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Alumina-Coated Silicon-Based Nanowire Arrays for High Quality Li-Ion Battery Anodes

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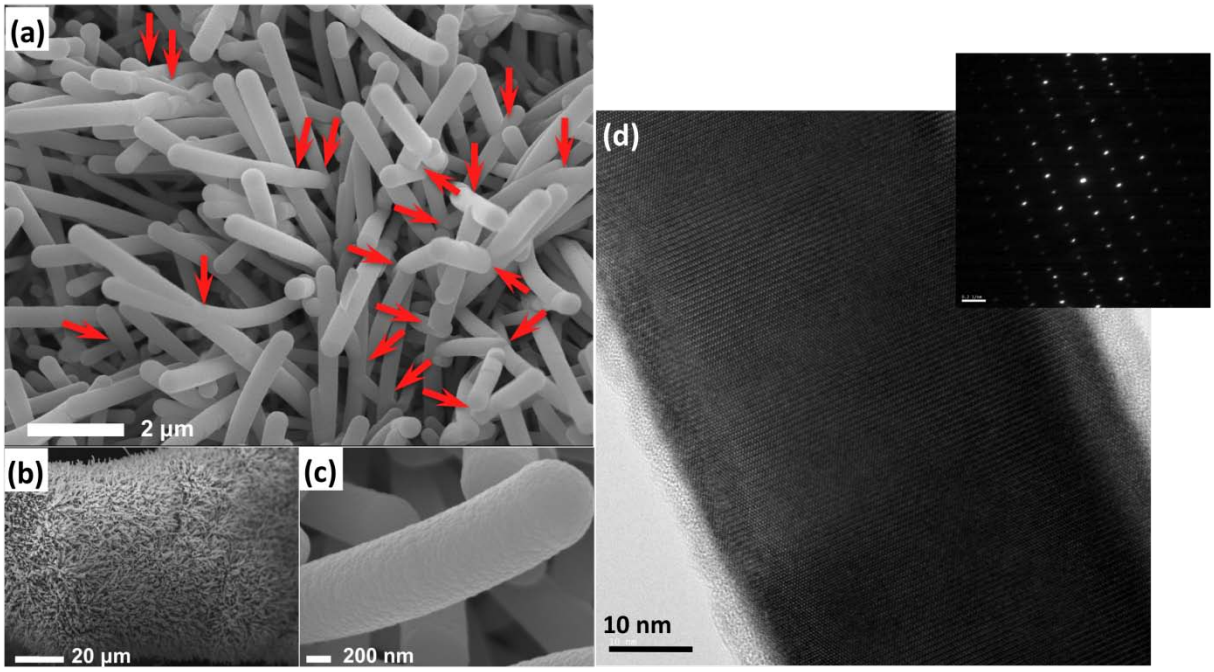

Figure S1. Electron microscope pictures showing details of the Al_2O_3-coated core-shell $NiSi_x$-aSi anode before testing. (a): SEM picture where the arrows point some of the interconnections between NWs. (b): Low magnification SEM view of a Ni foam branch covered with core-shell NW structures. (c): detail of one NW. (d): TEM picture of a core NiSi NW showing its high crystalline quality. Note the ~ 5 nm-thick amorphous layer at the surface of the NW. The inset is an electron diffraction pattern showing no trace of twinning or any other crystal defect.

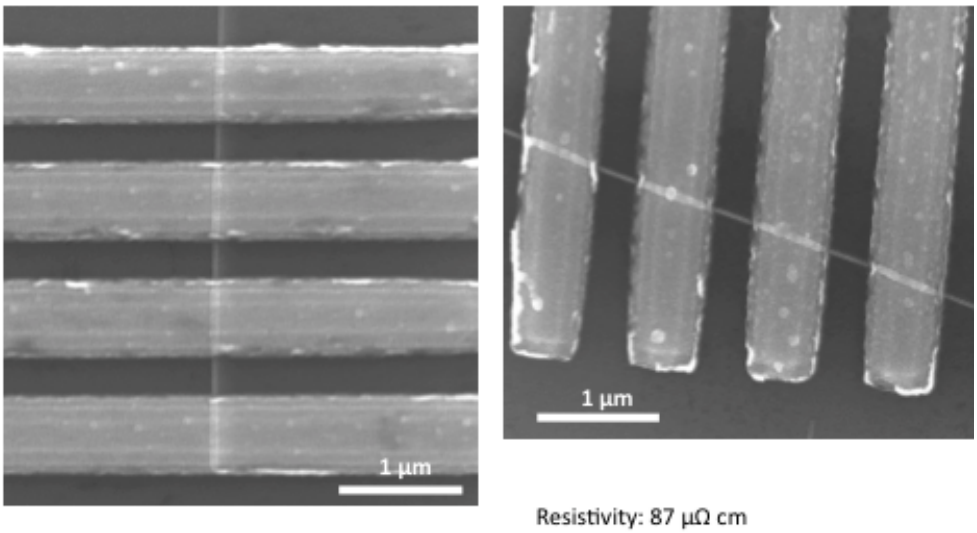

Figure S2. Electrical characterization of the $NiSi_x$ NWs. Two different $NiSi_x$ NWs are shown above and their average resistivity, measured by a 4-probe technique is 87 µΩ.cm. For the calculation of the resistivity, we have removed 10 nm from the SEM-measured diameter of the NWs. This is to take into account the native oxide/damaged surface layer than can be seen on the TEM picture of Figure S1d.

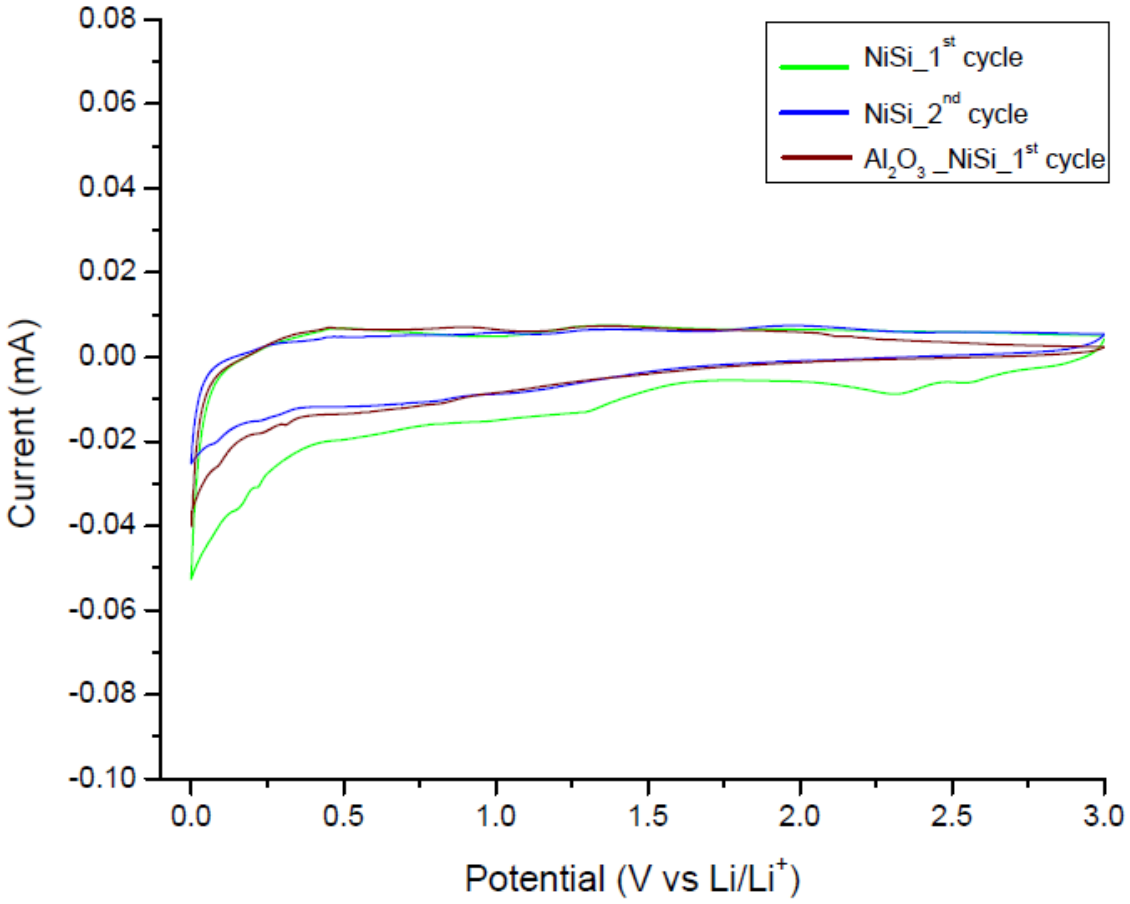

Figure S3. Cyclic voltammograms (scan rate: 0.05 mV/s) of bare $NiSi_x$ anodes (green and blue for respectively the first and second cycles), compared with the first cycle of Al_2O_3-coated $NiSi_x$ NWs (brown). Note the smaller magnitude of the current for the Al_2O_3-coated $NiSi_x$ NWs when the voltage approaches zero, an indication of the efficiency of the Al_2O_3 layer to limit electrolyte decomposition.