Advanced Germanium Nanoparticle Composite Anodes using Single Wall Carbon Nanotube Conductive Additives

M. W. Forney, a M. J. Dzara, b A. L. Doucett, b M. J. Ganter, a J. W. Staub, a R. D. Ridgley, c and B. J. Landi a,b

a NanoPower Research Laboratories, Rochester Institute of Technology, Rochester, NY 14623, USA.

b Chemical & Biomedical Engineering, Rochester Institute of Technology, Rochester, NY 14623, USA.

Electrochemical Impedance Spectroscopy (EIS)

Representative EIS spectra have been plotted in Figure 1 to demonstrate the dramatic reduction in charge transfer (CT) impedance when 5% Super C65 is replaced with just 1% SWCNT conductive additives. These data are for 100% lithiation of the Ge-NP electrode, corresponding to the data points at the right of Figure 5 in the manuscript, and the fitting model has been inset.

Figure 1: Representative EIS spectra for 5% Super C65 (black) and 1% SWCNT (red) at 100% lithiation.
Scanning Electron Microscopy (SEM)

Original SEM images from Figure 3 in the manuscript, without highlighted conductive additives, are shown in Figure 2.

**Figure 2:** SEM images of Ge-NP anode with (a) 5% Super C-65, (b) 10% Super C-65, (c) 1% SWCNT, (d) 2% SWCNT, and (e) 3% SWCNT.