Electronic Supplementary Material (ESI) for RSC Advances.

Supplementary Information

The role of thermal annealing on the microstructures of (Ti, Fe)-alloyed Si thin-film anodes for high-performance Li-ion batteries

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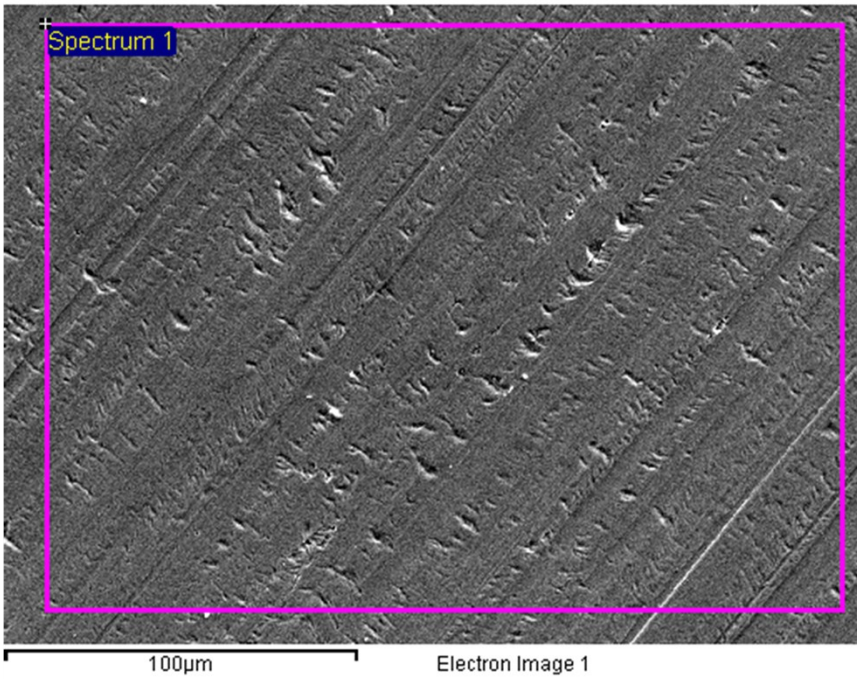
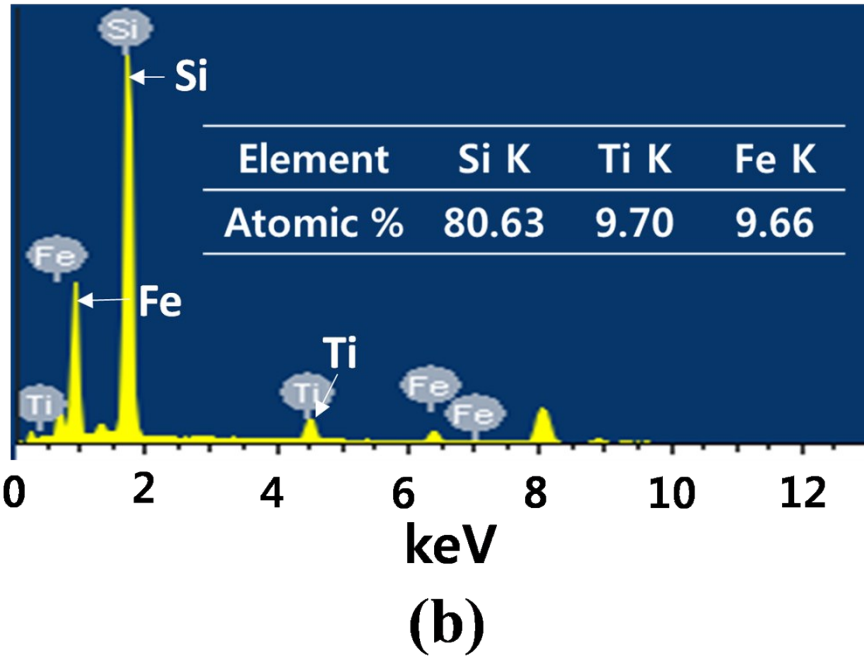


(a)



(b)

Figure S1. (a) SEM image of the as-deposited (Ti, Fe)-alloyed Si thin-film sample subjected to EDS analysis in the box. (b) EDS spectra of the sample showing the composition (at.%) (approximately 80 : 10 : 10 (= Si : Ti : Fe)).

Table S1. Elemental stoichiometry of the (Ti, Fe)-alloyed Si thin-film synthesized by different RF power densities of Si target.

		RF power density of Si target (W/cm^2)					
		7.4	8.63	9.87	11.1	12.33	14.8
Composition (%)	Si / (Si+Ti+Fe) (%)	77.0	78.5	80.5	81.5	82.5	84.0
	Ti / (Si+Ti+Fe) (%)	11.5	11.0	10.0	9.5	9.0	8.0
	Fe / (Si+Ti+Fe) (%)	11.5	10.5	9.5	9.0	8.5	8.0

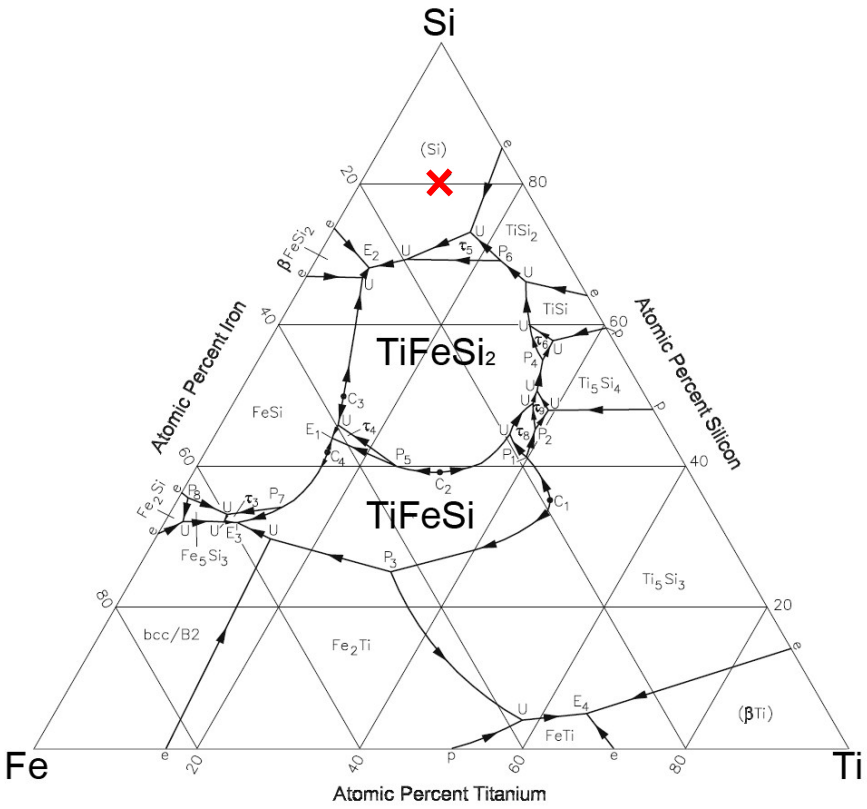


Figure S2. Ternary phase diagram of liquidus projection for Si-Ti-Fe three-component system [ref. JPEDAV (2009) 30:393–396]

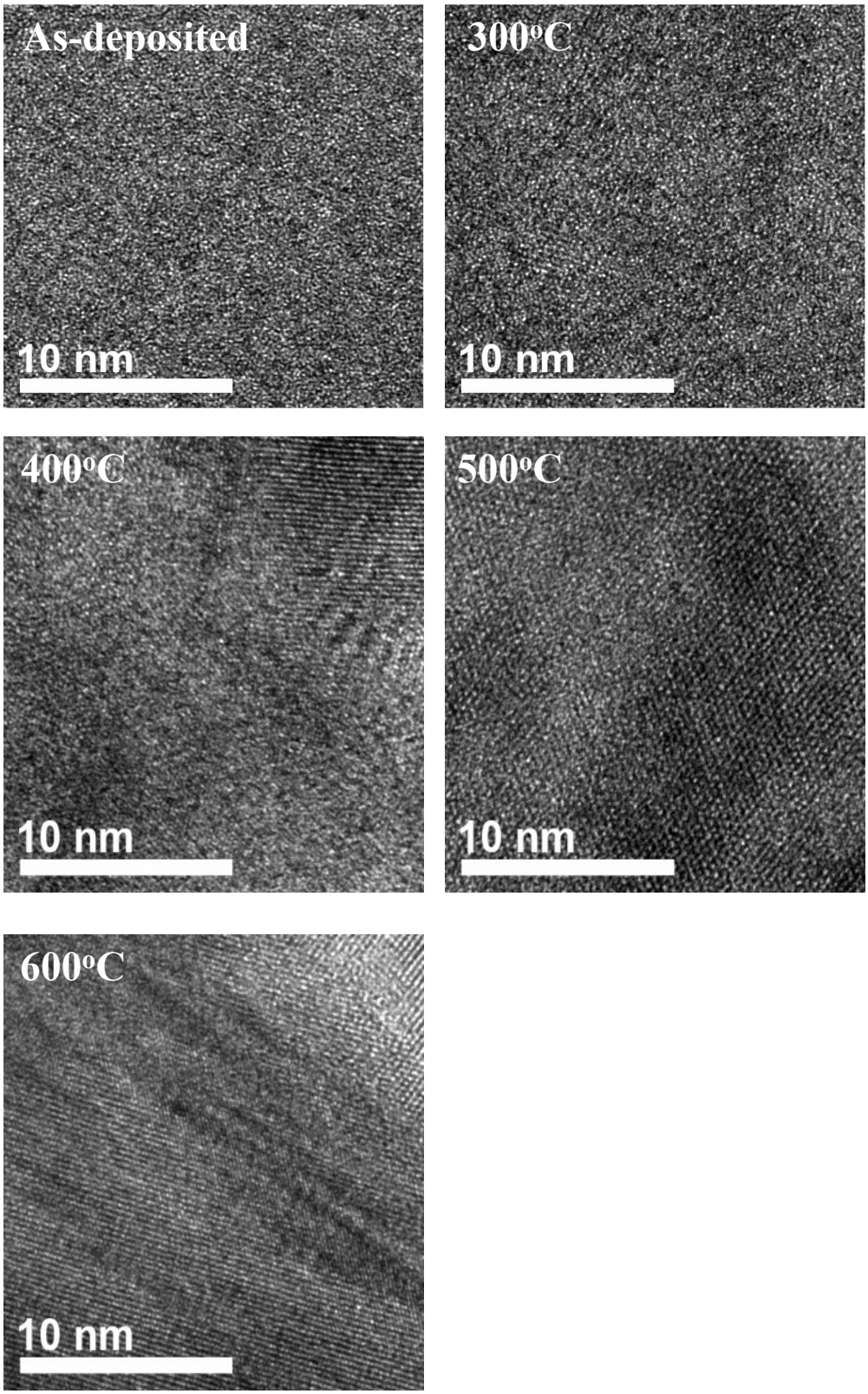


Figure S3. High-resolution electron micrographs of the (Ti, Fe)-alloyed Si thin-film samples annealed at the different temperatures. Note that these magnified micrographs are equivalent to those presented in the insets of Figure 2 in the main text.

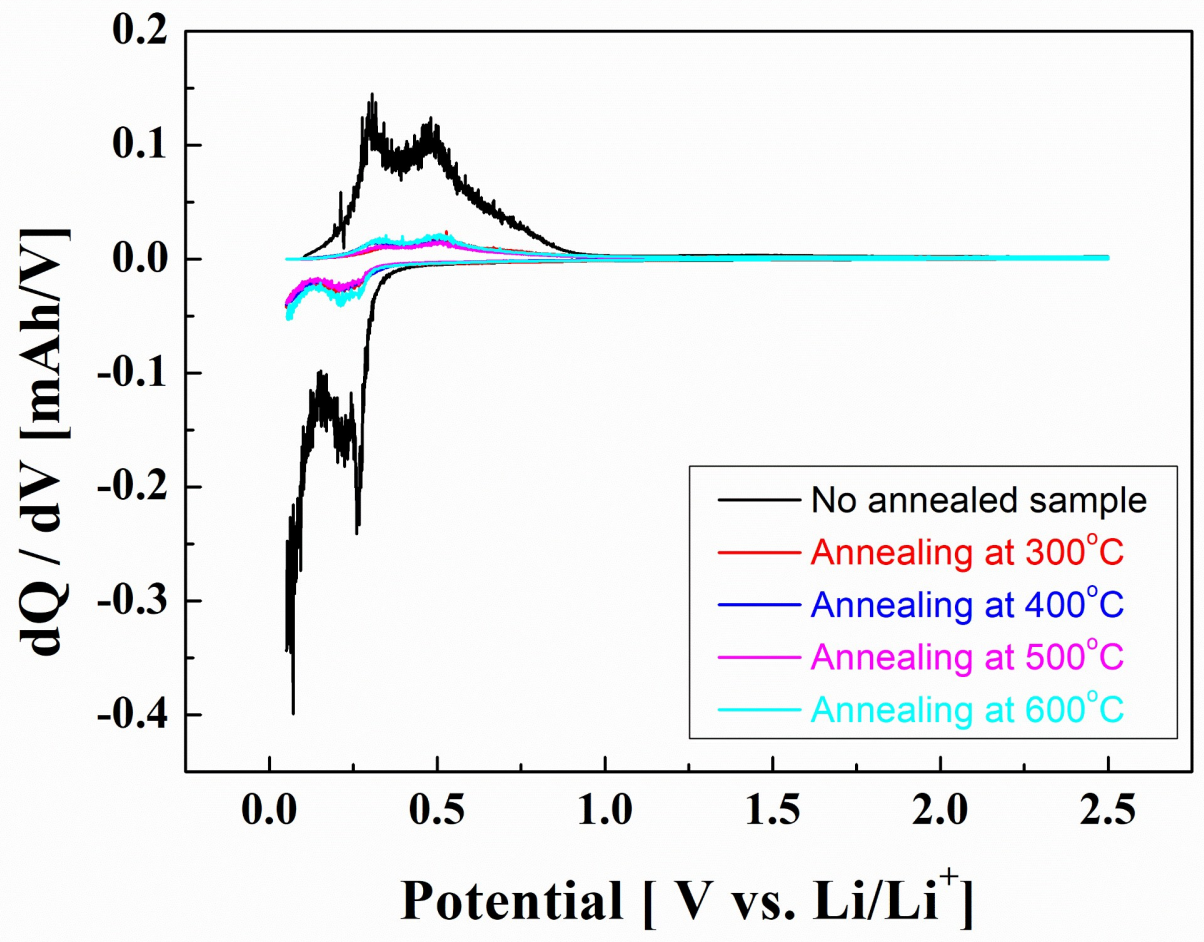


Figure S4. Differential capacity (dQ/dV) versus potential of the (Ti, Fe)-alloyed Si thin-film samples annealed at the different temperatures.

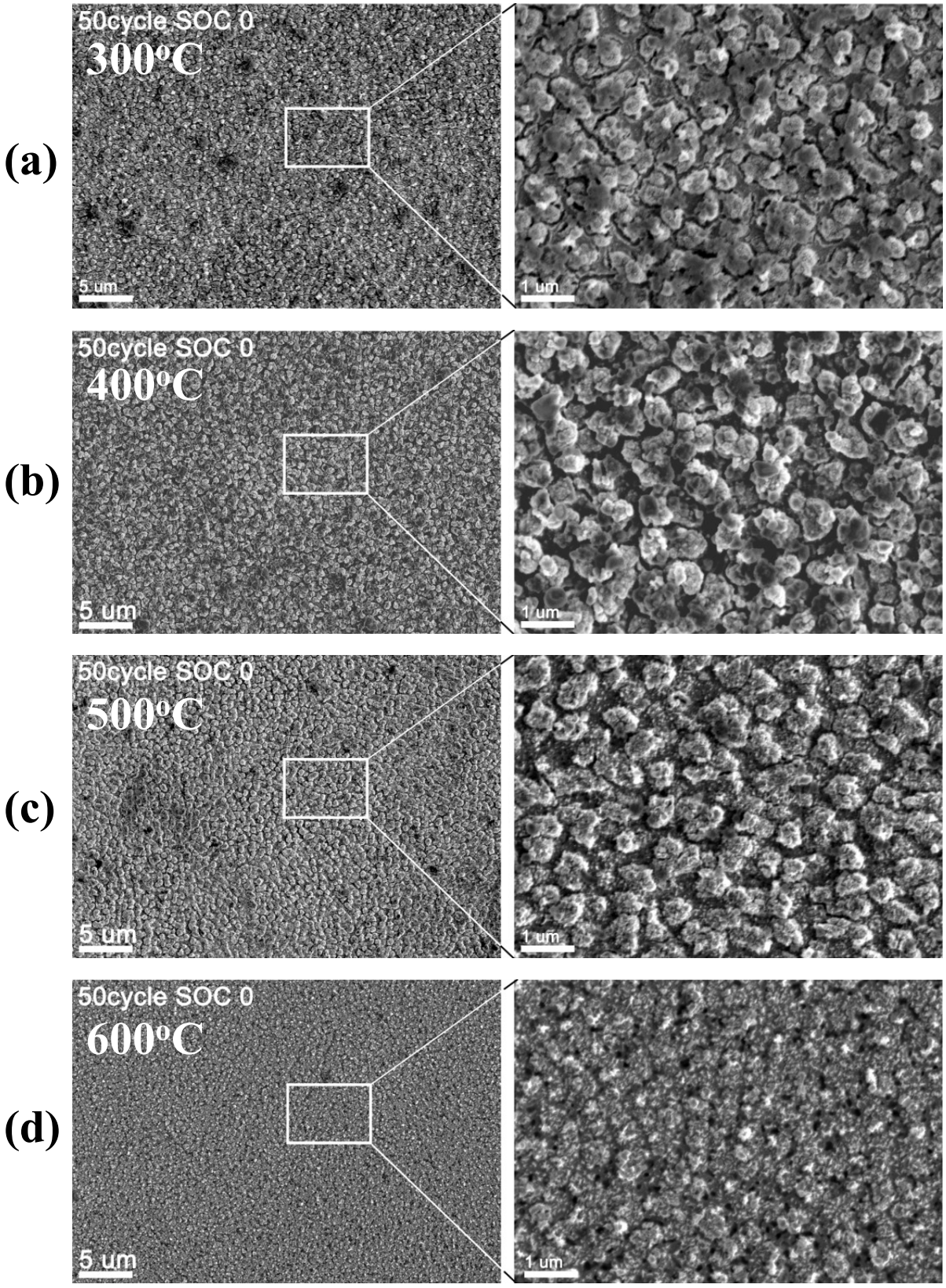


Figure S5. Surface morphological changes using FESEM for the 50 cycled samples annealed at the different temperatures.