Supporting information

A Facile Pyrolyzed N-doped Binder Network for Stable Si anodes

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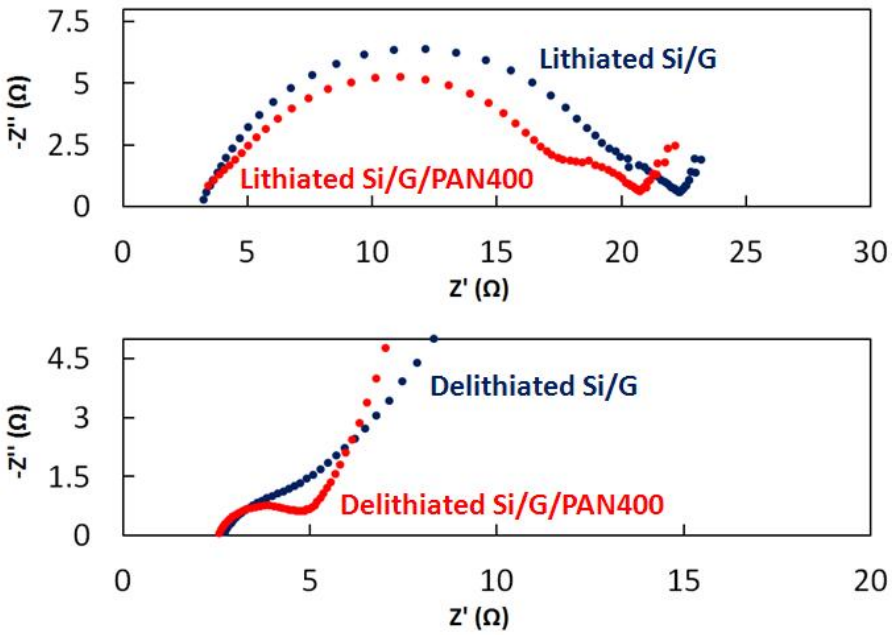

Figure S1. Electrochemical Impedance Spectra of the Si/G and Si/G/PAN400 anodes at lithiated and delithiated states. The depressed semicircles are related to the interfacial charge transfer impedances.

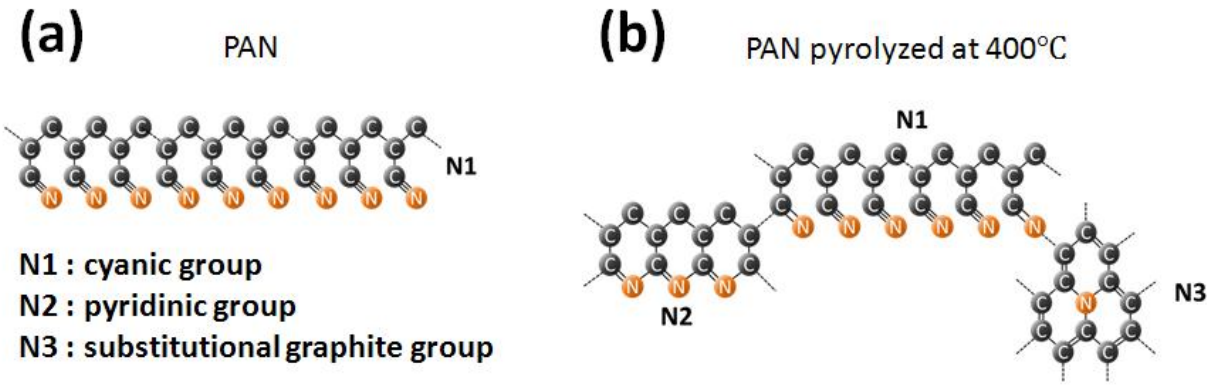

Figure S2. Molecular structures of (a) pristine PAN and (b) its pyrolyzed state at 400 ℃.

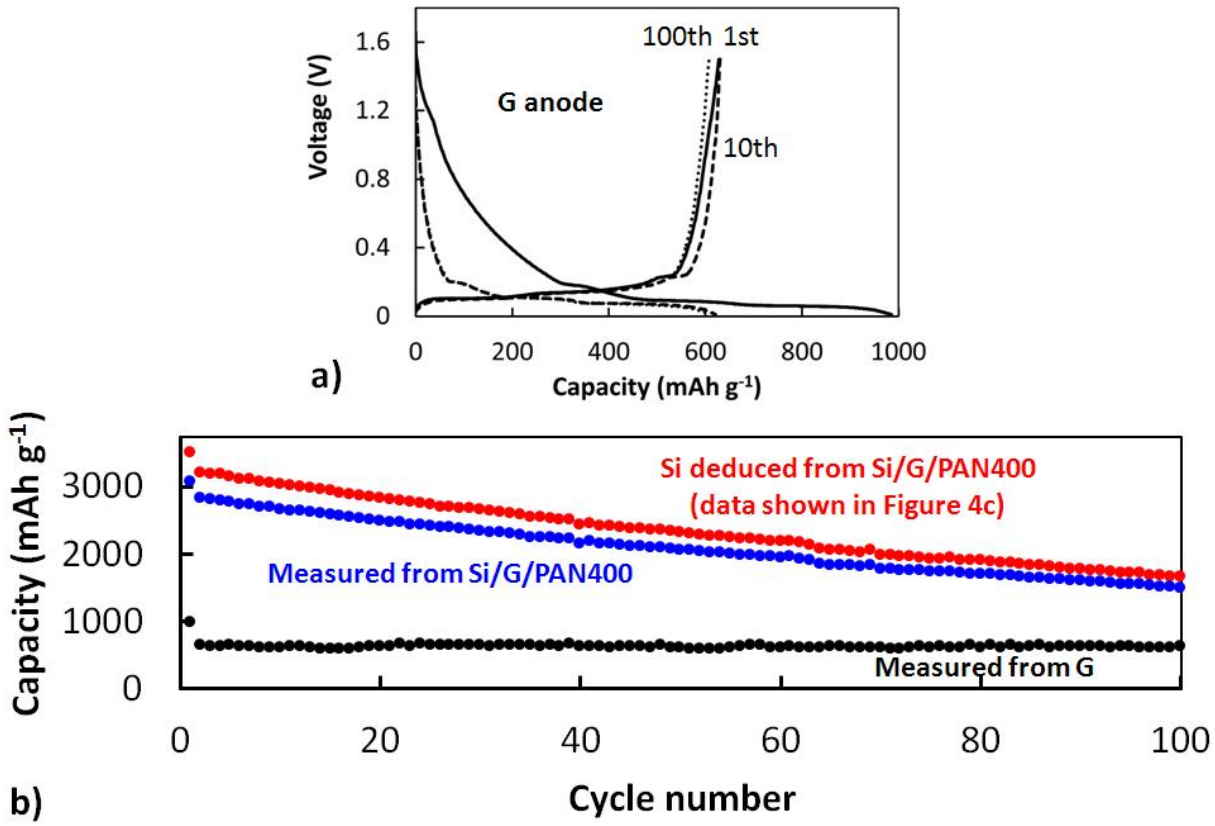

Figure S3. (a) Discharge-charge curves of an electrode consisting of pure G used in this work; (b) Measured discharge capacities of G and Si/G/PAN400 anodes and the deduced capacity contribution of the Si particles in the Si/G/PAN400 anode. As shown in (a), a stable discharge capacity of ~ 600 mAh g^{-1} was achieved for the G anode. It was based on this discharge capacity of G and the measured overall discharge capacity of Si/G/PAN400, we have deduced the capacity contribution of Si particles in the composite anode, as shown in (b). The same calculation has been applied for the Si/G anode.

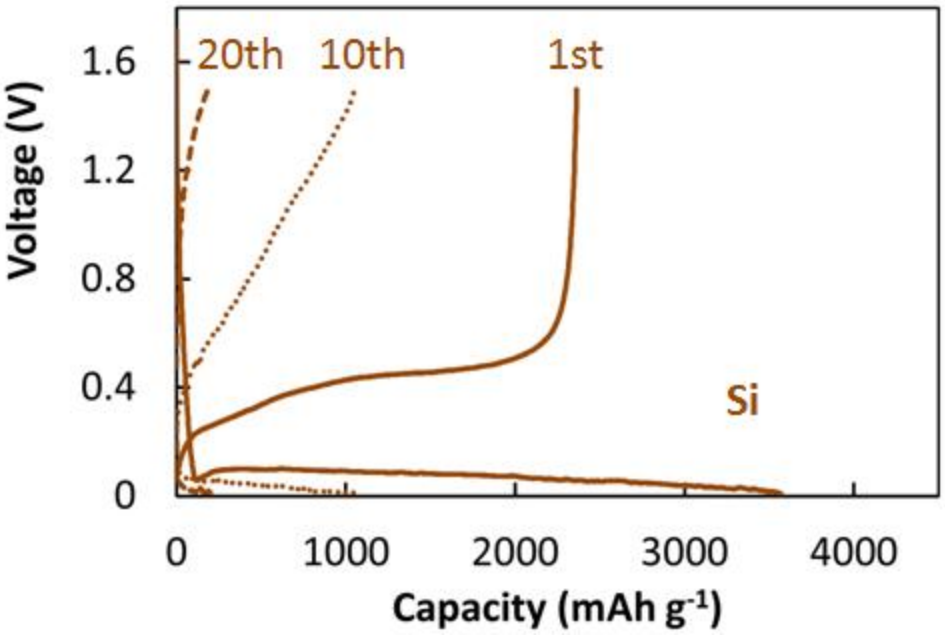

Figure S4. Discharge-charge curves of Si anode, at a current density of 800 mA g^{-1}.

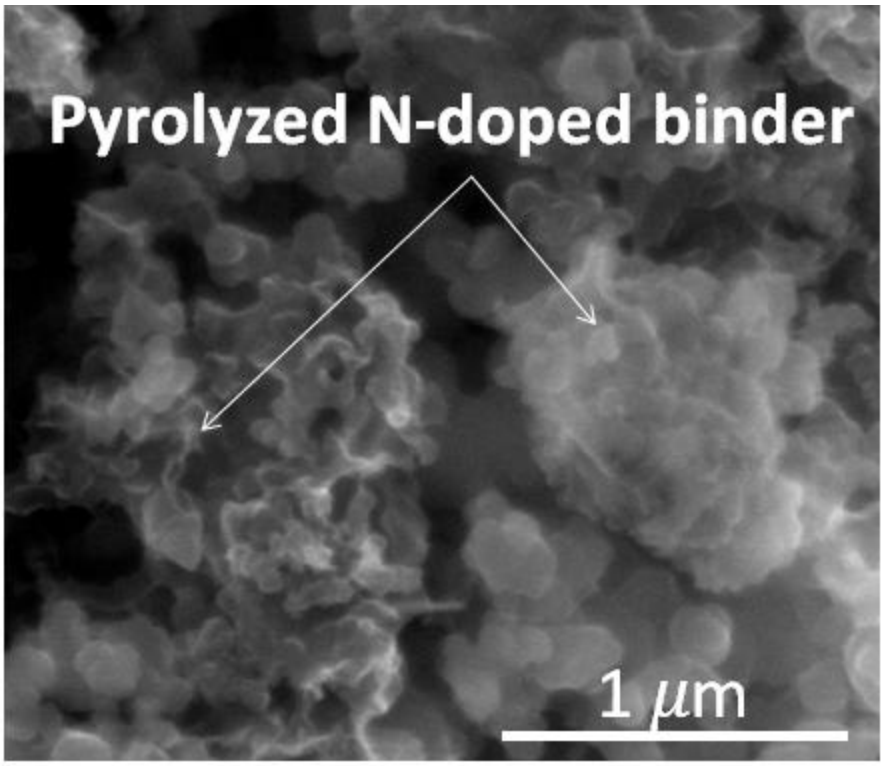

Figure S5. SEM image of the pyrolyzed N-doped binder network on single Si particles without dispersion in graphene sheets. As shown, the pyrolyzed binder network formed on the single Si particles is not well cross-linked, and may be less efficacious to provide cycling stability of Si particles.

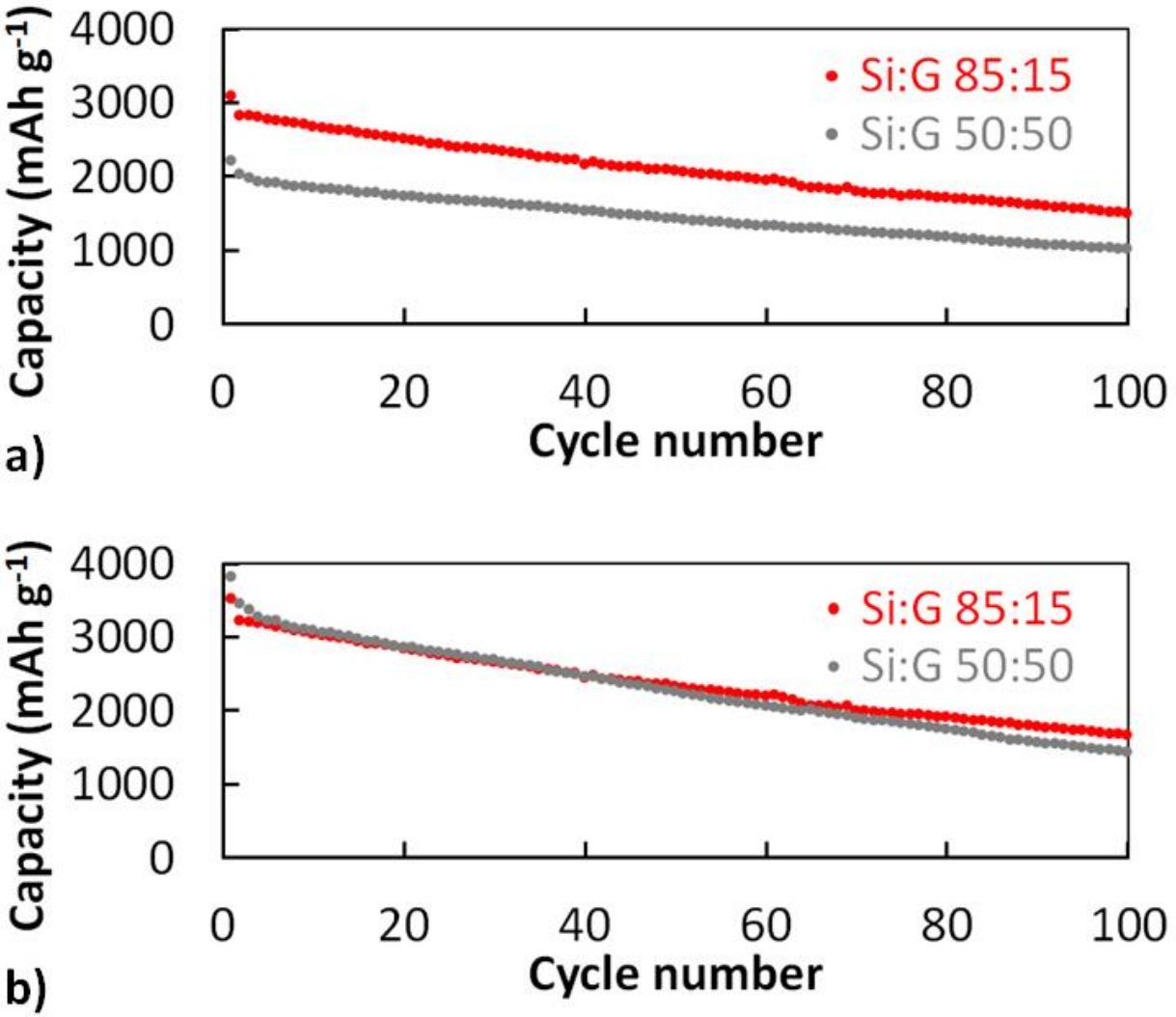

Figure S6. (a) Overall discharge capacities of the Si/G/PAN400 anodes with Si:G weight ratio of 85:15 and 50:50; (b) Capacity contributions of the Si particles in the Si/G/PAN400 anodes with Si:G weight ratio of 85:15 and 50:50.

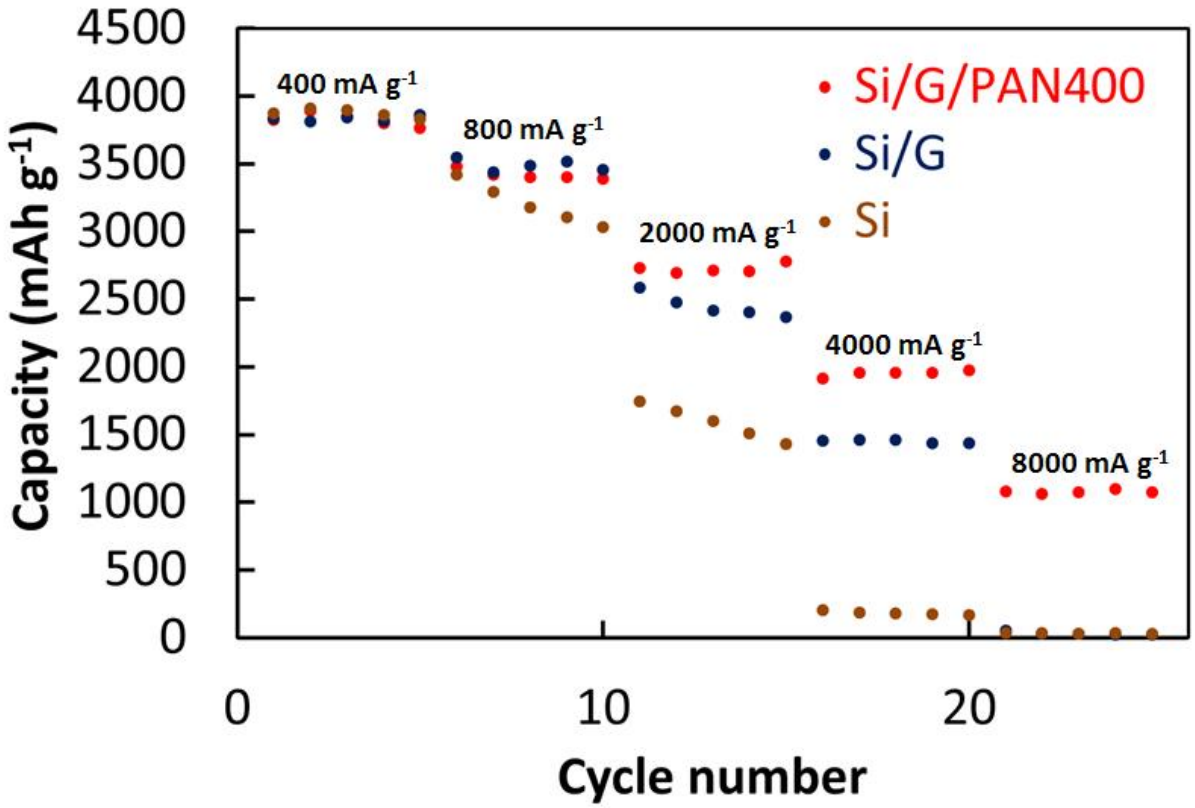

Figure S7. Rate capability tests for the Si, Si/G and Si/G/PAN400 anodes.

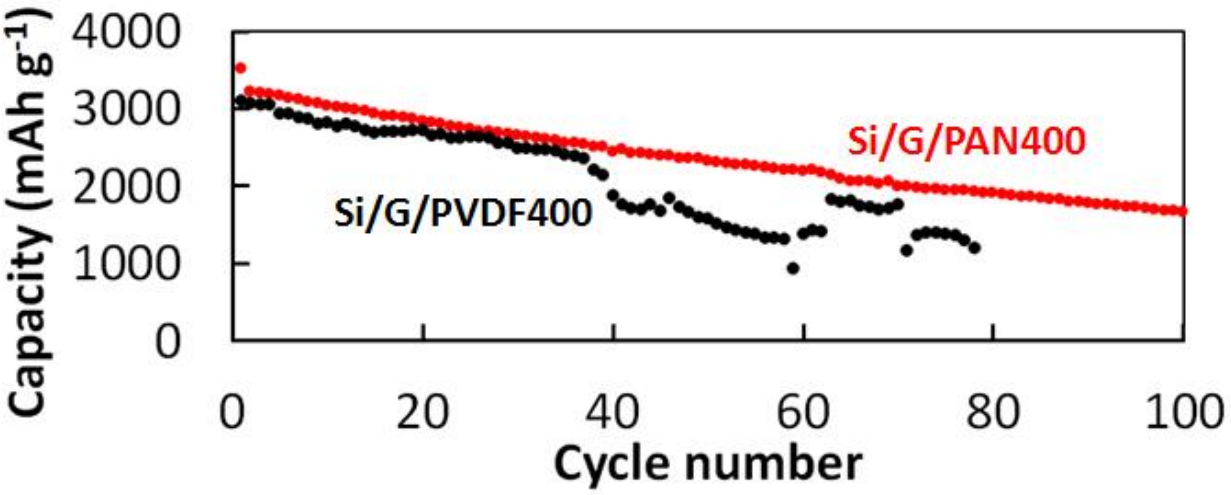

Figure S8. Cycling performances of Si/G/PAN400 and Si/G/PVDF400 anodes.