Electronic Supplementary Inforamtion for

Highly conductive carbon-CoO hybrid nanostructured arrays with enhanced electrochemical performance for asymmetric supercapacitors

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XRD results :

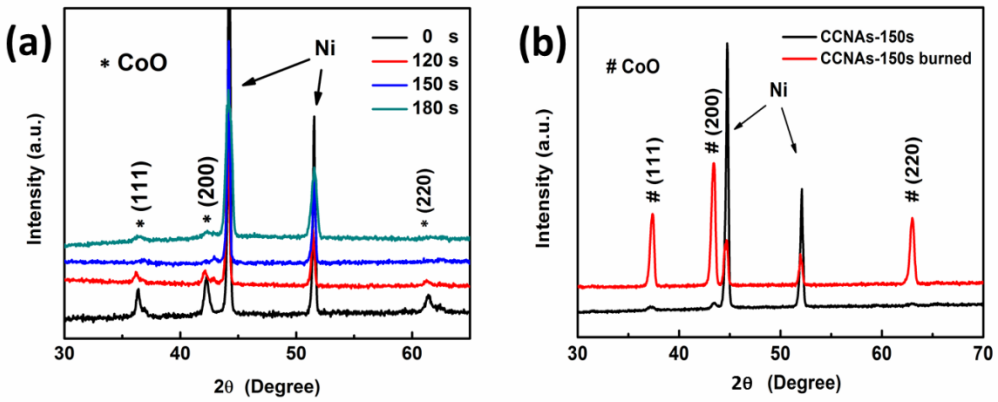

Figure S1. XRD patterns of (a) CCNAs-0s, 120 s, 150 s, 180 s respectively; (b) CCNAs-150s and CCNAs-150s burned.

Growth process discussions:

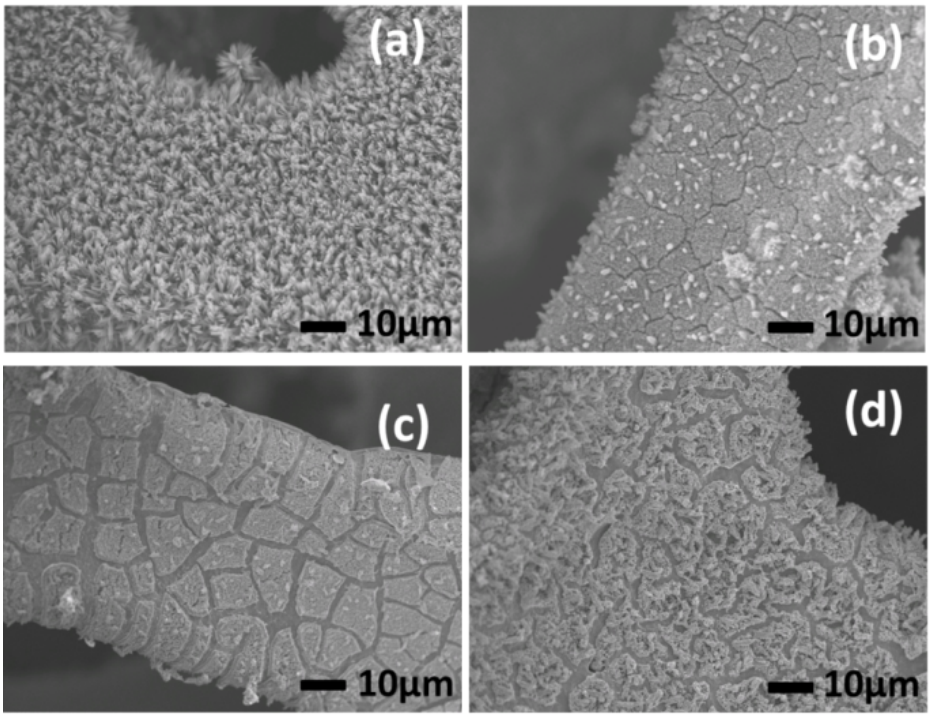

Figure S2. Low magnification SEM images of: CCNAs-0s(a), 120 s (b), 150 s (c), 240 s (d).

It is worth mentioning that as the ventilation time increased, the mass loading on the Ni foam decreased (Fig. S2). With the deposition time increasing in the range of 0 s, 120 s, 150 s, 180 s, 240s, the specific mass loading in each square centimeter decreased successively 2.70 ± 0.1 mg, 2.30 ± 0.1 mg, 2.06 ± 0.1 mg, 1.66 ± 0.1 mg, 0.64 ± 0.1 mg. For CCNAs-0s in Fig. S2a, no cracks are observed and the nanowires fully cover on the nickel foam. As the C_2H_2 were introduced, cracks occurred. It is supposed that as the carbon covered the nanowires, the adjacent nanowires randomly assembled to reduce stress. Due to the gathering centers were random occurrence, when an edge of center encountered another center, cracks appeared and islands about 10×10 μm^2 developed as shown in Fig. S 2b. Arrays around the islands initially may fell off from the substrate under gravity (3D Ni foam) and the rush of airflow. When the ventilation time increases to 150 s, cracks grew larger and islands became smaller. As to 240 s, the remaining isolated islands broke up into smaller islands themselves. Thus, masses of active material on the nickel foam decreased with ventilation time.

Water contact angle measurement

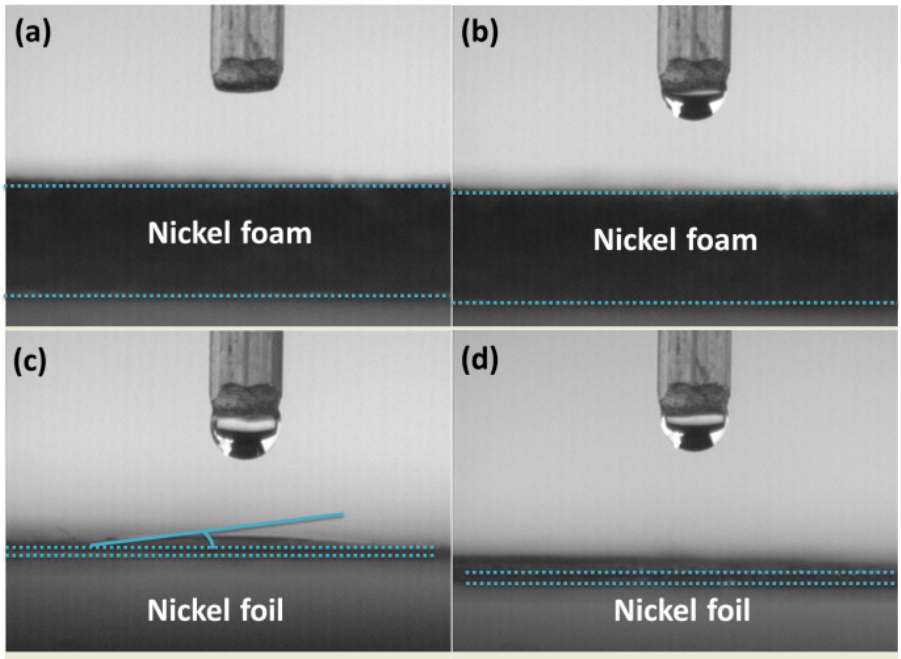

Fig. S3 Water contact angle measurement images of (a) CCNAs-0s on nickel foam; (b) CCNAs-150s on nickel foam; (c) CCNAs-0s on pressed nickel foam at 1 M Pa; (d) CCNAs-150s on pressed nickel foam at 1 M pa.

We have taken the water contact angel (CA) measurement to test the hydrophily of CCNAs. For both CCNAs-0s and CCNAs-150s on nickel foam, no CAs could be found because of the 3D porous structure of nickel foam as shown in Fig. S3a, b. Thus, we further pressed the 3D nickel foams with CCNAs to thin nickel foils at 1 M Pa to test as illustrated in Fig. S3c, d. As for CCNAs-0s, a very small CA in Fig. S3c was observed, however, for CCNAs-150s, no CA was found, suggesting the CCNAs-150s possess better hydrophily.