Supporting Information for

Hydrogenation of diamond nanowire surfaces for effective electrostatic charge storage

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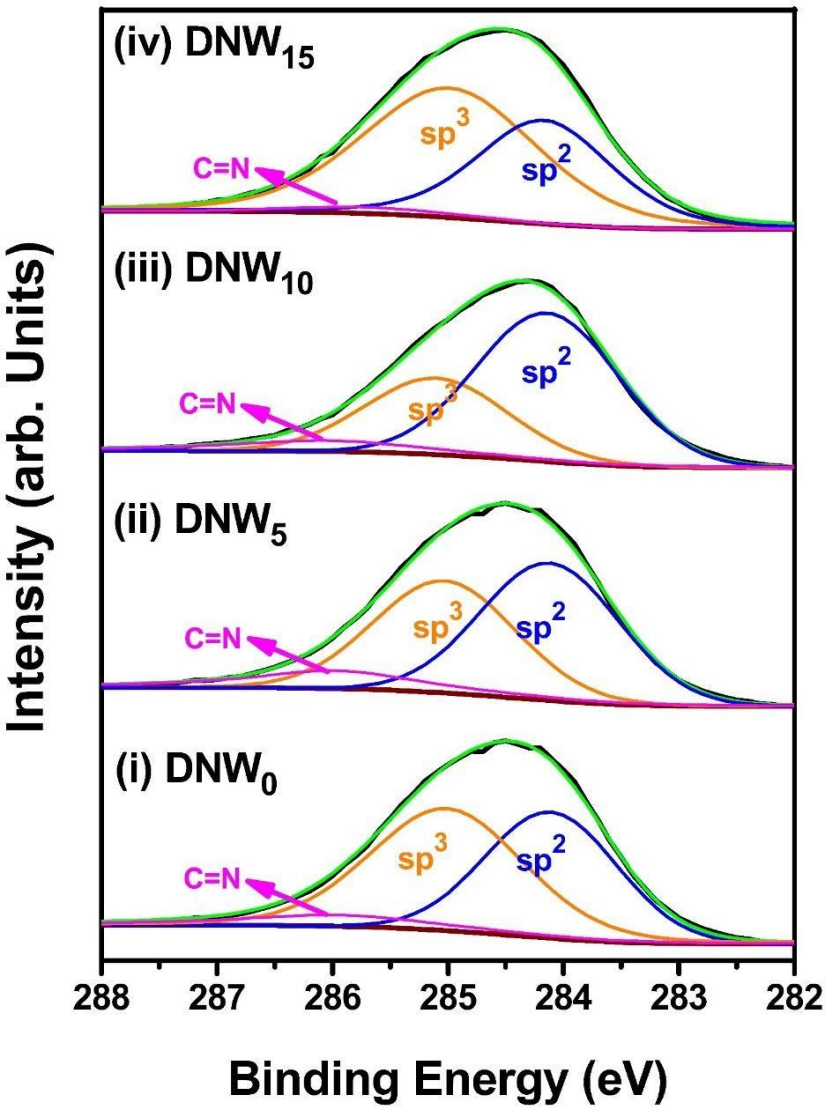

Figure S1. XPS spectra of (i) pristine and (ii, iii, iv) H_2 plasma-treated DNW films for (ii) 5, (iii) 10, and (iv) 15 min. The data are fitted to Lorentzian peaks with binding energies at 284.1, 285.2 and 286.0 eV corresponding to sp^2 C=C, sp^3 C–C and C=N bonding and their relative intensities are tabulated in Table I. In the DNW_0 film, the sp^3 C–C bonding is predominant with a peak intensity of 50.7%, while the sp^2 C=C peak intensity is 40.9% (curve i, Figure S1). The C=N peak is seen with an intensity of 8.4% at a binding energy of 286 eV. The appearance of C=N is not surprising because the films were grown in a N_2 containing plasma. The significant increase observed in the sp^2 phase fraction is caused by the H_2 plasma treatment (i.e., the sp^2 C=C peak intensity increases to 48.1% for the DNW_5 films (curve ii, Figure S1) and to 63.9% for the DNW_{10} films (curve iii, Figure S1)). However, extended H_2 plasma treatment removes the

graphitic phase content from the surface (curve iv, Figure S1) thereby decreasing the sp^2 phase fraction to 35.9%.

Table I. Relative intensities of the various components of the C1s XPS spectra from the pristine DNW_0 and the H_2 plasma-treated DNW films.

Peak position (eV)	Chemical bond	Peak intensity (%)			
		DNW_0	DNW_5	DNW_{10}	DNW_{15}
284.1	sp^2 C=C	40.9	48.1	63.9	35.9
285.2	sp^3 C–C	50.7	40.1	29.2	58.9
286.0	C=N	8.4	11.8	6.9	5.2

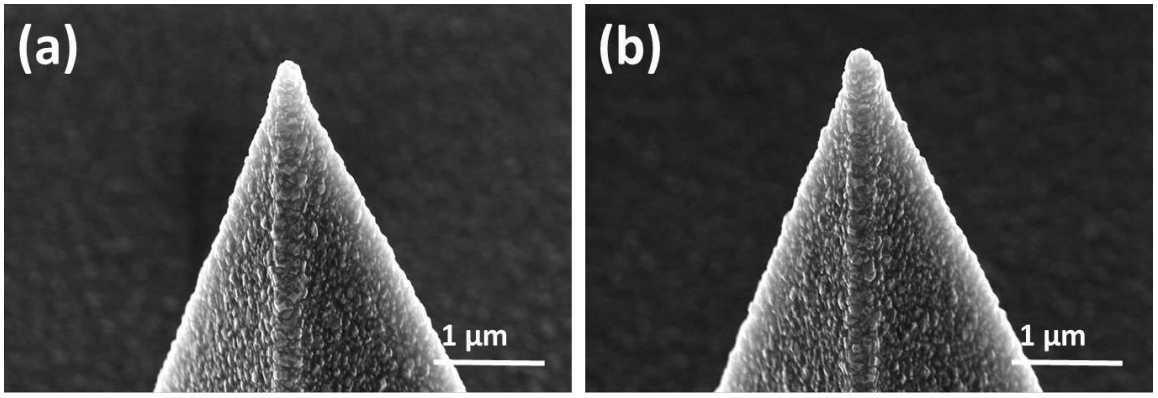

Figure S2. FESEM images of the diamond-coated Si tip (a) before and (b) after the load-dependent charge storage experiments on the DNW surface where the same tip was used many times. This indicates that the diamond-coated Si tips are stiff enough and did not change size because of the high load. Even a high bias of ±10 V did not change the tip.

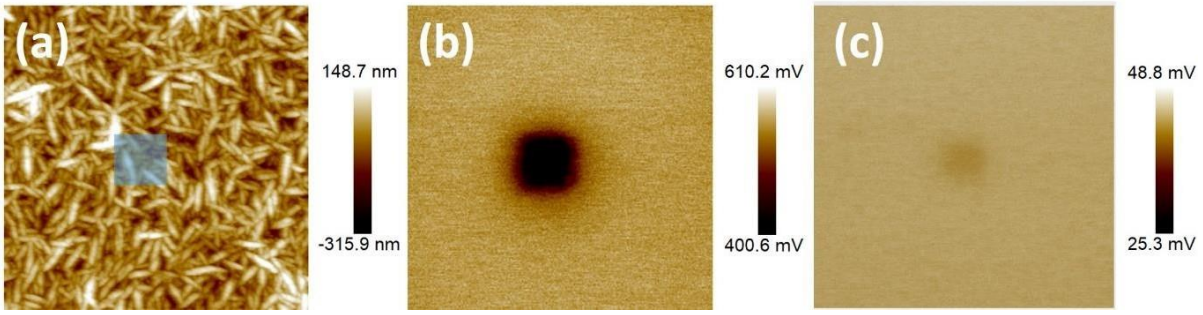

Figure S3. (a) Surface topography of the DNW_{10} surface that was written with a tip bias of −1 V in the marked square. (b) The corresponding KPFM potential signal clearly shows a negative potential shift. After reversing the tip polarity to +1 V, the same area was written again (all other parameters were the same as the first writing procedure at −1 V). (c) After the writing process at +1 V, the corresponding KPFM potential signal at the same position shows that the trapped charge can be erased by applying an exact opposite bias to the AFM tip. This indicates that the DNW surface can be rewritten. It is noted that there is still a small residual charge left on the writing area. Image sizes: (a, b, c) 4 µm.