Supporting information

TG was used to determine the anneal temperature of the precursor (NZOH) to produce NZO in static air at a heating rate of 5 K/min from 273 to 973 K. As shown in Fig. S1, the sample underwent multi-step weight losses arising from the dehydration and decomposition of NZOH. The first step of weight loss blow 423 K is assigned to the vaporization of absorbed water. The second large weight loss between 523 to 573 K, all the intercalated water molecules and organic species had completely escaped from the interslab space, can be attribute to the destruction of the NZOH with the simultaneous formation of NZO. There is no more weight loss above 723 K. Therefore, 723 K was chosen as the thermally treated temperature to produce NZO.

Fig. S2a illustrates the cyclic voltammetry (CV) curves of the NZS composites obtained at various hydrothermal temperatures. The samples were tested in 3M KOH solution at a scan rate of 10 mV/s. The sample produced at 393 K has the biggest surrounded area indicating that the capacitance of NZS-393 K might be the highest one. To further ensure the best condition of hydrothermal temperature, Galvanstatic charge-discharge for the NZS composite electrodes was also carried out at the same current density of 1A/g (fig. S2b). Different from electric double-layer capacitance, the shapes of these curves suggesting that pseudocapacitive reaction exists in the system. Furthermore, we can clearly observe that the charging and discharging times of NZS-393K samples is the longest, corresponding to the CV results. Fig. S2c also gives the calculated rate performance based on the Galvanstatic charge-discharge tests. Encouragingly, the NZS electrodes exhibit high specific capacitances of 1867, 1725, 1596, and 1312 F/g at reaction temperatures of 393, 413, 433, and 453K, respectively. Thereby, we choose 393K as the desired temperature in our

subsequent study.

Fig. S3 shows cycling performances and coulombic efficiency of NZOH electrode and NZO tested in three electrode systems. As shown in Fig. S3a, for NZOH, a mainly decays of specific capacitance occurs in the first 200 cycles, which is due to the weak adhesion between the active materials and the substrate, and stays stable afterward. A high coulombic efficiency near 100% was found at the whole process. Fig. S3a shows the cycle performance of NZO, at current density of 5A/g, an obvious phenomenon of activation was observed at the first 500 cycles and a high retention rate of 99% specific capacitance is found after 1000 cycles, indicating its good cycling stability. In addition, both of NZOH and NZO electrode show high coulombic efficiency around 100% in the whole process.

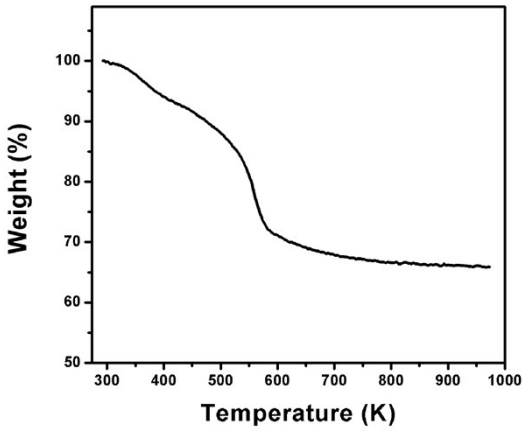

Fig. S1 TG curve of NZOH

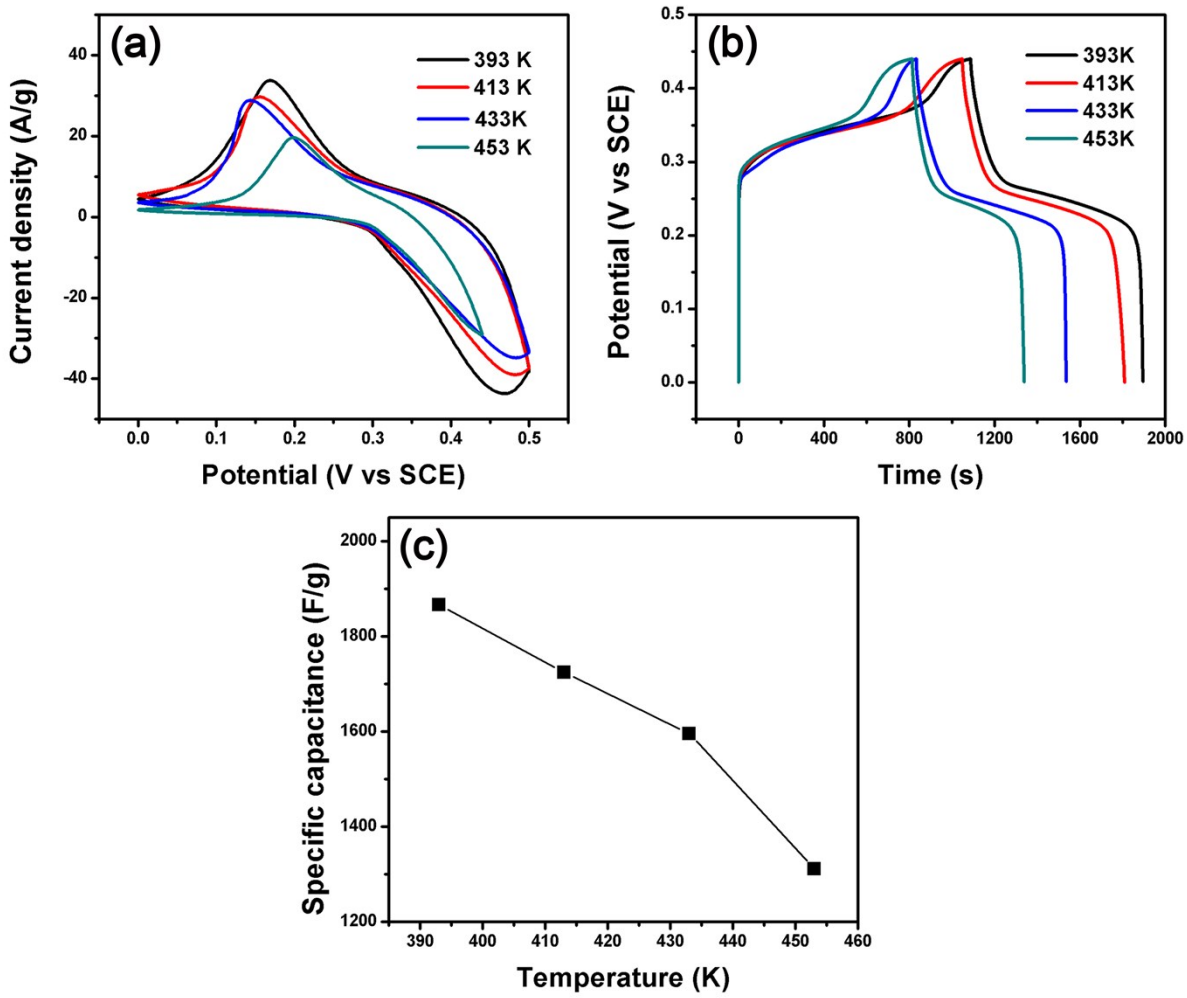

Fig. S2 (a) CV; (b) galvanostatic charge–discharge and (c) the rate performances curve of NZS at different conditions of hydrothermal temperature.

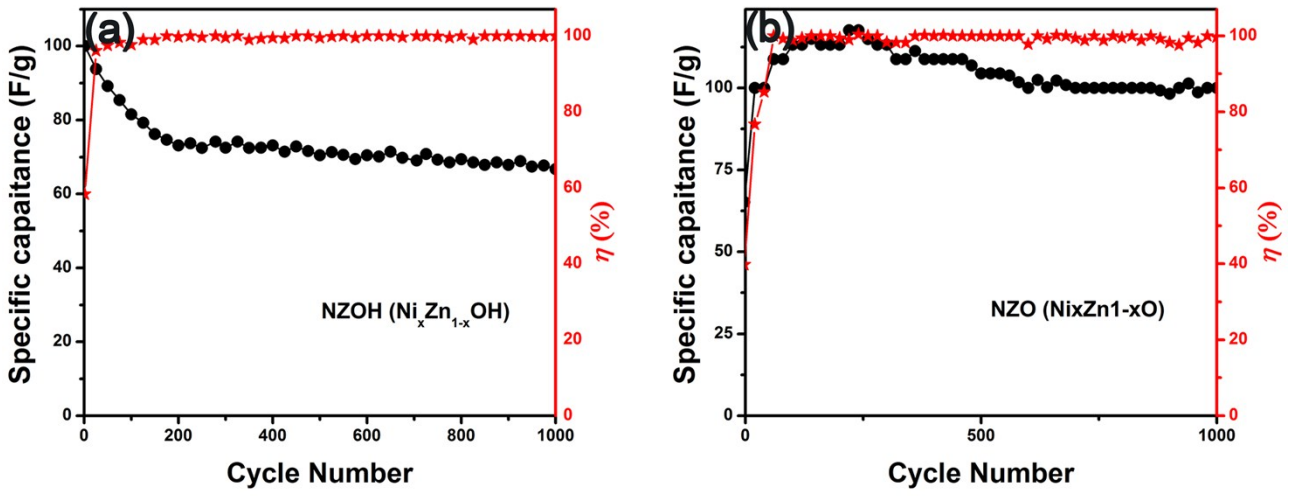

Fig. S3 Cycling performances and coulombic efficiency of (a) NZOH electrode and (b) NZO electrode at a current

density of 5 A/g.