Electrochemical performance of carbon coated silicon as anode materials for lithium ion batteries

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Graphite is widely used as anode active materials for Lithium-ion batteries. In order to overcome the low theoretical capacity of graphite (372 mAh g^{-1}), however, many researchers have studied silicon anode materials because Si has high theoretical capacity as much as 4200 mAh g^{-1}. Unfortunately, Si has major problem that is volume change during lithium-ion insertion and extraction. Due to the volume change, Si particles are isolated from electronic conducting paths in an electrode and eventually lose Li^+ storage ability. For an attempt to solve this problem, the mechanical stresses induced by the large volume change should be buffered. In this work, we prepared Si particles which were obtained from by-product during the manufacturing process of solar cell grade silicon. In order to remove SiO_2 covering Si particles, the Si particles were acid treated with the solution of 0.01 M HF, and dried in a vacuum oven at 80℃ for 4 hr. The dried Si particles was sonicated in isopropyl alcohol(IPA) and this solution was blended with stearic acid dissolved in IPA. The sample was again dried in a vacuum oven at 80 ℃ for 4 hr. Finally, it was carbonized under N_2 atmosphere at 800 ℃ for 1 hr.