Supplementary Material

Electrophoretic deposition of SnFe₂O₄-graphene hybrid films as anode for lithium-ion batteries

Tao Xu⁹, Qinghan Meng⁷,₈, Meng Yang⁹, Wanyuan Zhi⁹, Bing Cao⁹,₈

⁹College of Materials Science and Engineering, Beijing University of Chemical Technology, Beijing 100029, China.

⁷The Key Laboratory of Beijing City on Preparation and Processing of Novel Polymer Materials, Beijing University of Chemical Technology, Beijing 100029, China.

⁸Corresponding authors. Email: qhmeng@mail.buct.edu.cn (Q.H. Meng); bcao@mail.buct.edu.cn (B. Cao)

The TGA curves of SFG-1, SFG-2, SFG-3, and SFG-4 revealed that weight loss below 250 °C correspond to evaporation of water adsorbed on surface of SnFe₂O₄–srGO, and weight loss between 250 and 550 °C is associated with decomposition of residual oxygen-containing functional groups on srGO and combustion of carbon skeleton from srGO.¹¹ According to TGA test results, mass percentage content of
SnFe$_2$O$_4$ in SFG-1, SFG-2, SFG-3, and SFG-4 hybrid films totaled 74.50, 77.52, 81.47, and 83.76 wt.%, respectively.

![TGA curves of SFG-1, SFG-2, SFG-3, and SFG-4.](image)

**Fig. S1** TGA curves of SFG-1, SFG-2, SFG-3, and SFG-4.

Fig. S2 displays that XPS spectrum of C1s for sGO included four types of C-containing groups, namely, C–C/C=C (284.5 eV), C–O (286.5 eV), C=O (287.7 eV), and O–C=O (288.9 eV). In XPS for sGO, the C/O atomic ratios was 2.1, this value was close to the low limit of previous results (1.8 to 4.7) for GO products.$^{[2-5]}$ Peak area ratios of sp$^2$ C atoms (C–C/C=C) and oxygenated C atoms in the XPS spectrum measured 40.63% and 59.37%, respectively.
Fig. S2 XPS curve of sGO.

Fig. S3 shows CV curves of SFG-1, SFG-2, SFG-3, and SFG-4 electrodes for the fifth cycle at a scan rate of 0.2 mV s\(^{-1}\) and voltage range of 0.005–3.0 V. Decreasing order of CV areas starts from SFG-2, SFG-4, SFG-1, then end with SFG-3, revealing decreasing specific capacitance of SFG-2, SFG-4, SFG-1, and SFG-3.\(^{[6]}\) These results agree with conclusions in the previous text (Fig. 6a).

Fig. S3 The CV curves of SFG-1, SFG-2, SFG-3, and SFG-4 electrodes for the fifth cycle at a scan rate of 0.2 mV s\(^{-1}\) and voltage range of 0.005–3.0 V.
Fig. S4 displays the photograph of SnFe$_2$O$_4$-srGO hybrid films uniformly deposited onto copper substrate via electrophoretic deposition and subsequent carbonization treatment. The color of the obtained films is black. The hybrid film were used as binder-free anodes for lithium-ion half-cells.

![Cu foil](image) ![SnFe$_2$O$_4$-srGO](image)

**Fig. S4** The photograph of SnFe$_2$O$_4$-srGO hybrid films deposited onto copper substrate.

References