Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Supporting Information

Improvement of Desolvation and Resilience of Alginate Binders for Si-based Anode in a Lithium Ion Battery by Calcium-Mediated Cross-linking

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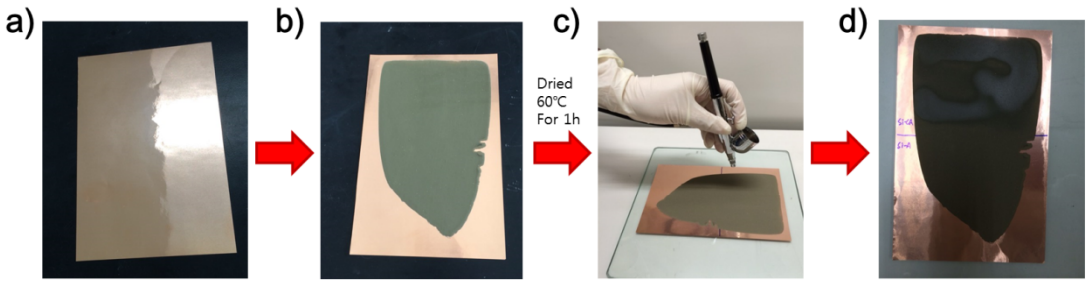

Figure S1. The process of spray-coating method. (a) The Cu foil was prepared. (b) The slurry (Si : Super P : alginate = 60: 20 : 20) was casted on a Cu foil using the doctor-blading technique. (c) After drying at 60℃ for 1 hour, spraying 1 wt% $CaCl_2$ solution on slurry. (d) The cast films was dried in a vacuum oven at 110℃ more than 8 hours.

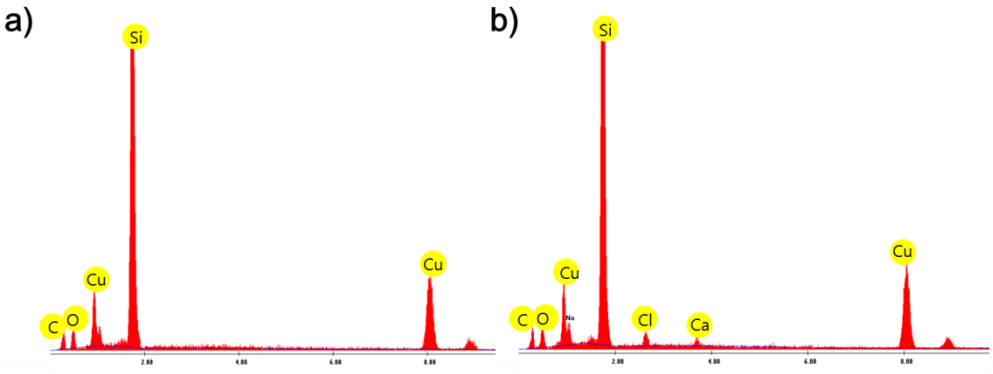

Figure S2. Energy-dispersive X-ray spectroscopy **(**EDS) spectrum of surface (a) Si-A and (b) Si-CA.

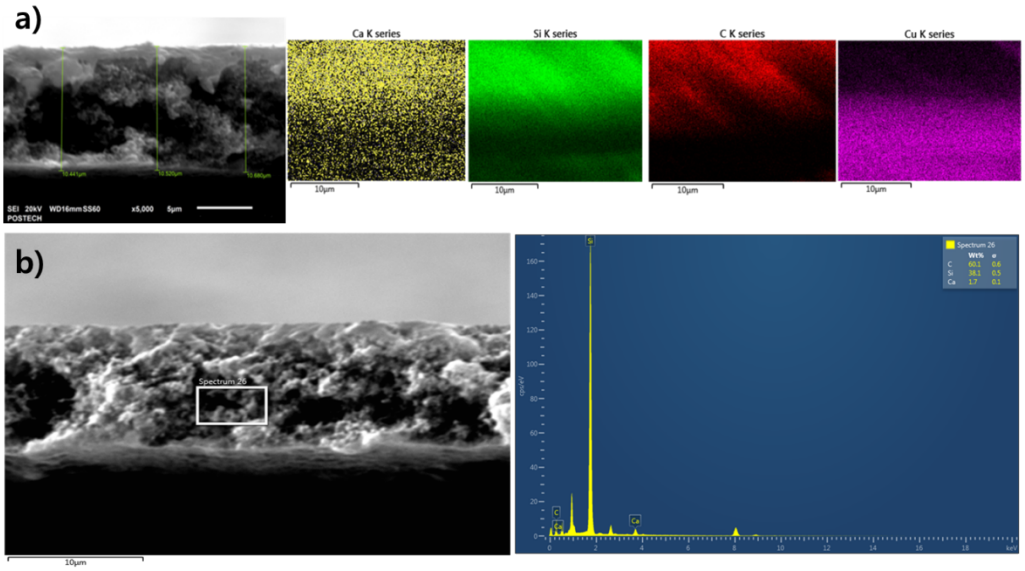

Figure S3. Energy-dispersive X-ray spectroscopy(EDS) (a) mapping and (b) spectrum of Si-anode with Ca-alginate binder in direction of thickness.

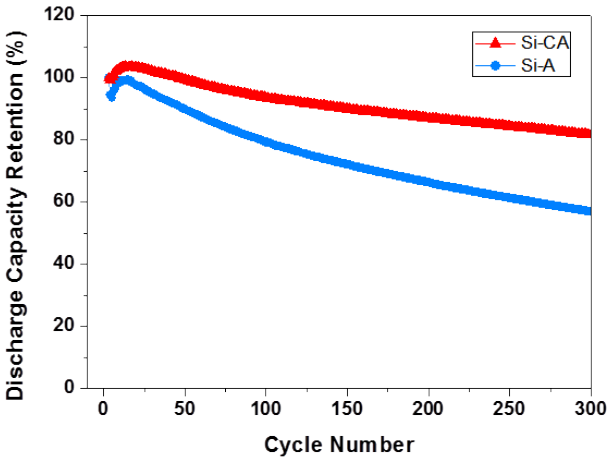

Figure S4. Discharge Capacity Retention plots of Si-CA and Si-A for 300cycles (at 1000 mA g^{-1}).

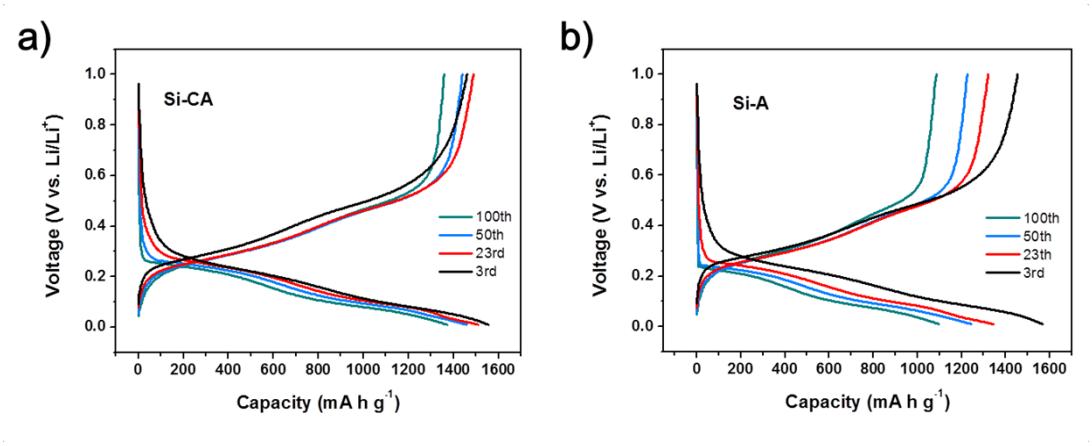

Figure S5. (a), (b) Charge-discharge profiles at 1000 mA g^{-1} of Si-CA and Si-A.

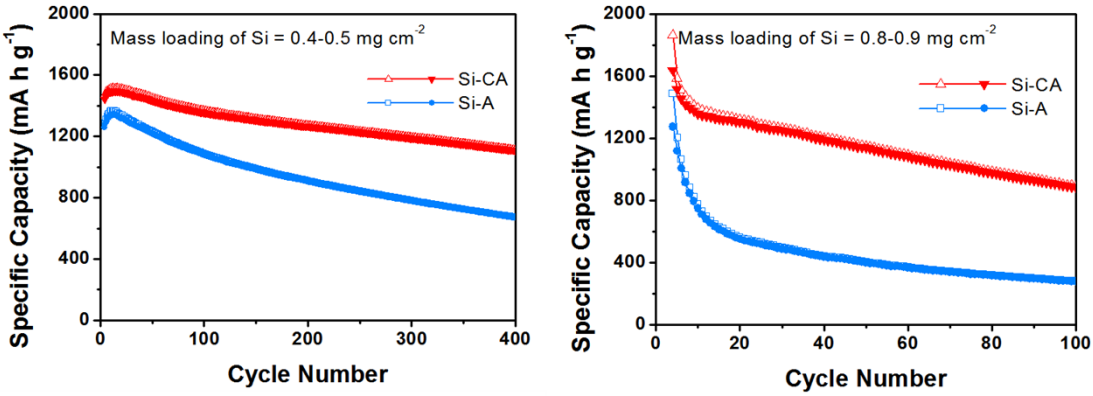

Figure S6. The charge capacity of Si-anodes with Ca-alginate (Si-CA) and alginate (Si-A). The mass loading of Si is (a) 0.4-0.5 mg cm^{-2} and (b) 0.8-0.9 mg cm^{-2}.

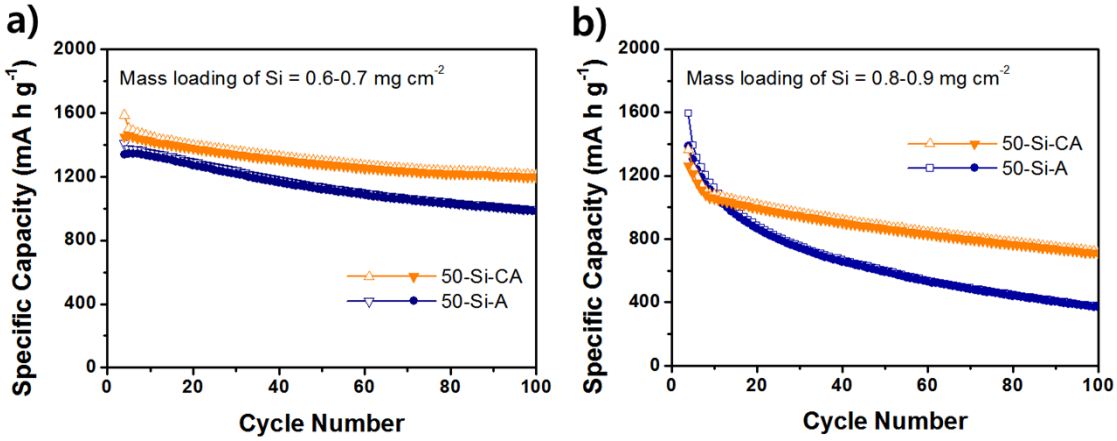

Figure S7. Cycle performance of Si-CA and Si-A at 50℃. The mass loading of Si was (a) 0.6-0.7 mg cm^{-2} and (b) 0.8-0.9 mg cm^{-2}.