

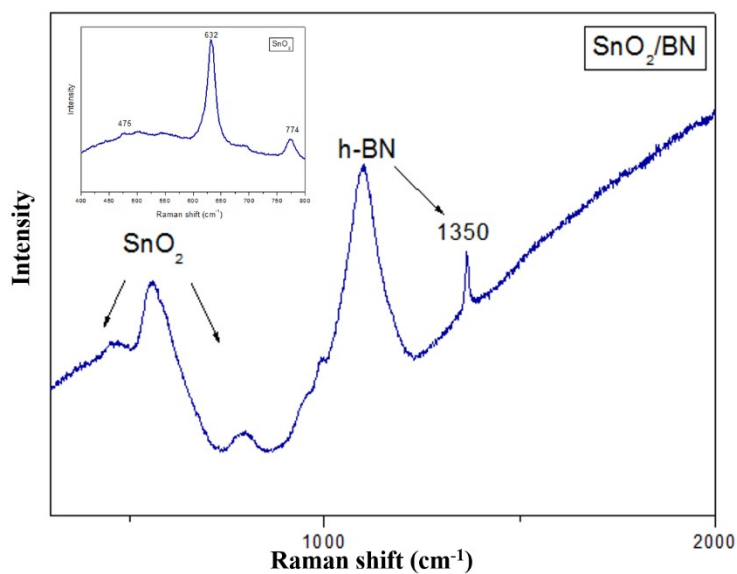
## **Supporting Information:**

### **SnO<sub>2</sub>/h-BN Nanocomposite Modified Separator as High-Efficiency Polysulfide Trap in Lithium-Sulfur Battery**

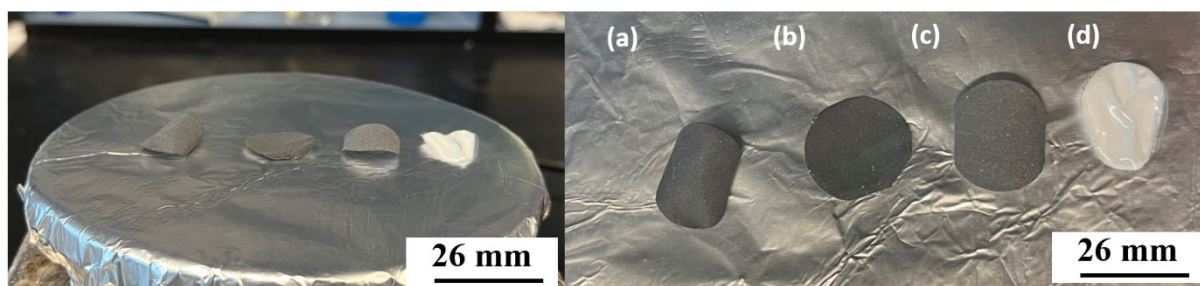
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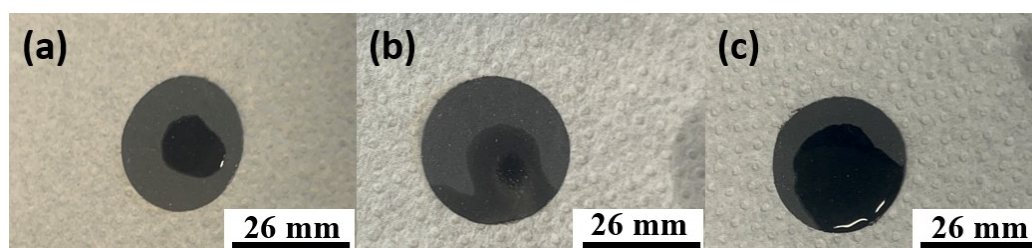
**Figure S1.** Raman spectra of the SnO<sub>2</sub>/10% h-BN composite.



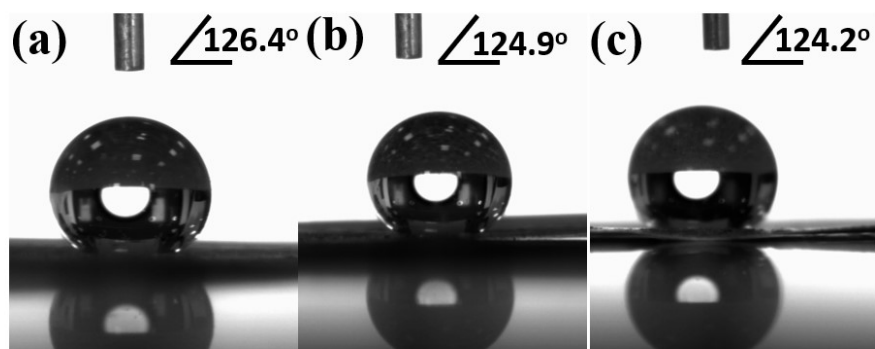
**Figure S2.** Thermal stability behavior of (a) SnO<sub>2</sub>/5% h-BN composite coated separator, (b) SnO<sub>2</sub>/10% h-BN composite coated separator, (c) SnO<sub>2</sub>/25% h-BN composite coated separator and (d) pristine polypropylene from room temperature to 100 °C.

**Table S1.** Thermal shrinkage of the separators.

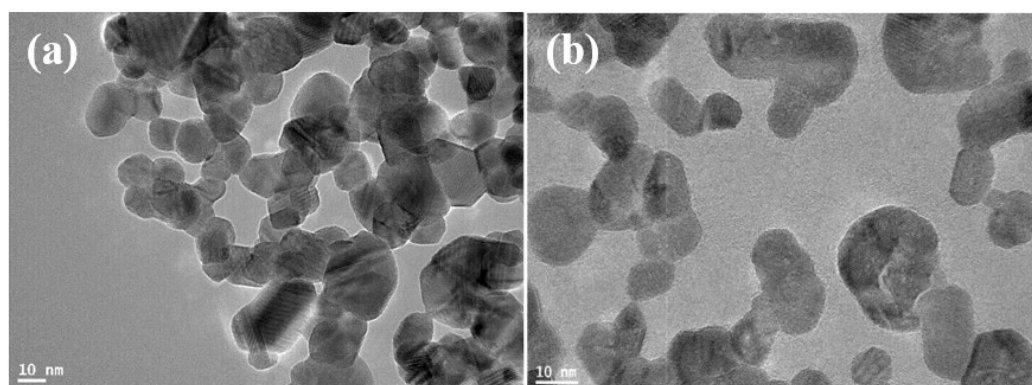
| S. No | Separator Name             | Shrinking (%) |
|-------|----------------------------|---------------|
| 1.    | Polypropylene              | 47            |
| 2.    | SnO <sub>2</sub> /5% h-BN  | 31            |
| 3.    | SnO <sub>2</sub> /10% h-BN | 4.7           |
| 4.    | SnO <sub>2</sub> /25% h-BN | 6.3           |



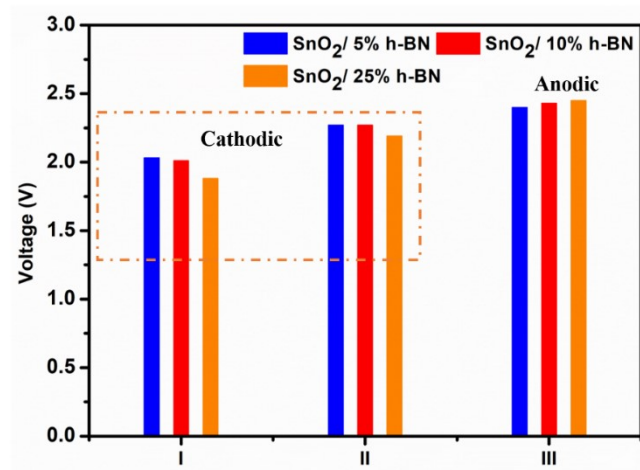
**Figure S3.** Electrolyte wettability study of (a) SnO<sub>2</sub>/5% h-BN composite coated separator, SnO<sub>2</sub>/10% h-BN composite coated separator, and (c) SnO<sub>2</sub>/25% h-BN composite coated separator.



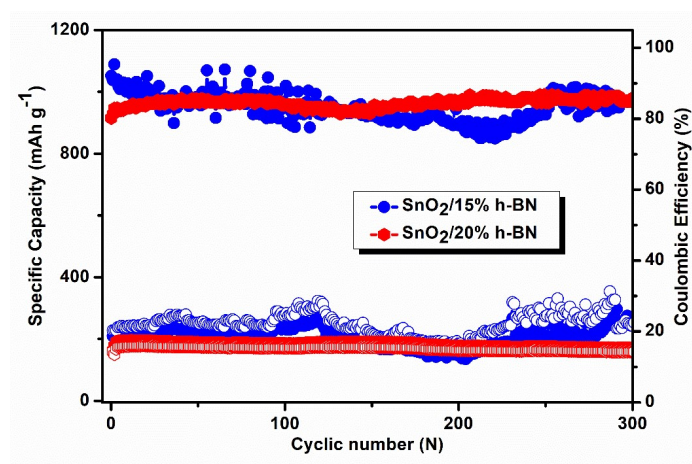
**Figure S4.** Contact angle study of the (a) SnO<sub>2</sub>/5% h-BN composite coated separator, SnO<sub>2</sub>/10% h-BN composite coated separator, and (c) SnO<sub>2</sub>/25% h-BN composite coated separator.



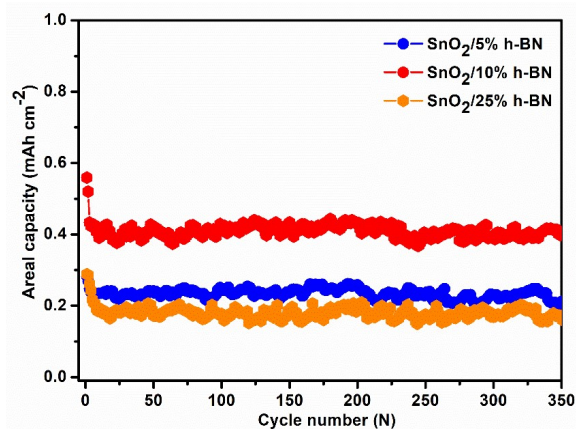
**Figure S5.** TEM images of (a and b) SnO<sub>2</sub>.



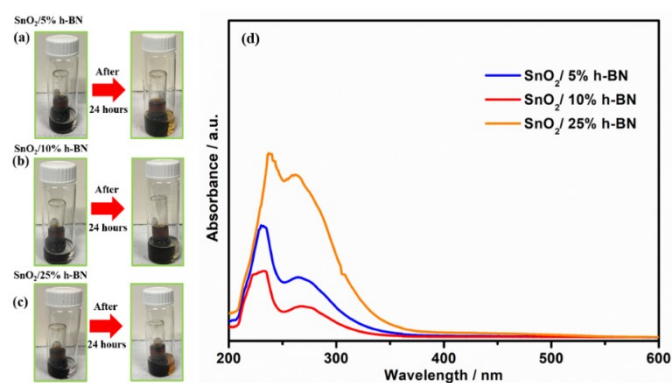
**Figure S6.** Peak voltages (cathode peaks: I and II, anodic peaks III) of SnO<sub>2</sub>/5% h-BN composite coated separated cell (blue color), SnO<sub>2</sub>/10% h-BN composite coated separated cell (red color) and SnO<sub>2</sub>/25% h-BN composite coated separated cell (orange color).



**Figure S7.** Cycling performance of lithium sulfur batteries fabricated with SnO<sub>2</sub>/15% h-BN composite coated separator, and SnO<sub>2</sub>/20% h-BN composite coated separator at a current rate of 1.0 C.



**Figure S8.** Areal capacity of lithium sulfur batteries fabricated with the SnO<sub>2</sub>/5% h-BN composite coated separator, SnO<sub>2</sub>/10% h-BN composite coated separator, and SnO<sub>2</sub>/25% h-BN composite coated separator.



**Figure S9.** Digital photograph of polysulfide adsorption study using (a) SnO<sub>2</sub>/5% h-BN coated separator, (b) SnO<sub>2</sub>/10% h-BN coated separator and (c) SnO<sub>2</sub>/25% h-BN coated separator before and after 24 hours; (d) UV–Vis spectra of SnO<sub>2</sub>/5% h-BN coated separator, SnO<sub>2</sub>/10% h-BN coated separator and SnO<sub>2</sub>/25% h-BN coated separator after 24 hours.