Electronic Supplementary Information

Sandwich-Structural Graphene-Based Metal Oxides as Anode Materials for Lithium-ion Batteries

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Experimental

Graphene oxide was synthesized from natural graphite powders by a modified Hummer's method. In brief, 5 g of graphite powder (average size 20 μm, apparent density 0.05 g cm^{-3}) and 5 g of $NaNO_3$ were added into 230 mL of 98% H_2SO_4 under stirring in an ice bath. 30 g of $KMnO_4$ was slowly added to the mixture under stirring for 15 min at below 5 °C. The mixture was then heated at 35 °C for 30 min. Subsequently, 460 mL of distilled water was slowly added into the above mixture, followed by stirring the mixture at 98 °C for more than 15 min. The mixture was further diluted with 1400 mL of distilled water and the reaction was terminated by adding 25 mL of 30 % H_2O_2. Meanwhile, the color of the solution turned from dark brown to bright yellow. The resulting mixture was filtered and washed with distilled water several times to remove residual acids and salts. As-prepared GO was dispersed in water by ultrasonication for 30 min, followed by a low-speed centrifugation to get rid of any aggregated GO nanosheets.

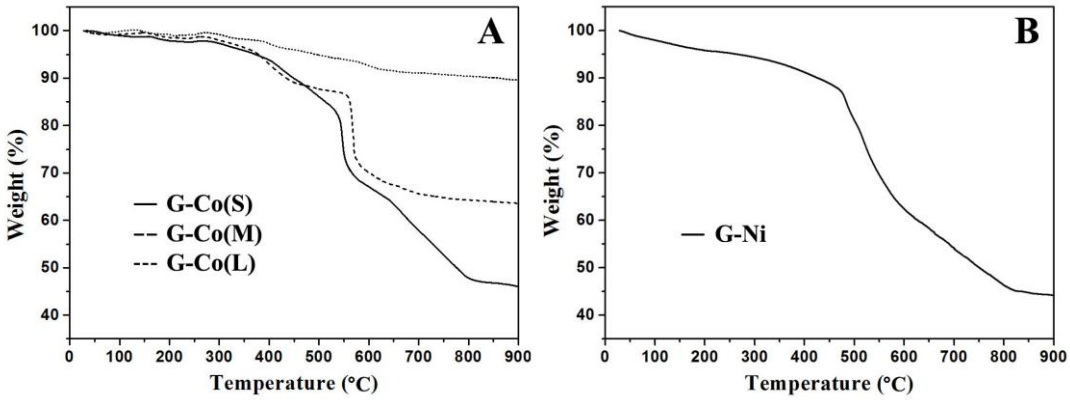

Fig. S1. TGA curves of (A) G-Co(S), G-Co(M) and G-Co(L), and (B) G-Ni, respectively.

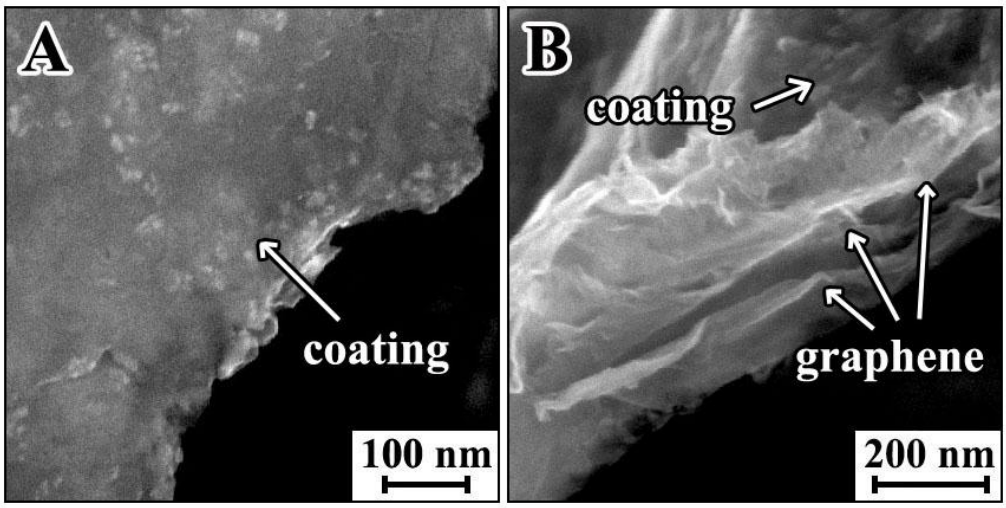

Fig. S2 SEM images of (A) the edge and (B) the cross-section of G-Co(S)-G.

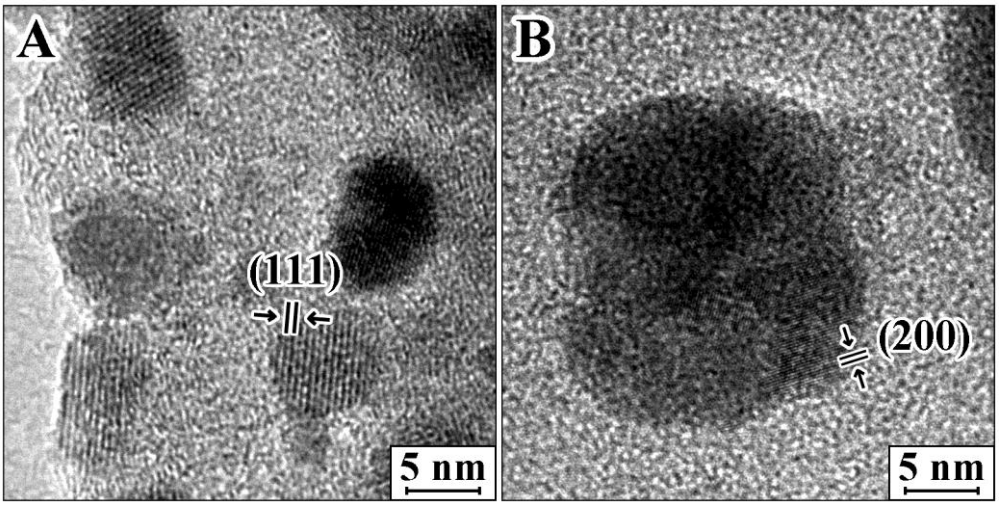

Fig. S3 HRTEM images of (A) G-Co(S) and (B) G-Ni, respectively.

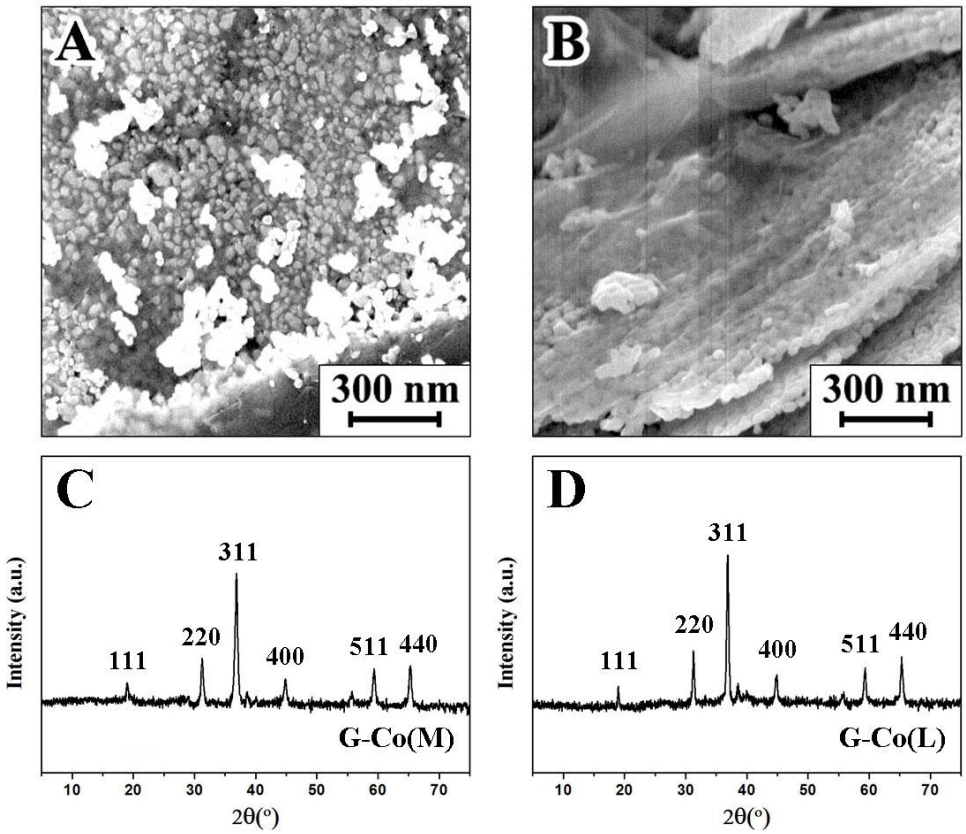

Fig. S4 SEM images of (A) G-Co(M)-G, (B) G-Co(L)-G and XRD patterns of (C) G-Co(M), (D) G-Co(L), respectively.

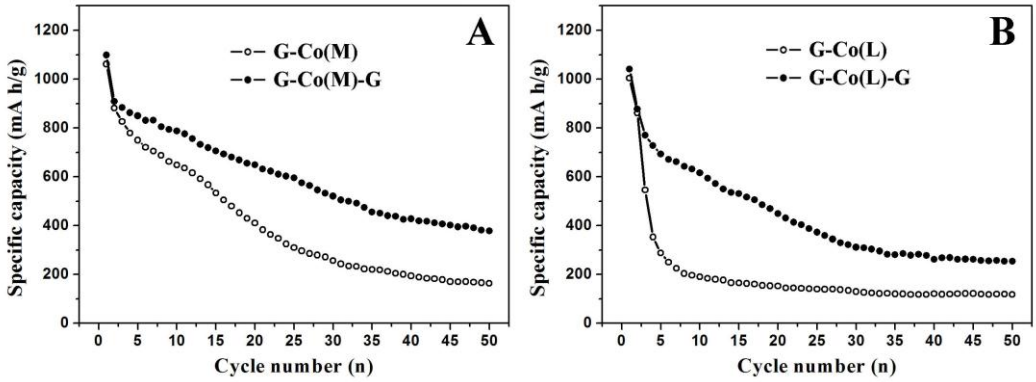

Fig. S5 The discharge capacities as a function of cycle numbers for (A) G-Co(M), G-Co(M)-G and (B) G-Co(L), G-Co(L)-G at 0.1 C, respectively.

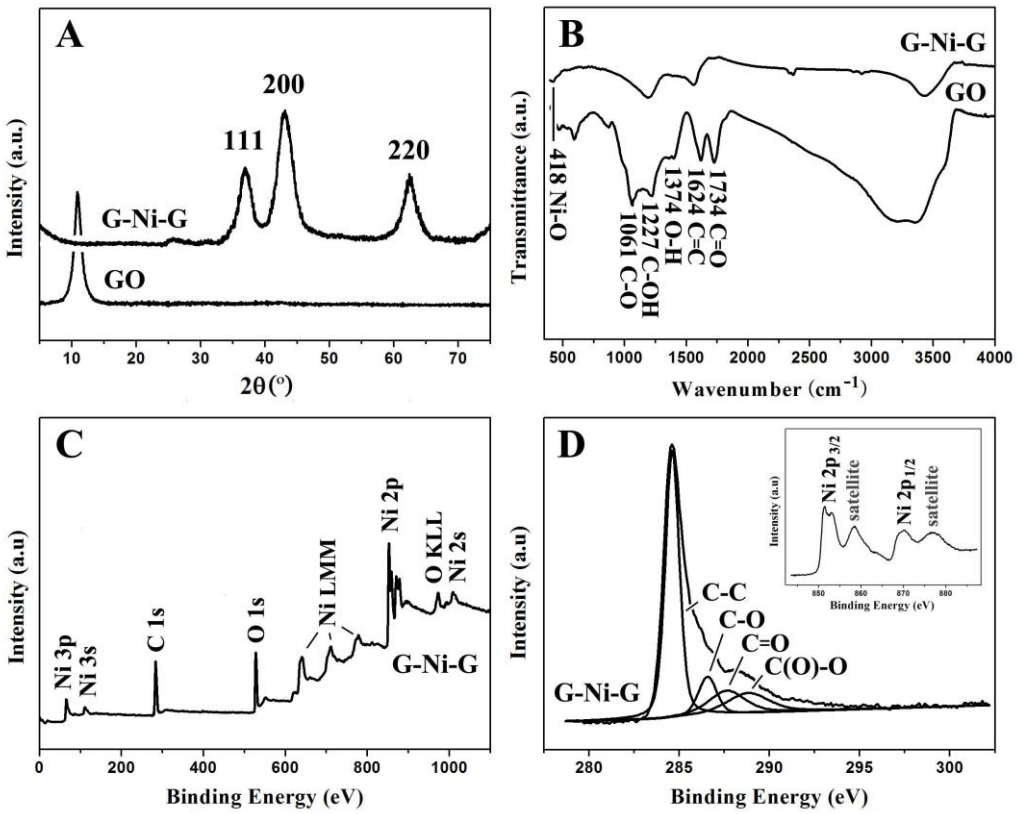

Fig. S6 (A) XRD patterns and (B) FT-IR spectra of GO and G-Ni-G. (C) survey XPS spectrum and (D) C 1s XPS spectrum of G-Ni-G. The inset of (D) is the Ni 2p XPS spectrum of G-Ni-G.