Electronic Supplementary Information (ESI)

High-rate, High-density FeSb-TiC-C Nanocomposite Anodes for Lithium-ion Batteries

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EXPERIMENTAL DETAILS

The intermetallic phase $FeSb_2$ and NiSb were synthesized in their pure form without the presence of reinforcing TiC or carbon by mixing stoichiometric amounts of metallic Fe, Sb, and Ni and subjecting them to HEMM for 12 h at room temperature under an argon environment. The HEMM step was carried out in stainless steel vials with a 20 : 1 ratio of stainless steel milling balls to milled powder and a milling speed of 500 RPM. Sb-TiC was prepared by first heating a 2 : 1 atomic ratio of Ti : Sb at 800 °C under flowing argon for 6 h. The resulting compound was then combined with a stoichiometric amount of carbon black such that all the Ti in the system would be converted to TiC. This HEMM step was carried out under the same conditions as described above with the exception that the milling time was 40 h instead of 12 h.

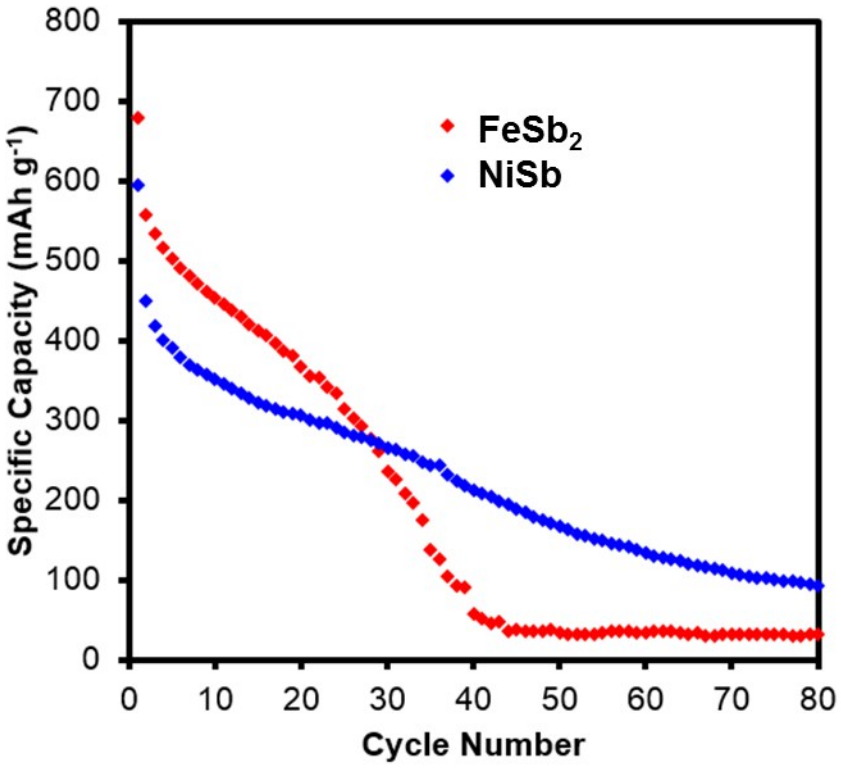

Figure S1. Cycle life of the HEMM-prepared intermetallic compounds $FeSb_2$ and NiSb cycled with a current density of 100 mA g^{-1} over a voltage range of 0 – 2.0 V vs. Li/Li^+.

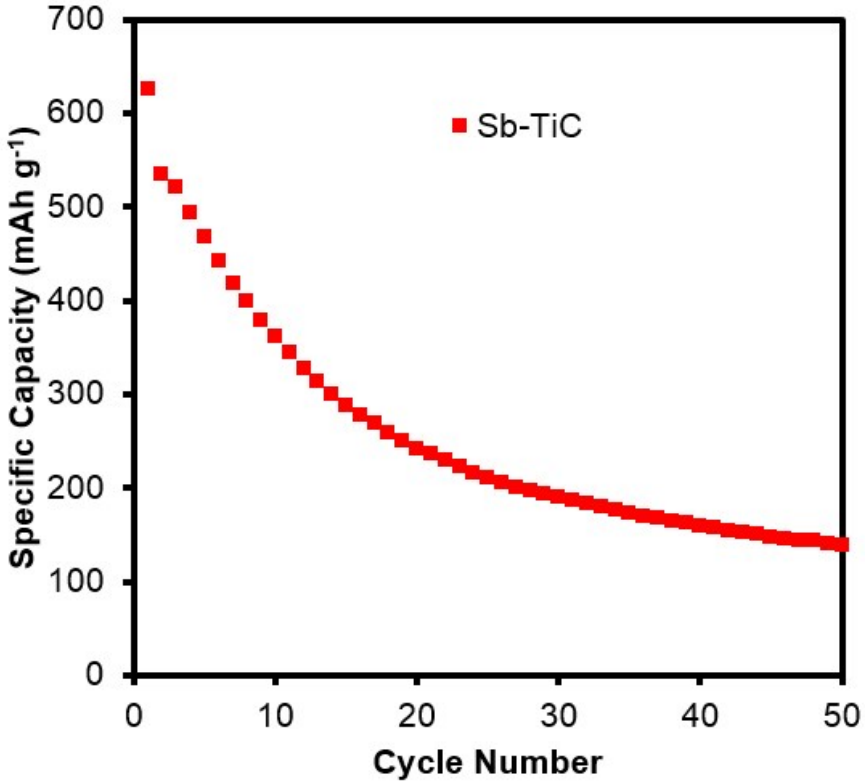

Figure S2. Cycle life of Sb-TiC prepared via HEMM with stoichiometric amounts of carbon black for the full formation of TiC. The material was cycled at a current density of 100 mA g^{-1} over a voltage window of 0 – 2.0 V vs. Li/Li^+.