Supplementary Material

**Supercapacitor Electrodes with High Active Mass Loading**

R.Poon and I.Zhitomirsky\*

Department of Materials Science and Engineering, McMaster University,

Hamilton, Ontario, L8S4L7, Canada,

\*E-mail: [zhitom@mcmaster.ca](mailto:zhitom@mcmaster.ca) Phone: 1- (905)5259140

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Fig.S1. Extraction of MWCNT from the aqueous phase (bottom) to the 1-butanol phase (top)

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Fig.S2. (a) Aqueous mixture of cetylpyridinium permanganate and MWCNT, (b) phase transfer and formation of mixed suspension of MnO2 and MWCNT in the 1-butanol phase.

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Fig.S3. High magnification SEM image of the MnO2-MWCNT composite material. The diameter of the MWCNT in the middle of the picture is significantly larger, compared to the diameter of original MWCNT (13 nm).

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Fig. S4. Transmission electron microscopy (TEM) (JEOL, JEM 1200 EX TEMSCAN) image of MnO2-MWCNT composite.

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Fig.S5 (a) CVs at different scan rates, (b) specific capacitance, calculated from the CV data versus scan rate, (c) Nyquist plot of complex impedance and (d) frequency dependencies of the components of complex capacitance, calculated from the impedance data for MnO2-MWCNT electrodes with mass loading of 51 mg cm-2.

Table S1 Capacitances calculated from the CV data versus scan rates for MnO2-MWCNT electrodes with different mass loadings.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Mass loadings (mg cm-2)** | | | | | |
| **42** | | **51** | | **61** | |
| **Scan Rate (mV s-1)** | **CS (F cm-2)** | **Cg (F g-1)** | **CS (F cm-2)** | **Cg (F g-1)** | **CS (F cm-2)** | **Cg (F g-1)** |
| **2** | **6.03** | **142.9** | **7.22** | **141.1** | **8.95** | **146.2** |
| **5** | **5.67** | **127.2** | **6.29** | **122.9** | **7.29** | **119.2** |
| **10** | **4.67** | **110.7** | **5.41** | **105.6** | **5.66** | **92.4** |
| **20** | **3.82** | **90.6** | **3.89** | **76.0** | **3.73** | **60.9** |
| **50** | **2.36** | **55.9** | **2.12** | **41.4** | **1.54** | **25.2** |
| **100** | **1.24** | **29.4** | **1.05** | **20.7** | **0.67** | **10.9** |

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Fig.S6 Specific capacitance, calculated from CV data at 2 mV s-1 versus mass loading for MnO2-MWCNT electrodes

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Fig.S7 Galvanostatic charge-discharge behavior at different current densities for for MnO2-MWCNT electrodes with mass loadings of (a) 42 and (b) 61 mg cm-2.