Electronic Supplementary Information

for

Crystalline Cu-silicide stabilizes the performance of a high capacity Si-based Li-ion battery anode†

Wenqing Ma,[a] Xizheng Liu,[b*] Xi Wang,[c] Zhifeng Wang,[b,d] Ruie Zhang,[b] Zhihao Yuan[a,b] and Yi Ding[a,b]

[a]*School of Materials Science and Engineering, Tianjin University, Tianjin 300350, P.R. China.*

[b]*Tianjin Key Laboratory of Advanced Functional Porous Materials, Institute for New Energy Materials and Low-Carbon Technologies, School of Materials Science and Engineering, Tianjin University of Technology, Tianjin 300384, P.R. China.*

[c]*School of Sciences, Beijing Jiaotong University, Beijing 100044, P.R. China.*

[d]*School of Materials Science and Engineering, Hebei University of Technology, Tianjin 300310, P.R. China.*

* Corresponding author: xzliu@tjut.edu.cn

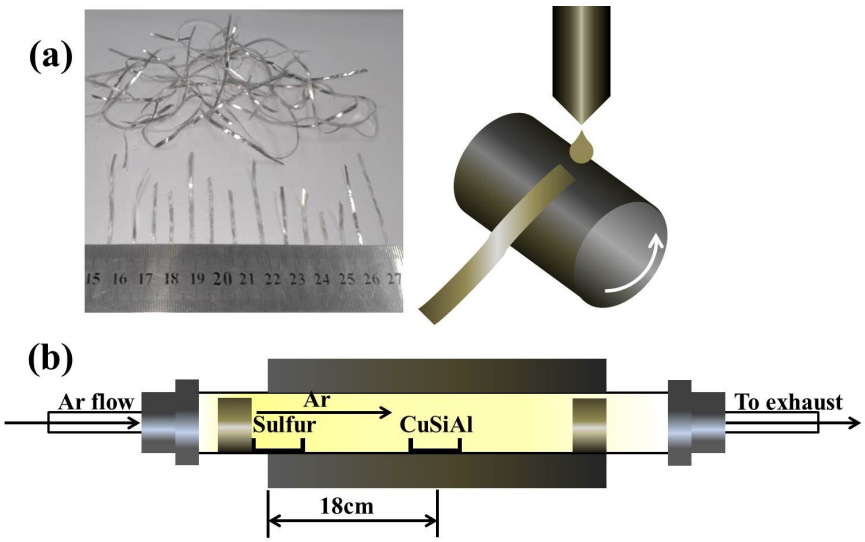

Fig. S1 a) The as-prepared melt spun Cu-Si-Al ribbon (left), and simplified schematics of melt spinner (right). b) Schematic diagram illustrate the Cu-Si-Al-S alloy synthesis setup using a flow tube reactor.

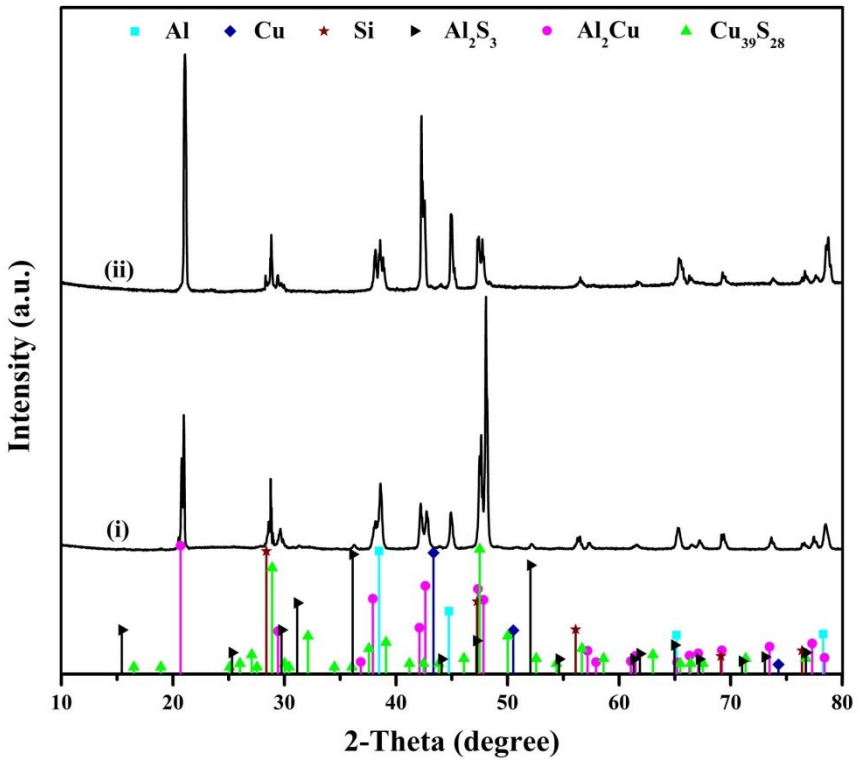

Fig. S2 XRD patterns of i) Cu-Si-Al-S alloy, ii) Cu-Si-Al-S alloy after water etching at 60℃ for 36h.

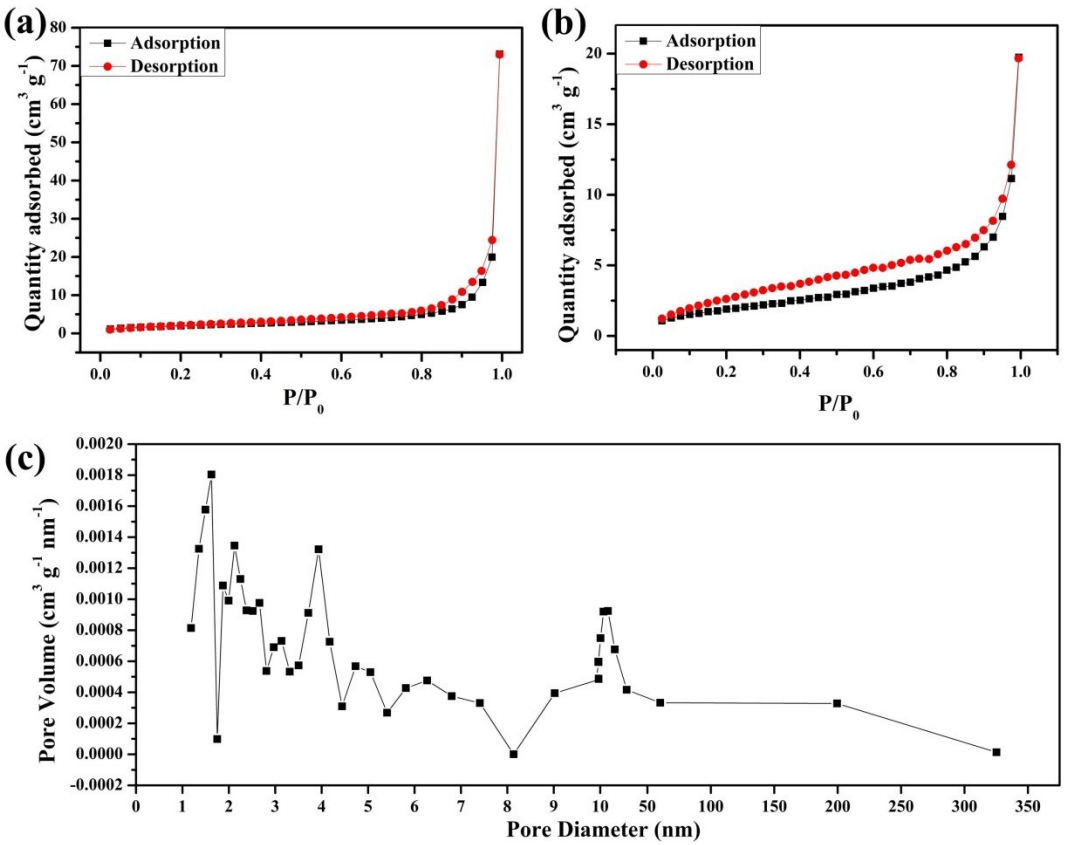

Fig. S3 N_2 adsorption isotherms of a) Si_{SERE} and b) HMSi. c) BJH pore size distribution curve of Si_{SERE}.

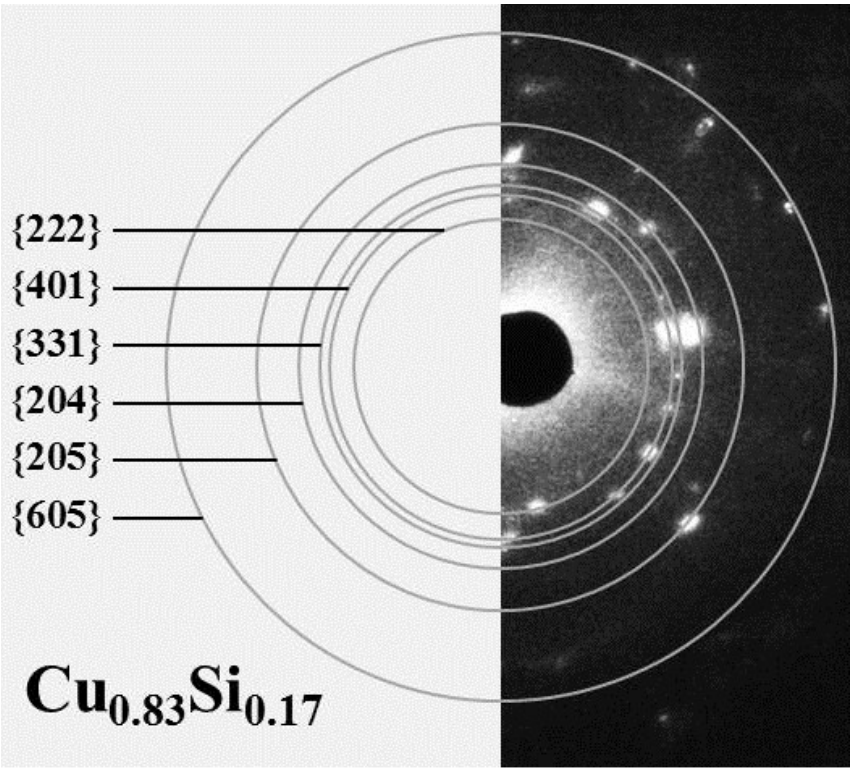

Fig. S4 SAED pattern of pure $Cu_{0.83}Si_{0.17}$ particles.

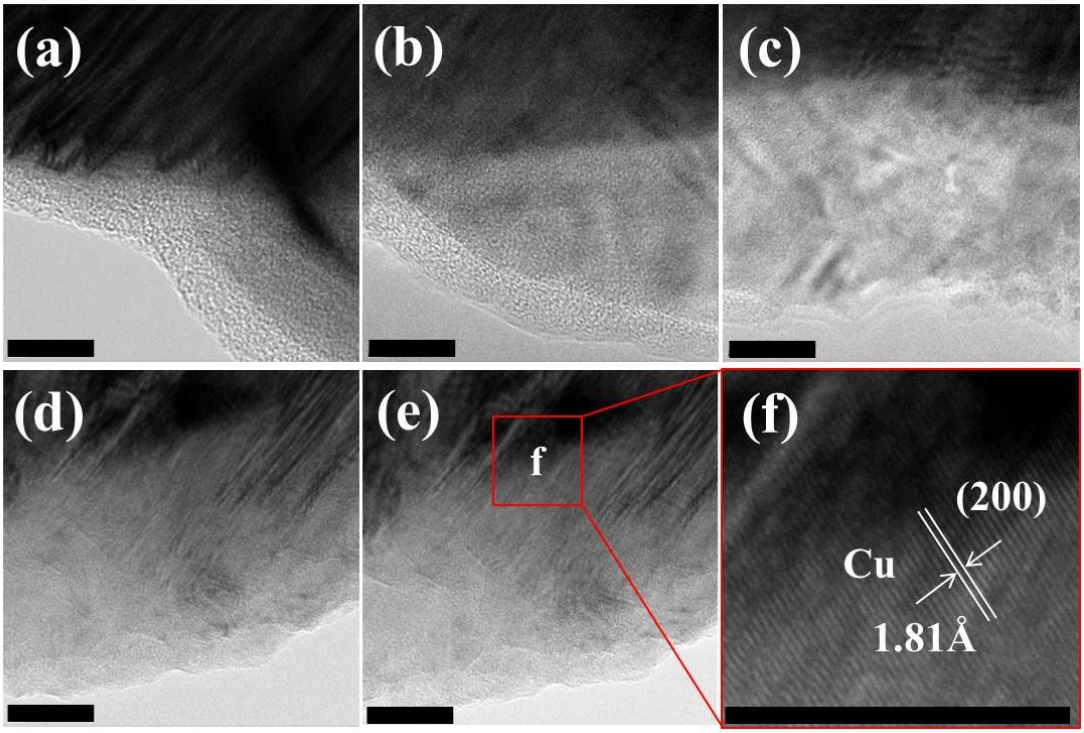

Fig. S5 HRTEM images of Si_{SERE} composite obtained by the In situ TEM experiment during the first lithiation (the scale bar is 10 nm).

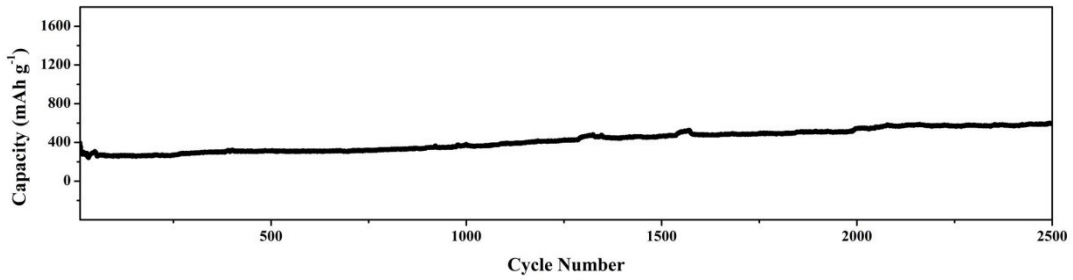

Fig. S6 Long-term cycling stability of Si_{SERE} electrode at a current density of 12 A g^{-1}.

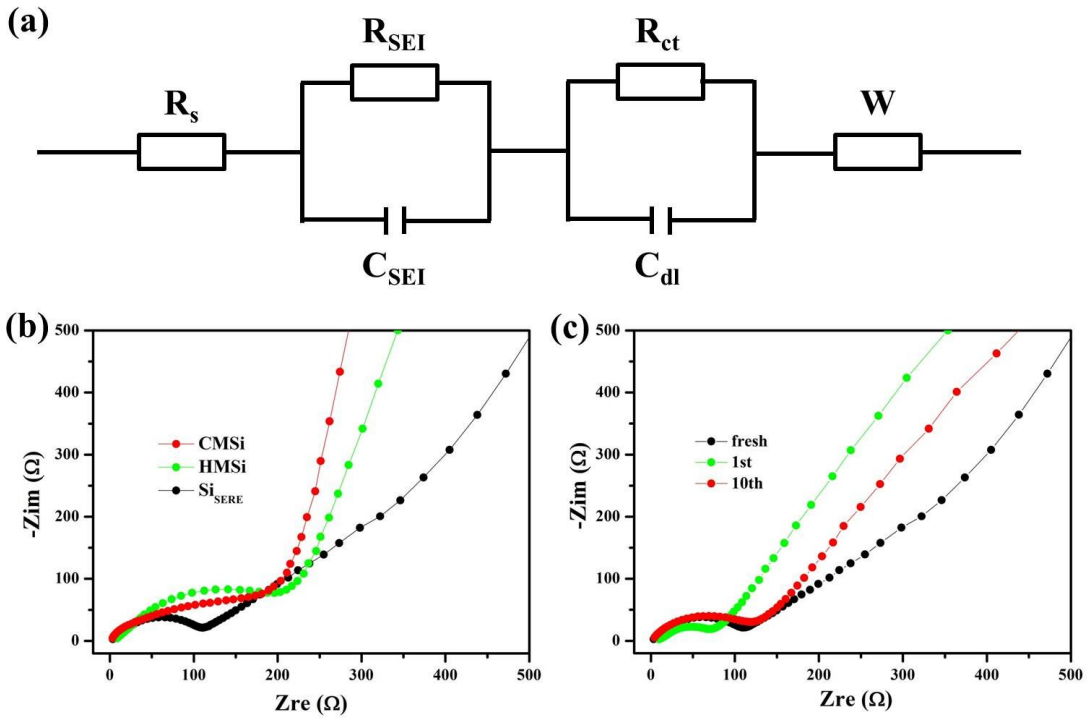

Fig. S7 a) An equivalent circuit model to fit the Nyquist plots. Nyquist plots of b) Si_{SERE}, HMSi, and CMSi at the fresh state; c) Si_{SERE} at different cycling stages by applying a sine wave with an amplitude of 20 mV over a frequency range of 100 kHz to 0.01Hz.

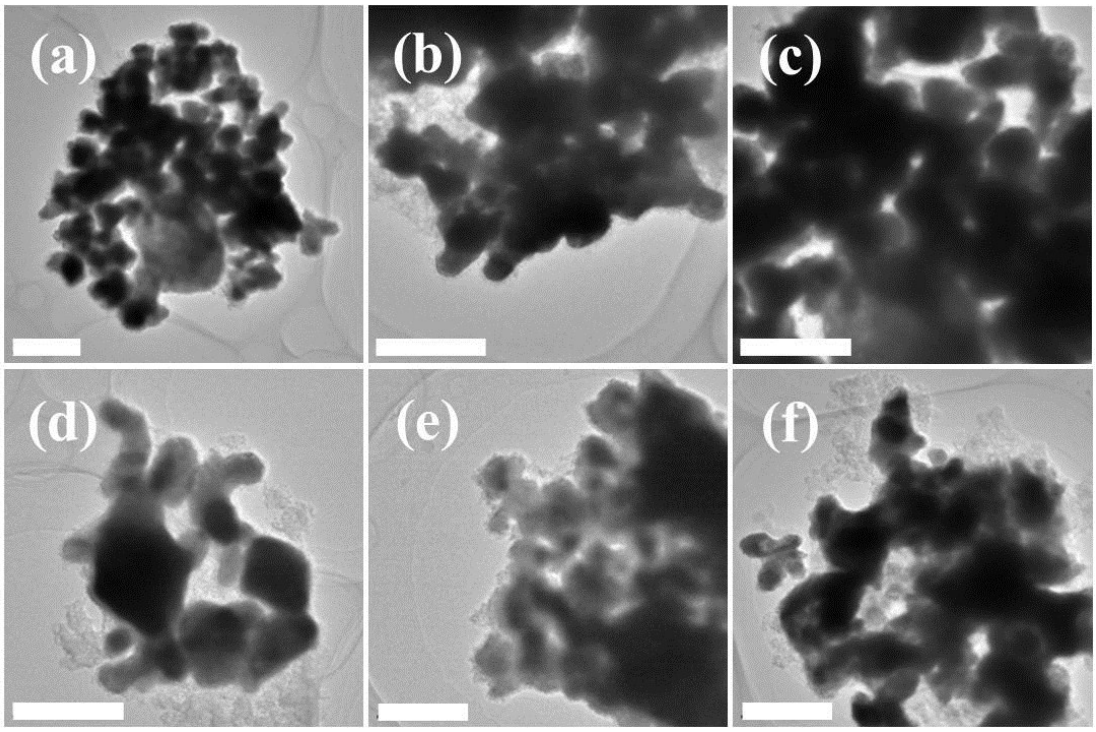

Fig. S8 TEM images of Si_{SERE} electrode after 200 cycles at 1.5 A g^{-1} (the scale bar is 500nm).

Table S1 The EIS fitting results of different electrode materials at the fresh state.

	R_s (Ω)	R_{ct} (Ω)
Si_{SERE}	14.26	71.7
HMSi	5.272	160.4
CMSi	14.09	199.6