**Supporting Information** 

## Oxidized Multiwall Carbon Nanotube Modified Separator for High Performance Lithium-Sulfur Batteries with High Sulfur Loading

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Figure S1. TGA curves of sulfur composite materials from 30  $^{\circ}$ C to 500  $^{\circ}$ C at a heating rate of 10  $^{\circ}$ C min<sup>-1</sup> under N<sub>2</sub> atmosphere.



Figure S2. Cross sectional SEM image of the cathode



Figure S3. Cross sectional SEM observation and elemental mappings of the cycled o-MWCNT-coated separator.



**Figure S4**. SEM images of the cycled Li foil in the cells utilizing (a) pristine separator and (b) o-MWCNT-coated separator.