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Supplementary Data

Synthesis of Ni-Doped Graphene Aerogels for Electrochemical Applications

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Electrochemically Active Surface Area (ECSA)

The electrochemically active surface area (*ECSA*) is commonly calculated by the following equation:

$$ECSA = Cdl/Cs$$

where *Cdl is* the double-layer capacitance and *Cs* the specific capacitance of a reference material (*Cs*). It is quite complex to know or determine the exact value of *Cs*, especially for inorganic/organic hybrid materials or material with complex structures, so most of the reported publications assumed that *Cs* have the same value for all the studied materials or at least range around the same order of magnitude. Thus, the trend of the *Cdl* values can be equivalent to that of ECSA. *Cdl* was determined by performing cyclic voltammetry (CV) in a three-electrode cell involving the studied samples, an Ag/AgCl electrode, and a glassy carbon electrode as the working, reference, and counter electrodes, respectively. The electrodes were immersed in a 0.1 NaOH solution and the CV were recorded between 0 and 0.3 V (vs Ag/AgCl), in which non-Faradaic processes take place, at different scan rates (from 20 to 140 mV s^{-1}). Then, *Cdl* was calculated as the slope obtained by plotting the maximum current density (at a potential of 0.15 V) versus the scan rate. Figure S1 shows the CV measured at different scan rates for the undoped sample GA-20 and Ni-doped graphene aerogels.

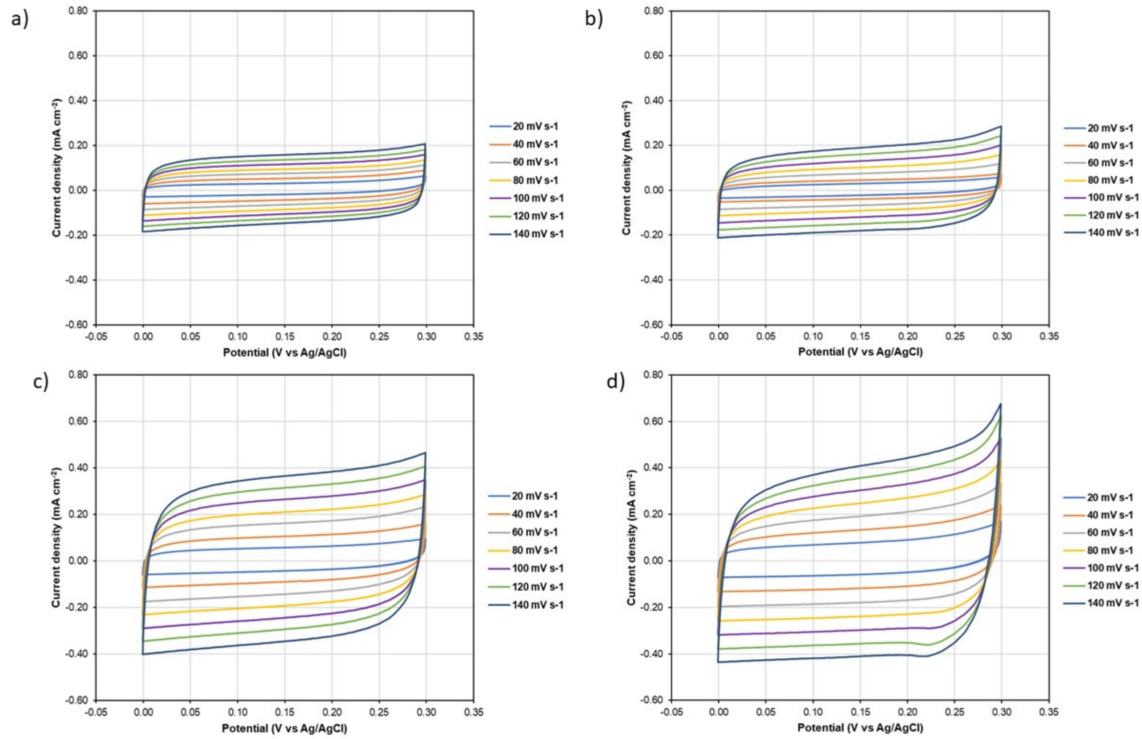

Figure S1. Cyclic voltammograms recorded between 0 and 0.3 V (vs Ag/AgCl), in which non-Faradaic processes take place, at different scan rates (from 20 to 140 mV s^{-1}) for sample GA-20 (a), GA-20-5%Ni_{ac} (b), GA-20-5%Ni_{Cl} (c), and GA-20-5%Ni_{nit} (d).