

Fig. S1 SEM image of TiO<sub>2</sub> nanowire at MnO<sub>2</sub>

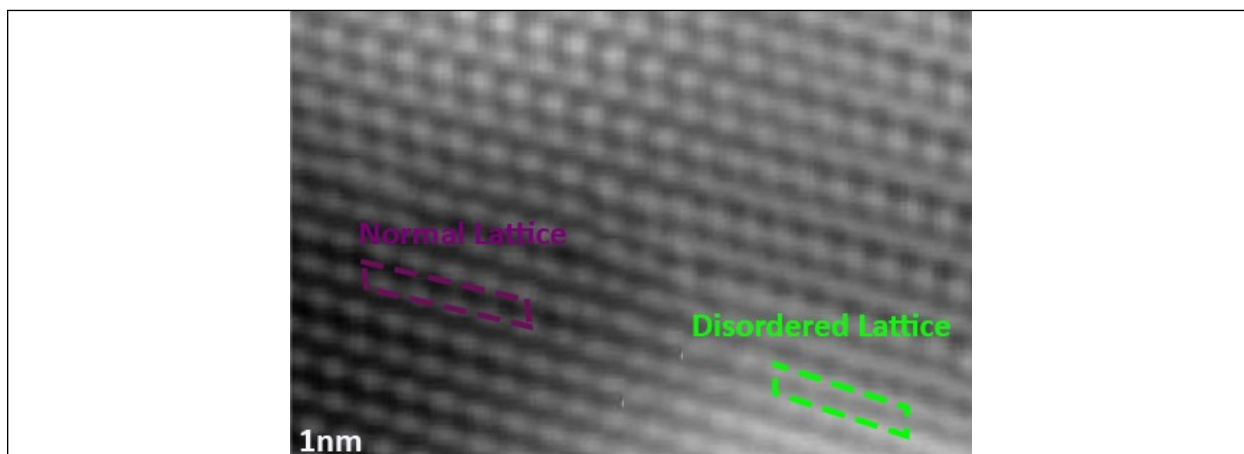


Fig. S2 inverse fast Fourier transform plot of OVTNW

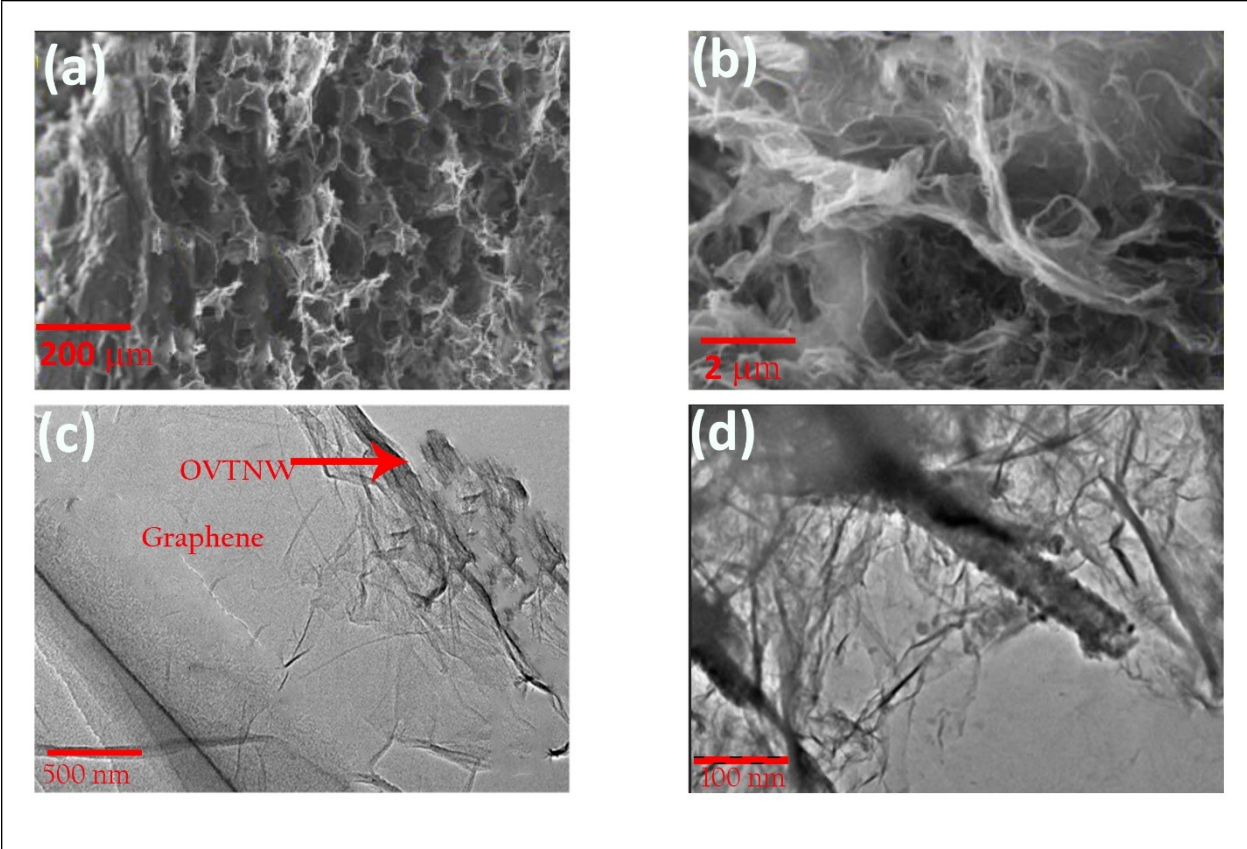


Fig.S3 (a) , (b) SEM images of OVTNW/NGA (c), (d) TEM images of OVTNW/NGA

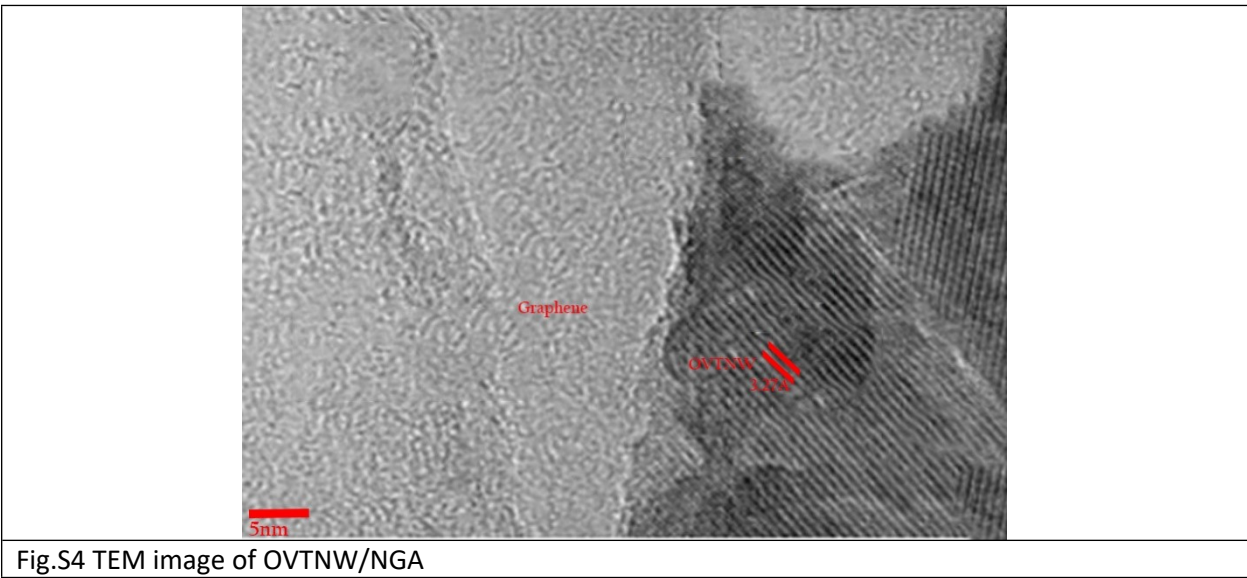


Fig.S4 TEM image of OVTNW/NGA

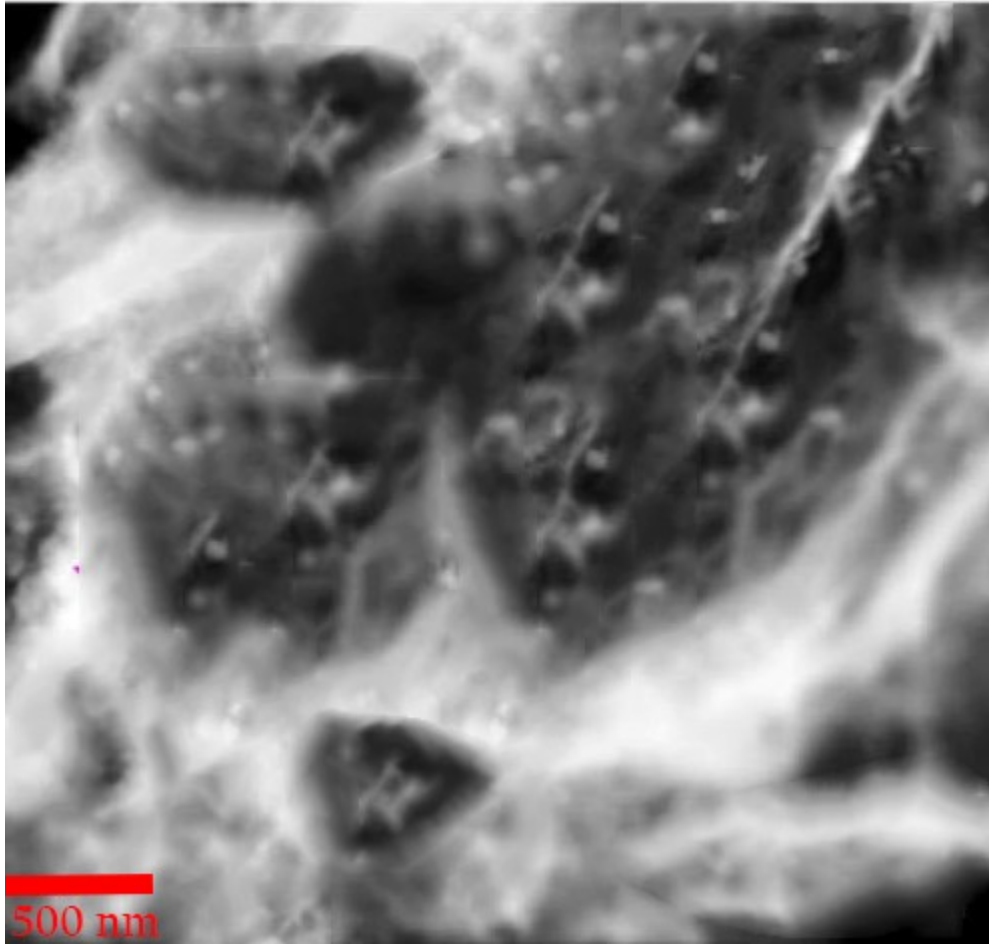


Fig.S5 SEM image of S- OVTNW/NGA

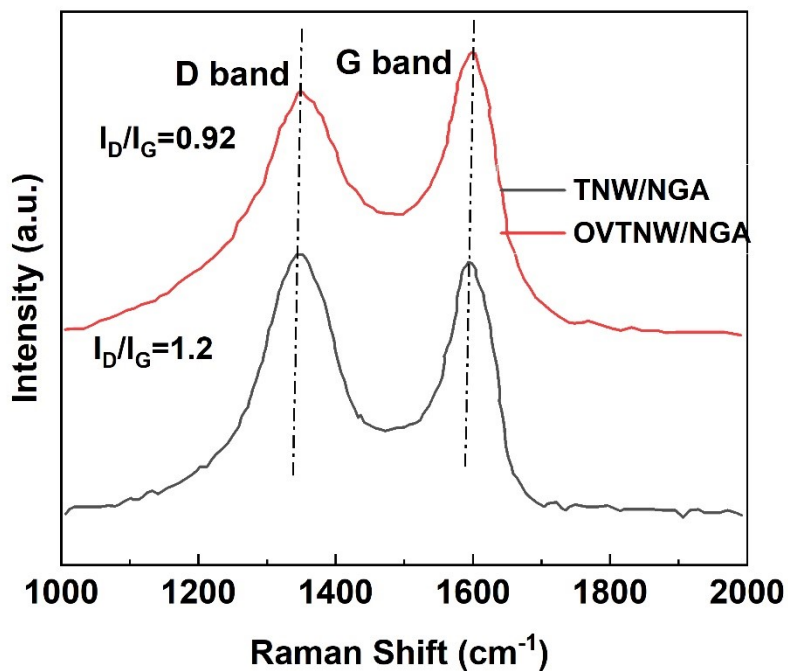


Fig. S6 Raman spectrum of OVTNW/NGA and TNW/NGA

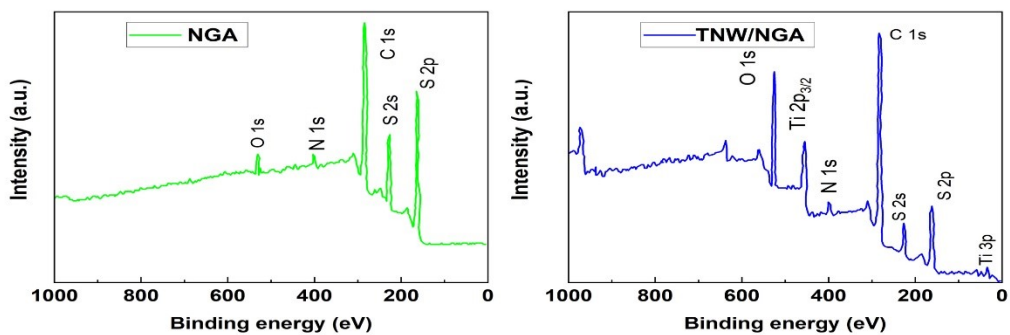


Fig. S7 XPS full-scan spectrum of NGA and TNW/NGA

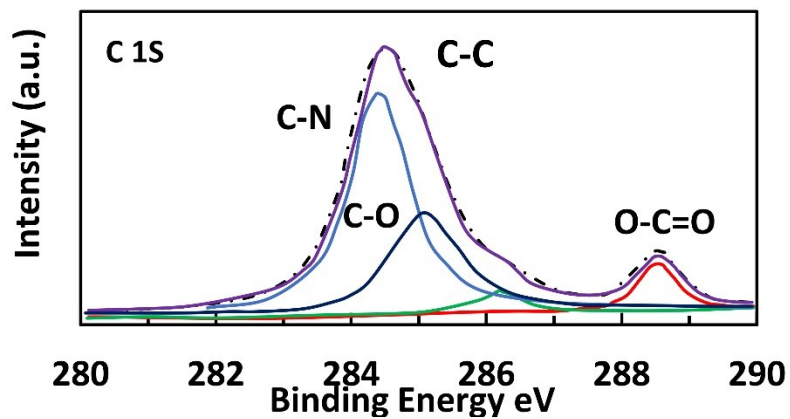


Fig. S8. deconvoluted XPS spectra of C 1s for OVTNW/NGA

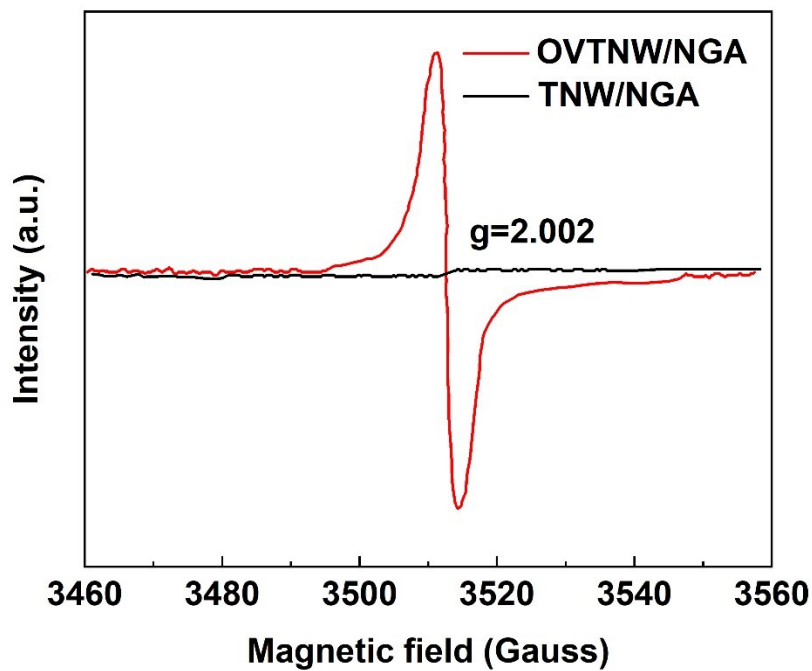


Fig. S9 EPR spectroscopy of OVTNW/NGA and OVTNW/NGA

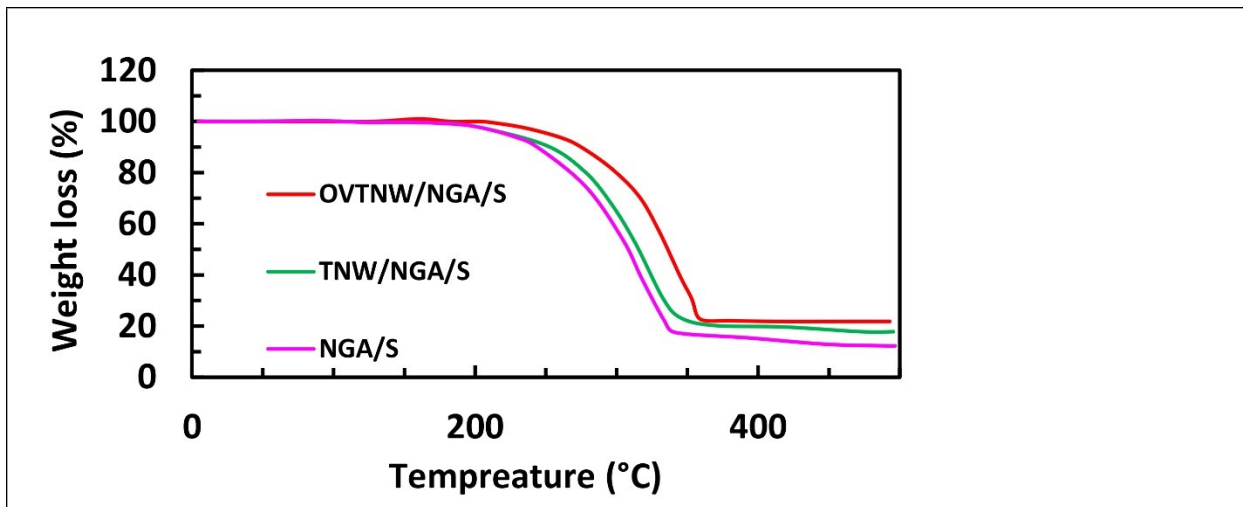


Fig. S10 TG curves of OVTNW/NGA/S, TNW/NGA/S and NGA under nitrogen.

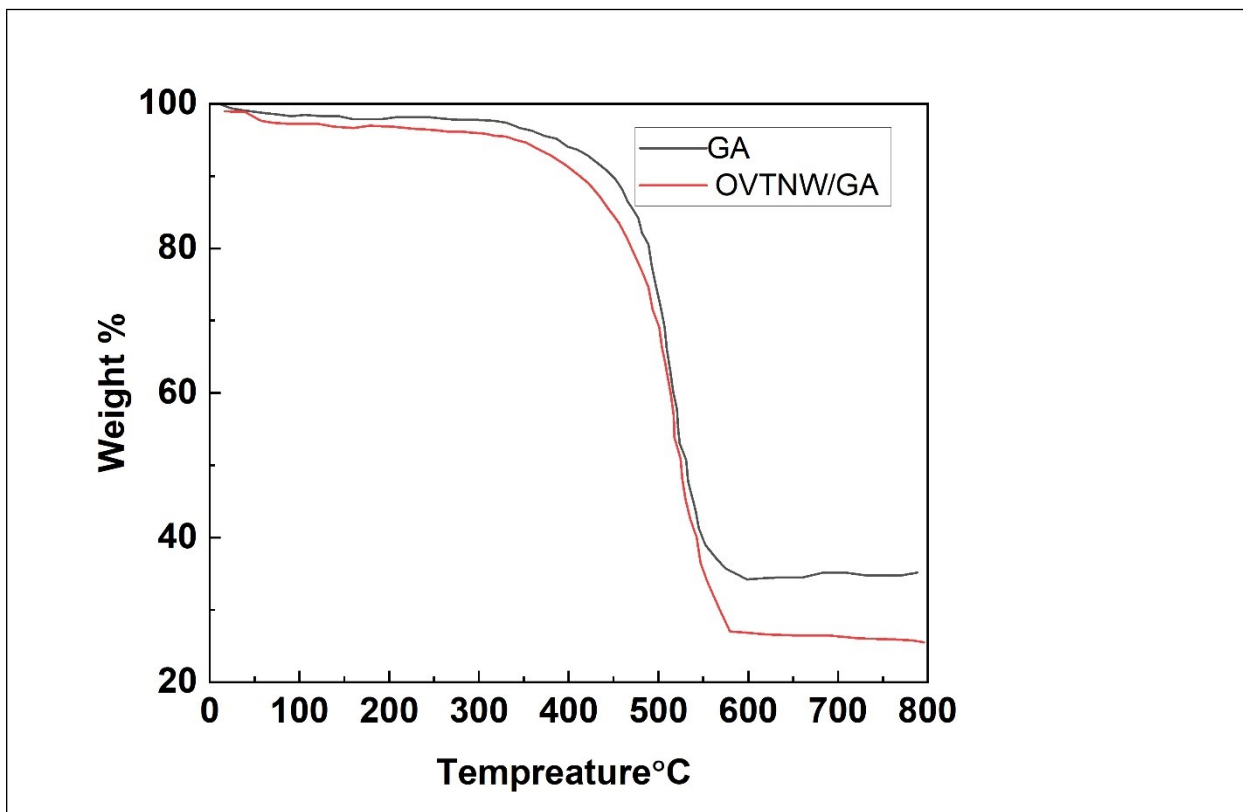


Fig. S11 TGA curves of  $\text{TiO}_2@\text{NC}$  and  $\text{OVs-TiO}_2\text{-x}@\text{NC}$  in air atmosphere.

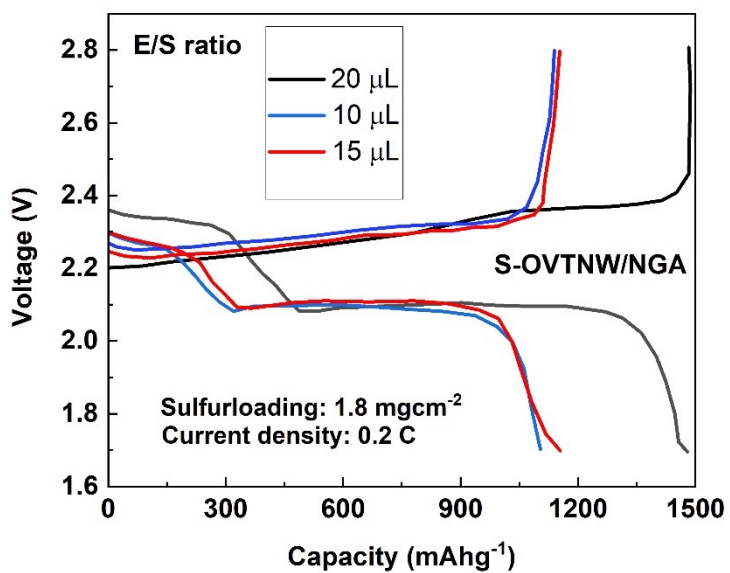


Fig. S12 The galvanostatic charge-discharge profiles of S-OVTNW/NGA electrode with different E/S amounts at 0.2 C

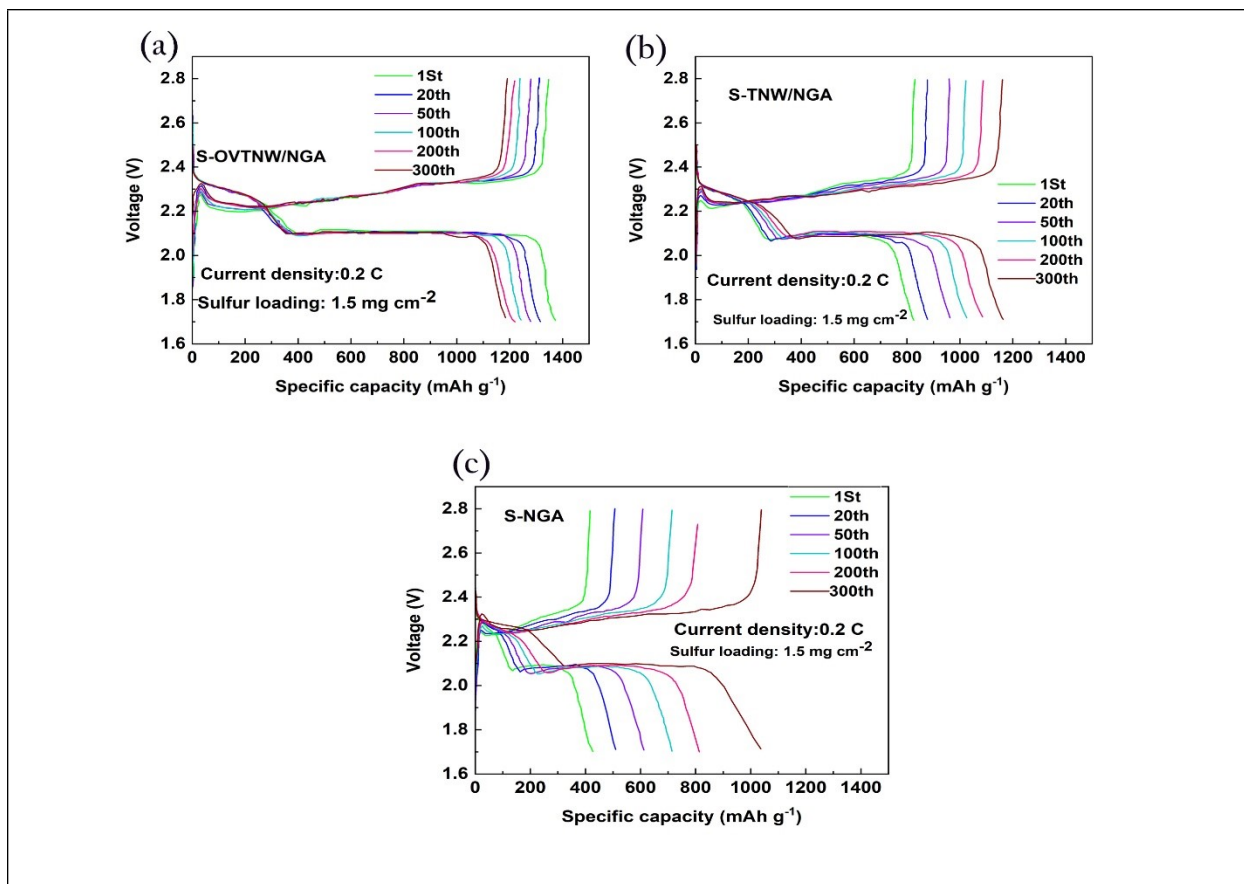


Fig.S13 The –charge-discharge plots for S-OVTNW/NGA at several cycle times (J=0.2 C)

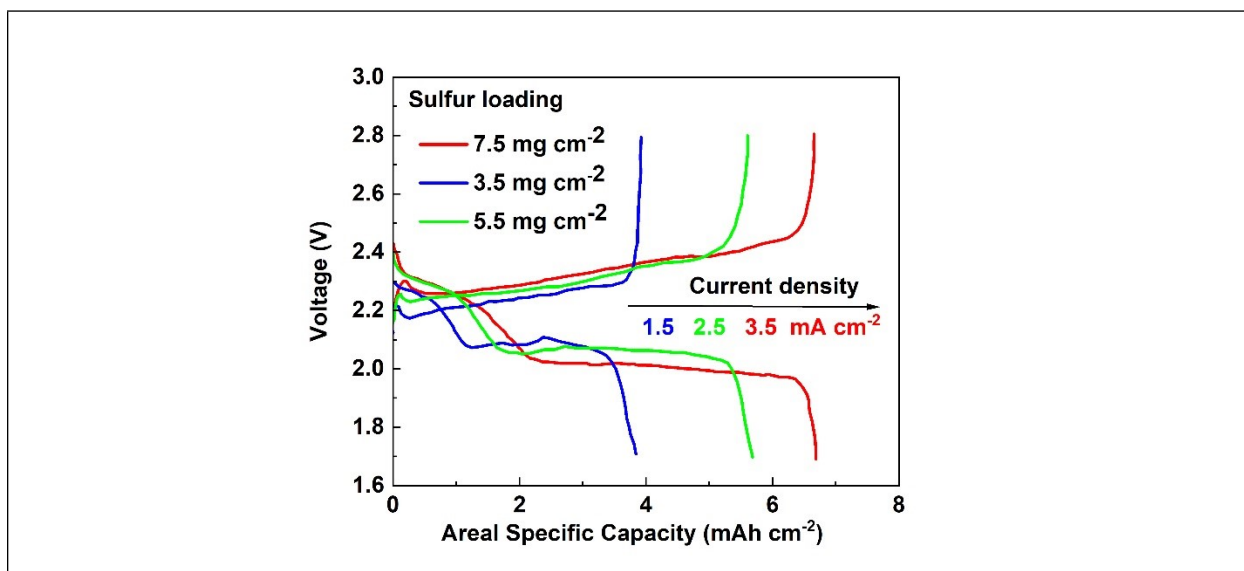


Fig.S14 The galvanostatic charge-discharge plots of the S-OVTNW/NGA cathode under several sulfur loading of 3.5, 5.5, and 7.5 mg cm<sup>-2</sup> at the current density of 0.2 C.



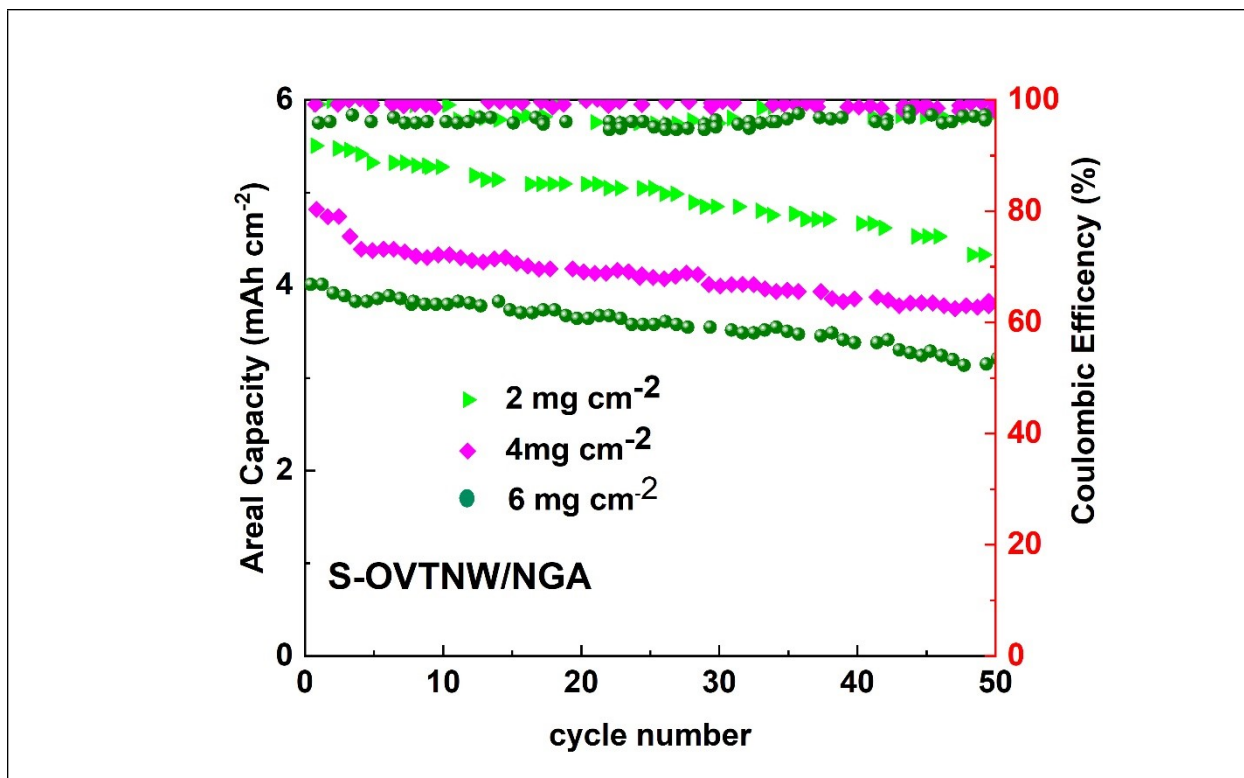


Fig.S15 Cycling analysis obtained at 0.1 C for Li-S cells fabricated using S-OVTNW/NGA at different sulfur loadings

sample	Peak I	Peak II	Peak III
S-OVTNW/NGA	0.63	0.45	0.71
S-TNW/NGA	0.56	0.41	0.63
S-NGA	0.54	0.40	0.57

Electrodes	Sulfur Loading (mg cm <sup>-2</sup> )	Current Density (mA cm <sup>-2</sup> )	Initial capacity (mAh g <sup>-1</sup> )	Reversible Capacity (mAh g <sup>-1</sup> )	Decay Rate (per cycle%)	Cycle number	Ref
<b>S-OVTNW/NGA</b>	1.5	0.1	1370	900	0.15	100	This work
<b>TiO@G-S</b>	1	2	831	455	0.226	200	[2]
<b>TiO@C-HS/S</b>	1.5	0.2	1190	750	0.074	500	[3]
<b>S@TiN-NP</b>	1.5	1	1163	1036	0.218	50	[4]
<b>C@TiN-S</b>	1.1	1	-	741	-	150	[5]
<b>OVsTiO<sub>2x</sub>@C/S</b>	1.6	1	1086	792	0.014	2000	[6]