

SUPPORTING INFORMATION for

Measurement of the Dewetting, Nucleation, and Deactivation Kinetics of Carbon Nanotube Population Growth by Environmental Transmission Electron Microscopy

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Video S1. Video showing a sequence of TEM images of the formation of nanoparticle population by dewetting upon the introduction of the acetylene gas at 750°C. (Video speed is 2X real time)

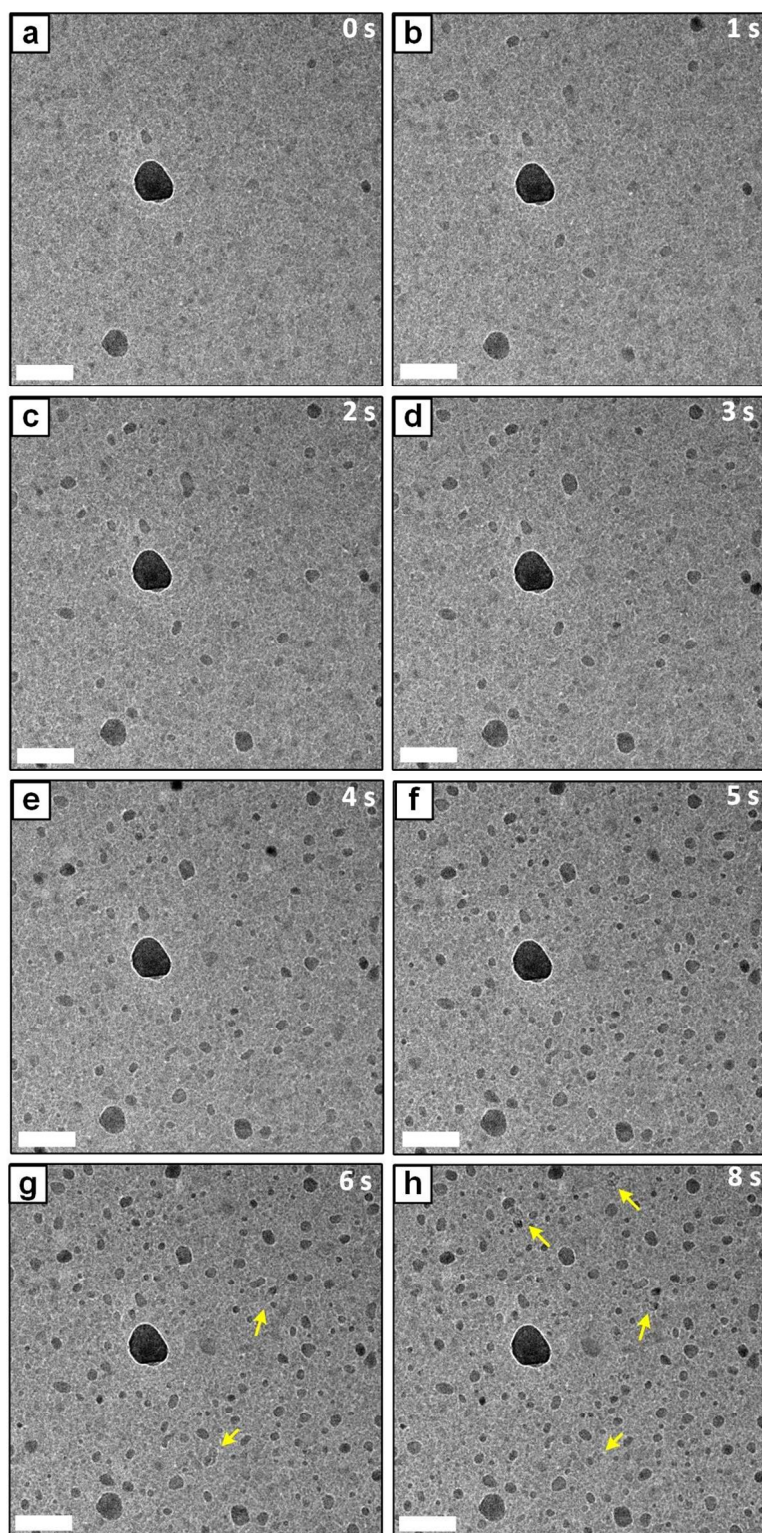


Figure S1. (a-h) Extended TEM images for the time-evolution of nanoparticle formation after introducing C_2H_2 . This shows a larger field of view than Figure 3 (also see Video S1). Yellow arrows indicate nucleating CNTs. Scale bar: 40 nm.

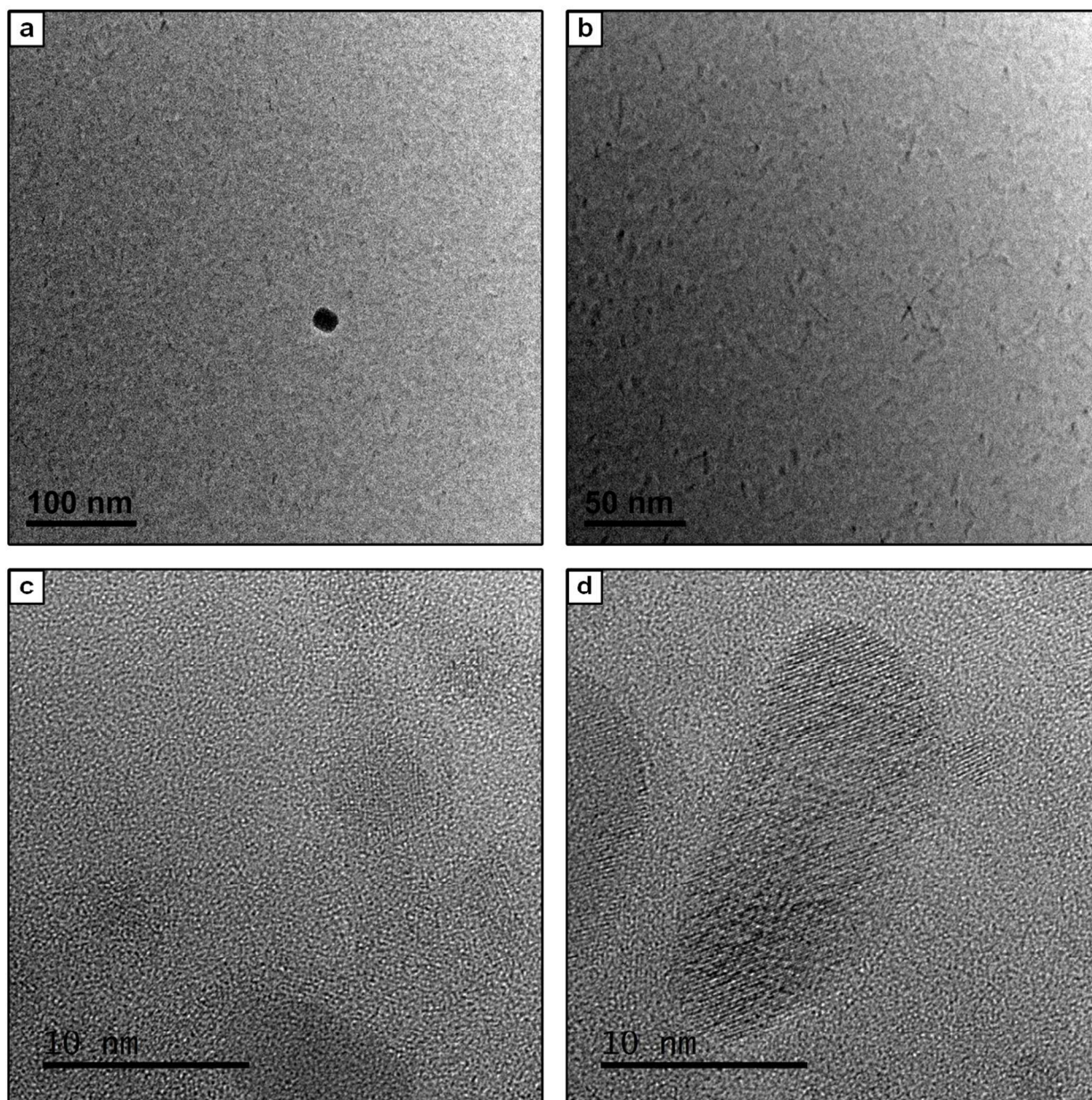


Figure S2. (a-c) TEM images showing the morphology of the catalyst after heating to 750 °C and dwelling for 15 minutes (immediately before introducing C_2H_2).

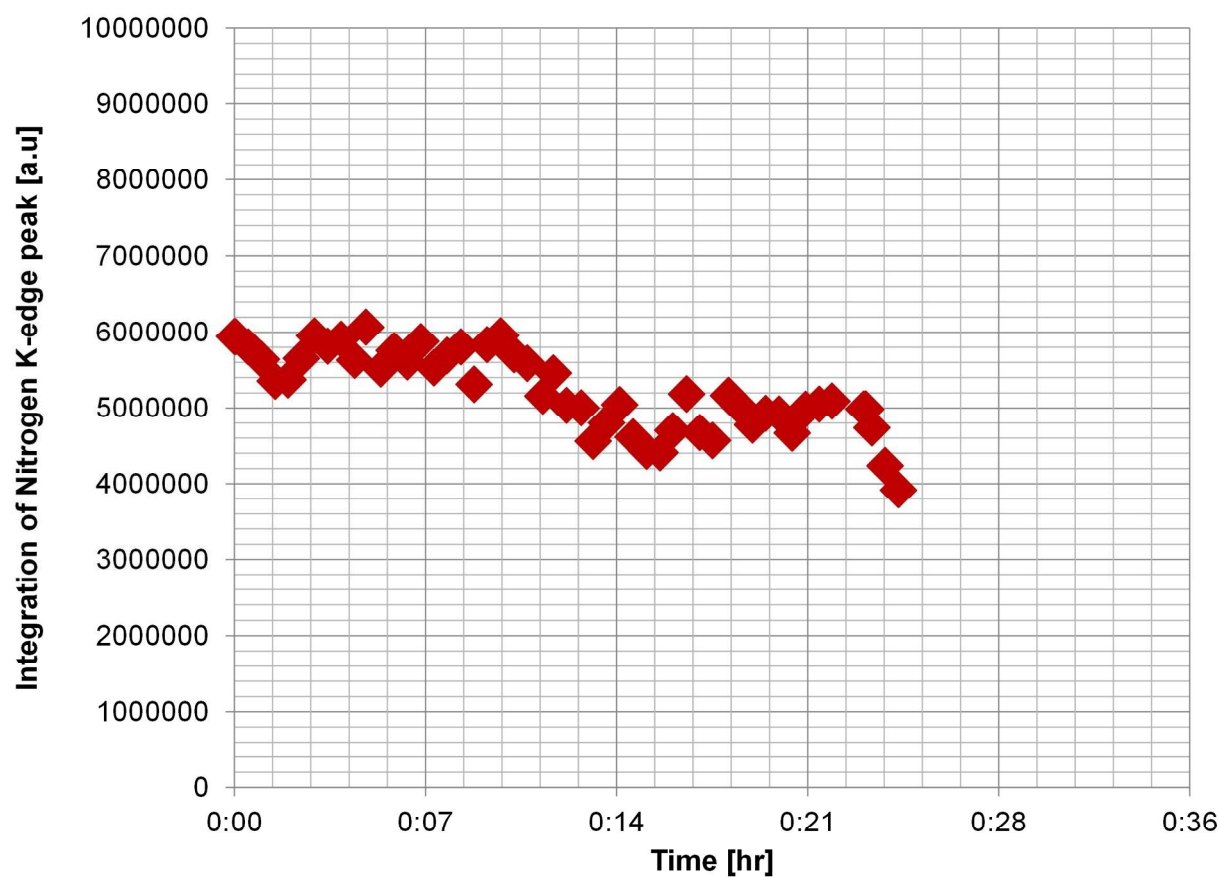


Figure S3. Time evolution of the area under the nitrogen K-edge peak, calculated by integration of the spectra in Figure 4a, in the energy range of 380-440 eV.

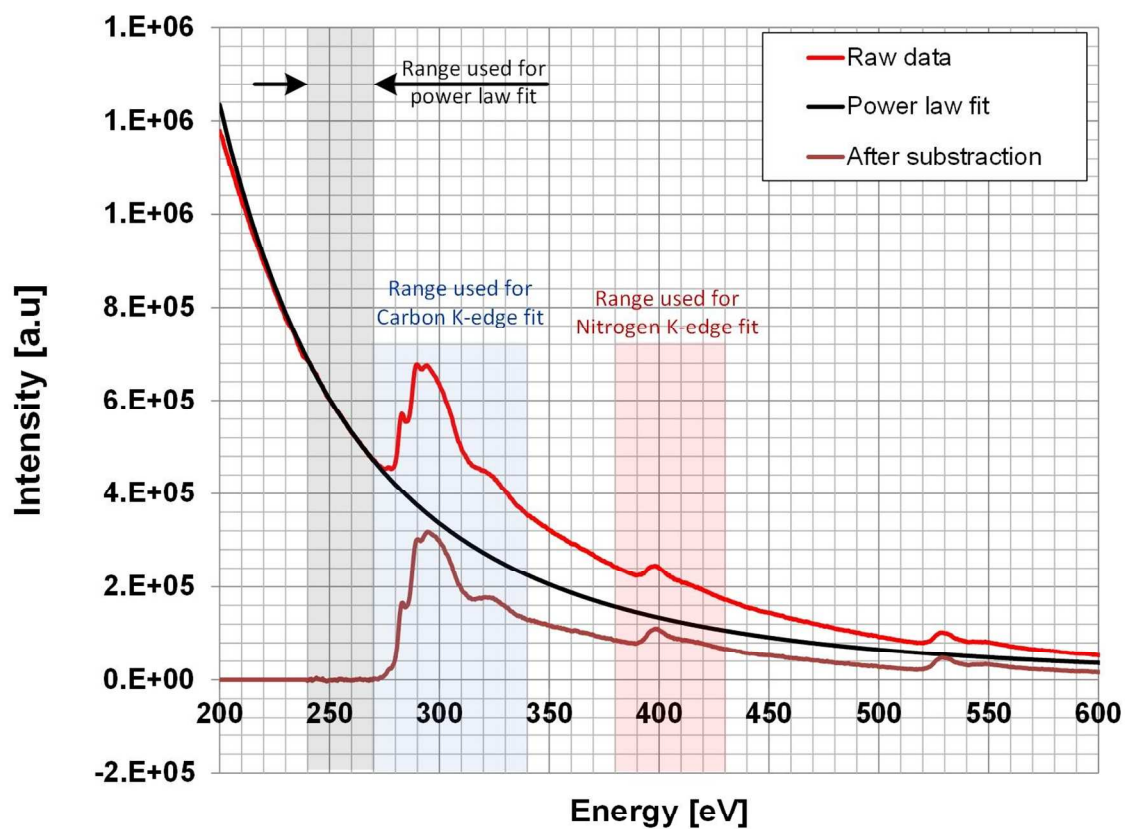


Figure S4. EELS spectrum collected at 24.5 minutes, showing the power law fit and background subtraction. The Cornell Spectrum Imager (CSI) plugin to ImageJ was used to process EELS data.¹

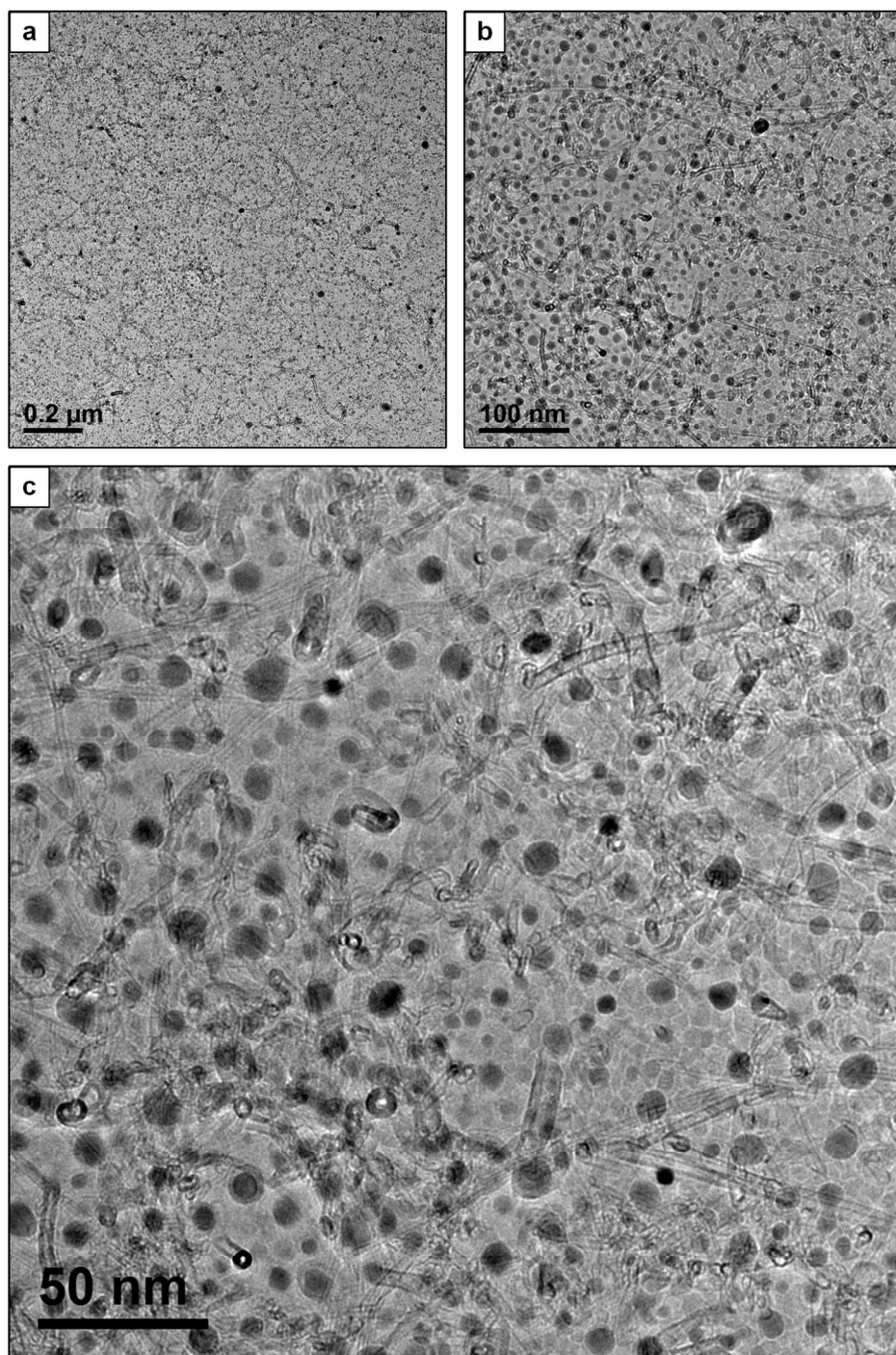


Figure S5. (a-c) TEM images taken after about 27.5 minutes of growth on the same sample, from which all the EELS spectra are collected. This shows that by the end of growth, high density CNTs have grown on the sample, which supports the explanation that emergence of the carbon K-edge peak seen in the spectra in Figure 4 is dominated by contribution from sp^2 -carbon in CNTs.

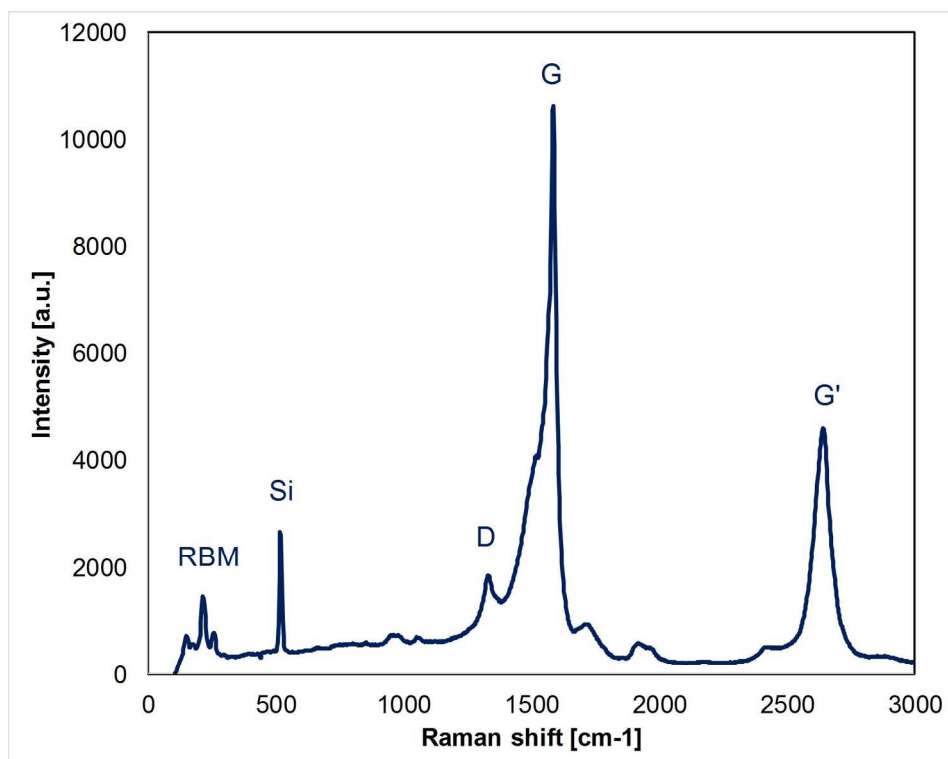


Figure S6. *Ex situ* Raman spectroscopy results confirming the presence of high quality CNTs after the growth experiment, as indicated by the high G/D ratio (≈ 5.8) and the clearly defined radial breathing modes (RBM). This spectrum was collected for the same sample that produced the *in situ* TEM images in Figures 3 and S1 (as well as Video S1).

References

1. Cueva, P.; Hovden, R.; Mundy, J. A.; Xin, H. L.; Muller, D. A. *Microscopy and Microanalysis* **2012**, 18, (04), 667-675.