

Supporting Information

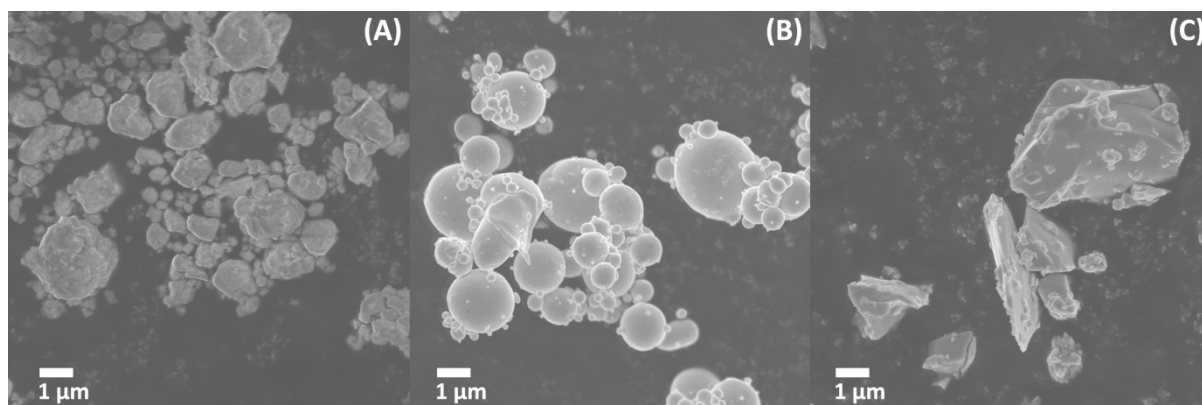


Fig. S1 Micrographs showing the particle size of (a) Sn-Ge (MS), (b) pure Sn and (c) pure Ge precursors.

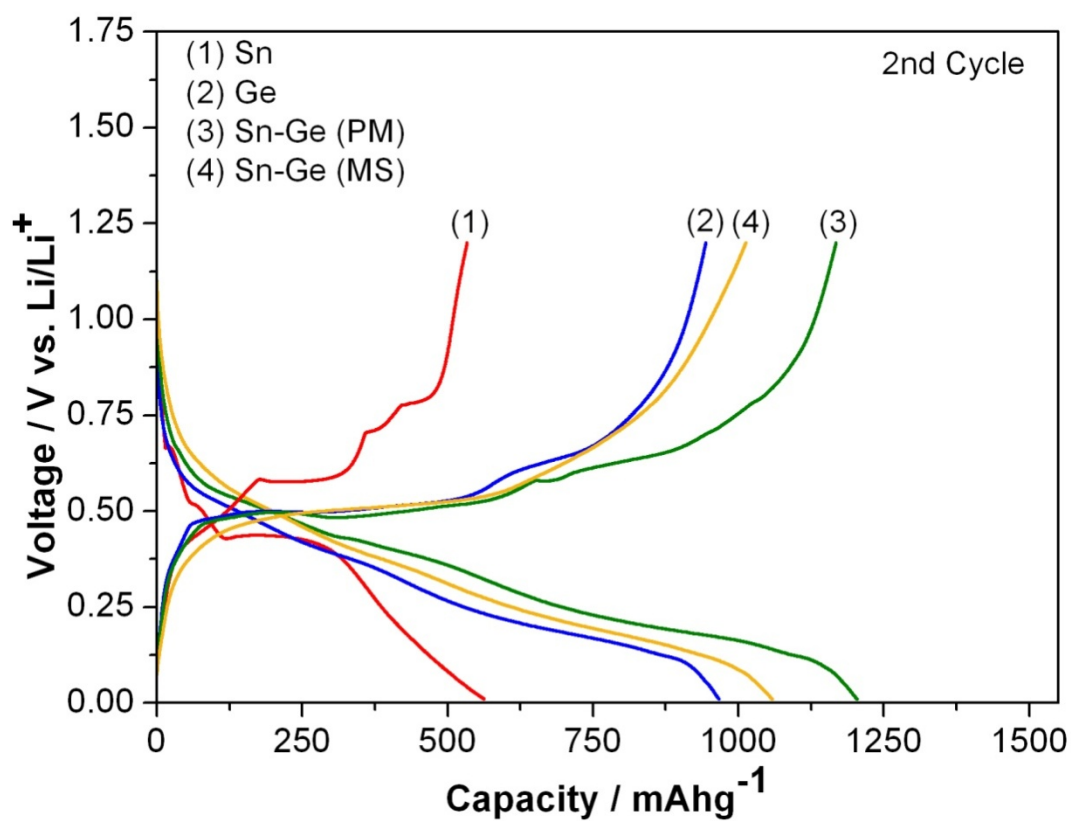


Fig. S2 2nd charge/discharge voltage profiles of Sn-Ge(MS), Sn-Ge (PM), pure Sn and Ge at C/10.

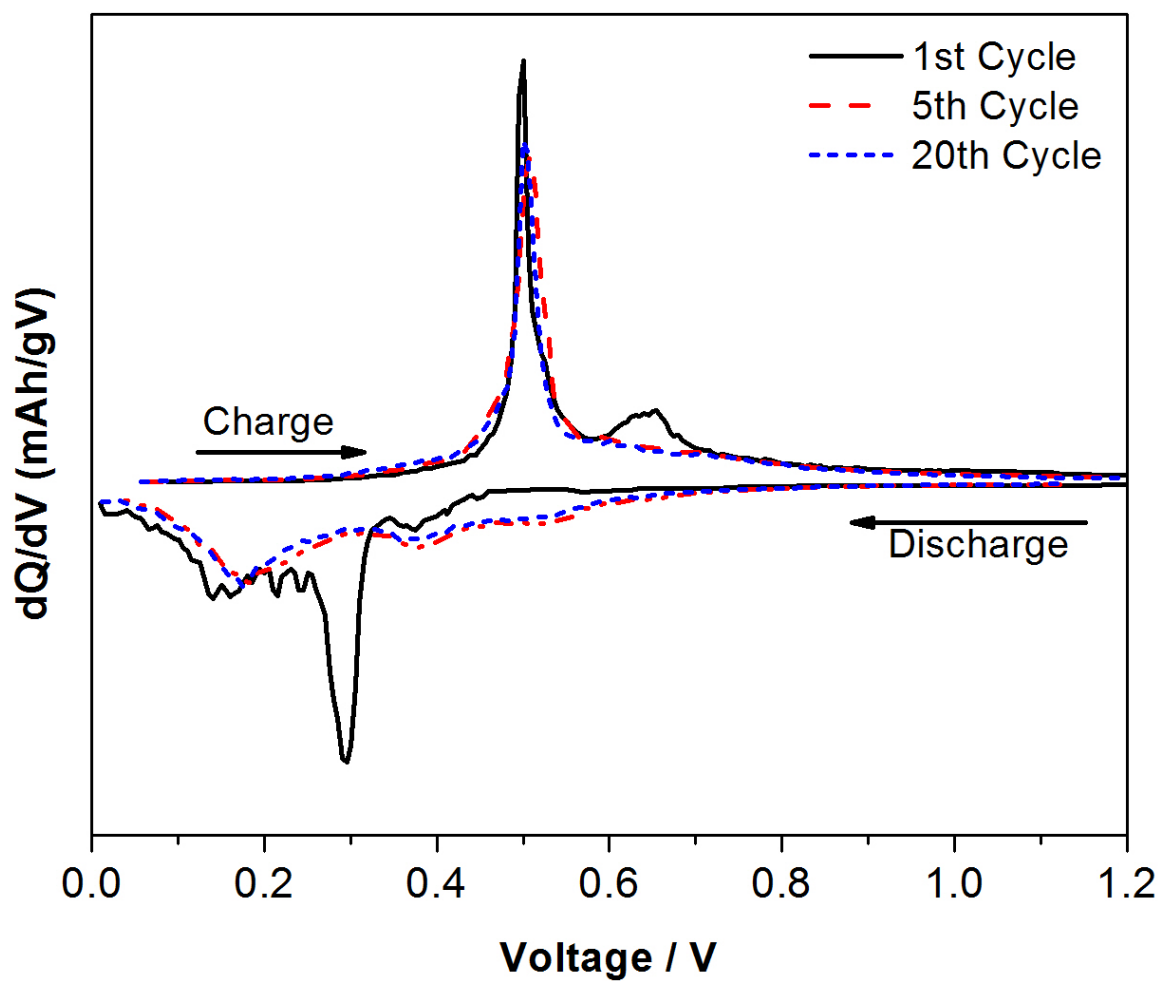


Fig. S3 Differential capacity plots of Sn-Ge (MS) at 1st, 5th and 20th cycle.

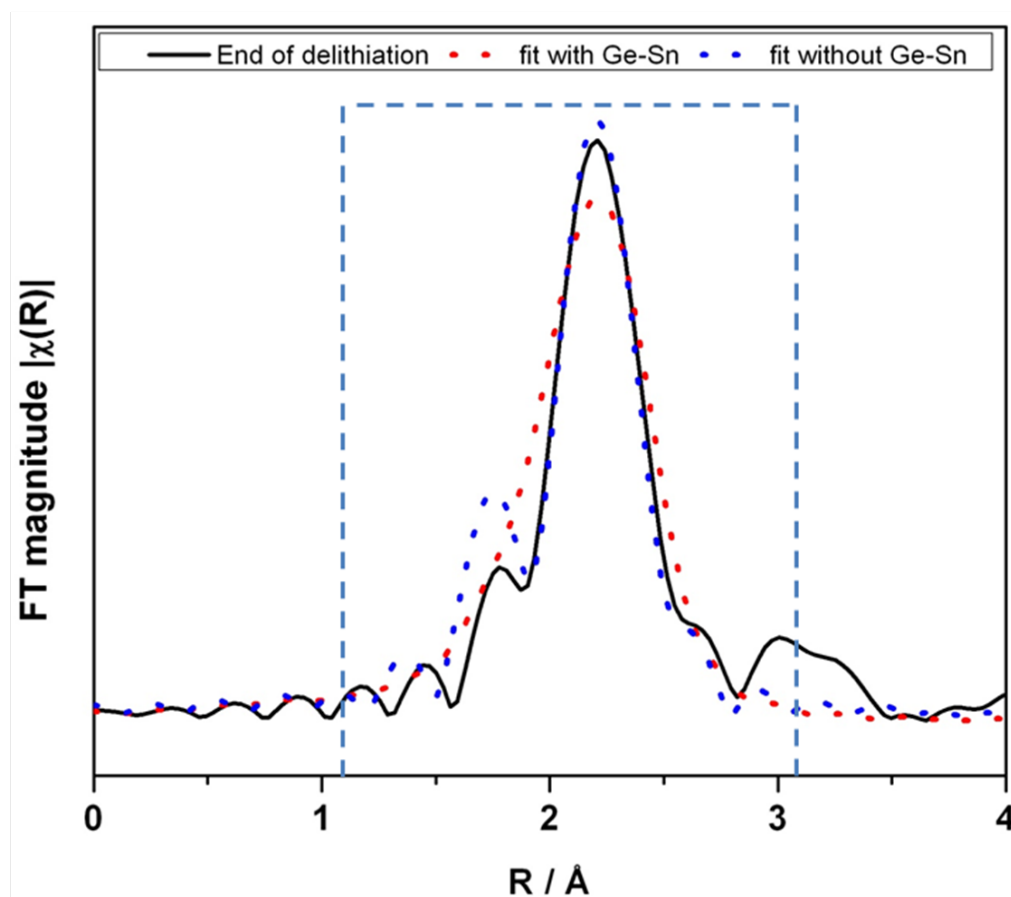


Figure S4. Fourier transforms of k^2 -weighted EXAFS spectra for delithiated Sn-Ge for the two fits. The fitting that includes both Ge-Sn and Ge-Ge bonds are represented by the red dots, and blue dots for the fitting with only Ge-Ge bonds. The dotted lines indicate the window used for the fit.

Table S1 Summary of single-scattering paths used in the fit, and local structure parameters based on quantitative analysis of Fourier transforms of k^2 -weighted EXAFS spectra for delithiated Sn-Ge (MS) using the alloy model and Ge model. Uncertainties in the last digit(s) are given in parentheses. The percentage of Ge from the alloy model is refined to be 103% +/- 4%. Notice that the σ^2 for alloy model is negative, indicating that the alloy model is not suitable for delithiated Sn-Ge (MS).

		N	R (Å)	σ^2 (10^{-3} Å ²)	Reduced $\chi^2 \times 10^3$	R factor $\times 10^{-2}$
Alloy model	Ge-Ge	3	2.486 (30)	12.5 (30)	1.641	4.18
	Ge-Sn	1	2.457 (16)	-2.2 (38)		
Ge model	Ge-Ge	2.2 (4)	2.481 (11)	5.3 (14)	1.106	3.61

Table S2. Summary of single-scattering paths used in the fit, and local structure parameters based on quantitative analysis of Fourier transforms of k^2 -weighted EXAFS spectra for delithiated Sn-Ge (MS) for the two cases where there's only Ge-Ge bond, and where there's both Ge-Ge and Ge-Li bond. The negative σ^2 is an indication of the likely absence of Ge-Li bond. Uncertainties in the last digit(s) are given in parentheses.

Data		N	R (Å)	σ^2 (10^{-3} Å ²)	Reduced $\chi^2 \times 10^3$	R factor $\times 10^{-2}$
1.20 V (charged)	Ge-Ge	2.2 (4)	2.481 (11)	5.3 (14)	1.106	3.61
	Ge-Ge	2.0 (8)	2.469 (20)	1.2 (20)	1.772	4.82
	Ge-Li	0.14 (150)	2.719 (60)	-3.26 (50)		