Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supporting information

Controlled electrochemical growth of $Co(OH)_2$ flakes on 3D multilayered graphene foam for high performance supercapacitors

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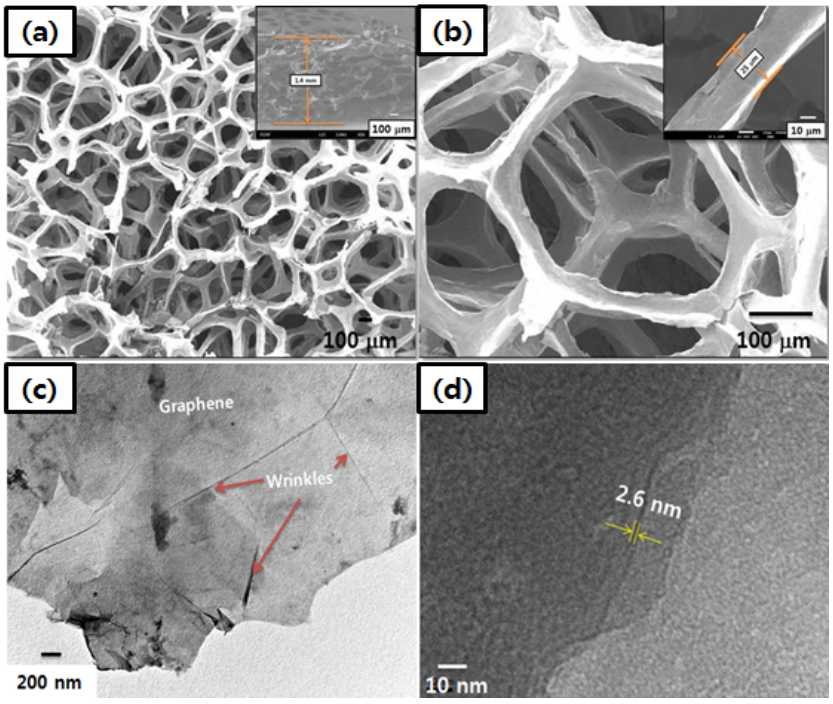

Fig. S1

Fig. S1 (a) shows SEM images of MGF electrode which replicates 3D structure of the nickel foam template with thickness about 1.5 mm (shown in the inset of figure), and all the graphene sheets in the foam are interconnected with each other without any breaks. (b)

The 3D porous graphene foam reveals a smooth and thin graphene skeleton with width of individual graphene sheets around ~25 μm as shown in inset of figure S1 (b). Figure (c, d) shows TEM images of graphene foam at different magnifications.

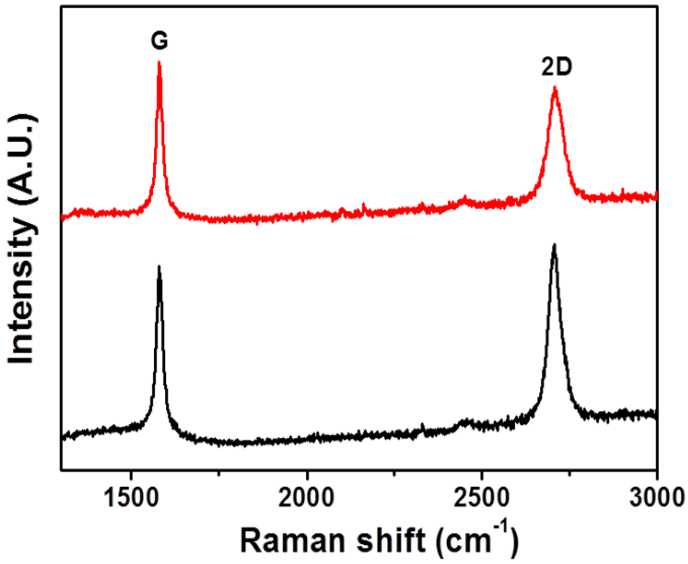

Fig. S2

Fig. S2. The Raman spectra of 3D graphene at different places on the foam exhibited two distinct peaks at ~1,559 cm^{-1} (G-band) and ~2,699 cm^{-1} (2D-band). The integral ratio of the 2D and G band indicates few layered domains (multilayers) contained as-grown GF.

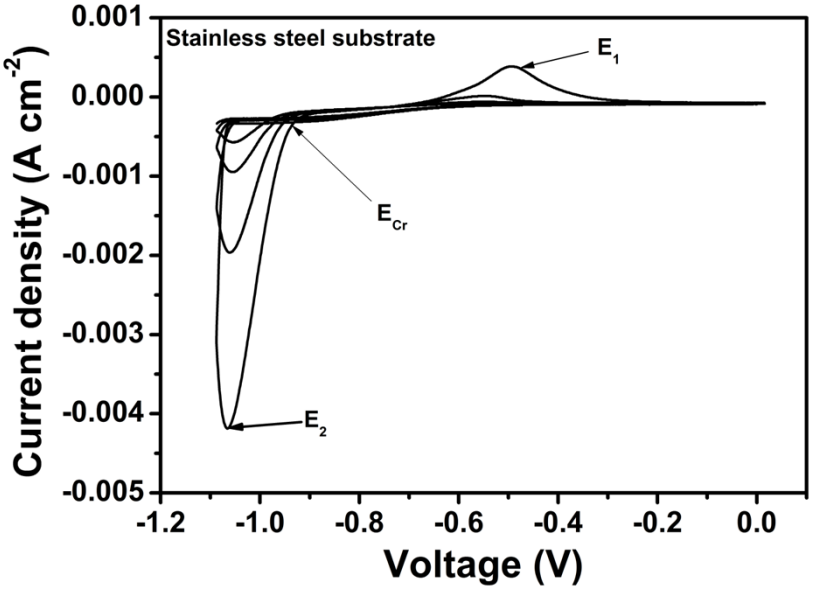

Fig. S3

Fig. S3. Cyclic voltammograms (CV) for a stainless steel (SS) electrode in 0.1 M $Co(NO_3)_2.6H_2O$ electrolyte.

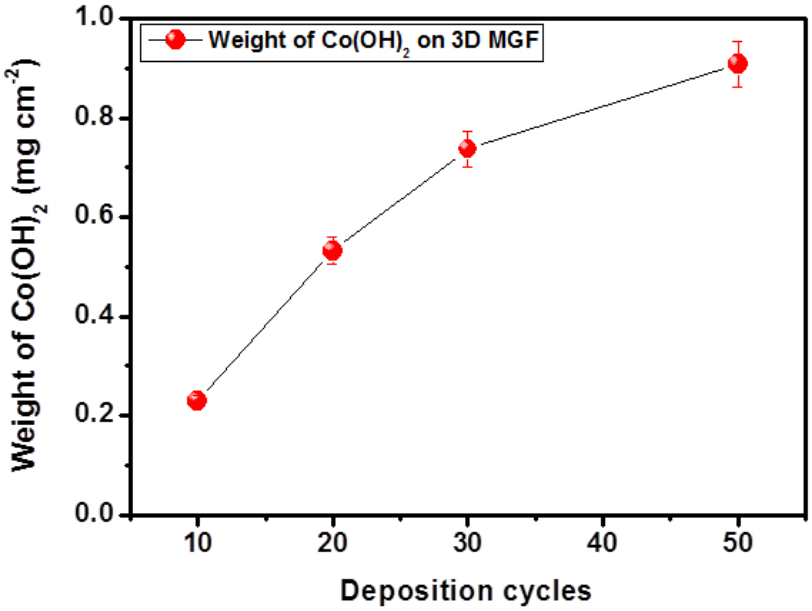

Fig. S4

Fig. S4 The graph of weight (mg cm^{-2}) of $Co(OH)_2$ deposited on MGF surface with the deposition cycles.

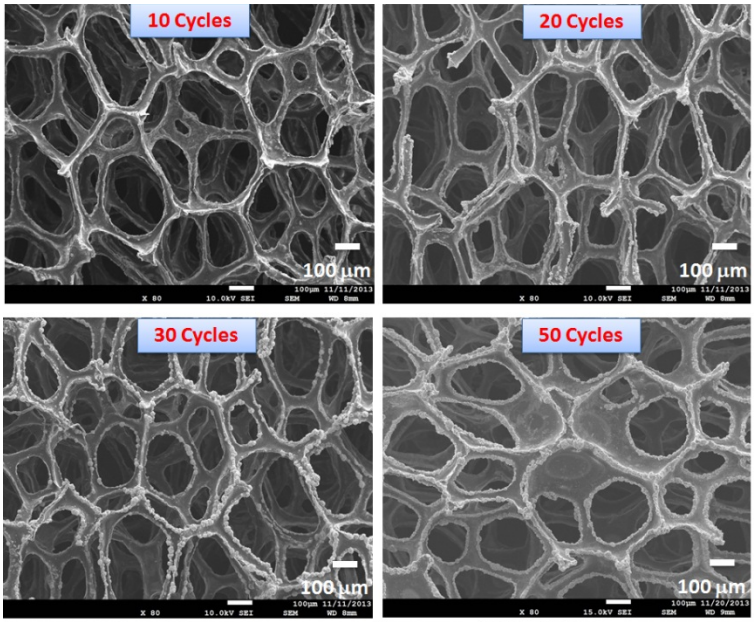

Fig. S 5(a)

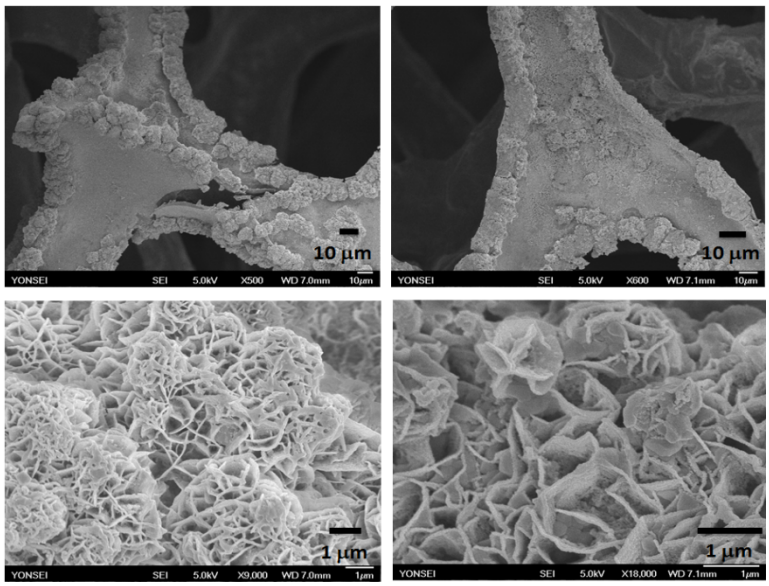

Fig. S 5(b)

Fig. S5 (a) shows SEM images at low magnification (X 80) of $Co(OH)_2$/MGF electrode at different deposition cycles (10 to 50 cycles) which reveals 3D structure of the graphene foam is entirely covered by $Co(OH)_2$. (b) The SEM images of $Co(OH)_2$/MGF electrodes at different magnifications (X500 to X18000).

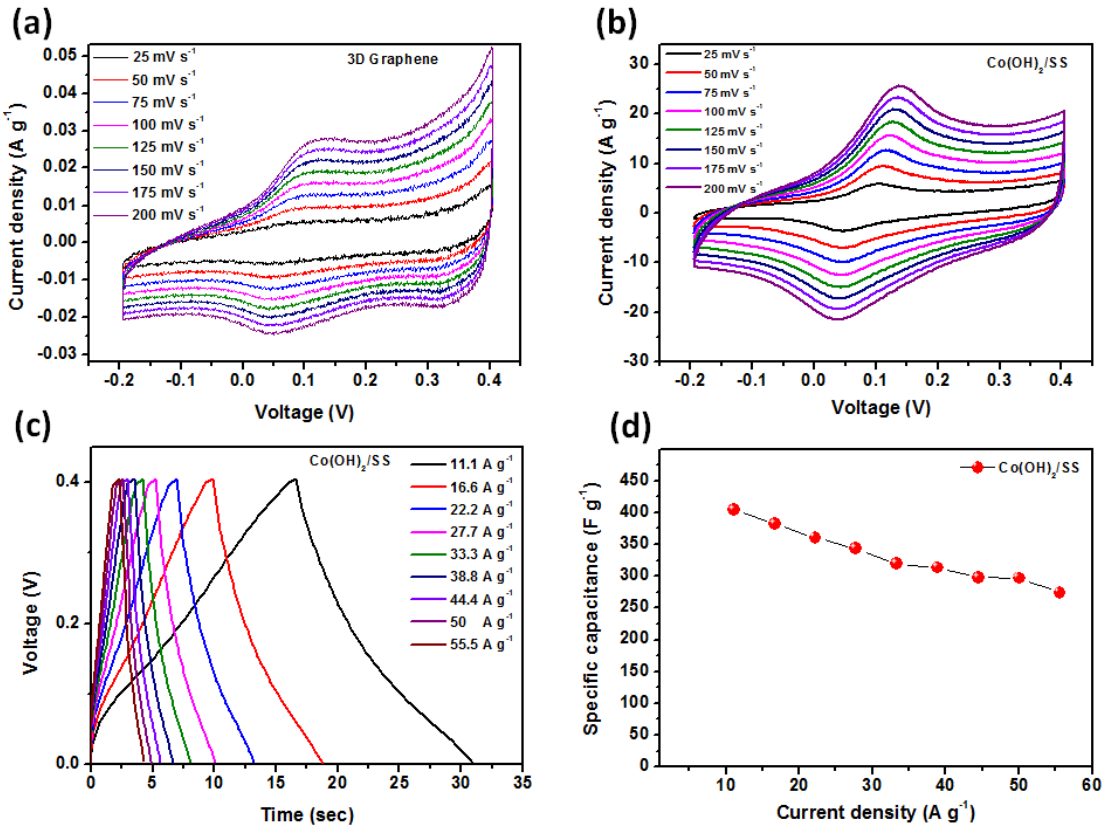

Fig. S6

Fig. S6. The CV curves of (a, b) MGF electrode and pure $Co(OH)_2$/SS electrode in 1M KOH at different scan rate. (c) The GCD curves of pure $Co(OH)_2$/SS electrode at different charging current densities. (d) The graph of specific capacitance of $Co(OH)_2$/SS electrode at different current densities calculated from GCD graph.