Supplementary Materials: The Electronic Properties of Silicon Nanowires During their Dissolution Under Simulated Physiological Conditions

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Absolute Values of AFM Height Measurements

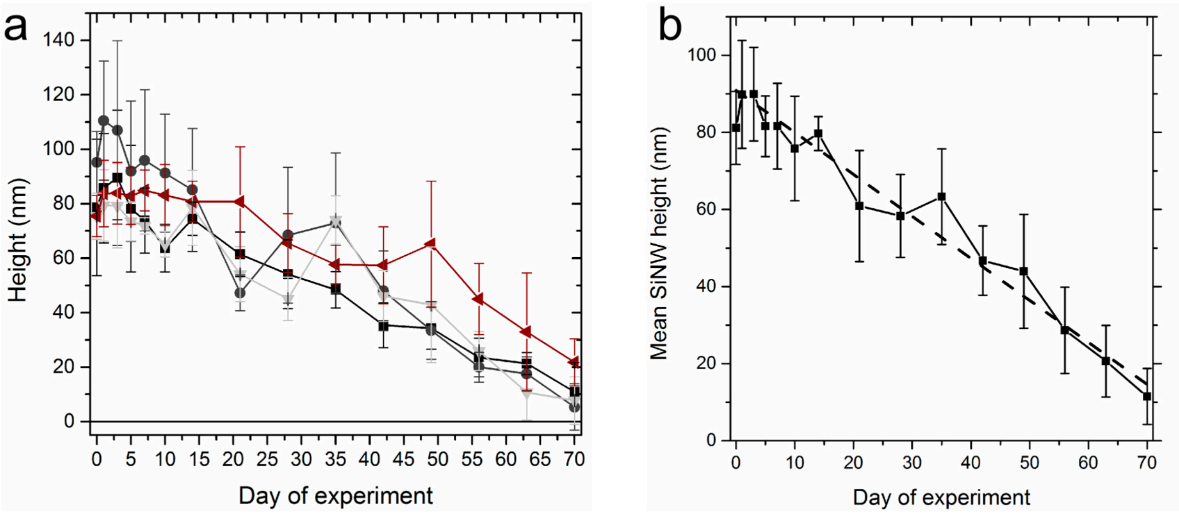

Figure S1. The height of four SiNWs over immersion time in PBS at 37 °C (**a**), each curve corresponding a single SiNW. Each data point corresponds to the mean of at least 2, usually 4–6, height measurements at different locations along the wire. In (**b**) the mean over all measured height profiles of all SiNW was fitted linearly. The slope yields an estimate for the SiNW etching rate under said conditions of (1 ± 0.1) nm/day.

Complete Series of *I-V* Measurements of a p-n Junction

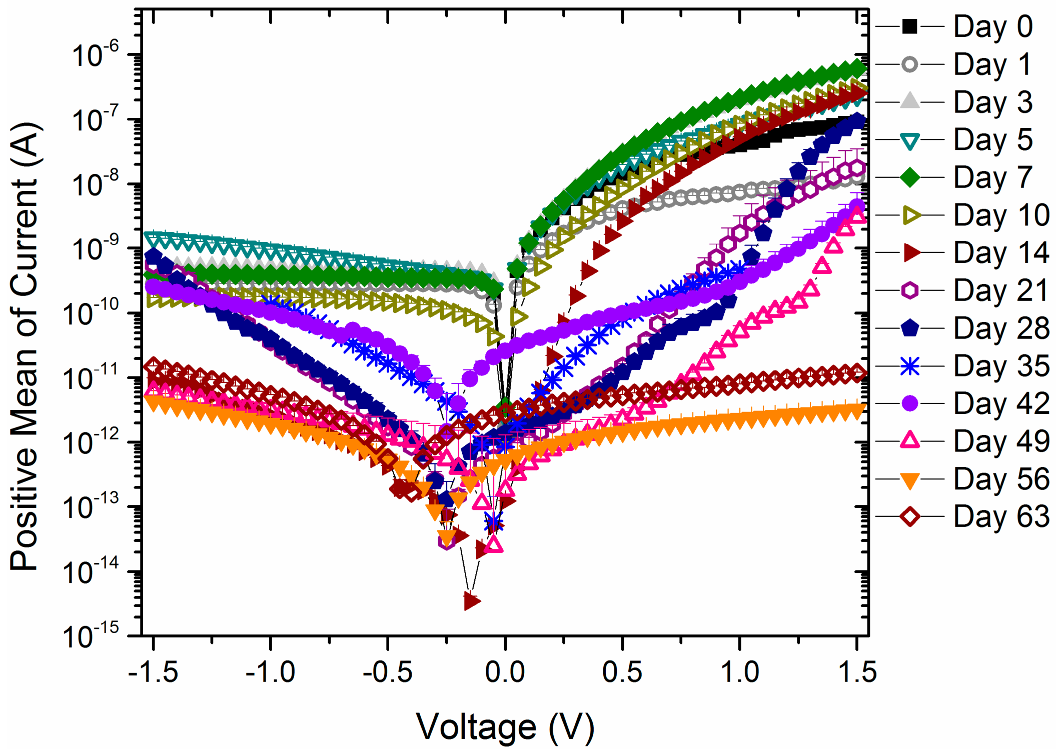

Figure S2. Complete set of *I-V* curves of a single SiNW measured before and after immersion in PBS at 37 °C for the given time period. Data points represent the mean and standard deviation of three measurements.

Change of Forward Currents Over Time

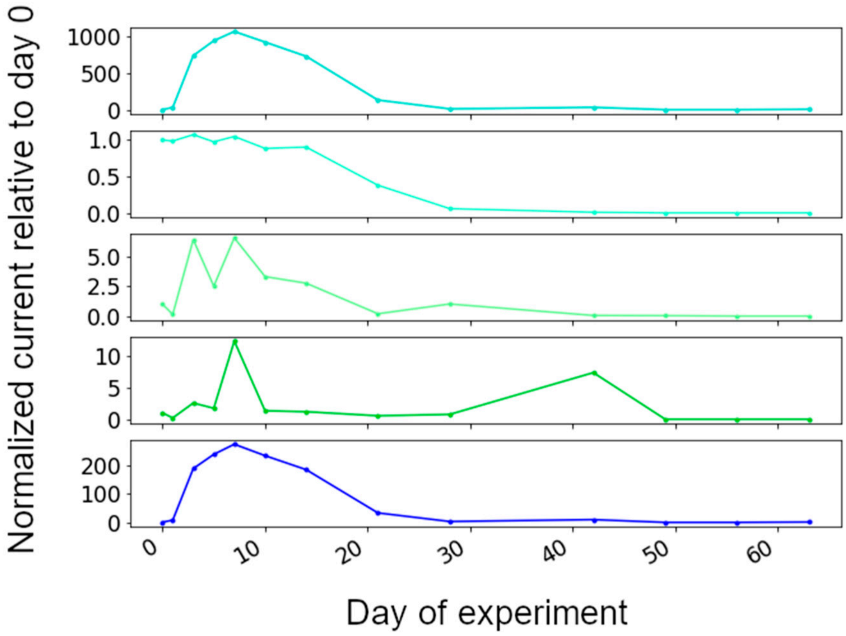

Figure S3. Change of normalized mean forward currents at 1.5 V during immersion in PBS. The current values were normalized to their respective equivalent on day 0 (before immersion). The values therefore show the fold change of forward currents over immersion time. The upper 4 subplots show current changes based on 4 SiNWs that were measured in triplicates at each timepoint. The dark green subplot corresponds to the series of measurements plotted in Figure S3. The 5th subplot (blue) depicts the mean values of these SiNWs. For all SiNW save one, the forward current value increases after immersion, peaks at day 7, and decreases again.

Al_2O_3 Coatings

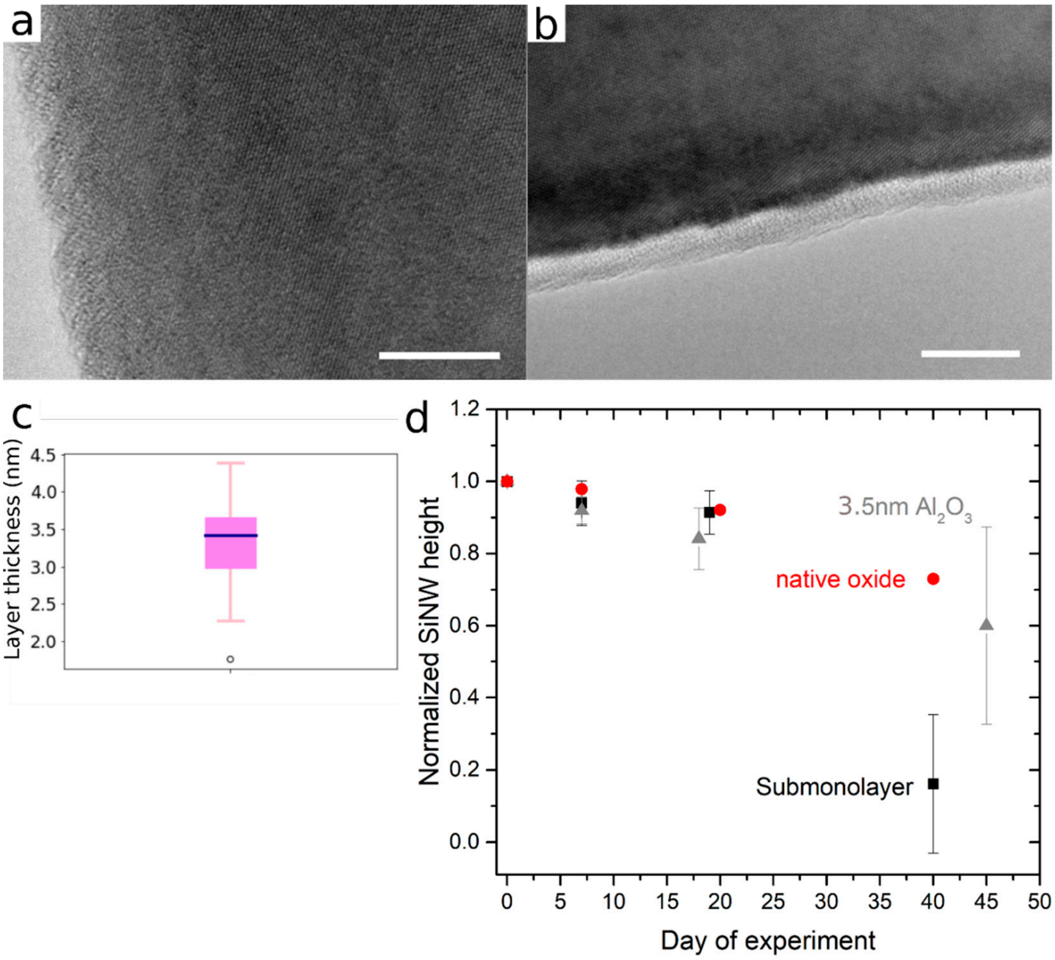

Figure S4. (**a**): TEM image of a SiNW coated with a submonolayer Al_2O_3 by applying two ALD reaction cycles of alternately letting trimethylaluminium (TMA) and water vapour react with the surface in a custom-made atomic layer deposition (ALD) set-up. The process was carried out at 200 °C chamber temperature and 15 sccm gas flow. The inlet time was 200 ms and 30 ms for TMA and water, respectively, the reaction time 10 s for both, and flush time 40 s and 50 s, respectively. Scale bar 10 nm. (**b**): TEM image of a SiNW coated with a thicker Al_2O_3 layer after 36 cycles as a reference and to verify the success of the coating process. The submonolayer did not exhibit obvious differences to the native oxide, whereas a thick amorphous layer is visible around the sample that is coated with the Al_2O_3 layer, suggesting a successful coating. Scale bar 10 nm. (**c**): Thickness of the Al_2O_3 layer after 36 cycles. Individual SiNW were imaged in a TEM and the images analyzed using the Fiji distribution of ImageJ. The thickness of the amorphous layer around the crystalline SiNW core was measured for 10 different areas each in 12 TEM images resulting in 120 measurements. The mean of these measurements was 3.3 nm, the median 3.4 nm. This yields a deposition rate of 0.92 Å/cycle (mean) and 0.94 Å/cycle (median), respectively. The 2 cycles applied to yield the submonolayers have according to these measurements therefore deposited 1.8–1.9 Å. (**d**): Comparison of height measurements of SiNWs with just the native oxide (red), with a submonolayer Al_2O_3 (black) and a ca. 3.5 nm thick Al_2O_3 layer (gray) employing a Bruker Bioscope Catalyst AFM in PeakForce tapping mode with scanasyst-fluid probes (Bruker). Measurements were performed in liquid, i.e. in PBS, at room temperature, before returning the samples to the 37 °C immersion temperature. Data was analyzed using the instrument's integrated Nanoscope Analysis software. Four samples with the submonolayer coating were monitored over the whole experiment and six with the 3.5 nm coating.