

# Supporting Information

## Electrochemical Anode Behavior of $\alpha$ -FeSi<sub>2</sub> co-Sintered with Solid Electrolyte

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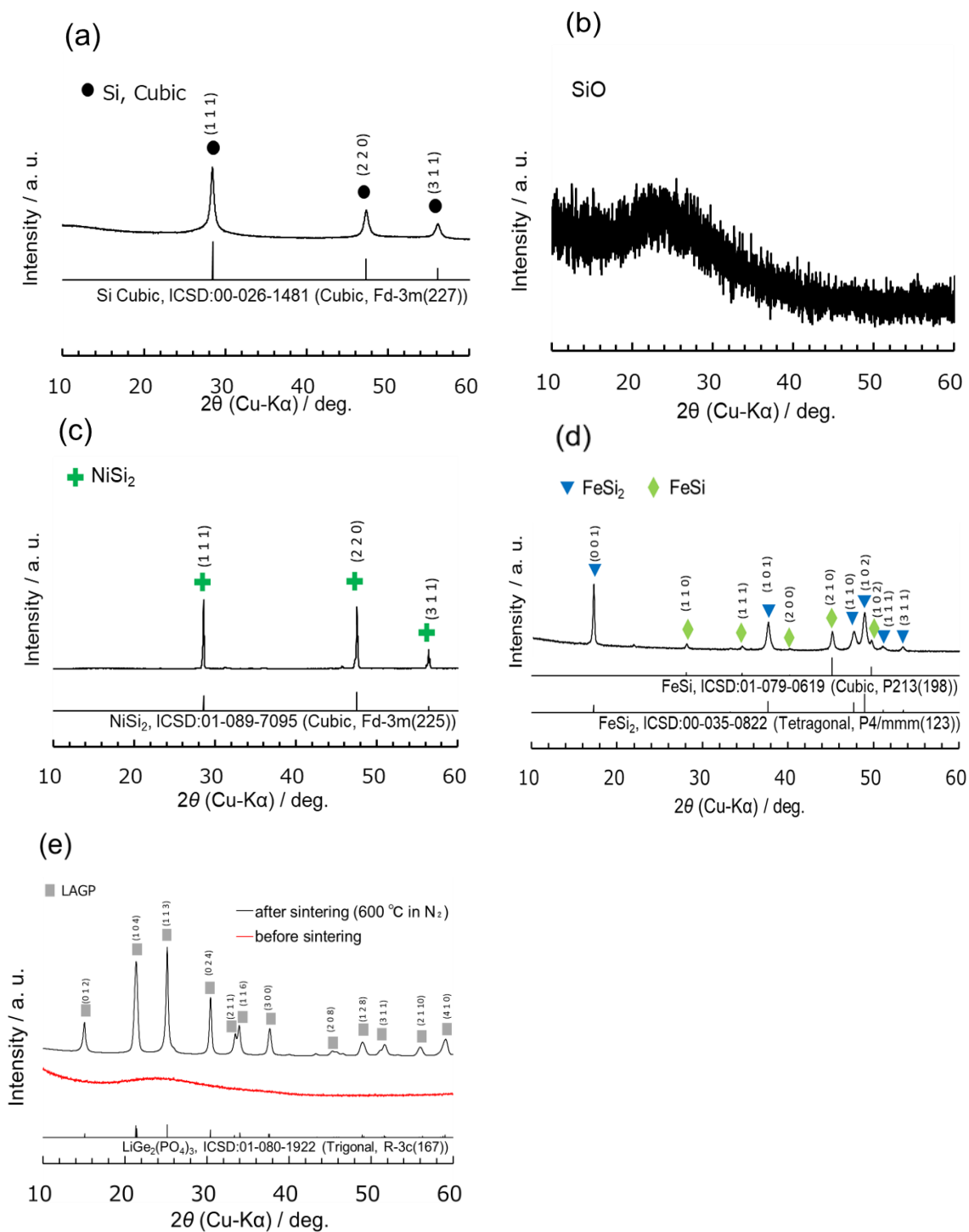
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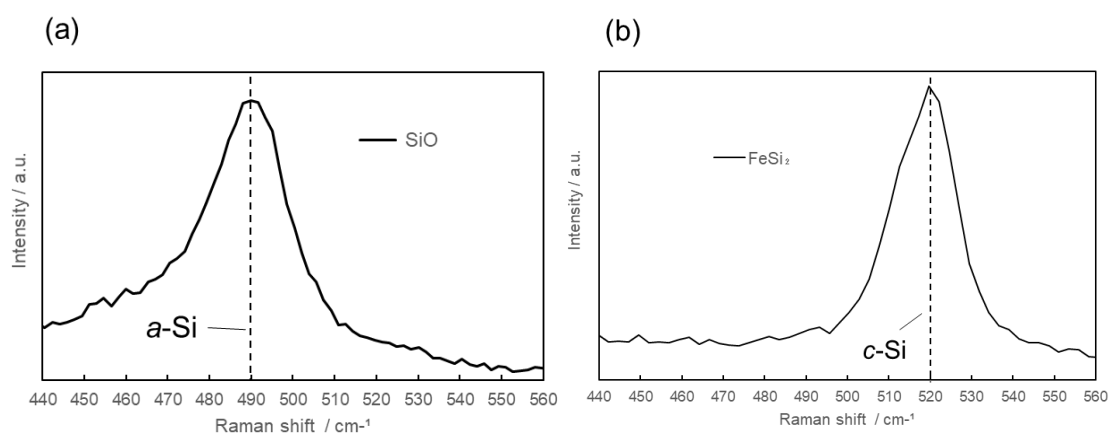
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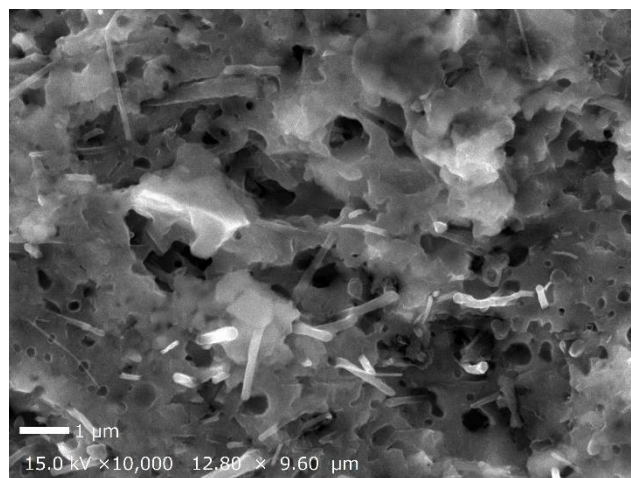
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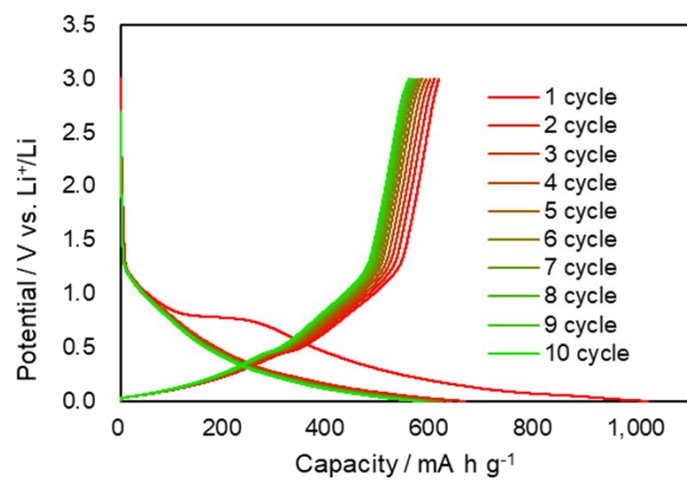
**Fig. S1** XRD patterns of (a) Si, (b) amorphous SiO, (c) NiSi<sub>2</sub>, (d) FeSi<sub>2</sub> and (e) LAGP before sintering/after sintering.



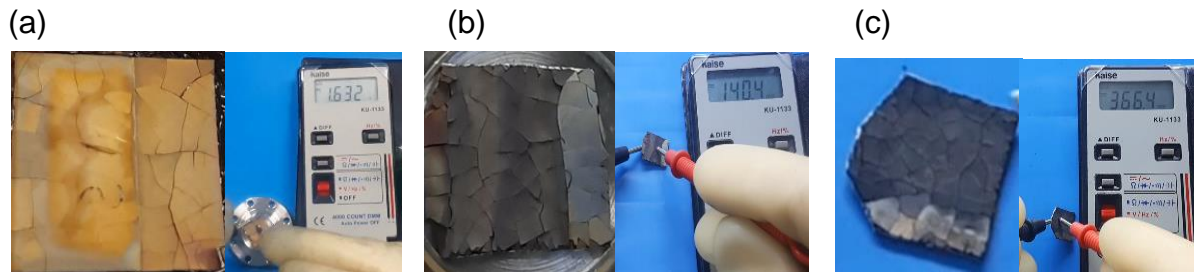
**Fig. S2** Raman spectra of (a) amorphous  $\text{SiO}$  and (b)  $\text{FeSi}_2$ .



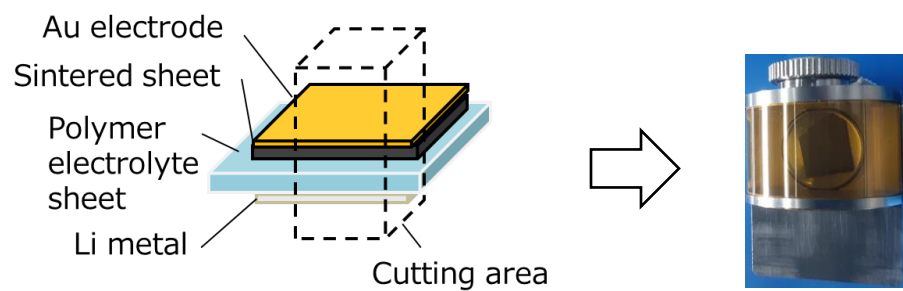
**Fig. S3** The sheet's cross section appearance of SEM observation.



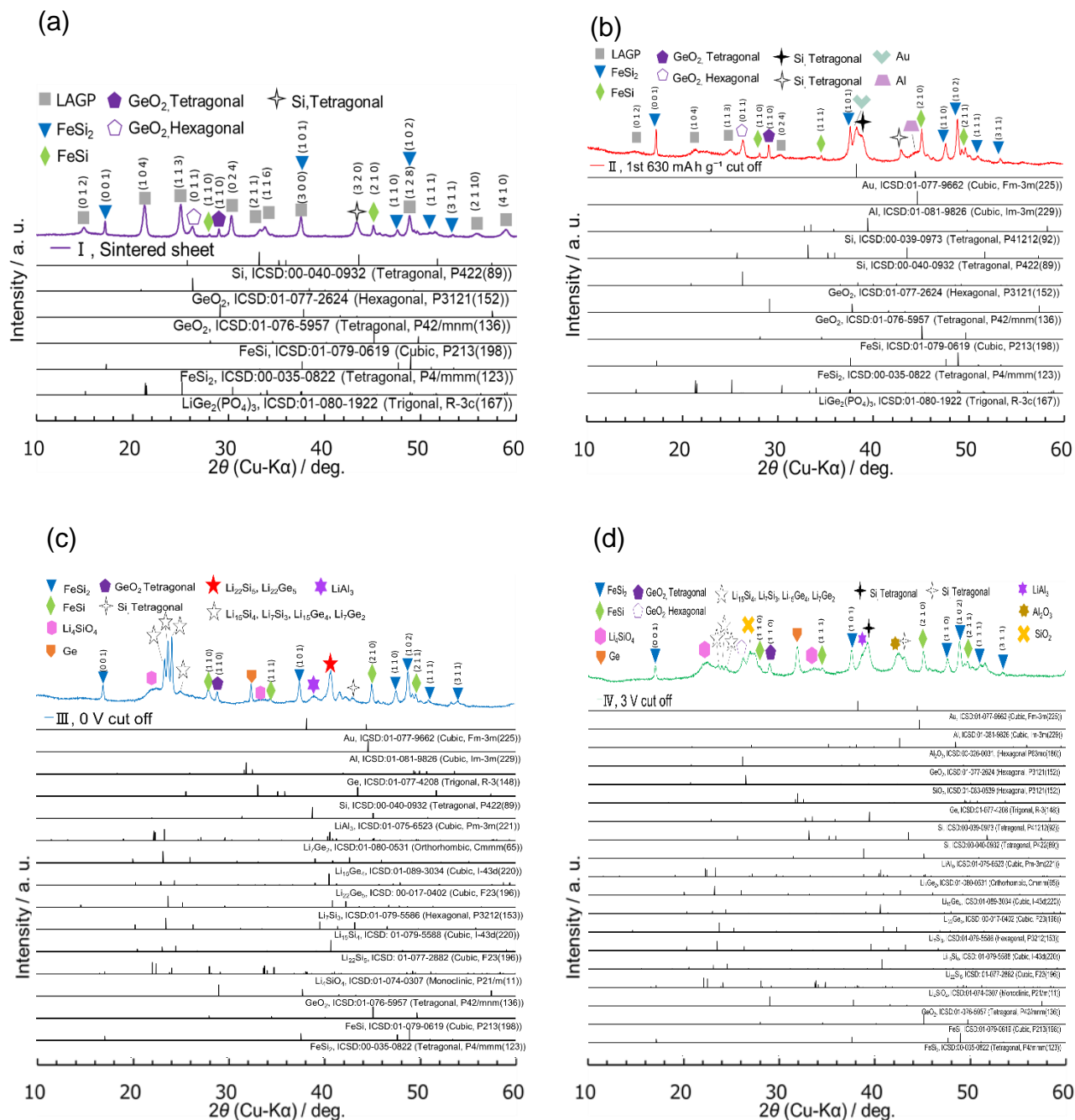
**Fig. S4** Charge/discharge curves of FeSi<sub>2</sub> electrode in 1 M LiPF<sub>6</sub>/EC/EMC (30/70 vol%).



**Fig. S5** Exterior photographs of  $\text{FeSi}_2$  sheet electrodes after (a) the first charge process at  $630 \text{ mA h g}^{-1}$ , (b) the third charge process at  $0 \text{ V}$ , and (c) the third discharge process at  $3 \text{ V}$ .

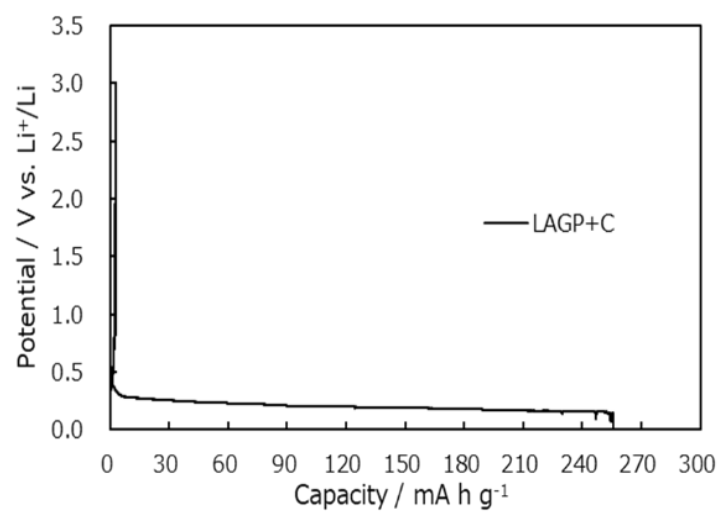


**Fig. S6** (Left) Schematic diagram of the cell and (right) XRD measurement sample holder containing the  $\text{FeSi}_2$  sheet electrode.

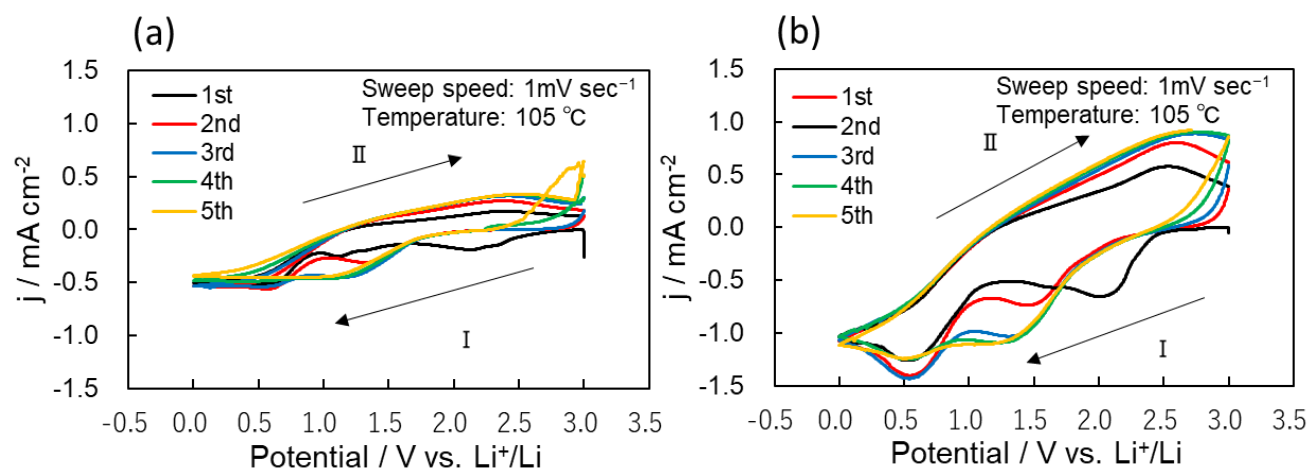


**Fig. S7** XRD patterns of sintered  $\text{FeSi}_2$  sheets (a) as prepared, (b) after the first charge process at  $630 \text{ mA h g}^{-1}$ , (c) after the third charge process at  $0 \text{ V}$ , and (d) after the third discharge process at  $3 \text{ V}$ .

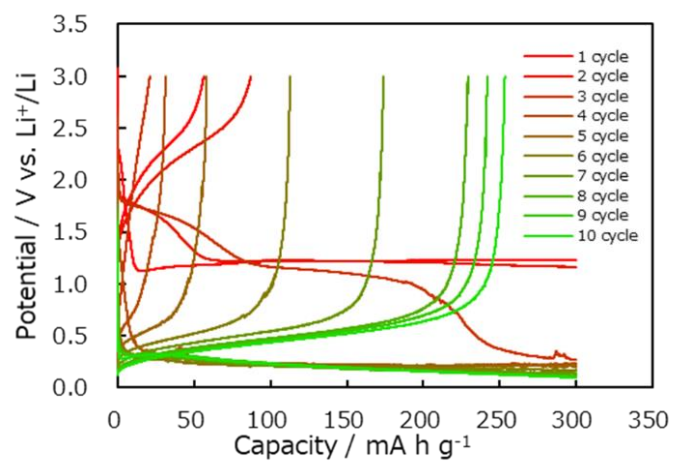




**Fig. S8** Charge/discharge curve of LAGP+VGCF at 0.01 C rate (1 C rate =  $423 \text{ mA h g(LAGP)}^{-1}$ ) in constant current mode.



**Fig. S9** Cyclic voltammograms of (a) LAGP+VGCF and (b) FeSi<sub>2</sub>+LAGP+VGCF.



**Fig. S10** Charge/discharge curves of the  $\text{FeSi}_2$  electrode with a charge capacity limitation of 300  $\text{mA h g}^{-1}$ .

**Table S1** The voltage of FeSi<sub>2</sub> electrodes after cell disassembly.

Disassembly sample	II . 630 mA h g <sup>-1</sup> cutoff	III. 0 V cutoff	IV. 3 V cutoff
Voltage (V)	1.632	0.140	0.3664