

Supplementary

Synthesis of Si/Fe₂O₃ anchored rGO frameworks as high performance anodes for Li-ion batteries

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S0: Experimental Section

S01. Material characterization

The phase composition of the products was uncovered by X-ray diffraction (XRD, D8-Discover, Bruker). Scanning electron microscope (SEM, JSM-7100F) and transmission electron microscope (TEM, JEM-2100F) were used to reveal the microstructure of the samples. X-ray photoelectron spectroscopy (XPS, ESCALAB 250XI) was used to analyze the valence of the sample. Nitrogen adsorption-desorption isotherm was performed on Micromeritics Tristar II 3020. The specific surface was analyzed by Brunauer-Emmett-Teller (BET) method, and Barrett-Joyner-Halenda (BJH) method was performed to determine pore size distributions. Raman spectroscopy (inVia Reflex) was measured in the wave number range of 100~2000 cm^{-1} .

S02. Electrochemical measurements

The active materials, carboxymethyl cellulose (CMC) and conductive Super P (mass ratio, 8:1:1) were mixed in deionized water to form a black slurry. Copper foil was coated with slurry and dried at 60°C for 12 h in a vacuum furnace. Then, it was cut into a circular piece with a diameter of 10 mm and used as the working electrode. The electrode was assembled into a CR2032 button battery in a vacuum glove box filled with argon gas. Celgard 2320 was selected as the separator and 1 M LiPF_6 dissolved in carbonate (EC)/Diethyl carbonate (DEC) solution (v:v=1:1) was adopted as the electrolyte. The electrochemical impedance spectroscopy (EIS) and cyclic voltammetry (CV) curves of the batteries were conducted using the electrochemical workstation

(CHI760E). Galvanostatic charge-discharge curves were tested on a NEWARE battery tester in the voltage window of 0.01–3 V (vs Li⁺/Li).

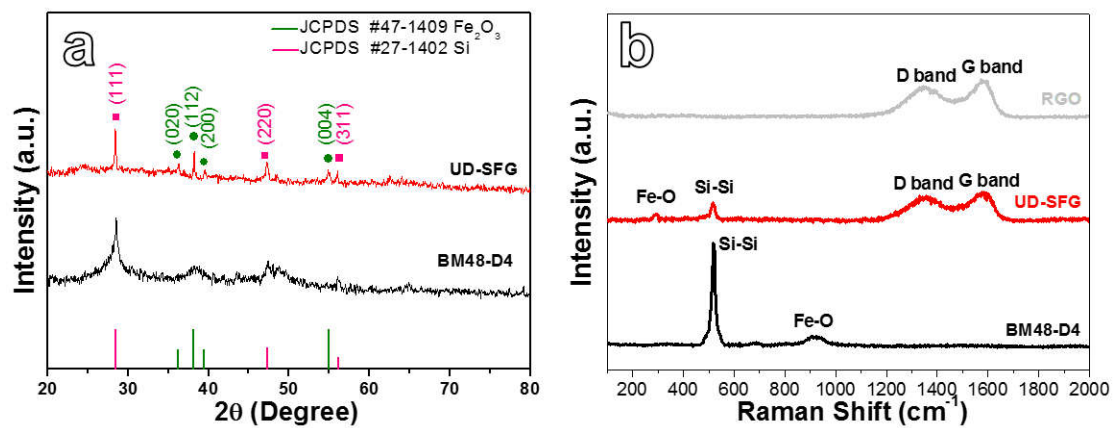


Figure S1 (a) XRD patterns of the UD-SFG and BM48-4; (b) Raman spectrum of the BM48-4, UD-SFG and BM48-4.

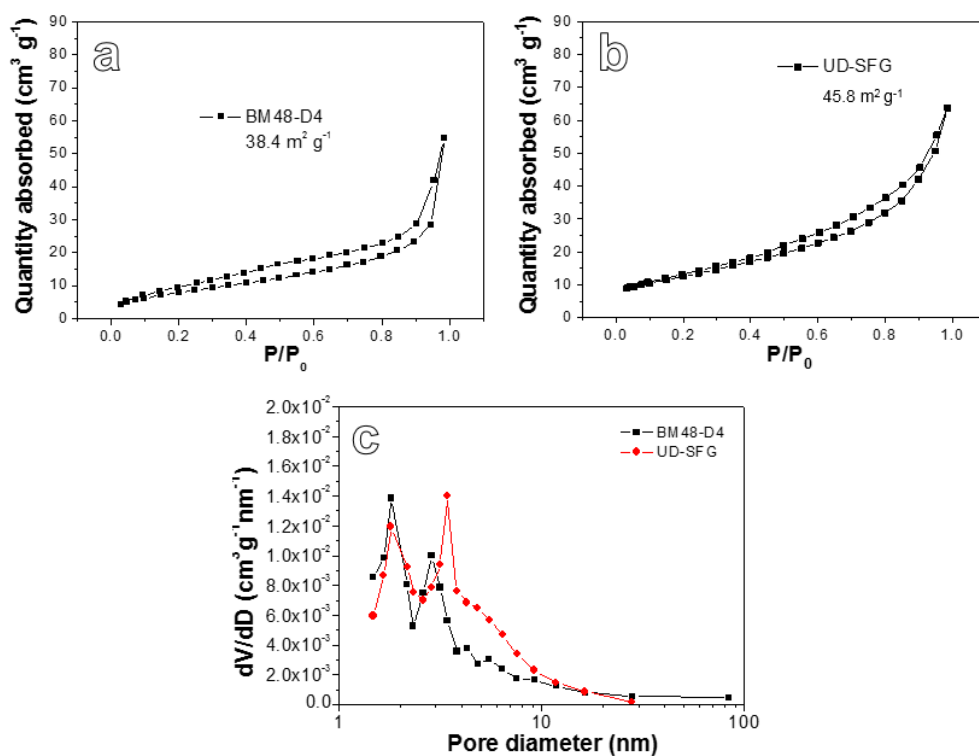


Figure S2 N₂ adsorption-desorption isotherm characteristics of BM48-D4 (a) and UD-SFG (b); (c) Pore size distribution of BM-48-4 and UD-SFG.

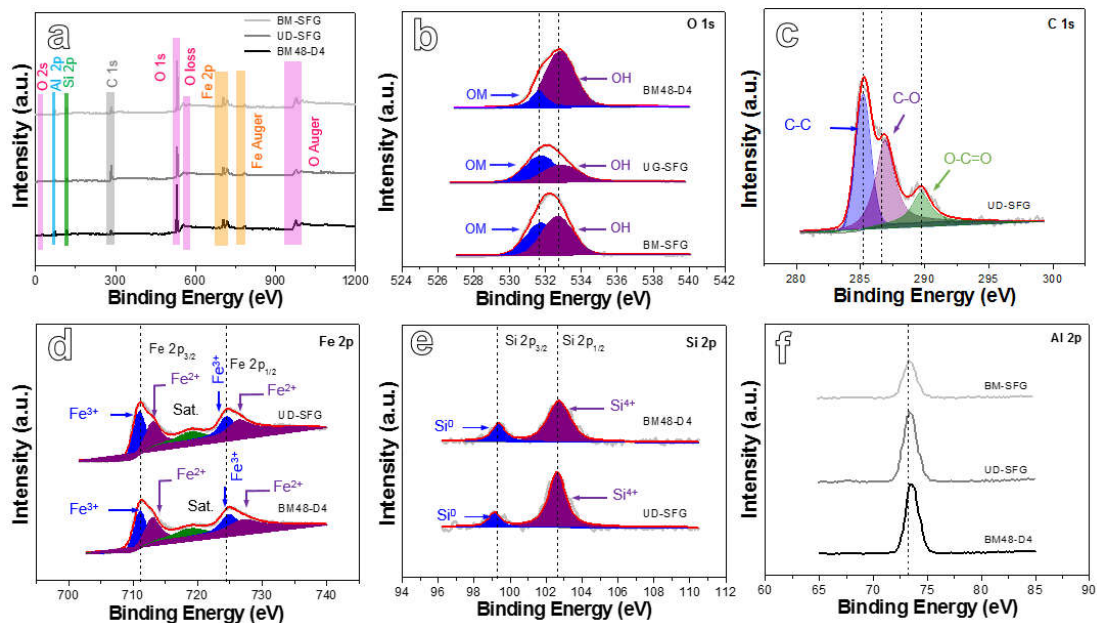


Figure S3 (a) XPS full survey spectrum and XPS spectra of (b) O 1s and (c) Al 2p for the BM-SFG, UD-SFG and BM-48-4; high resolution XPS spectra of (d) C 1s of UD-SFG, (e) Fe 2p and (f) Si 2p for the UD-SFG and BM-48-4.

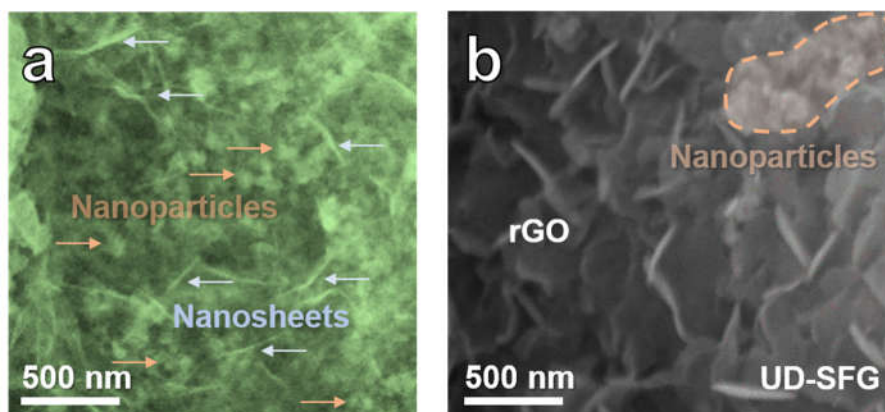


Figure S4 SEM images of (a) BM48-D4 and (b) UD-SFG.

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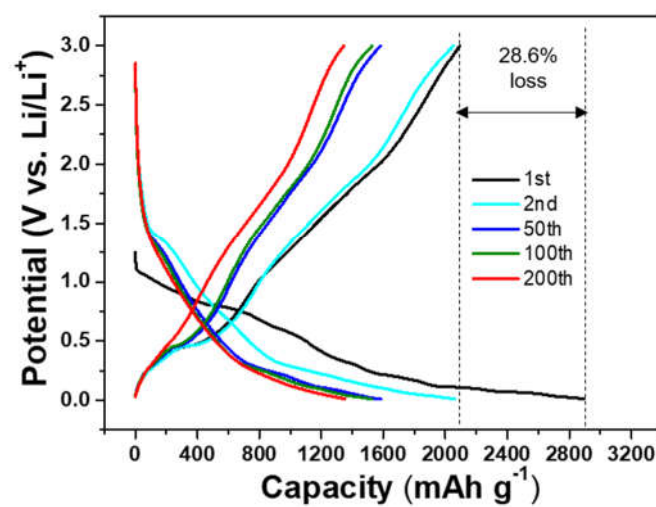


Figure S5 Galvanostatic charge-discharge (GCD) profiles of the UD-SFG electrode recorded under 200 mA g⁻¹.