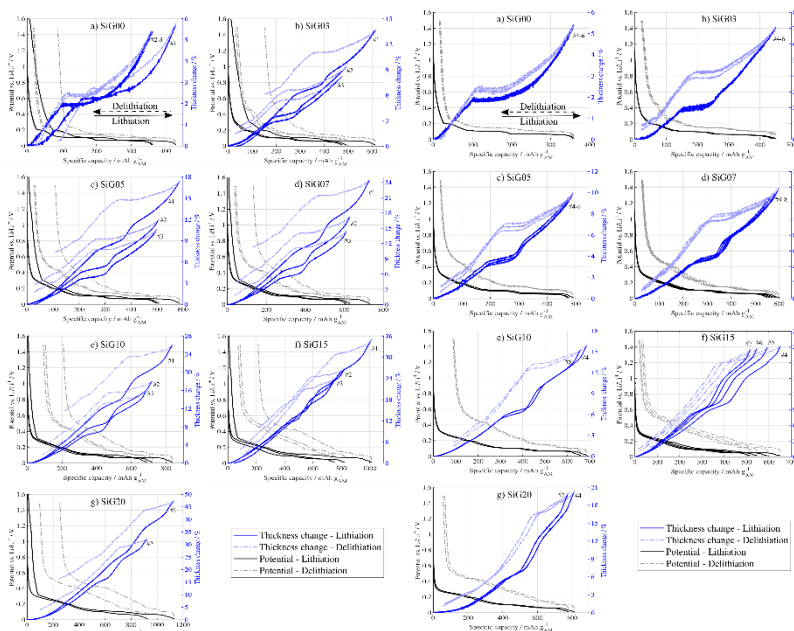
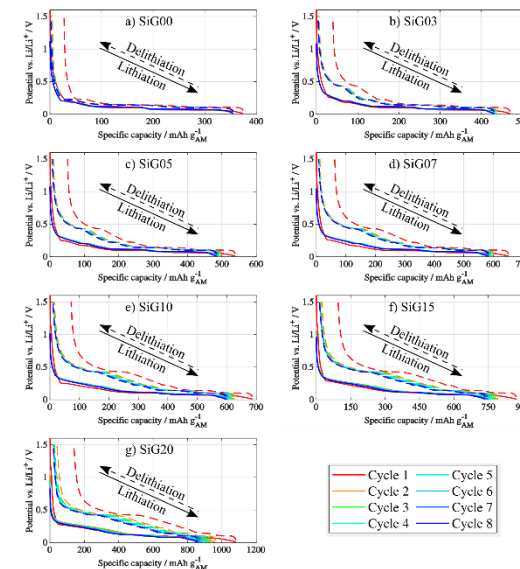


The Role of Silicon in Silicon-Graphite Composite Electrodes Regarding Specific Capacity, Cycle Stability, and Expansion

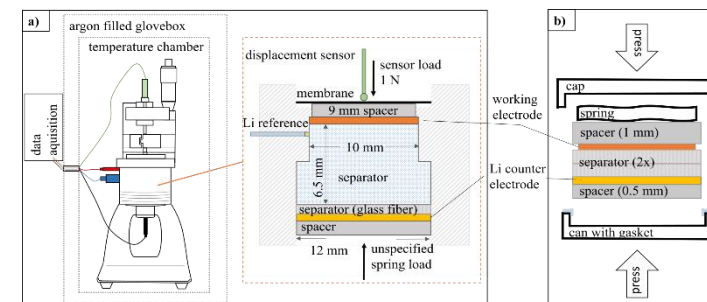
- The electrochemical performance and thickness change behavior of porous SiG anode compositions with silicon contents ranging from 0 wt% to 20 wt% are investigated using two methods: in situ dilatometry and conventional coin cells
- The initial thickness change of SiG electrodes increased significantly with the silicon content, but it leveled off during cycling for all compositions
- There exists a correlation between silicon content and capacity loss
- It is concluded that silicon predominantly lithiated before graphite, and delithiated after graphite
- It is not the macroscopic structural changes of the electrode matrix which determine the capacity evolution, but rather the repeated microscopic expansion, cracking, and SEI formation on the particle-level



Results of dilatometry measurements of formation cycles (left) and post-formation (right) shown for: a) SiG00, b) SiG03, c) SiG05, d) SiG07, e) SiG10, f) SiG15, and g) SiG20



Potential vs specific capacity for first eight cycles for a) SiG00, b) SiG03, c) SiG05, d) SiG07, e) SiG10, f) SiG15, and g) SiG20



Schematic of a) ECD-3-Nano dilatometer and b) the coin cell setup