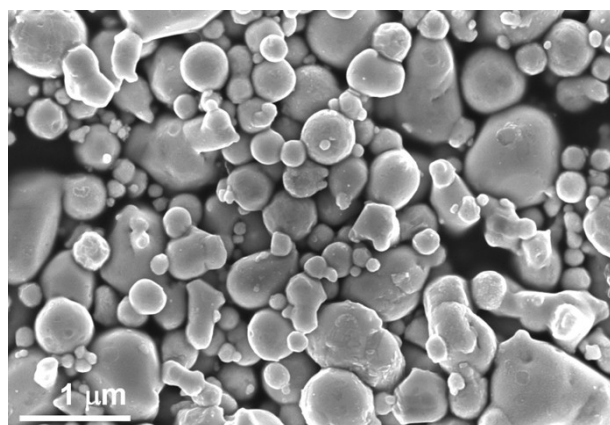
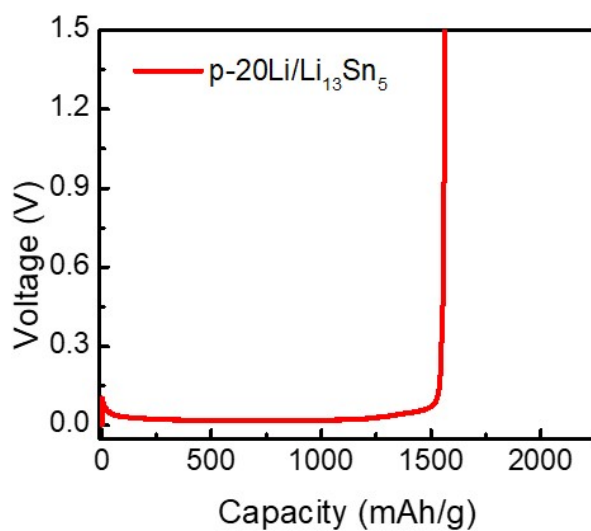


## Supporting information for

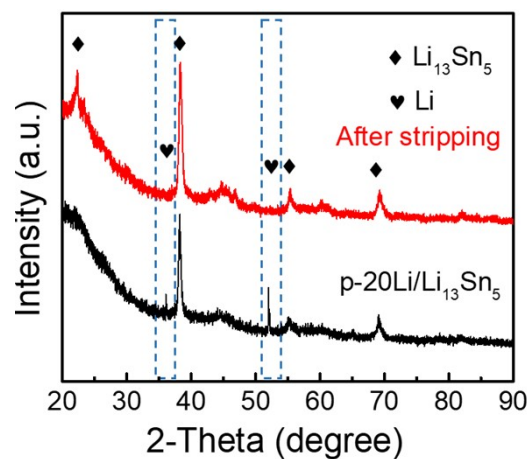
### Tuning the Li-Sn alloy dispersity to improve the lithiophilicity of lithium metal anode towards stable lithium metal batteries



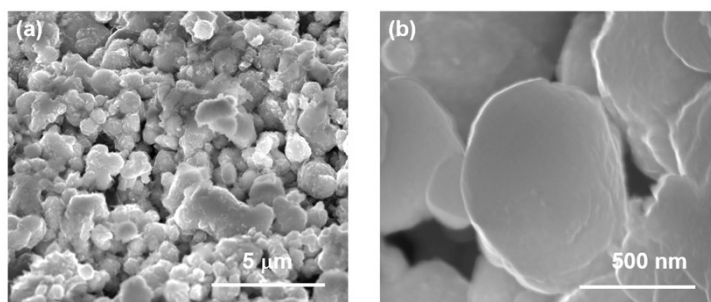
**Figure S1** The SEM image of Sn powders.



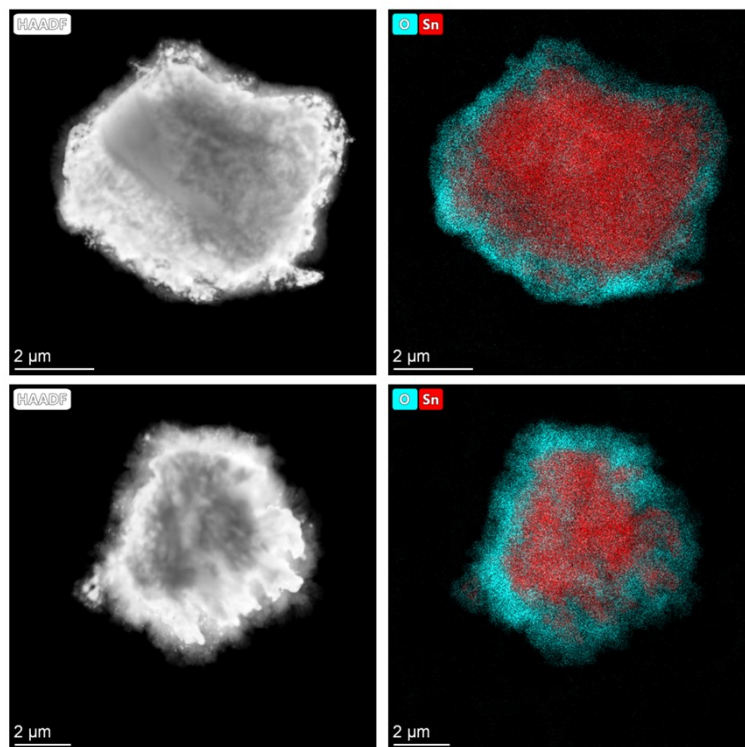
**Figure S2** the voltage-capacity curve of p-20Li/Li<sub>13</sub>Sn<sub>5</sub> electrode.



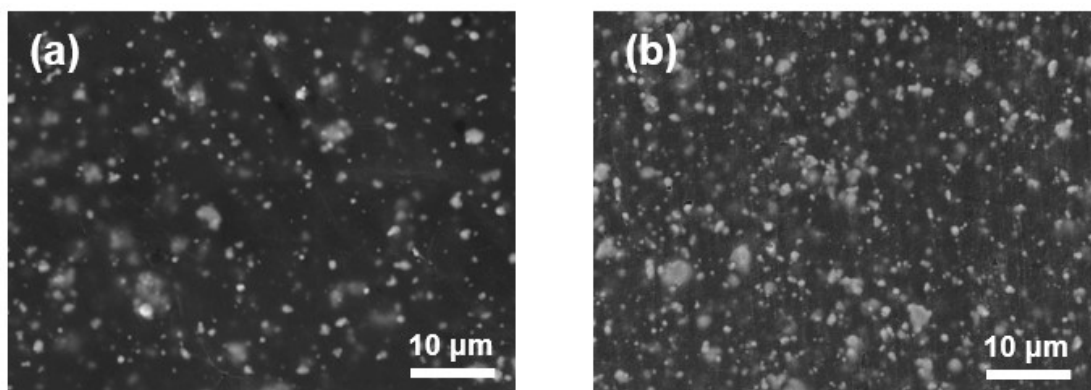
**Figure S3** XRD patterns of p-20/Li<sub>13</sub>Sn<sub>5</sub> electrode before and after Li stripping.



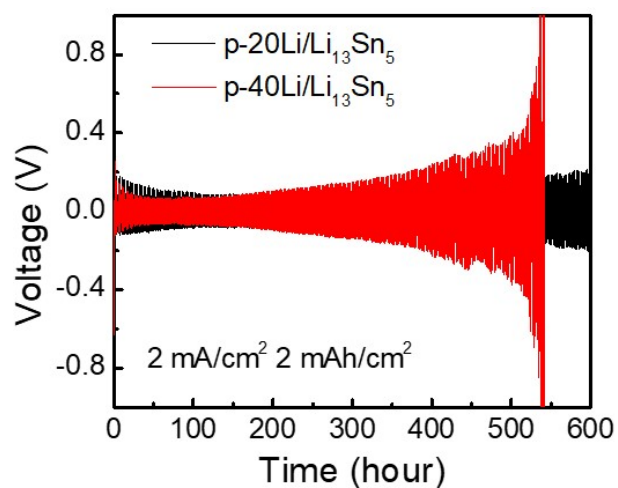
**Figure S4** SEM images of the Li stripped Li<sub>13</sub>Sn<sub>5</sub> particles of p-20Li/Li<sub>13</sub>Sn<sub>5</sub> electrode.



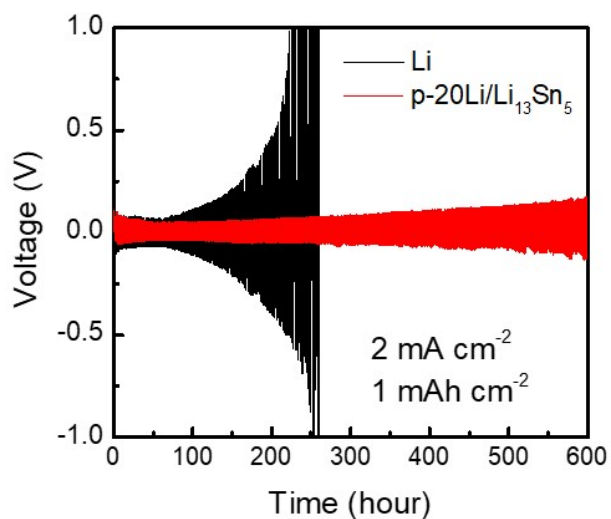
**Figure S5** HAADF-STEM images of the Li stripped  $\text{Li}_{13}\text{Sn}_5$  particles of p-20Li/ $\text{Li}_{13}\text{Sn}_5$  electrode.



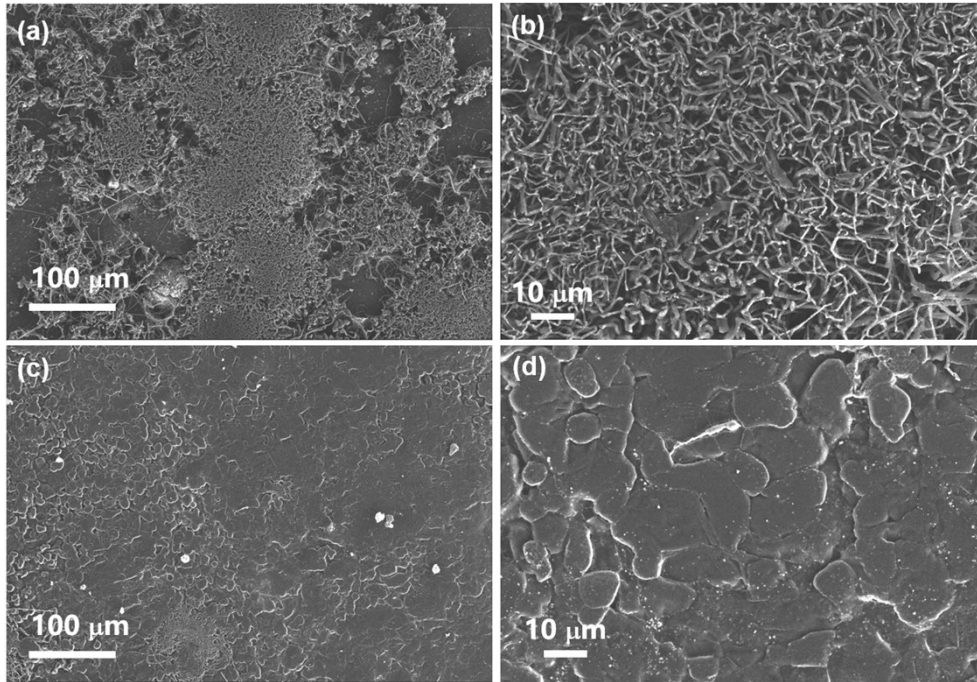
**Figure S6** The cross-sectional images of (a) p-40Li/ $\text{Li}_{13}\text{Sn}_5$  and (b) p-20Li/ $\text{Li}_{13}\text{Sn}_5$  electrodes.



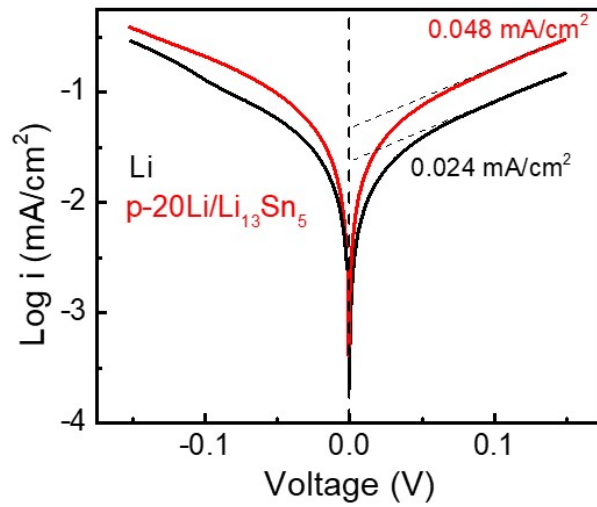
**Figure S7** The voltage-time curves of the symmetric cells with p-20Li/Li<sub>13</sub>Sn<sub>5</sub> and p-40Li/Li<sub>13</sub>Sn<sub>5</sub> electrodes.



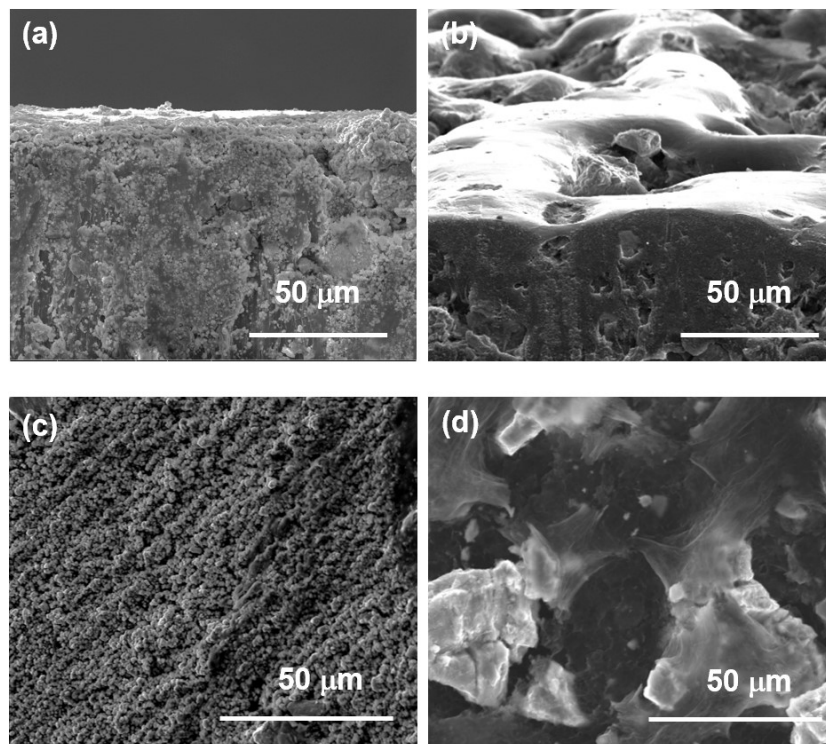
**Figure S8** The voltage-time curves of the symmetric cells with bare Li and p-40Li/Li<sub>13</sub>Sn<sub>5</sub> electrodes.



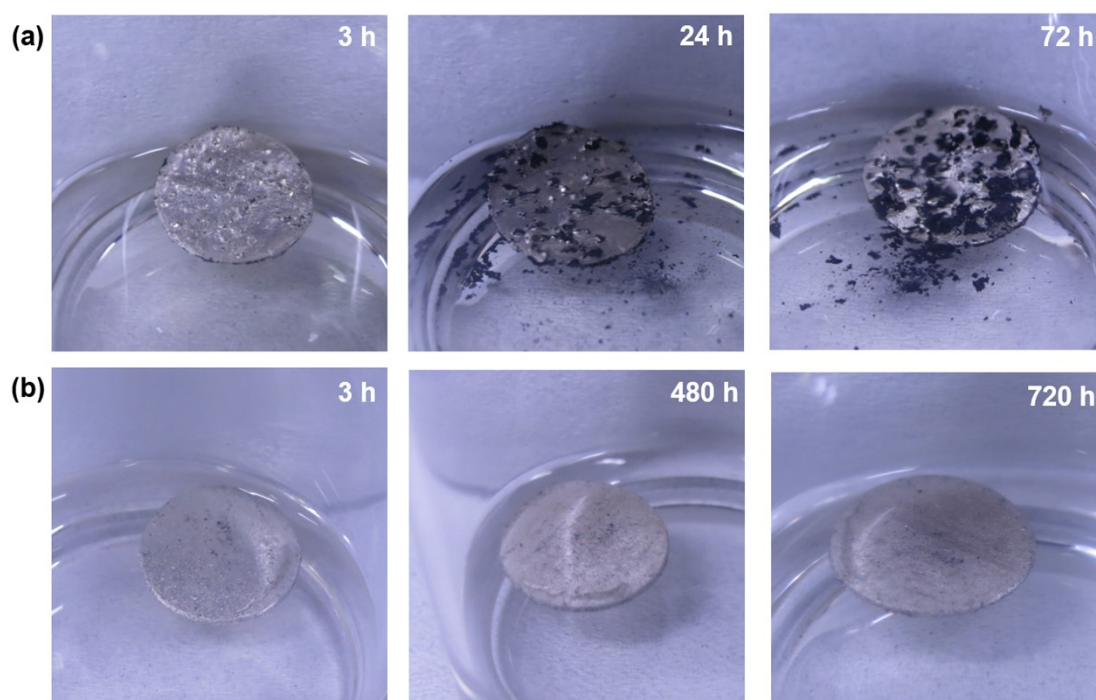
**Figure S9** Top-view images of (a, b) bare Li and (c,d) p-20Li/Li<sub>13</sub>Sn<sub>5</sub> electrodes after initial lithium plating.



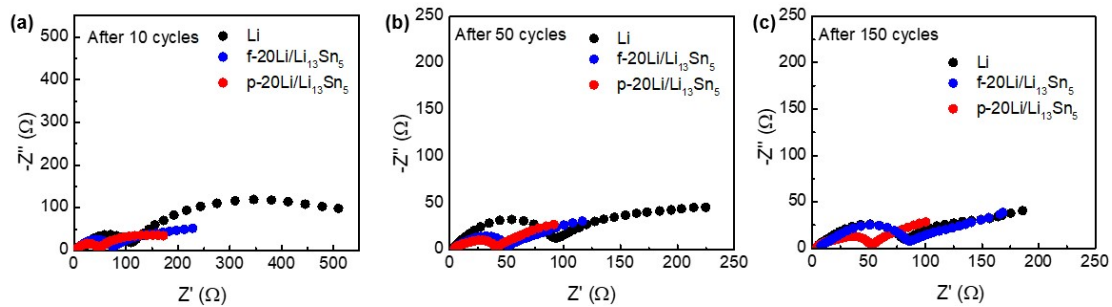
**Figure S10** The Tafel plots of the symmetric cells with bare Li and p-20Li/Li<sub>13</sub>Sn<sub>5</sub> electrodes.



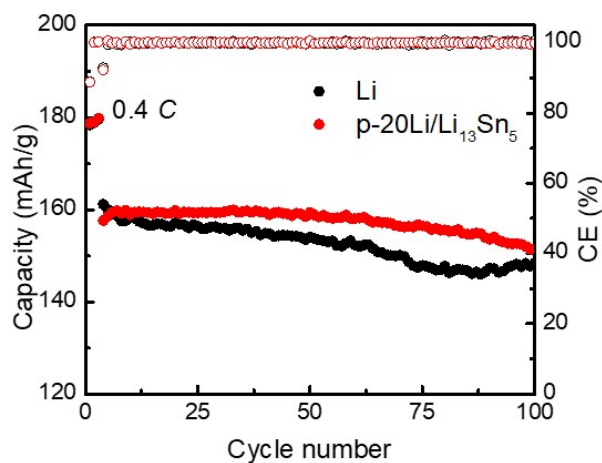
**Figure S11** The cross-sectional SEM images of (a) p-20Li/Li<sub>13</sub>Sn<sub>5</sub> and (b) f-20Li/Li<sub>13</sub>Sn<sub>5</sub> electrodes after 5 mAh cm<sup>-2</sup> of Li stripping. The top-view SEM images of (c) p-20Li/Li<sub>13</sub>Sn<sub>5</sub> and (d) f-20Li/Li<sub>13</sub>Sn<sub>5</sub> electrodes.



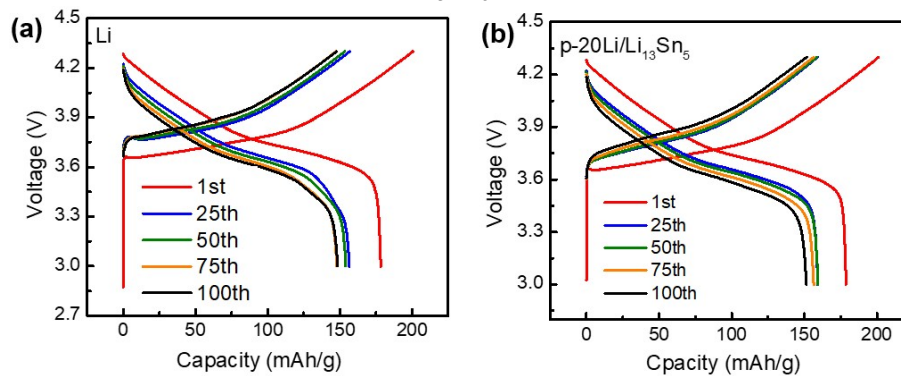
**Figure S12** Digital photos of (a) f-20Li/Li<sub>13</sub>Sn<sub>5</sub> and (b) p-20Li/Li<sub>13</sub>Sn<sub>5</sub> electrodes soaked in electrolyte for different time.



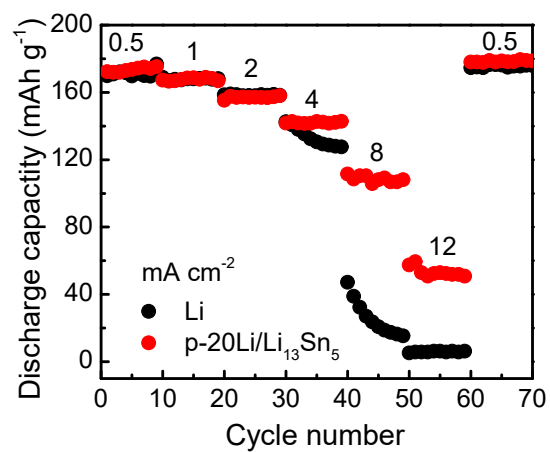
**Figure S13** The EIS of the Li/SPAN and p-20Li/Li<sub>13</sub>Sn<sub>5</sub>/SPAN electrodes after (a) 10 cycles, (b) 50 cycles and (c) 150 cycles.



**Figure S14** The cycling performances of the NCM cells with bare Li and p-20Li/Li<sub>13</sub>Sn<sub>5</sub> anodes.



**Figure S15** The voltage-capacity curves of (a) Li/NCM and (b) p-20Li/Li<sub>13</sub>Sn<sub>5</sub>/NCM cells.



**Figure S16** The capacity performances of Li/NCM and p-20Li/Li<sub>13</sub>Sn<sub>5</sub>/NCM cells at different current densities.