Silicon Carbide: A Promising Anode Material to Lookout for Lithium Ion Batteries

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Despite promising specific capacity (~3579 mAh/g) of silicon, its adoption in lithium-ion batteries (LIB) as anode material has delayed due to its accelerated capacity fading owing to aggressive volume change during alloying/dealloying with lithium.[1] Developing a facile methodology for rational designing of a robust Si and carbon-based anode systems for realization of high-performance LIB is much needed. In this line, inspired by the attractive structural features in combination with promising thermal stability of silicon carbide (SiC),[2] we have devised a user-friendly facile methodology to develop SiC based anode materials which does not require any sophisticated instrumentation or very high temperature treatment. To study the adeptness of this method we have selected two synthesis temperature in a window of 550 – 1100 °C and samples were named as SiC-1 and SiC-2, respectively. The SiC nanoparticle embedded carbon-based anode materials when employed in anodic-half cell configuration offered a high reversible capacity (~ 1230 mAh/g @ 250 cycles, Figure 1), in conjunction with a promising capacity retention. The study pointed out that SiC based systems were electrochemically active for lithation/delithiation and can be explored as an efficient anode material for LIB.

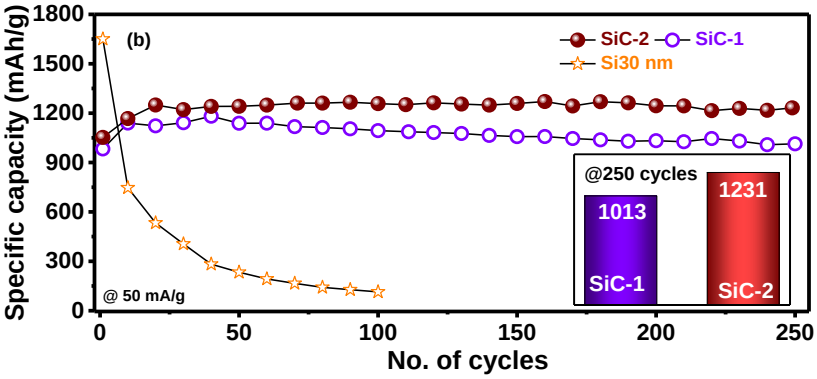

Figure 1. Comparative cycling study of SiC-1, SiC-2 and Si based anodic half-cells.

1) M. Ashuri et.al. *Nanoscale* **2016**, *8*, 74. 2) A. L. Lipson et.al. *J. Phys. Chem. C* **2012**, *116*, 20949.

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