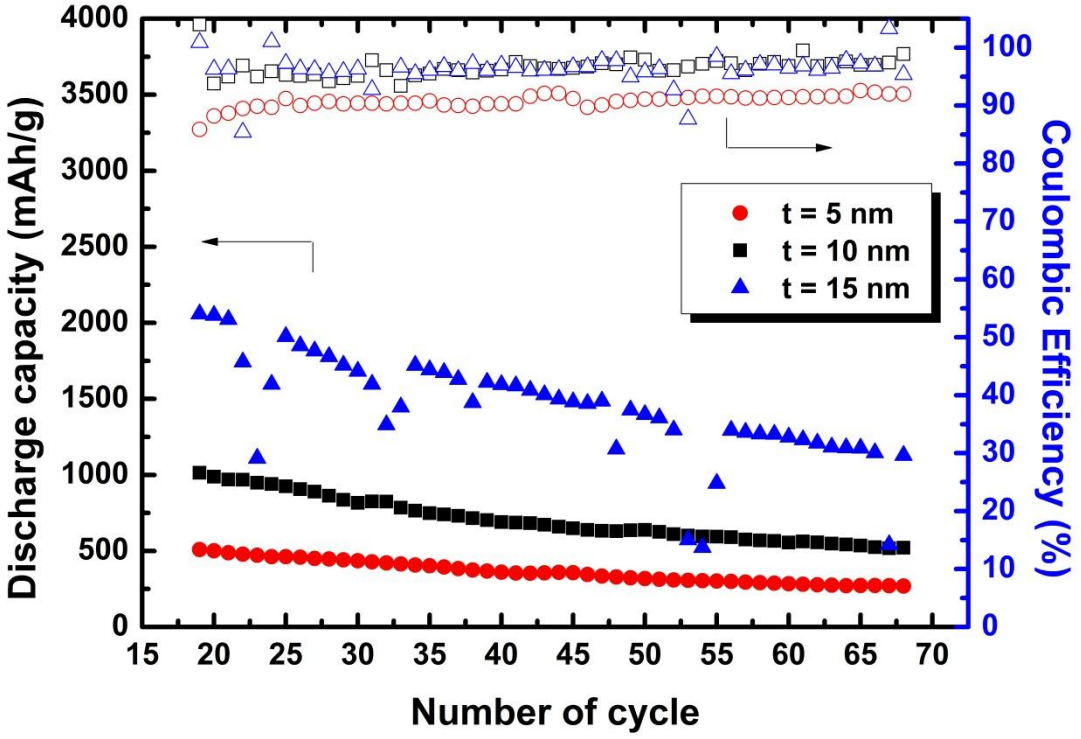

Fig. S1. Comparision of the cycling performance at different thickness of graphene solution (5 nm, 10 nm and 15 nm).

In order to investigate effects of optimum thickness of graphene, we varied the concentration of the graphene solution and measured the cycle performance. As a result, cycling performance has shown that the 10 nm thick graphene presented a stable and better cycling performance, whereas others do not. We discovered that optimal thickness of graphene is almost 10 nm.

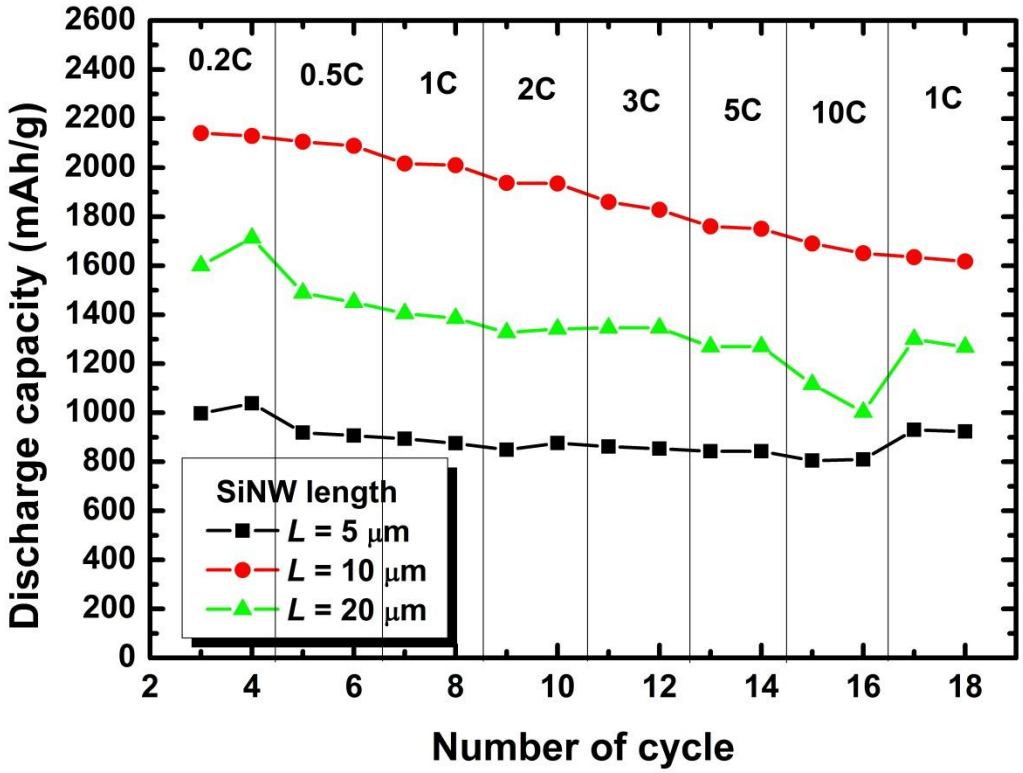

Fig. S2. Cycling stabilities at different length of the SiNWs (5 μm, 10 μm and 20 μm).

We prepared the different length of SiNWs by changing etching time to find an appropriate SiNW length Each SiNW length is 5 μm, 10 μm and 20 μm, respectively. Electrochemical data indicated that the sample of 10μm SiNW is superior to other length of SiNWs.