

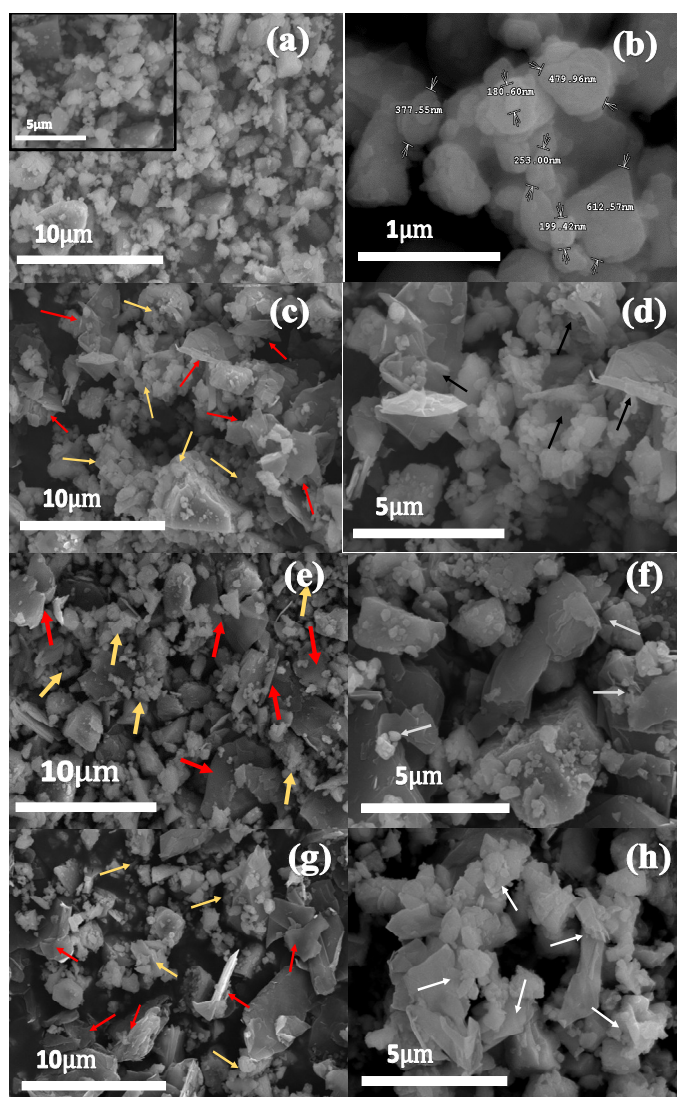
# Metal (Cu/Fe/Mn)-Doped Silicon/Graphite Composite as a Cost-Effective Anode for Li-Ion Batteries

Arunakumari Nulu, Young Geun Hwang, Venugopal Nulu and Keun Yong Sohn \*

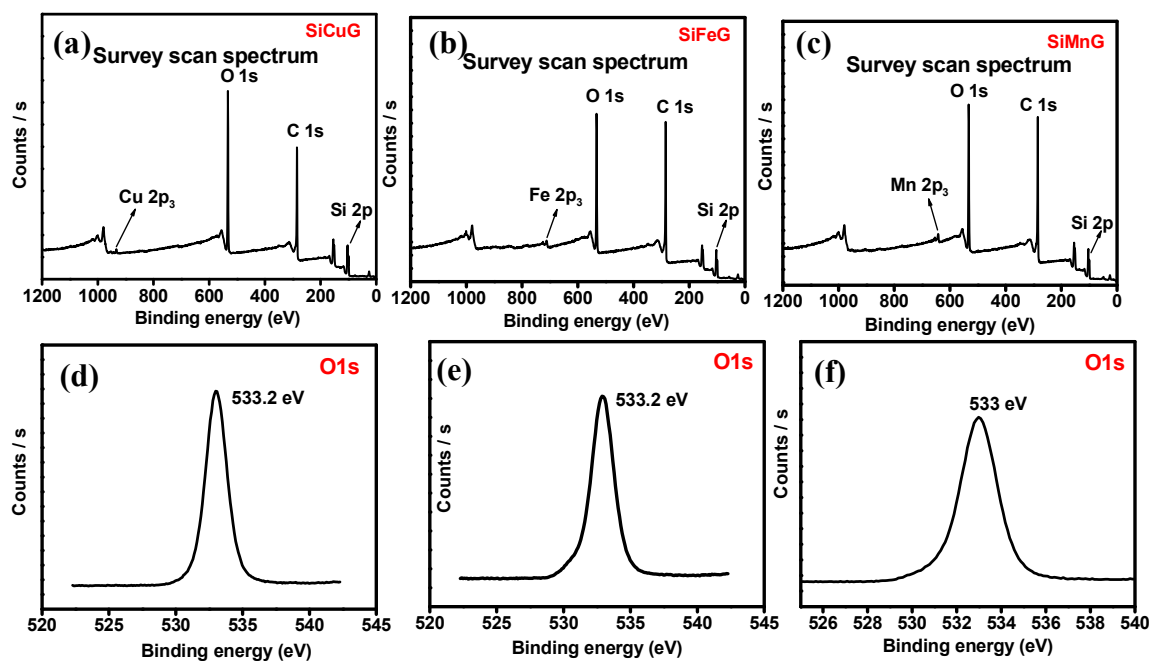
Department of Nanoscience and Engineering, Center for Nano Manufacturing, Inje University, 197 Inje-ro, Gimhae 50834, Gyeongnam-do, Korea

\* Correspondence: ksohn@inje.ac.kr; Tel.: +82-55-320-3714

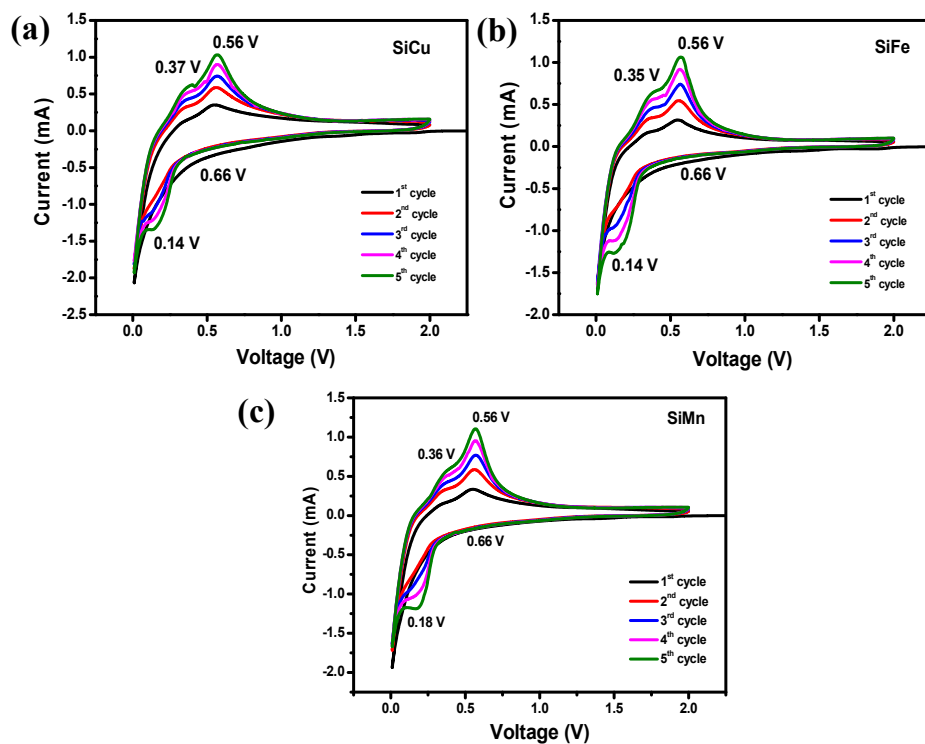
Supporting information



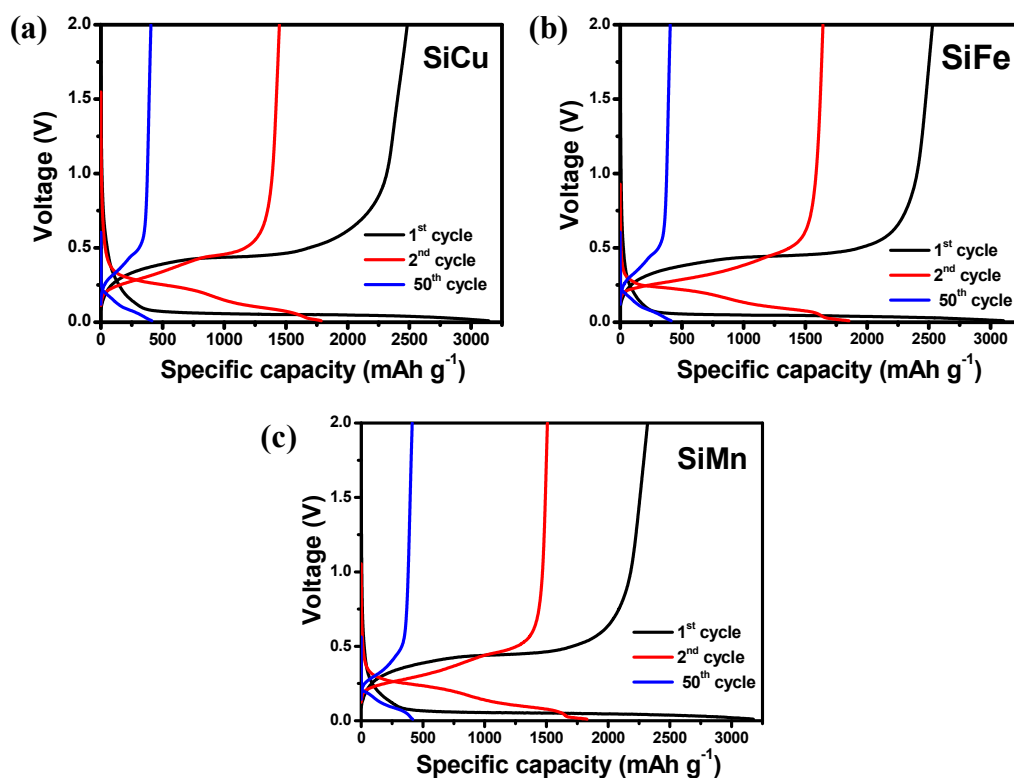
**Figure S1.** SEM images (a) & (b) Si- 48, (c) & (d) SiCuG, (e) & (f) SiFeG, and (g) & (h) SiMnG respectively.



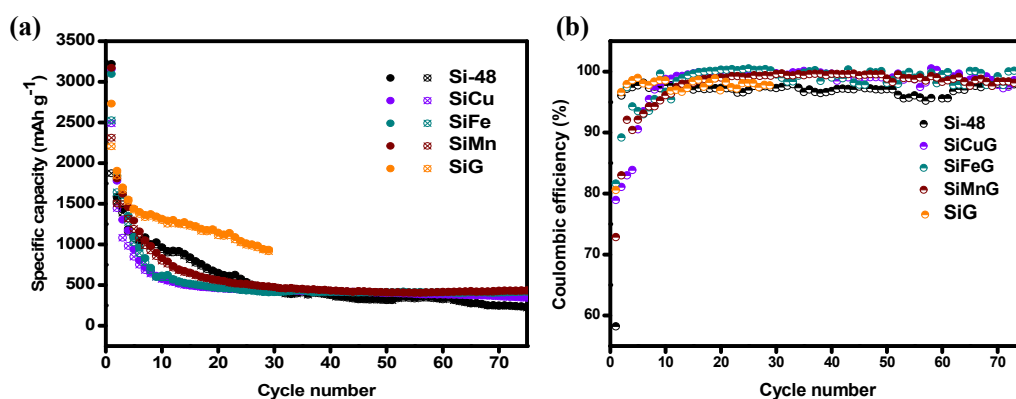
**Figure S2.** XPS-Spectra (a), (b), (c) survey scan spectra, (d), (e), (f) O 1S spectra of SiCuG, SiFeG, and SiMnG respectively.



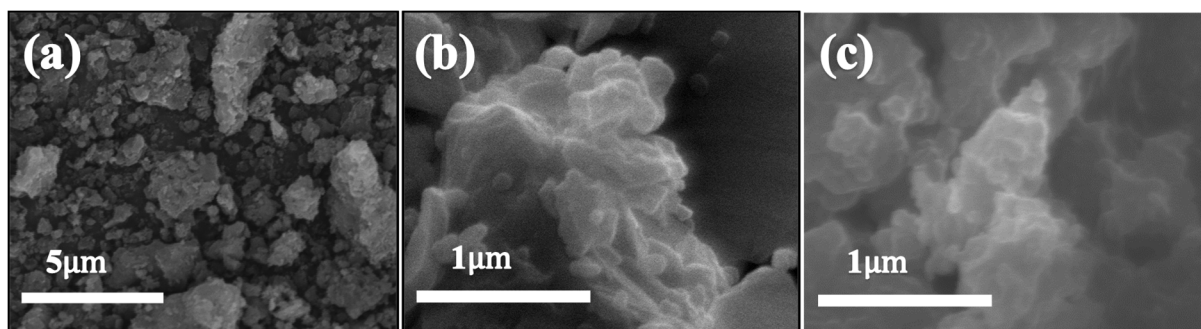
**Figure S3.** Cyclic voltammograms of (a) SiCu (b) SiFe and (c) SiMn vs. Li/Li<sup>+</sup> counter electrode with 1M LiPF<sub>6</sub> in EC: DEC: FEC (v/v ratio of 5:70:25) electrolyte at 0.1 mV s<sup>-1</sup> scan rate, in the potential window of 0.01–2.0 V.



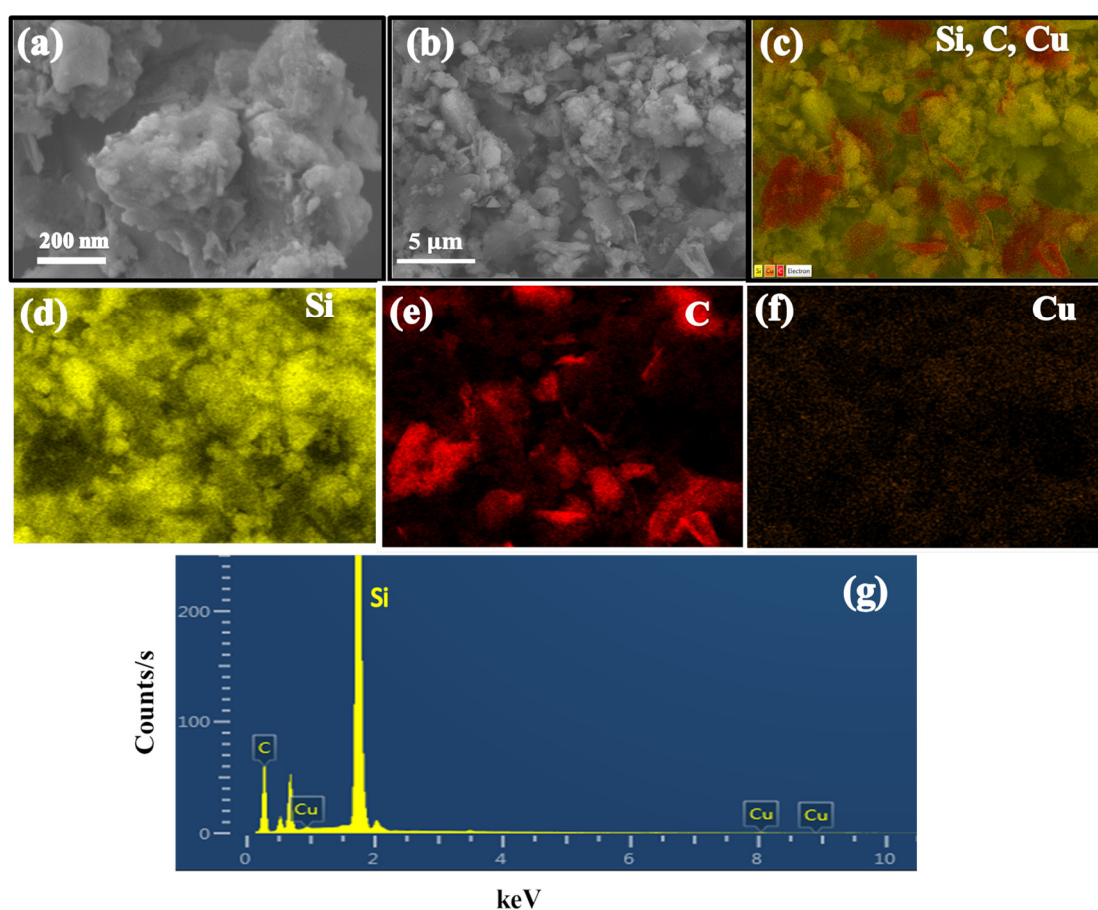
**Figure S4.** Voltage vs. specific capacity plots for 1<sup>st</sup>, 2<sup>nd</sup>, and 50<sup>th</sup> cycles (a) SiCu (b) SiFe and (c) SiMn vs.  $\text{Li/Li}^+$  as a counter electrode with 1M  $\text{LiPF}_6$  in EC: DEC: FEC (v/v ratio of 5:70:25), at  $200 \text{ mA g}^{-1}$  in the potential window of 0.01–2.0 V.



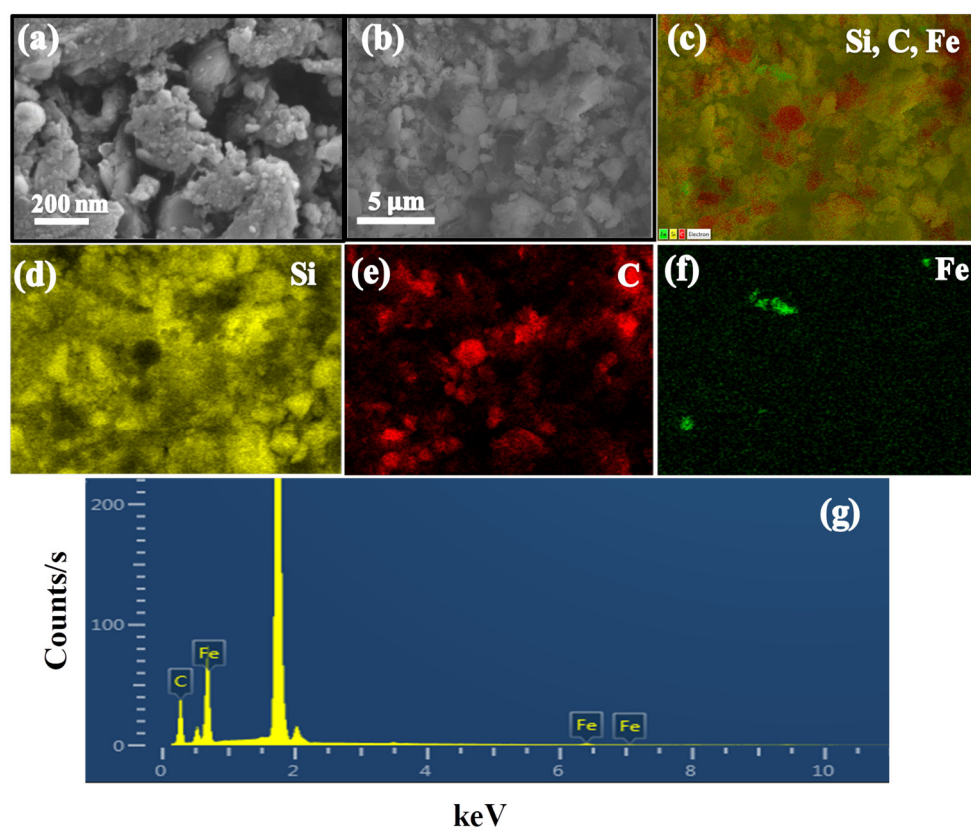
**Figure S5.** (a) cyclability (b) coulombic efficiency results of Si-48, SiCu, SiFe, SiMn and SiG vs.  $\text{Li/Li}^+$  as counter electrode with 1M  $\text{LiPF}_6$  in EC: DEC: FEC (v/v ratio of 5:70:25) electrolyte at  $200 \text{ mA g}^{-1}$  in the potential window of 0.01–2.0 V.



**Figure S6.** SEM images of Si-48 after 20 cycles at different magnifications

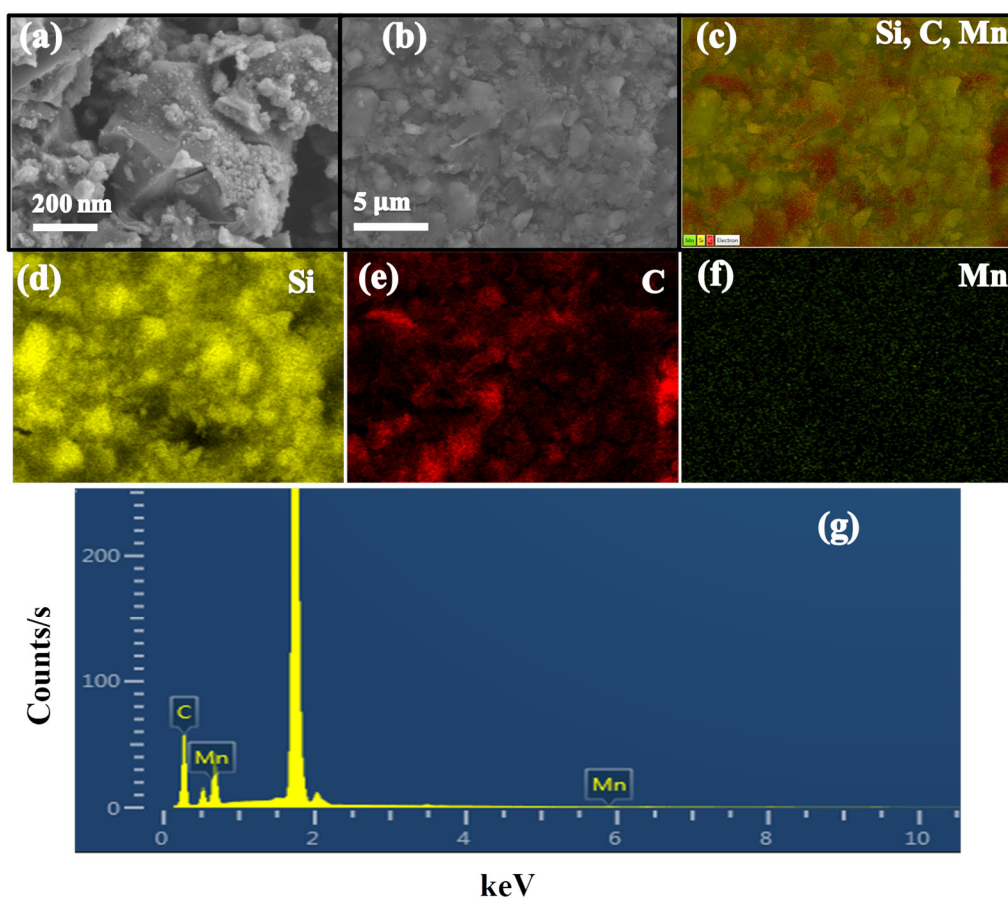


**Figure S7.** (a) and (b) SEM images (c) SEM-EDX elemental mapping of image (b) with respective Si, C, and Cu elements overlap (d) Si mapping (e) C mapping (f) Cu mapping (g) SEM-EDS spectra of image (b).

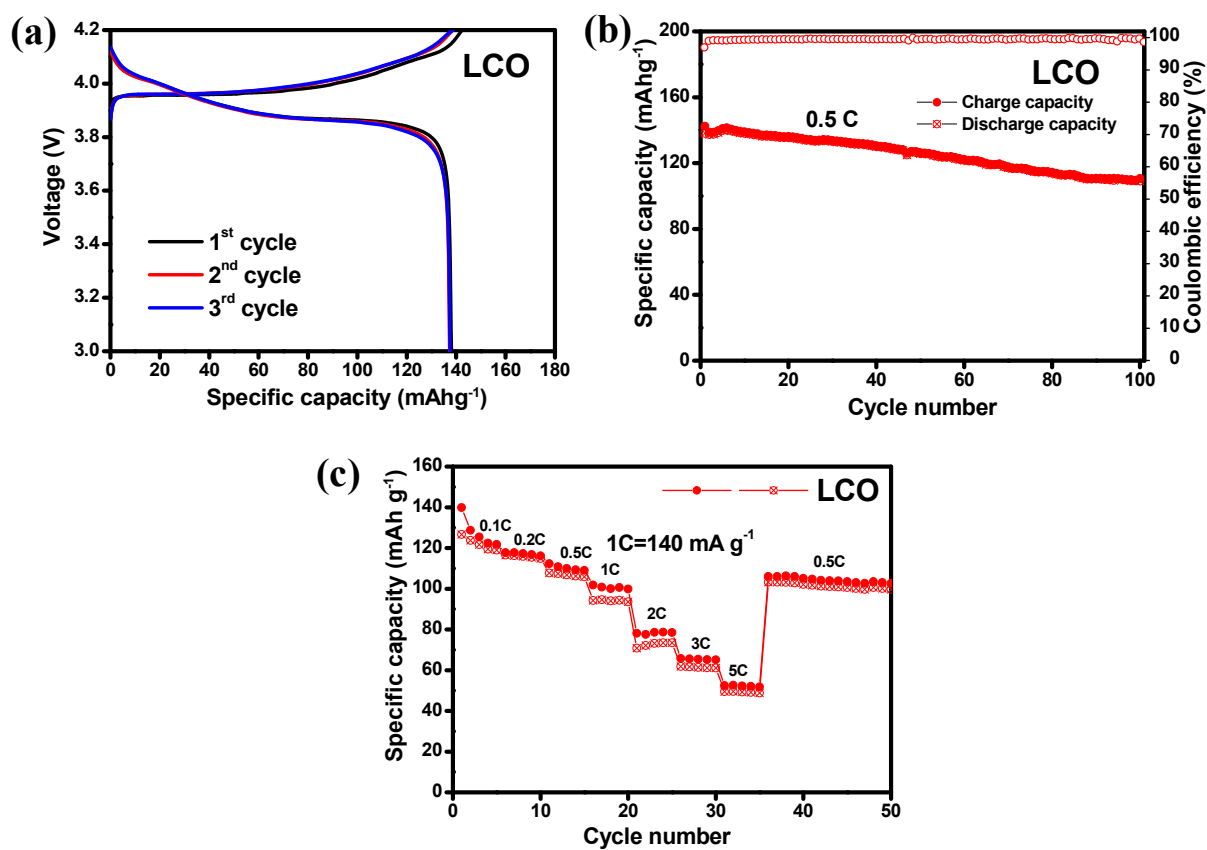


**Figure S8.** (a) and (b) SEM images (c) SEM-EDX elemental mapping of image (b) with respective Si, C, and Fe elements overlap (d) Si mapping (e) C mapping (f) Fe mapping (g) SEM-EDS spectra of image (b).





**Figure S9.** (a) and (b) SEM images (c) SEM-EDX elemental mapping of image (b) with respective Si, C, and Mn elements overlap (d) Si mapping (e) C mapping (f) Mn mapping (g) SEM-EDS spectra of image (b).



**Figure S10.** (a) Potential vs. specific capacity plots (b) cyclability (c) rate capability results of LCO vs.  $\text{Li/L}^+$  as a counter electrode at 0.5 C, in the voltage window of 3.0–4.2 V.