Electronic Supplementary Material (ESI) for Nanoscale

Enhanced lithium storage in Fe_2O_3-SnO_2-C nanocomposite anode with a breathable structure

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Fig. S1.

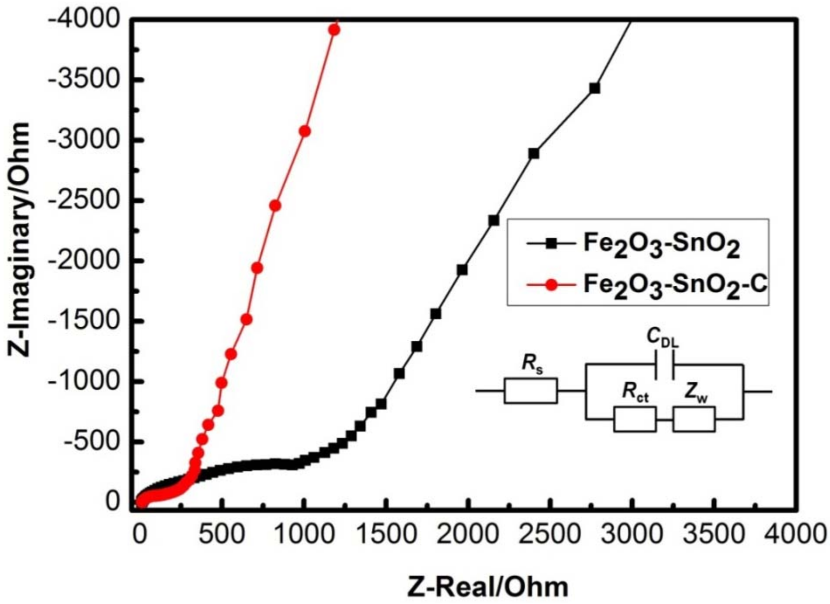

Fig. S1 Electrochemical impedance spectra for the fresh cells of the Fe_2O_3-SnO_2 and Fe_2O_3-SnO_2-C electrodes and the corresponding equivalent circuit (inset) model.

The Nyquist plots are semicircular in the high to medium frequency range, which reflects the charge-transfer resistance (R_{ct}) of both electrodes. The value of the intercept indicates the total electrical resistance of the electrolyte (R_s). The inclined line represents the

Warburg impedance (Z_w) at low frequency, which is associated with lithium-ion diffusion into the Fe_2O_3-SnO_2 particles. The corresponding equivalent circuit for the Nyquist plots of the Fe_2O_3-SnO_2 and Fe_2O_3-SnO_2-C electrodes is shown in the inset in Fig. S1, where C_{DL} represents the double layer capacitance. The values of R_{ct} for the Fe_2O_3-SnO_2 and Fe_2O_3-SnO_2-C electrodes were calculated to be approximately1457 Ω and 220 Ω, respectively. This indicates that Fe_2O_3-SnO_2 particles mixing with Super P Li^{TM} carbon black provides much easier charge transfer at the electrode/electrolyte interface, and consequently decreases the overall battery internal resistance, enabling higher reactivity and lower polarization.[24, 41] The presence of this carbon black in Fe_2O_3-SnO_2 improves the battery performance significantly.

References

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