

# Appendix E

## SEM/EDS Data for T2D30 Sediment

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Particulate sediments at the bottom of the tank directly relate to the corrosion products and debris generated during ICET tests. This appendix lists the SEM/EDS results for the sediment samples collected from the bottom of the tank on the date Test #2 was shut down (March 7, 2005). The purpose of these analyses is to provide information on the morphology and the composition of the sediment to evaluate the potentially occurring chemical reactions during ICET tests.

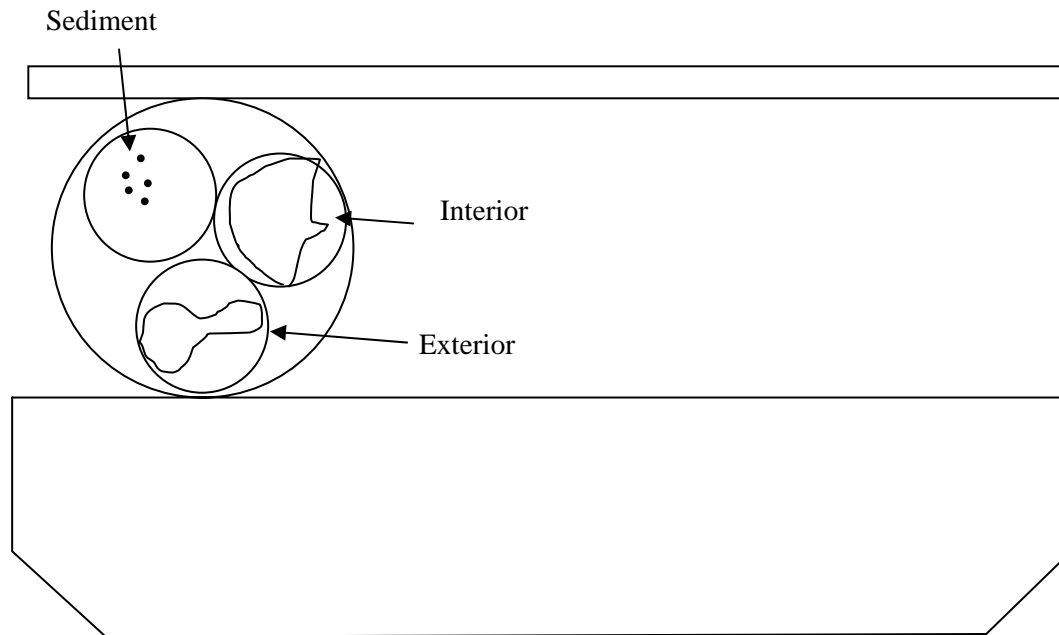
Probe SEM was used to examine the sediment samples after drying in air at room temperature, followed by being coated with carbon. EDS results provide a semi-quantitative elemental analysis of the sediment after calibration. Probe SEM/EDS results of the Test #2, Day-30 sediment samples were obtained on April 12, 2005.

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## Transcribed Laboratory Log

Laboratory session from April 12, 2005.

T2D30 Sediment Samples



### Sediment Samples

Image:	T2D30SEDMT003	150 ×	SEM image	Figure E-1
	T2D30SEDMT006	100 ×	SEM image sediment sample	Figure E-2
EDS:	T2D30SED1		Spot of the layer show in 006	Figure E-3
Image:	T2D30SEDMT004	300 ×	Porous structure	Figure E-4
EDS:	T2D30SED2		Of porous material in Image 004	Figure E-5

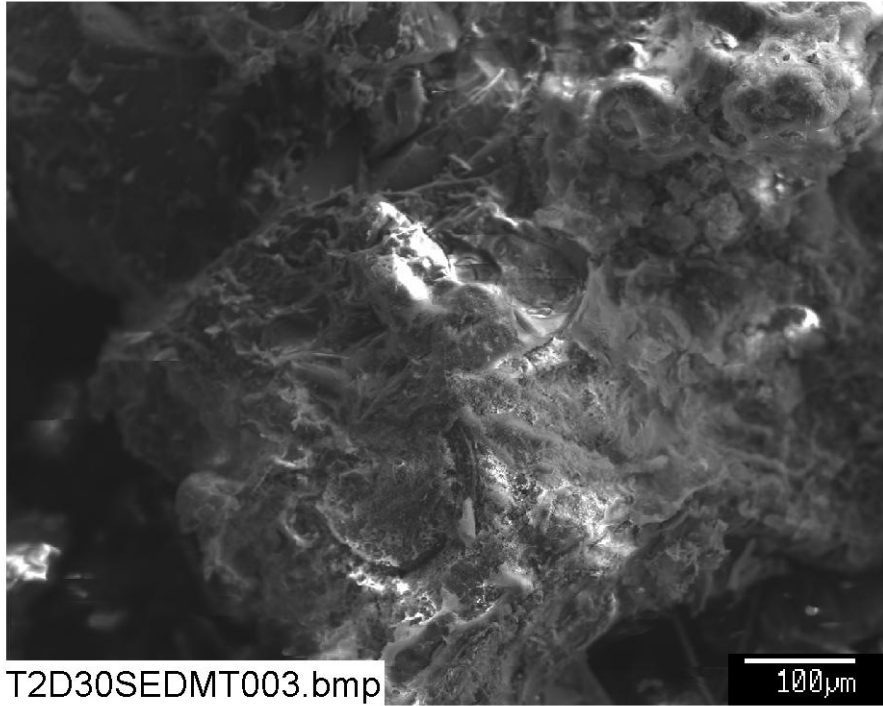


Figure E-1. SEM image for a Test #2, Day-30 sediment sample at 150 × magnification. (T2D30SEDMT003)

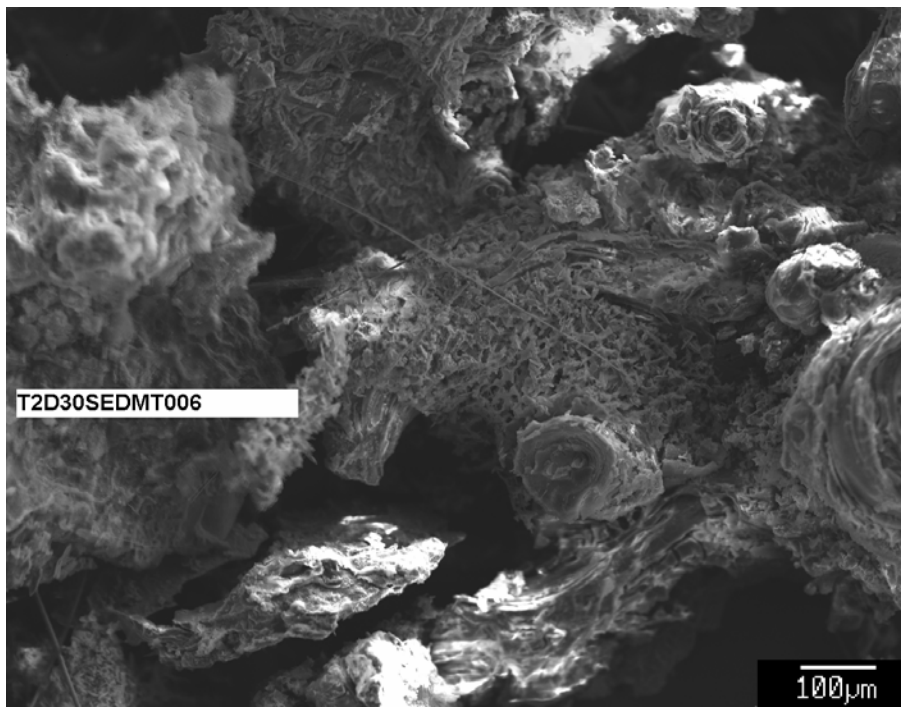


Figure E-2. SEM image for a Test #2, Day-30 sediment sample at 100 × magnification. (T2D30SEDMT006)

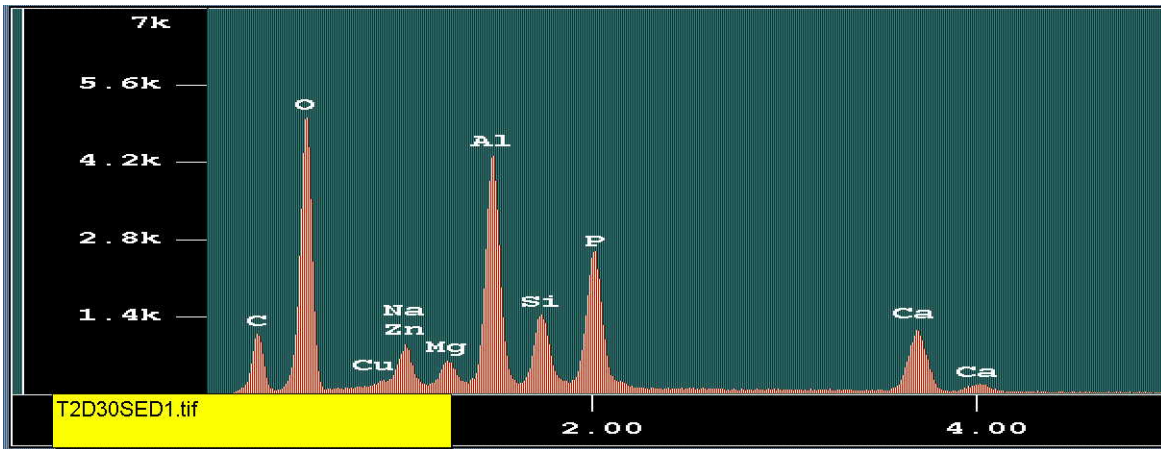


Figure E-3. EDS counting spectrum for the circularly layered material close to the right edge of Figure E-2. (T2D30SED1)

The results from the chemical composition analysis for T2D30SED1 are given in Table E-1.

**Table E-1. The Chemical Composition for T2D30SED1 (Figure E-2)**

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Group       : NRC
Sample      : Sediment ID# : 1
Comment     : T2D30 layered sediment
Condition   : Full Scale : 20KeV(10eV/ch,2Kch)
              Live Time  : 60.000 sec   Aperture # : 1
              Acc. Volt  : 15.0 KV      Probe Current : 4.371E-09 A
              Stage Point : X=86.820 Y=57.236 Z=10.927
              Acq. Date   : Tue Apr 12 13:28:07 2005
    
```

Element	Mode	ROI (KeV)	K-ratio(%)	+/-	Net/Background
C K	Normal	0.09- 0.46	4.5208	0.0013	6861 / 798
O K	Normal	0.25- 0.77	30.9657	0.0080	31679 / 628
Na K	Normal	0.81- 1.27	0.2289	0.0033	673 / 316
Mg K	Normal	0.97- 1.57	0.9830	0.0008	4198 / 412
Al K	Normal	1.19- 1.83	8.3515	0.0016	35453 / 290
Si K	Normal	1.50- 2.05	2.8377	0.0012	11233 / 2308
P K	Normal	1.75- 2.38	9.9889	0.0090	24403 / 700
Ca K	Normal	3.39- 4.30	7.5785	0.0045	14581 / 62
Cu K	Normal	7.63- 9.27	0.2619	0.0048	102 / 10
Zn K	Normal	8.22-10.03	0.6558	0.0069	194 / 10

Chi\_square = 136.8970

Element	Mass%	Atomic%	ZAF	Z	A	F
C	20.663	30.4778	4.4603	1.0251	4.3512	1.0000
O	45.036	49.8700	1.4193	0.9778	1.4515	1.0000
Na	0.316	0.2434	1.3462	1.0323	1.3050	0.9993
Mg	1.403	1.0223	1.3928	0.9720	1.4370	0.9971
Al	10.778	7.0766	1.2594	1.0050	1.2560	0.9977
Si	3.597	2.2689	1.2370	0.9827	1.2628	0.9968
P	9.217	5.2716	0.9004	1.1798	0.7635	0.9996
Ca	7.778	3.4382	1.0016	1.0043	0.9974	1.0000
Cu	0.344	0.0959	1.2820	1.2856	0.9972	1.0000
Zn	0.868	0.2353	1.2917	1.2954	0.9971	1.0000

Total 100.000 100.0000  
 Normalization factor = 1.0247



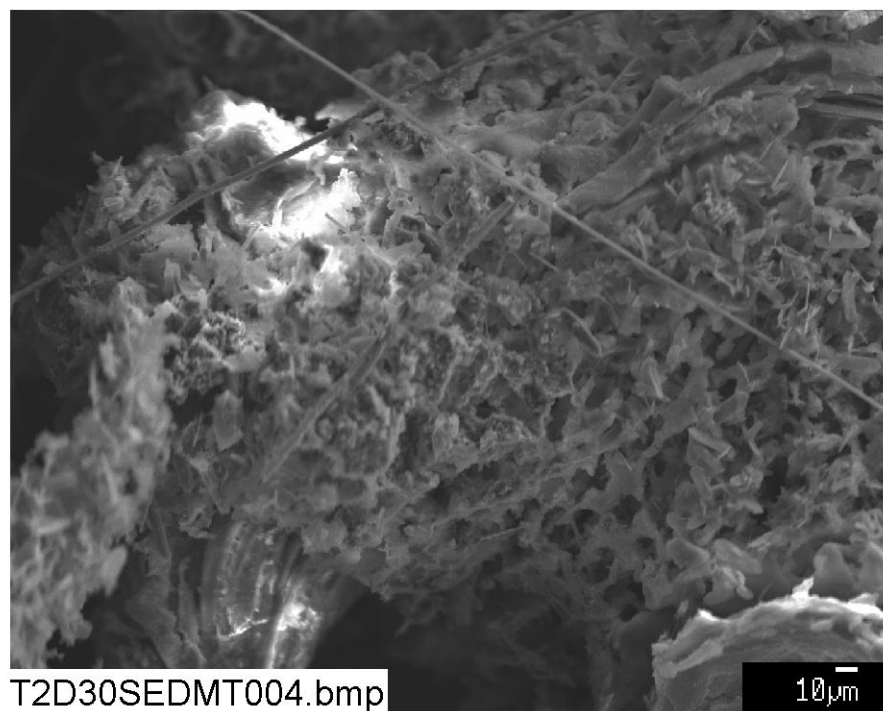


Figure E-4. SEM image for a Test #2, Day-30 sediment sample at 300 × magnification. (T2D30SEDMT004)

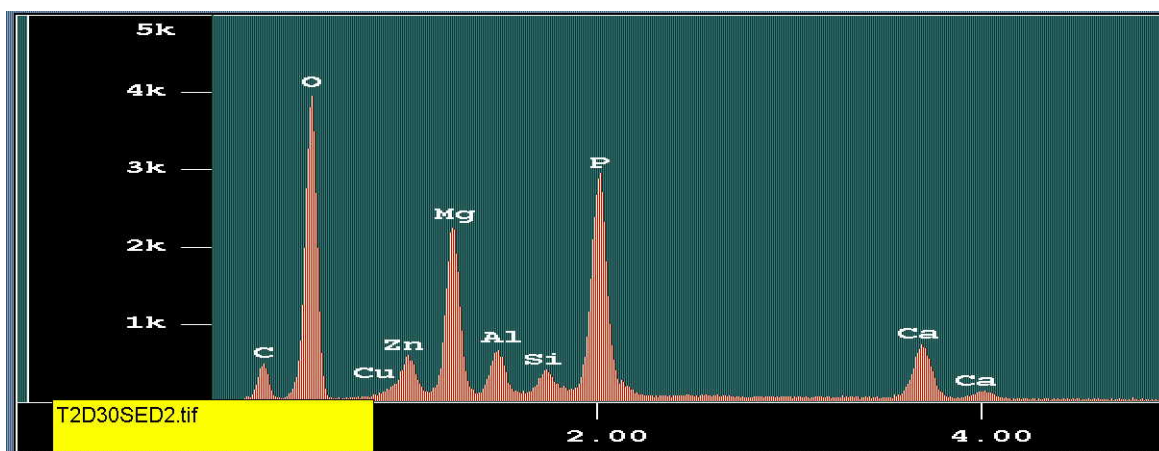


Figure E-5. EDS counting spectrum for the porous structured material shown in Figure E-3. (T2D30SED2)

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# Appendix F1

## TEM Data for Test #2, Day-4 Solution Samples

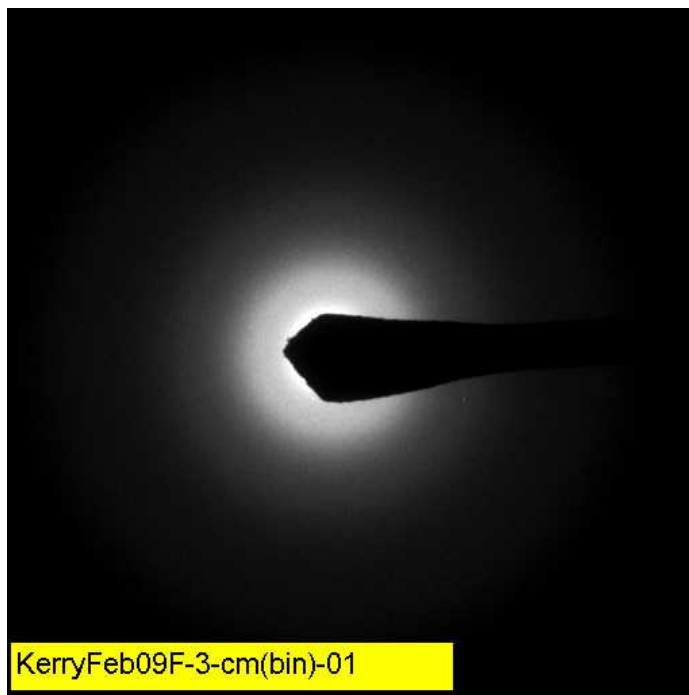
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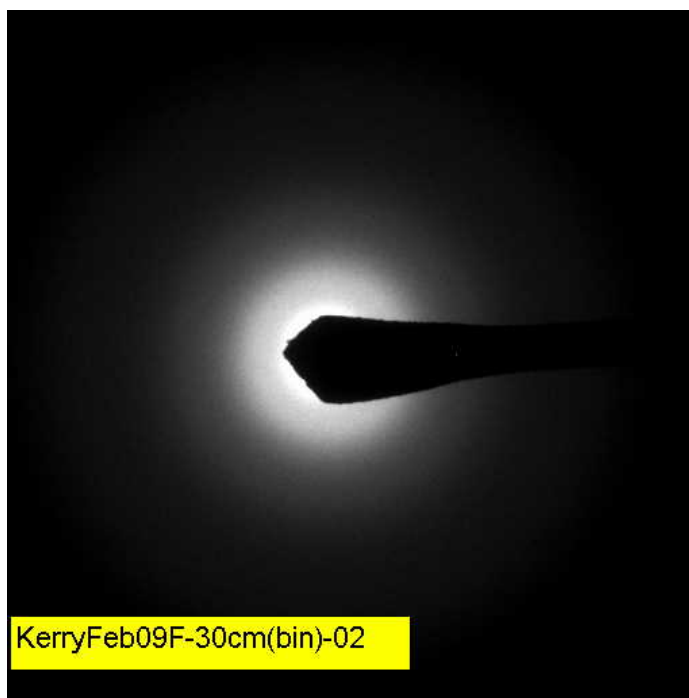
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This appendix presents TEM images and diffraction patterns for Test #2, Day-4 (February 9, 2005) filtered and unfiltered solution samples. The filtered samples were obtained by passing solution through a 0.7- $\mu\text{m}$  fiberglass filter at 60°C. The unfiltered solution samples were extracted from the tank directly. A drop of each solution sample was placed onto a copper grid of 200 mesh. After being dried in air at room temperature, the sample was ready for TEM analysis. The TEM results and diffraction patterns were obtained on February 9, 2005. Diffraction patterns show whether the sample was amorphous or crystalline. When a sample gives clear and significant diffraction patterns, it is crystalline. Otherwise, it is amorphous. The results show that all of the Test #2, Day-4 samples were amorphous.

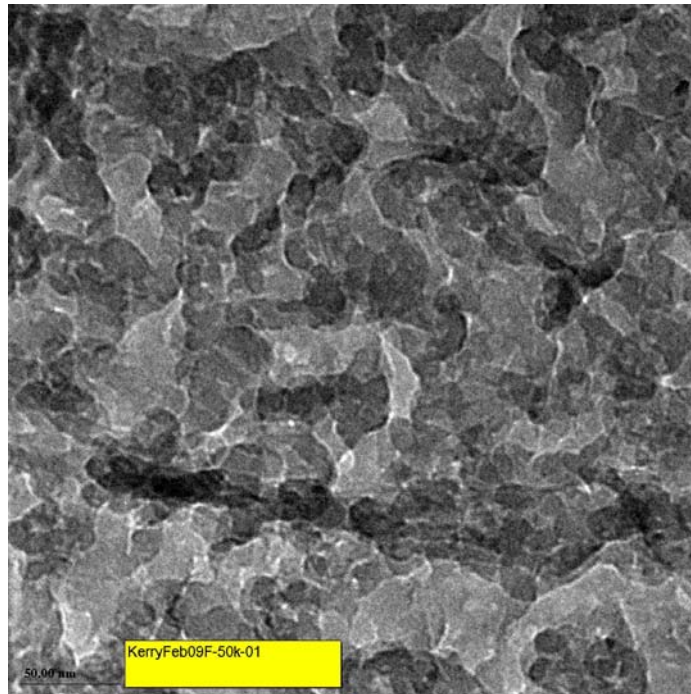
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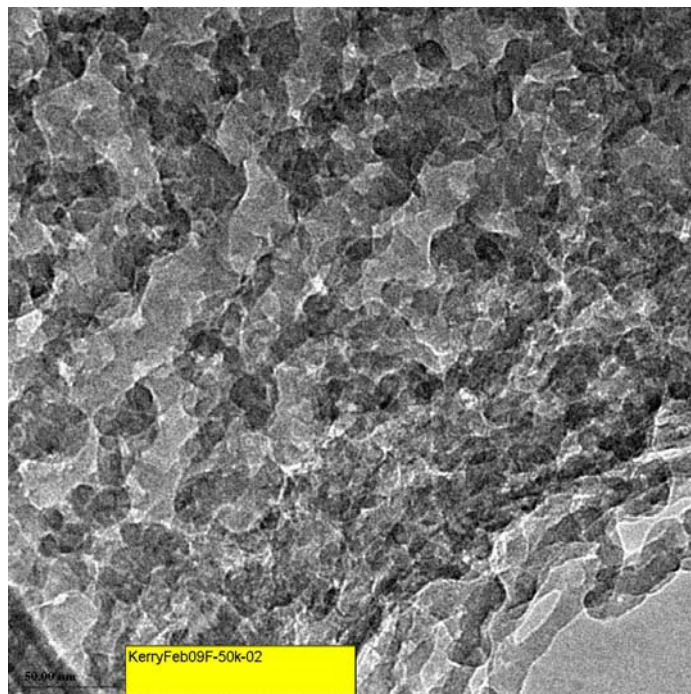
**Figure F1-1.** TEM image for a Test #2, Day-4 filtered sample solution. (KerryFeb09F-3-cm(bin)-01)



**Figure F1-2.** TEM image for a second Test #2, Day-4 filtered sample solution. (KerryFeb09F-30-cm (bin)-02)

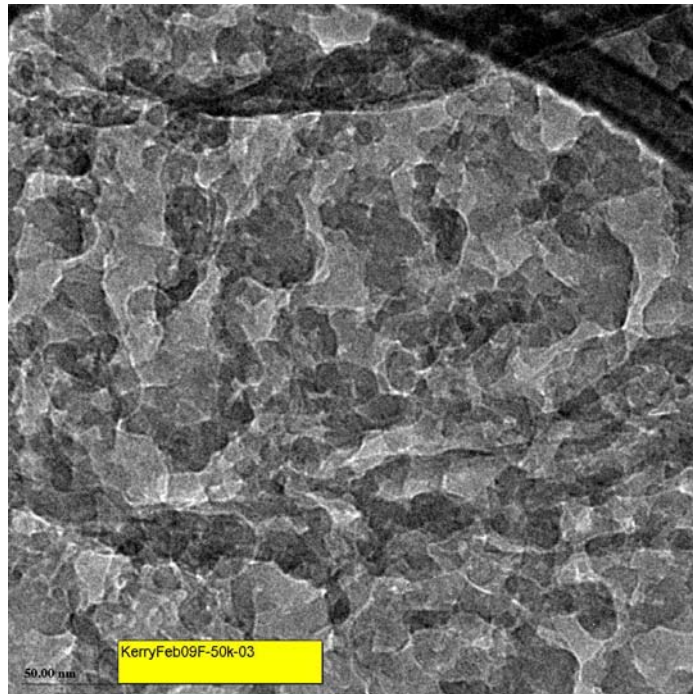


**Figure F1-3. Electron micrograph magnified 50,000 times for one Test #2, Day-4 filtered sample location. (KerryFeb09F-50k-01)**

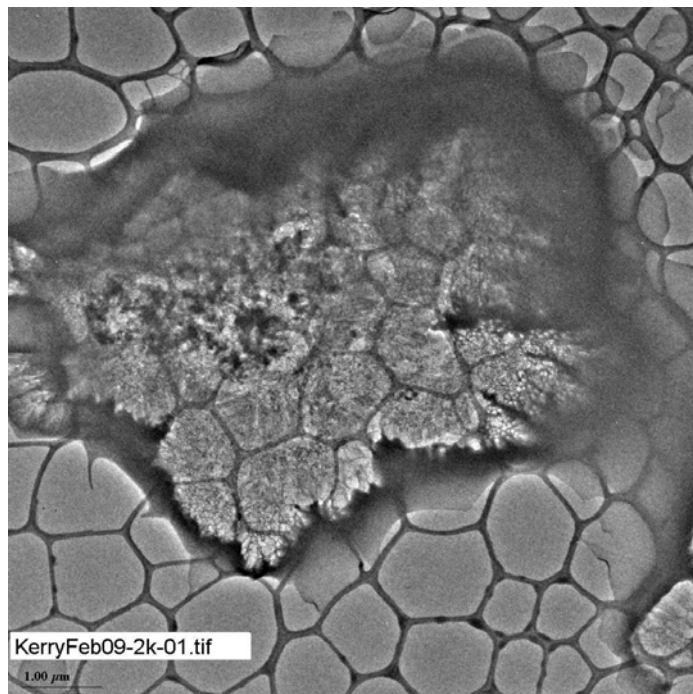


**Figure F1-4. Electron micrograph magnified 50,000 times for a second Test #2, Day-4 filtered sample location. (KerryFeb09F-50k-02)**

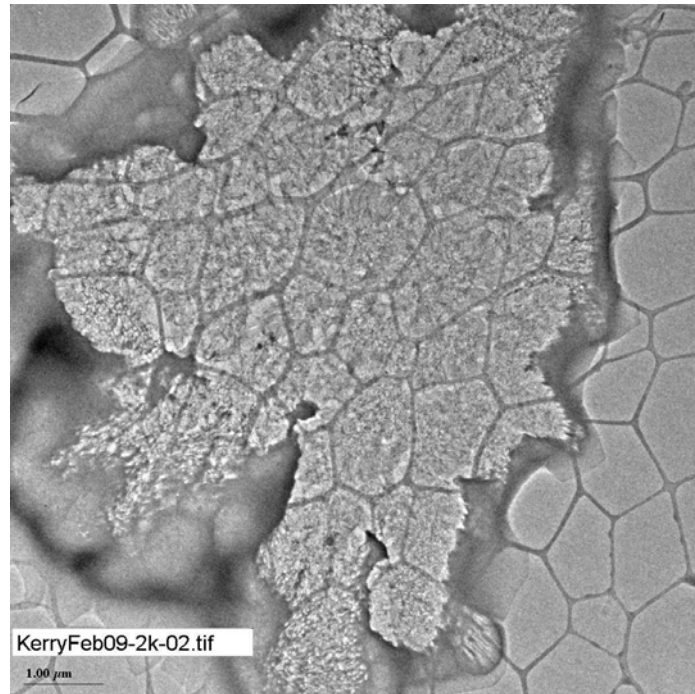




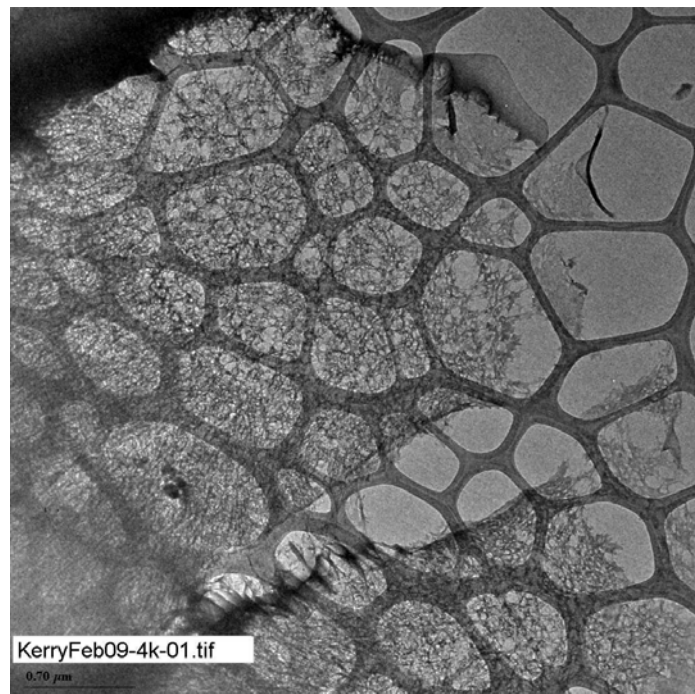
**Figure F1-5. Electron micrograph magnified 50,000 times for a third Test #2, Day-4 filtered sample location. (KerryFeb09F-50k-03)**



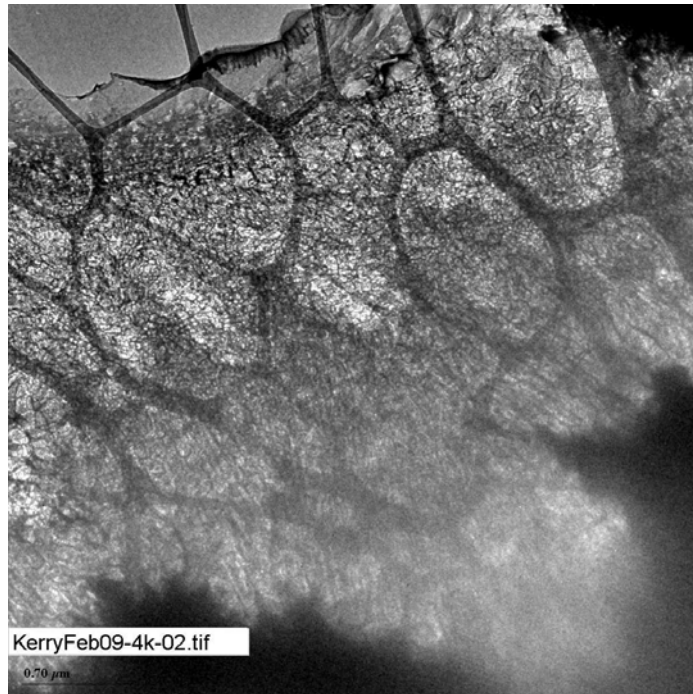
**Figure F1-6. Electron micrograph magnified 2000 times for one Test #2, Day-4 unfiltered sample location. (KerryFeb09-2k-01)**



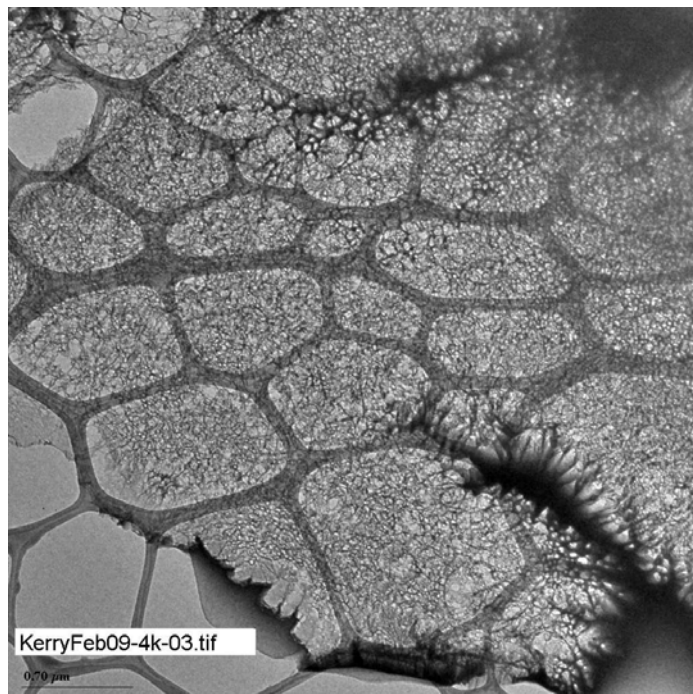
**Figure F1-7. Electron micrograph magnified 2000 times for a second Test #2, Day-4 unfiltered sample location. (KerryFeb09-2k-02)**



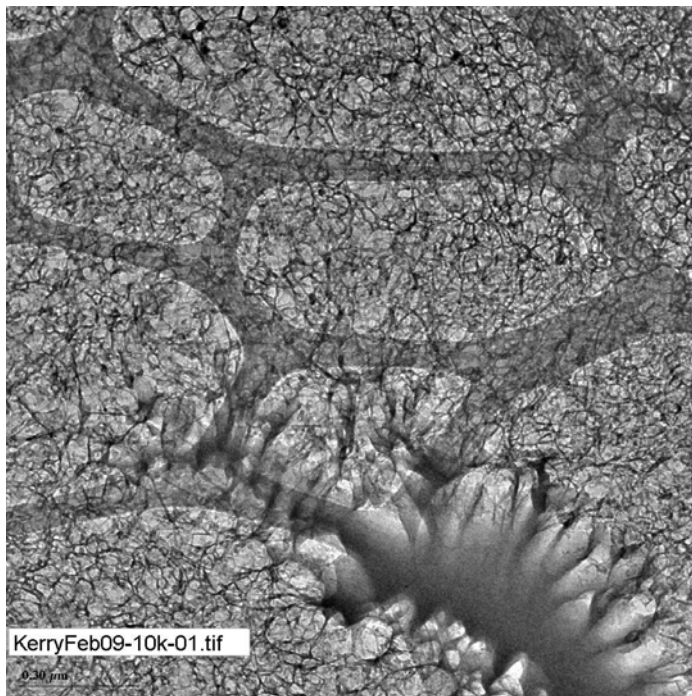
**Figure F1-8. Electron micrograph magnified 4000 times for one Test #2, Day-4 unfiltered sample location. (KerryFeb09-4k-01)**



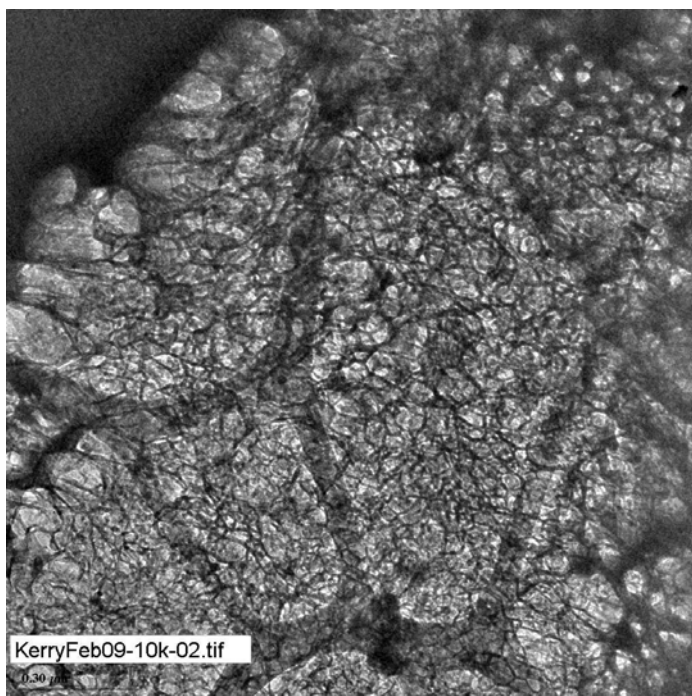
**Figure F1-9. Electron micrograph magnified 4000 times for a second Test #2, Day-4 unfiltered sample location. (KerryFeb09-4k-02)**



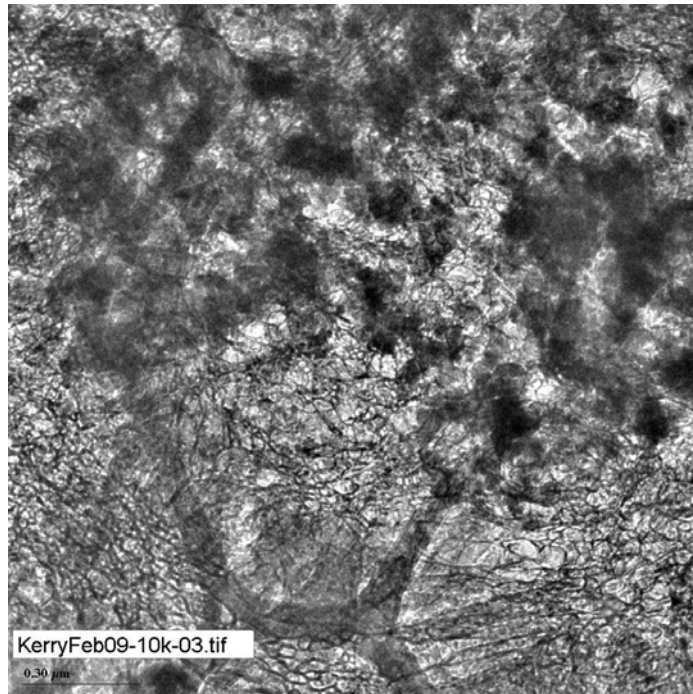
**Figure F1-10. Electron micrograph magnified 4,000 times for a third Test #2, Day-4 unfiltered sample location. (KerryFeb09-4k-03)**



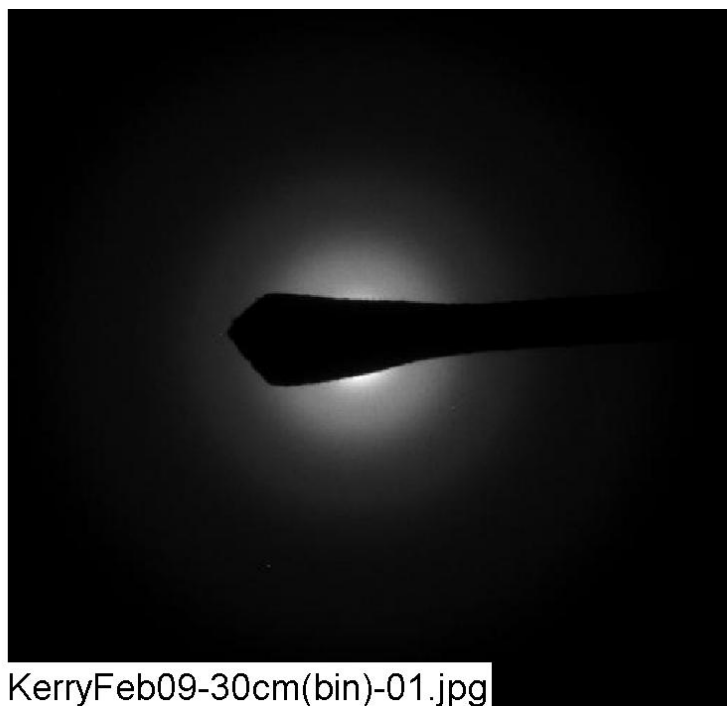
**Figure F1-11. Electron micrograph magnified 10,000 times for one Test #2, Day-4 unfiltered sample location. (KerryFeb09-10k-01)**



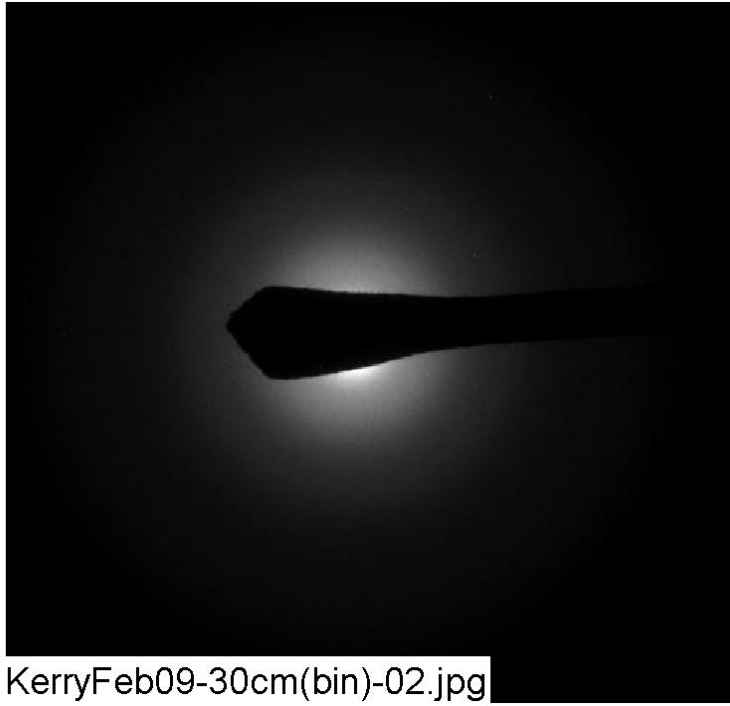
**Figure F1-12. Electron micrograph magnified 10,000 times for a second Test #2, Day-4 unfiltered sample location. (KerryFeb09-10k-02)**



**Figure F1-13. Electron micrograph magnified 10,000 times for a third Test #2, Day-4 unfiltered sample location. (KerryFeb09-10k-03)**

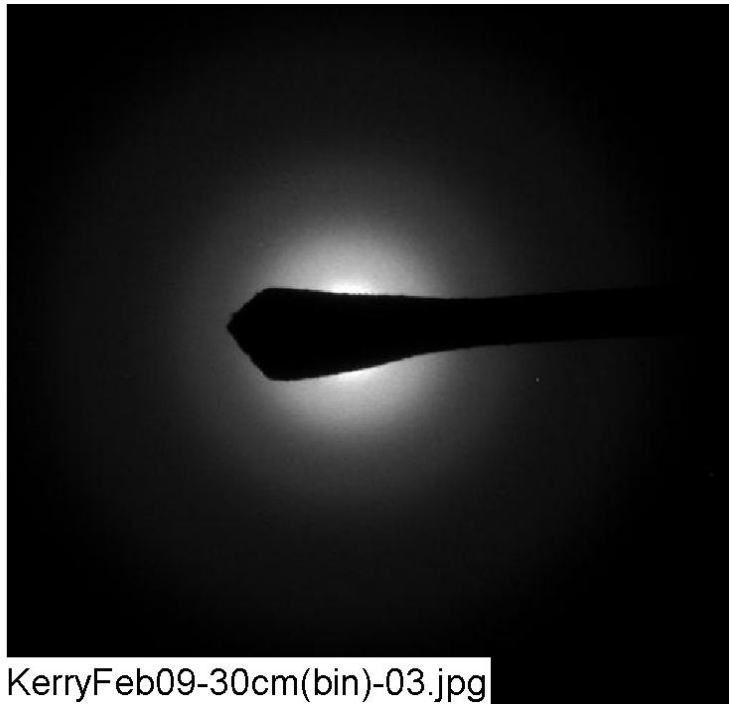


**Figure F1-14. TEM image for one Test #2, Day-4 unfiltered sample location. (KerryFeb09-30cm(bin)-01)**



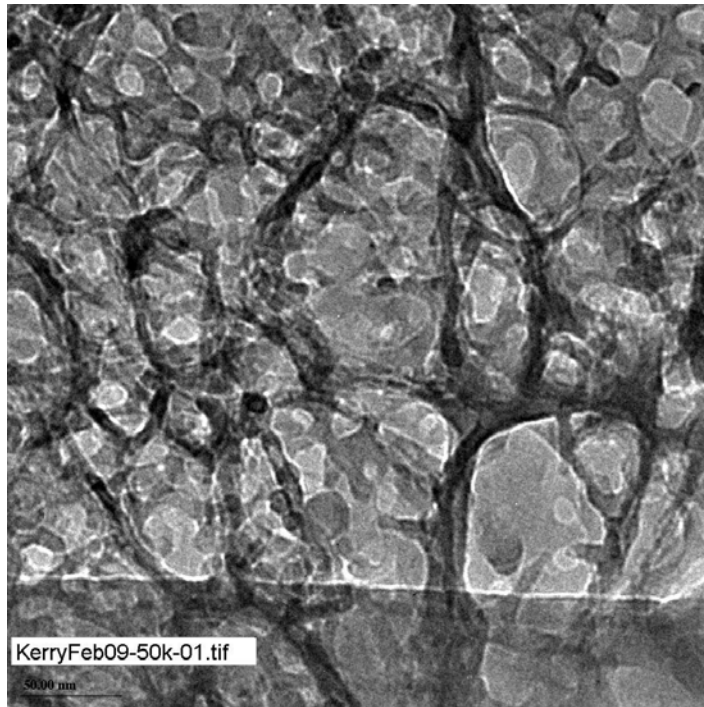
KerryFeb09-30cm(bin)-02.jpg

Figure F1-15. TEM image for a second Test #2, Day-4 unfiltered sample location. (KerryFeb09-30cm(bin)-02)

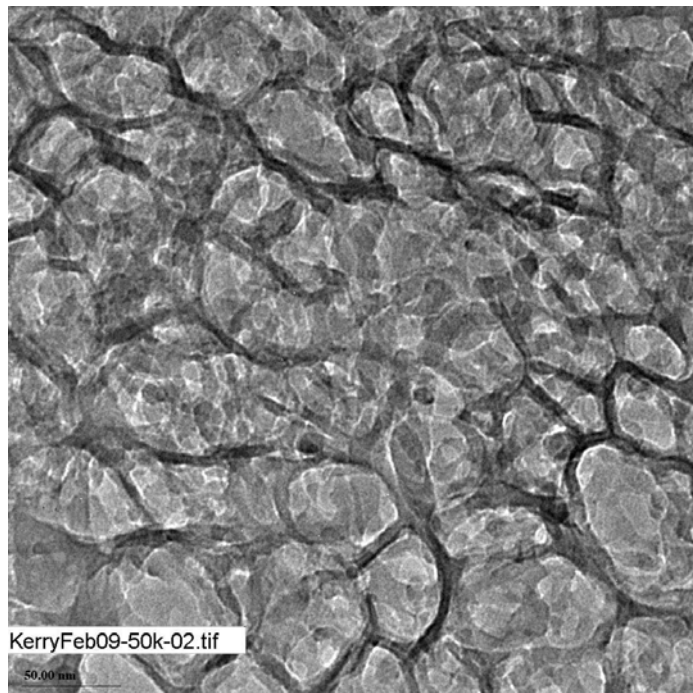


KerryFeb09-30cm(bin)-03.jpg

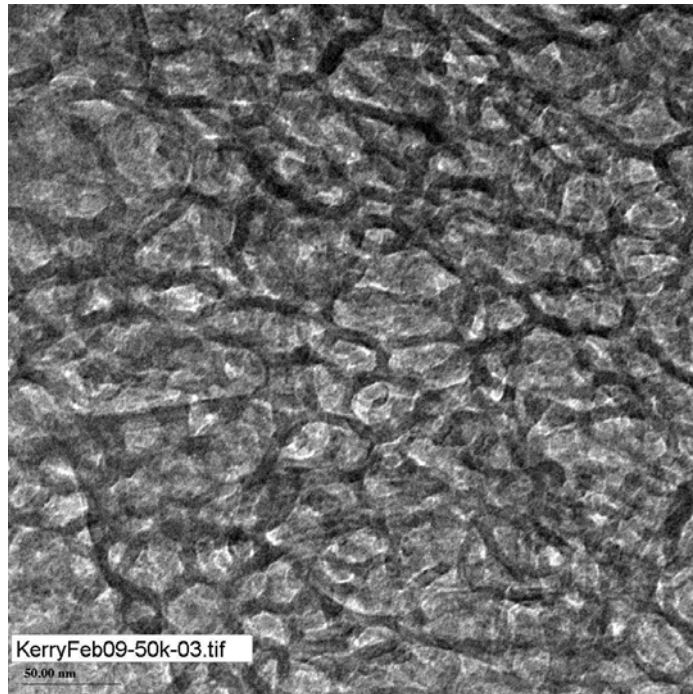
Figure F1-16. TEM image for a third Test #2, Day-4 unfiltered sample location. (KerryFeb09-30cm(bin)-03)



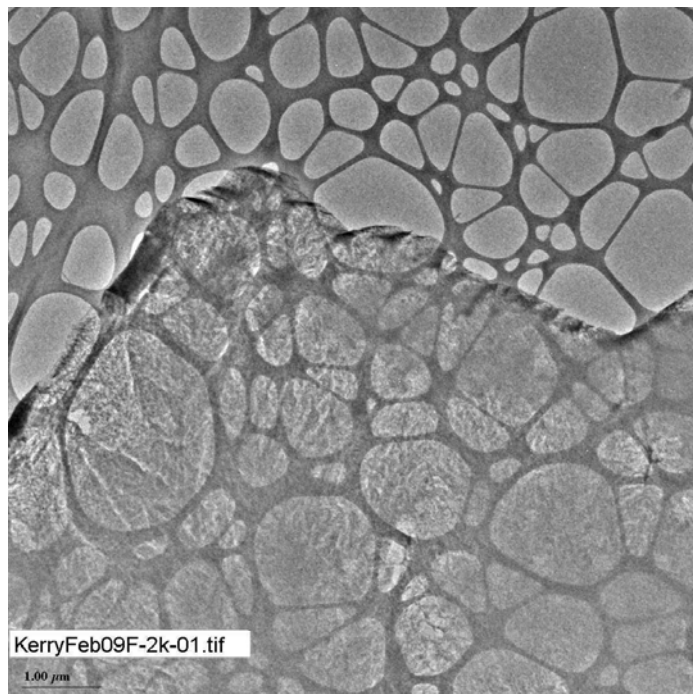
**Figure F1-17. Electron micrograph magnified 50,000 times for one Test #2, Day-4 unfiltered sample location. (KerryFeb09-50k-01)**



**Figure F1-18. Electron micrograph magnified 50,000 times for a second Test #2, Day-4 unfiltered sample location. (KerryFeb09-50k-02)**

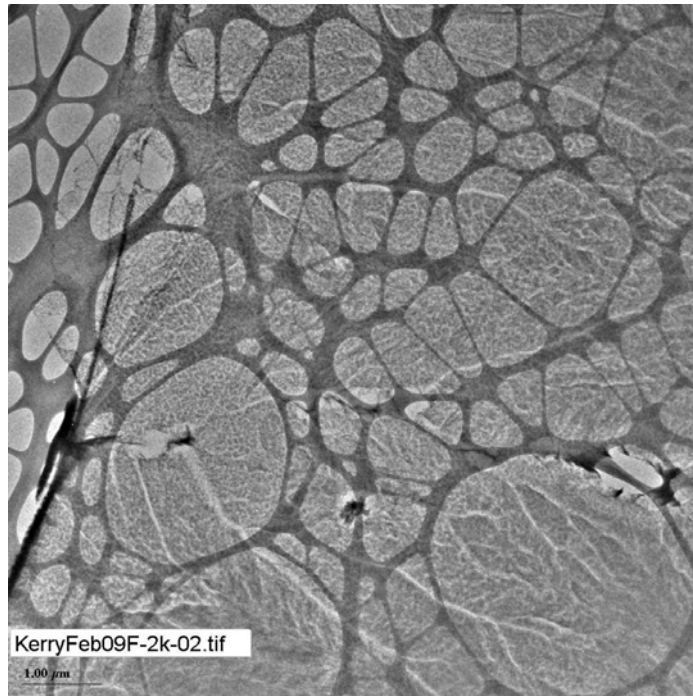


**Figure F1-19. Electron micrograph magnified 50,000 times for a third Test #2, Day-4 unfiltered sample location. (KerryFeb09-50k-03)**

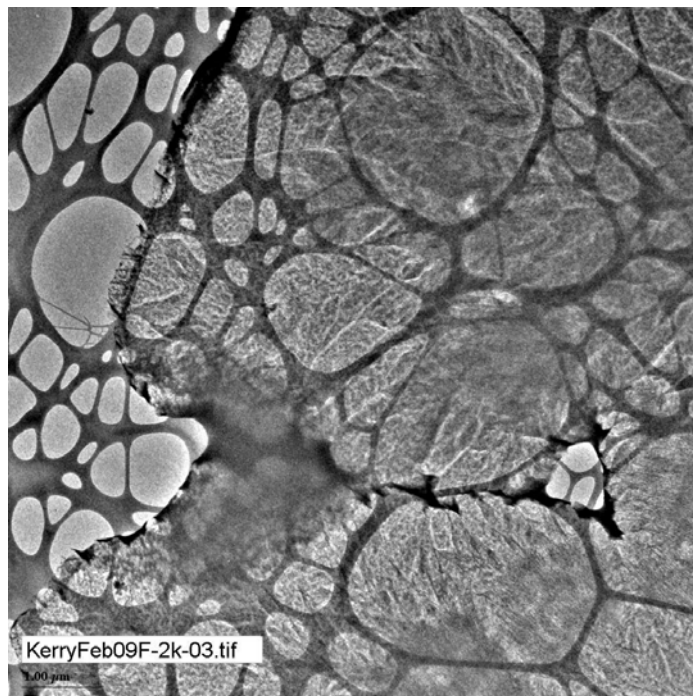


**Figure F1-20. Electron micrograph magnified 2000 times for one Test #2, Day-4 filtered sample location. (KerryFeb09F-2k-01)**

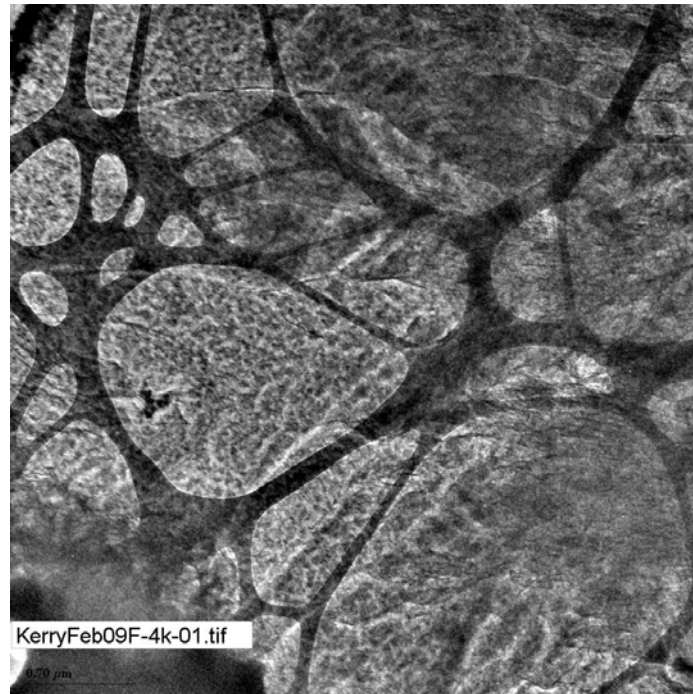




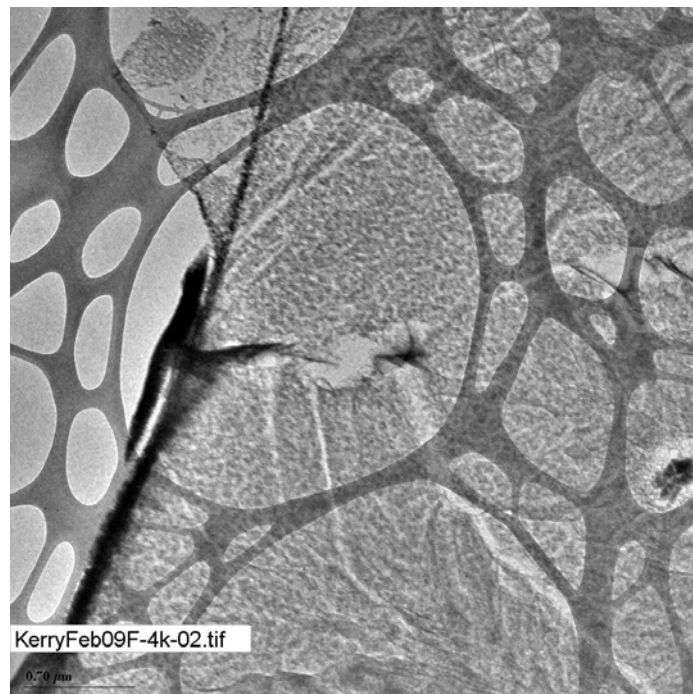
**Figure F1-21. Electron micrograph magnified 2000 times for a second Test #2, Day-4 filtered sample location. (KerryFeb09F-2k-02)**



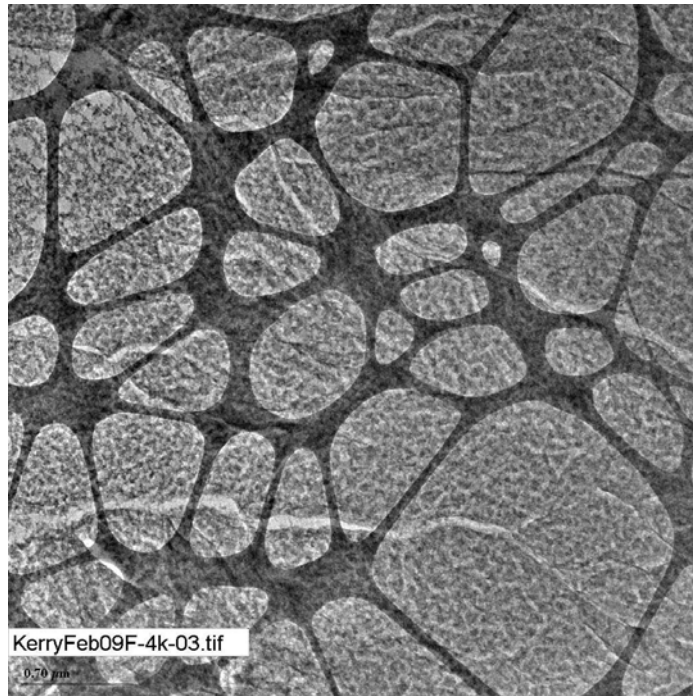
**Figure F1-22. Electron micrograph magnified 2000 times for a third Test #2, Day-4 filtered sample location. (KerryFeb09F-2k-03)**



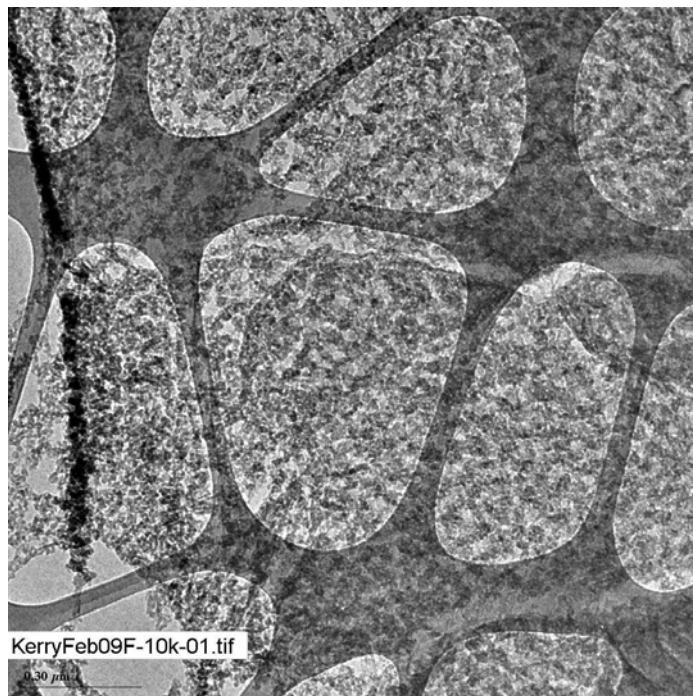
**Figure F1-23. Electron micrograph magnified 4000 times for one Test #2, Day-4 filtered sample location. (KerryFeb09F-4k-01)**



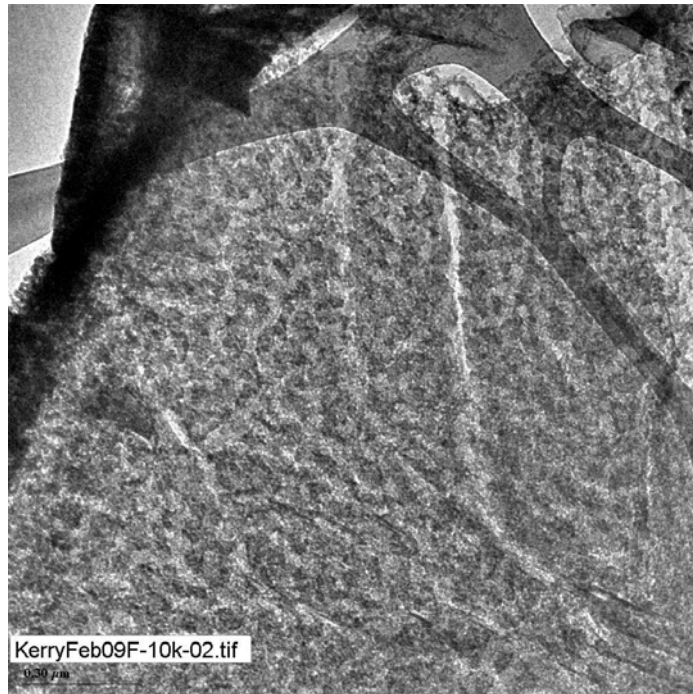
**Figure F1-24. Electron micrograph magnified 4000 times for a second Test #2, Day-4 filtered sample location. (KerryFeb09F-4k-02)**



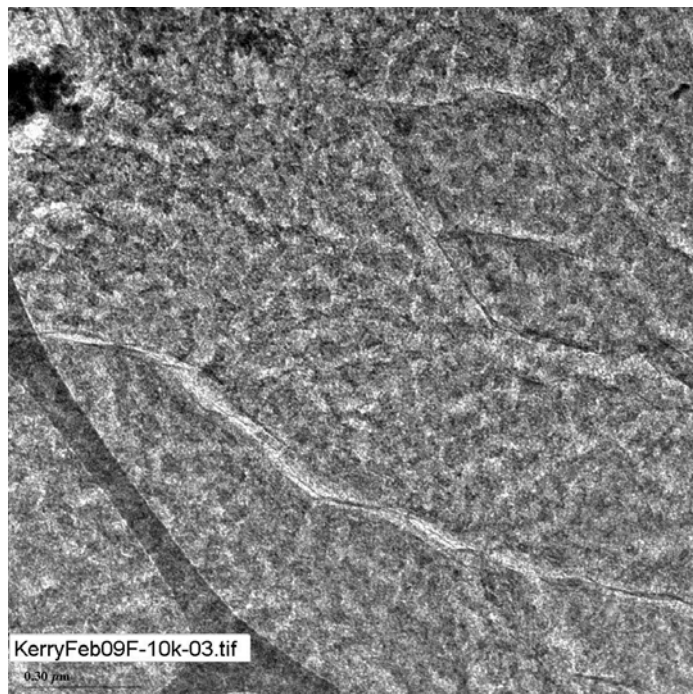
**Figure F1-25. Electron micrograph magnified 4000 times for a third Test #2, Day-4 filtered sample location. (KerryFeb09F-4k-03)**



**Figure F1-26. Electron micrograph magnified 10,000 times for one Test #2, Day-4 filtered sample location. (KerryFeb09F-10k-01)**



**Figure F1-27. Electron micrograph magnified 10,000 times for a second Test #2, Day-4 filtered sample location. (KerryFeb09F-10k-02)**



**Figure F1-28. Electron micrograph magnified 10,000 times for a third Test #2, Day-4 filtered sample location. (KerryFeb09F-10k-03)**