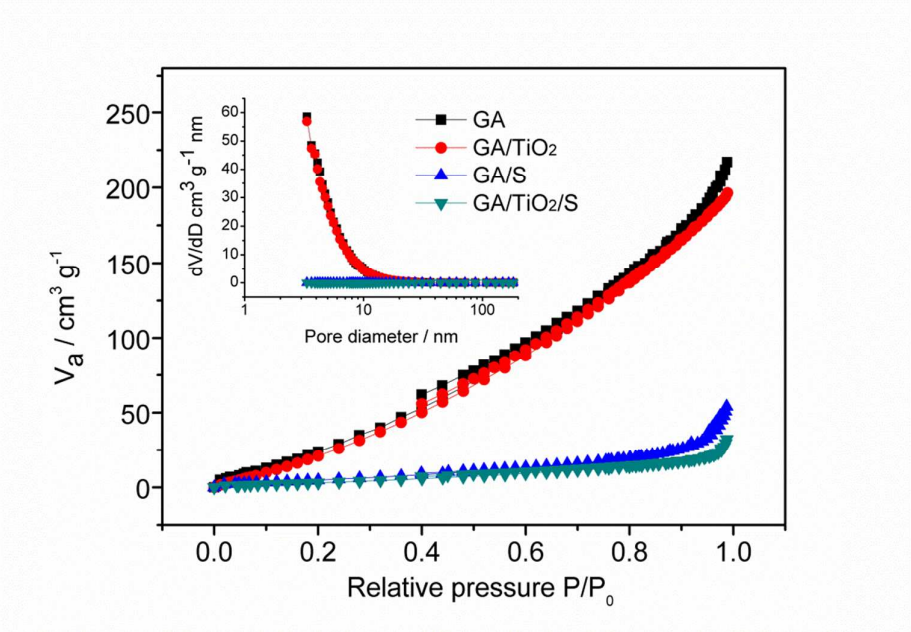

Figure S2. Nitrogen adsorption/desorption isotherm curves and pore size distributions of neat GA, GA/TiO_2, GA/S and GA/TiO_2/S composites.

Table S1 Surface areas and pore volumes of neat GA, GA/TiO2, GA/S and GA/TiO_2/S composites

Materials	Surface area (m^2/g)	Pore volume (cm^3/g)
GA	219.5	0.3249
GA/TiO_2	129.5	0.2973
GA/S	20.1	0.0736
GA/TiO_2/S	14.1	0.0418

As shown in Figure S2 and Table S1, GA presented a large surface area of 219.5 m^2/g and a large pore volume of 0.3249 cm^3/g. With TiO_2 nanoparticles grown on the graphene layers, the GA/TiO_2 composite maintained a highly porous structure in spite of the reduced surface area and pore volume. After the incorporation of sulfur into GA and GA/TiO_2, the specific surface areas for the GA/S and GA/TiO_2/S composites dramatically decreased to 20.1 and 14.1 m^2/g, respectively, indicating the sulfur particles occupying the most of micro- and mesopores.

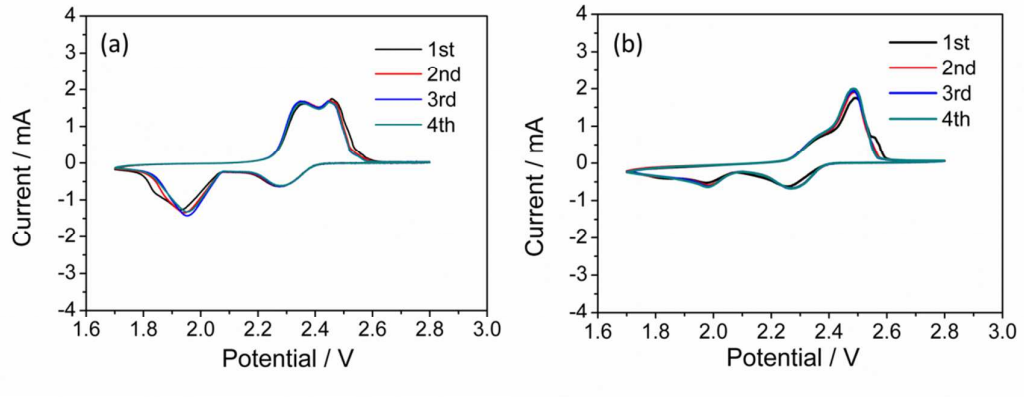

Figure S3. Cyclic voltammetric profiles of (a) GA/S composite electrode and (b) pure sulfur electrode at a scan rate of 0.1 mV/s.

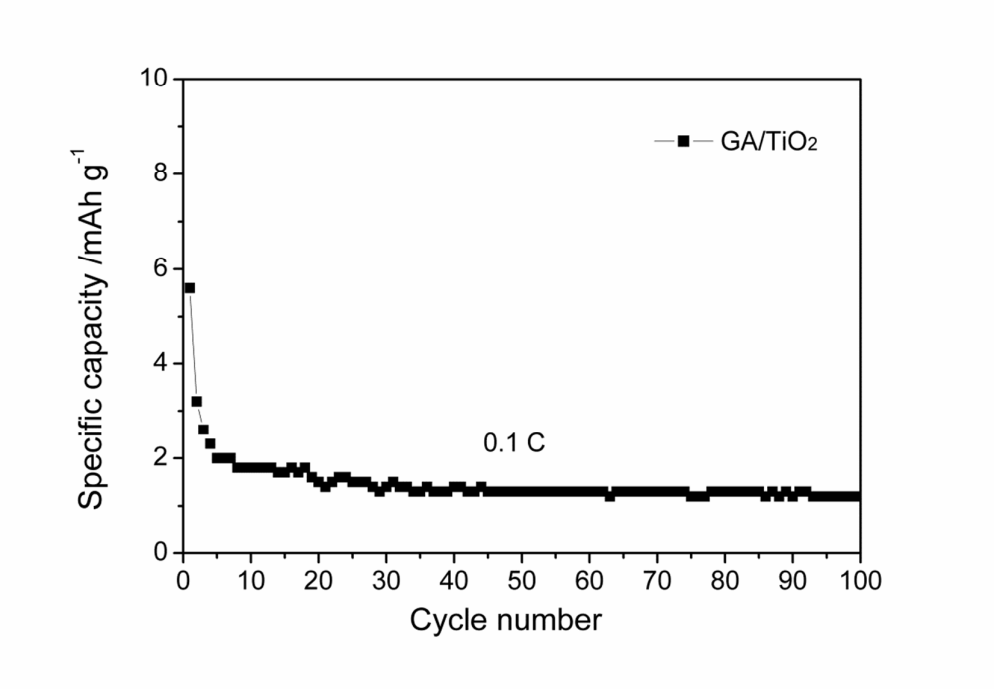

Figure S4. Cyclic performace of GA/TiO_2 composite electrode without sulfur.

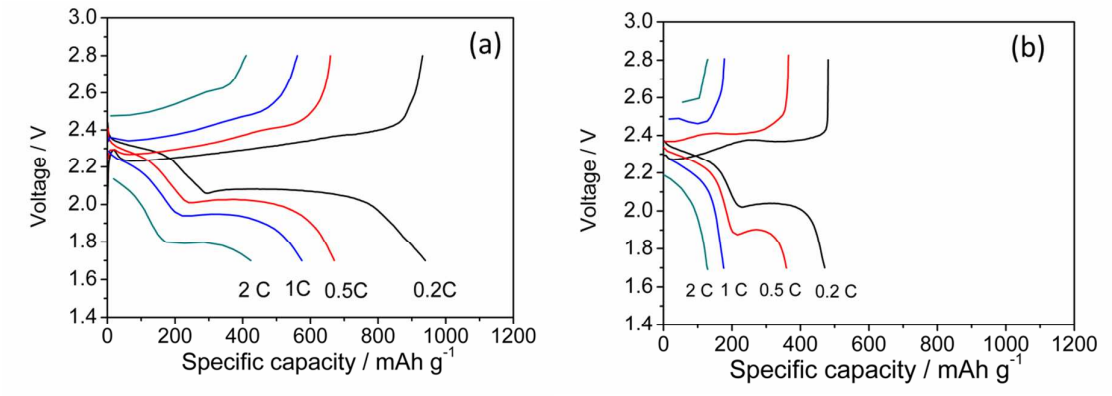

Figure S5. Charge/discharge voltage profiles of (a) GA/S electrode and (b) pure sulfur electrode determined at different current rates.

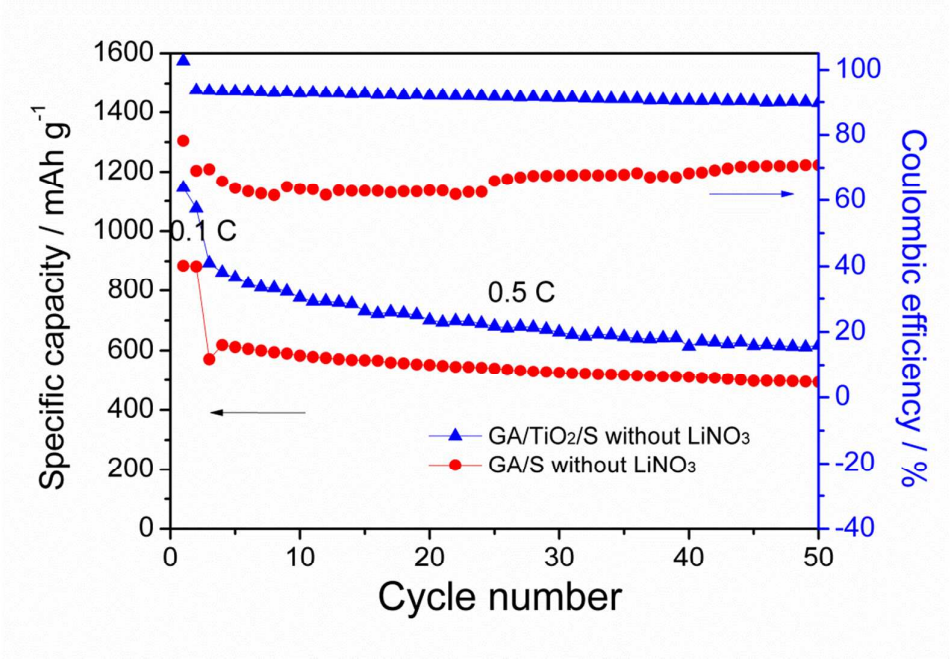

Figure S6. Cyclic performance of GA/TiO_2/S and GA/S eletcrodes using the electrolyte without $LiNO_3$.