Supplementary Information

Uniform Core-shell Cu_6Sn_5@C Nanospheres with Controllable Synthesis and Excellent Lithium Storage Performances

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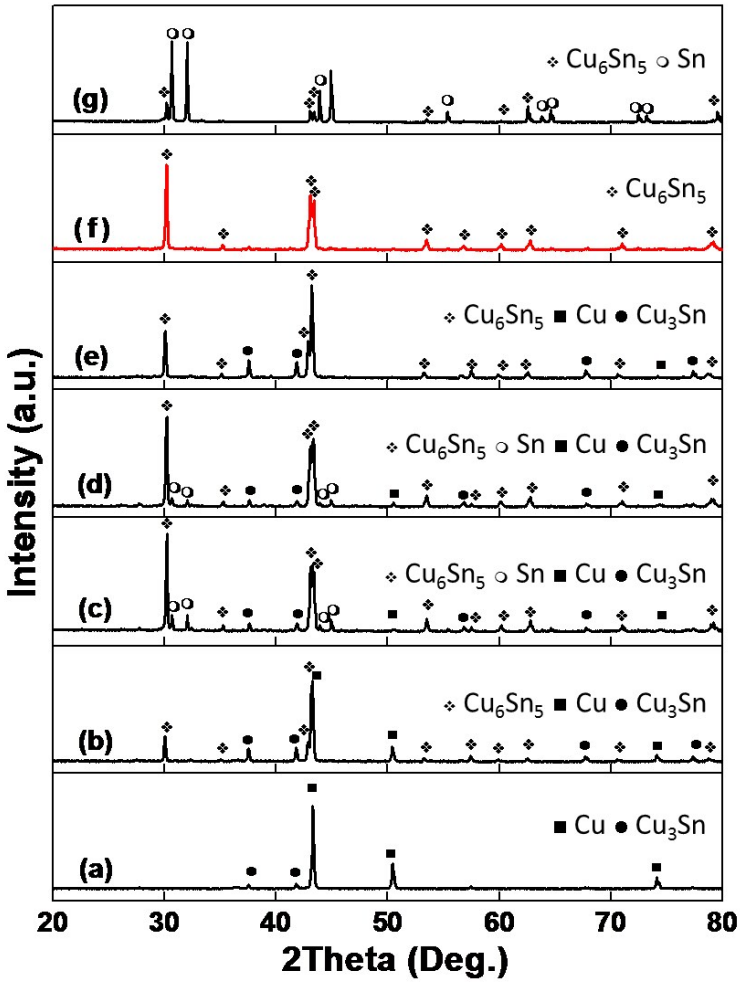

Figure S1. XRD patterns of Cu-Sn@C nanospheres synthesized with various Sn:Cu ratios (a-g) subjected to a heat-treatment at 300°C (■ Cu, ● Cu_3Sn, ❖ Cu_6Sn_5, ❍ Sn).

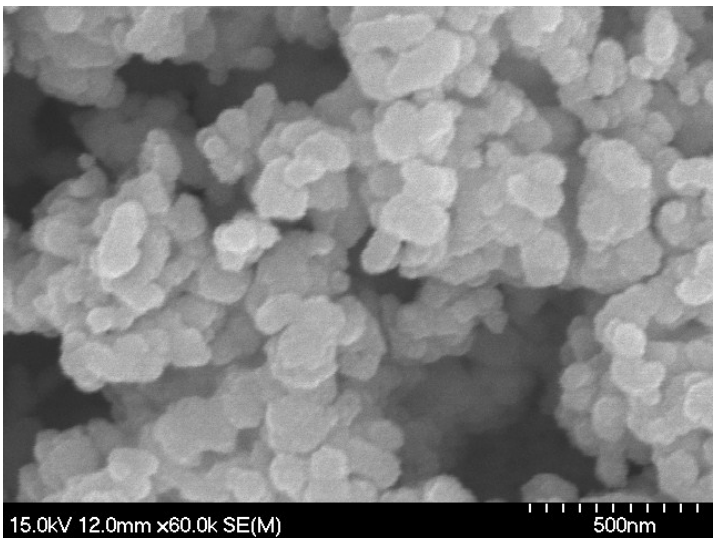

Figure S2. SEM image of the resultant core-shell Cu_6Sn_5@C nanospheres.

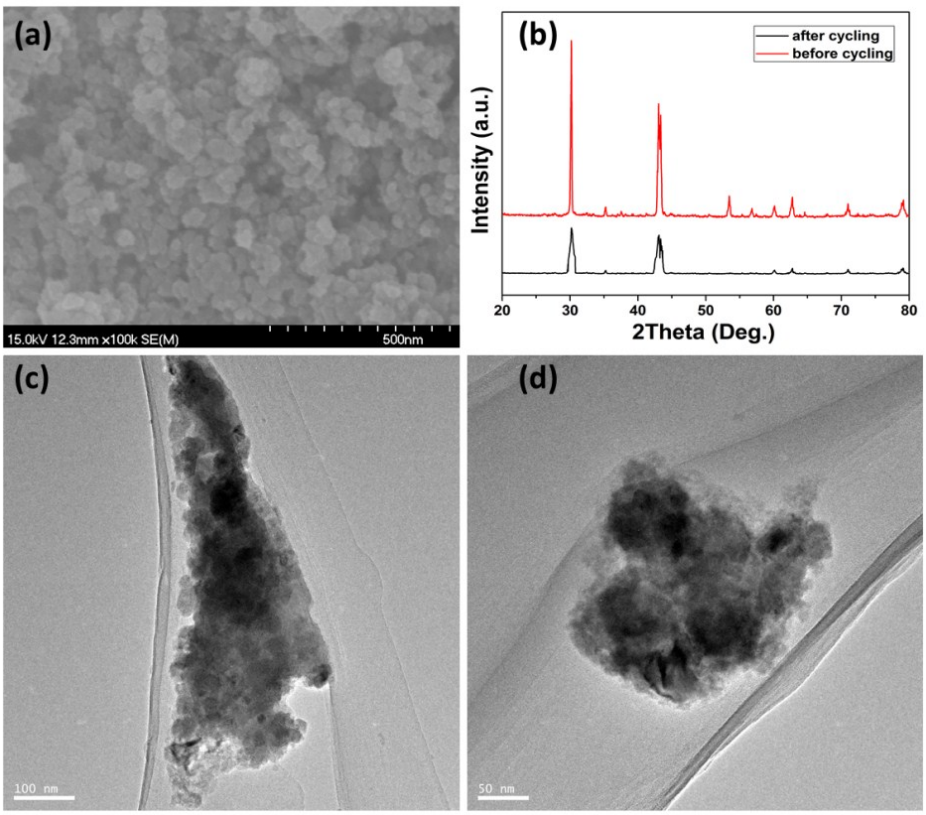

Figure S3. (a) SEM image, (b) XRD patterns, and (c, d) TEM images of Cu_6Sn_5@C electrodes after 30 cycles at 0.2C.

SEM, XRD, and TEM were carried out to investigate the structural and morphology change of the Cu_6Sn_5@C electrodes after 30 cycles at 0.2C (**Figure S3**). SEM image (**Figure S3a**) shows that the Cu_6Sn_5@C also keeps the relatively good distribution with a diameter of approximately 50 nm. TEM images (**Figure S3c**) can further confirm the core-shell structure of Cu_6Sn_5 (dark region) and carbon (gray region), although the nanoparticles agglomerate into larger particles to some extent. The tight contact between the core-shell particles can be clearly observed in **Figure S3d**. Note that, the small carbon nanoparticles (gray region) surrounding the Cu_6Sn_5@C particles should be the acetylene black used in assembling into working electrodes. The good structural stability comes from the effective accommodation of Cu and C for huge volume expansion of Sn and hence benefits for the long-term cycling performance. XRD patterns (**Figure S3b**) of Cu_6Sn_5@C indicate that the crystal phase of Cu_6Sn_5 still maintains after 30 cycles, while the weaker and broader reflections manifest a pulverization process of the crystalline during repeated charge/discharge processes.