Supporting Information

High Power Supercapacitor Electrodes from Single-walled Carbon Nanohorn/Nanotube Composite

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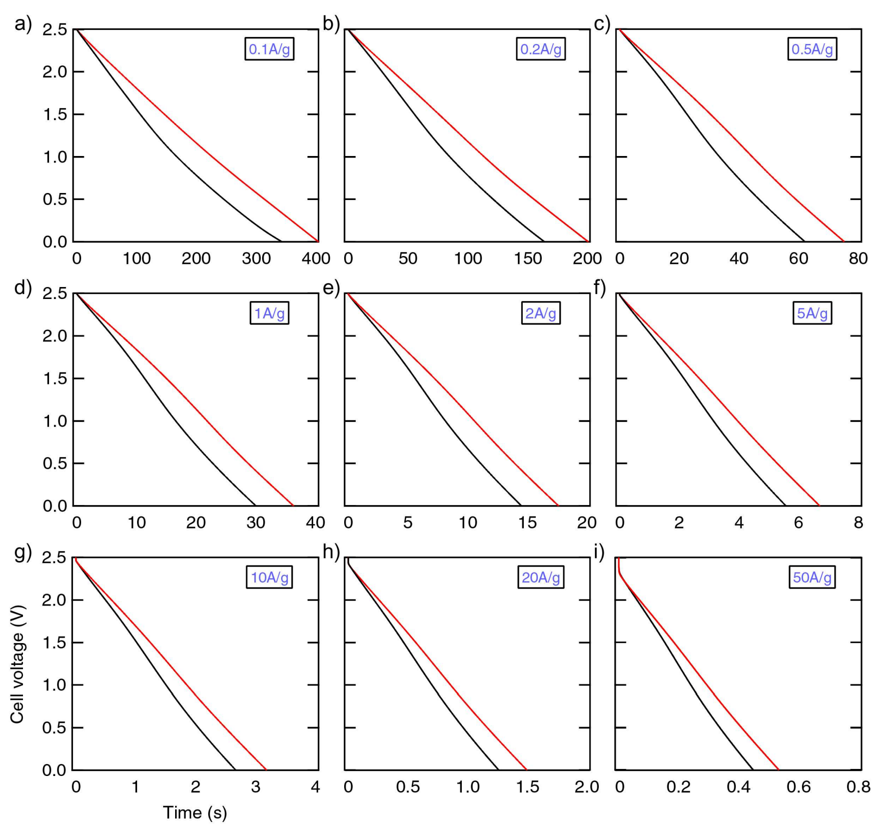

Figure S1. Constant current discharge profiles of as-prepared composite (black curves) and oxidized composite (red curves). a) discharge at 0.1A/g. b) discharge at 0.2A/g. c) discharge at 0.5A/g. d) discharge at 1A/g. e) discharge at 2A/g. f) discharge at 5A/g. g) discharge at 10A/g. h) discharge at 20A/g. i) discharge at 50A/g.

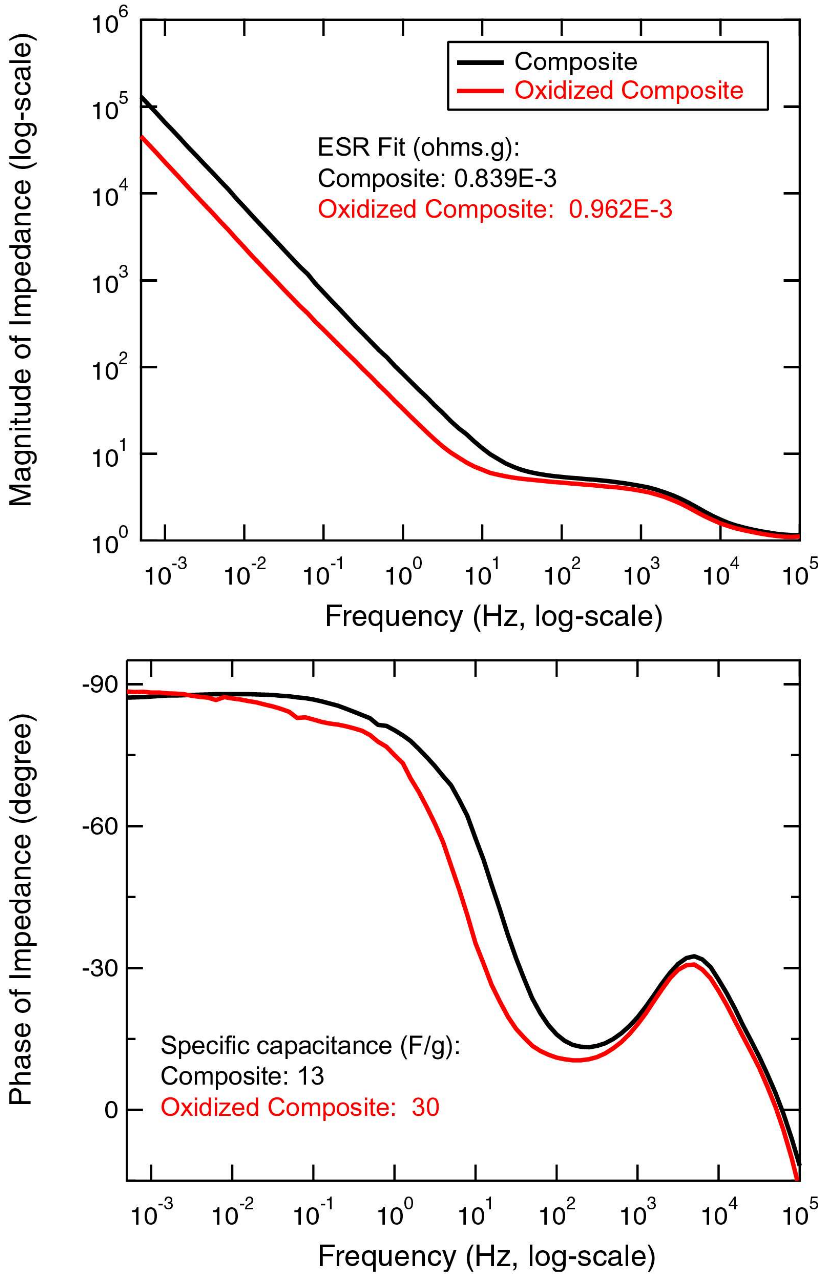

Figure S2. Impedance Bode plots (a: magnitude; b: phase) of the composite (black) and oxidized composite (red) electrodes. The magnitude of the impedance at zero phase (around 50 kHz) determines the equivalent series resistance (ESR) of the cells. Based on these ESR values, the maximum power ratings would be 1.8 MW/kg (composite) and 1.6 MW/kg (oxidized composite), however these values overestimate the maximum power rating. Impedance spectroscopy is carried out at 0V DC bias, with an AC signal having a peak to peak amplitude of 20 mV. Under such testing conditions, the magnitude of impedance at zero phase is mainly indicative of the electronic conductivity of the electrodes and the ionic conductivity of the bulk electrolyte (separator). The ESR does not fully represent the scale of ion transport within the electrode required during constant-current charge/discharge of the cells. As the devices are uncharged (0V DC bias), the capacitance values estimated from the impedance spectrum of the low frequency region are smaller than the galvanostatic discharge capacitance values.

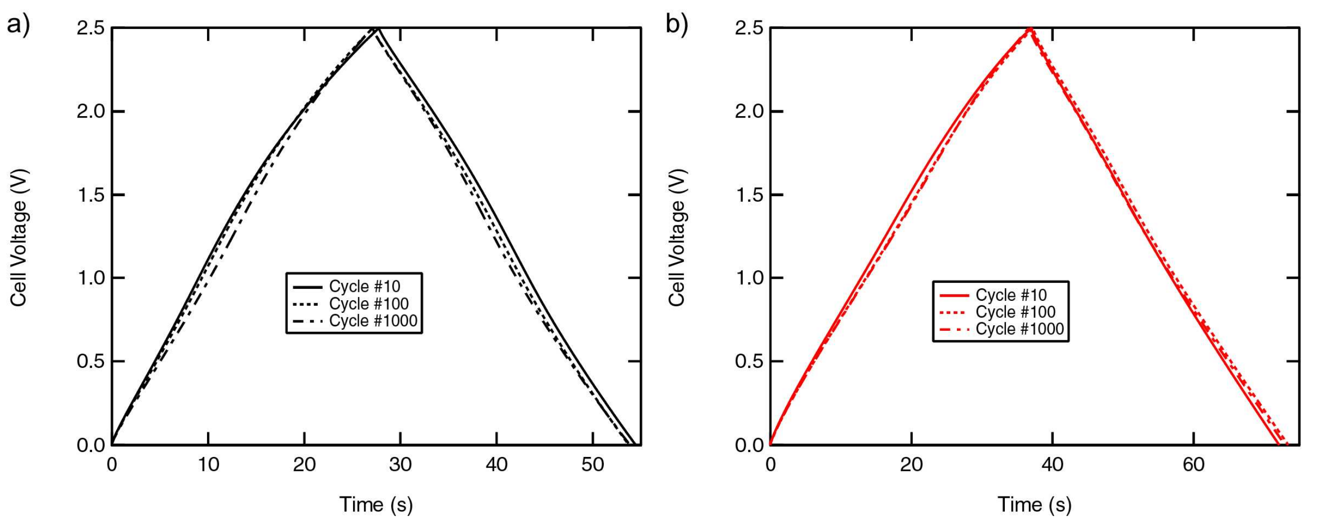

Figure S3. Charge/discharge cycles (#1, #10, #1000) of lifetime testing at 1A/g. a) as-prepared composite. b) oxidized composite.

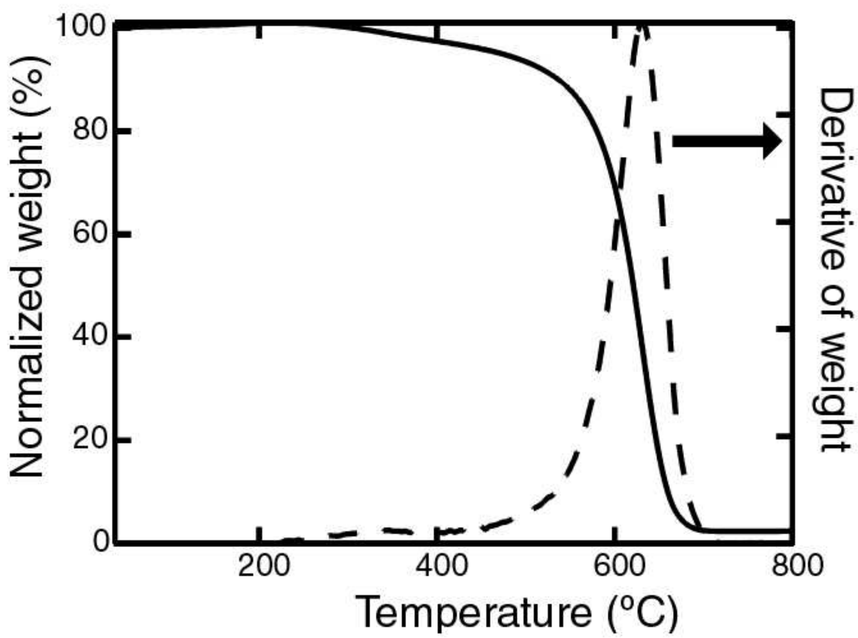

Figure S4. Thermogravimetric analysis of the as-prepared composite via heating at a rate of 2°C/min under dry air flow showed only one peak suggesting a monolithic chemical composition.