

## Supporting Information

# The Dissipation of Field Emitting Carbon Nanotubes in an Oxygen Environment as Revealed by *In Situ* Transmission Electron Microscopy

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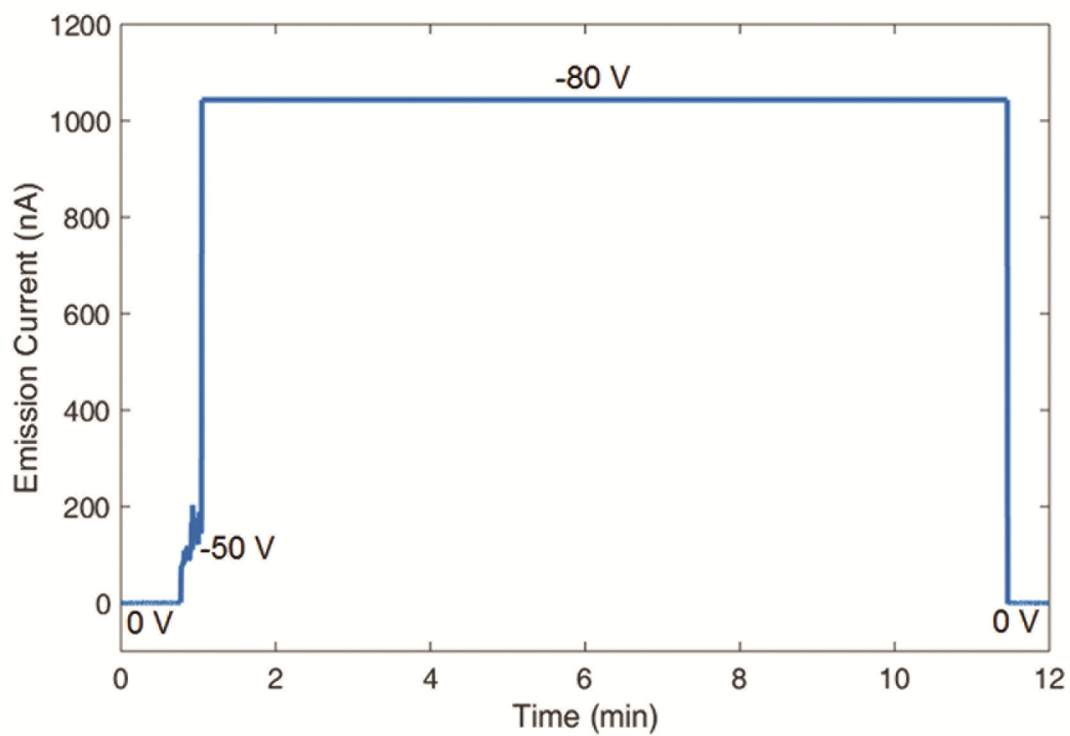
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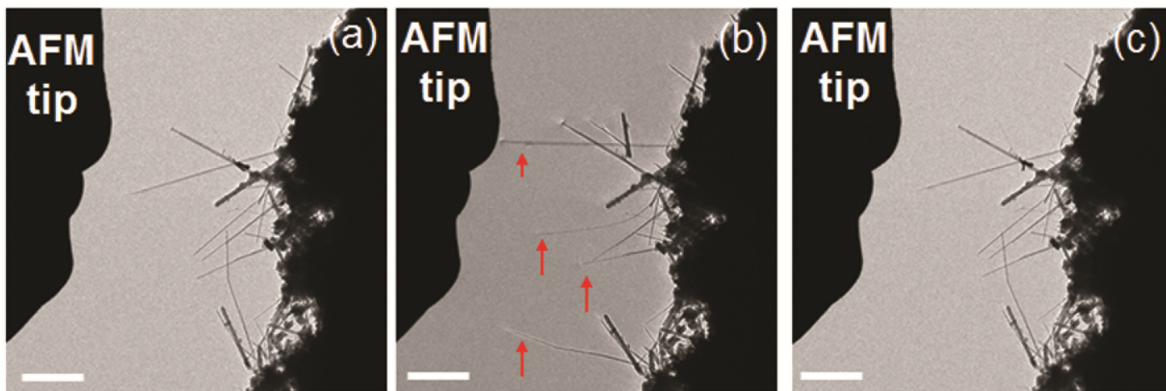
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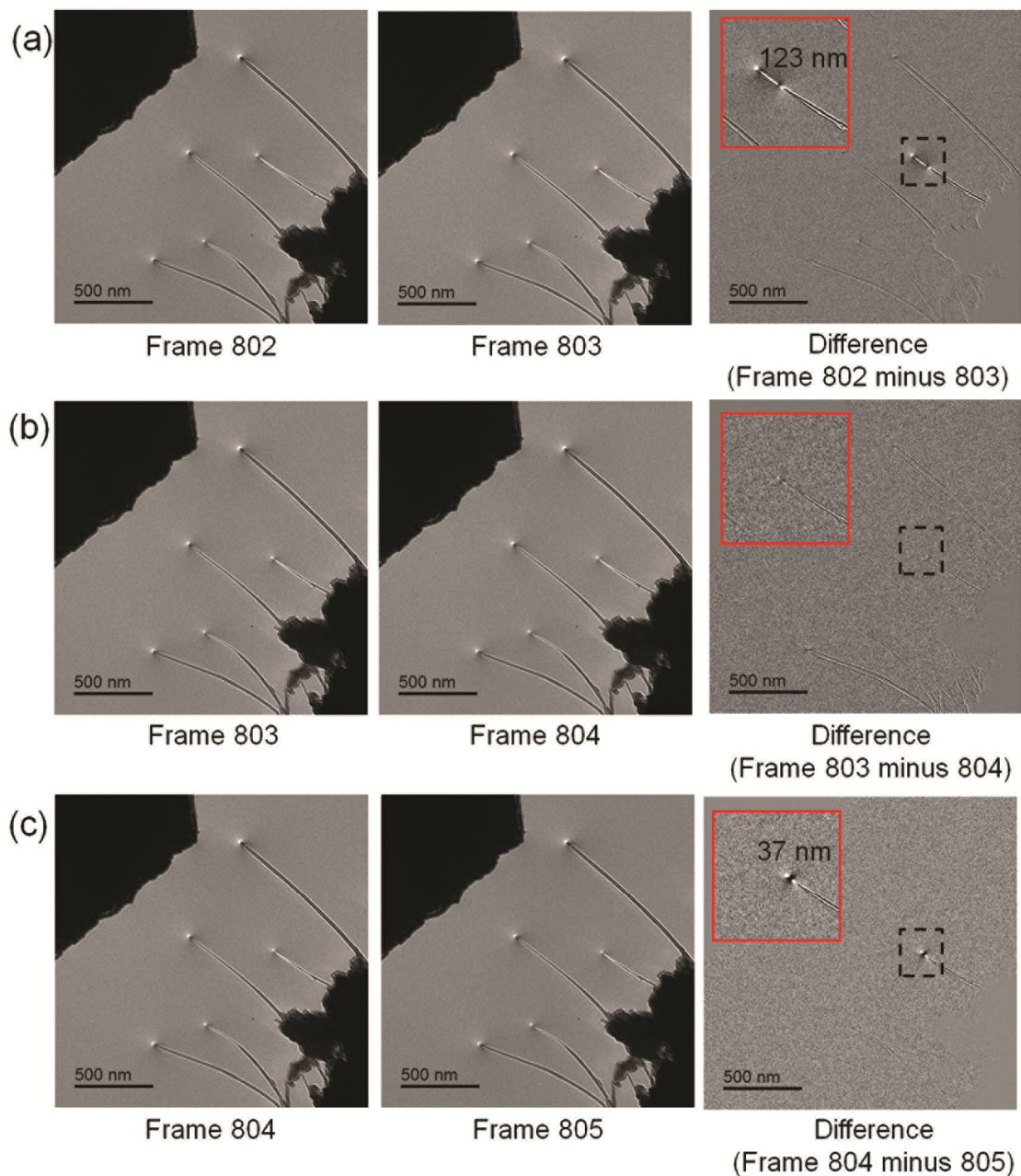
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Supplementary Fig. 1. Carbon nanotubes field-emit stably in high vacuum over time. This plot shows the field emission current (in nano-Amperes) versus time (in minutes) recorded during high vacuum field emission experiments. The corresponding applied biases are recorded on the plot.



Supplementary Fig. 2. TEM images of carbon nanotubes at (a) starting 0 V, (b) -80 V and (c) ending 0 V applied bias. With an applied bias, the initially random nanotubes were observed to align themselves parallel to the electric field, as indicated by the red arrows in (b). Scale markers equal 1  $\mu\text{m}$ .



Supplementary Fig. 3. Individual, consecutive, frames extracted from an *in situ* dataset recorded using the OneView camera at 25 fps (40 ms time resolution) during field emission in 34 Pa oxygen pressure and -100 V applied bias. Consecutive frames which revealed abrupt changes in CNT lengths were identified, and subtracted, to measure the change in CNT lengths, and are shown in insets (red boxes) of the right images.