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Pulsed Reverse Potential Electrodeposition of Carbon-Free Ni/NiO Nanocomposite Thin Film Electrode for Energy Storage Supercapacitor Electrodes

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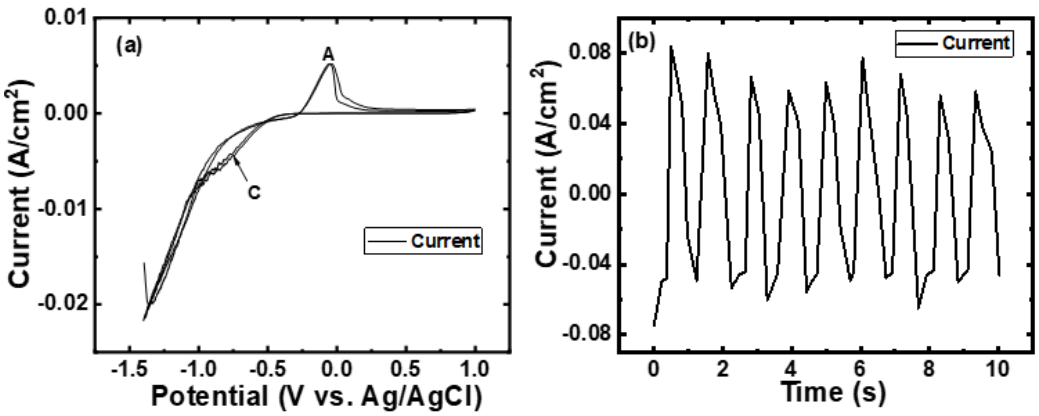


Figure S1. Deposition profiles of carbon-free Ni-NiO nanocomposite thin film on Ti-substrate: (a) Cyclic voltammetry (CV) followed by (b) Pulse reverse potential (PRP).

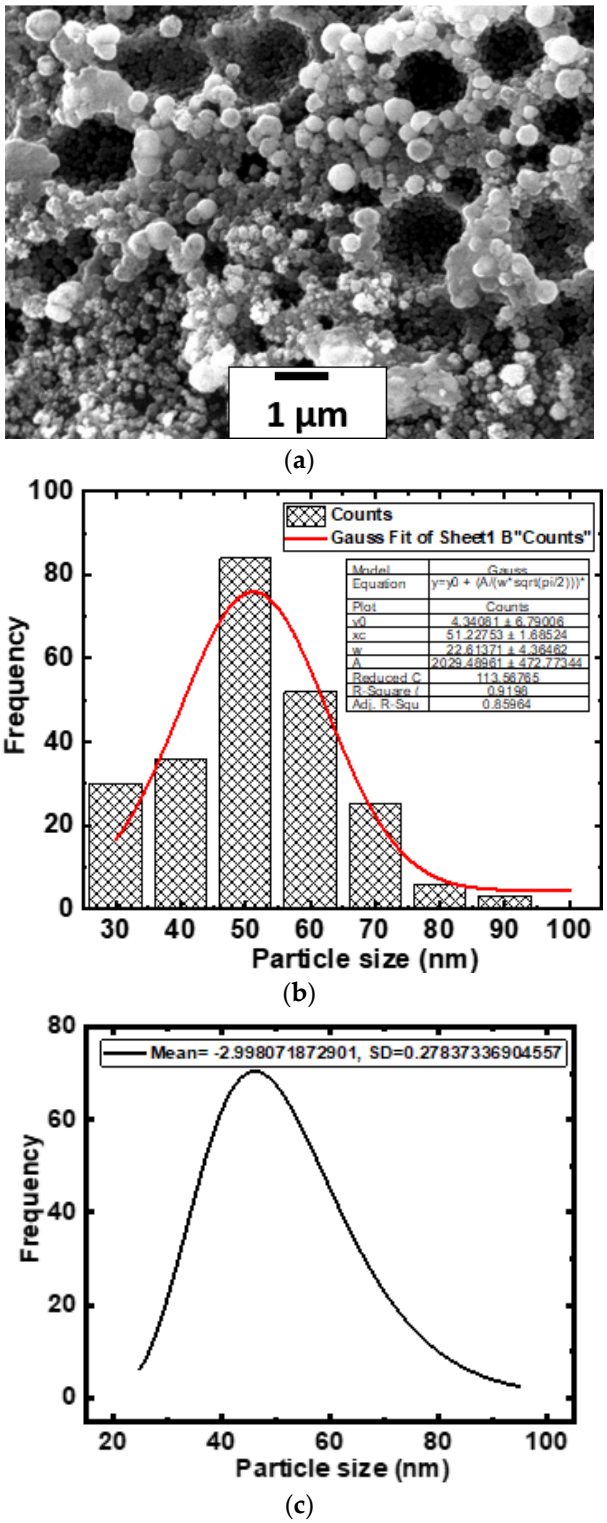
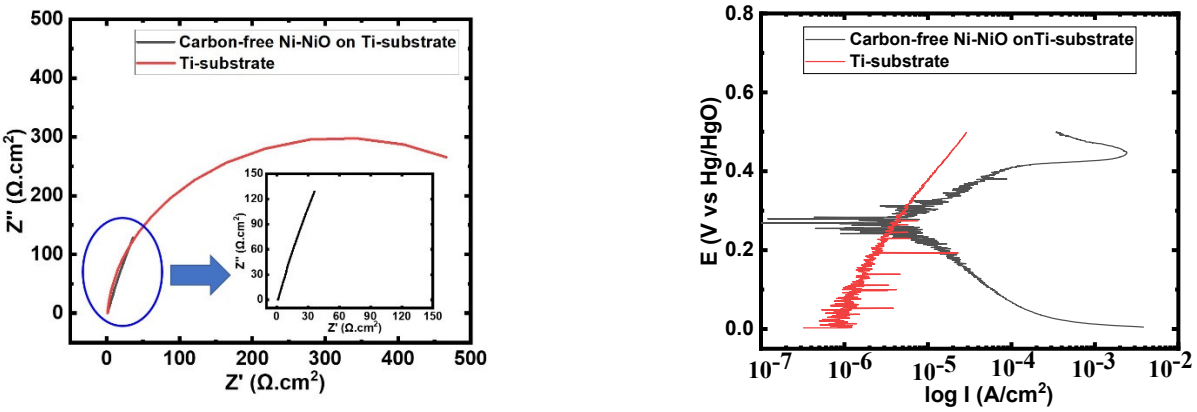


Figure S2. (**a**) SEM image (same as Figure 1(c) in the manuscript) (**b**,**c**) Particle size distribution of the Carbon-free Ni-NiO nanocomposite thin film on Ti-substrate.

The distribution of the particle size of Figure S2 was analyzed using an image analysis software (ImageJ analytical software). The analyzed data has been presented in Figure S2(b,c) (for the reviewer only). The results show that the image is populated by 50 nm (0.05 µm) particles.



(**a**) (**b**)

Figure S3. (**a**) Nyquist plots and (**b**) polarization curves of Ni/NiO coating on Ti substrate and pristine Ti substrate (Inset shows the Nyquist plot of Ni/NiO coating on Ti).

The electrochemical impedance spectroscopy measurement was performed in the frequency range of 100 kHz to 10 mHz for both electrodes in a 1M KOH electrolyte. The Nyquist plots shown in Figure S3(a) demonstrates a large semi-circle corresponding to the Ti substrate. The Ni/NiO coating on Ti substrate, however, is found to have been merged in the lower resistance zone close to zero. The inset of Figure S3a shows the Nyquist plot of Ni/NiO coating on the Ti substrate. The nature of this plot distinctly shows the capacitive behavior of the coating as compared to the pure resistive behavior of the pristine Ti substrate.

Figure S3b shows the polarization curves of the Ti substrate and the Ni/NiO coated Ti substrate, in the potential range of 0 to 0.5V. This potential range was chosen as the CV and charge-discharge experiments were performed in the same range.