Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.


## Supporting Information

# Ultrasmall $SnS_2$ Nanoparticles Anchoring on Well-Distributed Nitrogen-Doped Graphene Sheets for Li-Ion and Na-Ion Batteries

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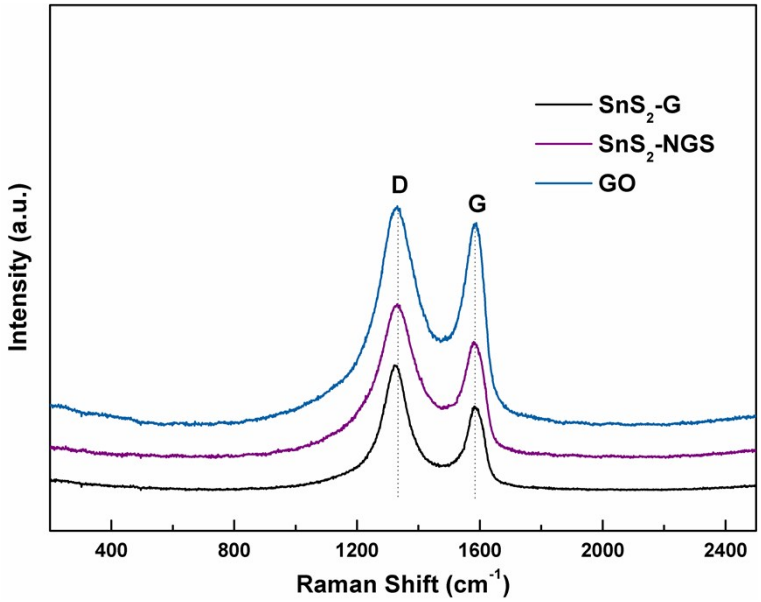


**Figure S1.** Raman spectra of $SnS_2$-GN, $SnS_2$-NGS, and GO.

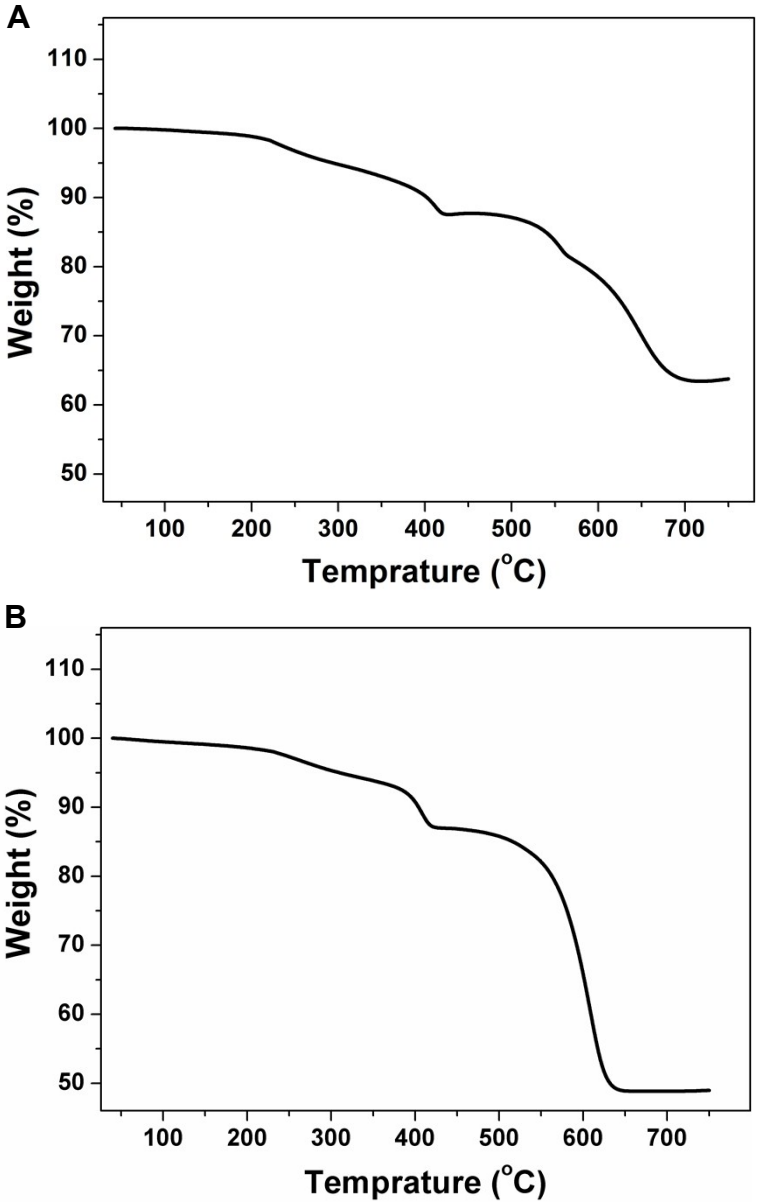


**Figure S2.** TGA profiles of $SnS_2$-NGS (A) and $SnS_2$-GN (B).

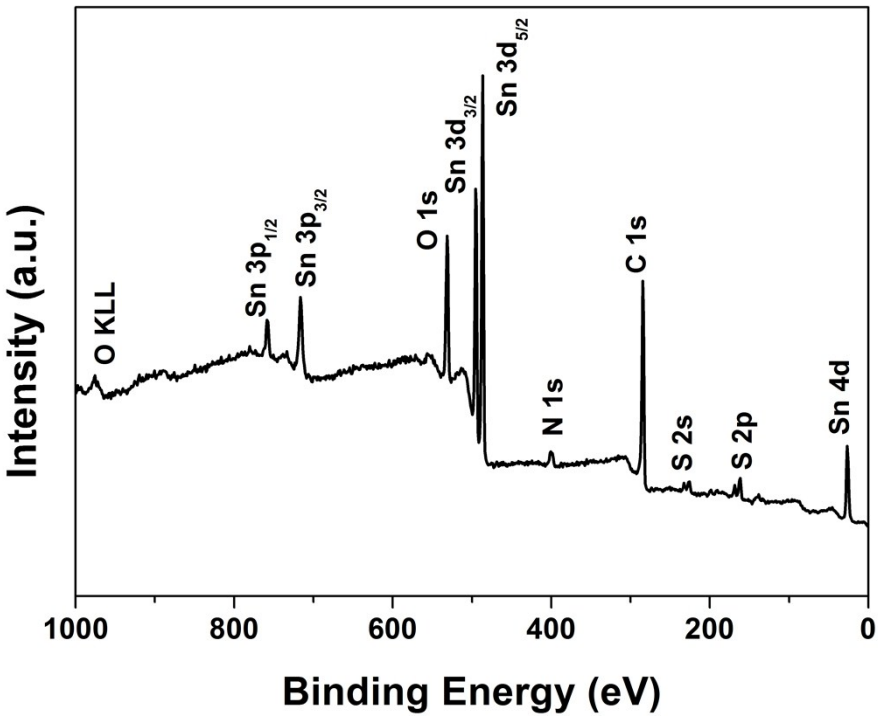


**Figure S3.** The overall XPS spectrum of $SnS_2$-NGS hybrids.

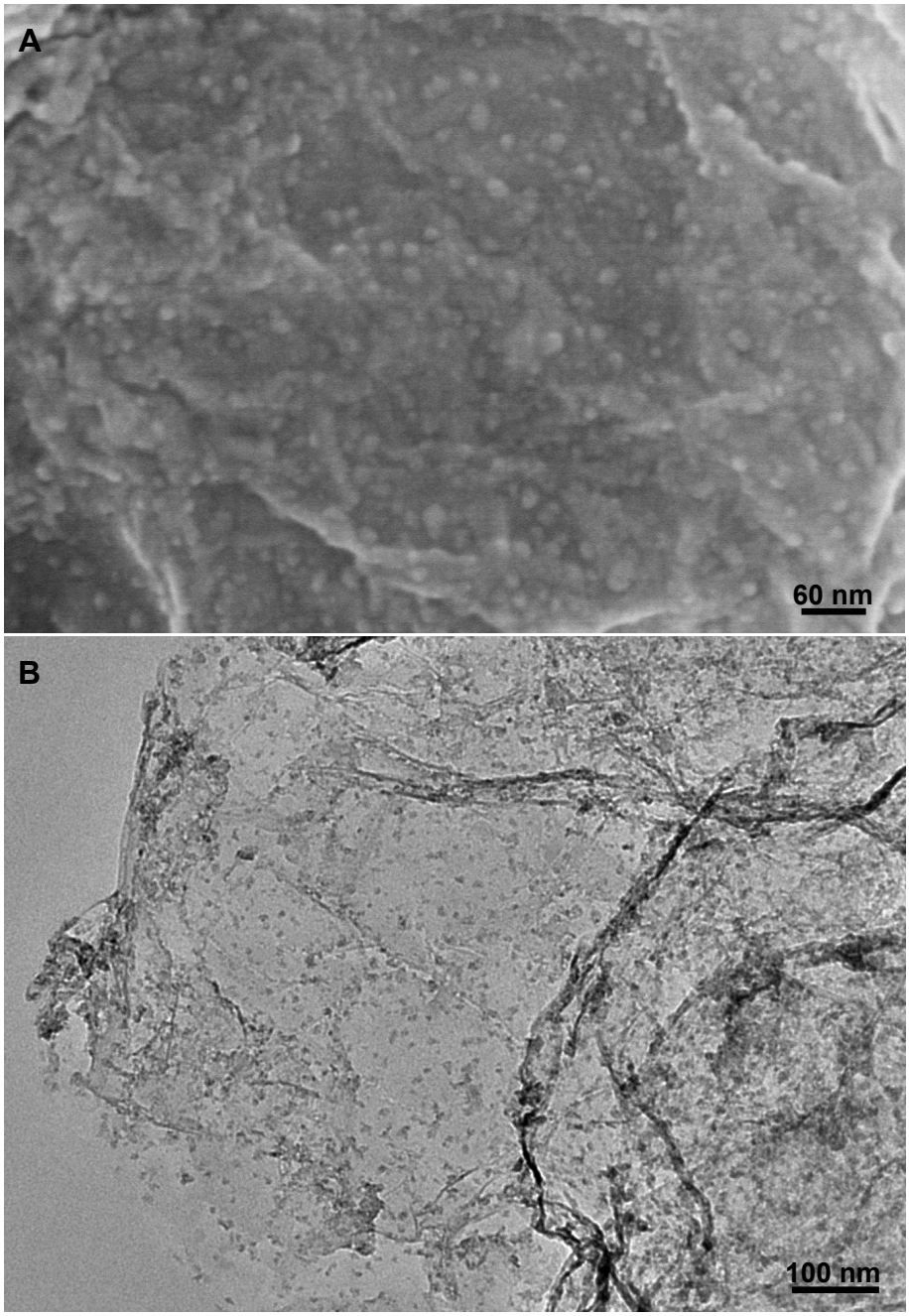


**Figure S4.** High-magnification SEM (A) and TEM (B) images of $SnS_2$-NGS.

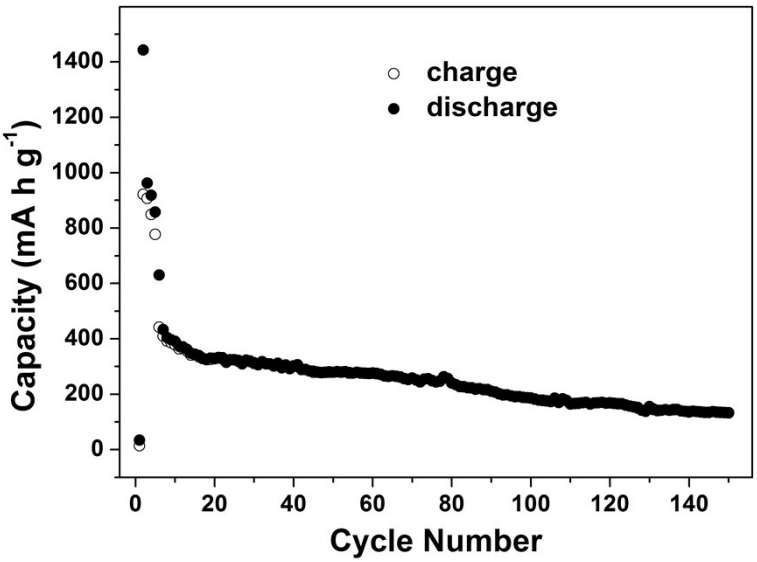


**Figure S5.** Cycling performance of the pure $SnS_2$ electrode for LIBs at 0.8 A $g^{-1}$, being cycled at 0.2 A $g^{-1}$ for the first five cycles.

Table S1. Comparison of electrochemical abilities of $SnS_2$-based anodes for LIBs.

| Sample | Current density [mA $g^{-1}$] | Cycle number | Final capacity [mA h $g^{-1}$] | Current density [A $g^{-1}$] | Capacity [mA h $g^{-1}$] | Reference |
|---|---|---|---|---|---|---|
| **$SnS_2$-NGS** | 200 | 120 | 1407 | 10 | 200 | This work |
| | | | | 5 | 520 | |
| **SSG** | 120 | 60 | 564 | 3 | 242 | [1] |
| **$SnS_2$/GNS** | 100 | 30 | 1114 | 1 | 870 | [2] |
| **TSG** | 100 | 200 | 1005 | 2 | 612 | [3] |
| **$SnS_2$-RGO** | 66 | 40 | 896 | | | [4] |
| **RGO-$SnS_2$** | 322 | 80 | 405 | 3.225 | 200 | [5] |
| **$SnS_2$/G-As** | 50 | 30 | 656 | 1 | 240 | [6] |
| **$SnS_2$nanocrystals@RGO** | 64.5 | 200 | 1034 | 6.45 | 300 | [7] |
| **$SnS_2$/GNS-RS** | 58.4 | 50 | 577 | | | [8] |
| **FL-$SnS_2$/G** | 100 | 50 | 920 | 1 | 600 | [9] |
| **G-$SnS_2$-S** | 50 | 30 | 650 | 6.4 | 230 | [10] |
| **$SnS_2$@graphene** | 322 | 200 | 504 | | | [11] |
| **$SnS_2$/VACNTs** | 100 | 100 | 551 | 2 | 223 | [12] |
| **MWCNT/$SnS_2$ NS** | 645 | 100 | 432 | 6.45 | 420 | [13] |
| **$SnS_2$/SWCNTs** | 1000 | 100 | 509 | 2 | 498 | [14] |
| **$SnS_2$ NS@MWCNTs-thin** | 100 | 50 | below 600 | 0.5 | 296.1 | [15] |
| **$SnS_2$ nanoplates** | 200 | 30 | 935 | 5 | 370 | [16] |
| **$SnS_2$ microspheres** | 650 | 100 | 570 | 6.5 | 264 | [17] |
| **$SnS_2$ flowers (II)** | 64.5 | 50 | 557 | | | [18] |
| **$SnS_2$ -200-10.5** | 100 | 50 | 521 | 3 | 340 | [19] |
| **flower-like $SnS_2$** | 100 | 100 | 549.5 | 1 | 210.8 | [20] |


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