AMA Analytical Services, Inc.
Focused On Results.

CERTIFICATE OF ANALYSIS

Chain of Custody: 310123
Client: US Food & Drug Administration
Address: Office of Cosmetics & Colors
4300 River Road
College Park, MD 20740
Attention: John Gasper

Job Name: Task 3 - Analysis of Official Samples
Job Location: 5th Group - 15 Samples
Job Number: CLIN 1 - Task 3
PO Number: HHSF223201810337P

Date Submitted: 8/15/2019
Date Analyzed: 9/18/2019 - 9/30/2019
Report Date: 10/24/2019
Date Sampled: Not Provided
Person Submitting: John Gasper
Revised: 11/8/2019, Revision #1

SUMMARY OF ANALYSIS

AMA Sample ID	Client Sample ID	TEM LOD Using ASTM D5756 Mass Calculation	TEM LOQ Using ASTM D5756 Mass Calculation	% Tremolite by TEM Using ASTM D5756 Mass Calculation	% Chrysotile by TEM Using ASTM D5756 Mass Calculation	% Total Tremolite & Chrysotile by TEM Using ASTM D5756 Mass Calculation	% Asbestos by PLM	% Organics	% Acid Soluable	% Other	Comments
310123-1	D-68	0.00000241%	0.00000964%	ND	ND	ND	ND	15.1%	13.1%	71.9%	
310123-1A	D-68	0.00000180%	0.00000721%	ND	ND	ND	ND	15.2%	14.8%	70.0%	
310123-1B	D-68	0.00000206%	0.00000824%	ND	ND	ND	ND	15.2%	13.9%	70.9%	
310123-2	D-69	0.00000204%	0.00000814%	ND	ND	ND	ND	32.5%	9.1%	58.4%	
310123-2A	D-69	0.00000171%	0.00000684%	ND	ND	ND	ND	32.8%	3.0%	64.2%	
310123-2B	D-69	0.00000156%	0.00000622%	ND	ND	ND	ND	32.6%	2.9%	64.5%	
310123-3	D-70	0.00000522%	0.00002090%	ND	ND	ND	ND	31.8%	11.9%	56.3%	
310123-3A	D-70	0.00000317%	0.00001267%	ND	ND	ND	ND	33.0%	9.3%	57.8%	
310123-3B	D-70	0.00000346%	0.00001386%	ND	ND	ND	ND	30.8%	10.5%	58.8%	
310123-4	D-71	0.00000139%	0.00022292%	< 0.00022	ND	< 0.00022	ND	19.4%	2.2%	78.3%	
310123-4A	D-71	0.00000113%	0.00000453%	ND	ND	ND	ND	19.4%	5.1%	75.5%	
310123-4B	D-71	0.00000162%	0.00000649%	ND	ND	ND	ND	19.4%	3.1%	77.5%	
310123-5	D-72	0.00000216%	0.00000865%	ND	ND	ND	ND	30.3%	8.9%	60.8%	
310123-5A	D-72	0.00000240%	0.00000959%	ND	ND	ND	ND	30.3%	9.5%	60.2%	
310123-5B	D-72	0.00000184%	0.00000735%	ND	ND	ND	ND	30.2%	16.2%	53.6%	
310123-6	D-73	0.00000117%	0.00000466%	ND	ND	ND	ND	8.4%	9.5%	82.1%	
310123-6A	D-73	0.00000144%	0.00000577%	ND	ND	ND	ND	8.1%	7.8%	84.1%	
310123-6B	D-73	0.00000130%	0.00000519%	ND	ND	ND	ND	8.2%	8.1%	83.7%	
310123-7	D-74	0.00000121%	0.00000484%	ND	ND	ND	ND	15.7%	14.3%	70.1%	
310123-7A	D-74	0.00000156%	0.00000623%	ND	ND	ND	ND	15.6%	12.9%	71.4%	
310123-7B	D-74	0.00000131%	0.00000524%	ND	ND	ND	ND	16.1%	15.3%	68.6%	
310123-8	D-75	0.00000168%	0.00000671%	ND	ND	ND	ND	10.3%	8.4%	81.4%	
310123-8A	D-75	0.00000200%	0.00000798%	ND	ND	ND	ND	10.2%	4.2%	85.7%	
310123-8B	D-75	0.00000140%	0.00000562%	ND	ND	ND	ND	10.2%	5.7%	84.1%	
310123-9	D-76	0.00000171%	0.00000684%	ND	ND	ND	ND	10.7%	7.8%	81.5%	
310123-9A	D-76	0.00000220%	0.00000880%	ND	ND	ND	ND	10.6%	12.2%	77.1%	
310123-9B	D-76	0.00000187%	0.00000749%	ND	ND	ND	ND	10.8%	15.3%	73.9%	
310123-10	D-77	0.00000194%	0.00000775%	ND	ND	ND	ND	1.2%	2.6%	96.3%	
310123-10A	D-77	0.00000198%	0.00266501%	< 0.00267	< 0.00267	< 0.00267	ND	1.2%	6.7%	91.9%	
310123-10B	D-77	0.00000182%	0.00000727%	ND	ND	ND	ND	1.2%	6.8%	91.9%	
310123-11	D-78	0.00000188%	0.00000751%	ND	ND	ND	ND	14.2%	8.5%	77.3%	
310123-11A	D-78	0.00000168%	0.00000670%	ND	ND	ND	ND	13.7%	8.3%	77.9%	
310123-11B	D-78	0.00000159%	0.00000636%	ND	ND	ND	ND	13.1%	8.6%	78.2%	
310123-12	D-79	0.00000133%	0.00000533%	ND	ND	ND	ND	6.2%	9.4%	84.4%	
310123-12A	D-79	0.00000142%	0.00000569%	ND	ND	ND	ND	6.8%	5.9%	87.3%	
310123-12B	D-79	0.00000156%	0.00000625%	ND	ND	ND	ND	6.4%	5.2%	88.3%	
310123-13	D-80	0.00000237%	0.00000950%	ND	ND	ND	ND	29.1%	5.9%	65.0%	
310123-13A	D-80	0.00000256%	0.00001022%	ND	ND	ND	ND	28.9%	6.1%	65.0%	
310123-13B	D-80	0.00000224%	0.00000898%	ND	ND	ND	ND	28.9%	5.7%	65.4%	
310123-14	D-81	0.00000103%	0.00000414%	ND	ND	ND	ND	24.6%	26.5%	48.9%	
310123-14A	D-81	0.00000104%	0.00000415%	ND	ND	ND	ND	24.5%	28.1%	47.3%	
310123-14B	D-81	0.00000082%	0.00000328%	ND	ND	ND	ND	24.6%	27.5%	47.8%	
310123-15	D-82	0.00000269%	0.00001075%	ND	ND	ND	ND	36.4%	5.3%	58.3%	

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Revised: 11/8/2019, Revision #1

SUMMARY OF ANALYSIS

AMA Sample ID	Client Sample ID	TEM LOD Using ASTM D5756 Mass Calculation	TEM LOQ Using ASTM D5756 Mass Calculation	% Tremolite by TEM Using ASTM D5756 Mass Calculation	% Chrysotile by TEM Using ASTM D5756 Mass Calculation	% Total Tremolite & Chrysotile by TEM Using ASTM D5756 Mass Calculation	% Asbestos by PLM	% Organics	% Acid Soluable	% Other	Comments
310123-15A	D-82	0.00000201%	0.00000804%	ND	ND	ND	ND	36.5%	5.4%	58.1%	
310123-15B	D-82	0.00000280%	0.00001120%	ND	ND	ND	ND	36.5%	5.1%	58.4%	

LOD = Limit of Detection **LOQ** = Limit of Quantification **ND** = Not Detected **PLM** = Polarized Light Microscopy **TEM** = Transmission Electron Microscopy

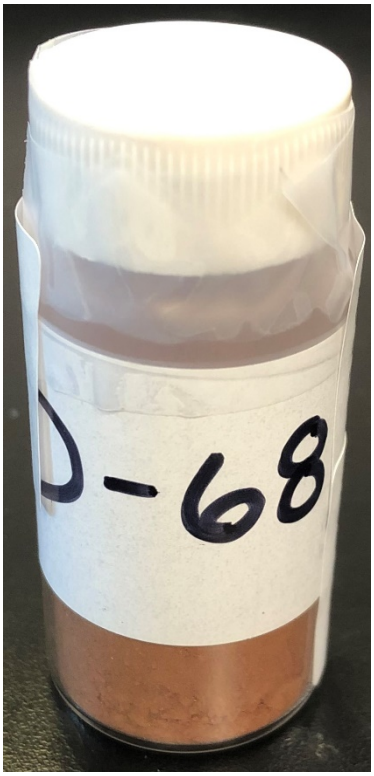
Analytical Method(s): PLM by Modified NY ELAP 198.6
TEM by Modified NY ELAP 198.4/ASTM D5756

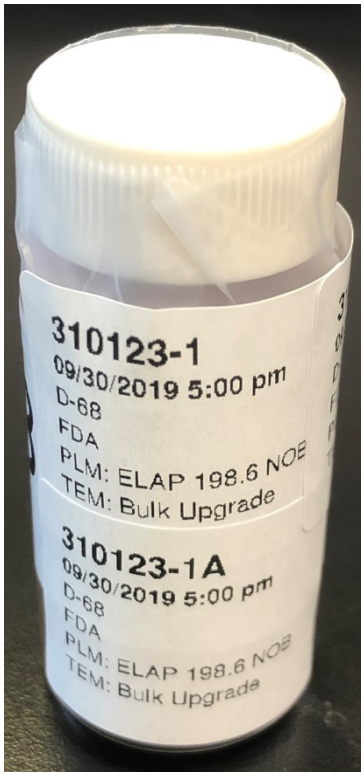
Analyst(s): **PLM** (b) (6)
TEM (b) (6)

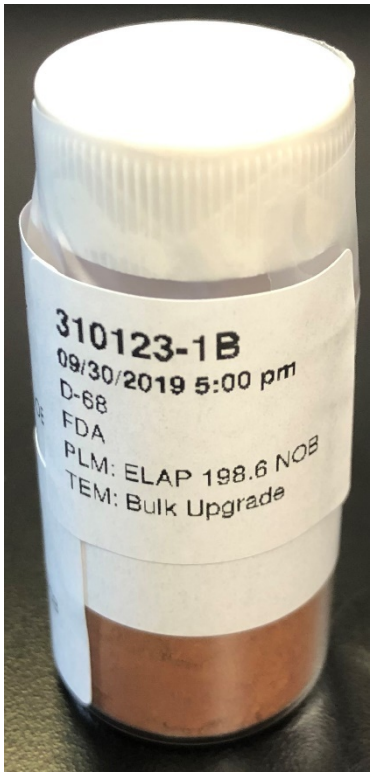
Technical Director: Andreas Saldivar

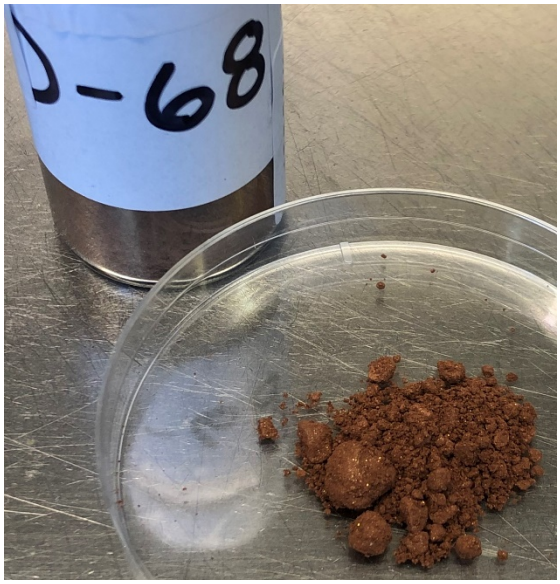
All results are to be considered preliminary and subject to change unless signed by the Technical Director or Deputy

310123-1, 1A, 1B/D-68









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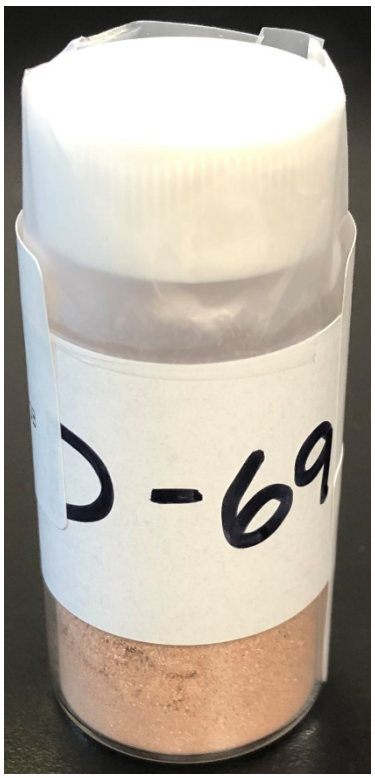

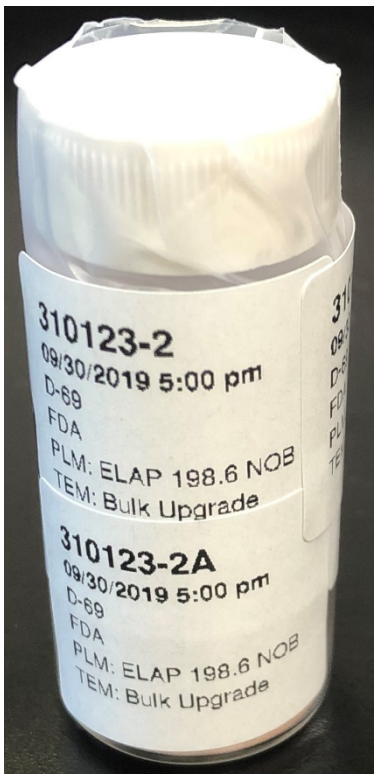

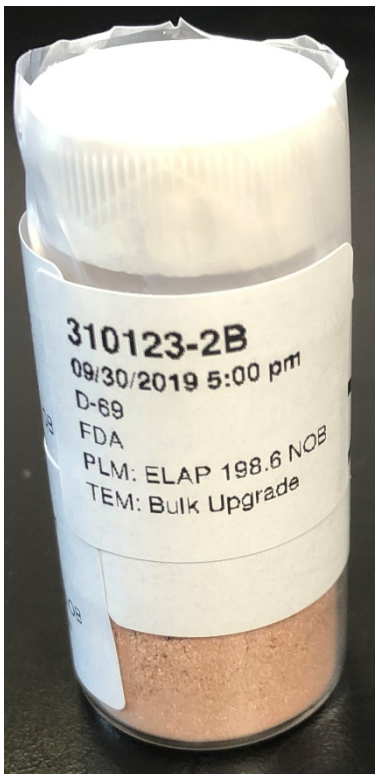

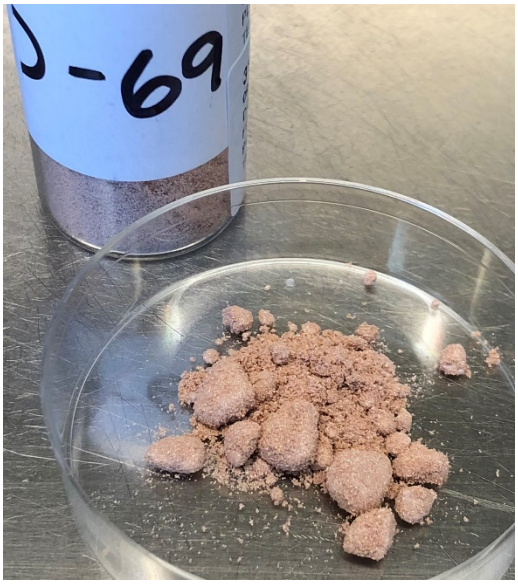

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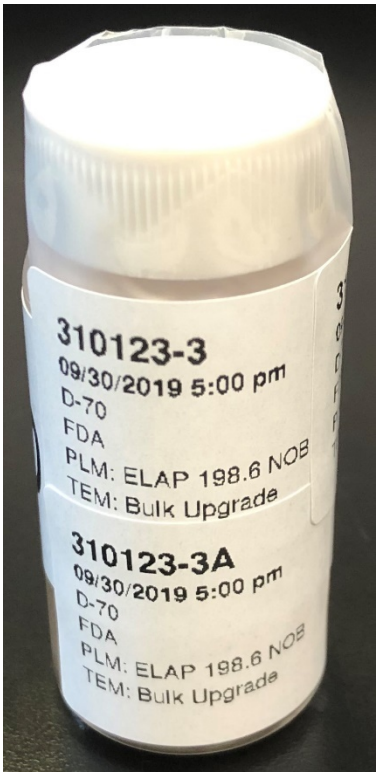

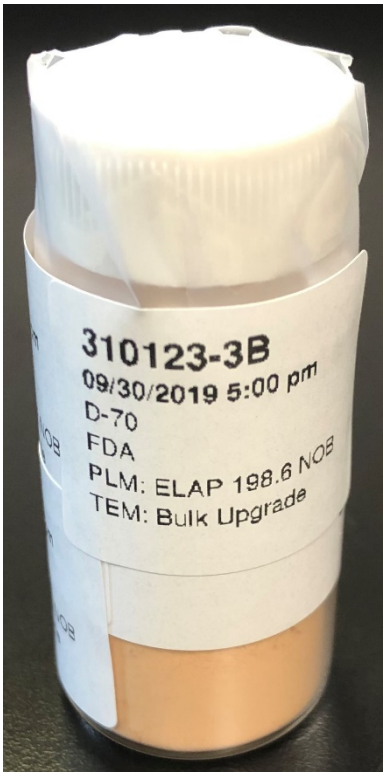

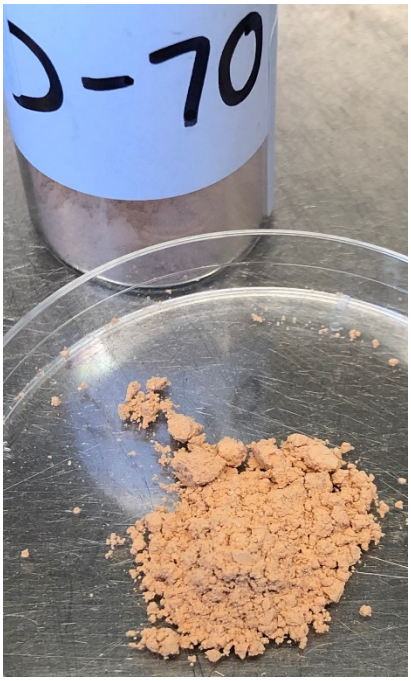

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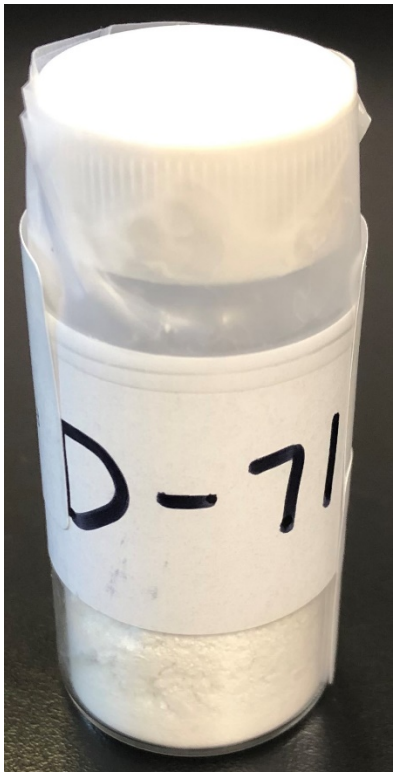

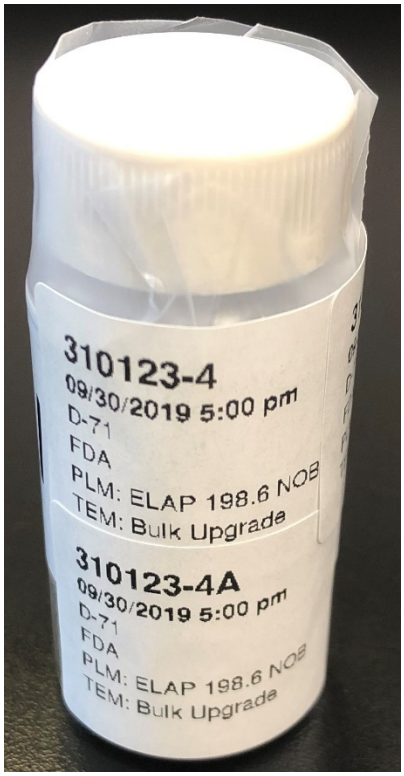

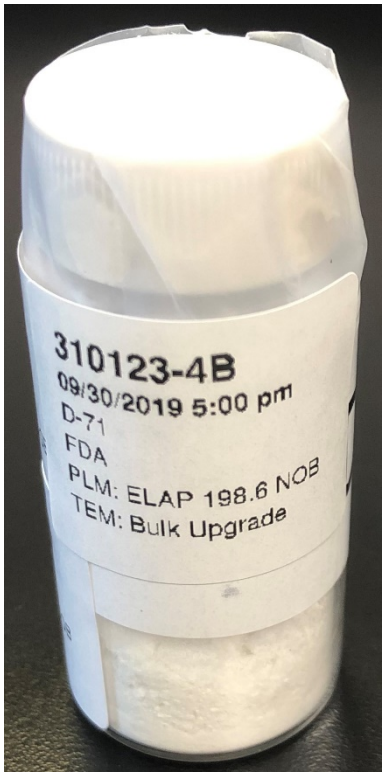

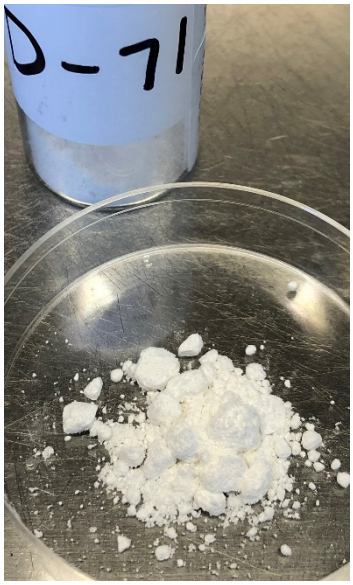

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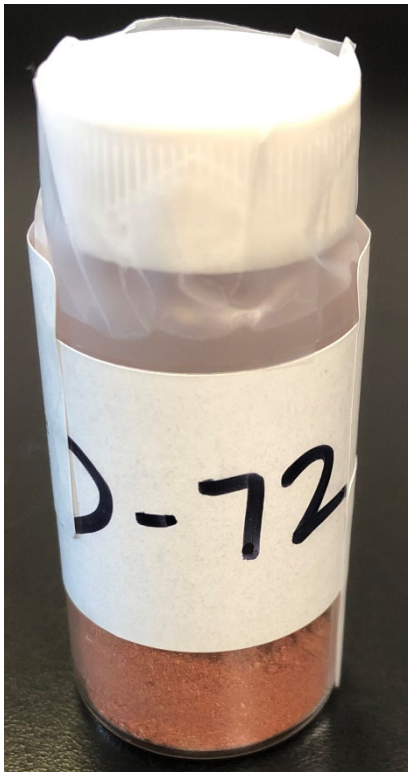

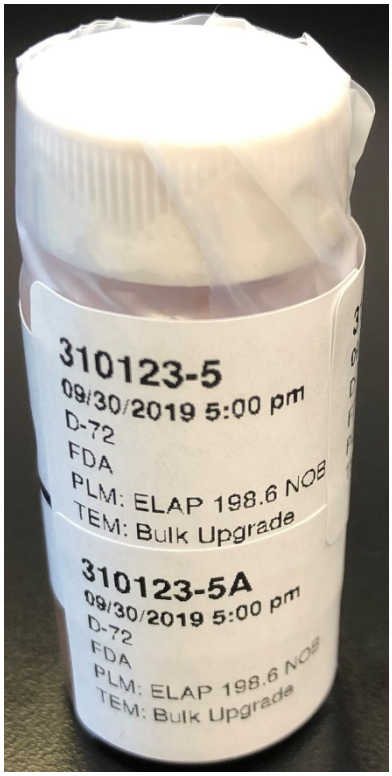

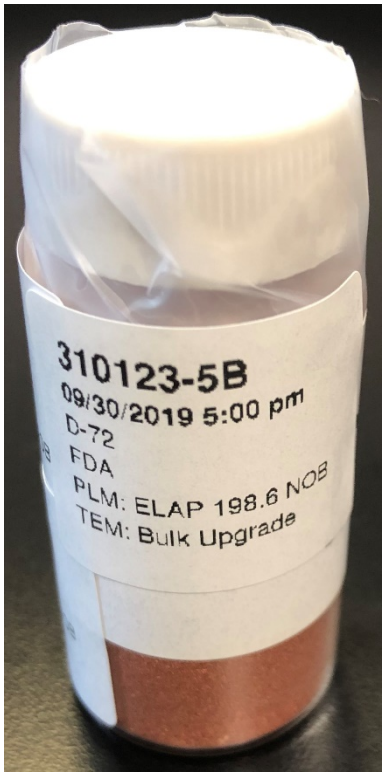

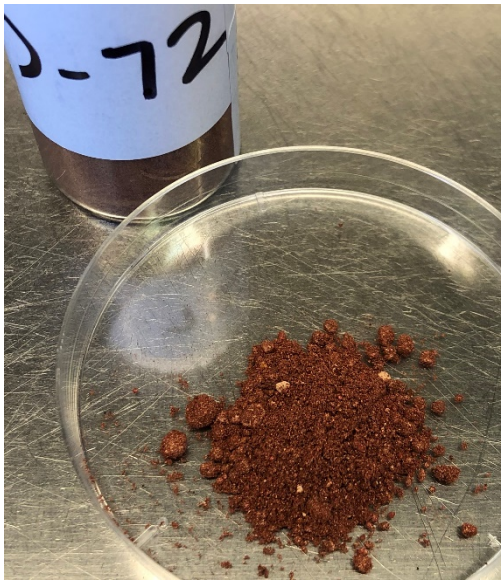

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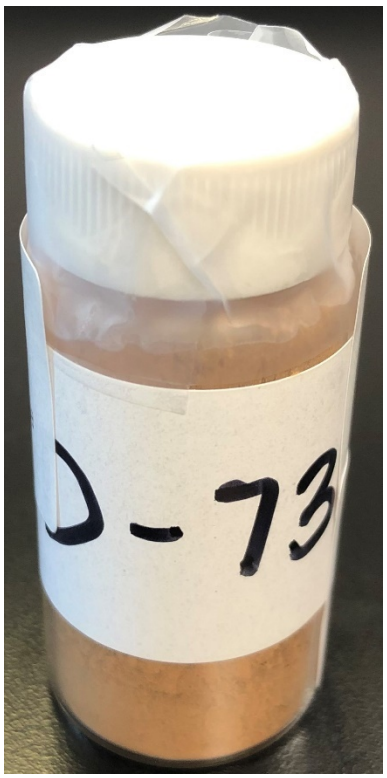
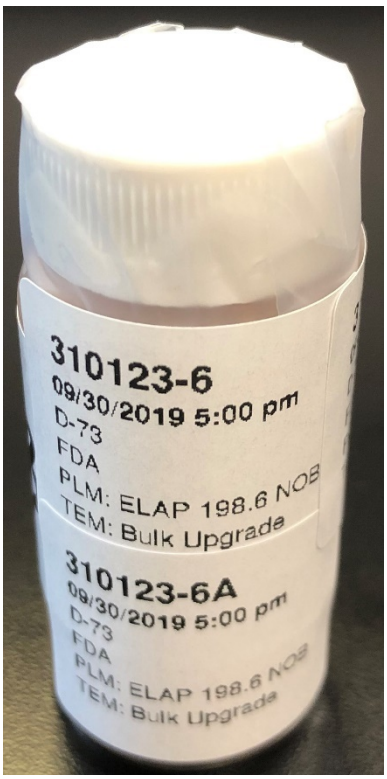
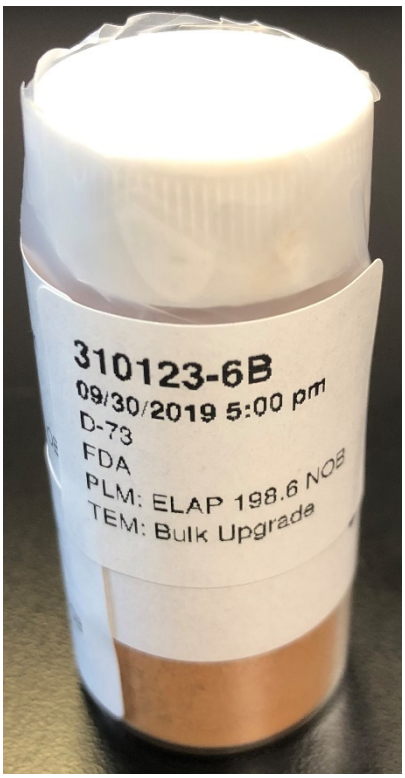
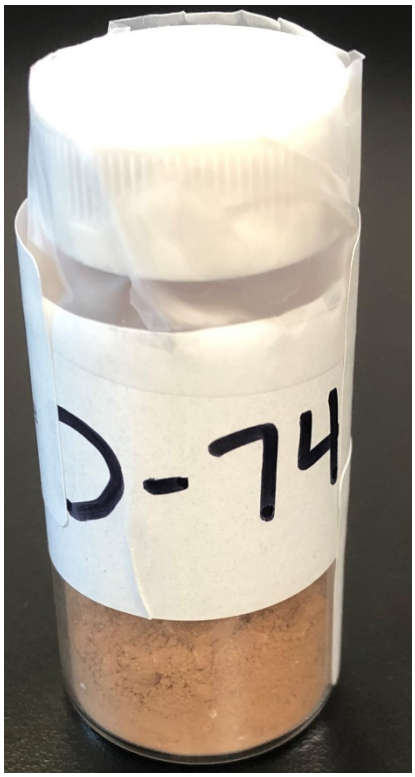
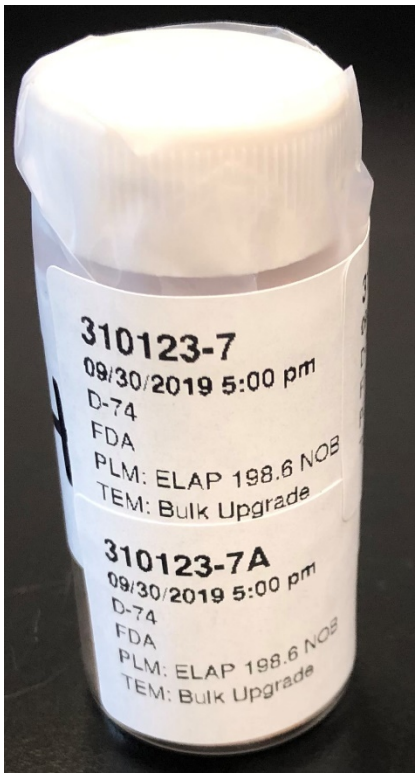


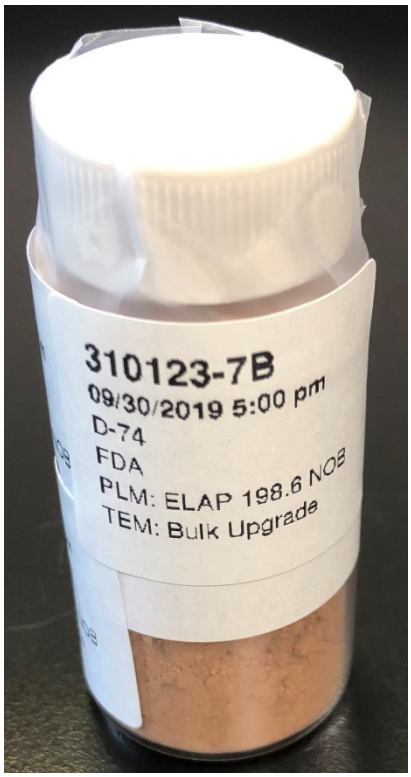


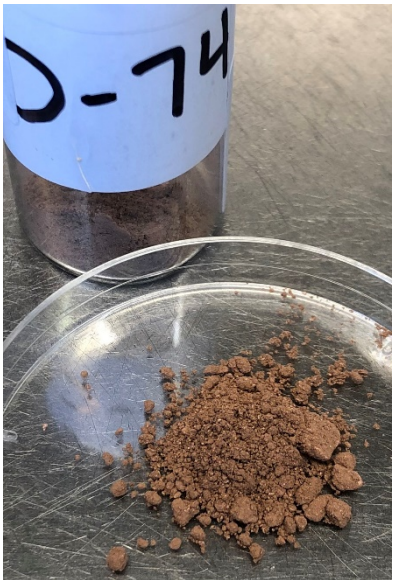


310123-7, 7A, 7B/D-74









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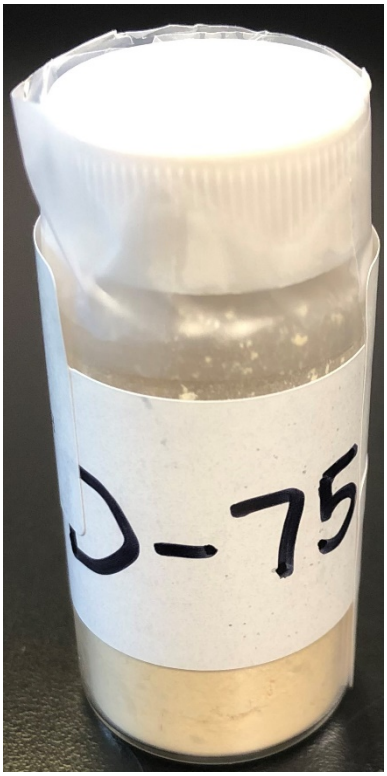
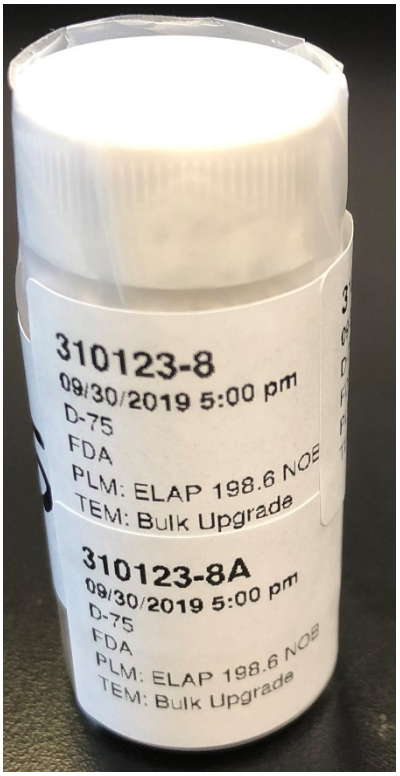
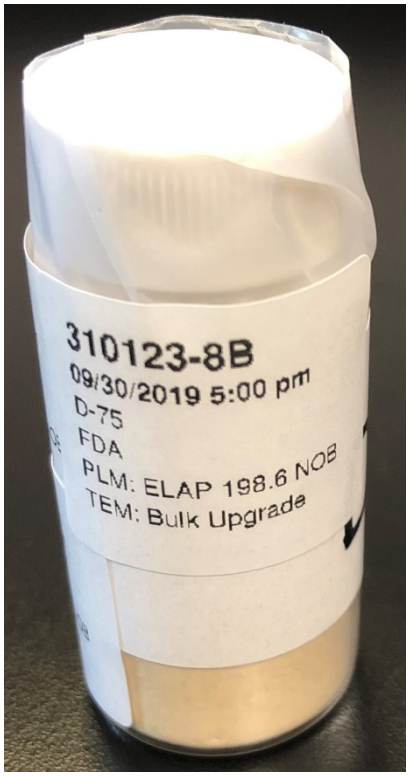
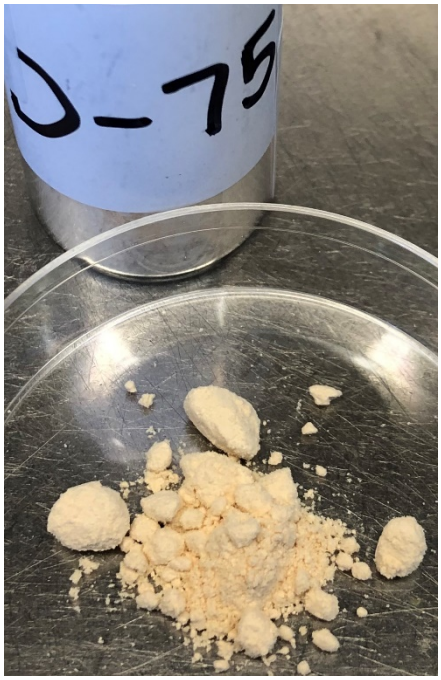
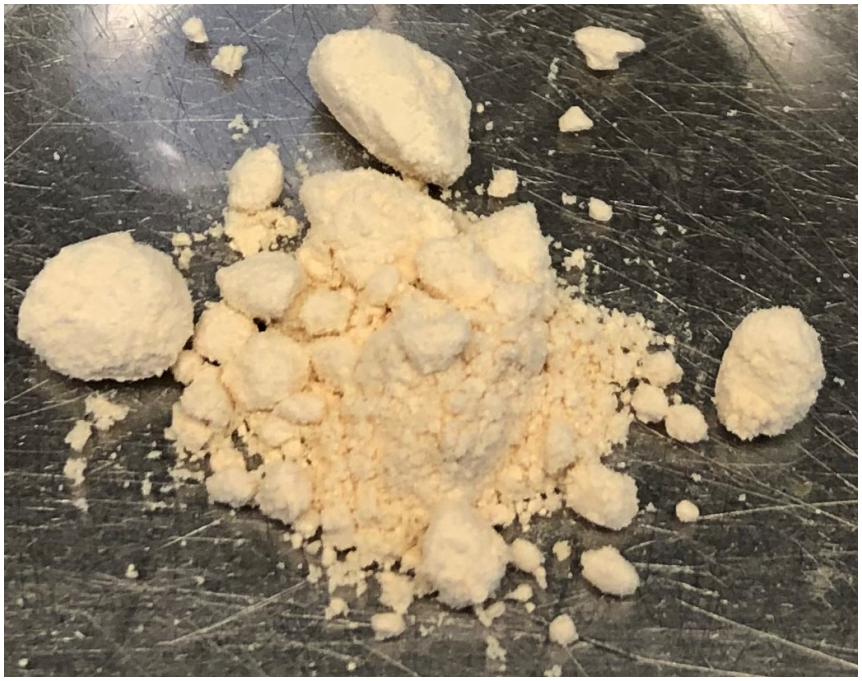


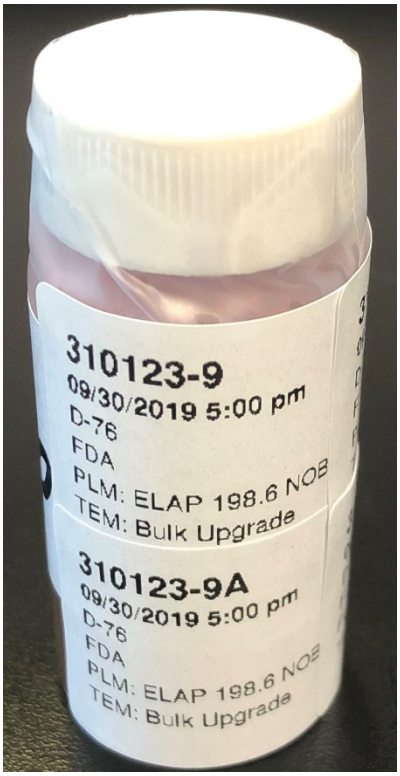


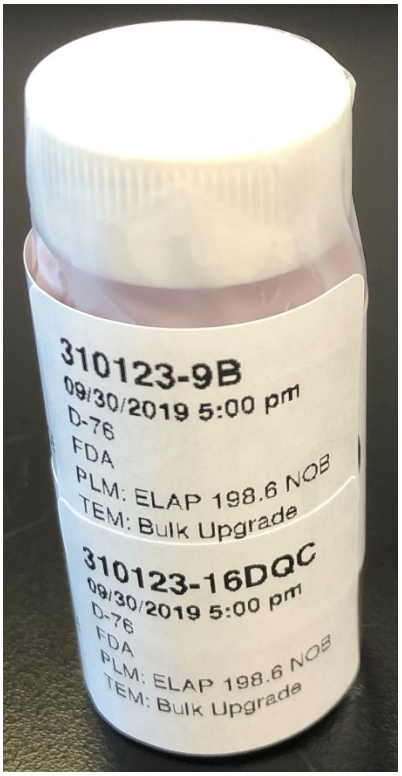


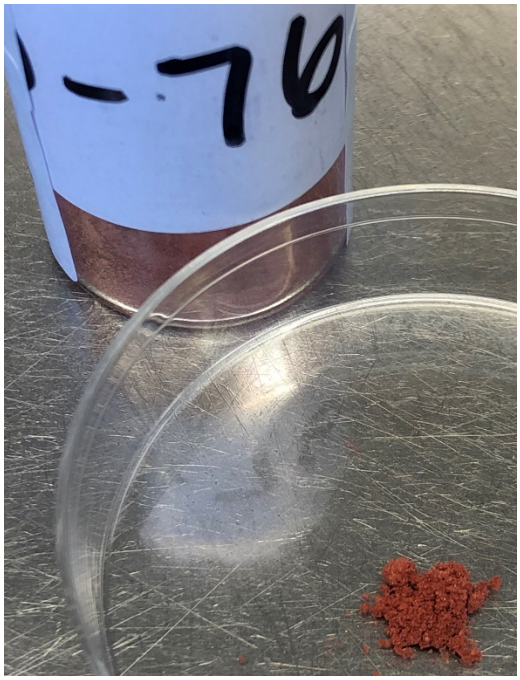




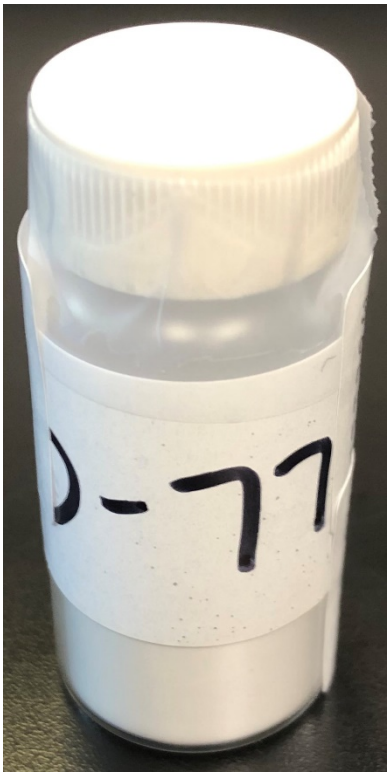
310123-9, 9A, 9B/D-76

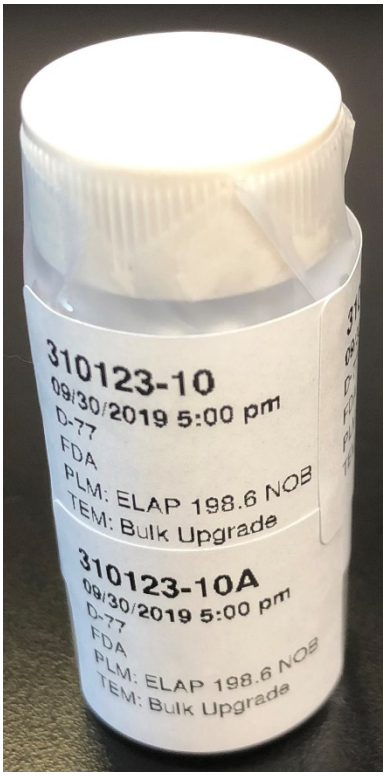


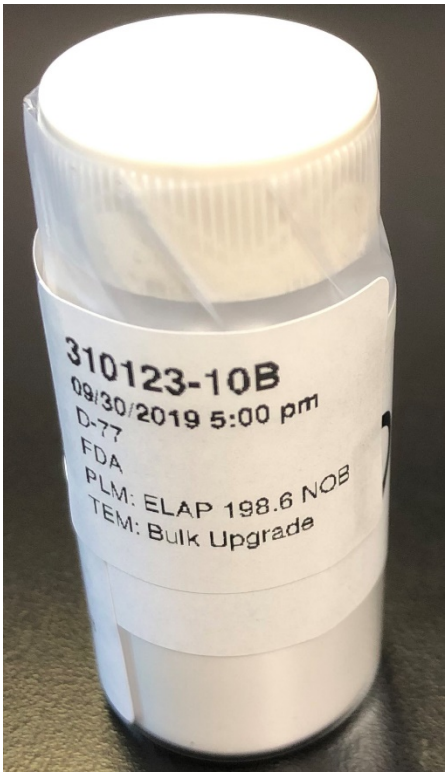


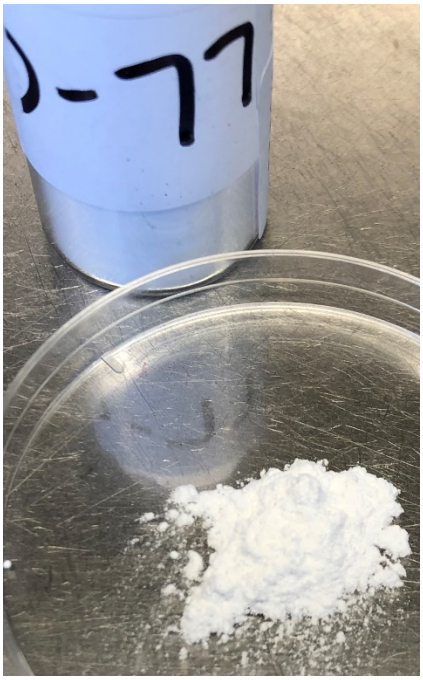


310123-10, 10A, 10B/D-77

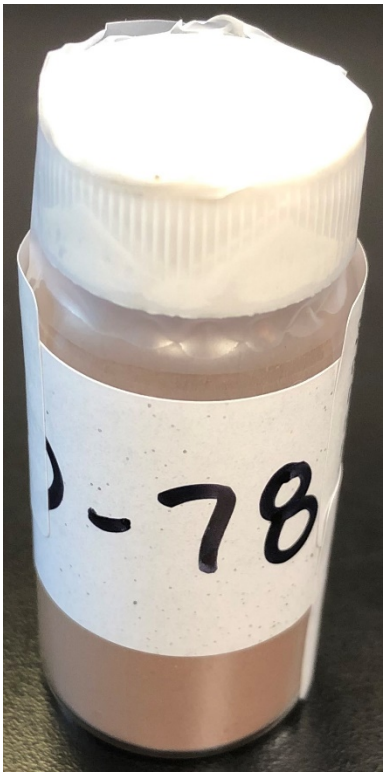


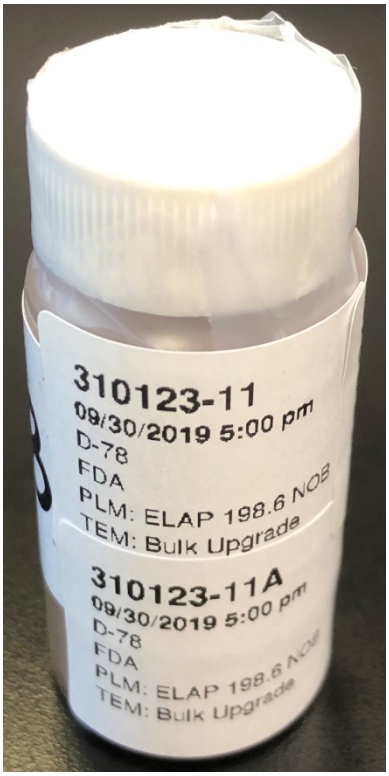


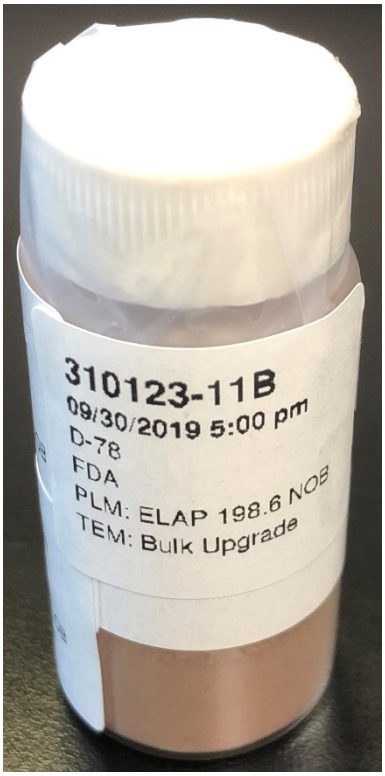


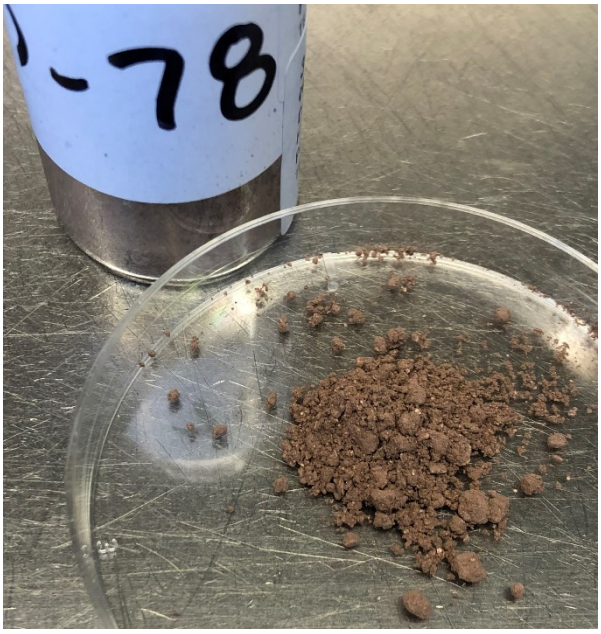


310123-11, 11A, 11B/D-78

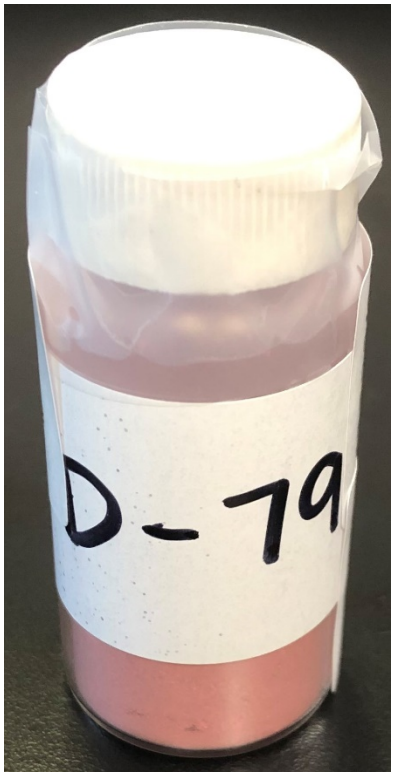


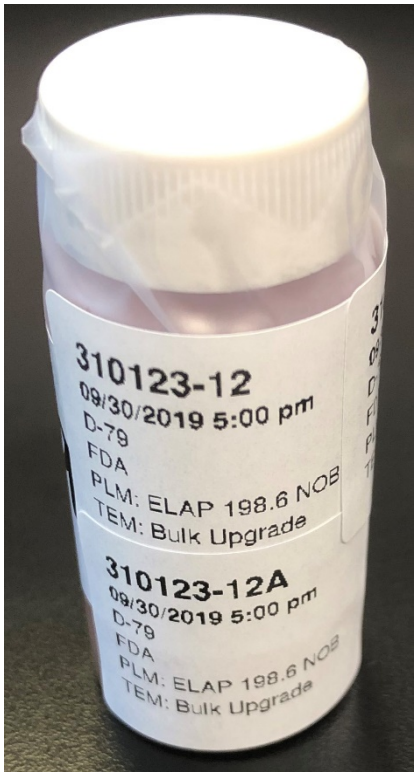


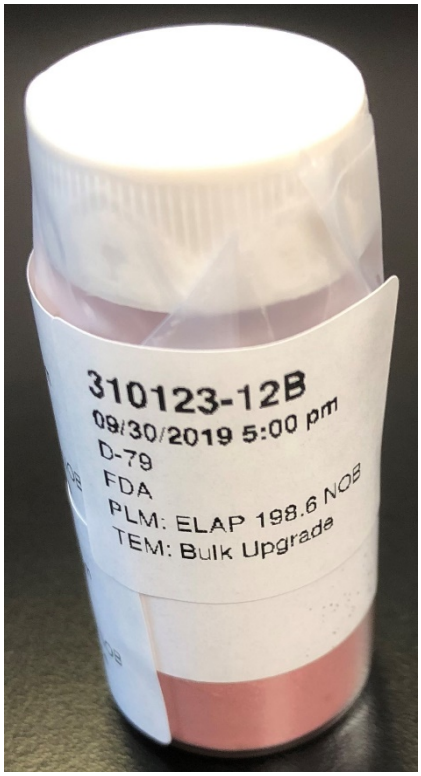




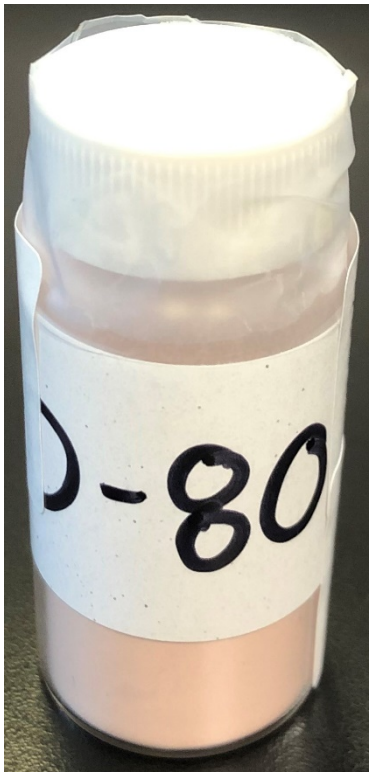
310123-12, 12A, 12B/D-79

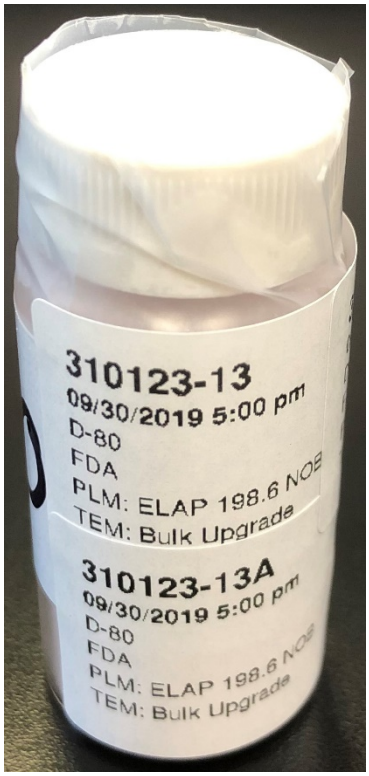


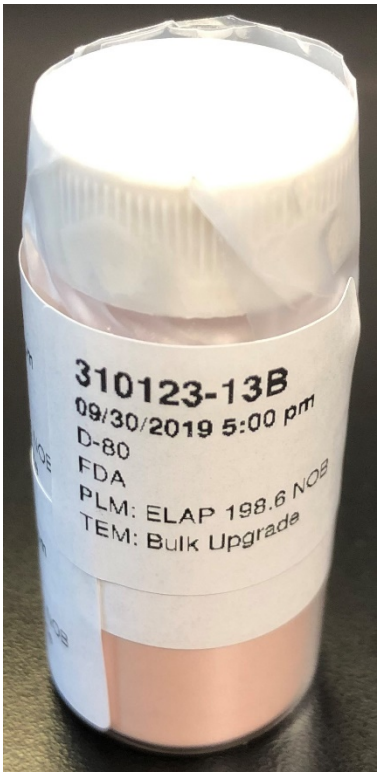


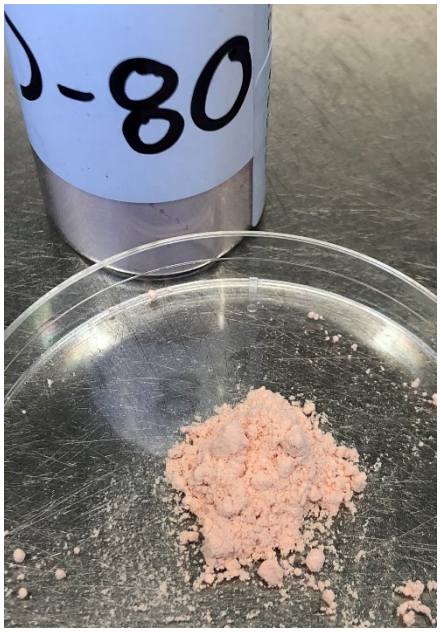


310123-13, 13A, 13B/D-80

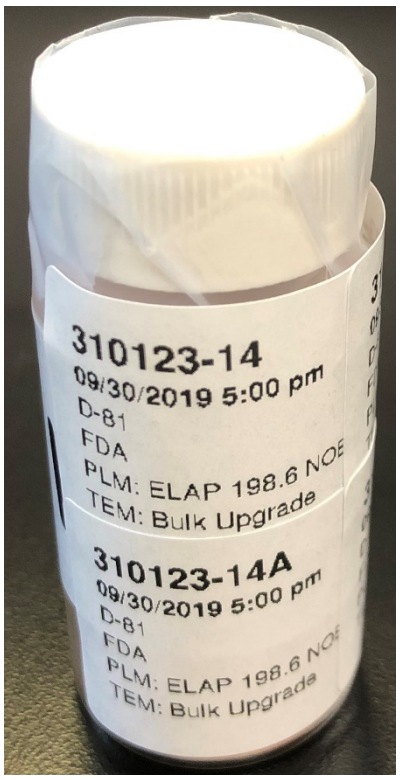


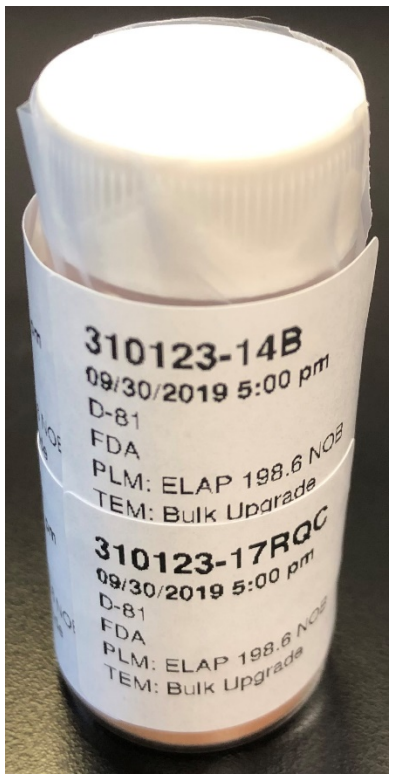




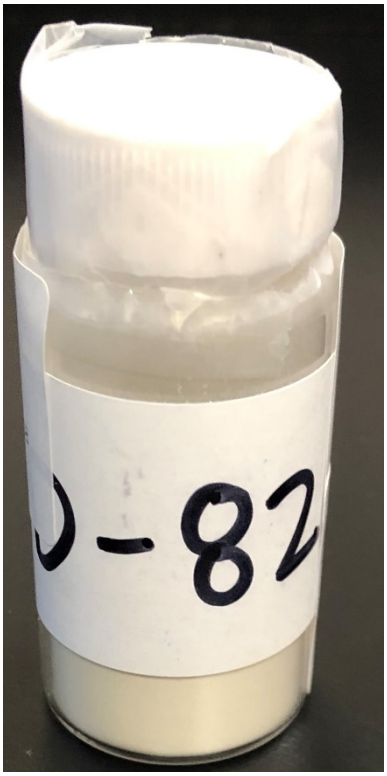


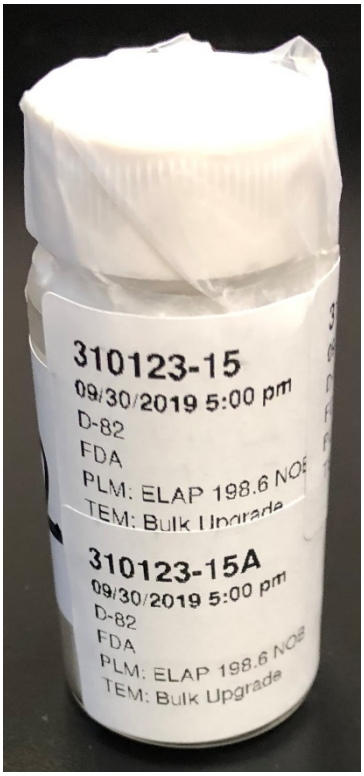
310123-14, 14A, 14B/D-81

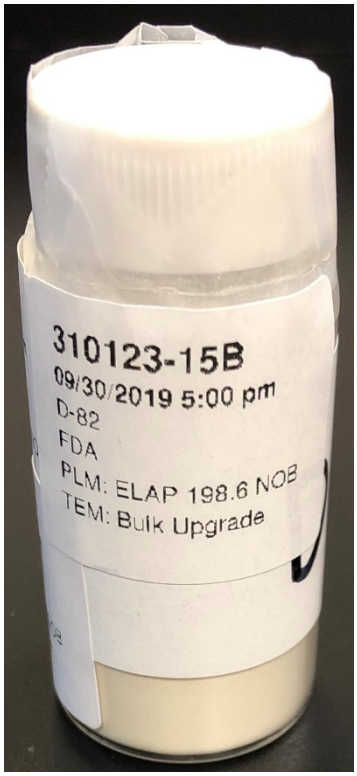


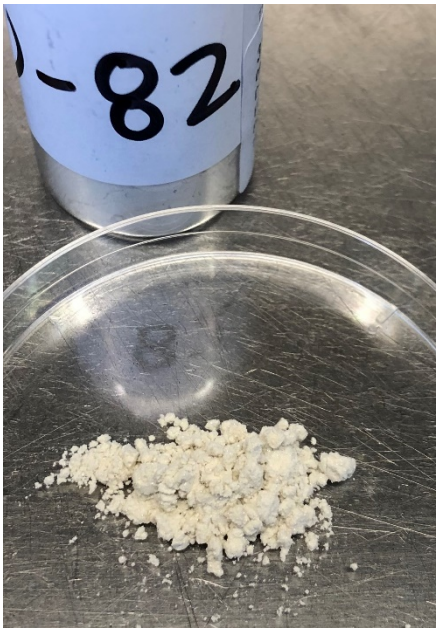


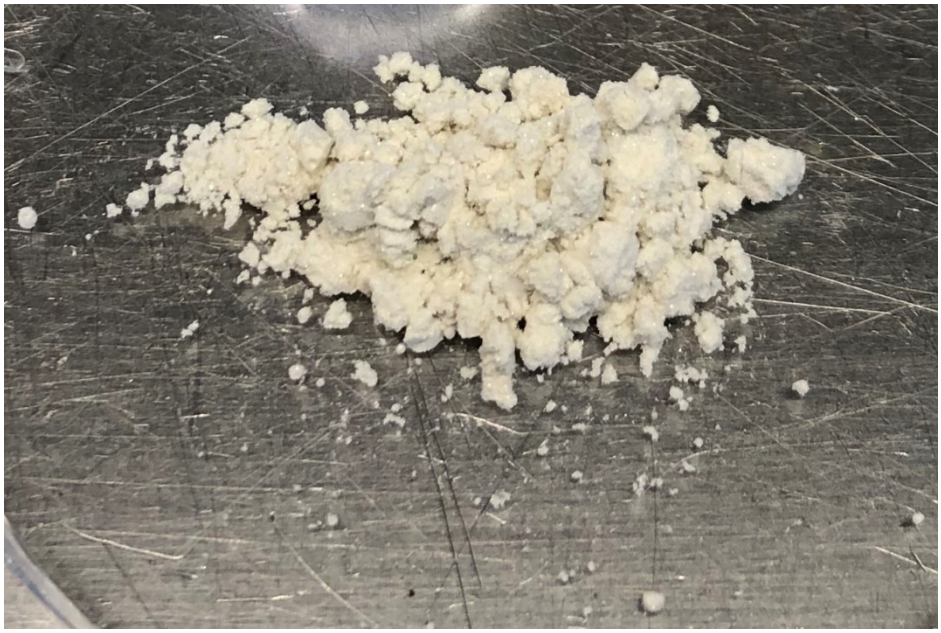
310123-15, 15A, 15B/D-82











Sample Preparation

Samples were prepared for PLM and TEM bulk analysis by (b) (6) on September 6, 2019 through September 24, 2019. Sample preparation consisted of the following steps:

1) Label and weigh two 8mL glass vials for each sample in the set – one vial for the PLM preparation and one vial for the TEM preparation.
2) Weigh out 0.1 to 0.8 grams of material and place in corresponding 8mL glass vial. Record weight.
3) Burn samples at 480° C for at least 12 hours.
4) Record Post-Ash Weight.
5) Treat ashed sample with concentrated hydrochloric acid.
6) Filter acid reduced material onto a pre-weighed 47mm 0.4um PolyCarbonate filter.
7) Place filter into drying oven for 30 minutes and then record Post-Acid Reduced weight.
8) Make four PLM slide preparations from the PLM residual ash for each sample in 1.550 dispersion oil. Make additional preparations in 1.605, 1.625, 1.680 and 1.700 dispersion oil as necessary for particle identification.
9) Weigh a portion of the residue from the TEM residual ash and place it into the corresponding pre-weighed 100ml jar.
10) Fill the 100ml jar with deionized water
11) Sonicate the jars for approximate 5-minutes.
12) Filter 0.2ml to 1ml of the solution onto a 47mm 0.22um MCE filter.
13) Dry the filter for 10 minutes then collapse, carbon coat, and place on a 3 TEM grids.

PLM Analysis

Analysis was performed in accordance with NY ELAP 198.6 protocols. The analysis was conducted using an Olympus BH-2 polarized light microscope (PLM) equipped with a dispersion staining objective. All four slide preparations for each aliquot were examined. 400-point count was performed for those samples on which asbestos was observed. If no asbestos was detected on any of the slides, the percentage of fibrous components was determined by visual estimation. The results of this analysis are detailed below in the *Discussion and Interpretation of Analytical Findings* section for each individual sample.

TEM Analysis

Analysis was performed in accordance with modified NY ELAP Method 198.4 protocols. The analysis was performed using a JEOL JEM-100CX II and JEOL JEM-100CX transmission electron microscopes (TEM), equipped with a Thermo Fisher Quest Energy Dispersive X-Ray Analyzer (EDXA), at magnifications of 19,000x and 20,000x. Two grids for each aliquot were examined. Twenty (20) grid openings were examined per sample.

Modifications to the NY ELAP 198.4 Method were:

1) The residue was not placed in alcohol and prepared using the quick drop method. To obtain a more uniform preparation, the residue was placed in a jar and filled with 100ml of deionized water. The jar was sonicated, and a portion of the solution was filtered onto a 47mm 0.22um MCE filter.
2) The tremolite and chrysotile were not visually estimated. The length and width of the observed particles were measured, and the mass of each amphibole particle was calculated using the ASTM D5756 method.
3) All particles identified as tremolite were included with the counts/concentrations, regardless of size and aspect ratio.

The results of this analysis are detailed below in the *Discussion and Interpretation of Analytical Findings* section for each individual sample.

Calculations

ASTM D5756 Mass

$M = \pi/4\ L * W^2 * D * 10^{-12}$

M = mass
L = length

W = width
D = density

Percent Calculation

$$\frac{EFA(mm^2) * 100ml * MA(g) * RW(g)}{VF(ml) * IW(g) * AA(mm^2) * RJ(g)}$$

The calculated value is then multiplied by 100 to convert it to percent.

EFA – Effective filter area
MA – Mass of asbestos
RW – Weight of residue
VF – Volume filtered
IW – Initial weight of the sample
AA – Area analyzed
RJ – Weight of residue placed into the jar

Limit of Detection and Quantification

We used the mass of a 0.5 x 0.04-micron tremolite or chrysotile fiber, depending on what was found in each sample, as the basis for our calculations. For samples without tremolite or chrysotile, tremolite is used to determine the LOD and LOQ. Limit of detection was defined as 1 fiber and limit of quantification was defined as 4 fibers.

Some aliquots of samples D71 and D77 contained very small amounts of asbestos that were either at or below our 4-fiber limit of quantification. For these samples we defined our limit of quantification as follows:

310123-4: mass of the single observed tremolite structure plus the mass of three tremolite fibers measuring 0.5 x 0.04 microns

310123-10A: mass of the single observed tremolite structure plus the mass of the two observed chrysotile structures plus the mass of one tremolite fiber measuring 0.5 x 0.04 microns

Discussion and Interpretation of Analytical Findings:

<u>310123-1, 1A, 1B, Client Sample D-68</u>

PLM

All three aliquots of sample D-68 were analyzed by (b) (6) on September 26, 2019. No asbestos or non-asbestos amphibole variants were detected the samples. The results were calculated using the equations detailed in the calculations section.

310123-1	NAD
310123-1A	NAD
310123-1B	NAD

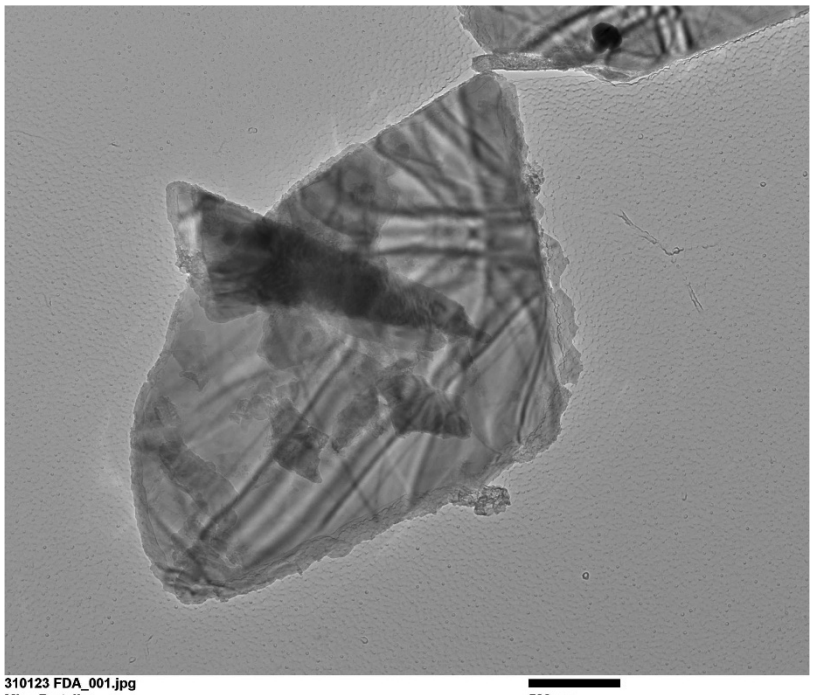
TEM

(b) (6) analyzed Sample 1 on September 18, 2019 and Sample 1A on September 22, 2019. (b) (6) analyzed sample 1B on September 26, 2019. The primary particle observed was mica along with a few talc particles, silica particles, and titanium particles and very few talc, mica, and silica fibers and silica spheres. No asbestos or non-asbestos amphibole variants were detected in the samples. The results were calculated using the equations detailed in the calculations section.

310123-1	NAD
310123-1A	NAD
310123-1B	NAD

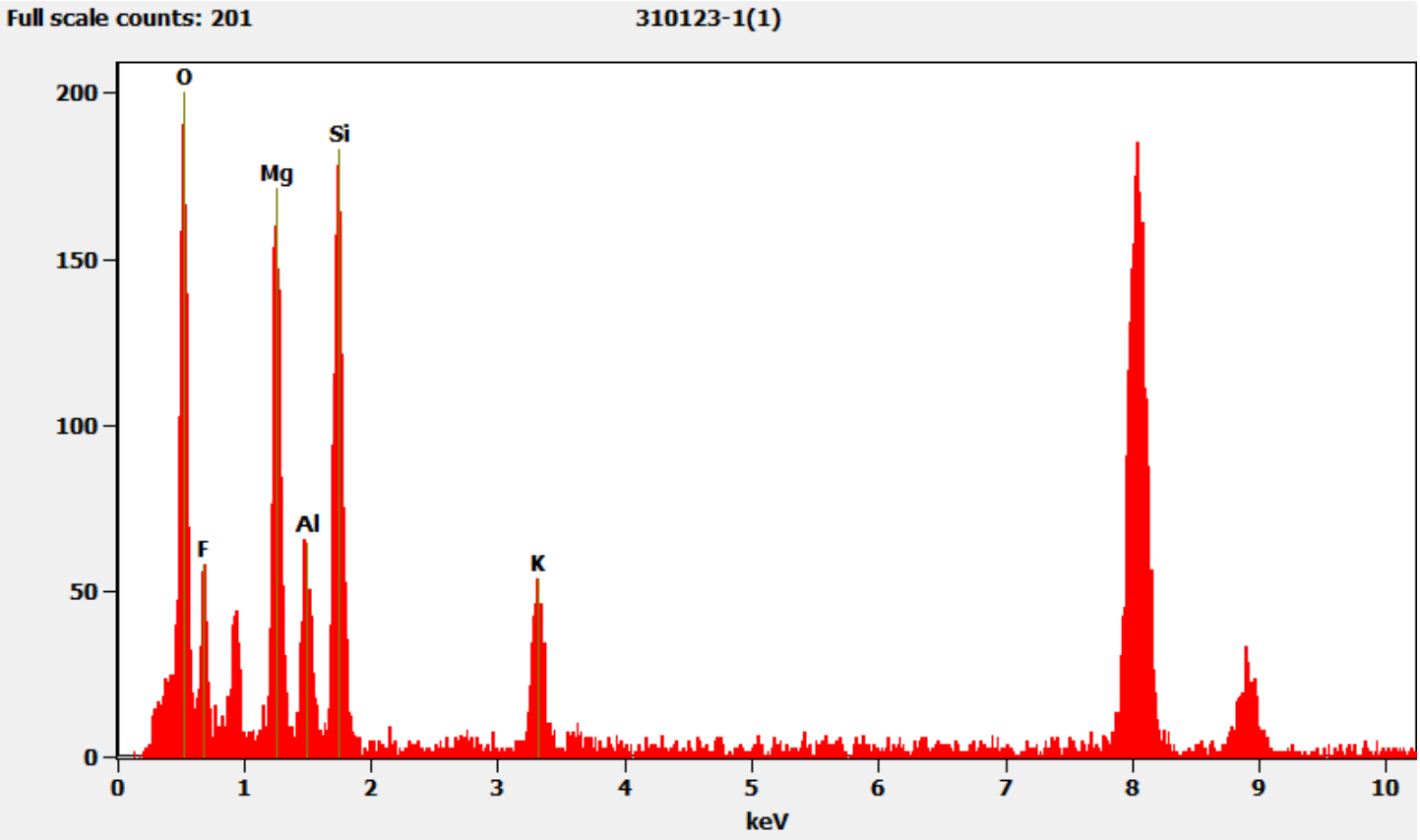
Below are pictures, diffraction patterns, and chemistry from some of the observed particles. The unidentified peaks in chemistry spectra are copper, zinc, and carbon. Those peaks are from the TEM specimen holder and specimen grid.

Sample 310123-1, Mica Particle

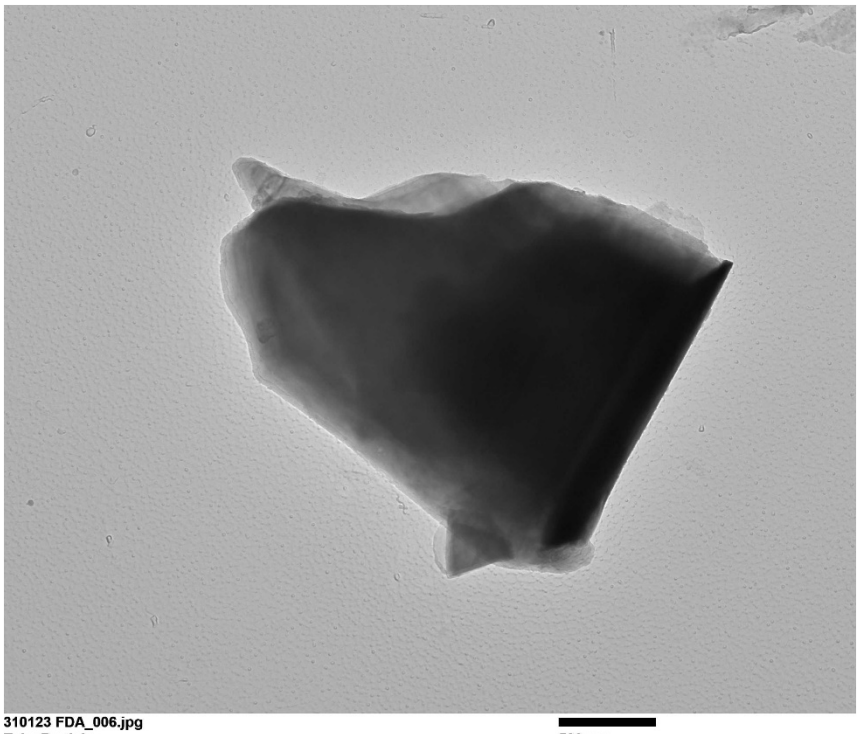


Diffraction pattern from the Mica Particle pictured above.

Chemistry from the Mica Particle pictured above.



Sample 310123-1, Talc Particle

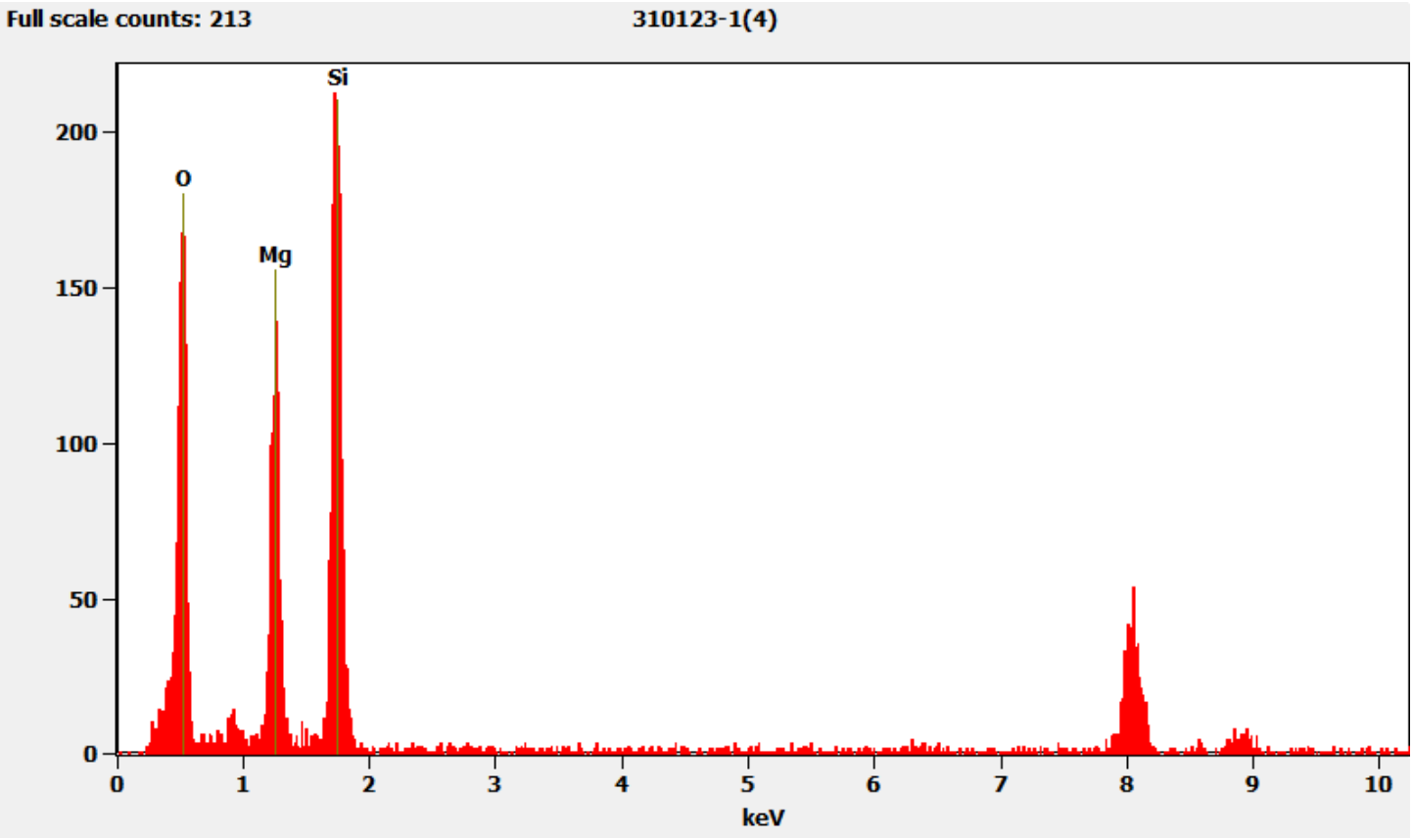


310123 FDA_006.jpg
Takc Particle
Cal: 0.001774 µm/pix
14:58 9/18/2019
TEM Mode: Imaging
Microscopist: [redacted]
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

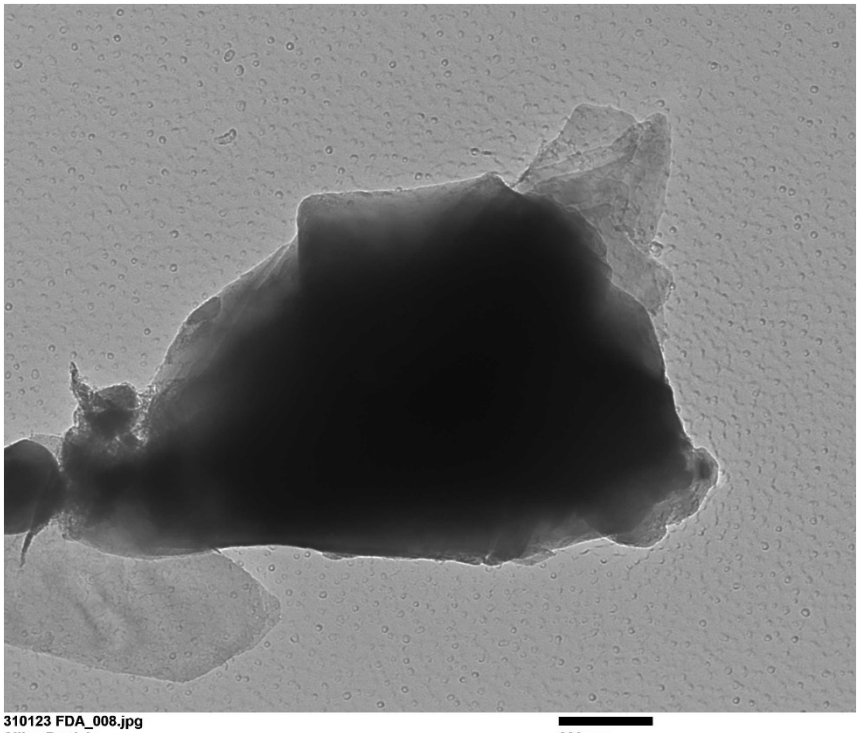
500 nm
HV=100kV
Direct Mag: 5800 x
AMA Analytical Services, Inc

Hexagonal diffraction pattern from the Talc Particle pictured above.

Chemistry from the Talc particle pictured above



Sample 310123-1, Silica Particle



310123 FDA_008.jpg
Sllica Particle
Cal: 0.734921 nm/pix
15:03 9/18/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

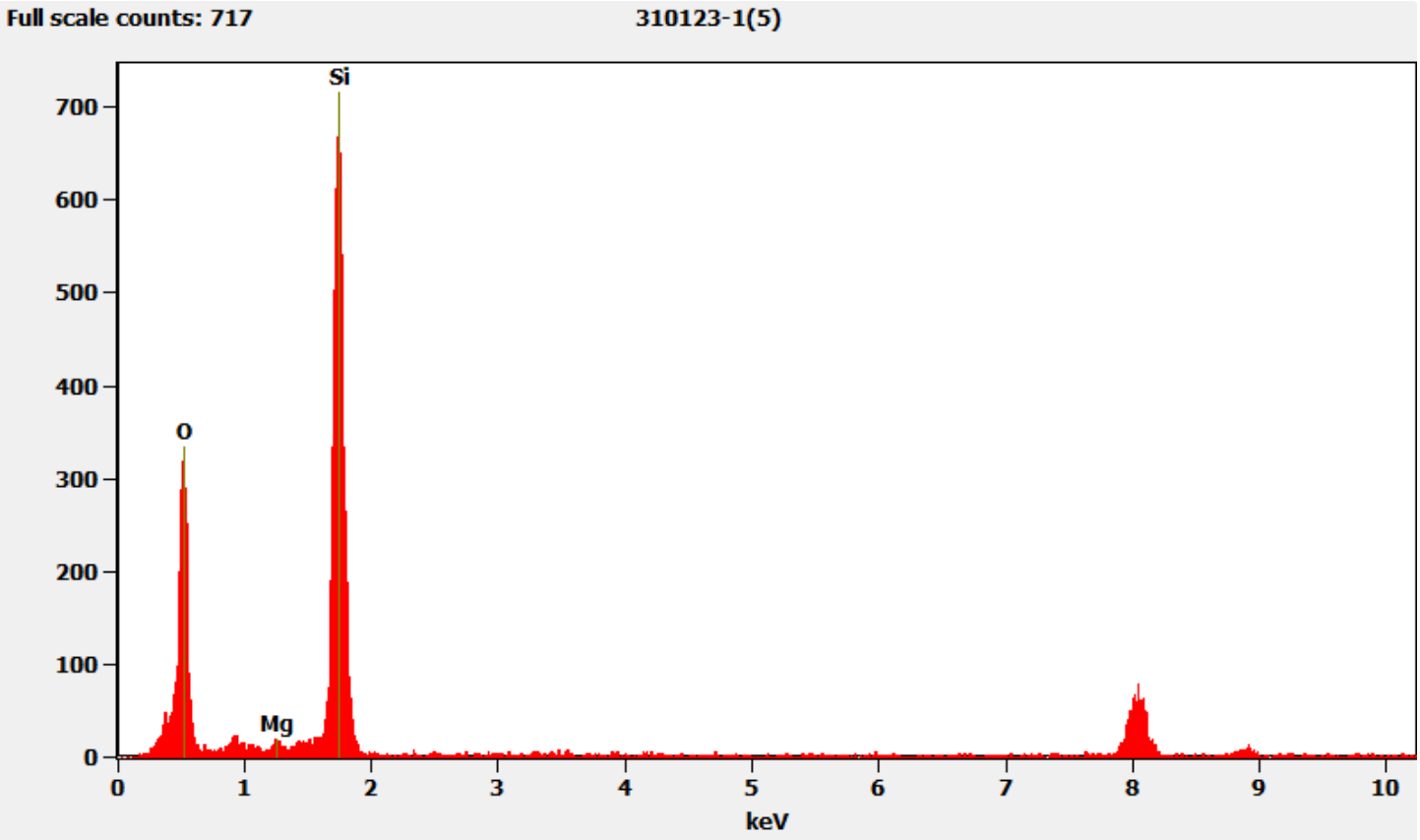
200 nm
HV=100kV
Direct Mag: 14000 x
AMA Analytical Services, Inc

Diffraction pattern from the Silica Particle pictured above.

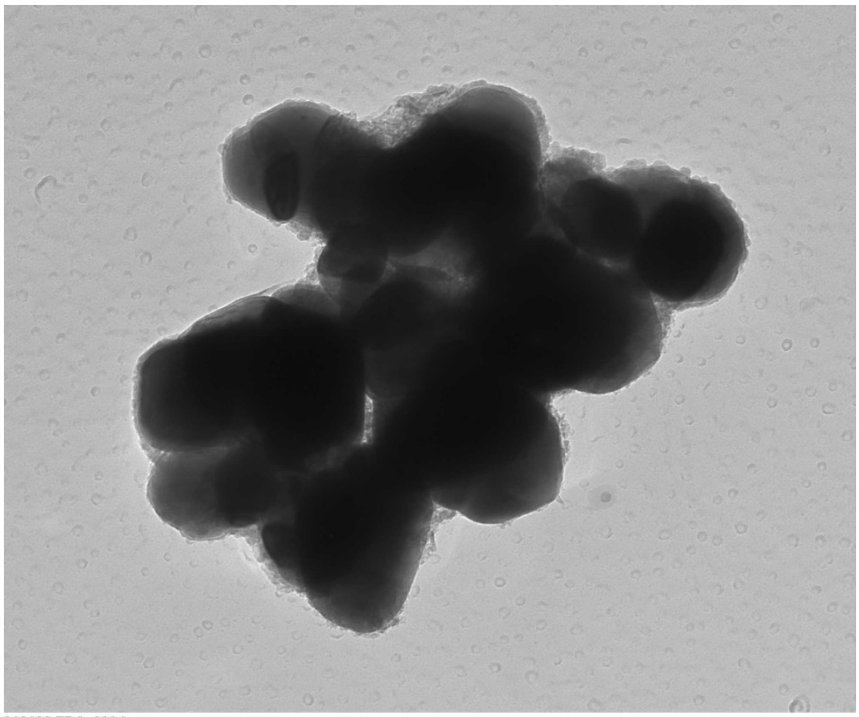
310123 FDA_009.jpg
Sllica Particle
15:04 9/18/2019
TEM Mode: Diffraction
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

100 (1/Å)
HV=100kV
Cam Len: 0.2200 m
AMA Analytical Services, Inc

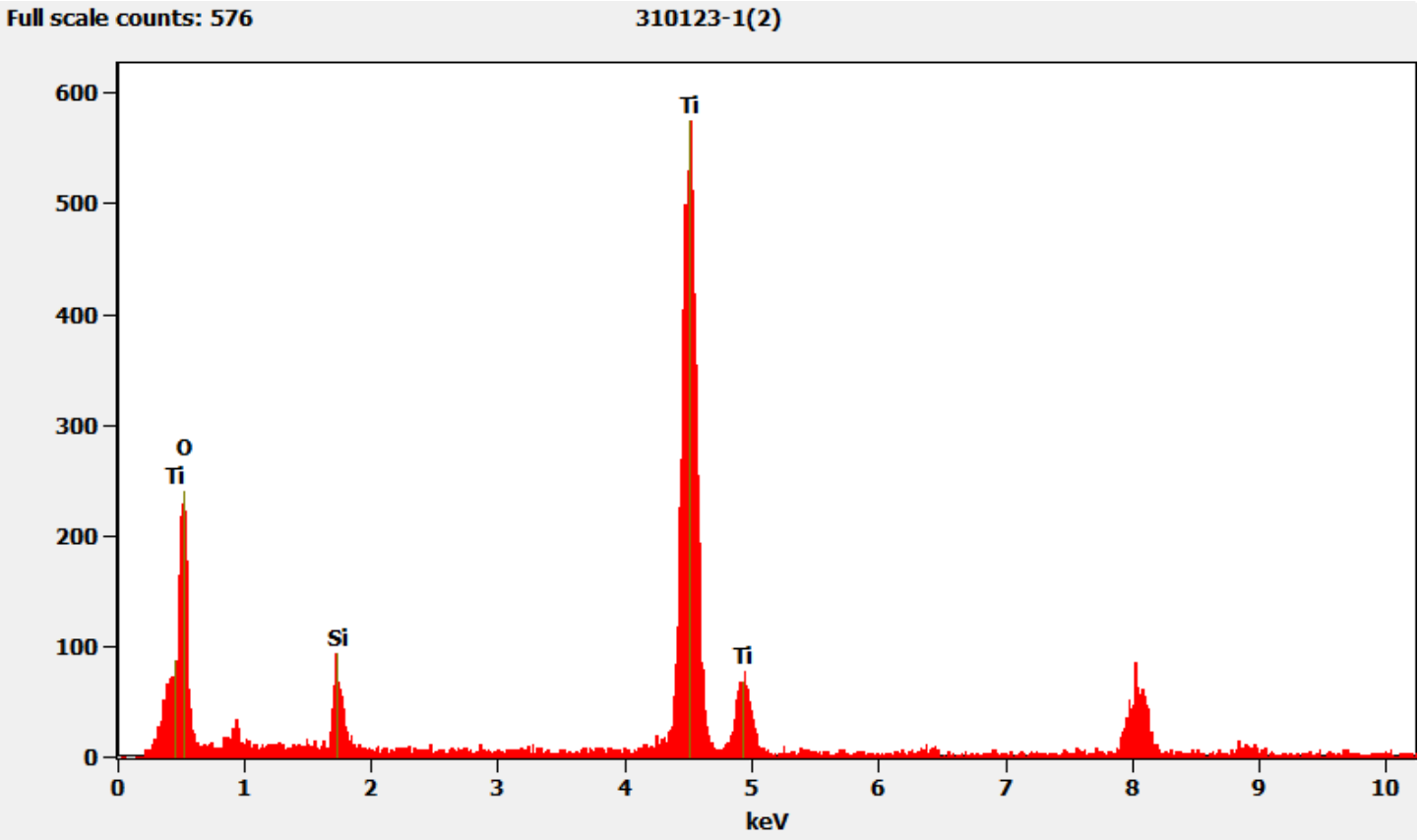
Chemistry from the Silica Particle pictured above.



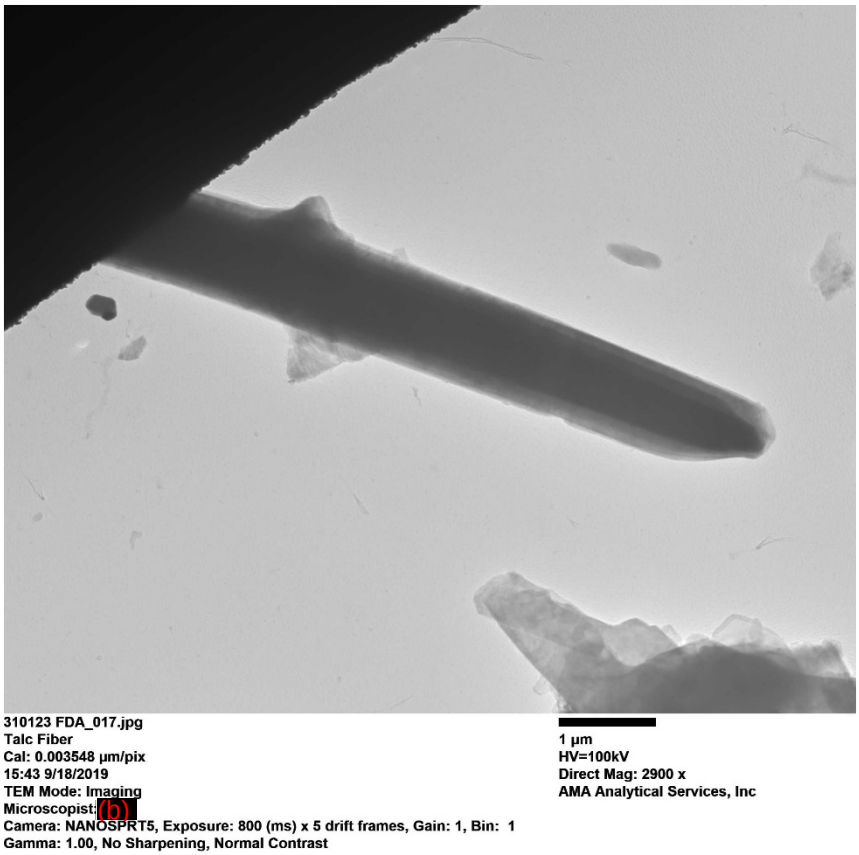
Sample 310123-1, Titanium Particles



Chemistry from the Titanium Particles pictured above.

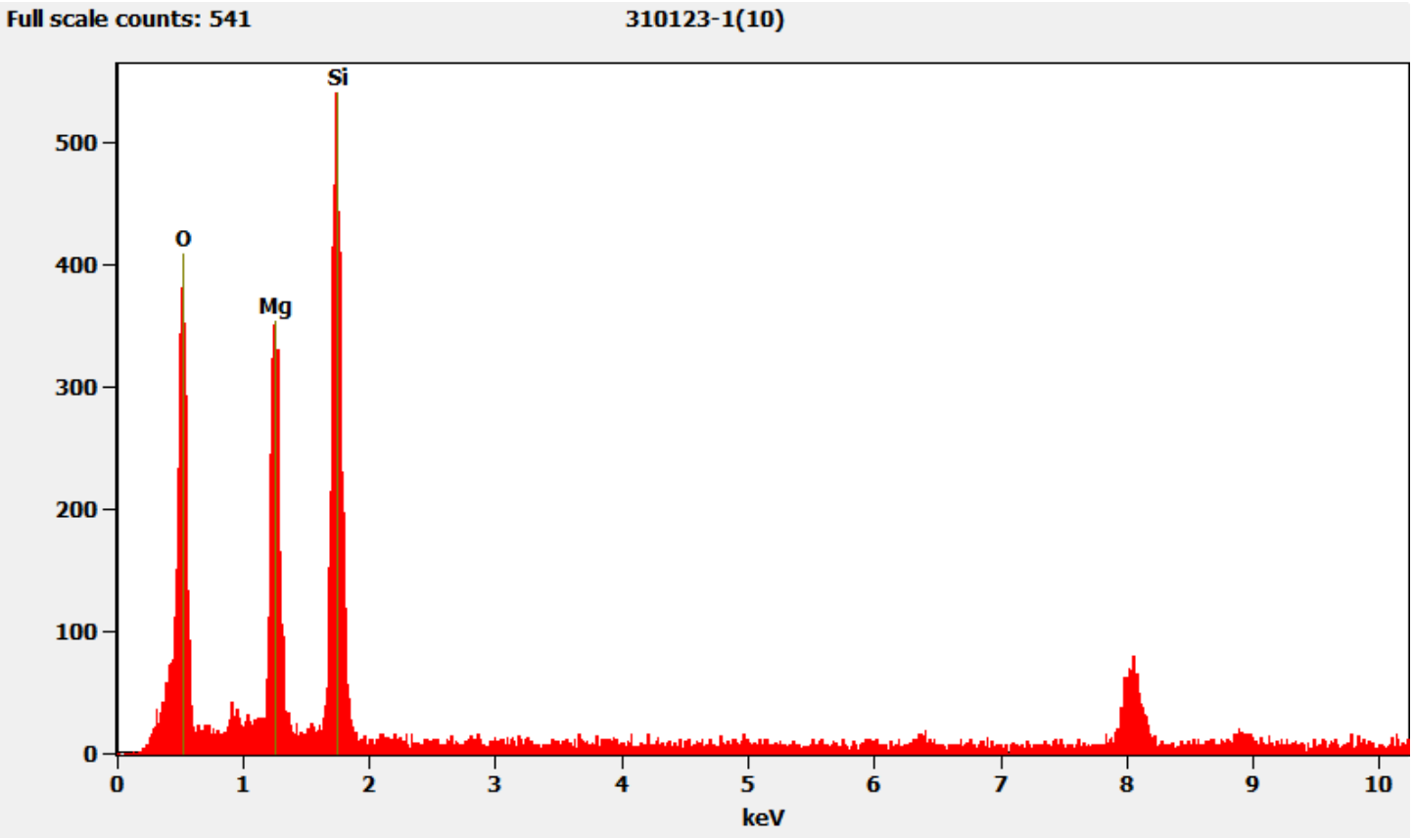


310123-1, Talc Fiber

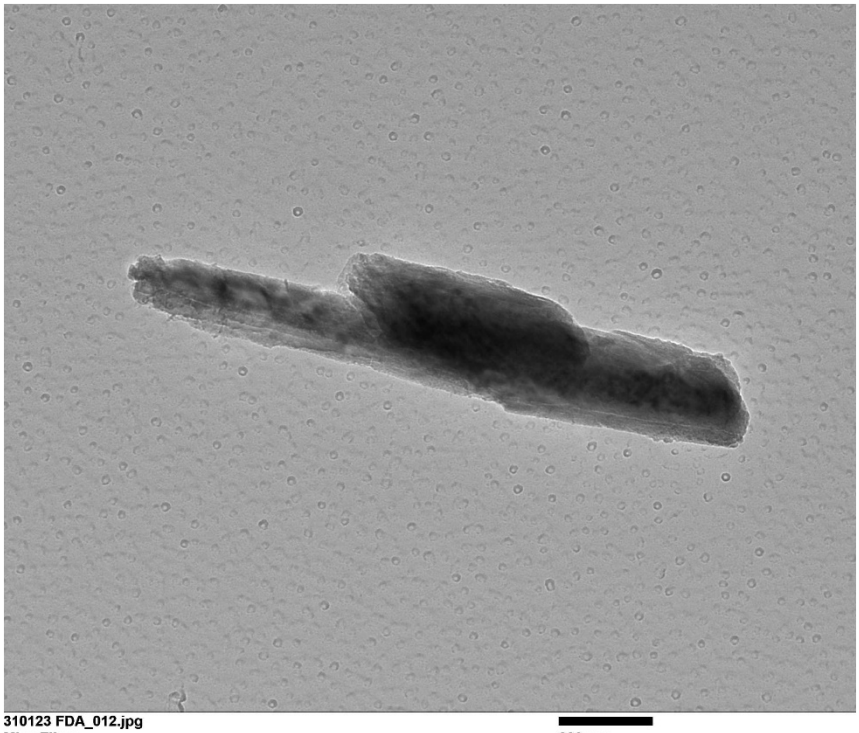


Diffraction pattern from the Talc Fiber pictured above

Chemistry from the Talc Fiber pictured above



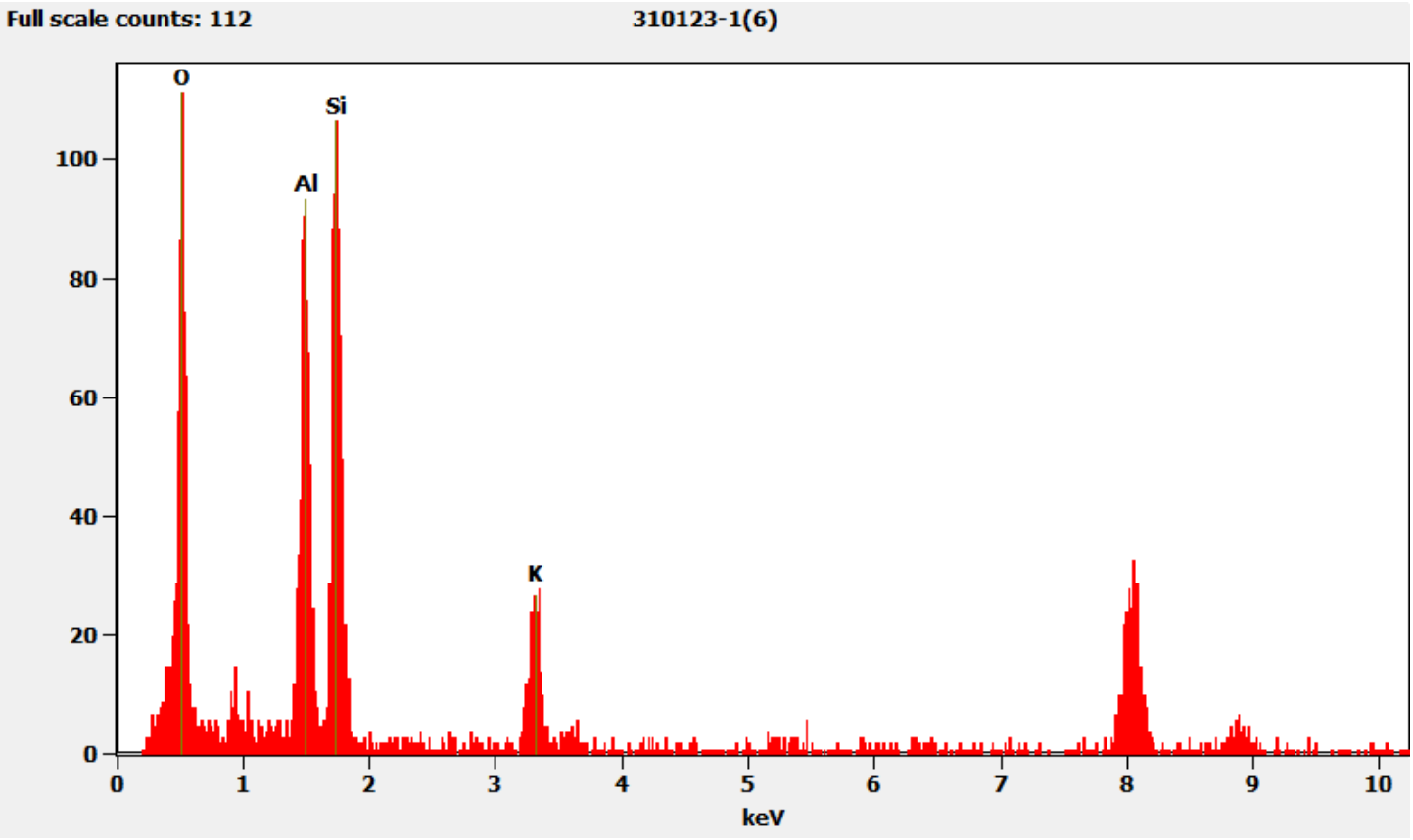
310123-1, Mica Fiber



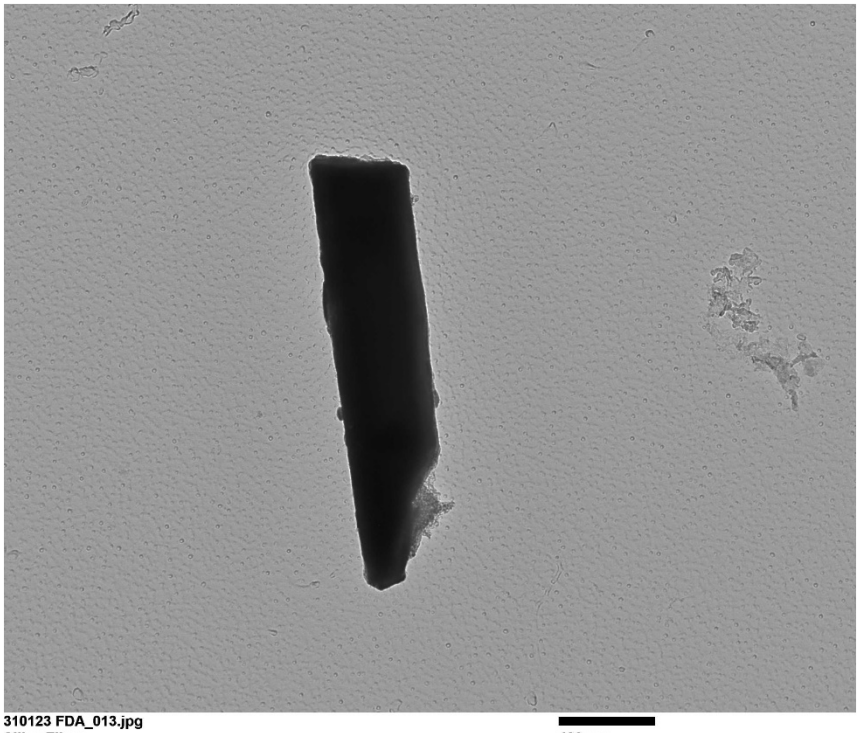
310123 FDA_012.jpg
Mica FIber
Cal: 0.734921 nm/pix
15:12 9/18/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

200 nm
HV=100kV
Direct Mag: 14000 x
AMA Analytical Services, Inc

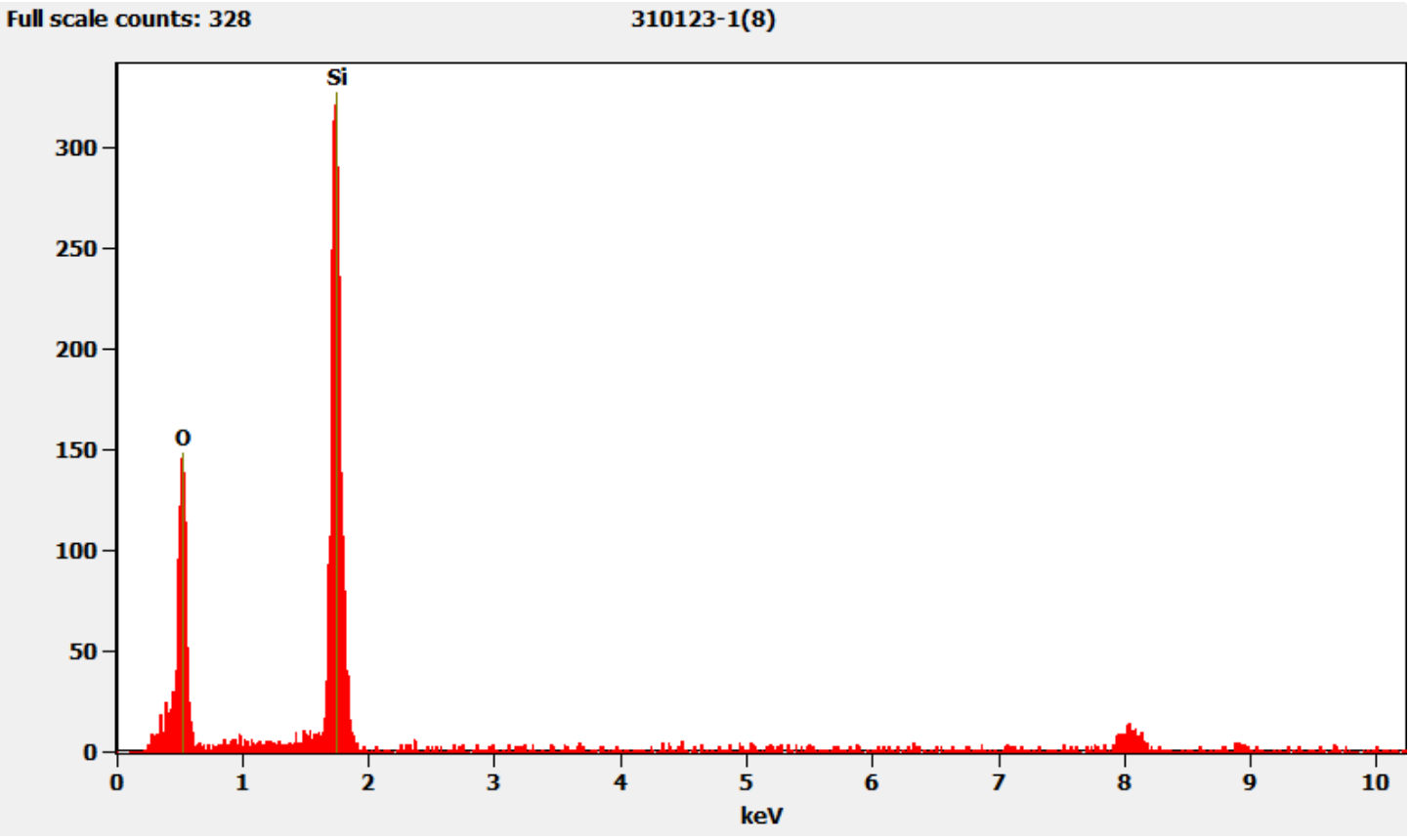
Chemistry from the Mica Fiber pictured above



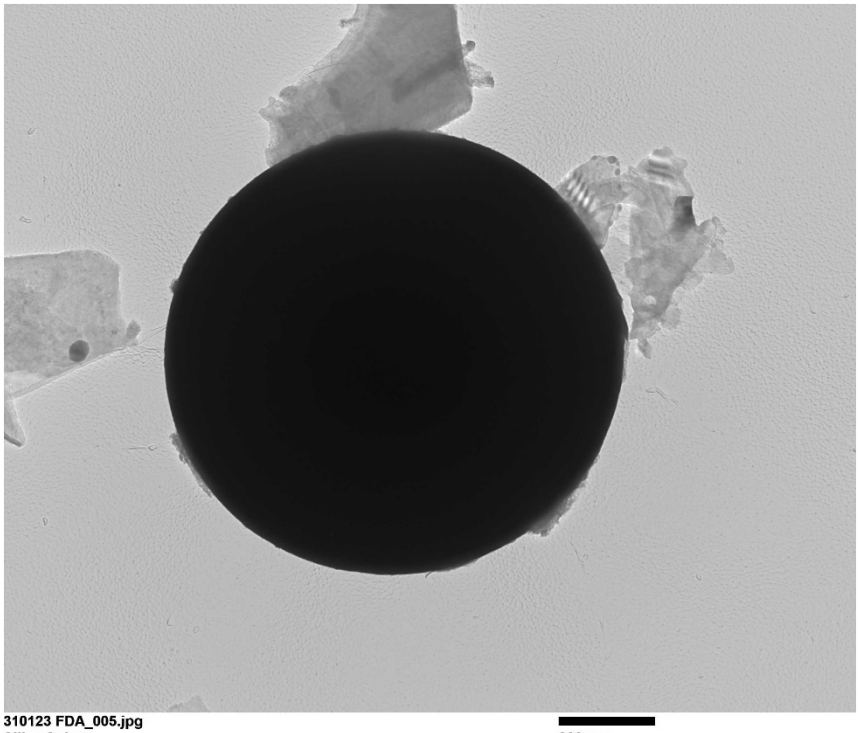
310123-1, Silica Fiber



Chemistry from the Silica Fiber pictured above



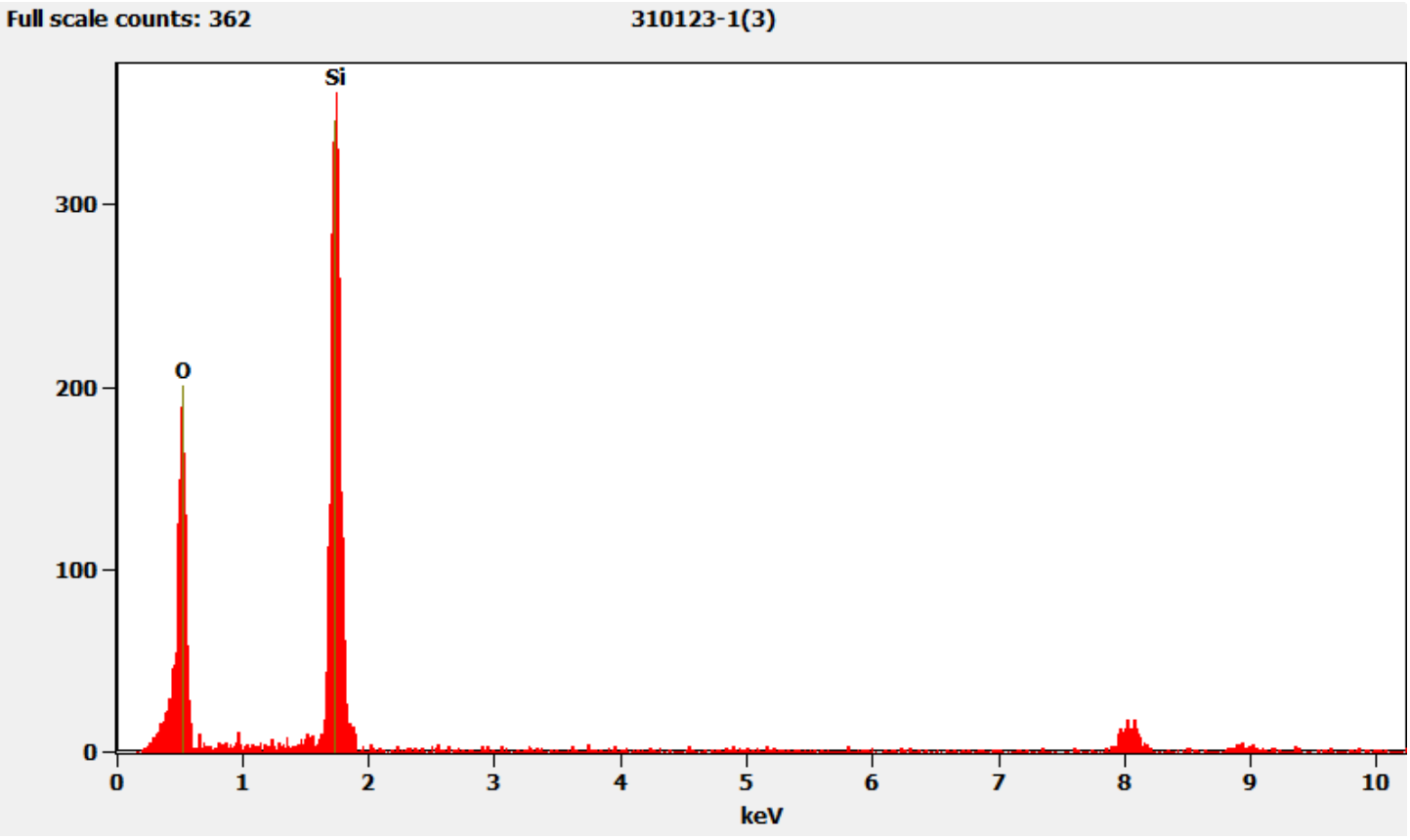
310123-1, Silica Sphere



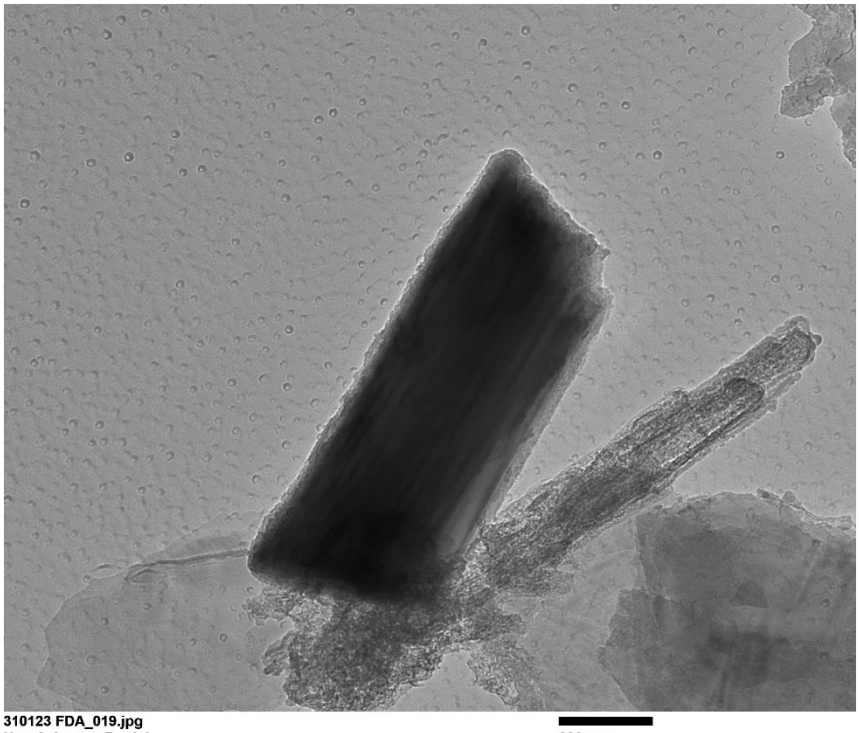
310123 FDA_005.jpg
Silica Sphere
Cal: 0.002858 µm/pix
14:56 9/18/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

800 nm
HV=100kV
Direct Mag: 3600 x
AMA Analytical Services, Inc

Chemistry from the Silica Sphere pictured above



310123-1, Non-Asbestos Particle



310123 FDA_019.jpg
Non Asbestos Particle
Cal: 0.734921 nm/pix
15:56 9/18/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

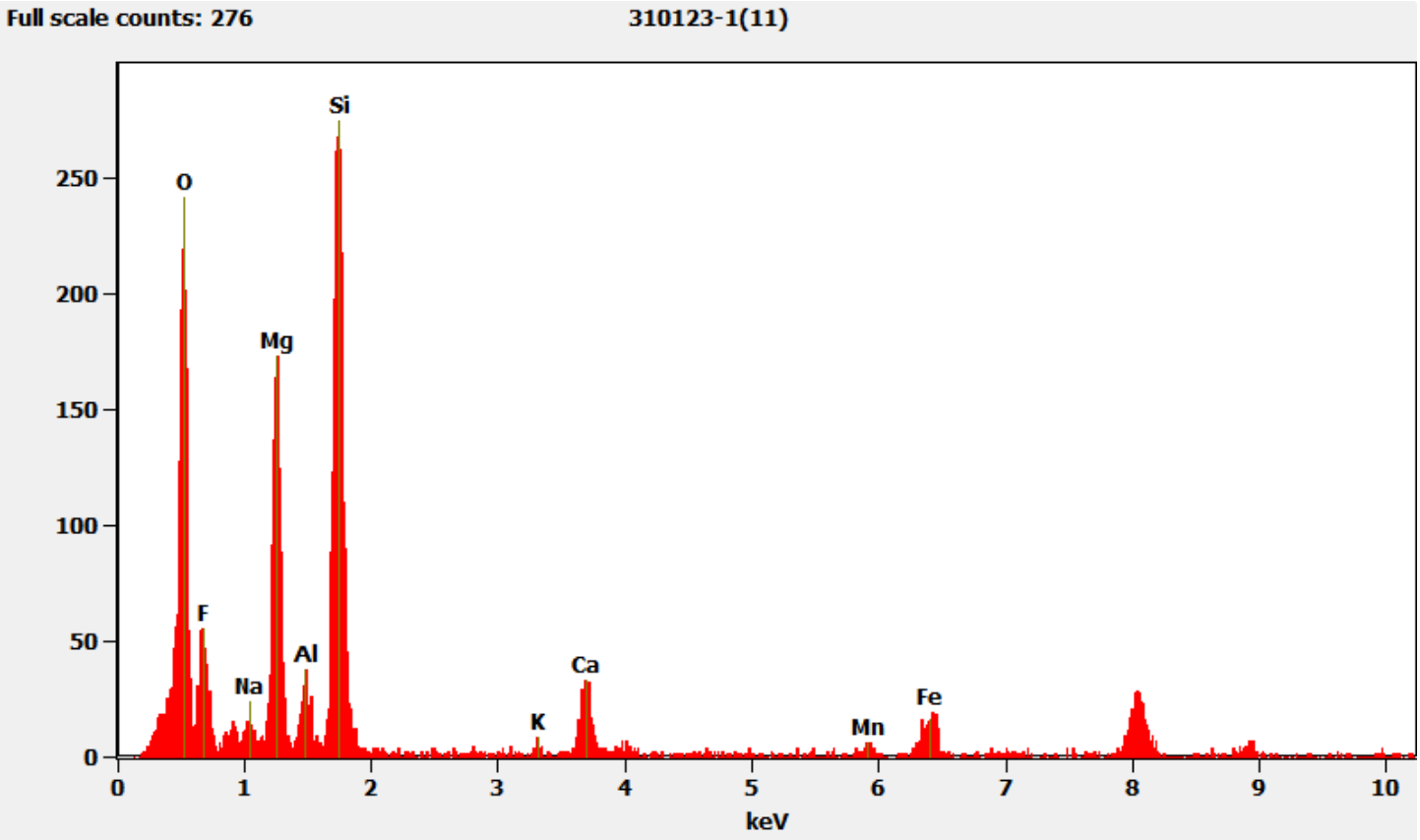
200 nm
HV=100kV
Direct Mag: 14000 x
AMA Analytical Services, Inc

Diffraction Pattern from the Non-Asbestos Particle pictured above

310123 FDA_020.jpg
Non Asbestos Particle
15:57 9/18/2019
TEM Mode: Diffraction
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

100 (1/Å)
HV=100kV
Cam Len: 0.2200 m
AMA Analytical Services, Inc

Chemistry from the Non-Asbestos Particle pictured above



<u>310123-2, 2A, 2B, Client Sample D-69</u>

PLM

All three aliquots of sample D-69 were analyzed by (b) (6) on September 26, 2019. No asbestos or non-asbestos amphibole variants were detected the samples. The results were calculated using the equations detailed in the calculations section.

310123-2	NAD
310123-2A	NAD
310123-2B	NAD

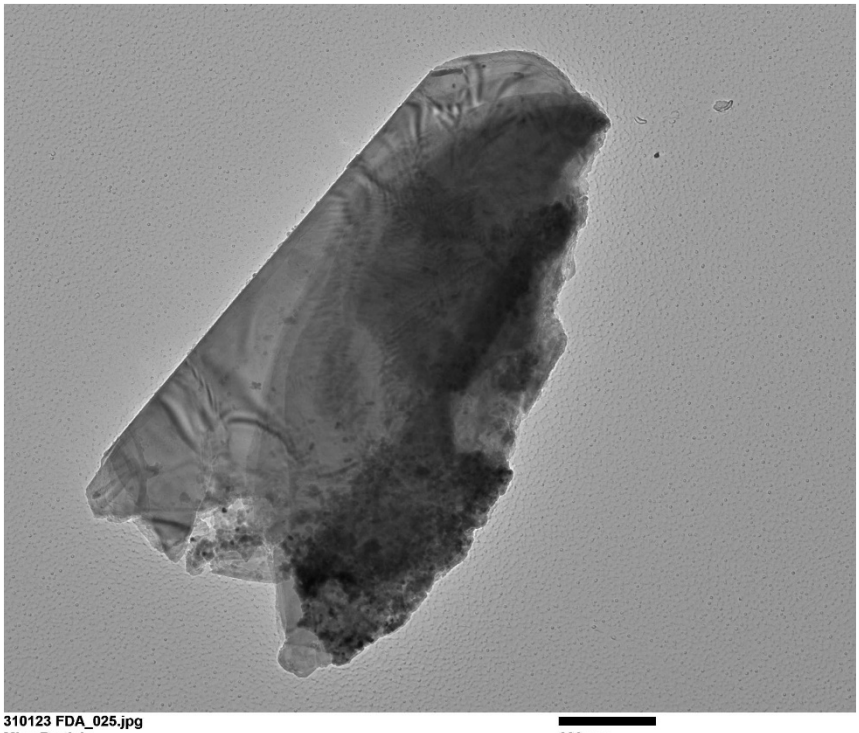
TEM

Sample 2 was analyzed by (b) (6) on September 18-19, 2019. (b) (6) analyzed samples 2A and 2B on September 26, 2019. The primary particles observed were mica and talc along with some silica spheres, a few titanium-coated particles and talc fibers. No asbestos or non-asbestos amphibole variants were detected in the samples. The results were calculated using the equations detailed in the calculations section.

310123-2	NAD
310123-2A	NAD
310123-2B	NAD

Below are pictures, diffraction patterns, and chemistry from some of the observed particles. The unidentified peaks in chemistry spectra are copper, zinc, and carbon. Those peaks are from the TEM specimen holder and specimen grid.

Sample 310123-2A, Mica Particle



310123 FDA_025.jpg
Mica Particle
Cal: 0.002144 µm/pix
17:13 9/18/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

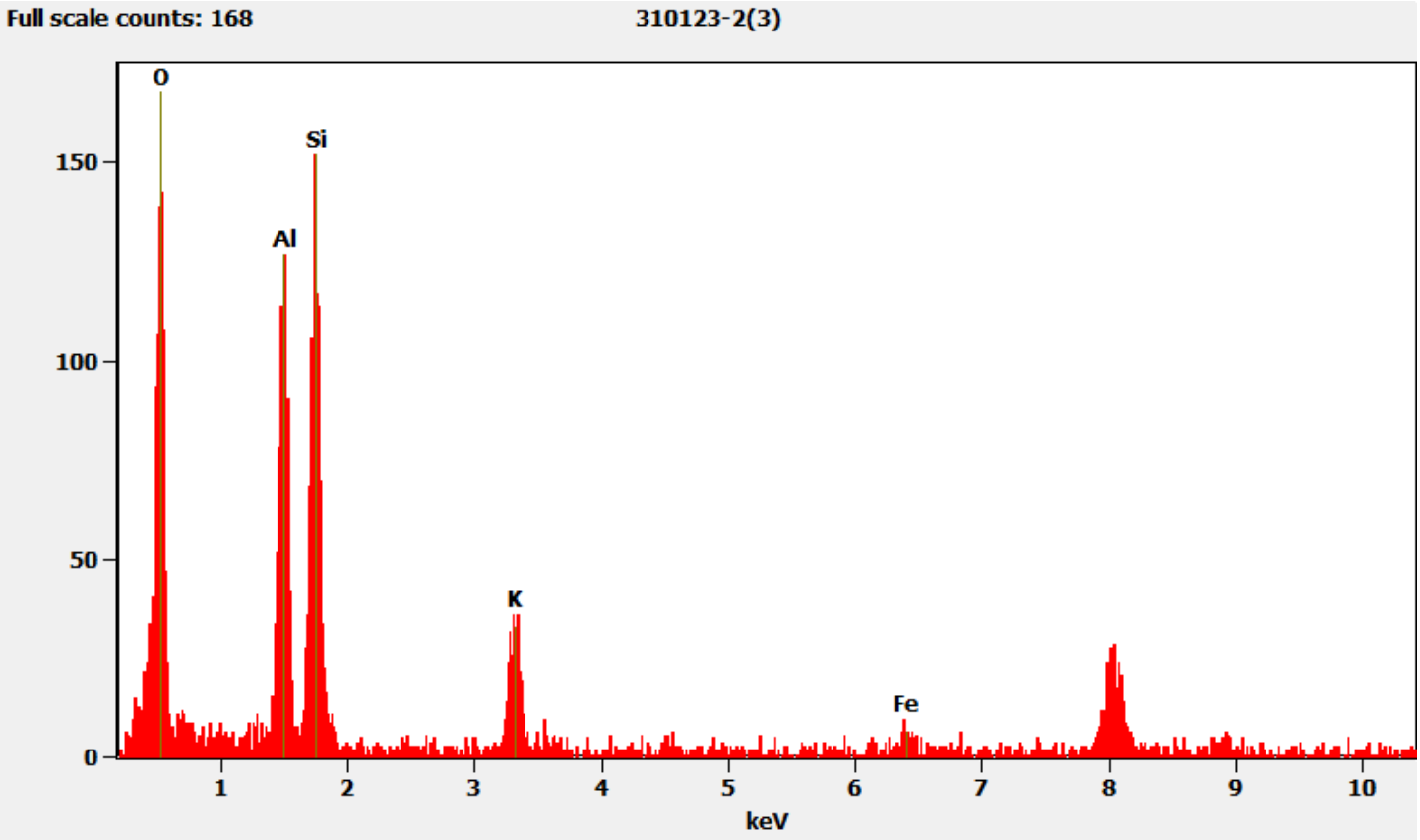
600 nm
HV=100kV
Direct Mag: 4800 x
AMA Analytical Services, Inc

Diffraction Pattern from the Mica Particle pictured above.

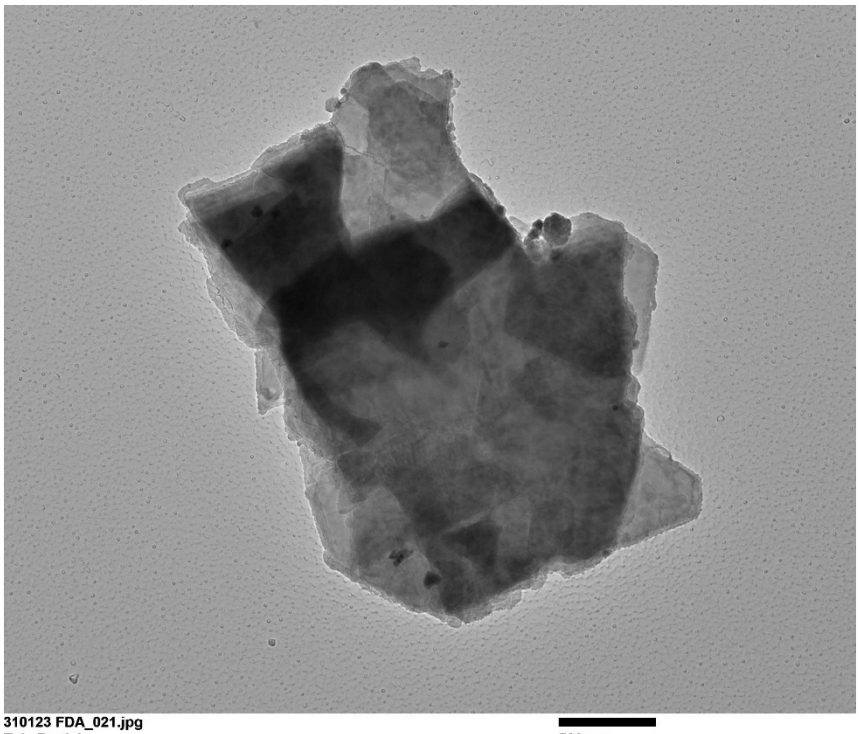
310123 FDA_026.jpg
Mica Particle
17:14 9/18/2019
TEM Mode: Diffraction
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

100 (1/Å)
HV=100kV
Cam Len: 0.2200 m
AMA Analytical Services, Inc

Chemistry from the Mica Particle pictured above

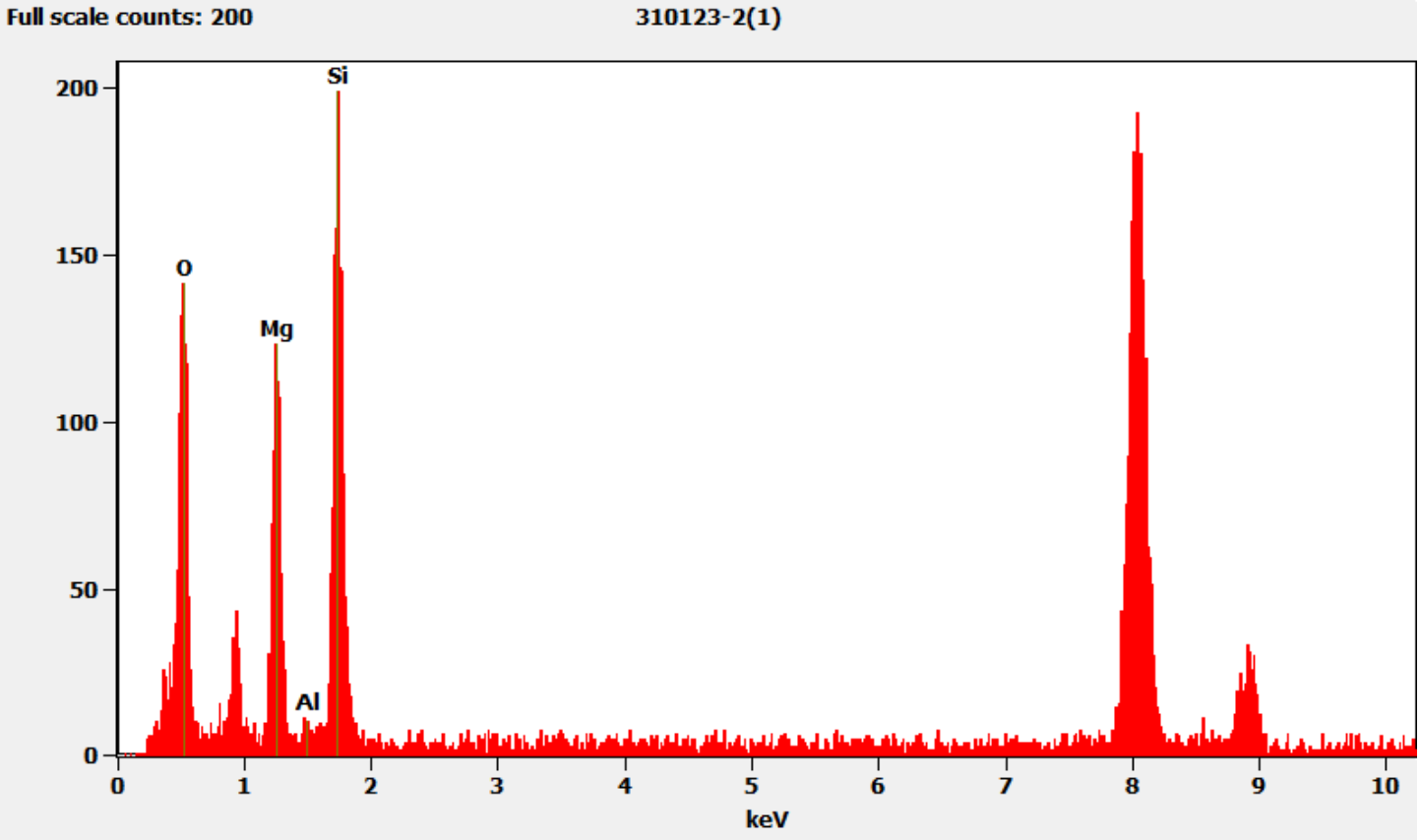


Sample 310123-2, Talc Particle

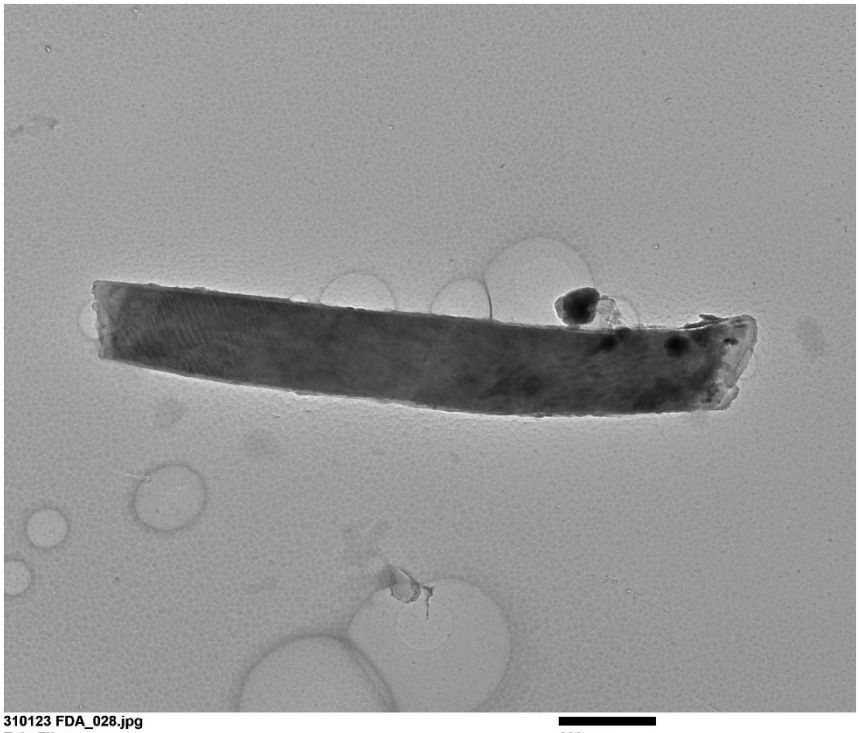


Hexagonal diffraction pattern from the Talc Particle pictured above

Chemistry from the Talc Particle pictured above



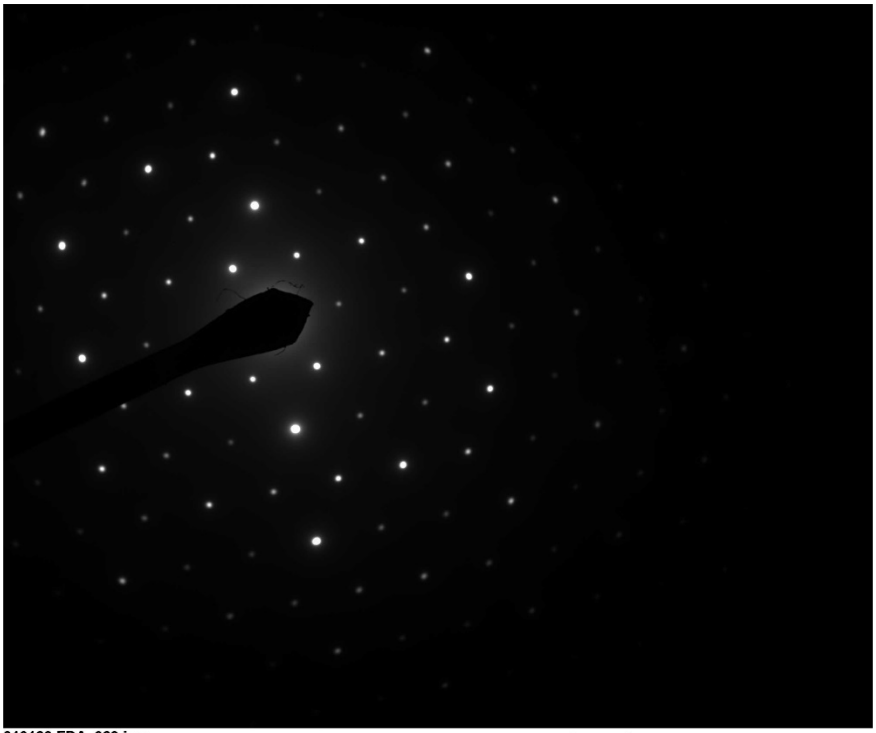
Sample 310123-2, Talc Fiber



310123 FDA_028.jpg
Talc Fiber
Cal: 0.002144 µm/pix
17:30 9/18/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

600 nm
HV=100kV
Direct Mag: 4800 x
AMA Analytical Services, Inc

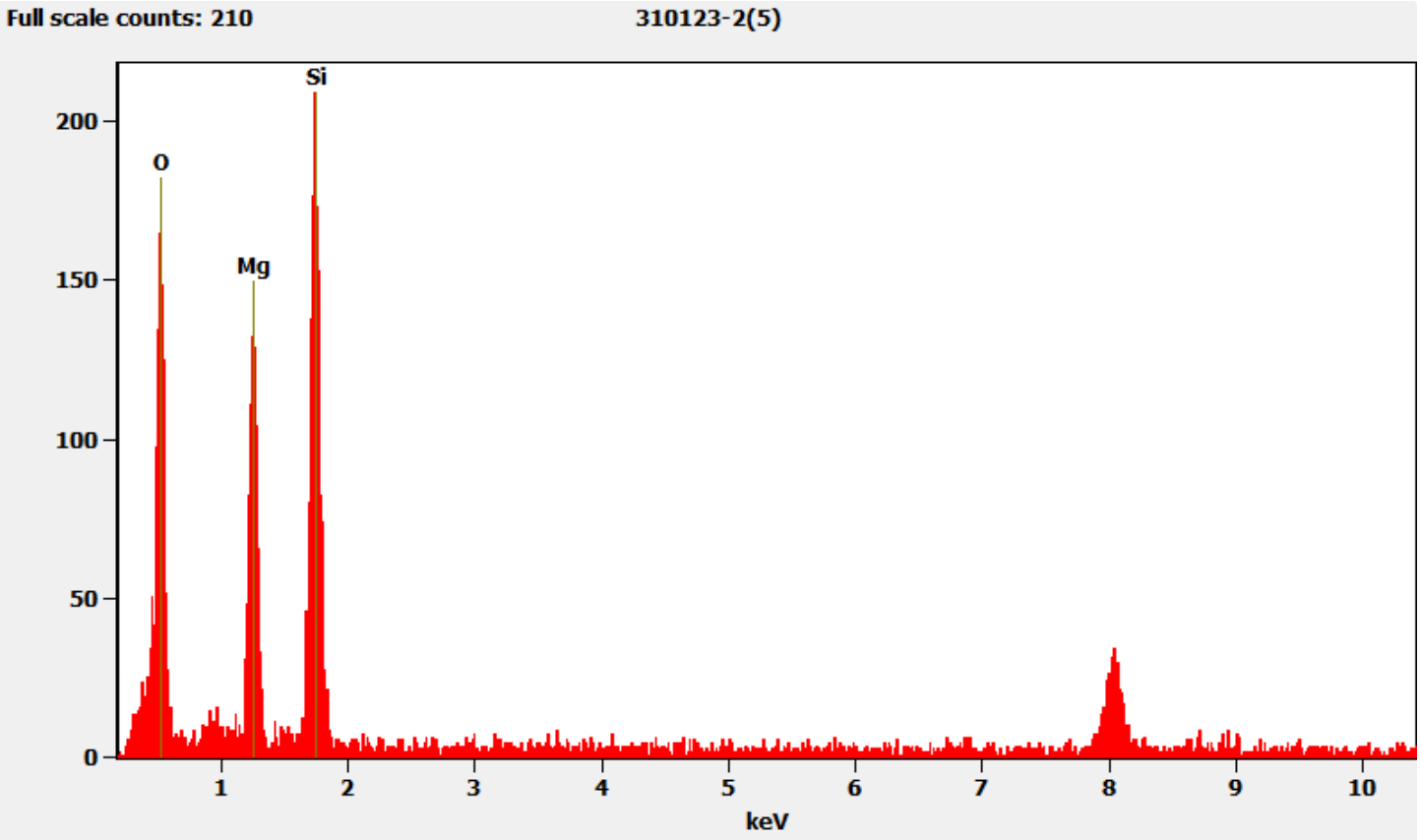
Hexagonal diffraction pattern from the Talc Fiber pictured above.



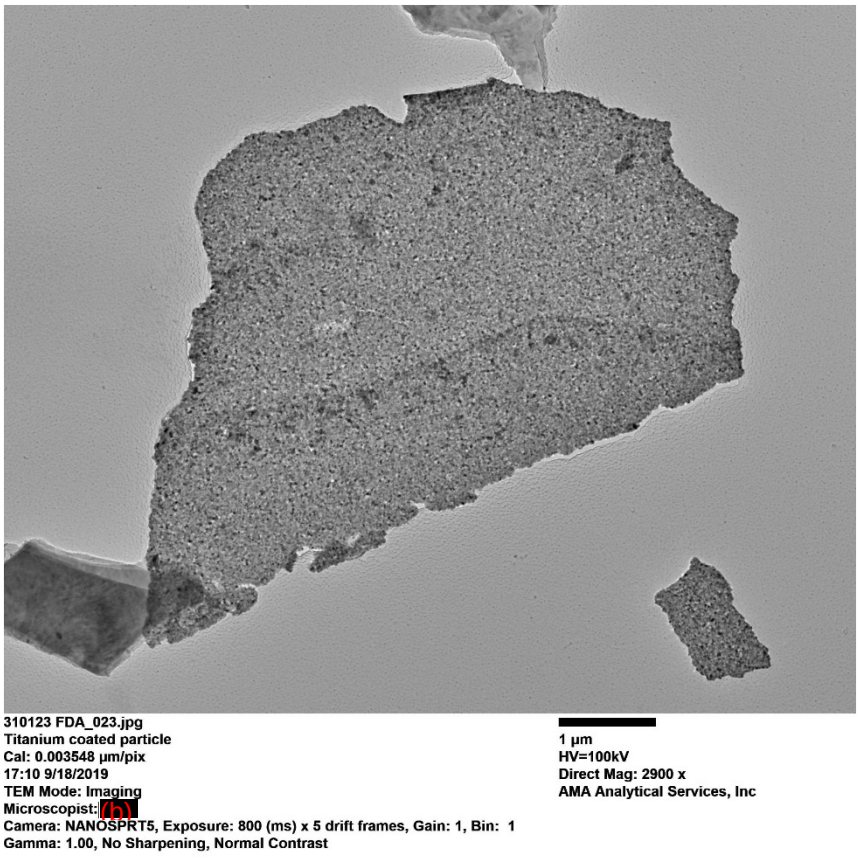
310123 FDA_029.jpg
Talc Fiber
17:31 9/18/2019
TEM Mode: Diffraction
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

100 (1/Å)
HV=100kV
Cam Len: 0.2200 m
AMA Analytical Services, Inc

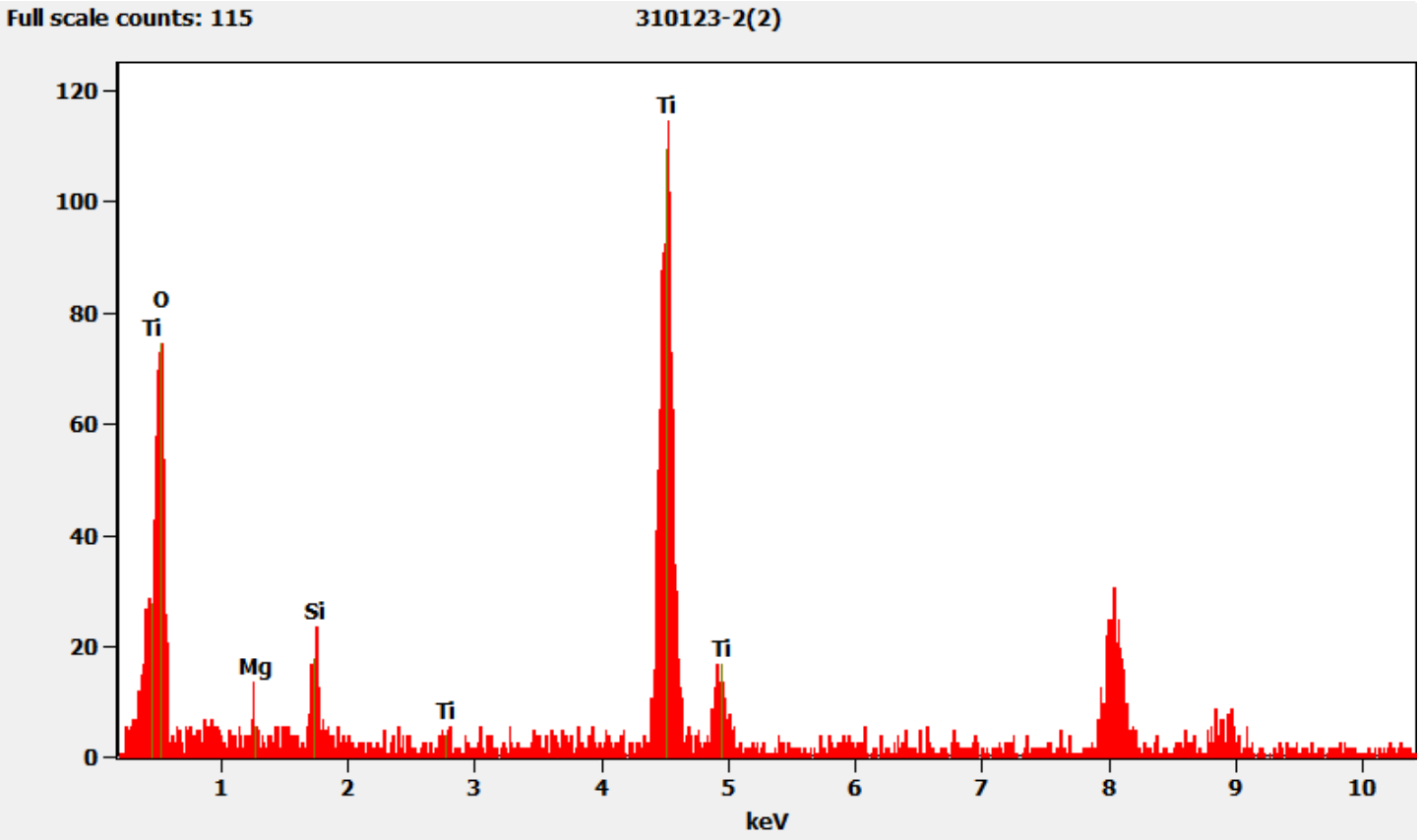
Chemistry from the Talc Fiber pictured above.



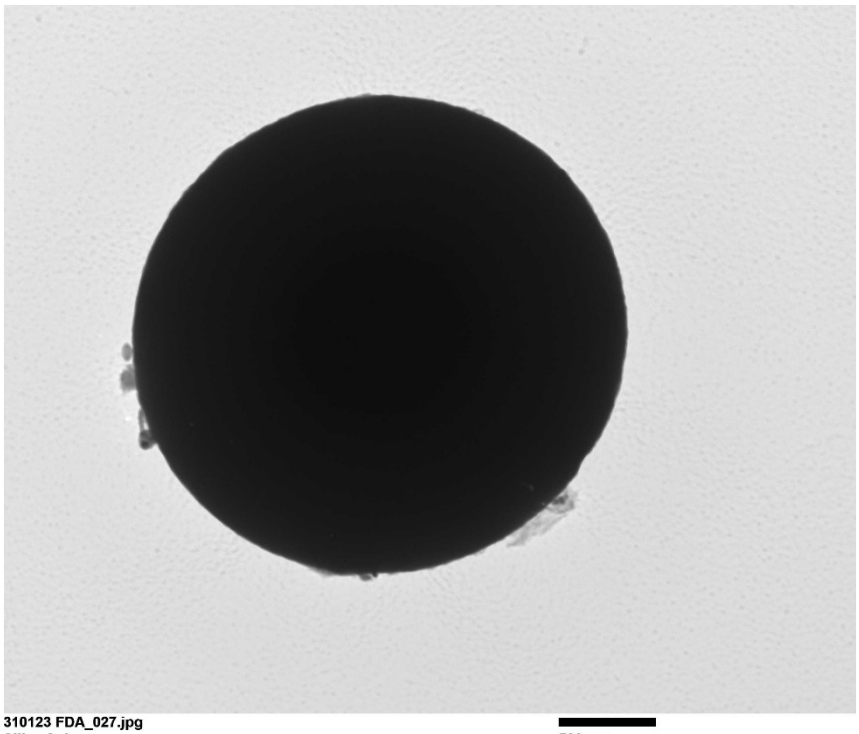
Sample 310123-2, Titanium Coated Particle



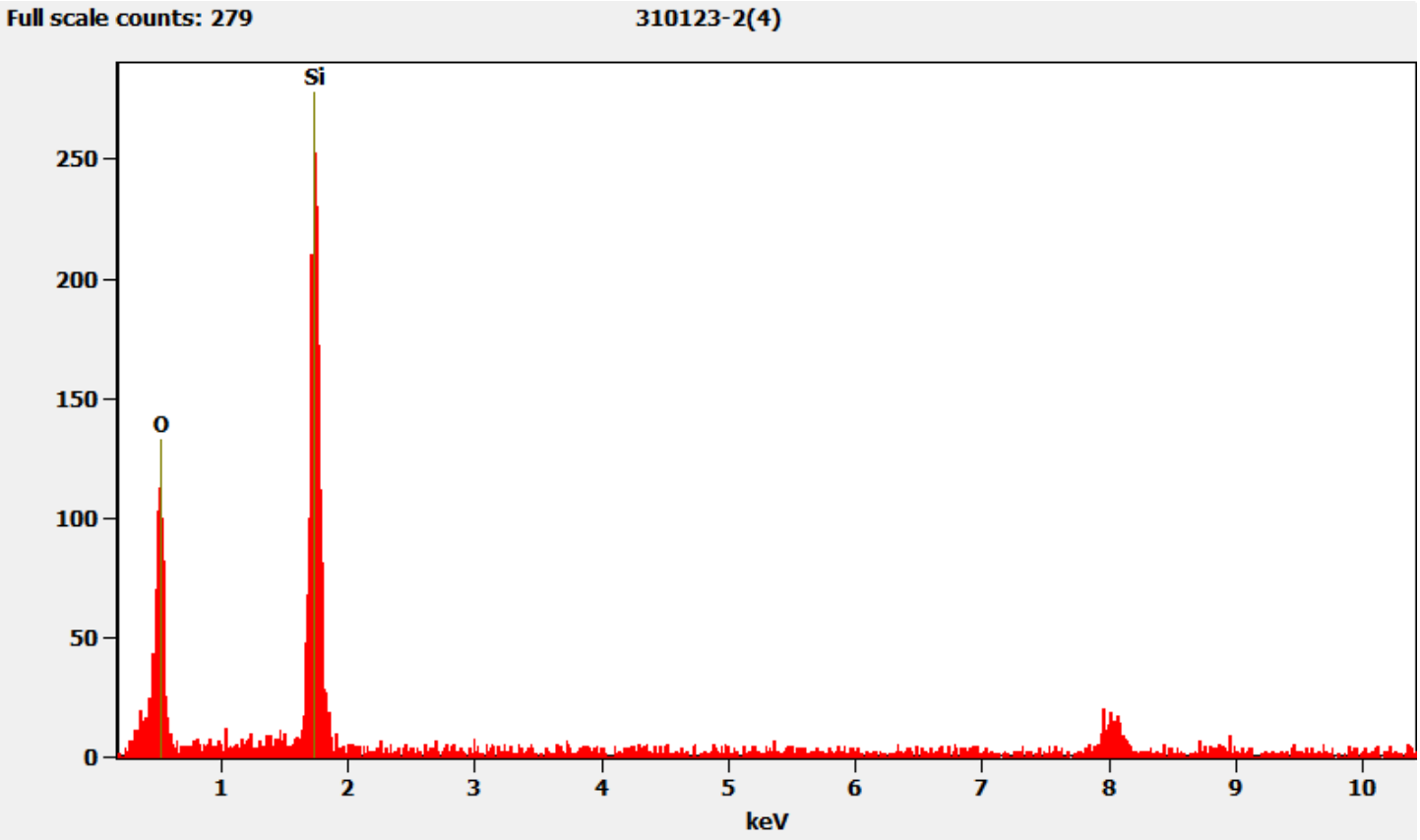
Chemistry from the Titanium Coated Particle pictured above.



310123-2, Silica Sphere



Chemistry from the Silica Sphere pictured above



310123-3, 3A, 3B, Client Sample D-70

PLM

All three aliquots of sample D-70 were analyzed by (b) (6) on September 26, 2019. No asbestos or non-asbestos amphibole variants were detected the samples. The results were calculated using the equations detailed in the calculations section.

310123-3	NAD
310123-3A	NAD
310123-3B	NAD

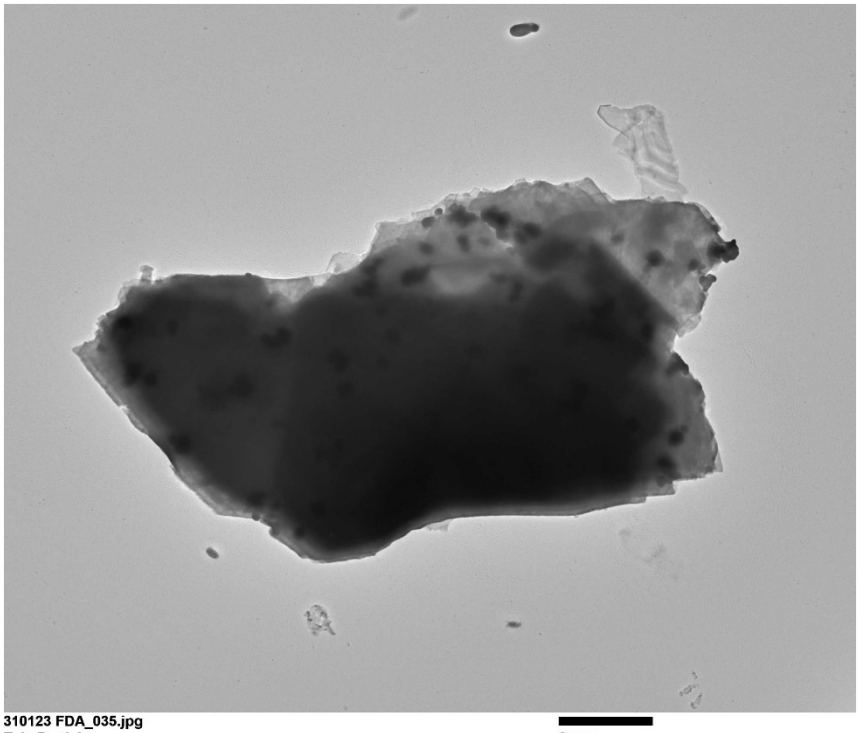
TEM

(b) (6) analyzed sample 3 on September 19, 2019 and sample 3B September 26, 2019. (b) (6) analyzed sample 3A on September 26, 2019. The primary particles observed were talc and mica along with some silica spheres and titanium particle and a few titanium fibers. No asbestos or non-asbestos amphibole variants were detected in the samples. The results were calculated using the equations detailed in the calculations section.

310123-3	NAD
310123-3A	NAD
310123-3B	NAD

Below are pictures, diffraction patterns, and chemistry from some of the observed particles. The unidentified peaks in chemistry spectra are copper, zinc, and carbon. Those peaks are from the TEM specimen holder and specimen grid.

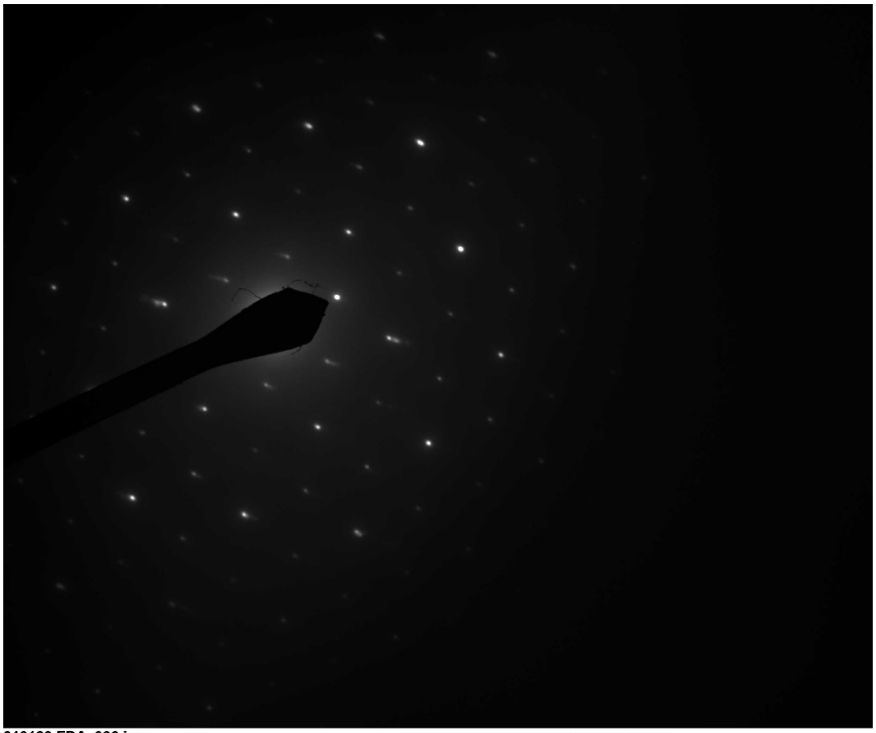
Sample 310123-3, Talc Particle



310123 FDA_035.jpg
Talc Particle
Cal: 0.007349 µm/pix
10:29 9/19/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

2 µm
HV=100kV
Direct Mag: 1400 x
AMA Analytical Services, Inc

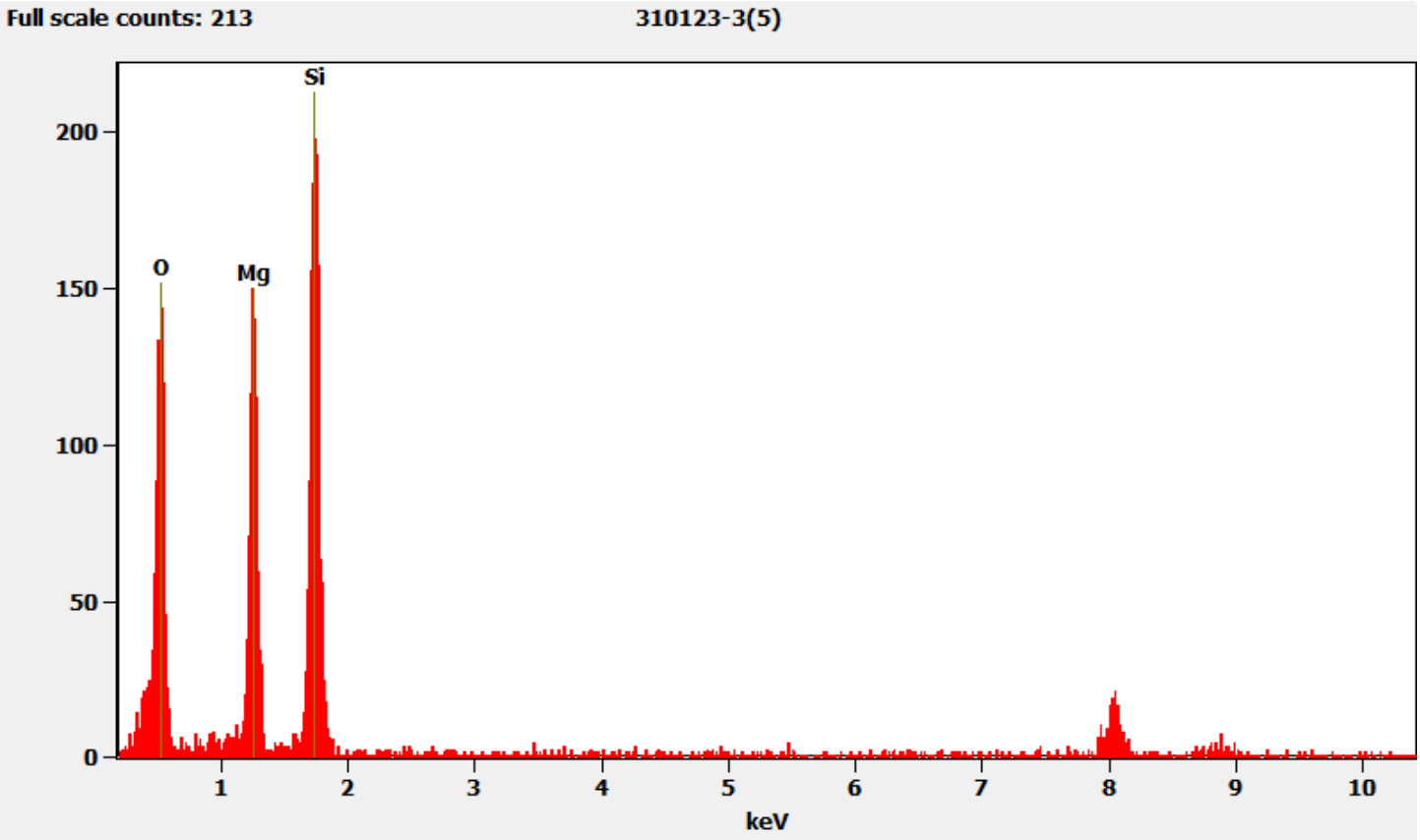
Hexagonal diffraction pattern from the Talc Particle pictured above.



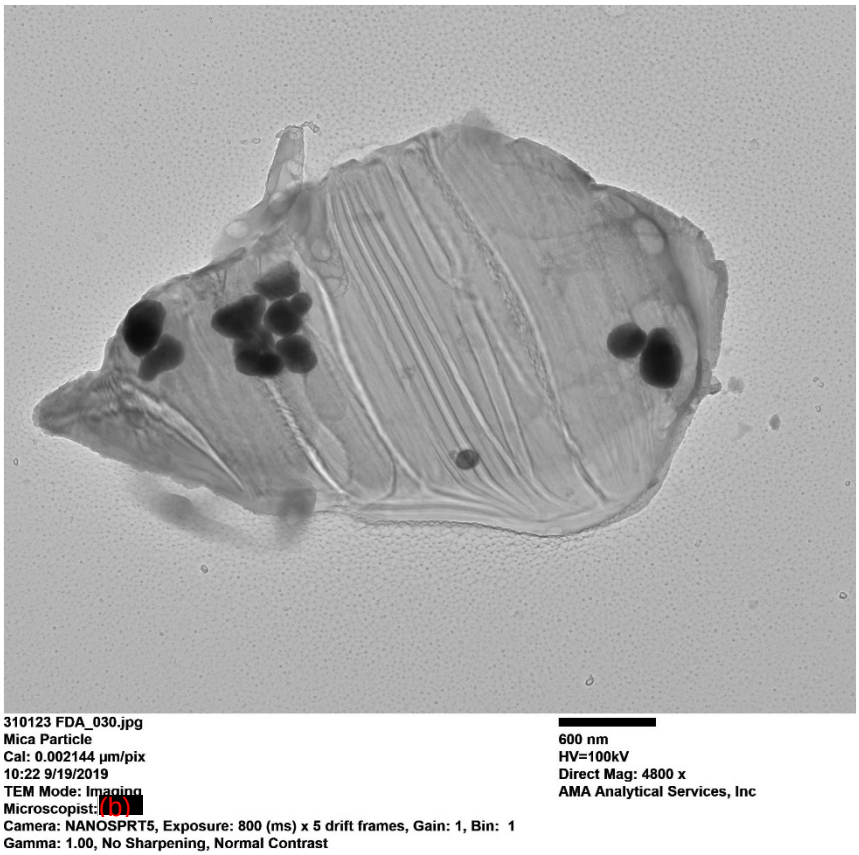
310123 FDA_036.jpg
Talc Particle
10:30 9/19/2019
TEM Mode: Diffraction
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

100 (1/Å)
HV=100kV
Cam Len: 0.2200 m
AMA Analytical Services, Inc

Chemistry from the Talc Particle pictured above

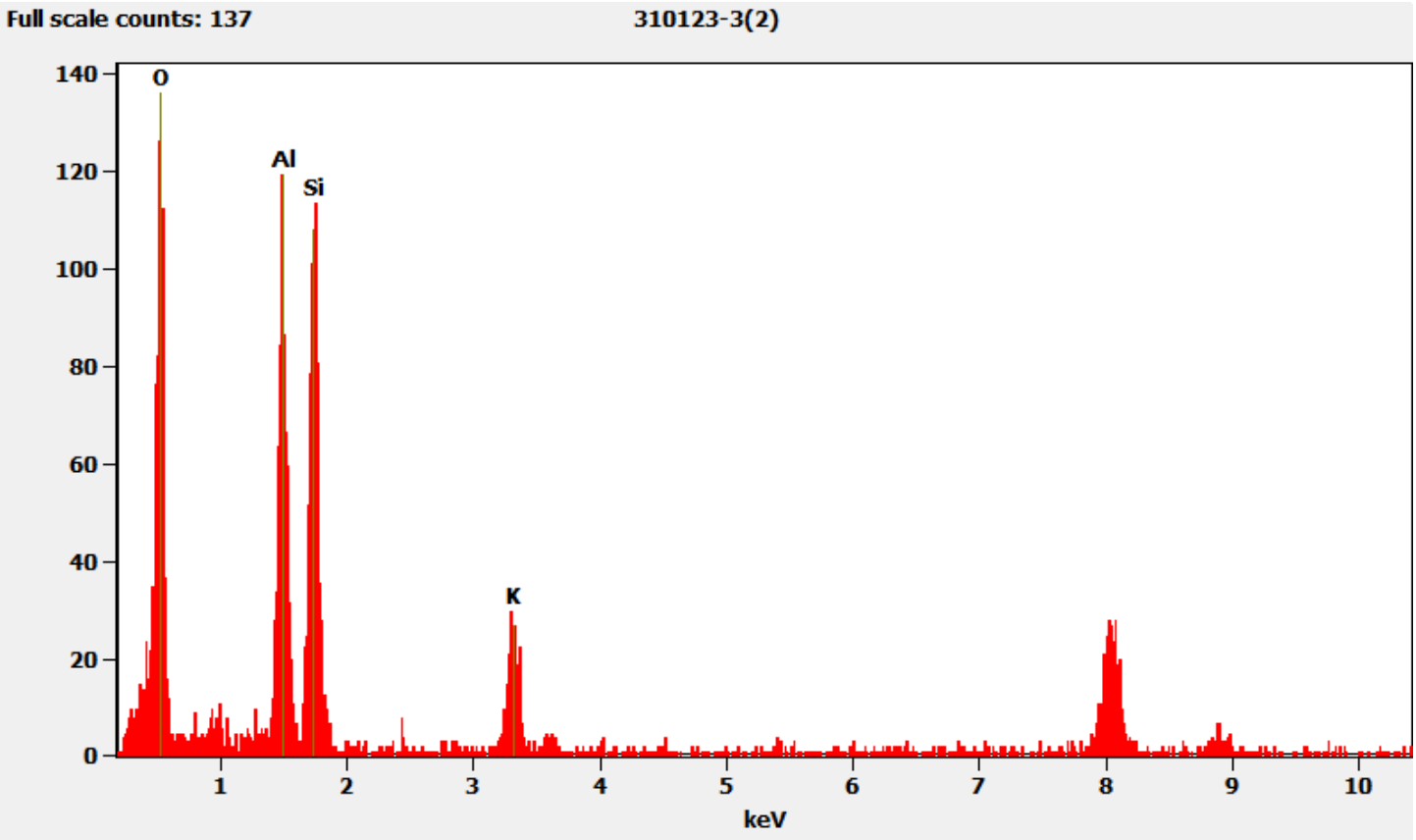


Sample 310123-3, Mica Particle

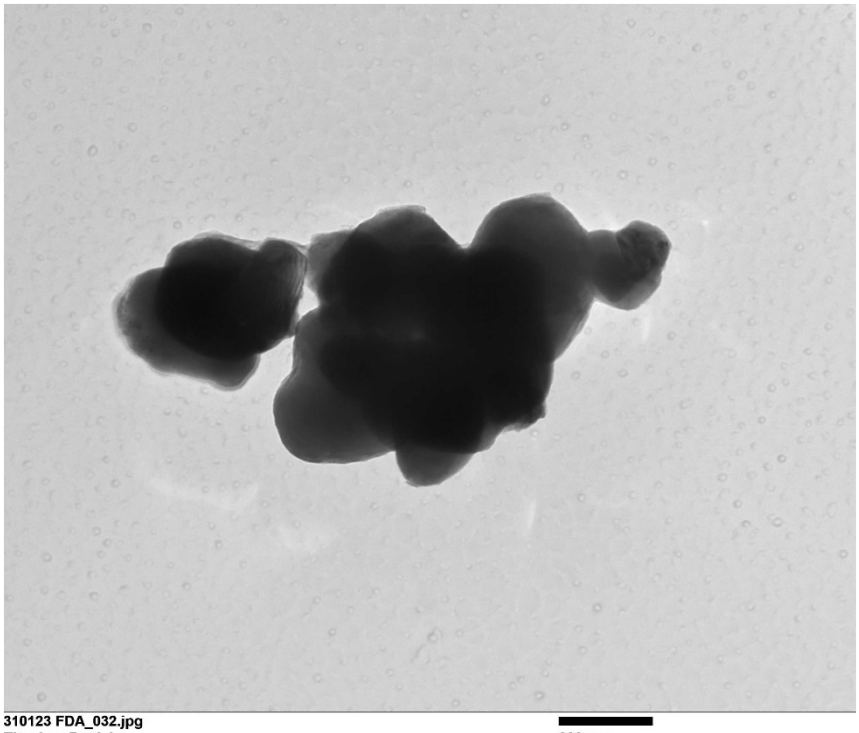


Diffraction pattern from the Mica Particle pictured above

Chemistry from the Mica Particle pictured above



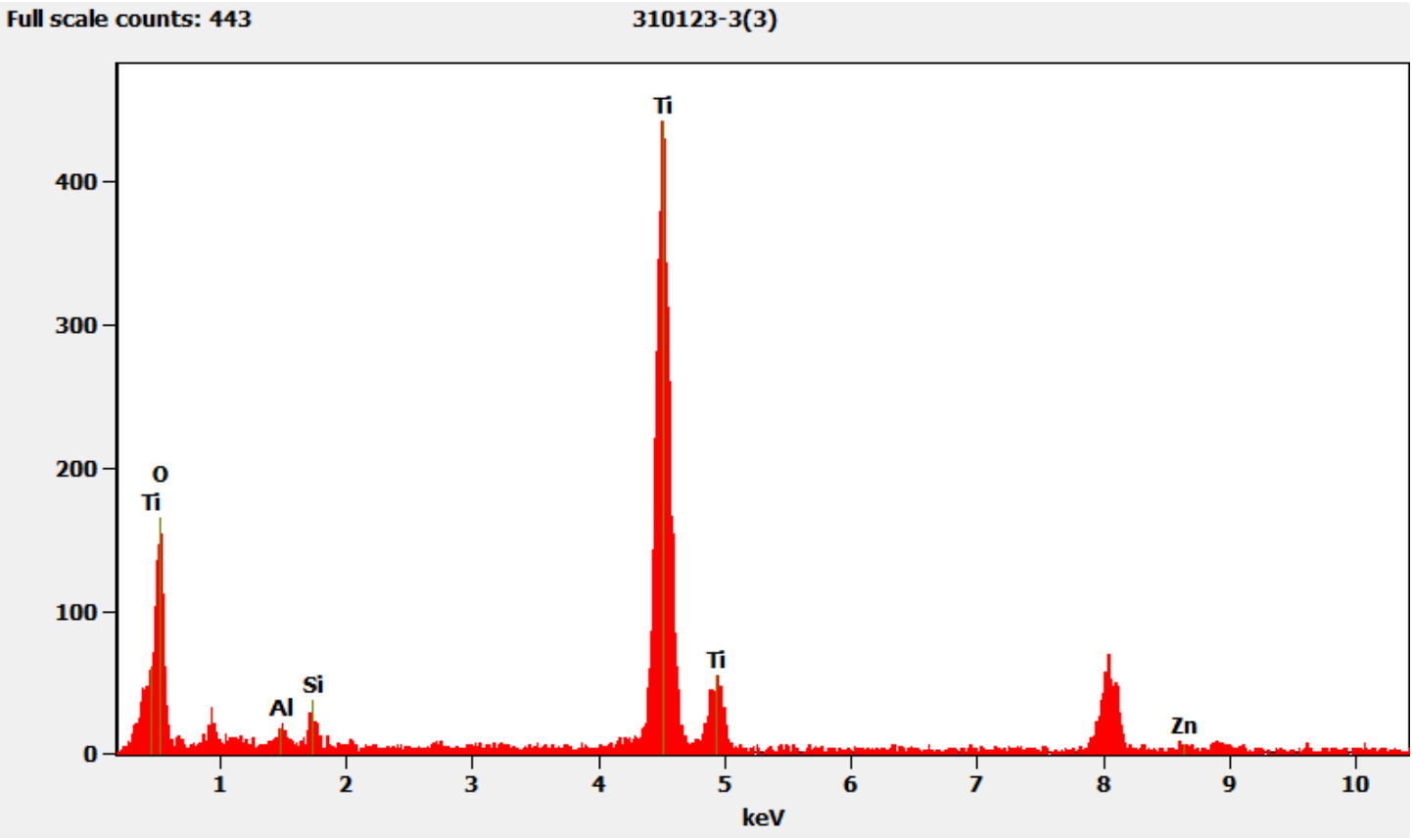
310123-3, Titanium Particles



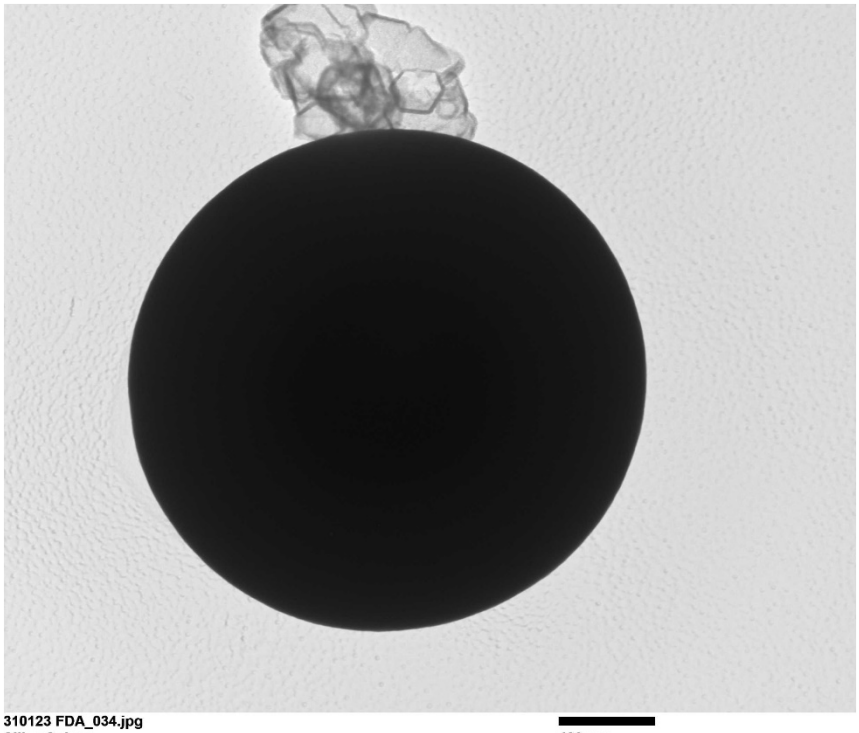
310123 FDA_032.jpg
Titanium Particles
Cal: 0.734921 nm/pix
10:24 9/19/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

200 nm
HV=100kV
Direct Mag: 14000 x
AMA Analytical Services, Inc

Chemistry from the Titanium Particles pictured above



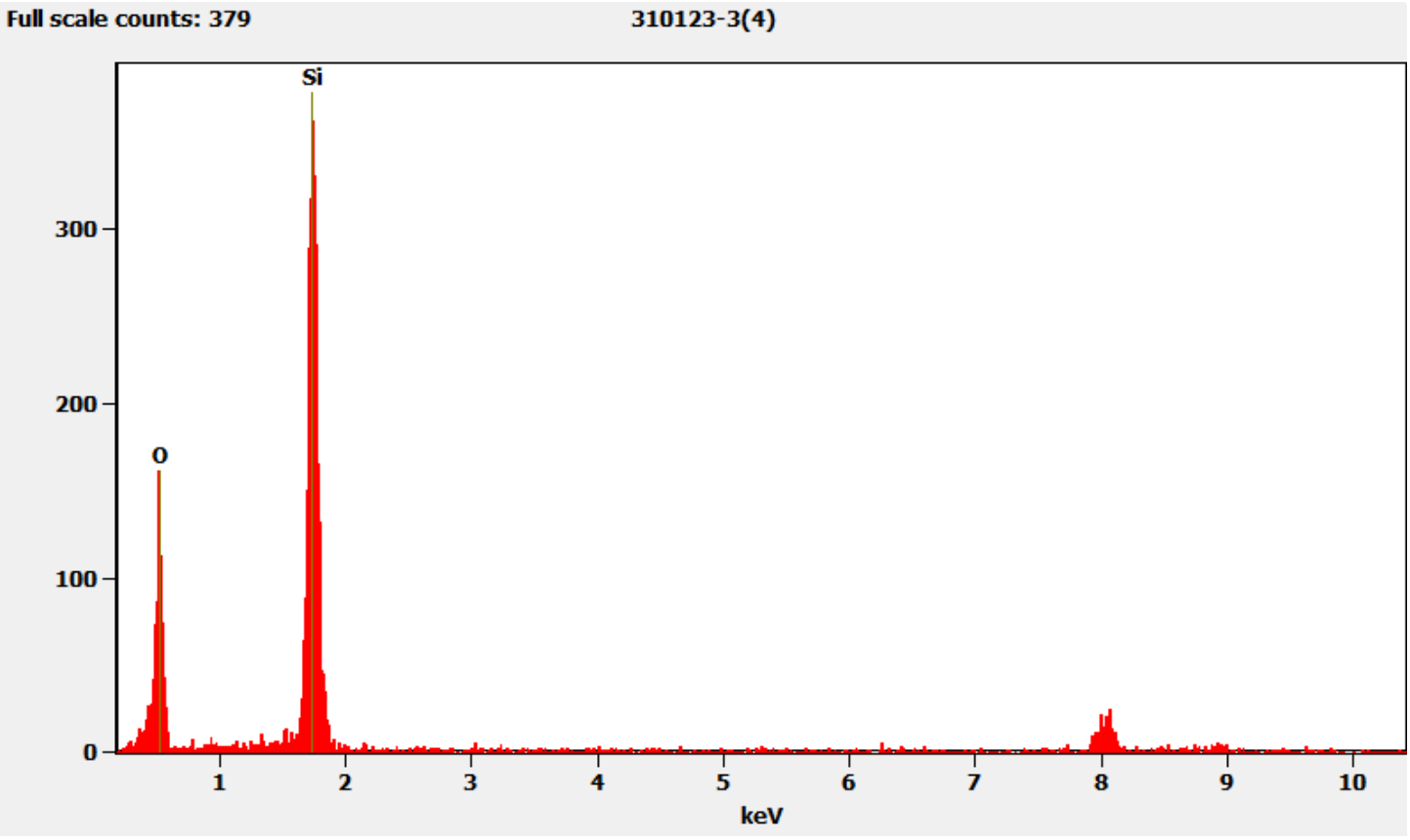
Sample 310123-3, Silica Sphere



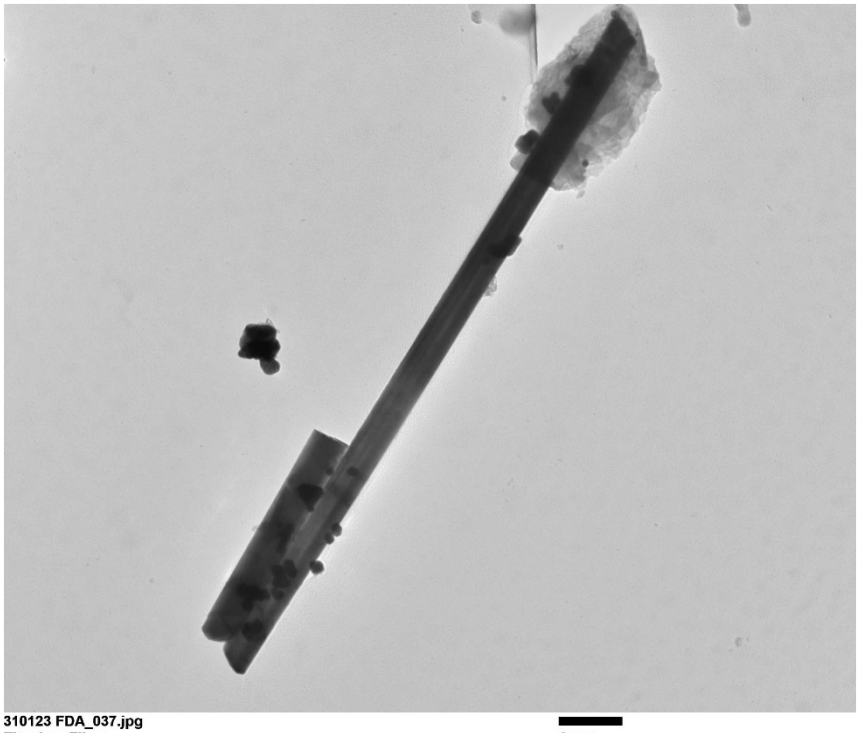
310123 FDA_034.jpg
Silica Sphere
Cal: 0.001429 µm/pix
10:27 9/19/2019
TEM Mode: Imaging
Microscopist: [redacted]
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

400 nm
HV=100kV
Direct Mag: 7200 x
AMA Analytical Services, Inc

Chemistry from the Silica Sphere pictured above



310123-3, Titanium Fiber



310123 FDA_037.jpg
Titanium Fiber
Cal: 0.005415 µm/pix
11:03 9/19/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

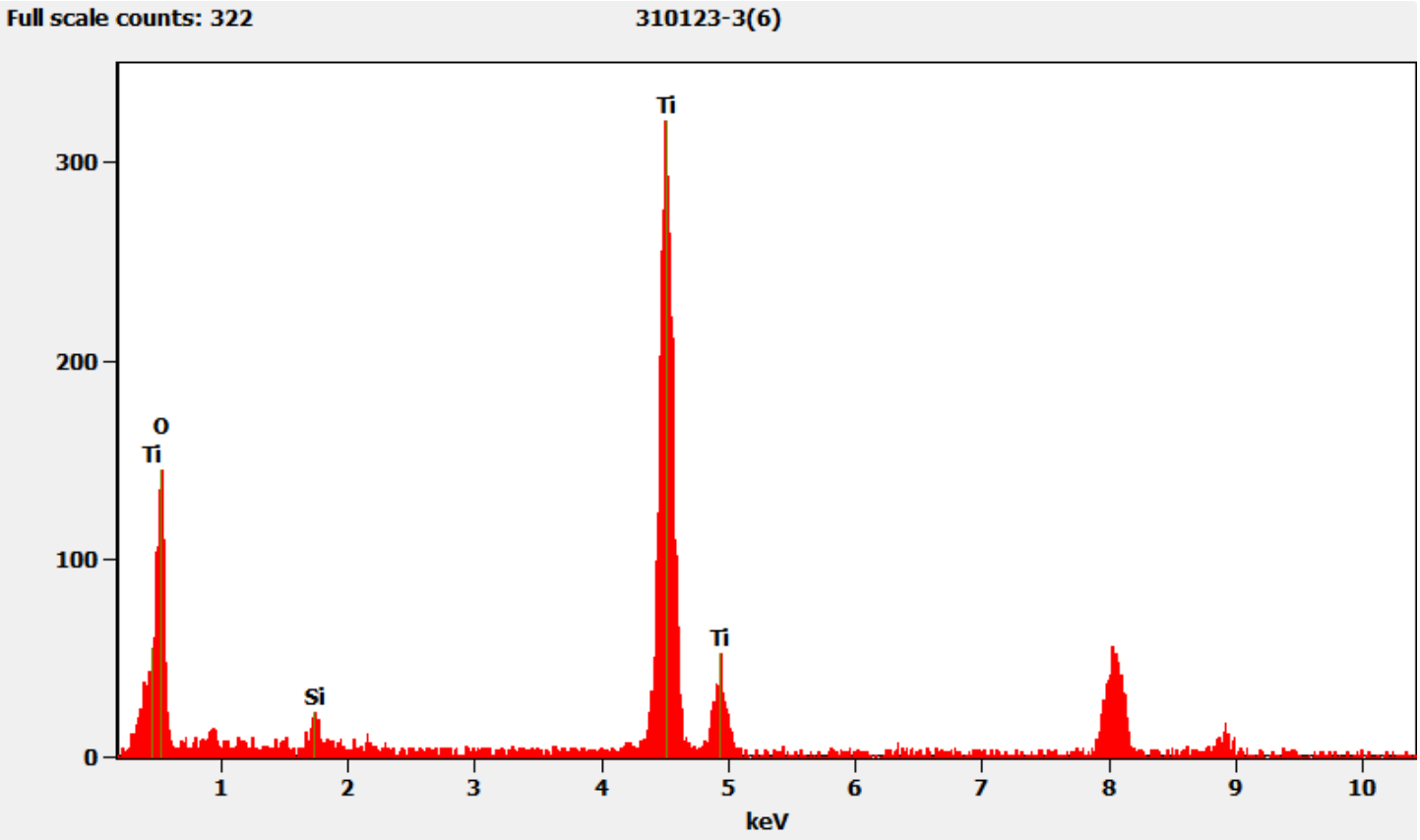
1 µm
HV=100kV
Direct Mag: 1900 x
AMA Analytical Services, Inc

Diffraction pattern from the Titanium Fiber pictured above

310123 FDA_038.jpg
Titanium Fiber
11:04 9/19/2019
TEM Mode: Diffraction
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

100 (1/Å)
HV=100kV
Cam Len: 0.2200 m
AMA Analytical Services, Inc

Chemistry from the Titanium Fiber pictured above



310123-4, 4A, 4B, Client Sample D-71

PLM

All three aliquots of sample D-71 were analyzed by (b) (6) on September 26, 2019. No asbestos or non-asbestos amphibole variants were detected the samples. The results were calculated using the equations detailed in the calculations section.

310123-4	NAD
310123-4A	NAD
310123-4B	NAD

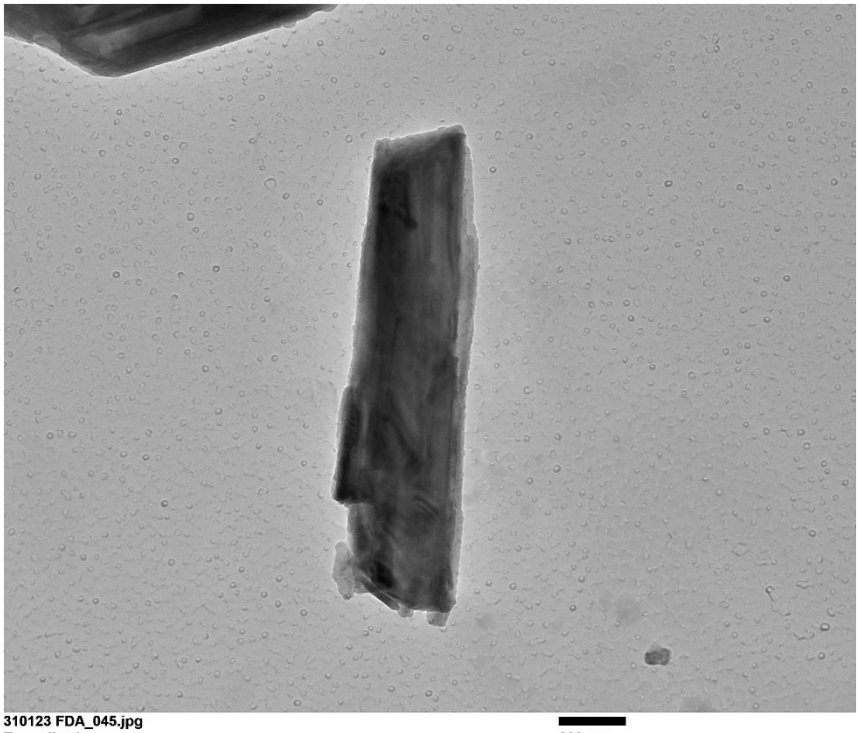
TEM

(b) (6) analyzed sample 4 on September 19, 2019 and samples 4A and 4B and September 26, 2019. The primary particle observed was talc along with a few talc fibers and talc ribbons. A tremolite structure was observed on aliquot 4. The results were calculated using the equations detailed in the calculations section.

310123-4	<0.00022
310123-4A	NAD
310123-4B	NAD

Below are pictures, diffraction patterns, and chemistry from some of the observed particles. The unidentified peaks in chemistry spectra are copper, zinc, and carbon. Those peaks are from the TEM specimen holder and specimen grid.

Sample 310123-4 Tremolite Structure



310123 FDA_045.jpg
Tremolite 1
Cal: 0.001029 µm/pix
12:41 9/19/2019
TEM Mode: Imaging
Microscopist:
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

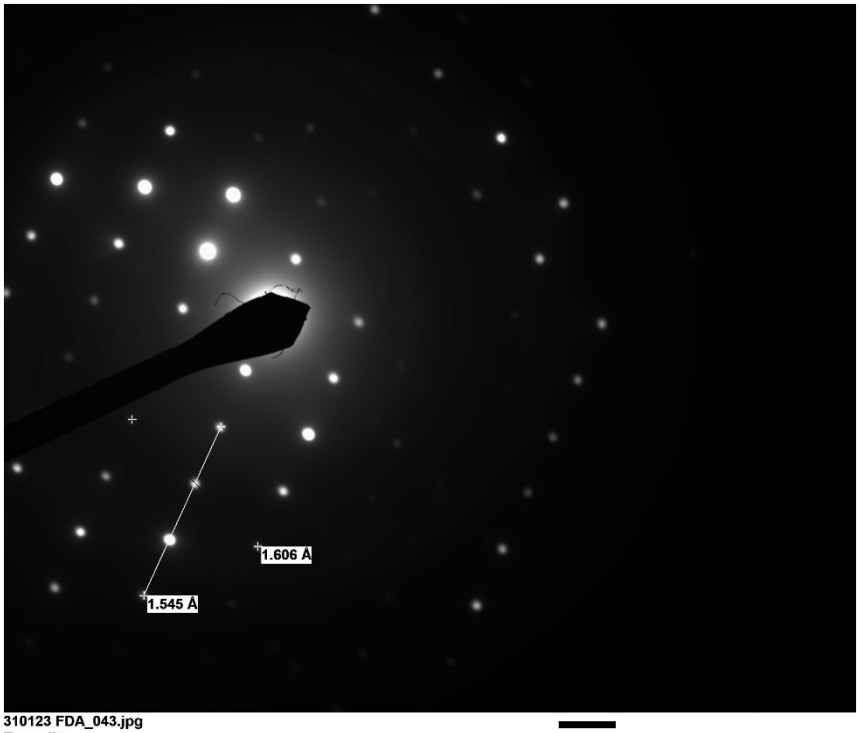
200 nm
HV=100kV
Direct Mag: 10000 x
AMA Analytical Services, Inc

Diffraction Pattern from the Tremolite Structure pictured above.

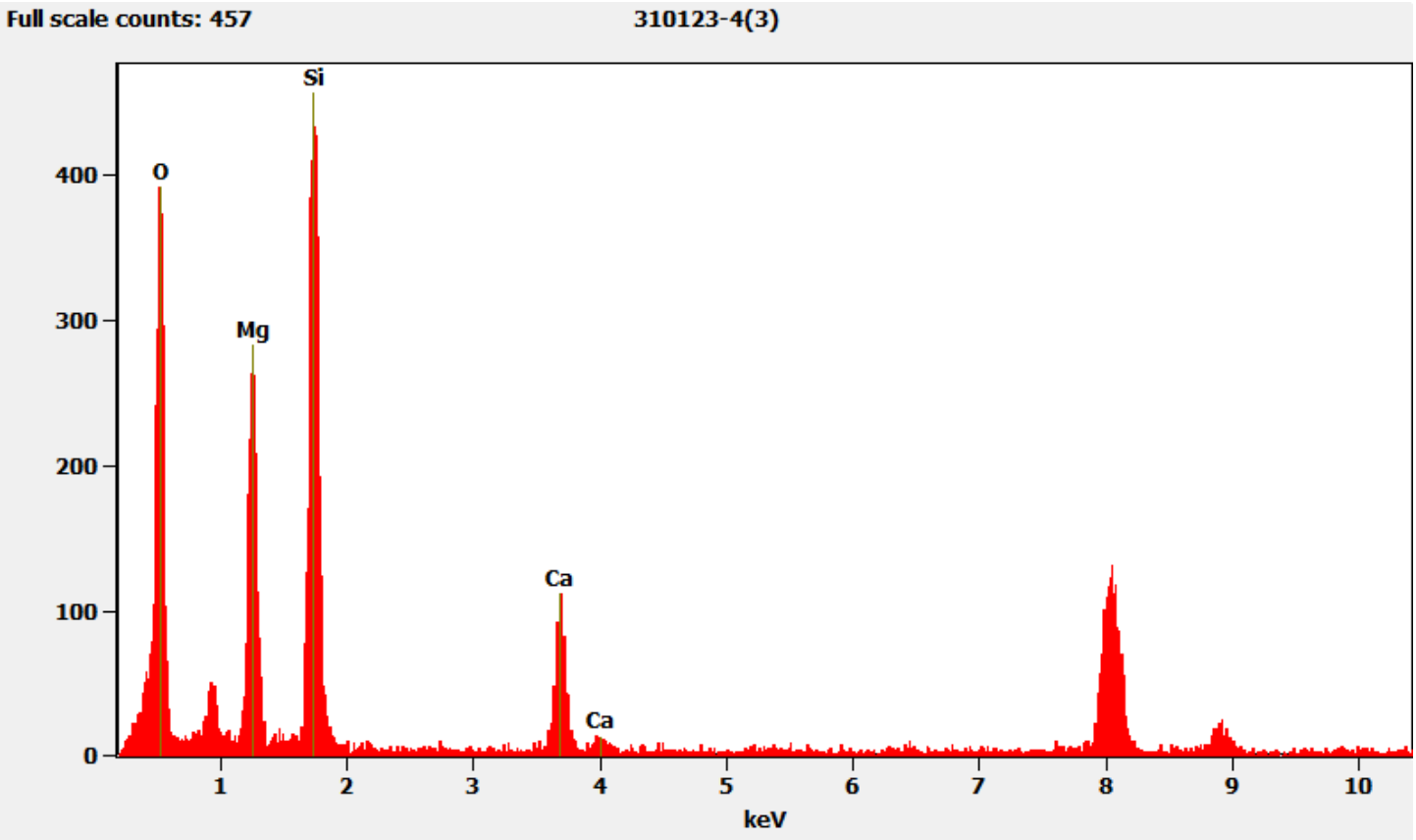
310123 FDA_044.jpg
Tremolite 1
12:38 9/19/2019
TEM Mode: Diffraction
Microscopist:
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

100 (1/Å)
HV=100kV
Cam Len: 0.2200 m
AMA Analytical Services, Inc

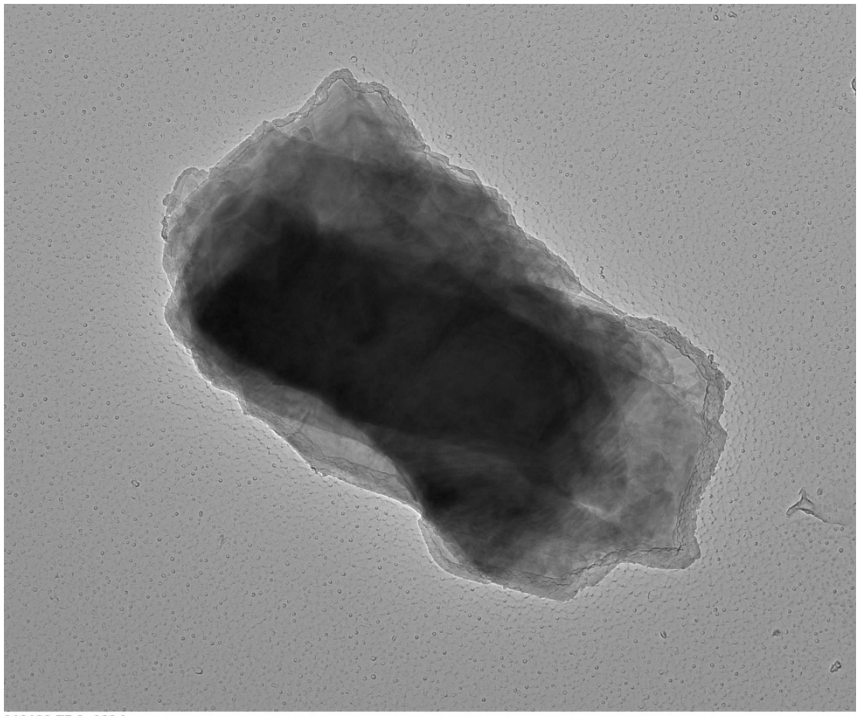
Zone-axis diffraction pattern from the Tremolite Structure pictured above



Chemistry from the Tremolite Structure pictured above



Sample 310123-4, Talc Particle



310123 FDA_039.jpg
Talc Particle
Cal: 0.001774 µm/pix
12:16 9/19/2019
TEM Mode: Imaging
Microscopist: [redacted]
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

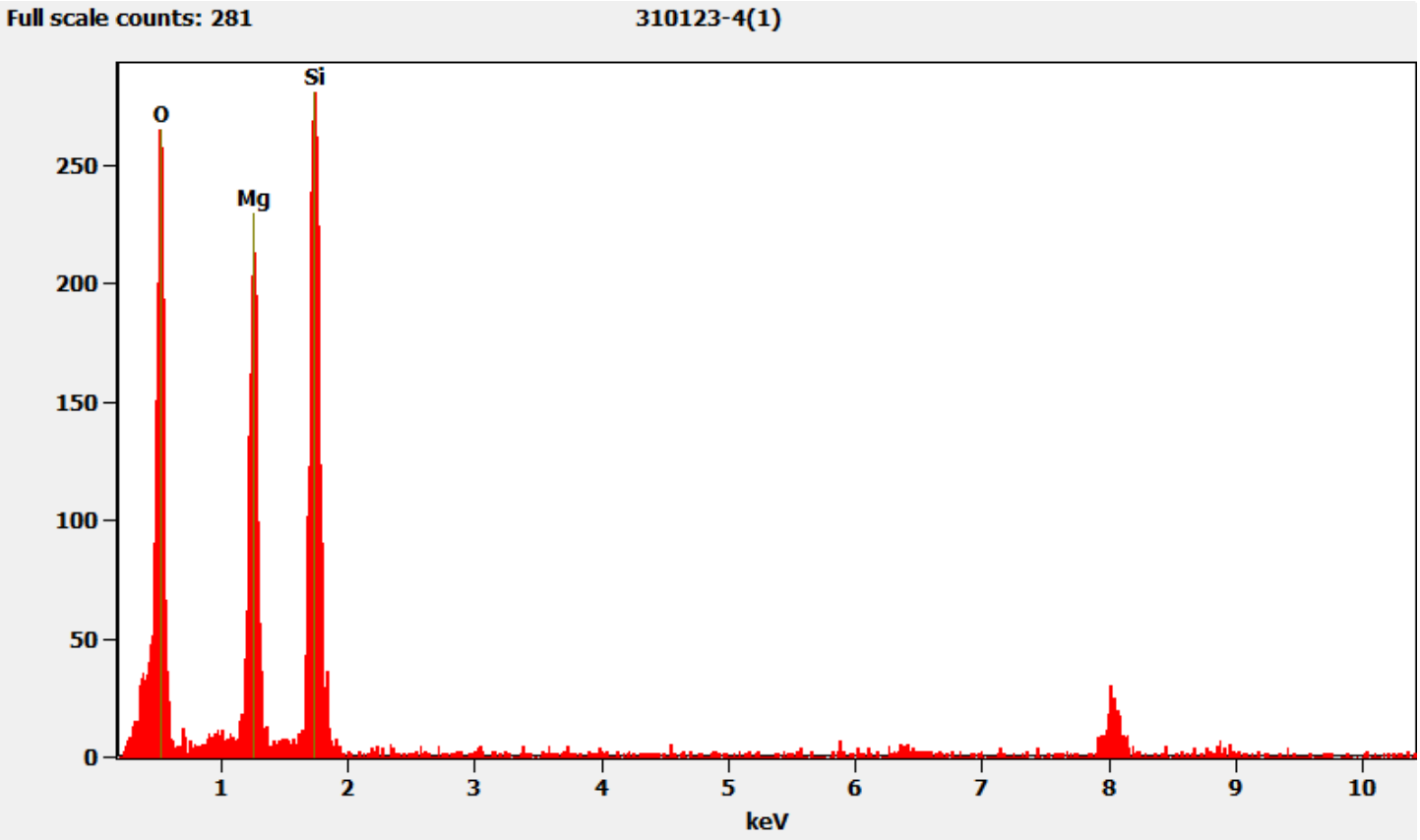
500 nm
HV=100kV
Direct Mag: 5800 x
AMA Analytical Services, Inc

Hexagonal diffraction pattern from the Talc Particle pictured above.

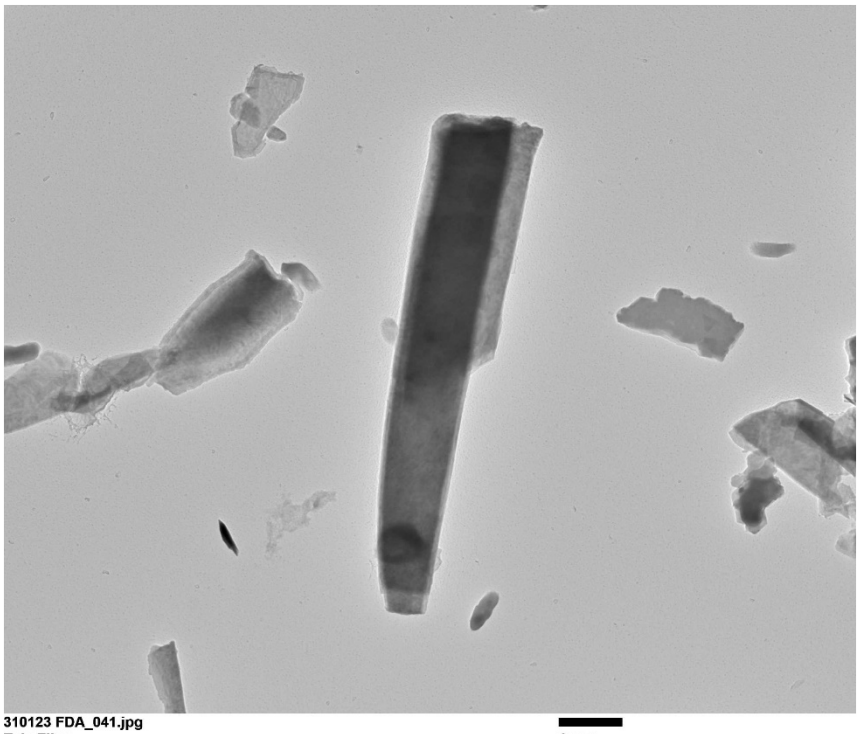
310123 FDA_040.jpg
Talc Particle
12:17 9/19/2019
TEM Mode: Diffraction
Microscopist: [redacted]
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

100 (1/Å)
HV=100kV
Cam Len: 0.2200 m
AMA Analytical Services, Inc

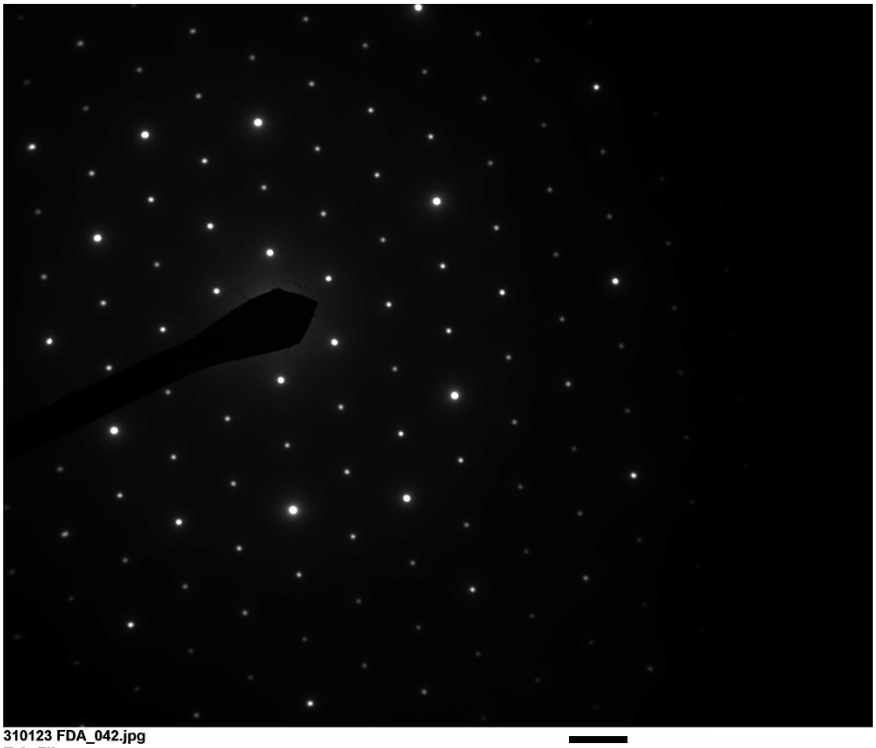
Chemistry from the Talc Particle pictured above.



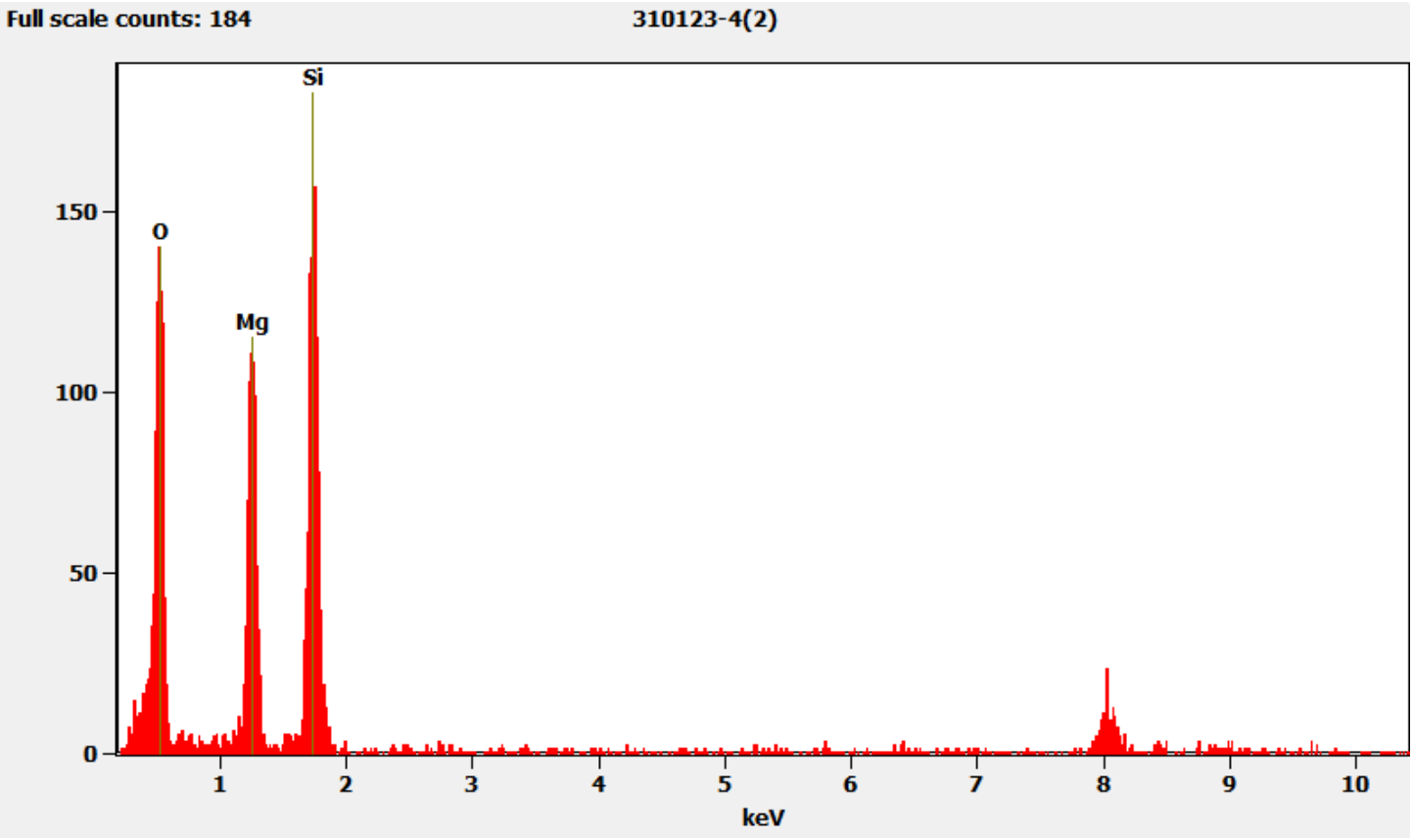
Sample 310123-4, Talc Fiber



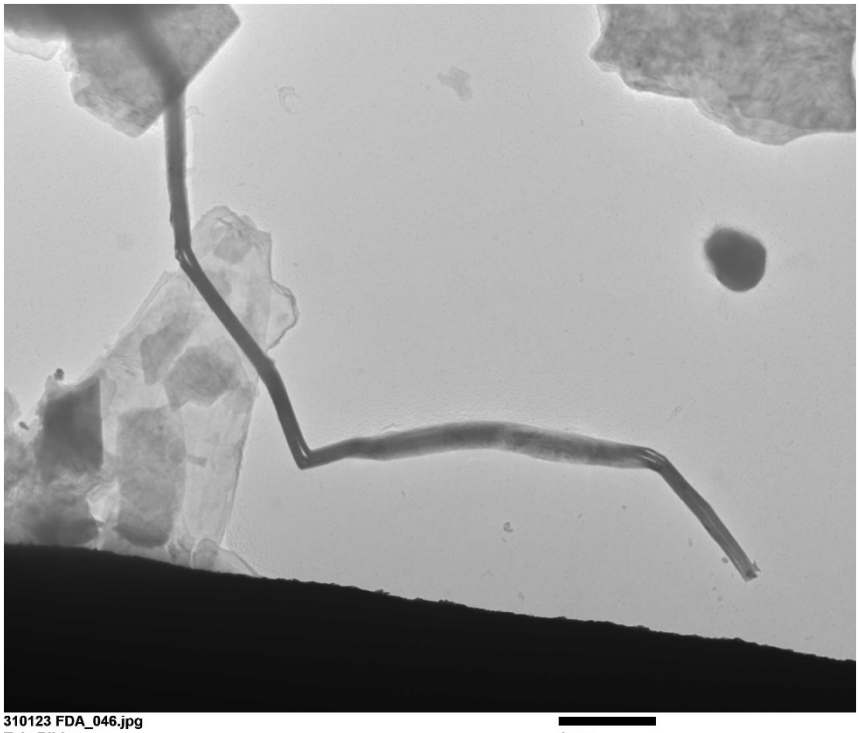
Hexagonal diffraction pattern from the Talc Fiber pictured above.



Chemistry from the Talc Fiber pictured above



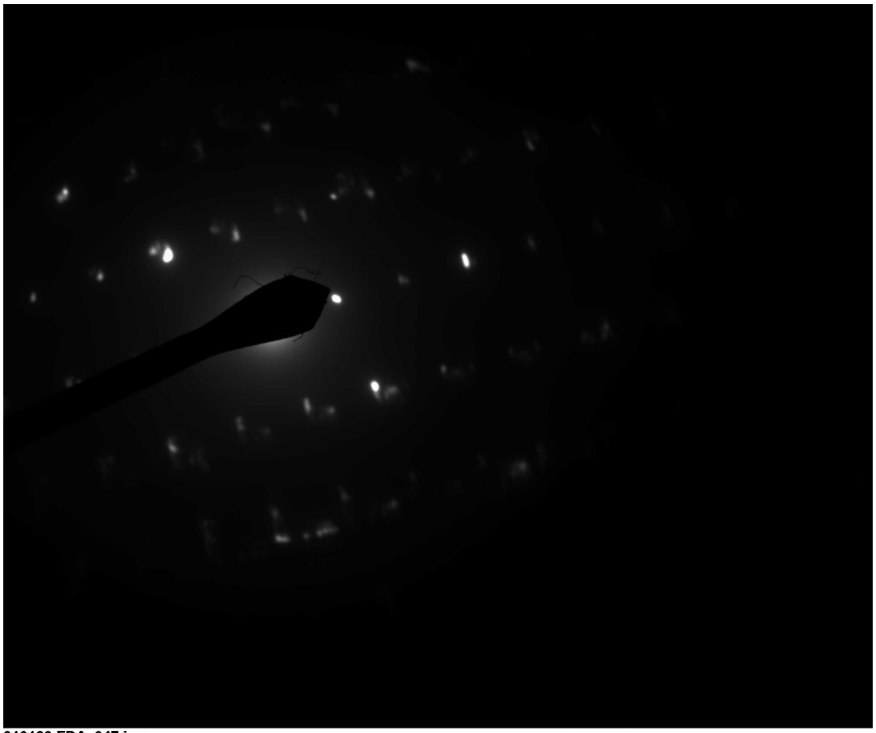
Sample 310123-4, Talc Ribbon



310123 FDA_046.jpg
Talc Ribbon
Cal: 0.003548 µm/pix
13:10 9/19/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

1 µm
HV=100kV
Direct Mag: 2900 x
AMA Analytical Services, Inc

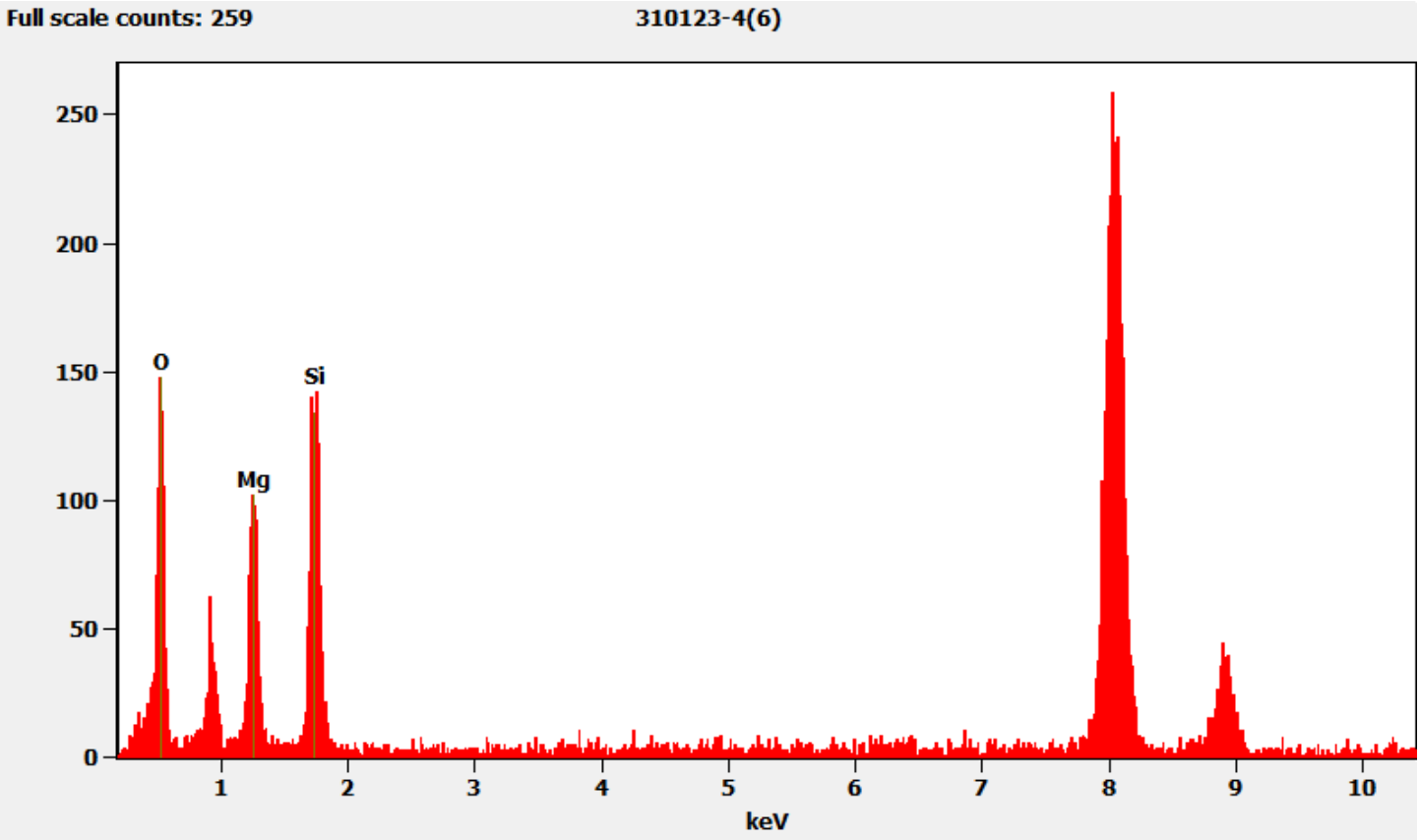
Diffraction pattern from the Talc Ribbon pictured above.



310123 FDA_047.jpg
Talc Ribbon
13:11 9/19/2019
TEM Mode: Diffraction
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

100 (1/Å)
HV=100kV
Cam Len: 0.2200 m
AMA Analytical Services, Inc

Chemistry from the Talc Ribbon pictured above.



<u>310123-5, 5A, 5B, Client Sample-D72</u>

PLM

All three aliquots of sample D-72 were analyzed by (b) (6) on September 26, 2019. No asbestos or non-asbestos amphibole variants were detected the samples. The results were calculated using the equations detailed in the calculations section.

310123-5	NAD
310123-5A	NAD
310123-5B	NAD

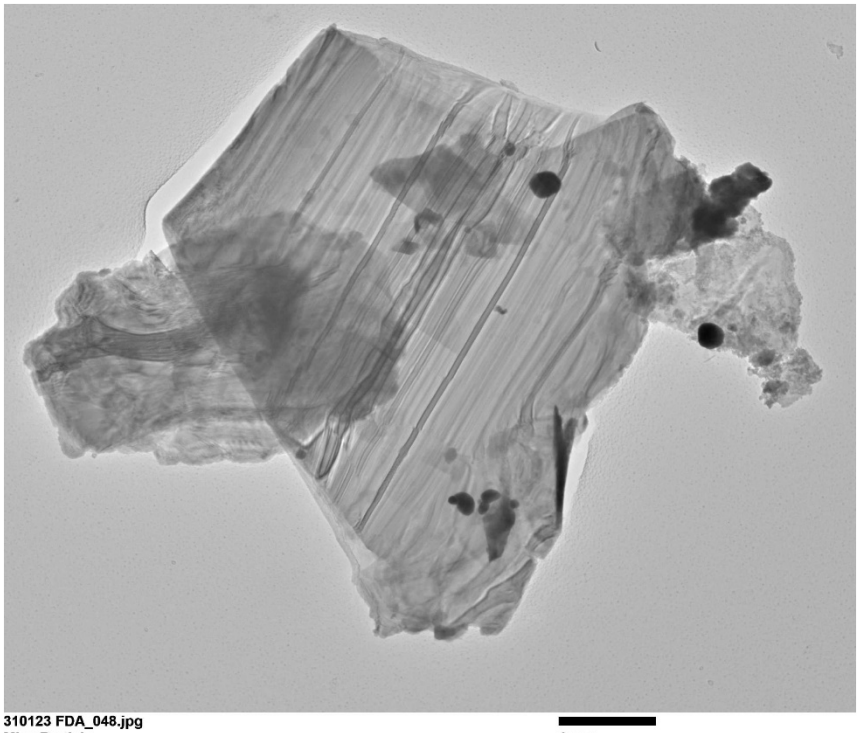
TEM

Sample 5 was analyzed by (b) (6) on September 19 and 23, 2019. (b) (6) analyzed samples 5A and 5B on September 27, 2019. The primary particle observed was mica along with some talc particles, silica particles, titanium coated particles and a few non-asbestos particles. No asbestos or non-asbestos amphibole variants were detected in the samples. The results were calculated using the equations detailed in the calculations section.

310123-5	NAD
310123-5A	NAD
310123-5B	NAD

Below are pictures, diffraction patterns, and chemistry from some of the observed particles. The unidentified peaks in chemistry spectra are copper, zinc, and carbon. Those peaks are from the TEM specimen holder and specimen grid.

Sample 310123-5, Mica Particle



310123 FDA_048.jpg
Mica Particle
Cal: 0.003548 µm/pix
13:39 9/19/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

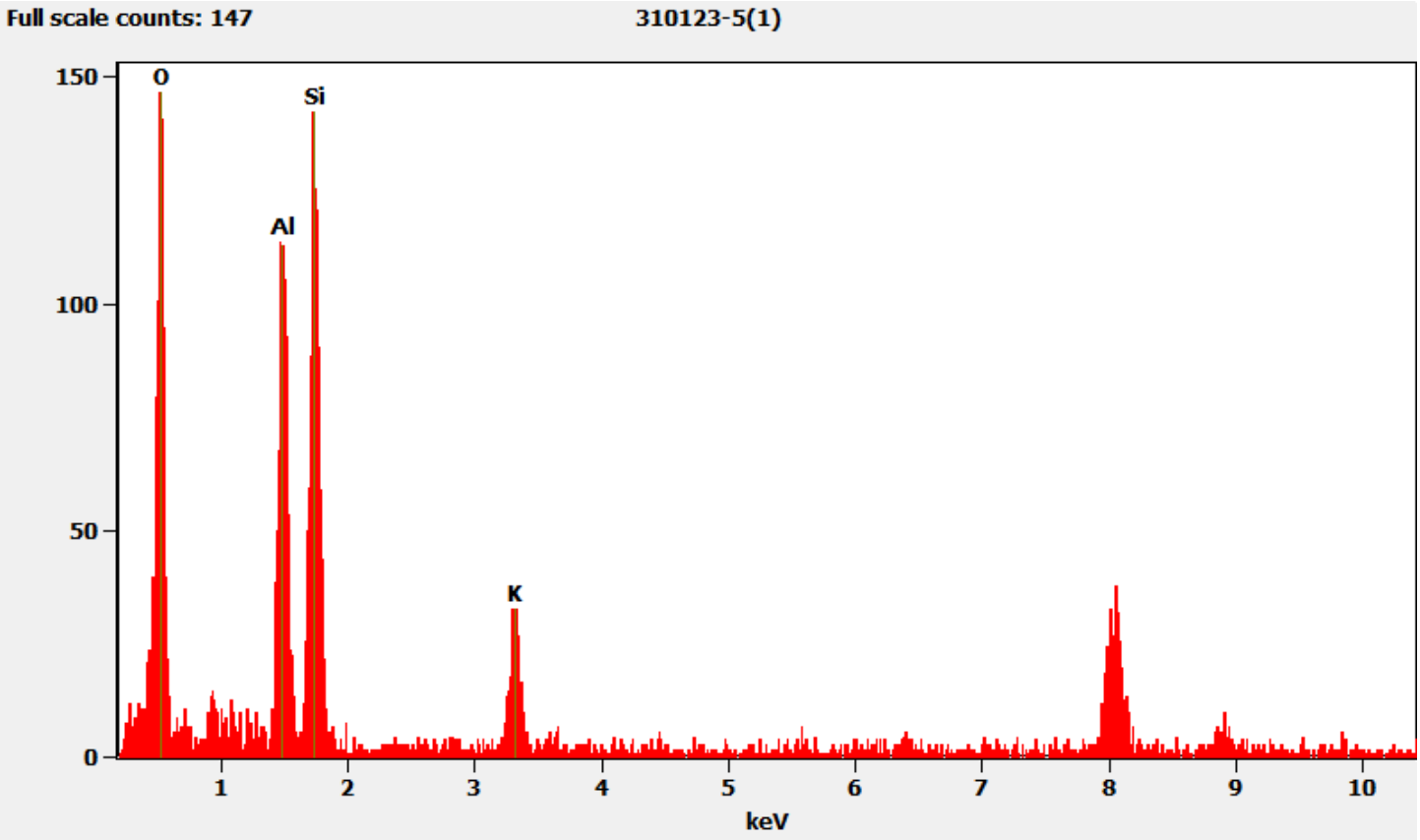
1 µm
HV=100kV
Direct Mag: 2900 x
AMA Analytical Services, Inc

Diffraction pattern from the Mica Particle pictured above.

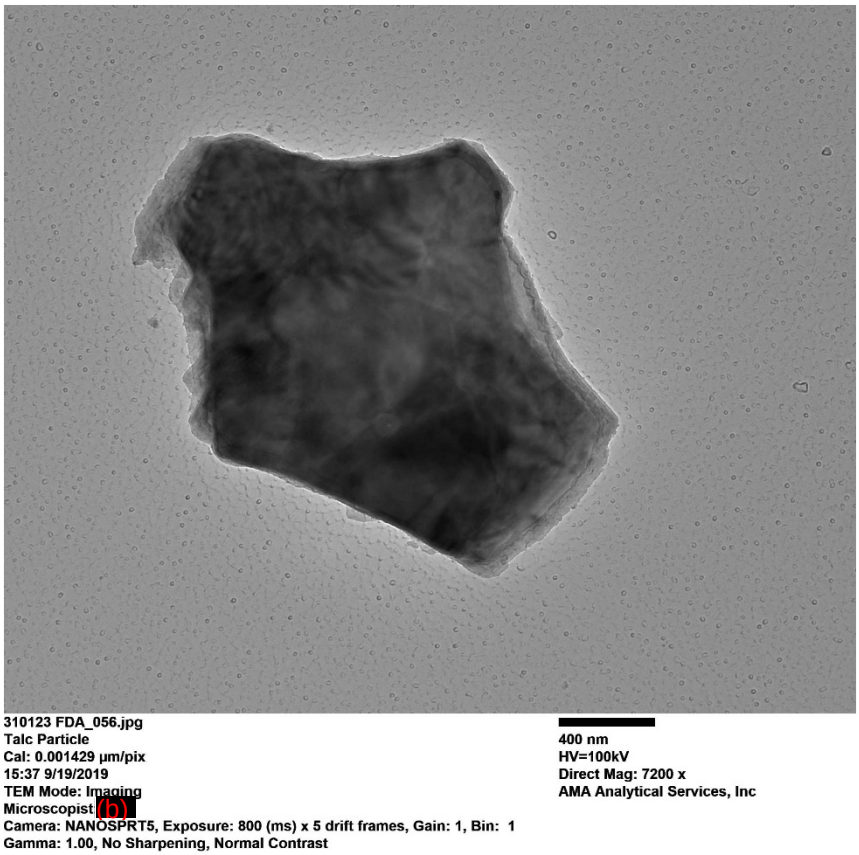
310123 FDA_049.jpg
Mica Particle
13:42 9/19/2019
TEM Mode: Diffraction
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

100 (1/Å)
HV=100kV
Cam Len: 0.2200 m
AMA Analytical Services, Inc

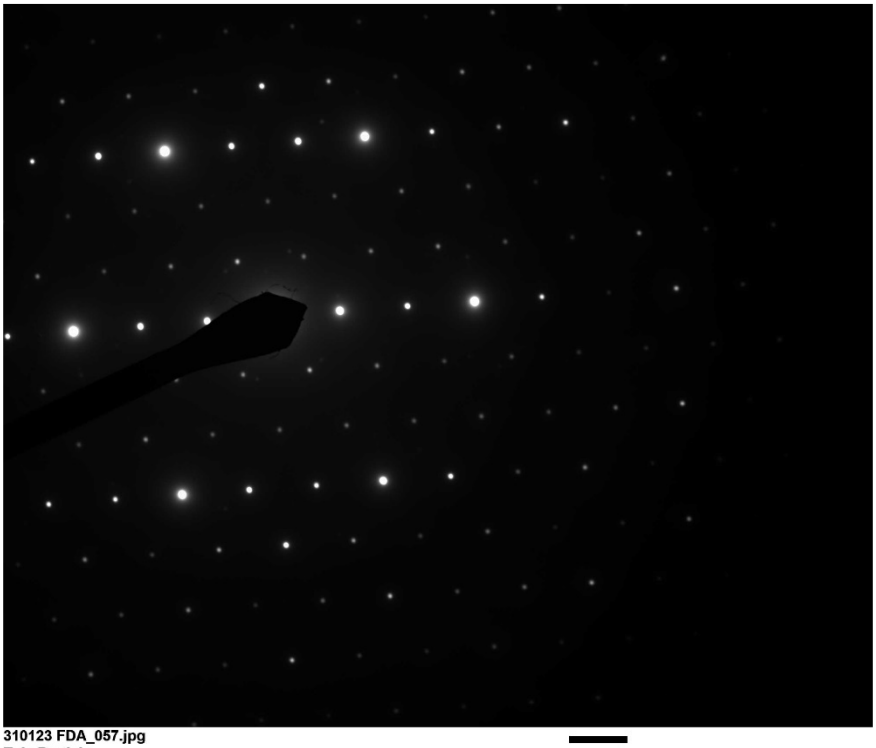
Chemistry from the Mica Particle pictured above



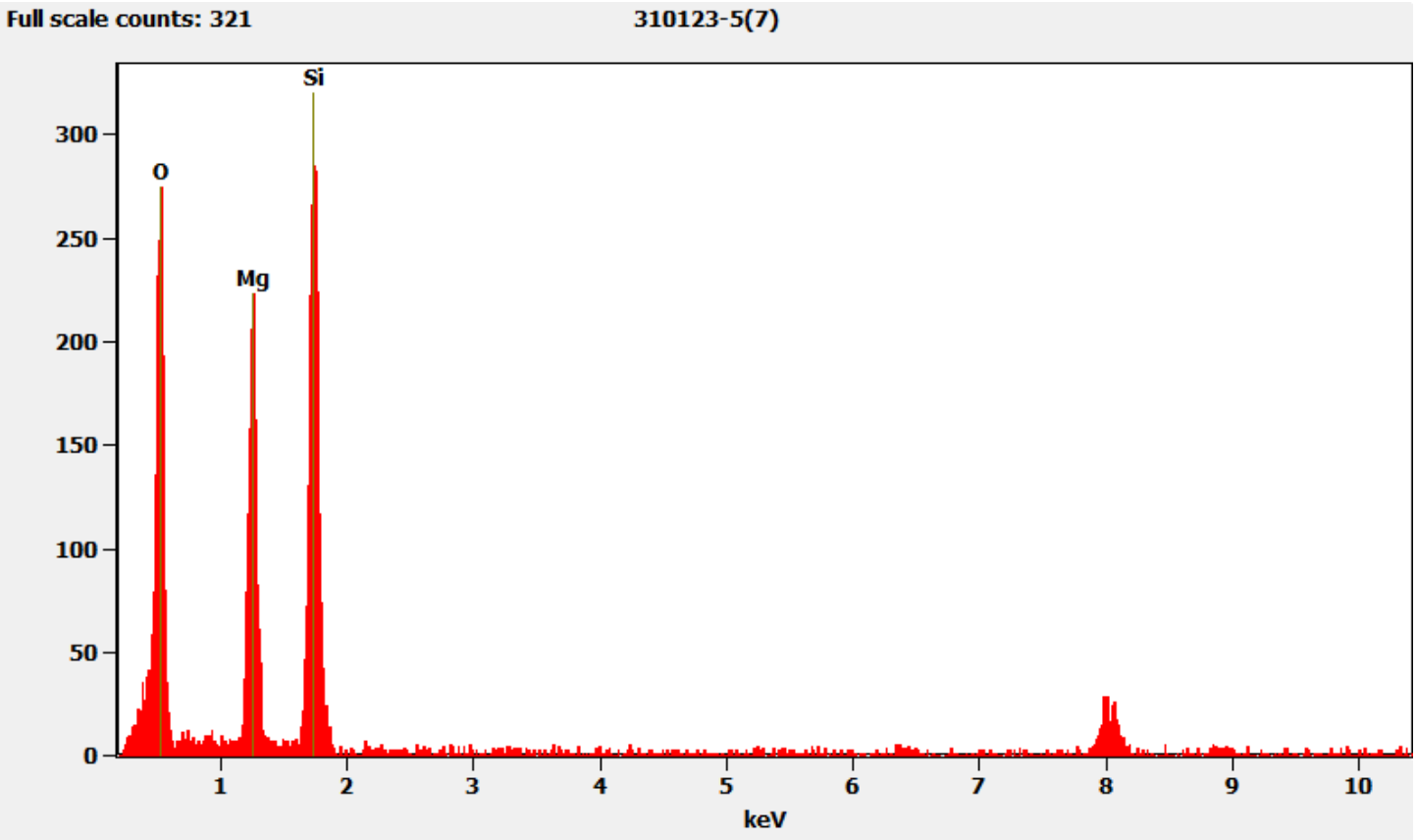
Sample 310123-5, Talc Particle



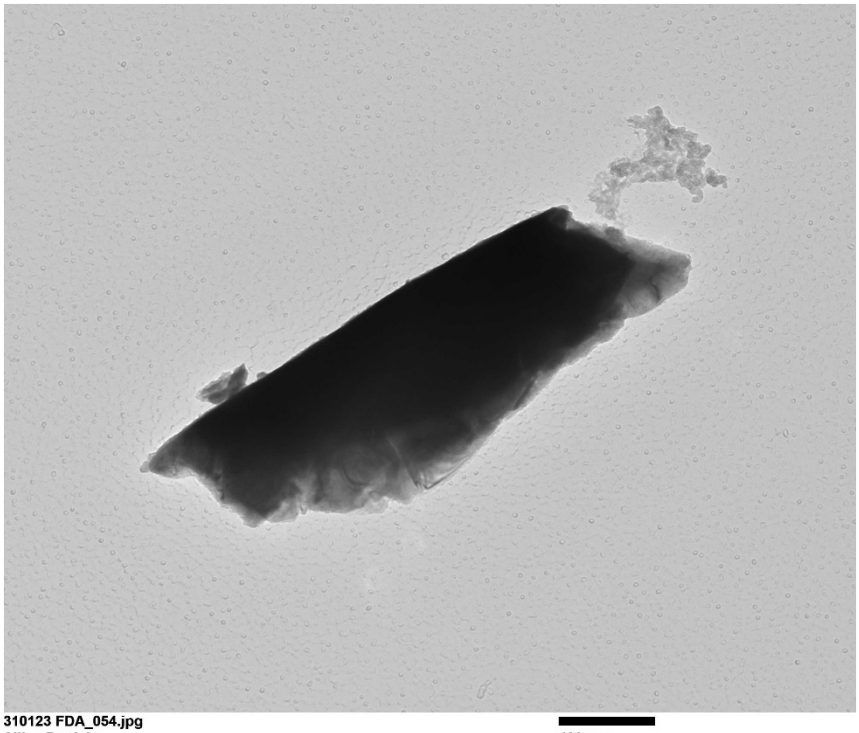
Hexagonal diffraction pattern from the Talc Particle pictured above



Chemistry from the Talc Particle pictured above



Sample 310123-5, Silica Particle



310123 FDA_054.jpg
Silica Particle
Cal: 0.001429 µm/pix
15:02 9/19/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

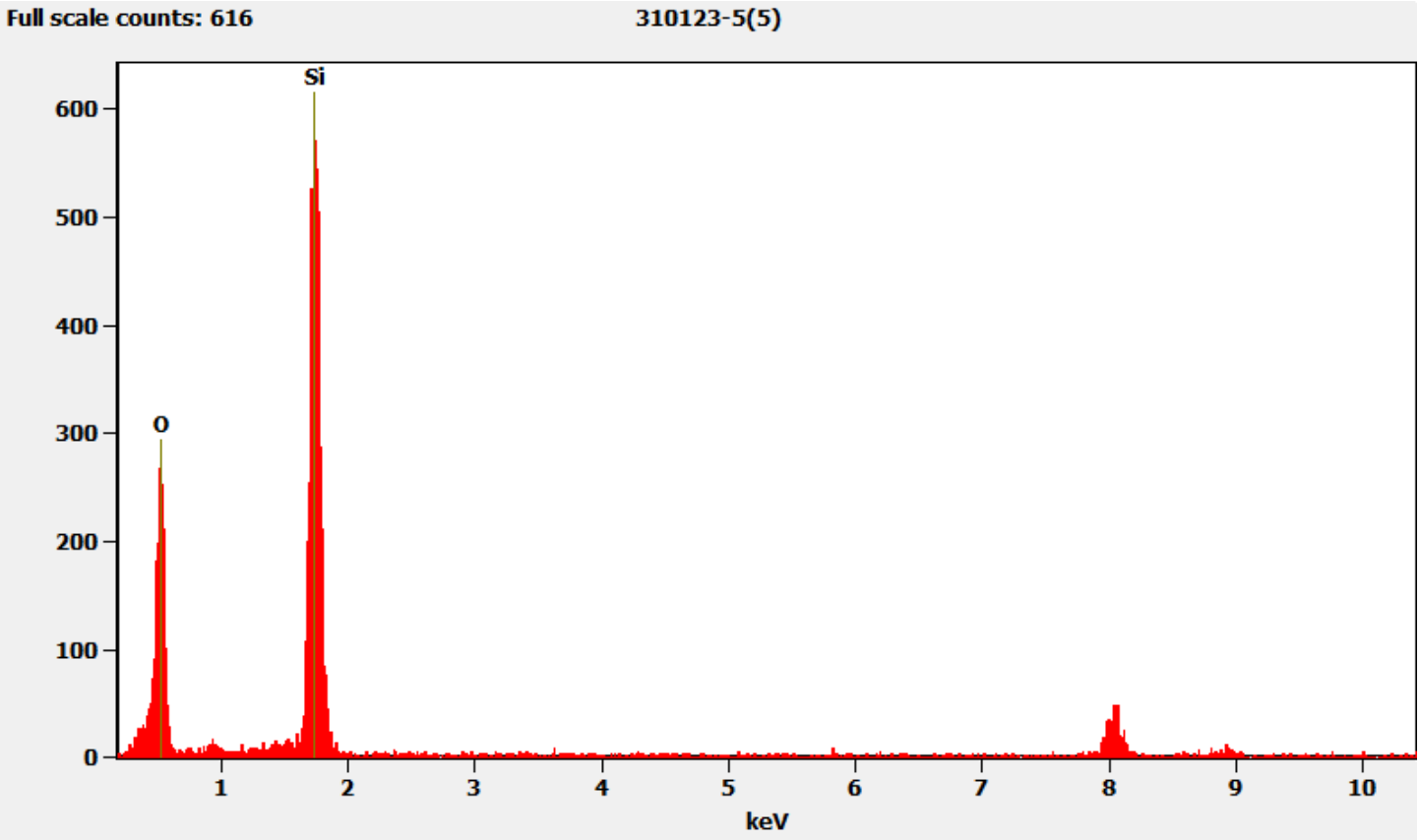
400 nm
HV=100kV
Direct Mag: 7200 x
AMA Analytical Services, Inc

Diffraction pattern from the Silica Particle pictured above

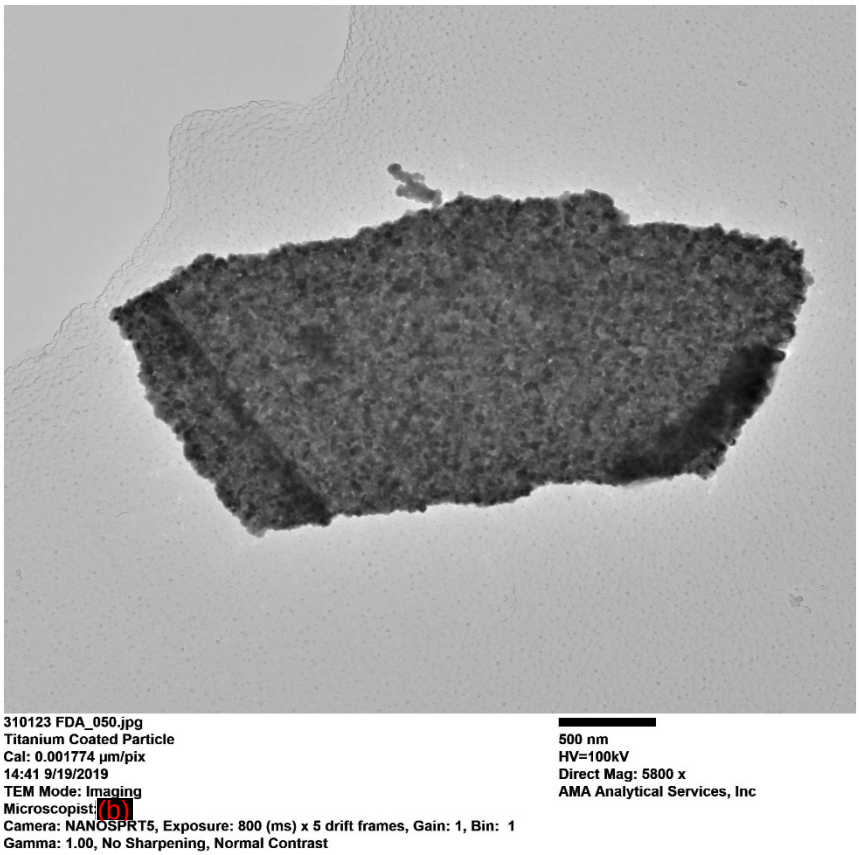
310123 FDA_055.jpg
Silica Particle
15:03 9/19/2019
TEM Mode: Diffraction
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

100 (1/Å)
HV=100kV
Cam Len: 0.2200 m
AMA Analytical Services, Inc

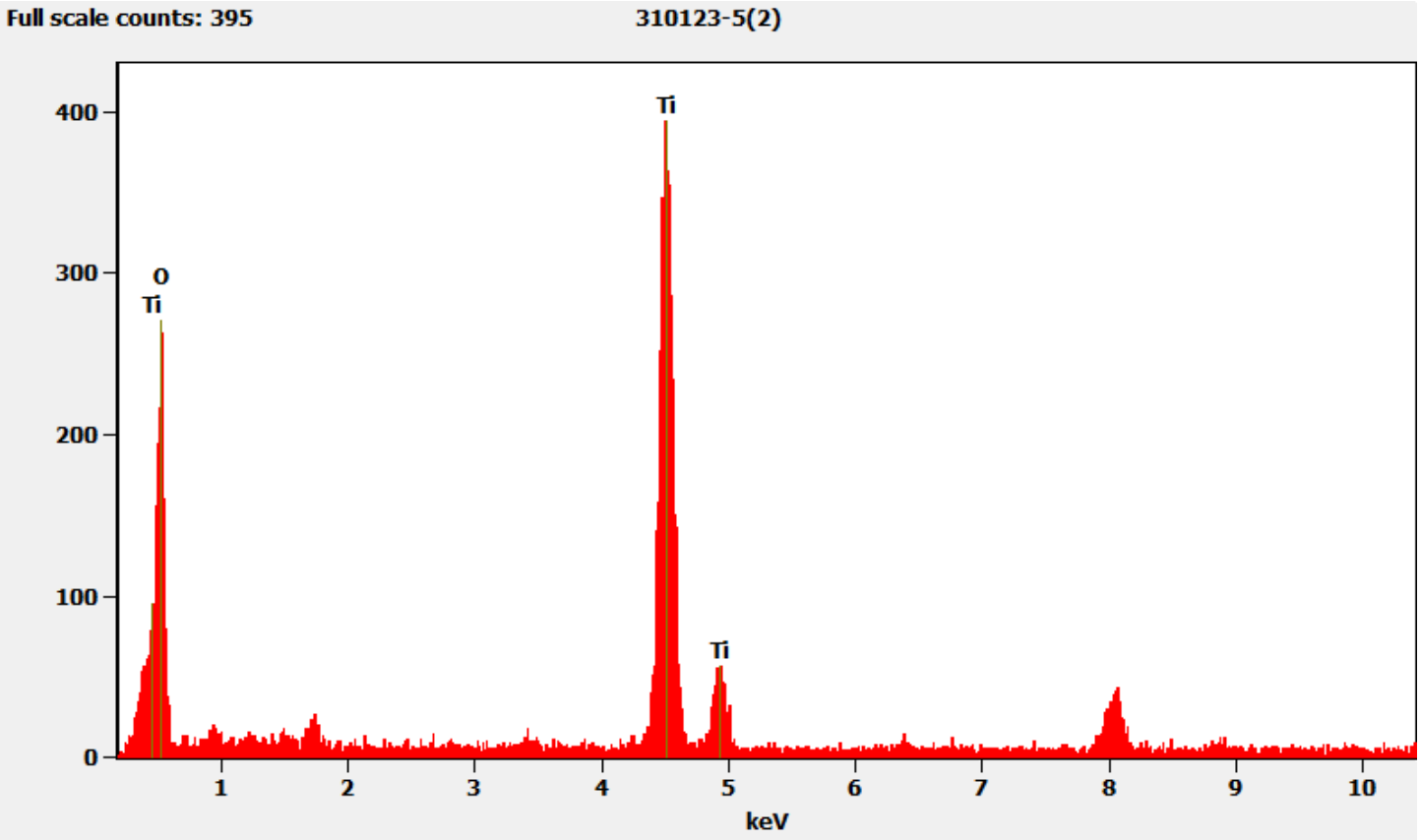
Chemistry from the Silica Particle pictured above



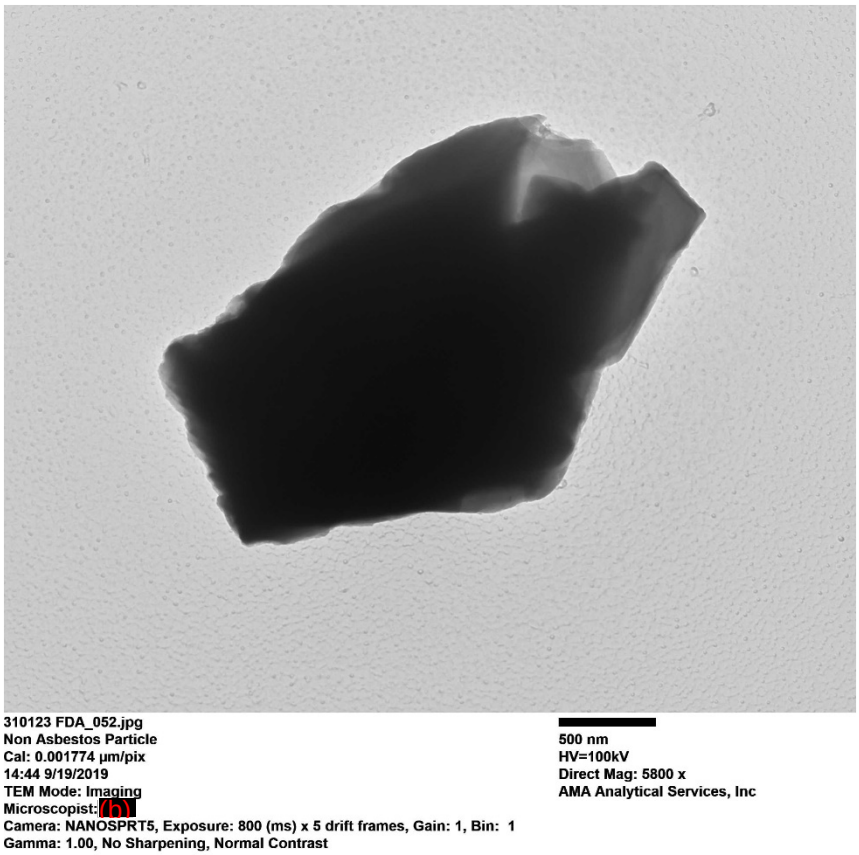
Sample 310123-5, Titanium Coated Particle



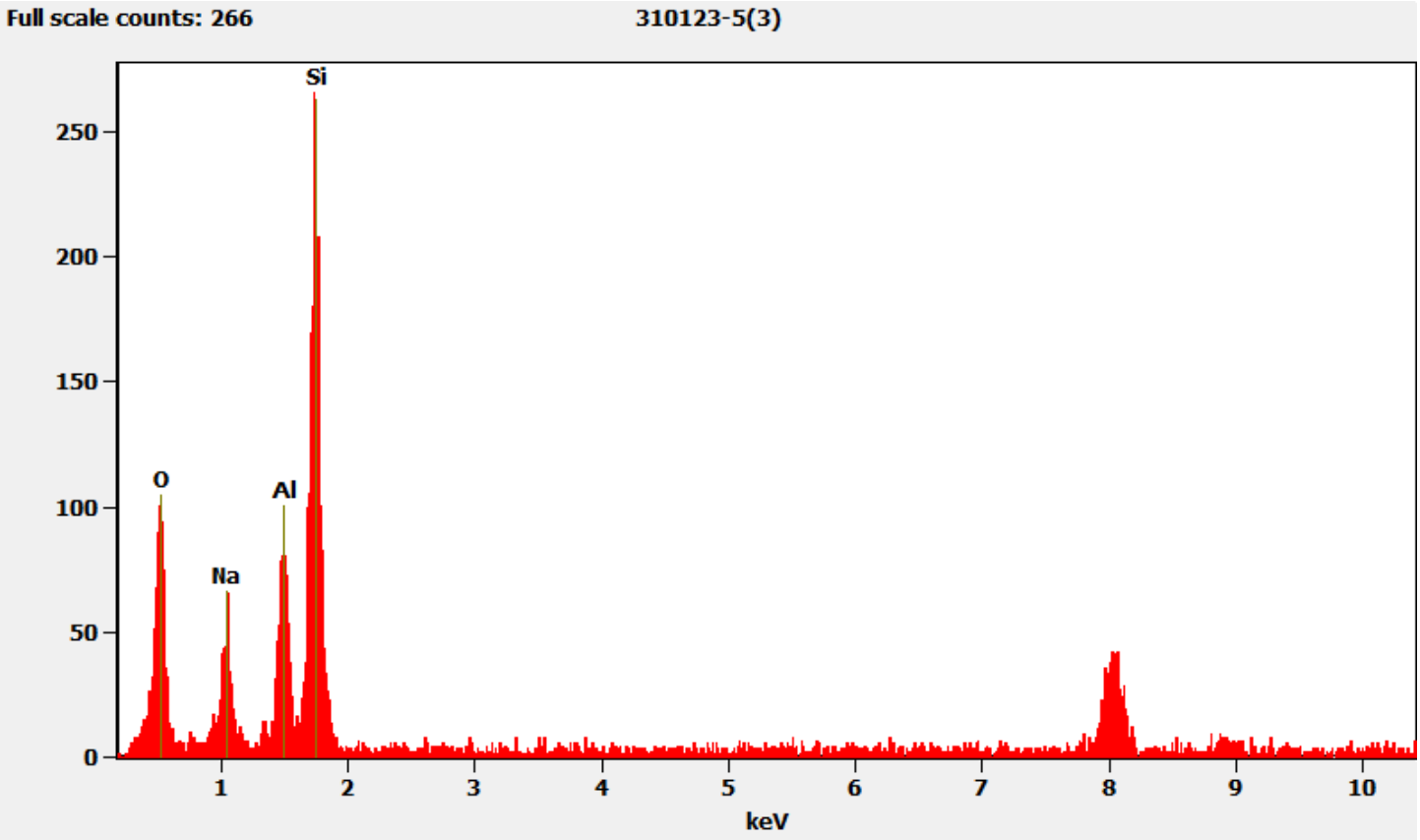
Chemistry from the Titanium Coated Particle pictured above



Sample 310123-5, Non-Asbestos Particle



Chemistry from the Non-Asbestos Particle pictured above



<u>310123-6, 6A, 6B, Client Sample D-73</u>

PLM

All three aliquots of sample D-73 were analyzed by [redacted] on September 26, 2019. No asbestos or non-asbestos amphibole variants were detected the samples. The results were calculated using the equations detailed in the calculations section.

310123-6	NAD
310123-6A	NAD
310123-6B	NAD

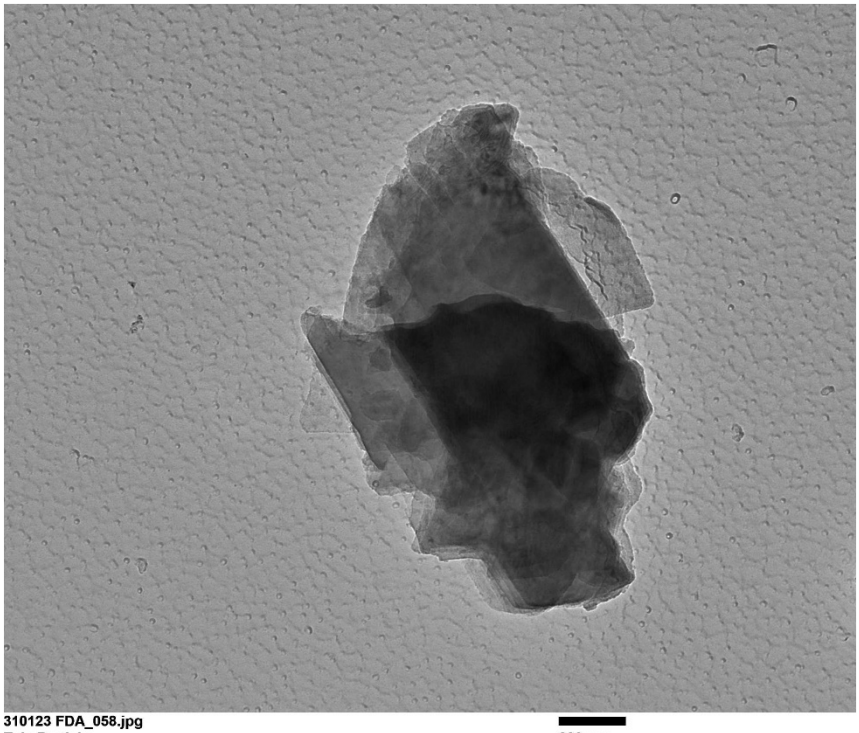
TEM

Sample 6 was analyzed by [redacted] on September 22, 2019. [redacted] analyzed samples 6A and 6B on September 27, 2019. The primary particle observed was talc along with small silica/iron fibers, titanium particles, some mica particles, and a few titanium coated particles and mica fibers. No asbestos or non-asbestos amphibole variants were detected in the samples. The results were calculated using the equations detailed in the calculations section.

310123-6	NAD
310123-6A	NAD
310123-6B	NAD

Below are pictures, diffraction patterns, and chemistry from some of the observed particles. The unidentified peaks in chemistry spectra are copper, zinc, and carbon. Those peaks are from the TEM specimen holder and specimen grid.

Sample 310123-6, Talc Particle



310123 FDA_058.jpg
Talc Particle
Cal: 0.001029 µm/pix
10:04 9/22/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

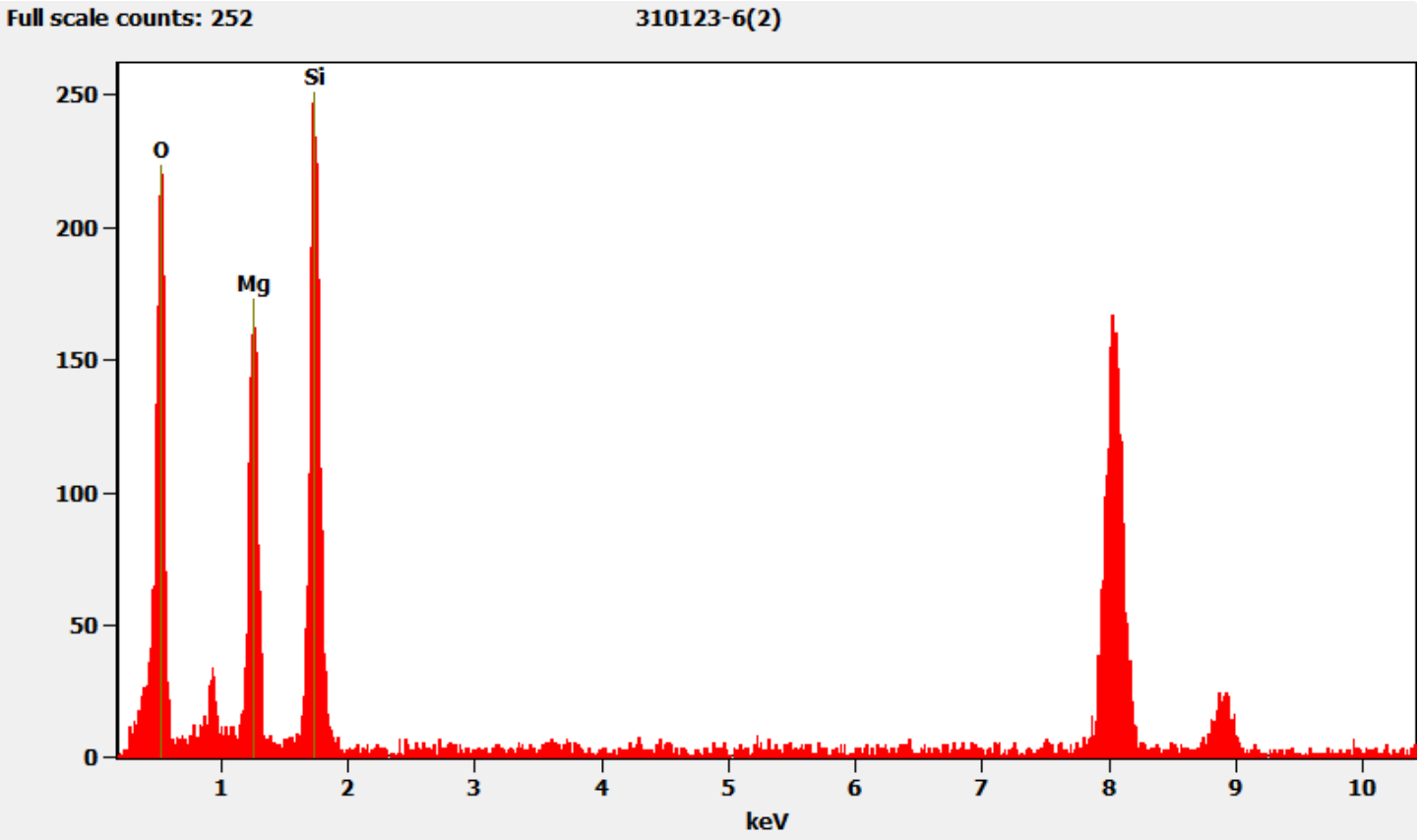
200 nm
HV=100kV
Direct Mag: 10000 x
AMA Analytical Services, Inc

Hexagonal diffraction from the Talc Particle pictured above.

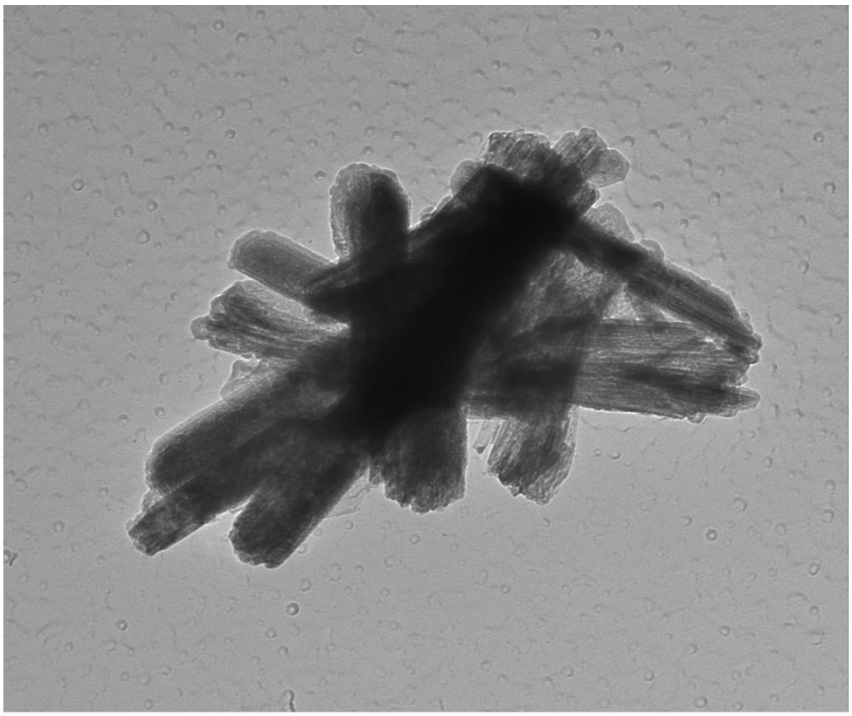
310123 FDA_059.jpg
Talc Particle
10:05 9/22/2019
TEM Mode: Diffraction
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

100 (1/Å)
HV=100kV
Cam Len: 0.2200 m
AMA Analytical Services, Inc

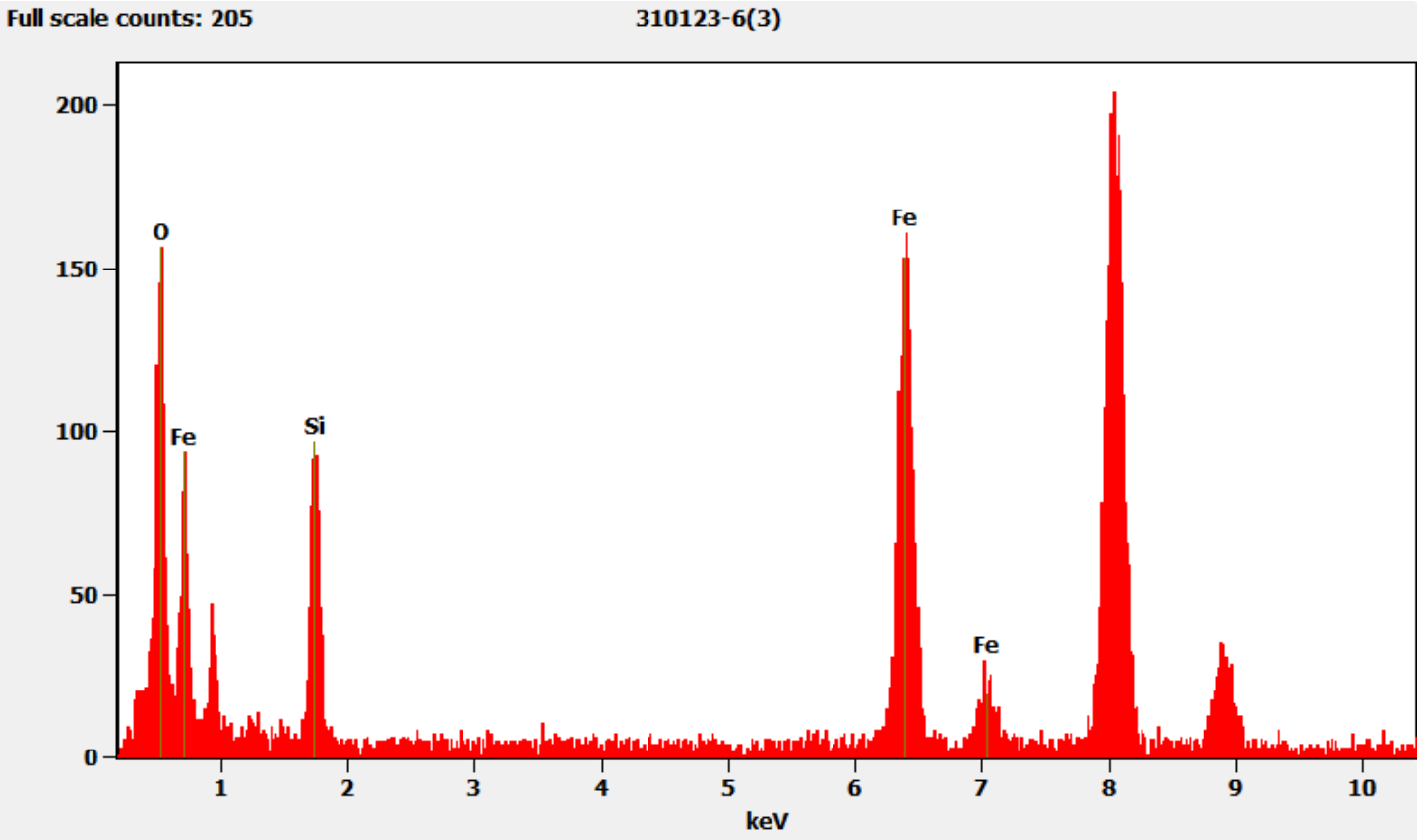
Chemistry from the Talc Particle pictured above.



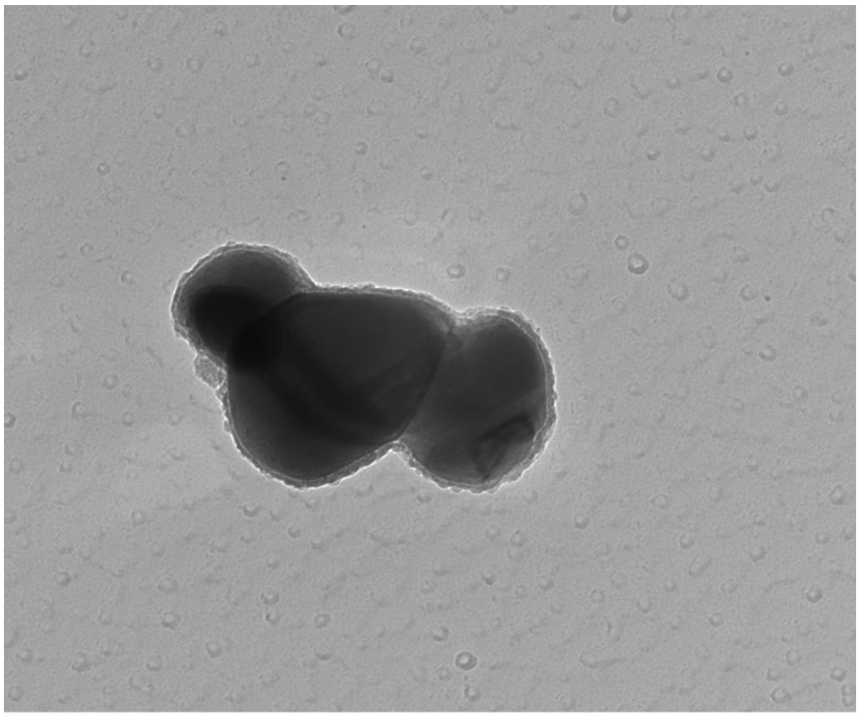
Sample 310123-6, Silica/Iron Fibers



Chemistry from the Silica/Iron Fibers pictured above



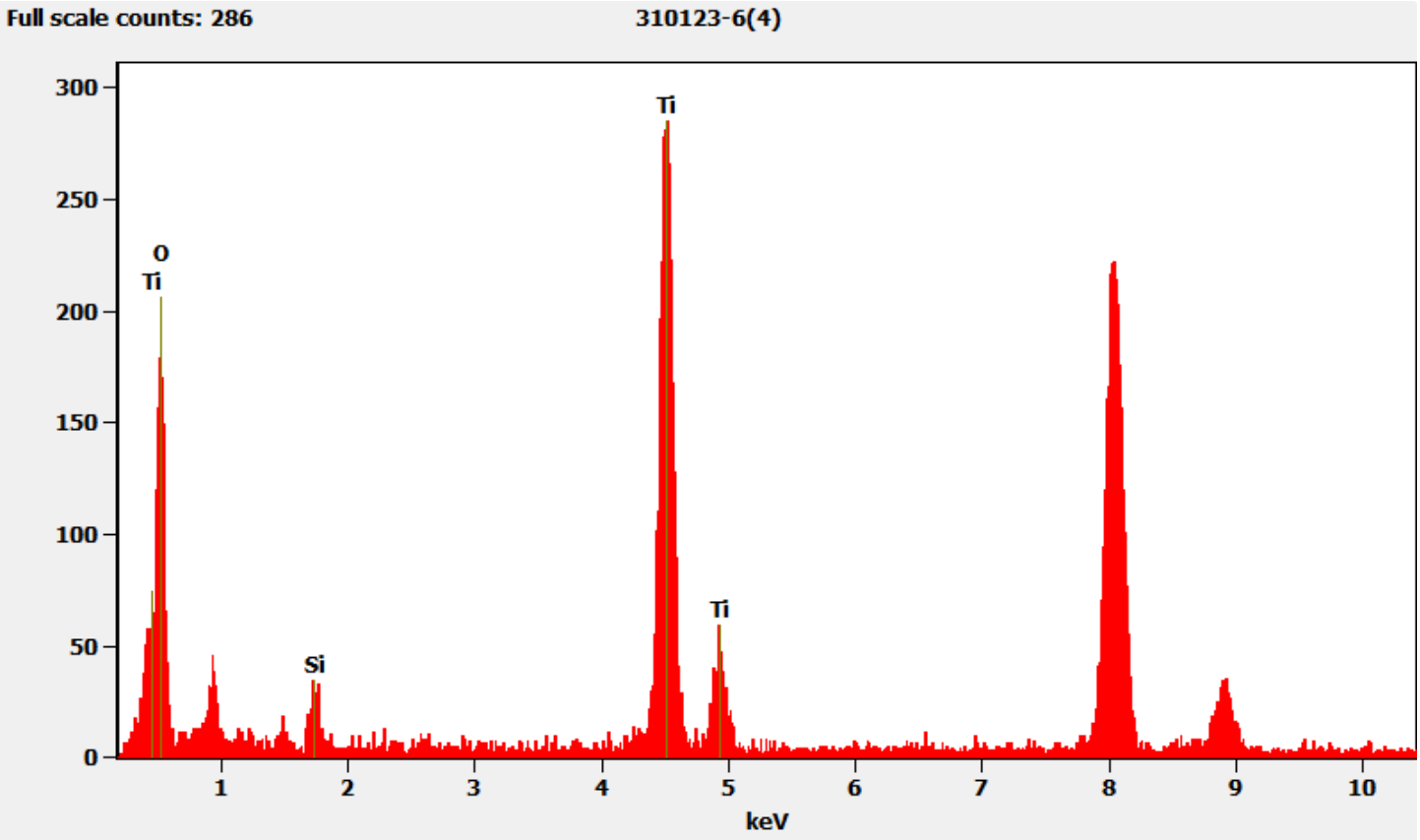
Sample 310123-6, Titanium Particles



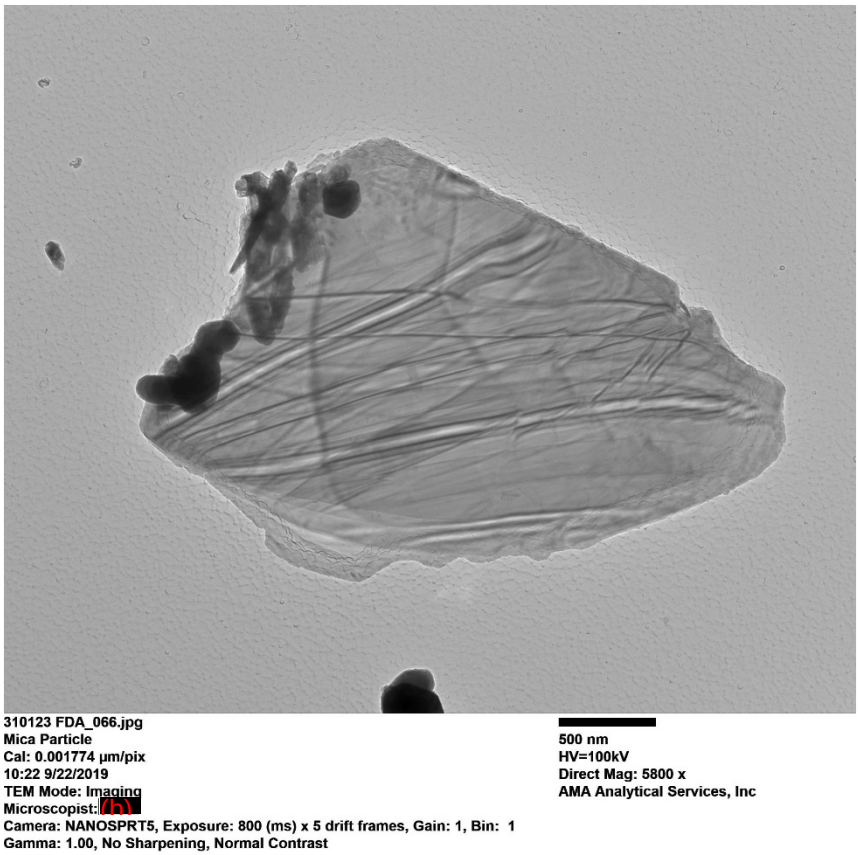
310123 FDA_062.jpg
Titanium Particles
Cal: 0.354789 nm/pix
10:10 9/22/2019
TEM Mode: Imaging
Microscopist: [redacted]
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

100 nm
HV=100kV
Direct Mag: 29000 x
AMA Analytical Services, Inc

Chemistry from the Titanium Particles pictured above.

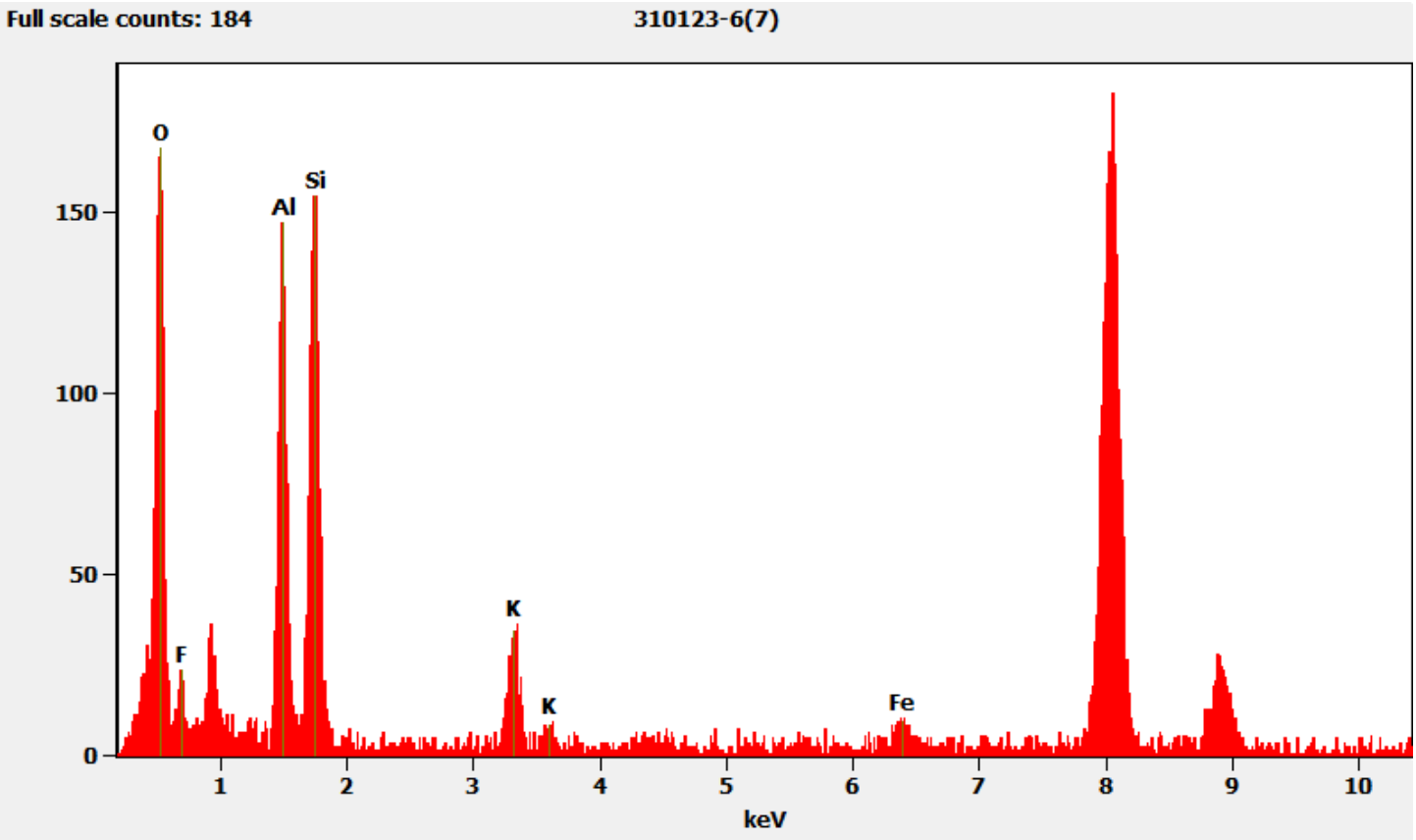


Sample 310123-6, Mica Particle

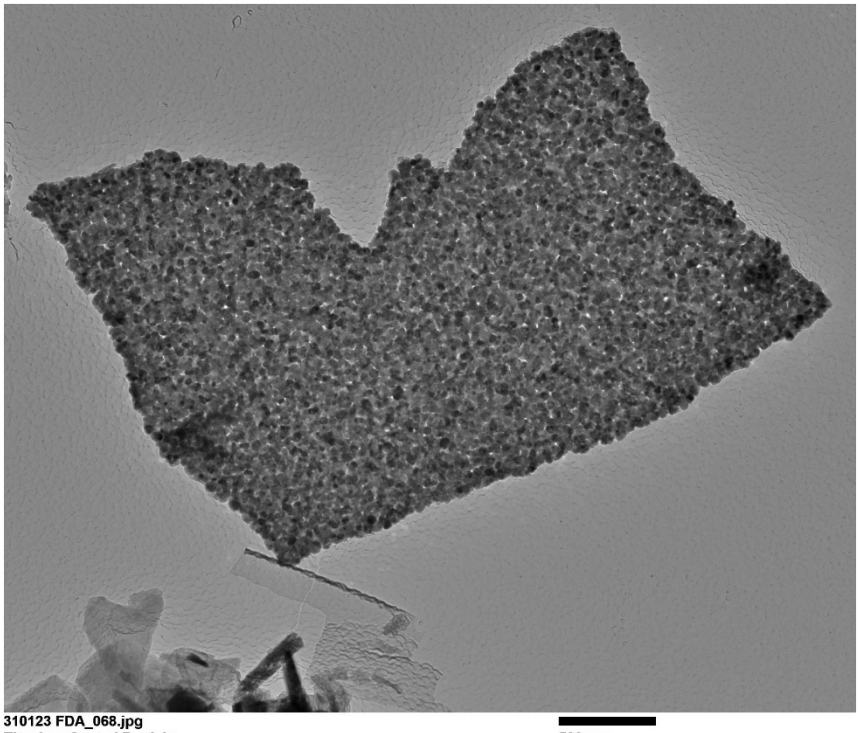


Diffraction pattern from the Mica Particle pictured above.

Chemistry from Mica Particle pictured above.



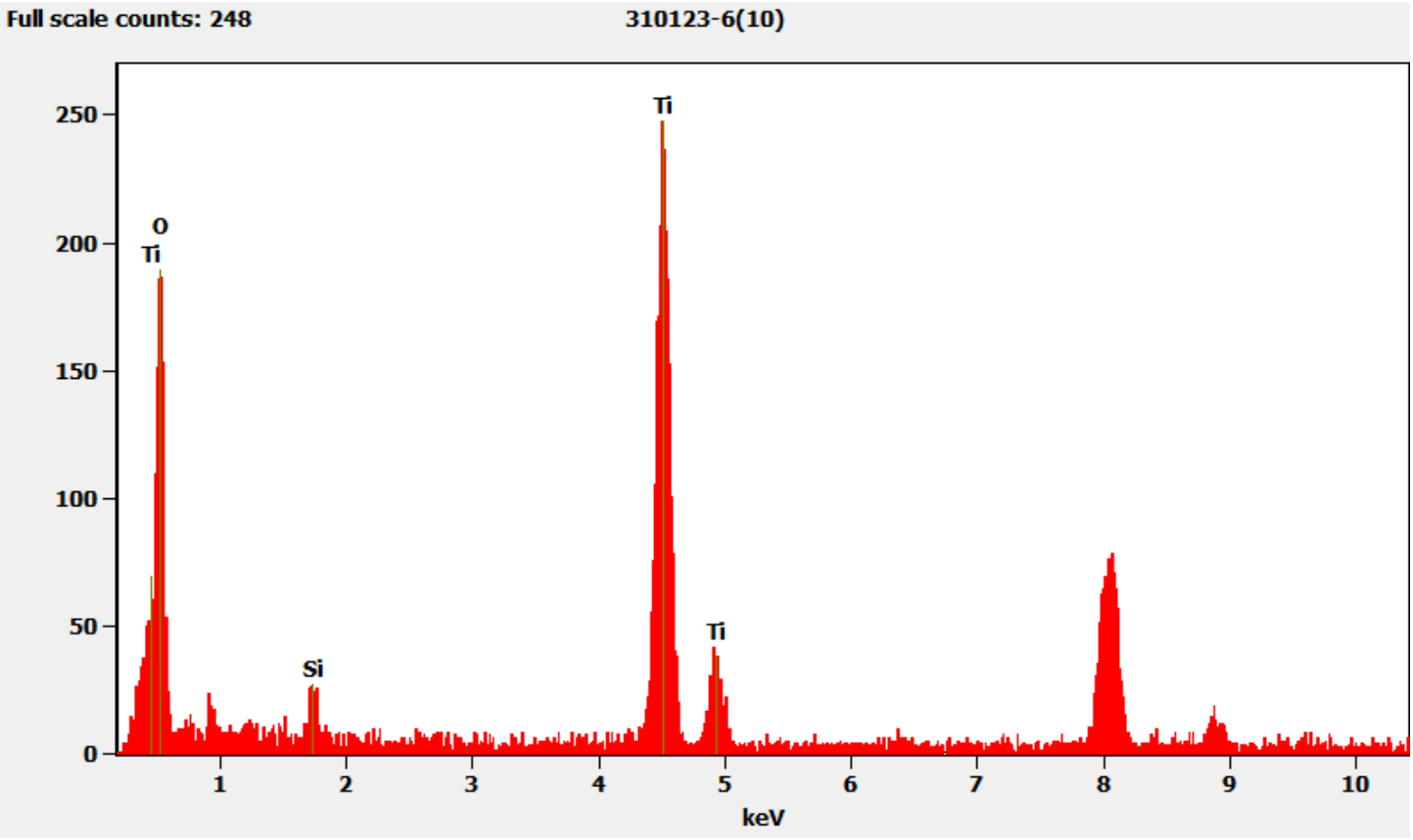
310123-6, Titanium Coated Particle



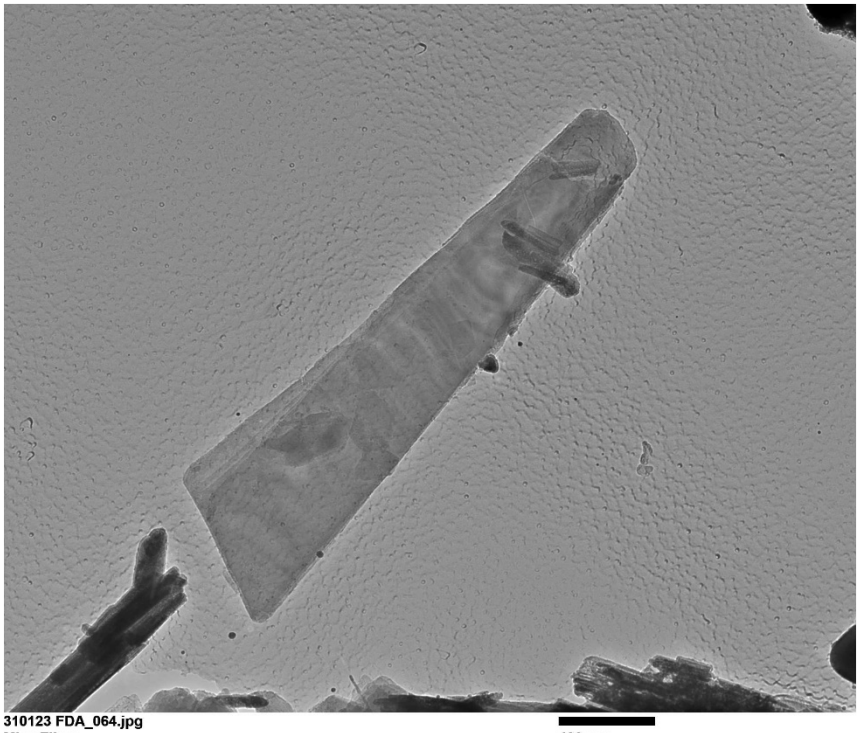
310123 FDA_068.jpg
Titanium Coated Particle
Cal: 0.001774 µm/pix
10:46 9/22/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

500 nm
HV=100kV
Direct Mag: 5800 x
AMA Analytical Services, Inc

Chemistry from the Titanium coated particle pictured above



310123-6, Mica Fiber



310123 FDA_064.jpg
Mica Fiber
Cal: 0.001429 µm/pix
10:13 9/22/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

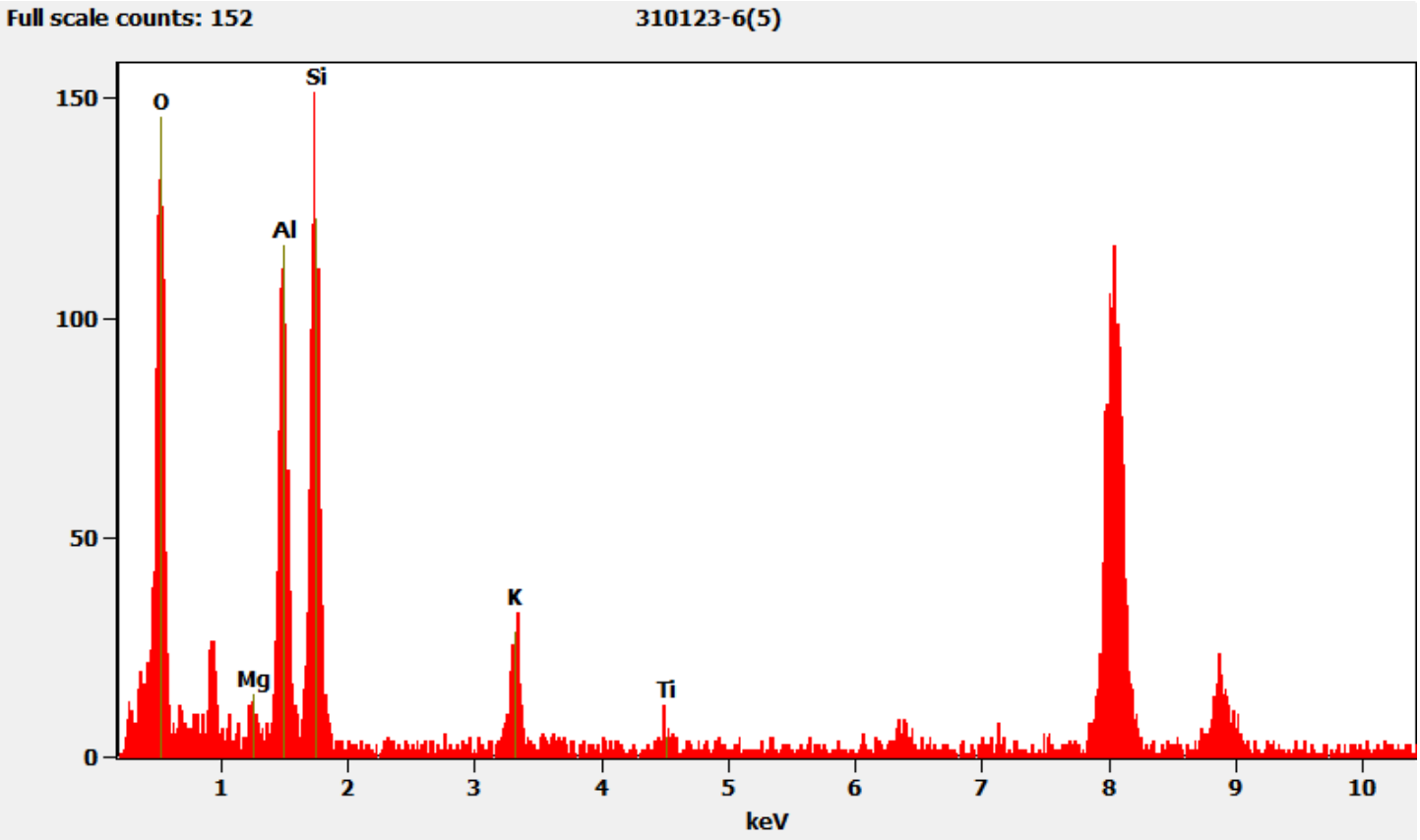
400 nm
HV=100kV
Direct Mag: 7200 x
AMA Analytical Services, Inc

Diffraction pattern from the Mica Fiber pictured above

310123 FDA_065.jpg
Mica Fiber
10:14 9/22/2019
TEM Mode: Diffraction
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

100 (1/Å)
HV=100kV
Cam Len: 0.2200 m
AMA Analytical Services, Inc

Chemistry from the Mica Fiber pictured above



<u>310123-7, 7A, 7B, Client Sample D-74</u>

PLM

All three aliquots of sample D-74 were analyzed by (b) (6) on September 26, 2019. No asbestos or non-asbestos amphibole variants were detected the samples. The results were calculated using the equations detailed in the calculations section.

310123-7	NAD
310123-7A	NAD
310123-7B	NAD

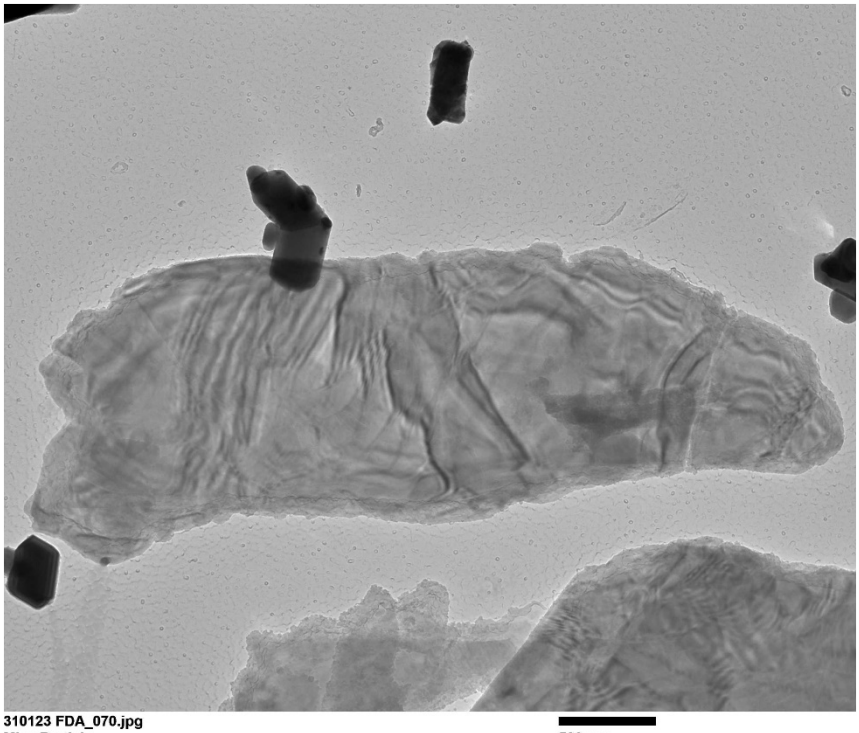
TEM

(b) (6) analyzed Sample 7 on September 2, 2019 and sample 7B on September 29, 2019. (b) (6) analyzed sample 7A on September 27, 2019. The primary particle observed was mica along with small titanium particles, some talc particles, silica spheres and a few mica fibers, talc fibers and titanium fibers. No asbestos or non-asbestos amphibole variants were detected in the samples. The results were calculated using the equations detailed in the calculations section.

310123-7	NAD
310123-7A	NAD
310123-7B	NAD

Below are pictures, diffraction patterns, and chemistry from some of the observed particles. The unidentified peaks in chemistry spectra are copper, zinc, and carbon. Those peaks are from the TEM specimen holder and specimen grid.

Sample 310123-7, Mica Particle



310123 FDA_070.jpg
Mica Particle
Cal: 0.001774 µm/pix
11:15 9/22/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

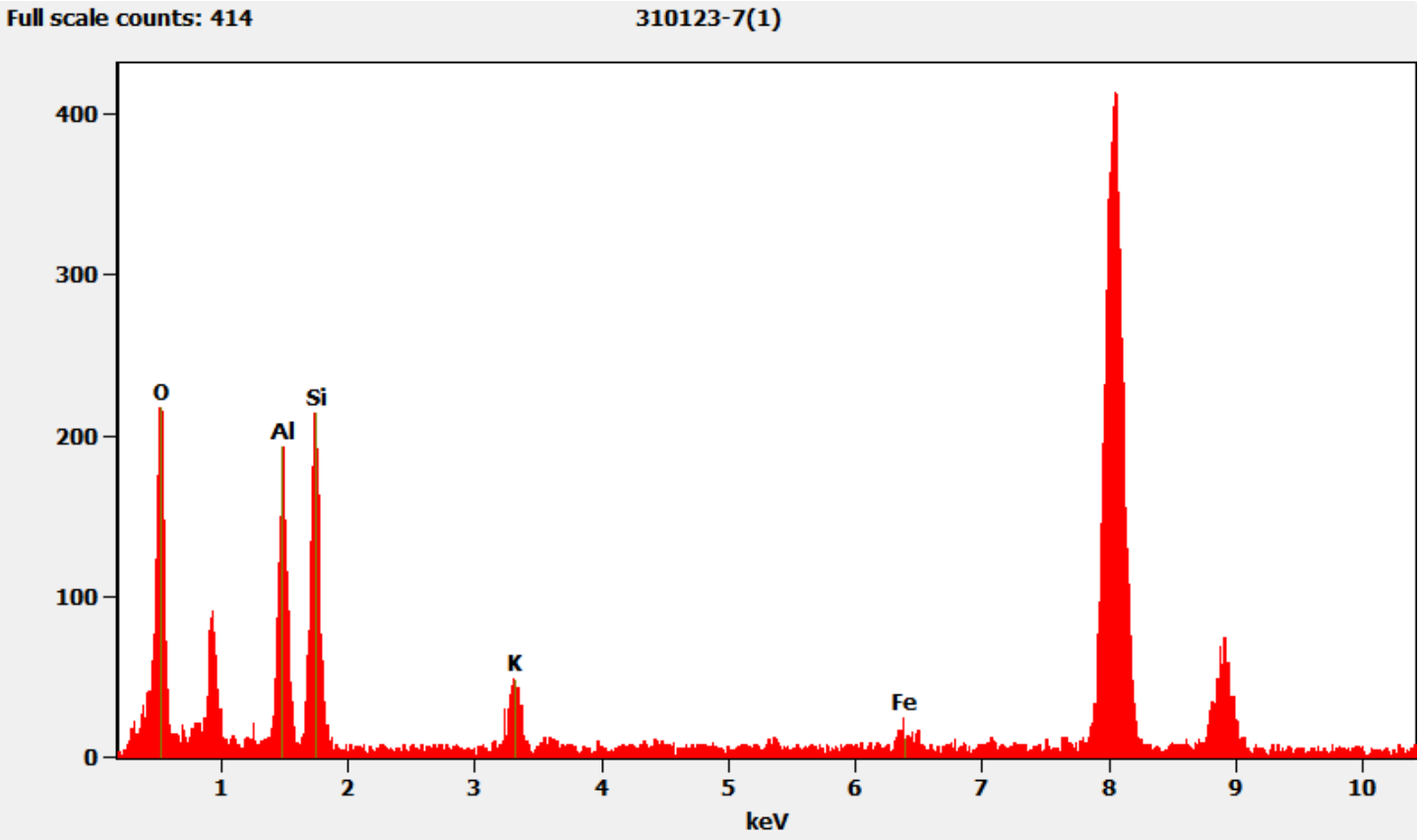
500 nm
HV=100kV
Direct Mag: 5800 x
AMA Analytical Services, Inc

Diffraction from the Mica Particle pictured above.

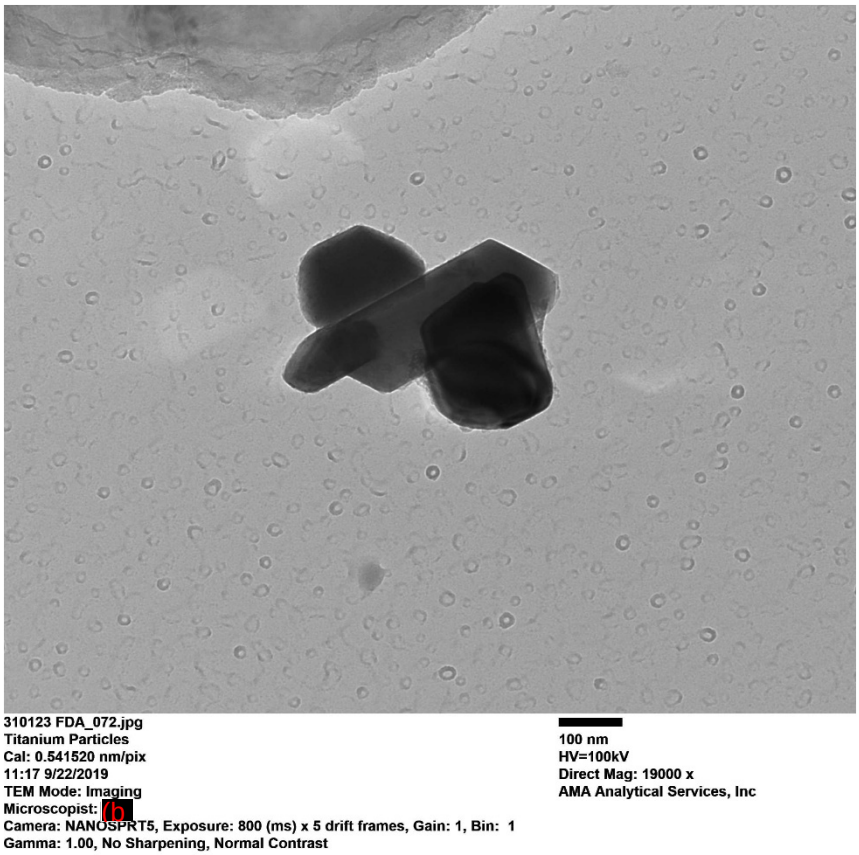
310123 FDA_071.jpg
Mica Particle
11:16 9/22/2019
TEM Mode: Diffraction
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

100 (1/Å)
HV=100kV
Cam Len: 0.2200 m
AMA Analytical Services, Inc

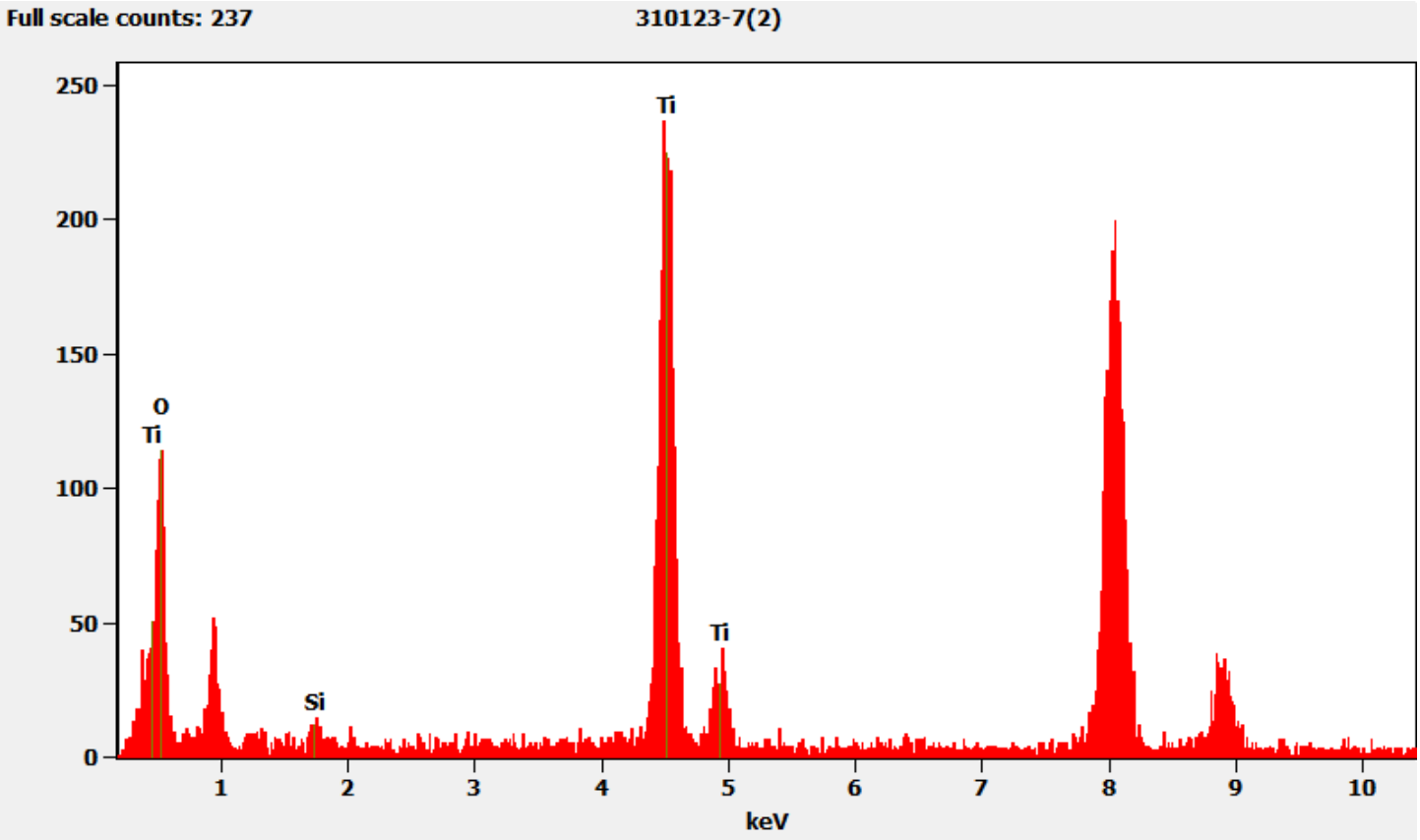
Chemistry from the Mica Particle pictured above.



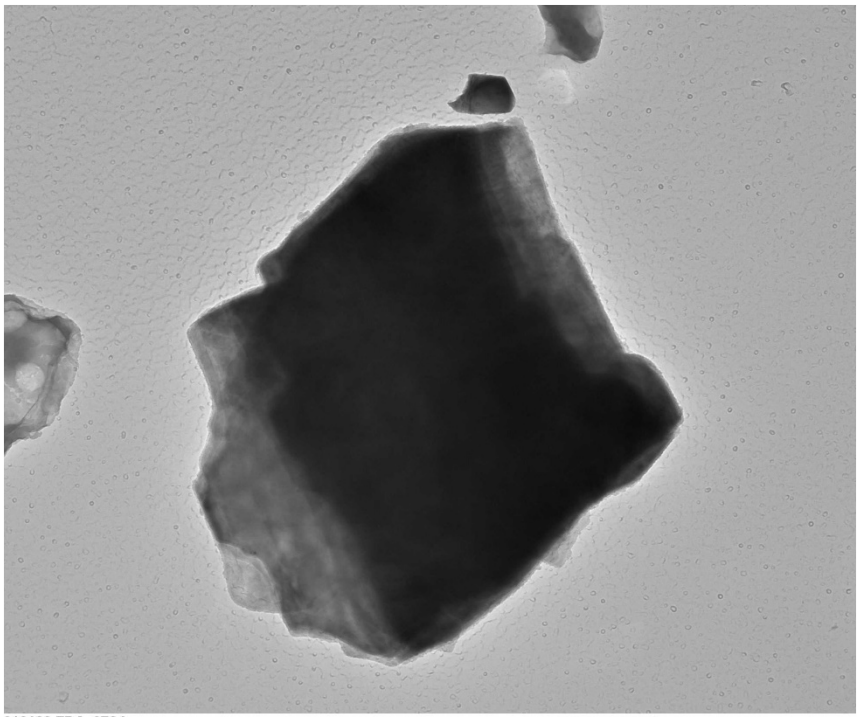
Sample 310123-7, Titanium Particles



Chemistry from the Titanium Particles pictured above



Sample 310123-7, Talc Particle

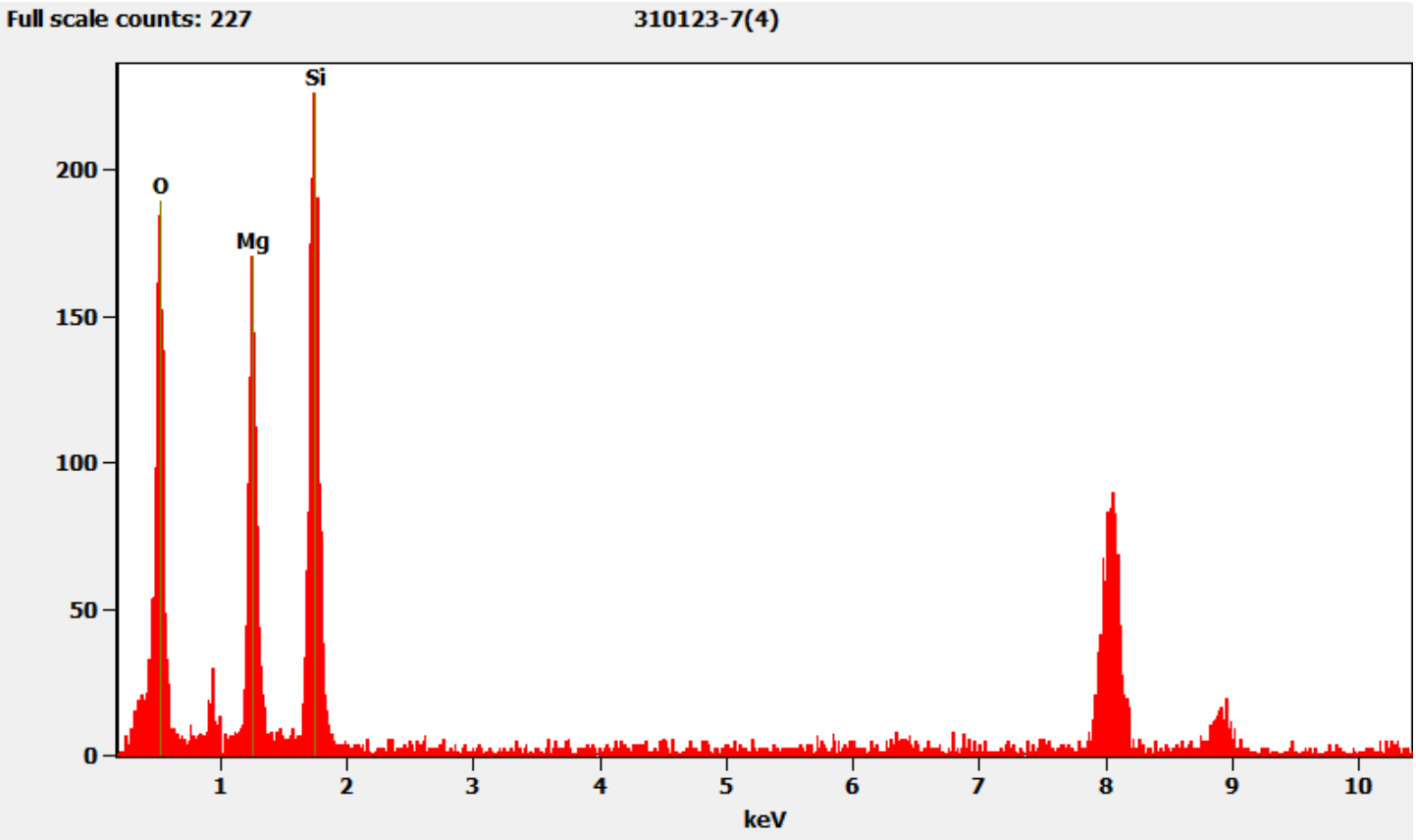


310123 FDA_076.jpg
Talc Particle
Cal: 0.001429 µm/pix
11:22 9/22/2019
TEM Mode: Imaging
Microscopist:
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

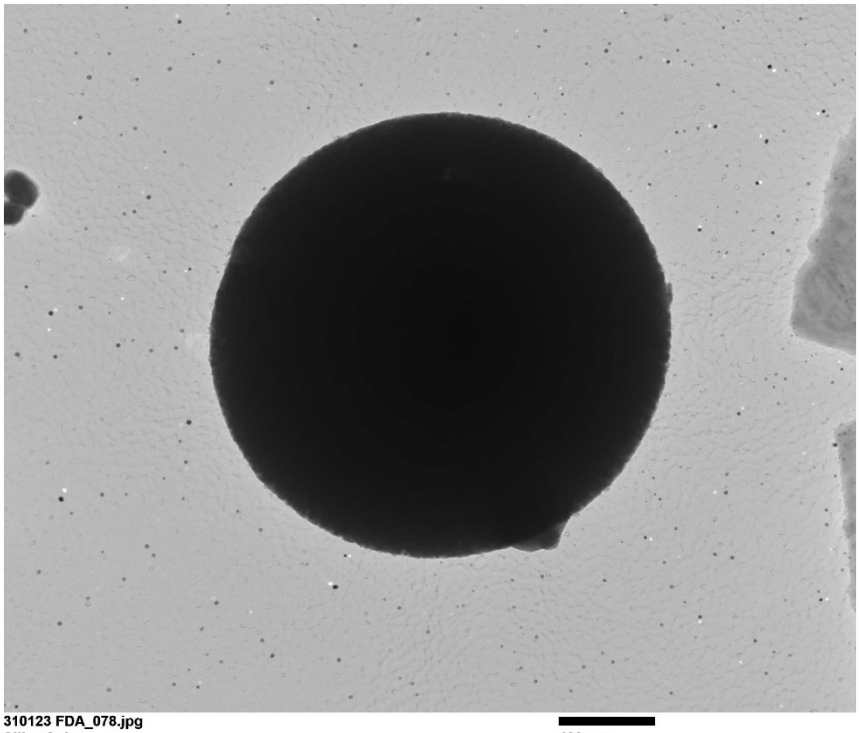
400 nm
HV=100kV
Direct Mag: 7200 x
AMA Analytical Services, Inc

Hexagonal diffraction pattern from the Talc Particle pictured above.

Chemistry from the Talc Particle pictured above.



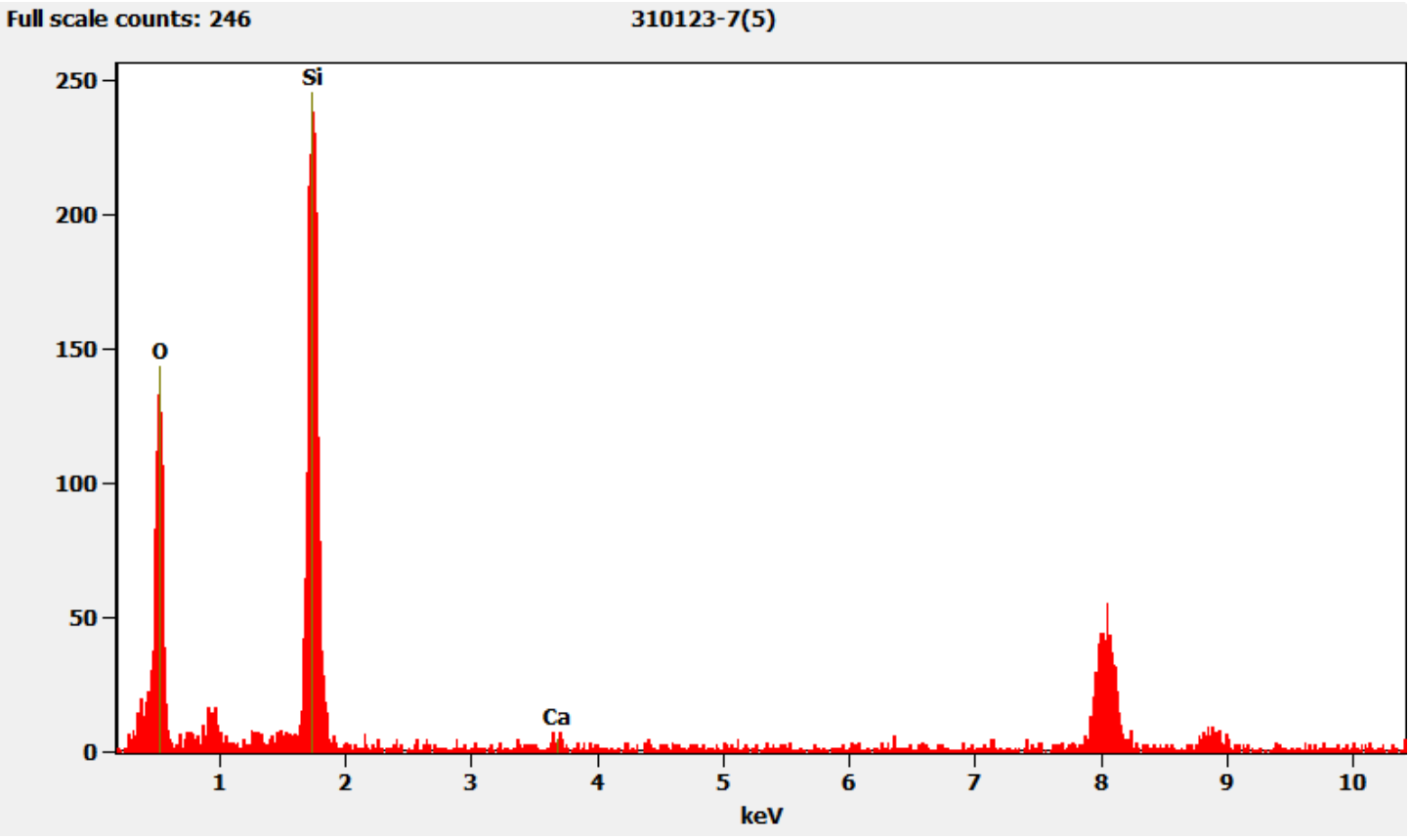
Sample 310123-7, Silica Sphere



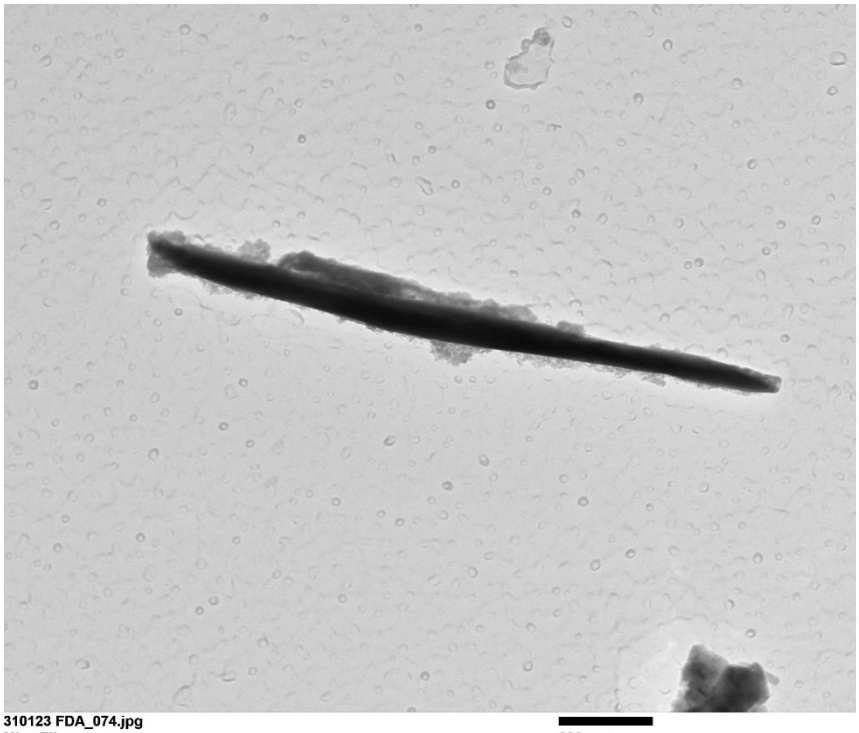
310123 FDA_078.jpg
Silica Sphere
Cal: 0.001429 µm/pix
11:25 9/22/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

400 nm
HV=100kV
Direct Mag: 7200 x
AMA Analytical Services, Inc

Chemistry from the Silica Sphere pictured above.



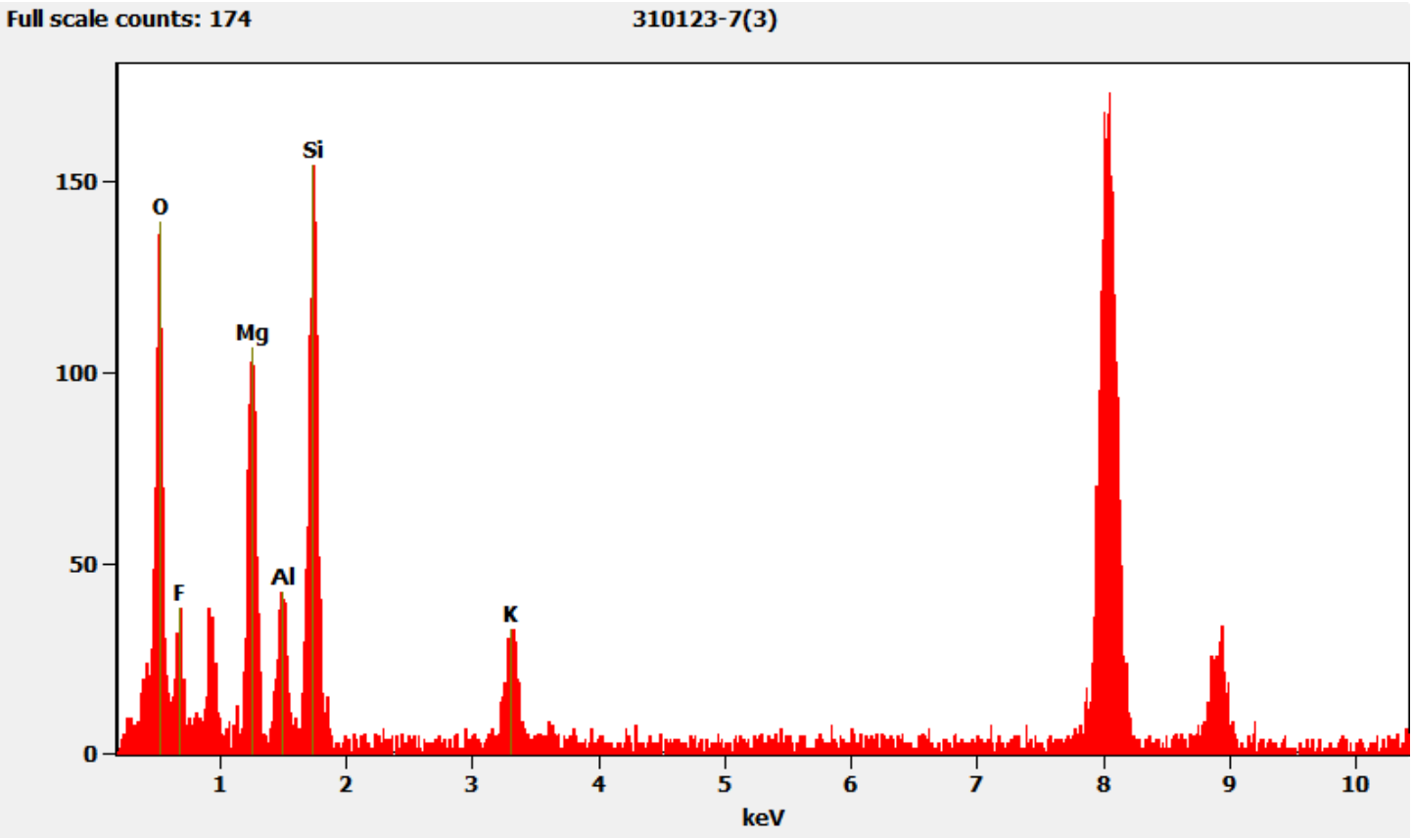
Sample 310123-7, Mica Fiber



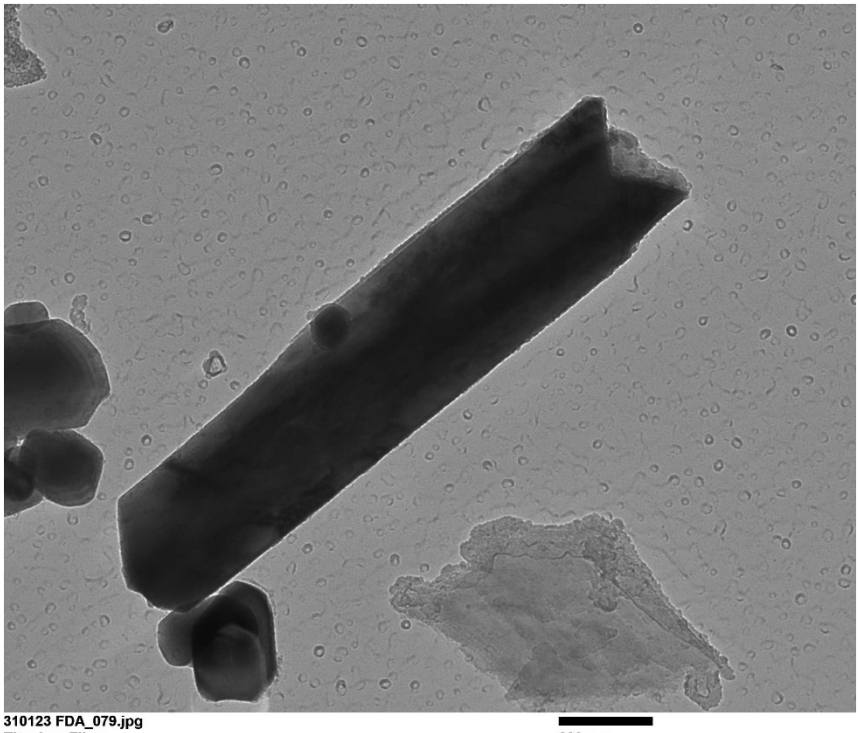
310123 FDA_074.jpg
Mica Fiber
Cal: 0.734921 nm/pix
11:20 9/22/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

200 nm
HV=100kV
Direct Mag: 14000 x
AMA Analytical Services, Inc

Chemistry from the Mica Fiber pictured above.



Sample 310123-7, Titanium Fiber



310123 FDA_079.jpg
Titanium Fiber
Cal: 0.734921 nm/pix
11:28 9/22/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

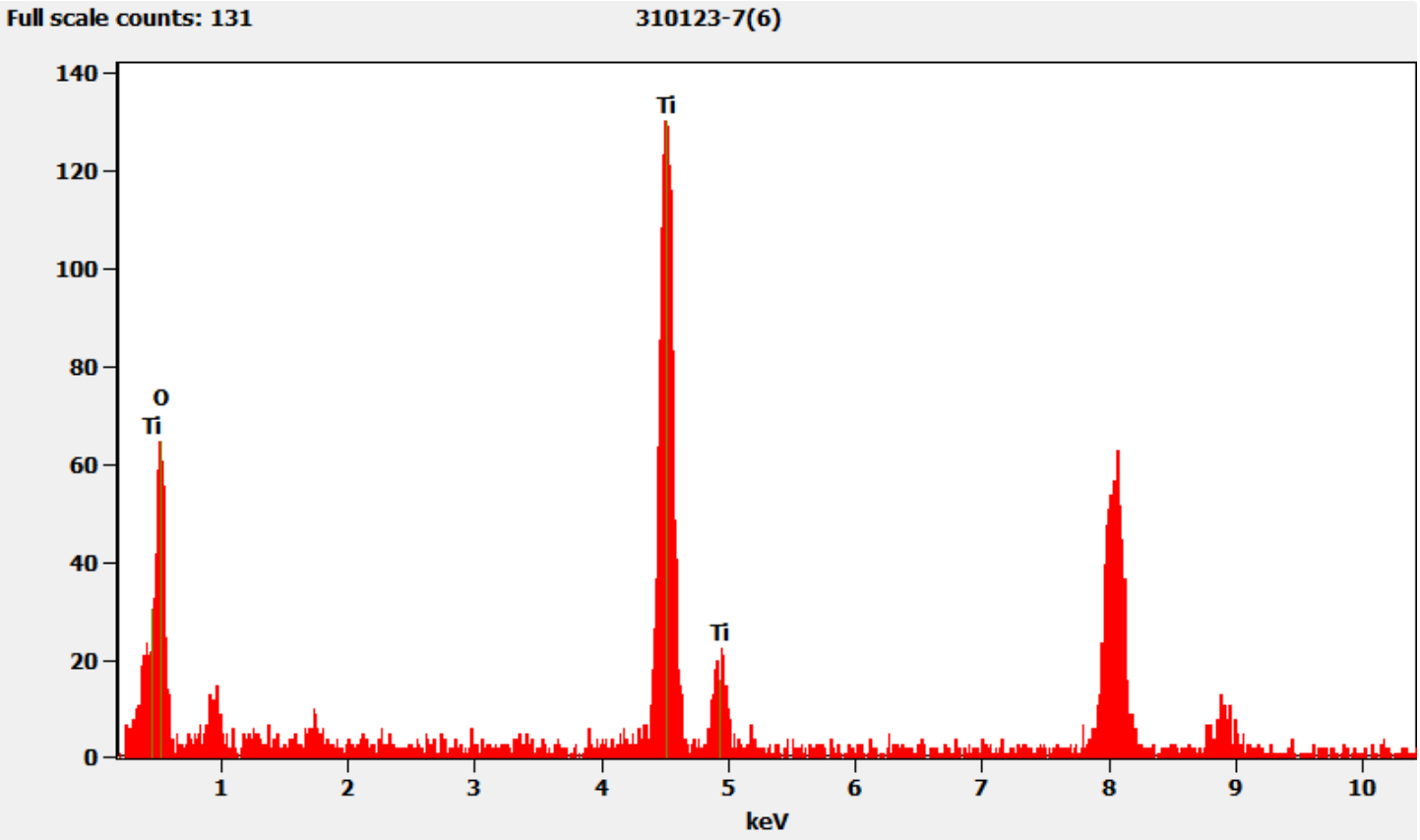
200 nm
HV=100kV
Direct Mag: 14000 x
AMA Analytical Services, Inc

Diffraction pattern from the Titanium Fiber pictured above.

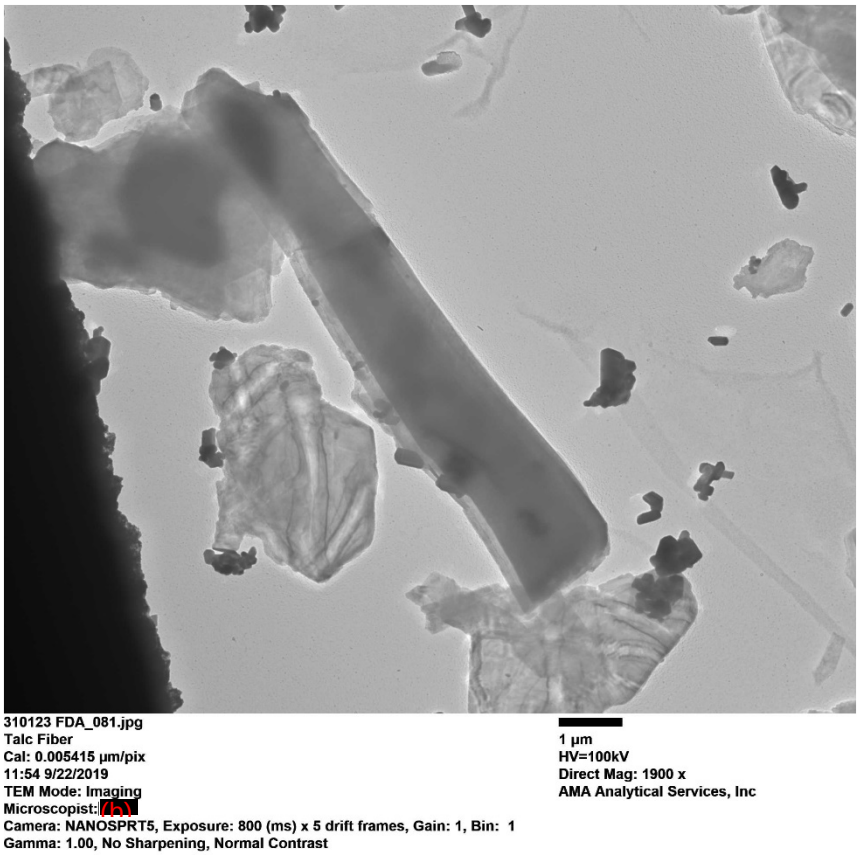
310123 FDA_080.jpg
Titanium Fiber
11:29 9/22/2019
TEM Mode: Diffraction
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

100 (1/Å)
HV=100kV
Cam Len: 0.2200 m
AMA Analytical Services, Inc

Chemistry from the Titanium Fiber pictured above.

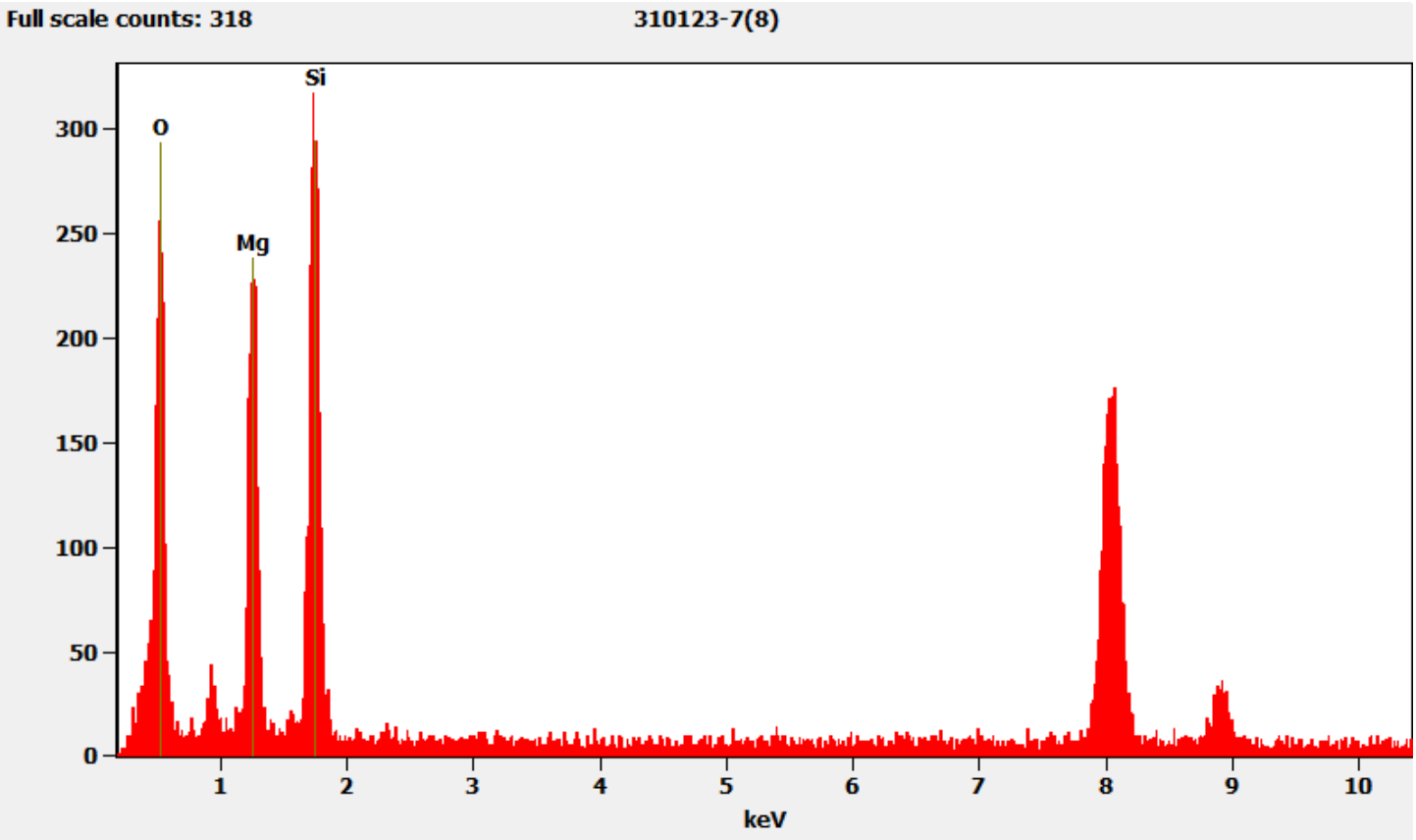


Sample 310123-7, Talc Fiber



Hexagonal diffraction pattern from the Talc Fiber pictured above.

Chemistry from the Talc Fiber pictured above.



310123-8, 8A, 8B, Client Sample D-75

PLM

All three aliquots of sample D-75 were analyzed by (b) (6) on September 26, 2019. No asbestos or non-asbestos amphibole variants were detected the samples. The results were calculated using the equations detailed in the calculations section.

310123-8	NAD
310123-8A	NAD
310123-8B	NAD

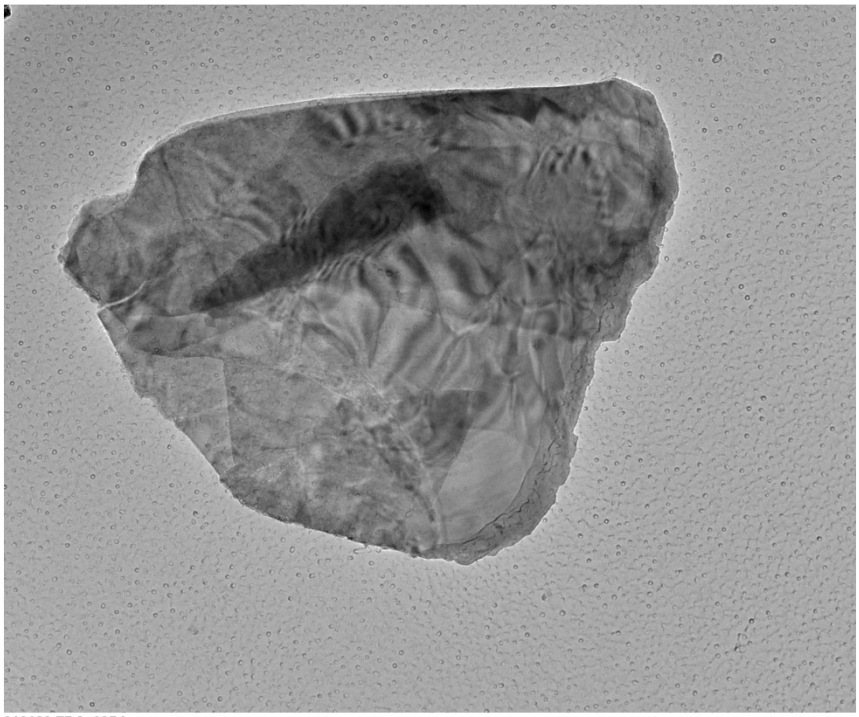
TEM

(b) (6) analyzed sample 8 on September 2, 2019 and samples 8A and 8B on September 29, 2019. The primary particles observed were mica and talc along with some talc fibers and a few talc ribbons. No asbestos or non-asbestos amphibole variants were detected in the samples. The results were calculated using the equations detailed in the calculations section.

310123-8	NAD
310123-8A	NAD
310123-8B	NAD

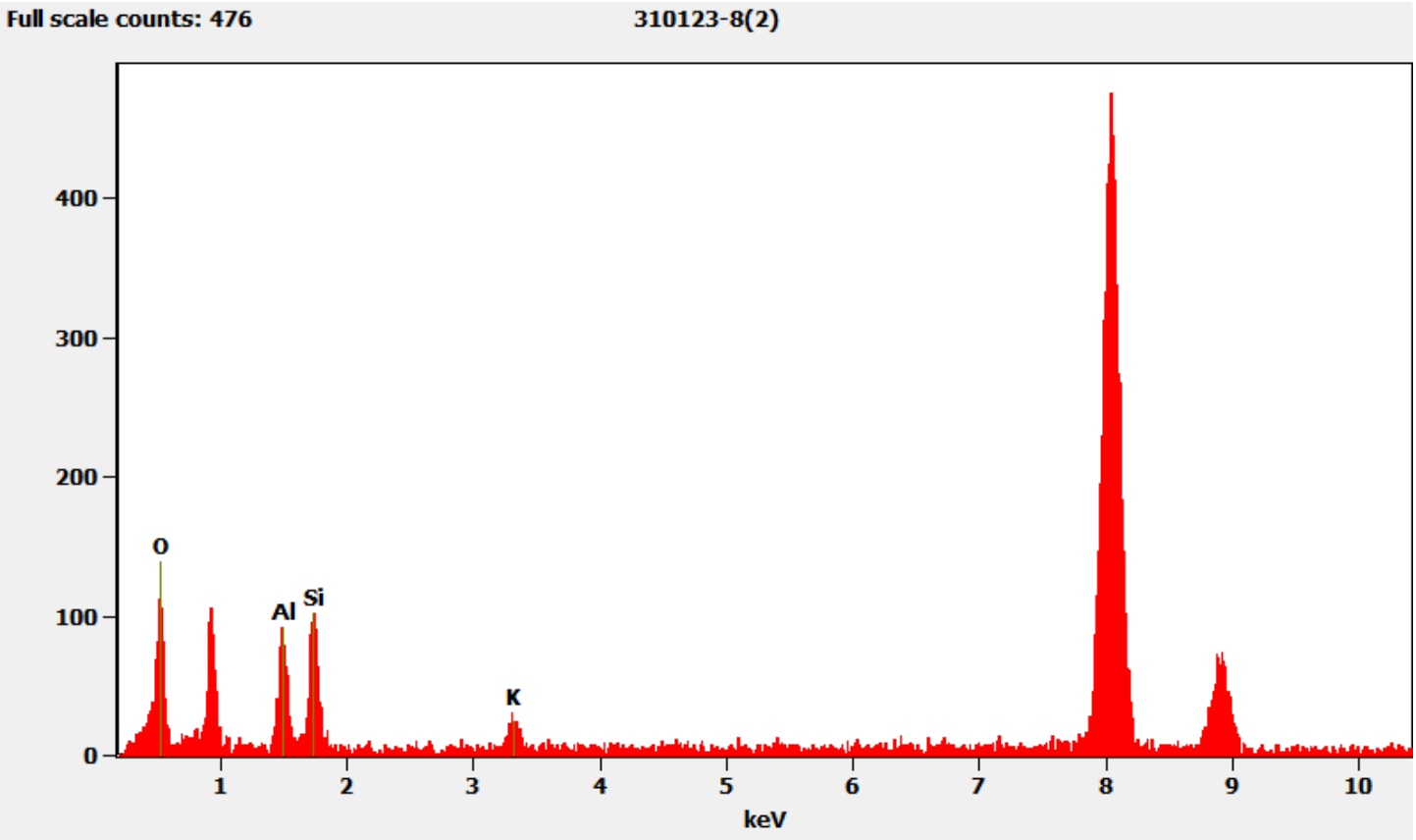
Below are pictures, diffraction patterns, and chemistry from some of the counted particles. The unidentified peaks in chemistry spectra are copper, zinc, and carbon. Those peaks are from the TEM specimen holder and specimen grid.

Sample 310123-8, Mica Particle

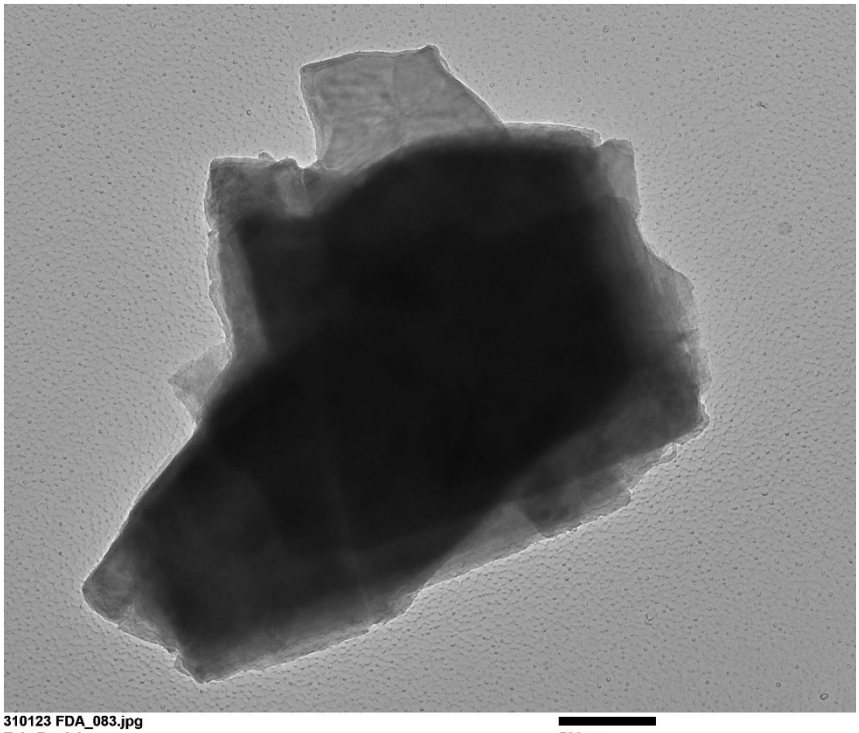


Diffraction pattern from the Mica Particle pictured above.

Chemistry from the Mica Particle pictured above



Sample 310123-8, Talc Particle



310123 FDA_083.jpg
Talc Particle
Cal: 0.001774 µm/pix
12:21 9/22/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

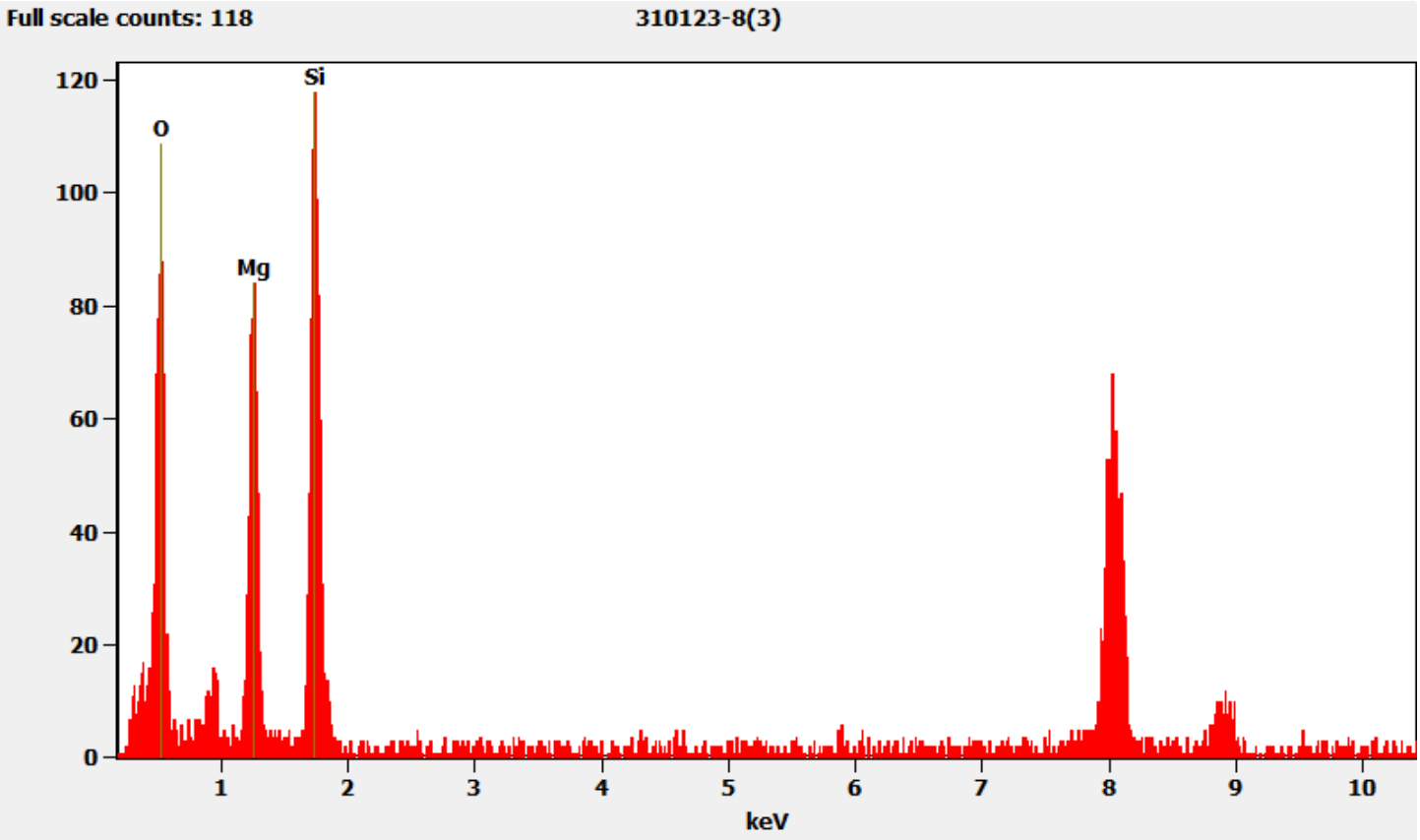
500 nm
HV=100kV
Direct Mag: 5800 x
AMA Analytical Services, Inc

Hexagonal diffraction from the Talc Particle pictured above.

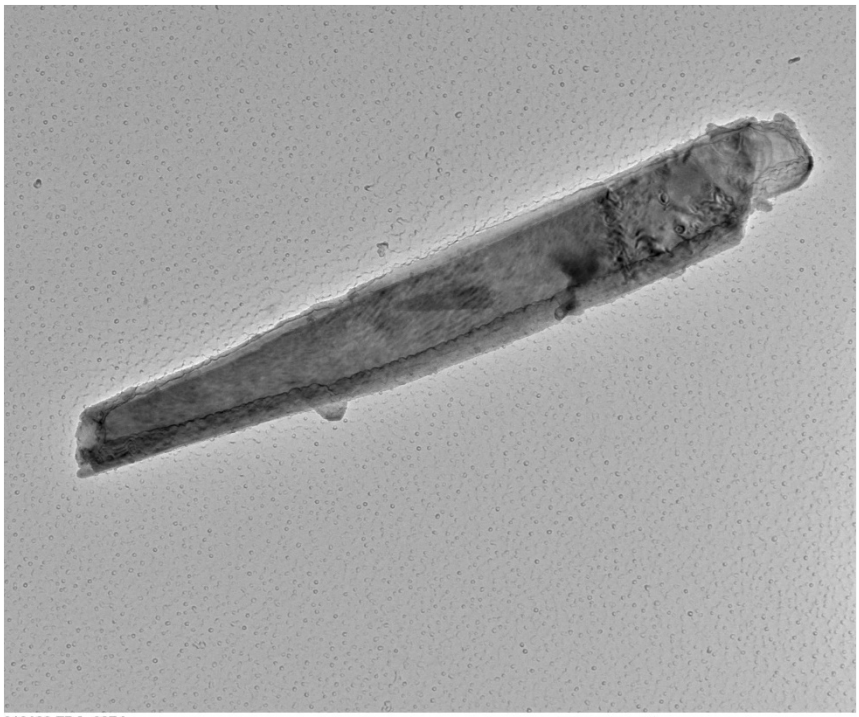
310123 FDA_084.jpg
Talc Particle
12:21 9/22/2019
TEM Mode: Diffraction
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

100 (1/Å)
HV=100kV
Cam Len: 0.5500 m
AMA Analytical Services, Inc

Chemistry from the Talc Particle pictured above.



Sample 310123-8, Talc Fiber

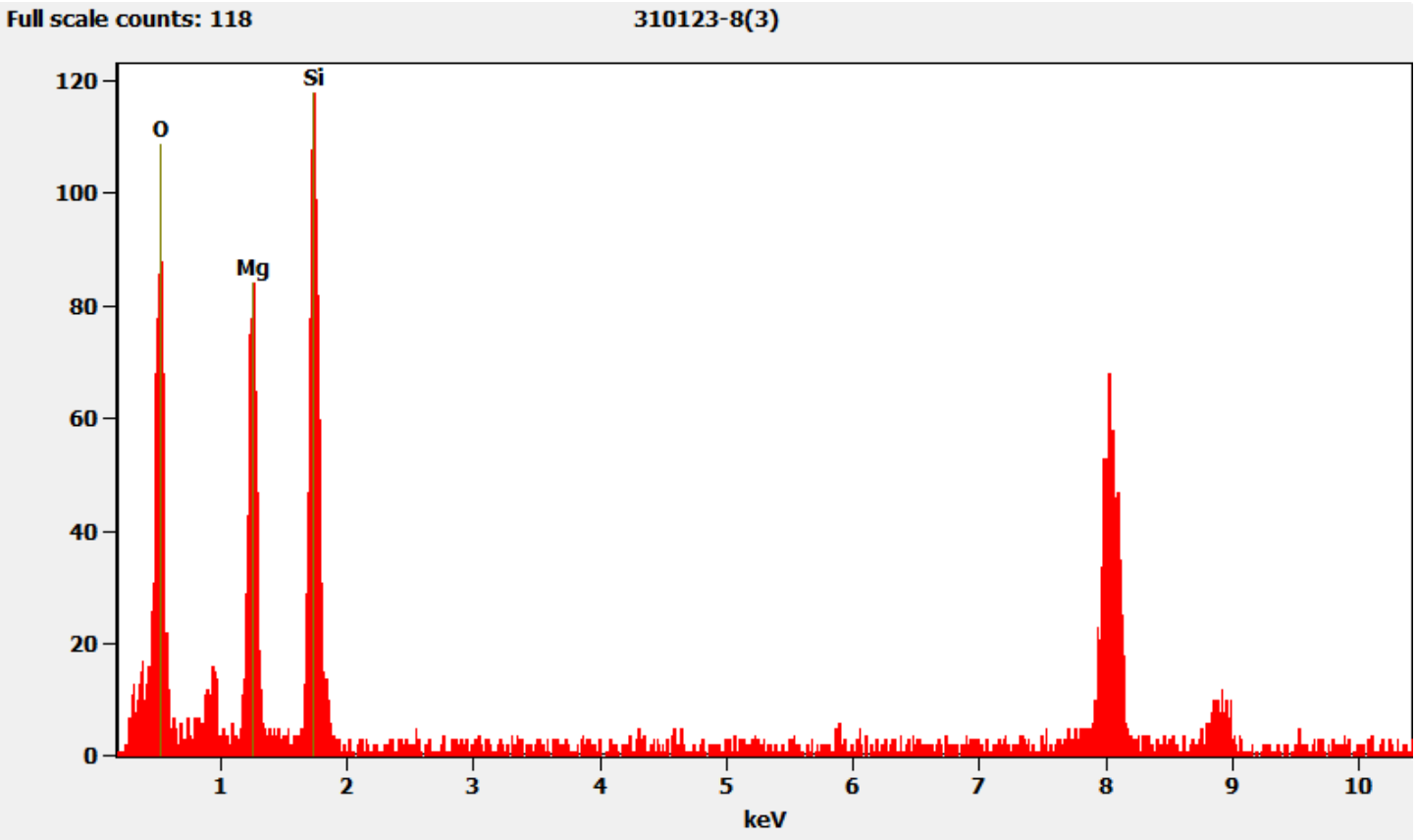


310123 FDA_087.jpg
Talc Fiber
Cal: 0.001429 µm/pix
12:27 9/22/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

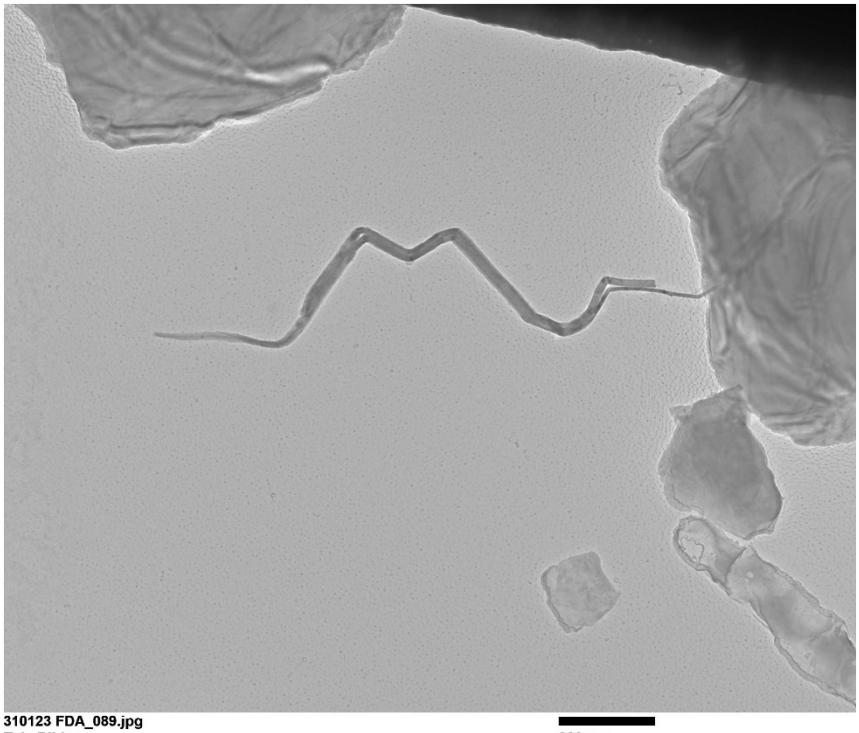
400 nm
HV=100kV
Direct Mag: 7200 x
AMA Analytical Services, Inc

Hexagonal diffraction pattern from the Talc Fiber pictured above.

Chemistry from the Talc Fiber pictured above



Sample 310123-8, Talc Ribbon



310123 FDA_089.jpg
Talc Ribbon
Cal: 0.002858 µm/pix
13:05 9/22/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

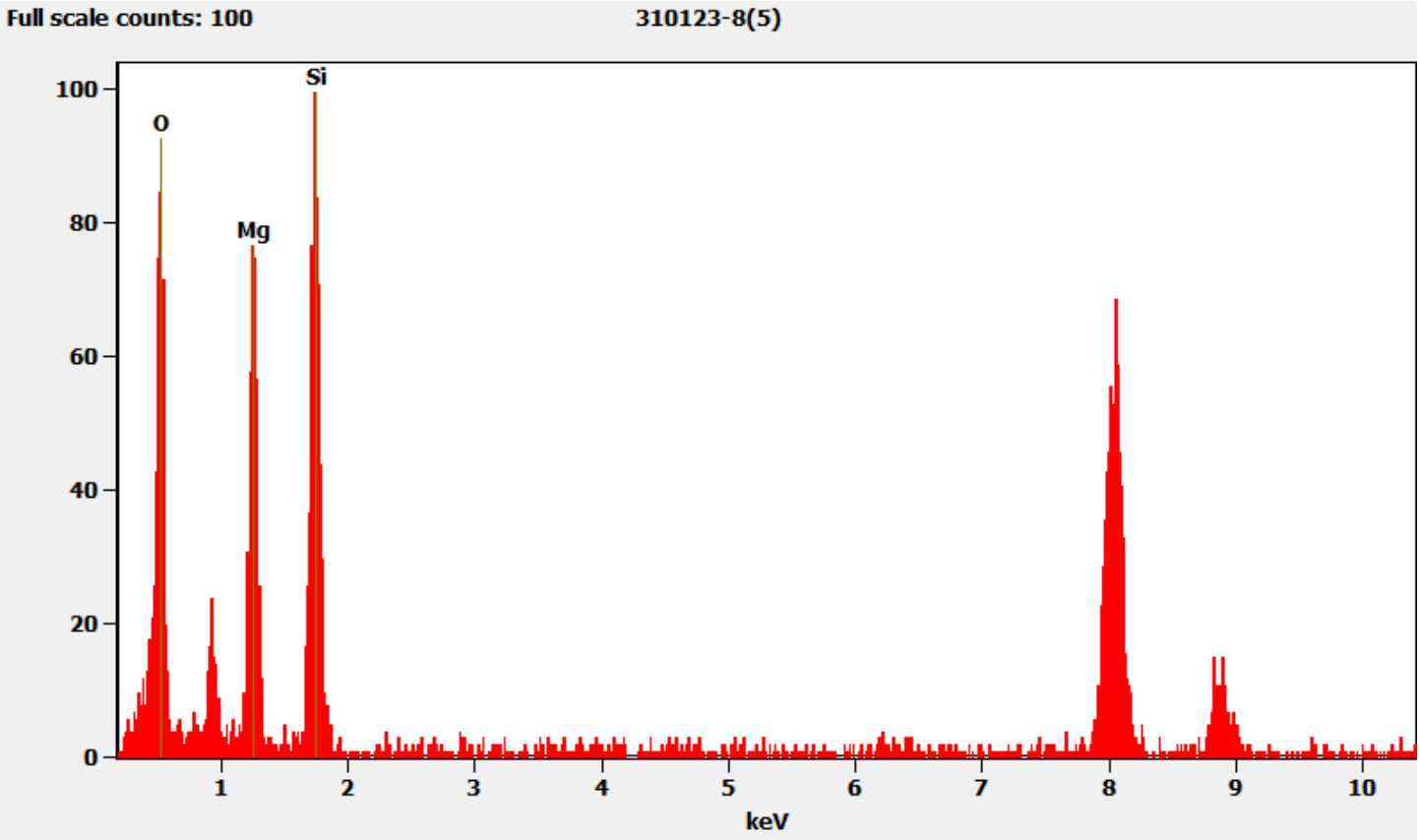
800 nm
HV=100kV
Direct Mag: 3600 x
AMA Analytical Services, Inc

Diffraction pattern from the Talc Ribbon pictured above.

310123 FDA_090.jpg
Talc Ribbon
13:06 9/22/2019
TEM Mode: Diffraction
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

100 (1/Å)
HV=100kV
Cam Len: 0.2200 m
AMA Analytical Services, Inc

Chemistry from the Talc Ribbon pictured above.



<u>310123-9, 9A, 9B, Client Sample D-76</u>

PLM

All three aliquots of sample D-76 were analyzed by (b) (6) on September 26, 2019. No asbestos or non-asbestos amphibole variants were detected the samples. The results were calculated using the equations detailed in the calculations section.

310123-9	NAD
310123-9A	NAD
310123-9B	NAD

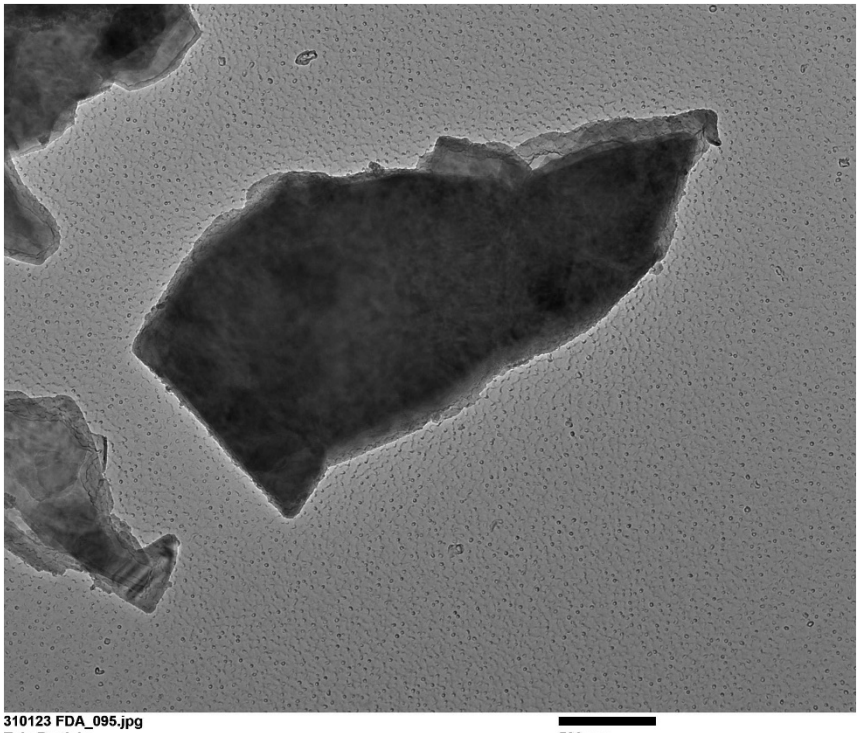
TEM

Sample 9 was analyzed by (b) (6) on September 22, 2019. (b) (6) analyzed samples 9A and 9B on September 30, 2019. The primary particles observed were talc and mica along some talc fibers, silica particles, titanium coated particles and a few titanium fibers. No asbestos or non-asbestos amphibole variants were detected in the samples. The results were calculated using the equations detailed in the calculations section.

310123-9	NAD
310123-9A	NAD
310123-9B	NAD

Below are pictures, diffraction patterns, and chemistry from some of the counted particles. The unidentified peaks in chemistry spectra are copper, zinc, and carbon. Those peaks are from the TEM specimen holder and specimen grid.

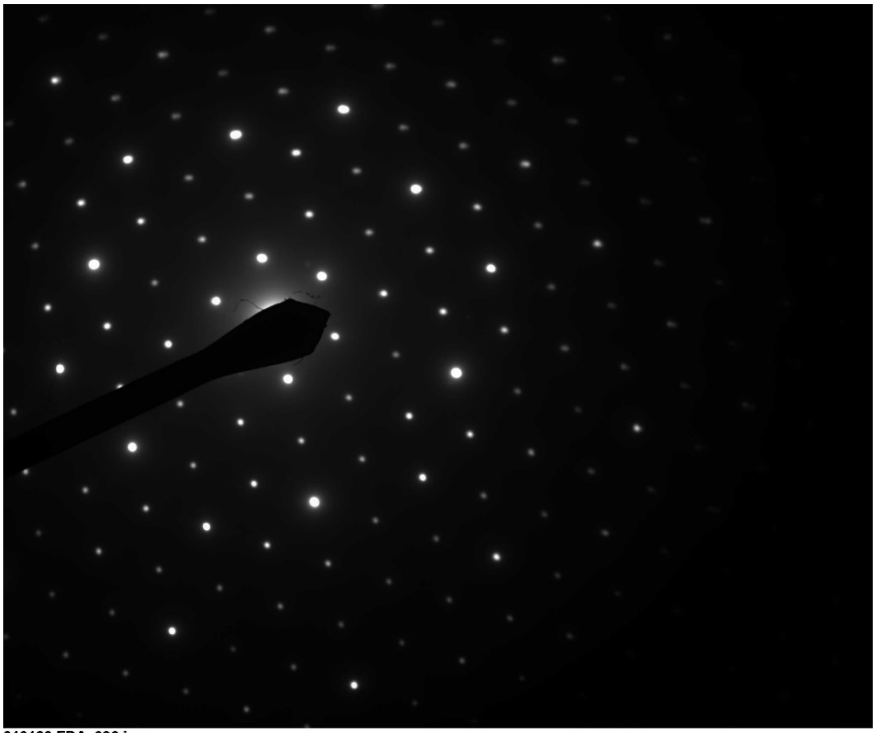
Sample 310123-9, Talc Particle



310123 FDA_095.jpg
Talc Particle
Cal: 0.001774 µm/pix
13:25 9/22/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

500 nm
HV=100kV
Direct Mag: 5800 x
AMA Analytical Services, Inc

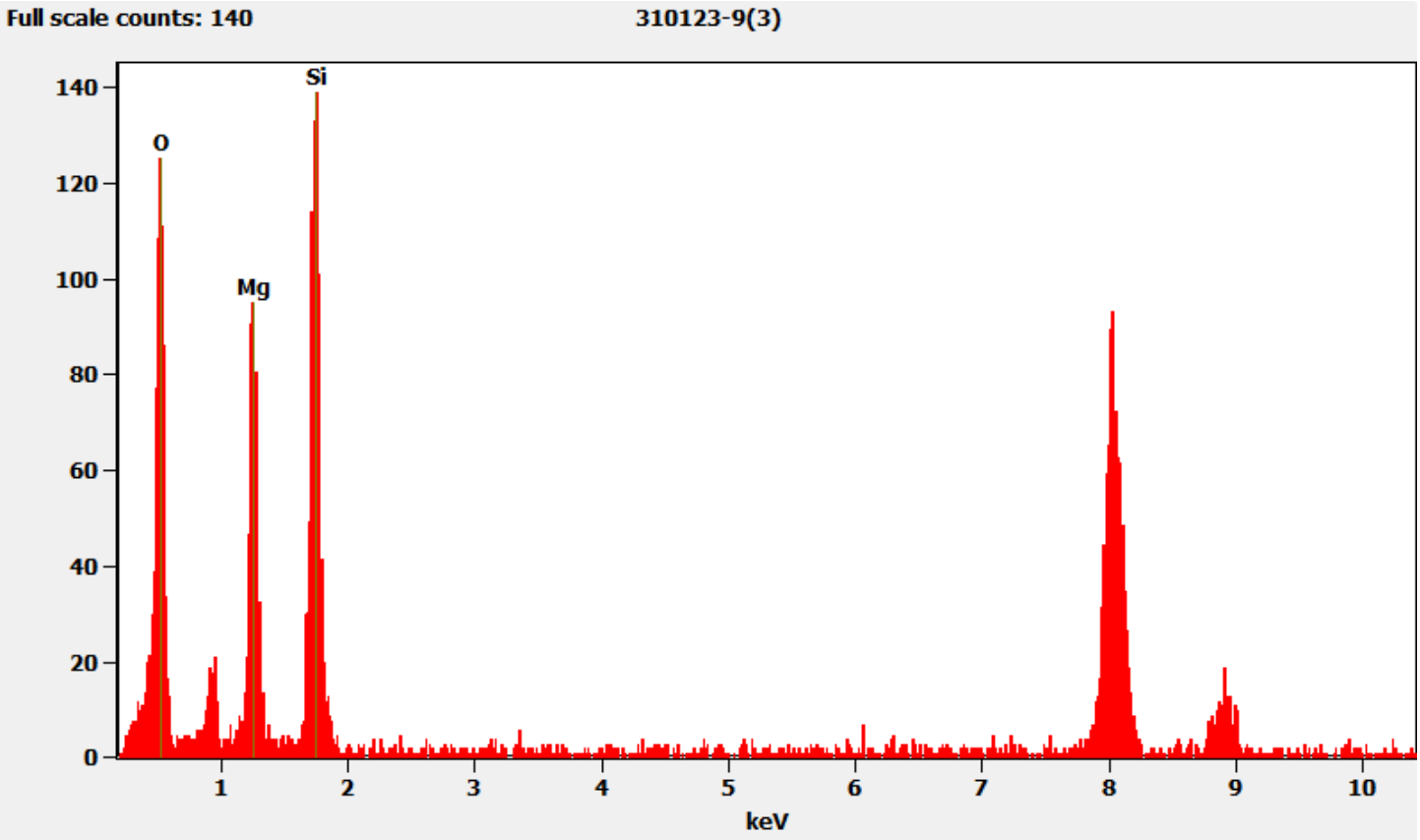
Hexagonal diffraction pattern from the Talc Particle pictured above.



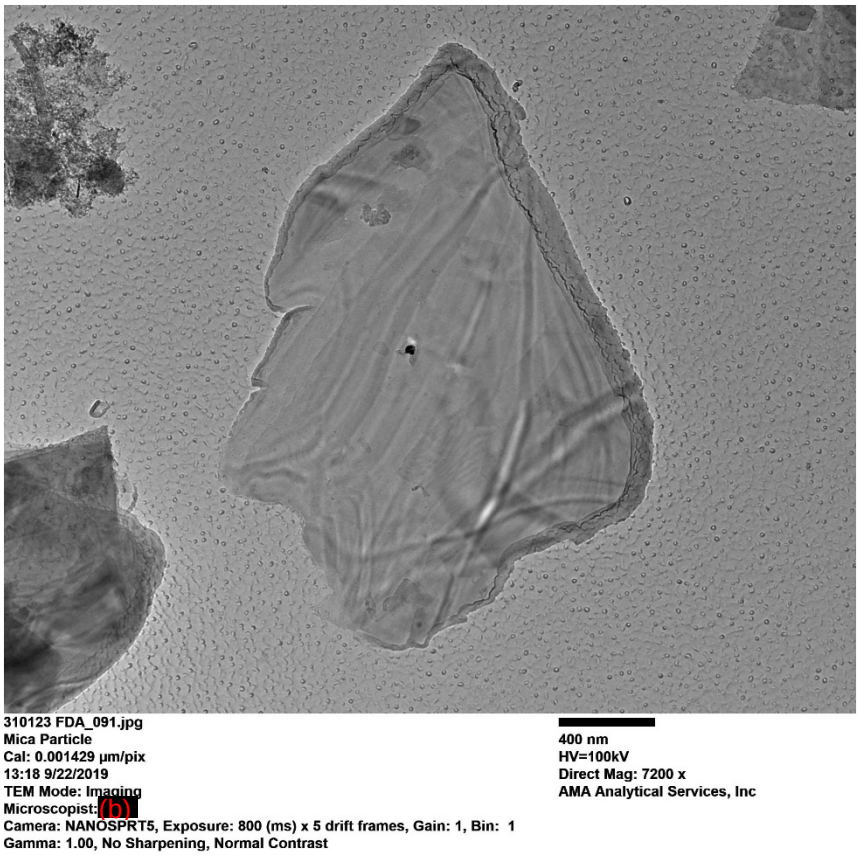
310123 FDA_096.jpg
Talc Particle
13:26 9/22/2019
TEM Mode: Diffraction
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

100 (1/Å)
HV=100kV
Cam Len: 0.2200 m
AMA Analytical Services, Inc

Chemistry from the Talc Particle pictured above.

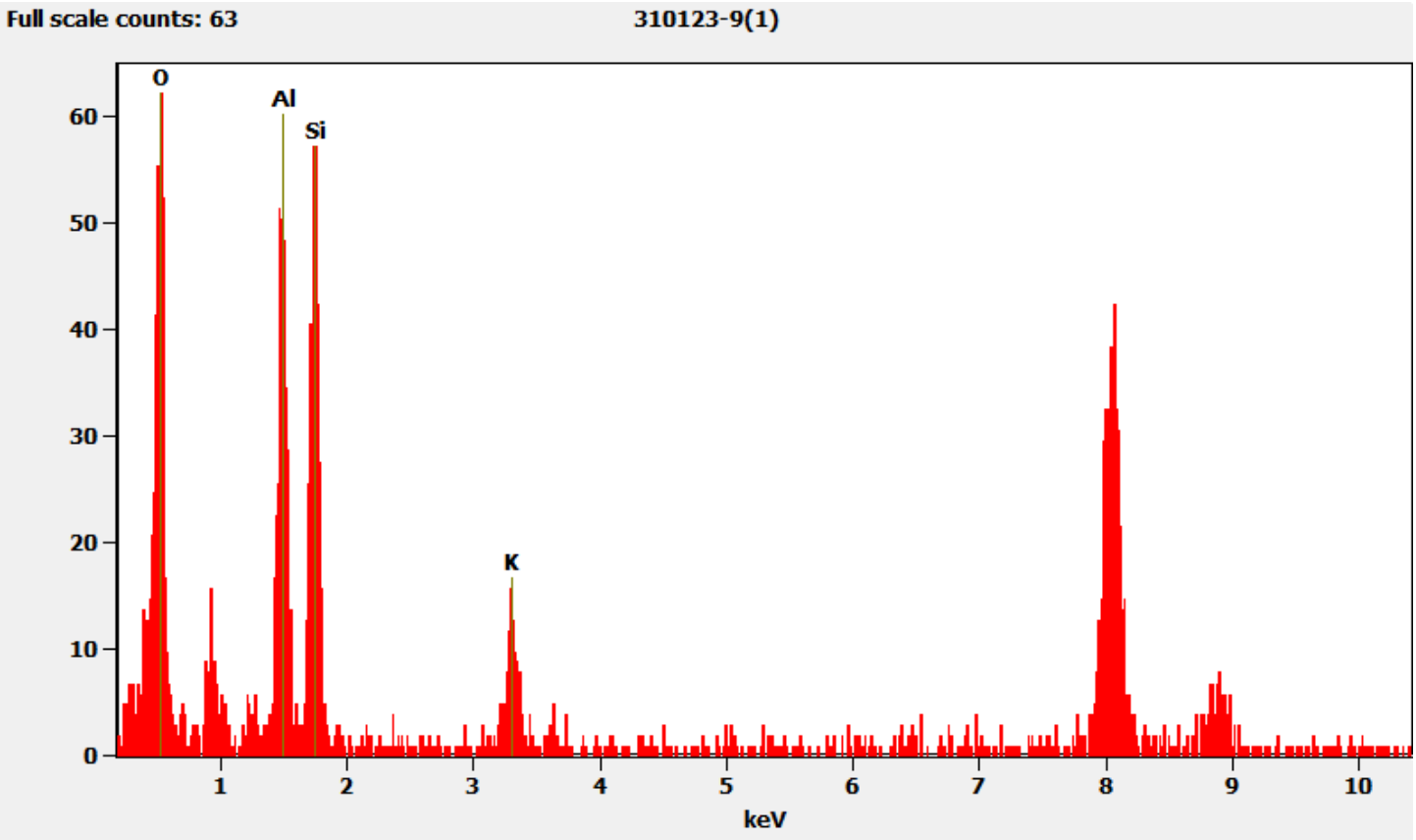


Sample 310123-9, Mica Particle

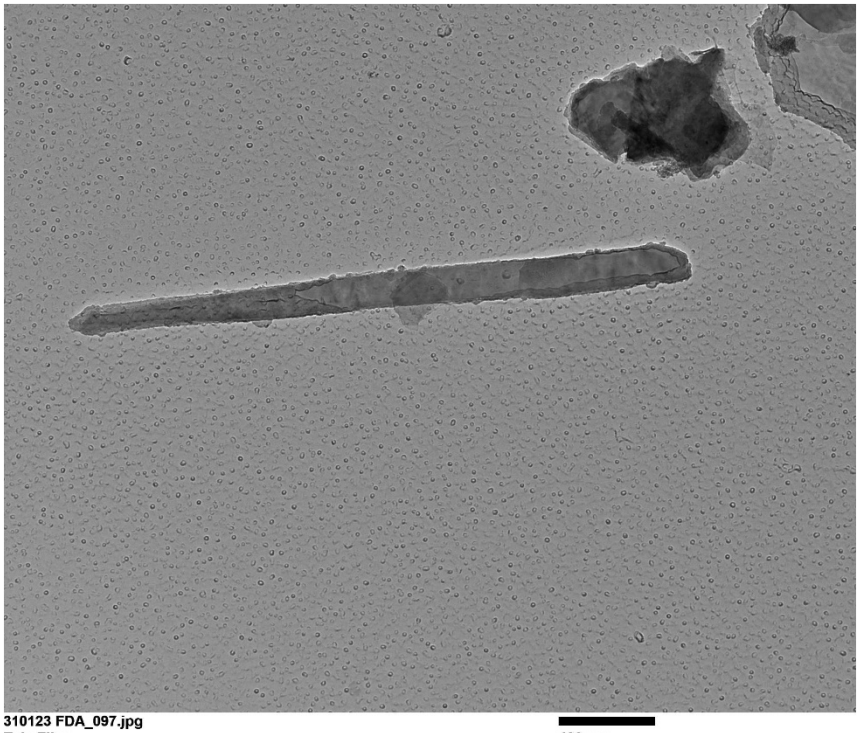


Diffraction pattern from the Mica Particle pictured above.

Chemistry from the Mica Particle pictured above



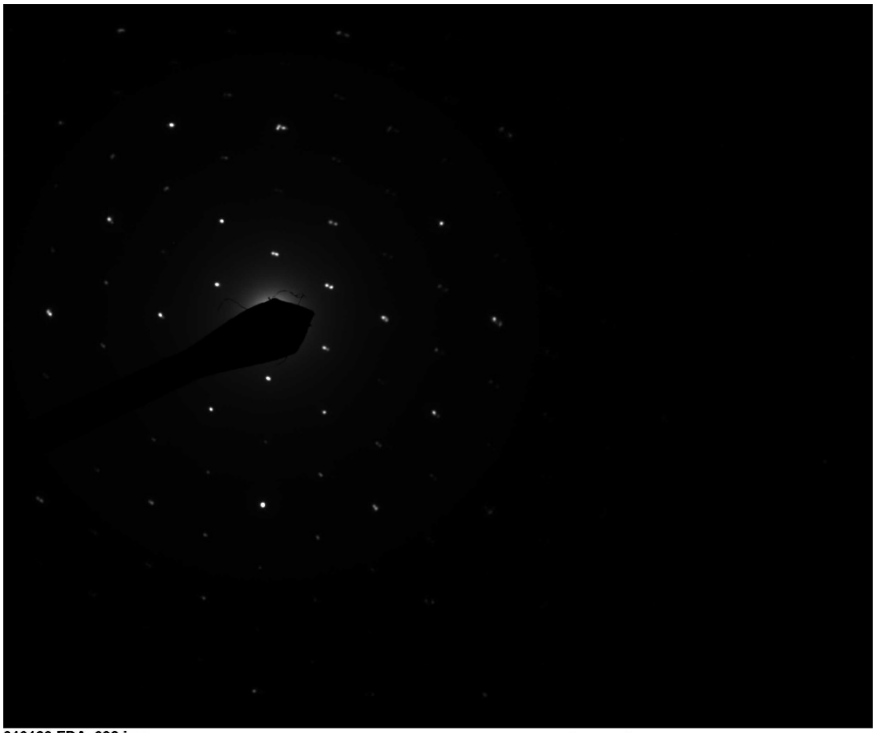
Sample 310123-9, Talc Fiber



310123 FDA_097.jpg
Talc Fiber
Cal: 0.001429 µm/pix
13:32 9/22/2019
TEM Mode: Imaging
Microscopist: (a)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

400 nm
HV=100kV
Direct Mag: 7200 x
AMA Analytical Services, Inc

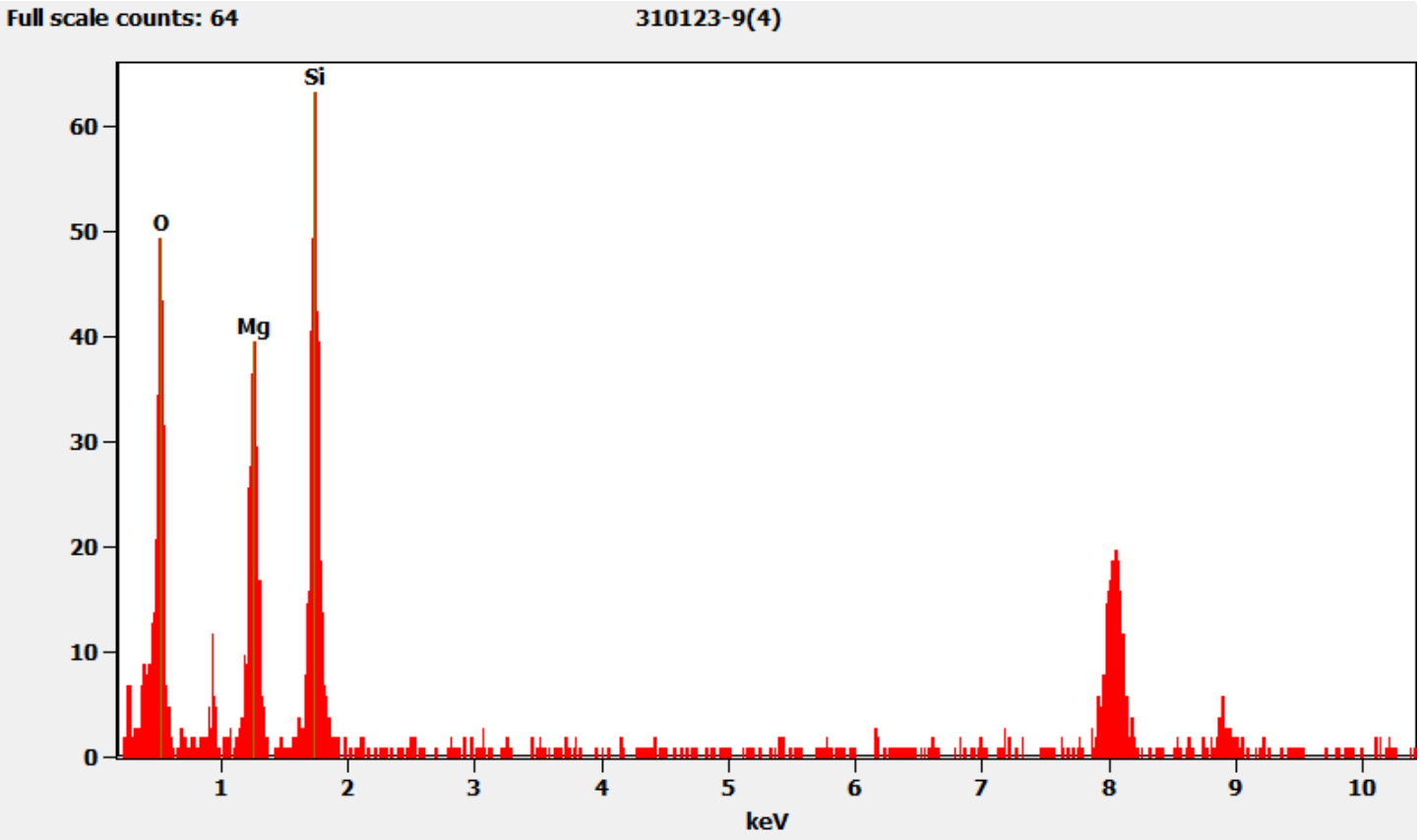
Hexagonal diffraction pattern from the Talc Fiber pictured above.



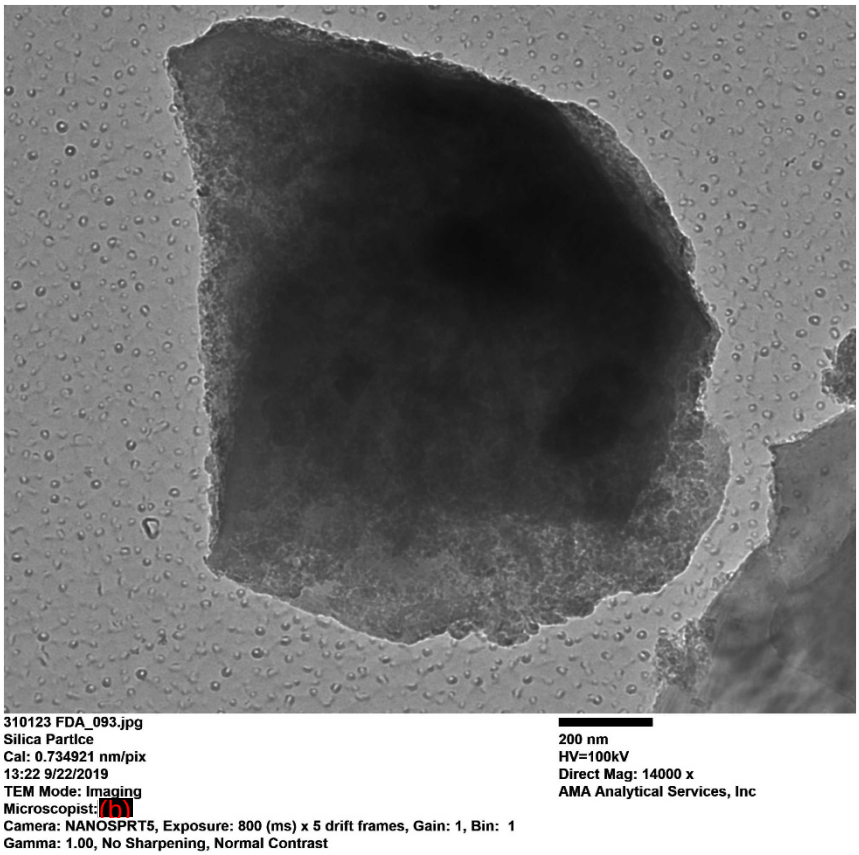
310123 FDA_098.jpg
Talc Fiber
13:33 9/22/2019
TEM Mode: Diffraction
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

100 (1/Å)
HV=100kV
Cam Len: 0.2200 m
AMA Analytical Services, Inc

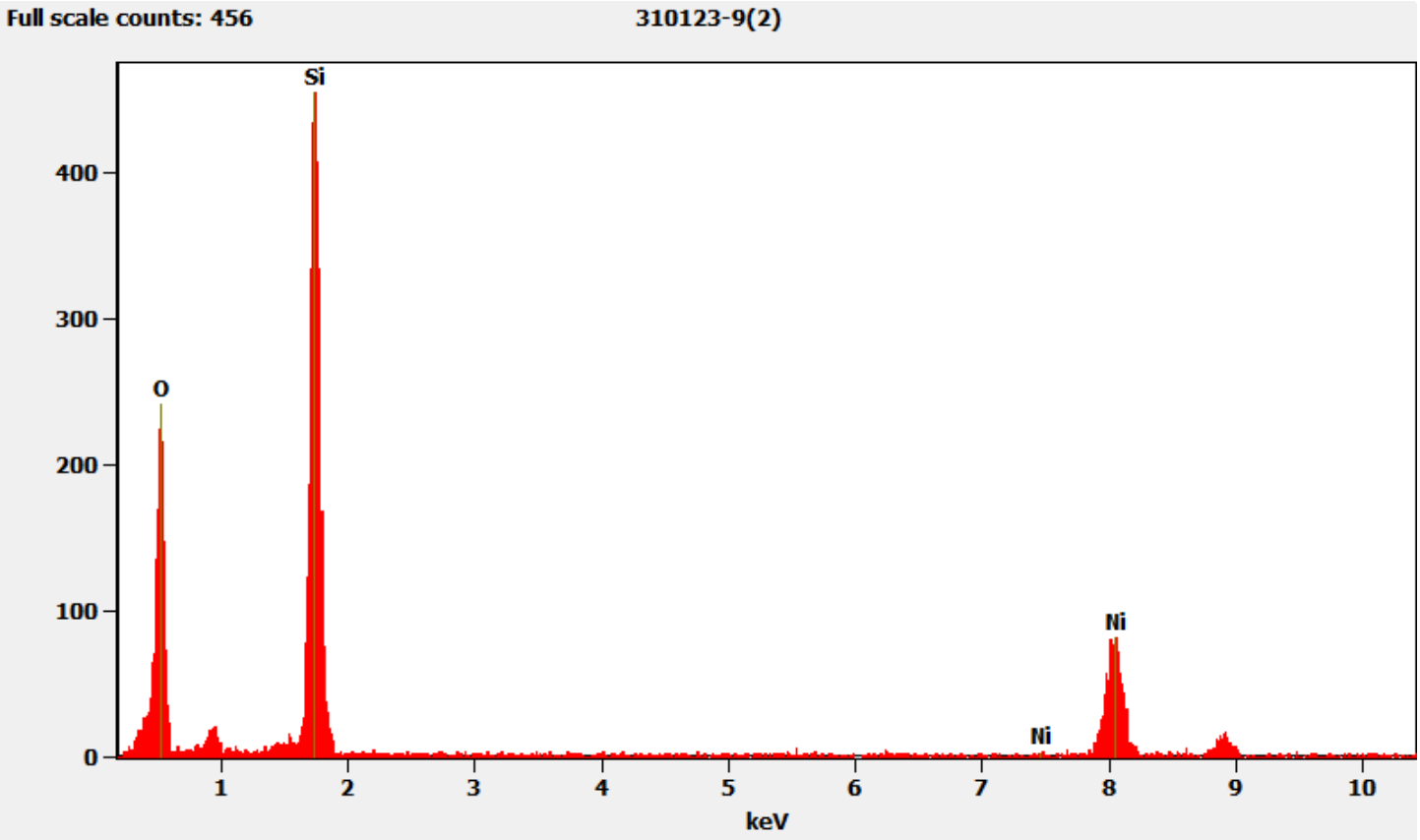
Chemistry from the Talc Fiber pictured above.



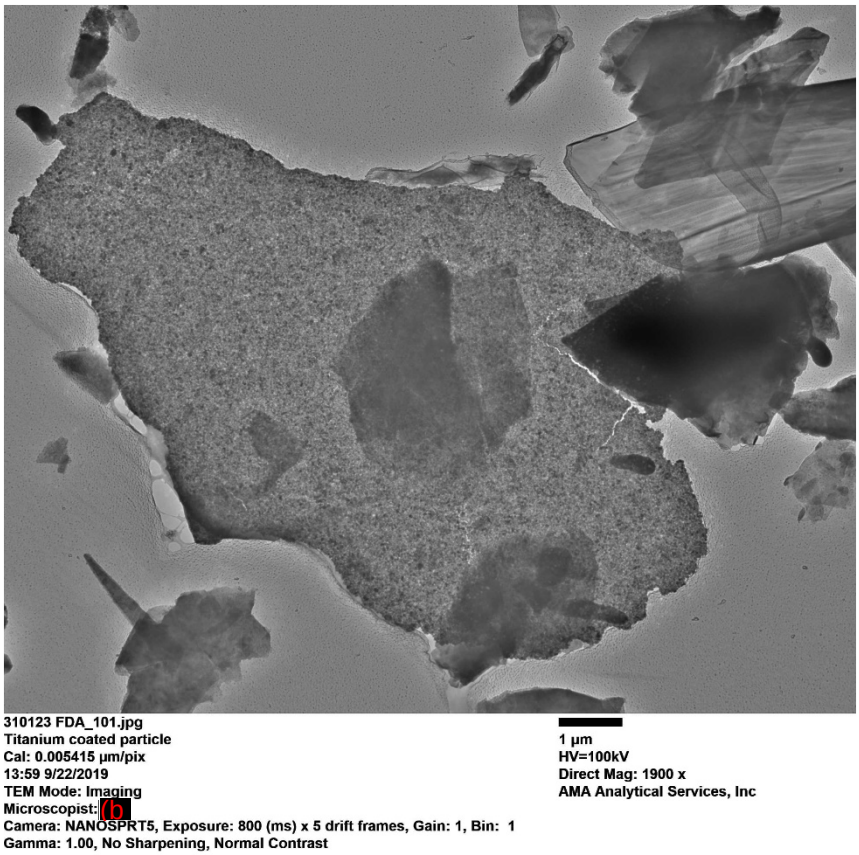
Sample 310123-9, Silica Particle



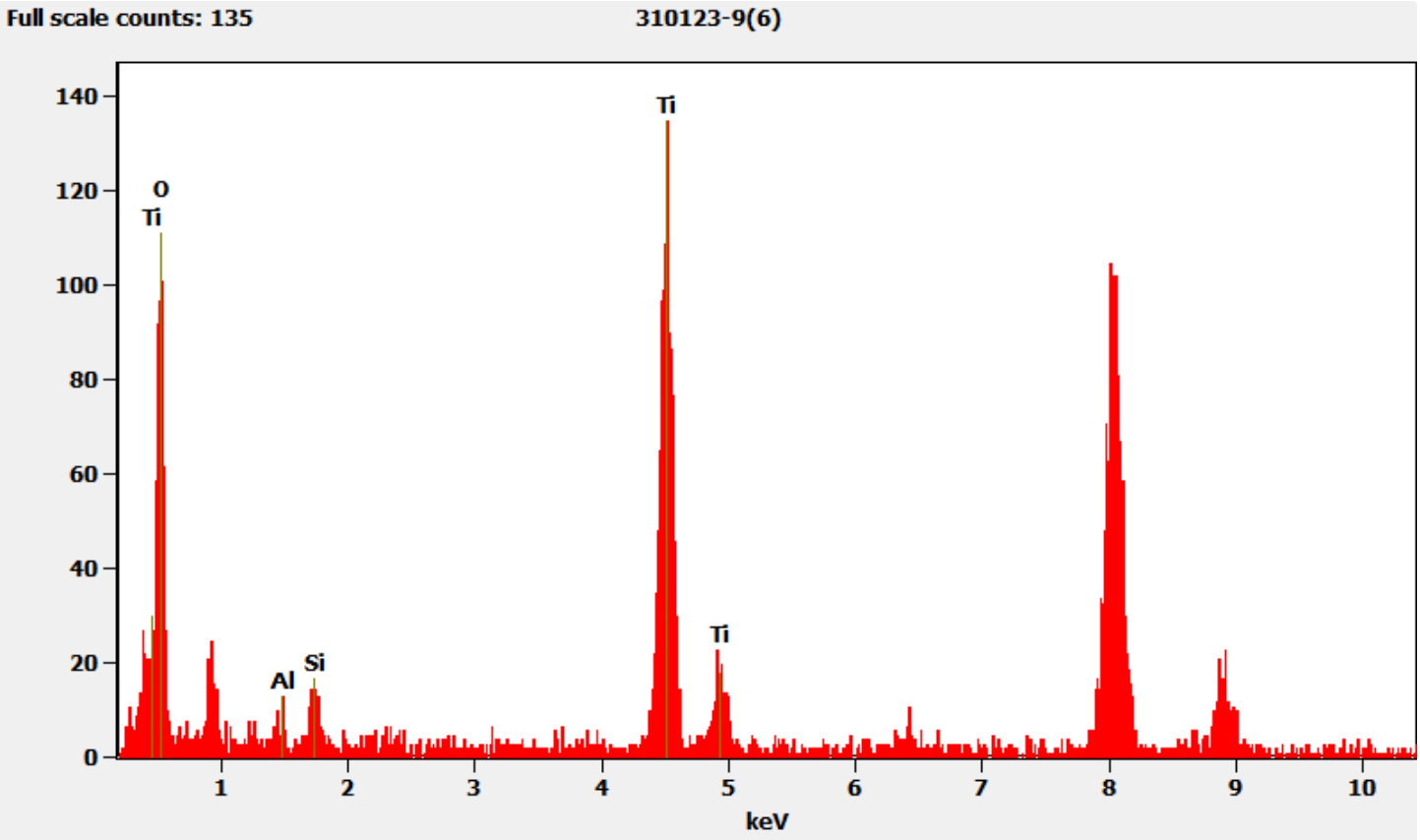
Chemistry from the Silica Particle pictured above



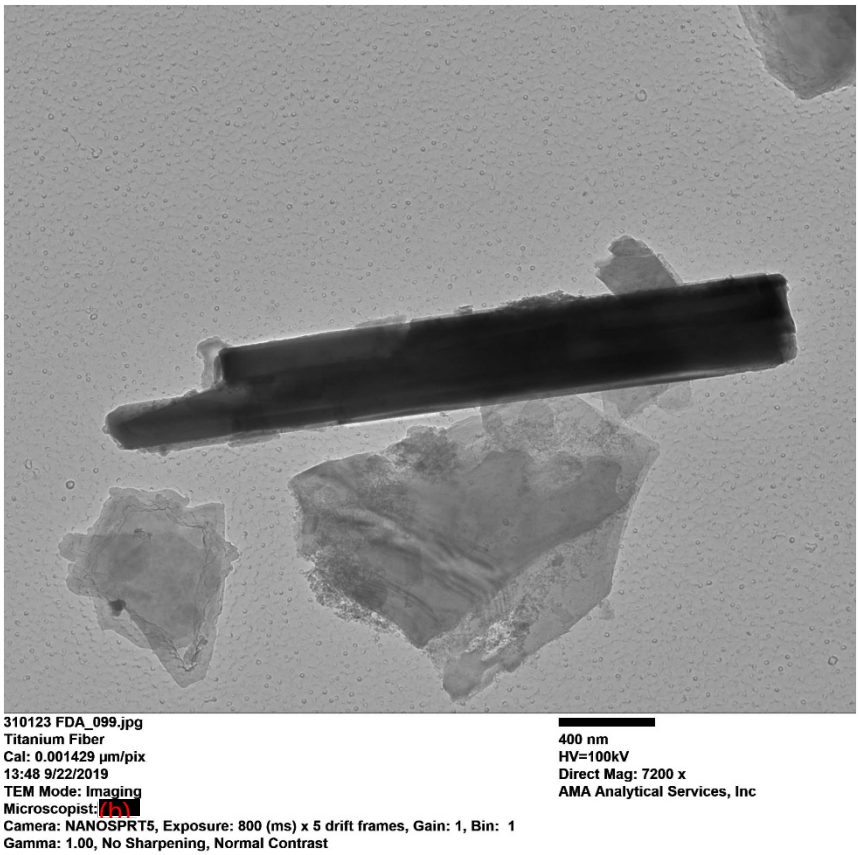
Sample 310123-9, Titanium Coated Particle



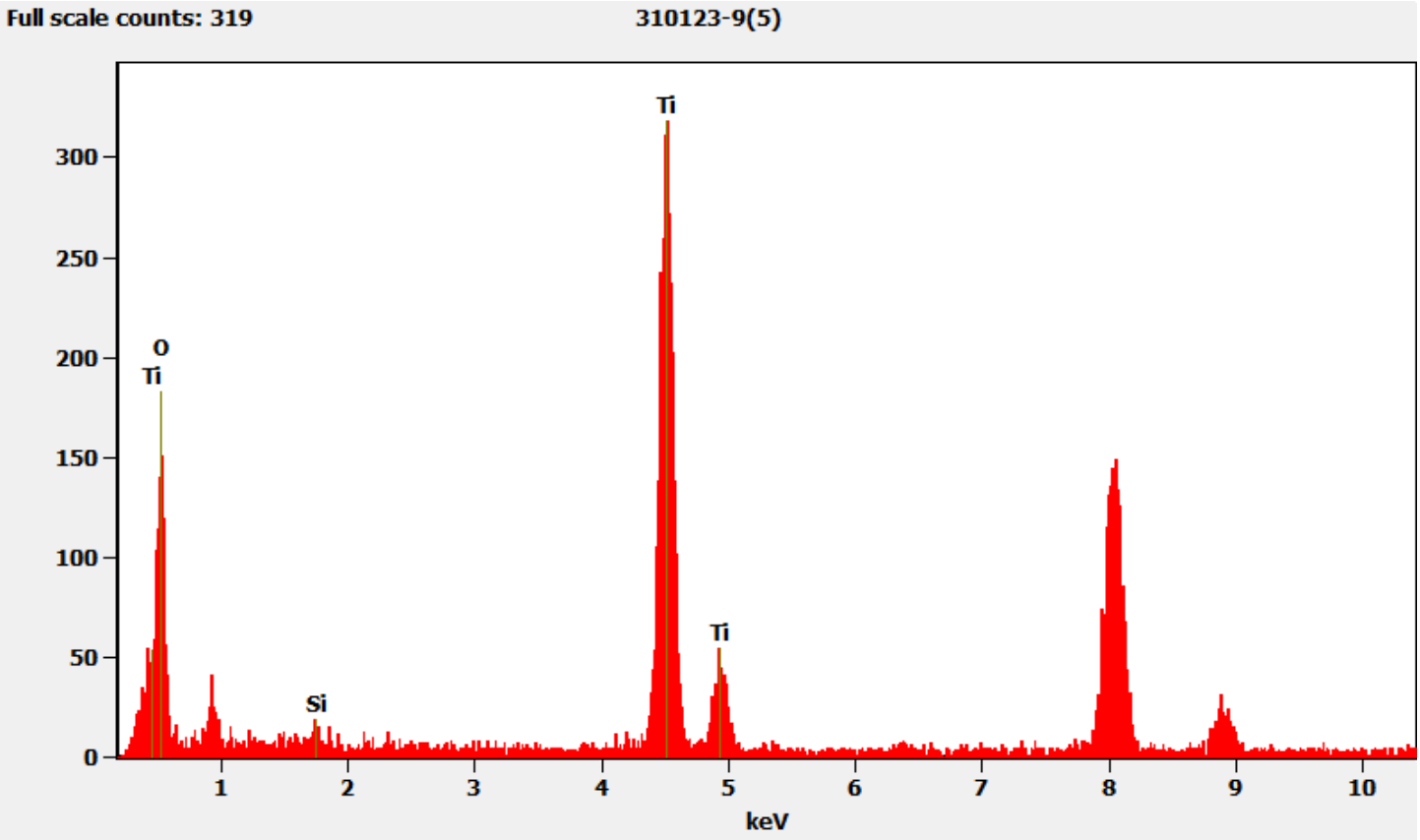
Chemistry from the Titanium Coated Particle pictured above



Sample 310123-9, Titanium Fiber



Chemistry from the Titanium Fiber pictured above



<u>310123-10, 10A, 10B, Client Sample D-77</u>

PLM

All three aliquots of sample D-77 were analyzed by (b) (6) on September 26, 2019. No asbestos or non-asbestos amphibole variants were detected the samples. The results were calculated using the equations detailed in the calculations section.

310123-10	NAD
310123-10A	NAD
310123-10B	NAD

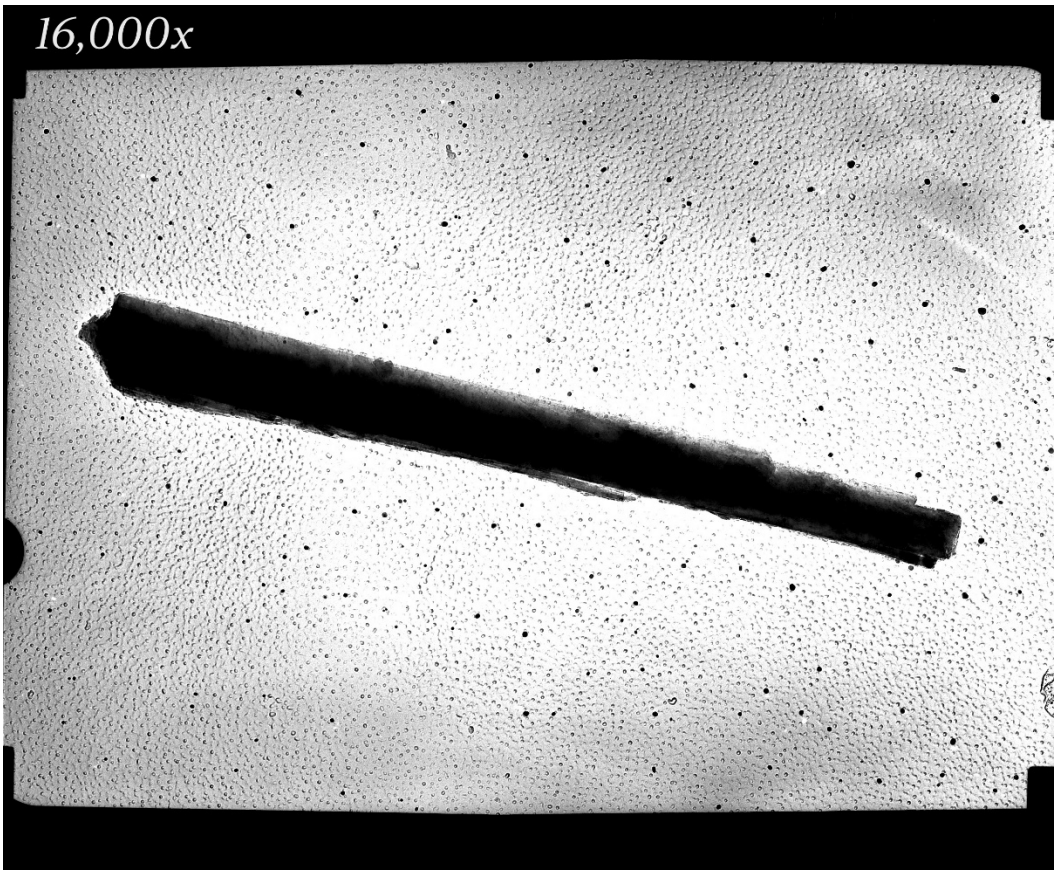
TEM

(b) (6) analyzed sample 10 on September 22, 2019 and sample 10B on September 30, 2019. (b) (6) analyzed sample 10A on September 30, 2019. The primary particle observed was talc along with a few talc fibers and very few silica particles and talc ribbons. One tremolite structure and two chrysotile structures were observed on aliquot 10A. The results were calculated using the equations detailed in the calculations section.

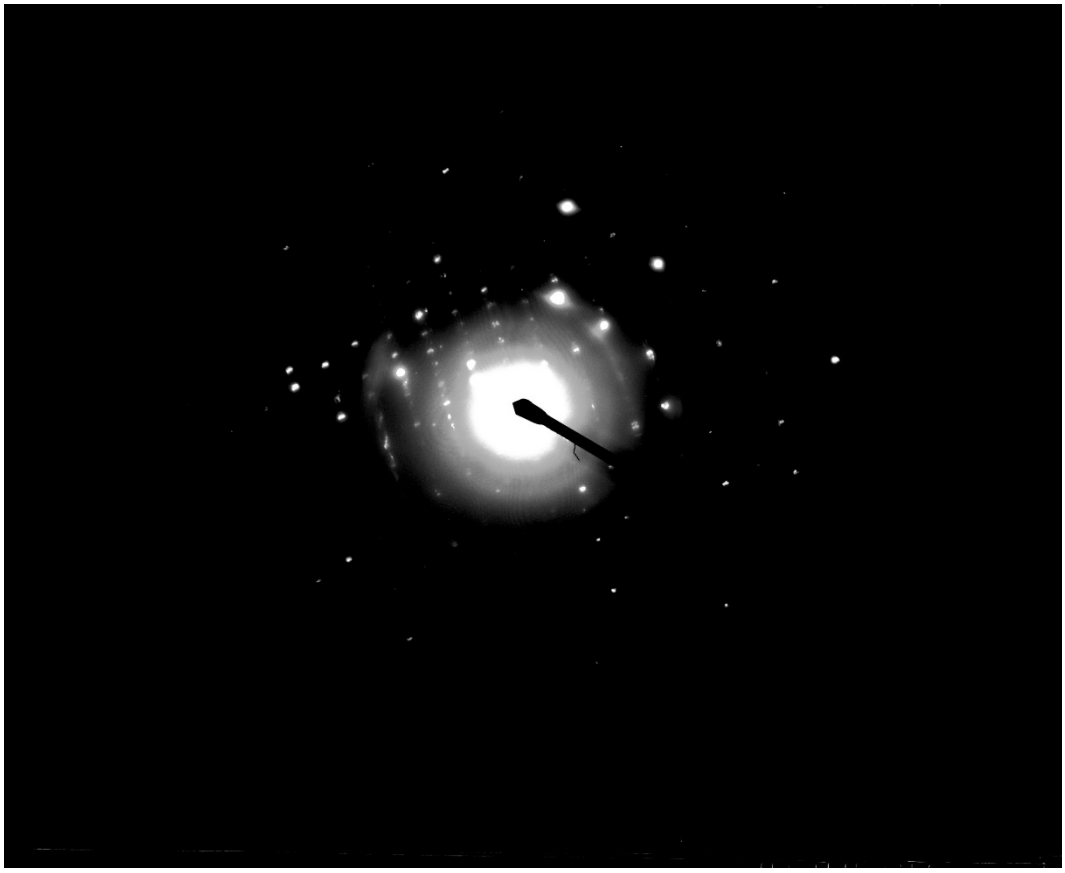
310123-10	NAD
310123-10A	<0.00267
310123-10B	NAD

Below are pictures, diffraction patterns, and chemistry from some of the counted particles. The unidentified peaks in chemistry spectra are copper, zinc, and carbon. Those peaks are from the TEM specimen holder and specimen grid.

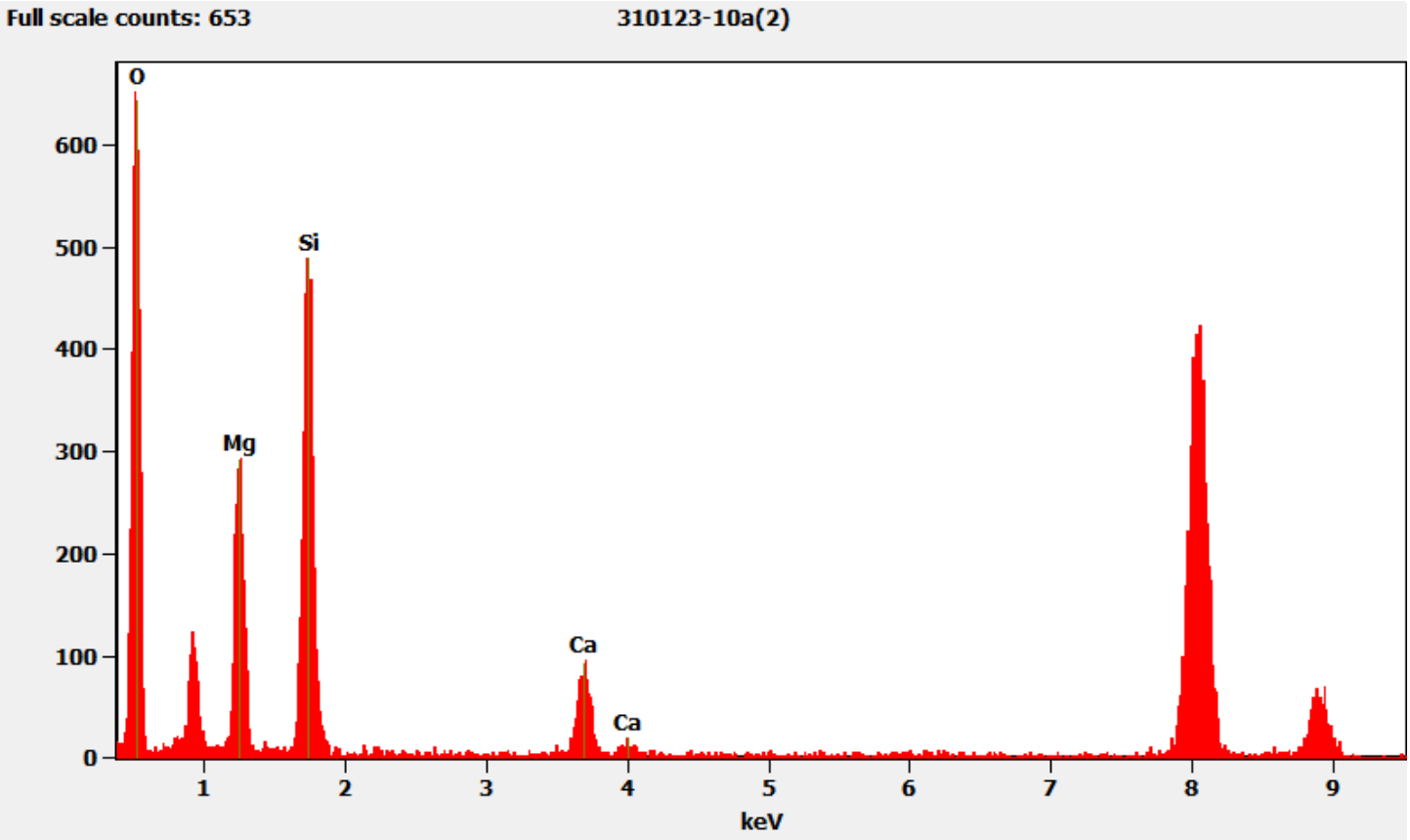
Sample 310123-10A, Tremolite Structure



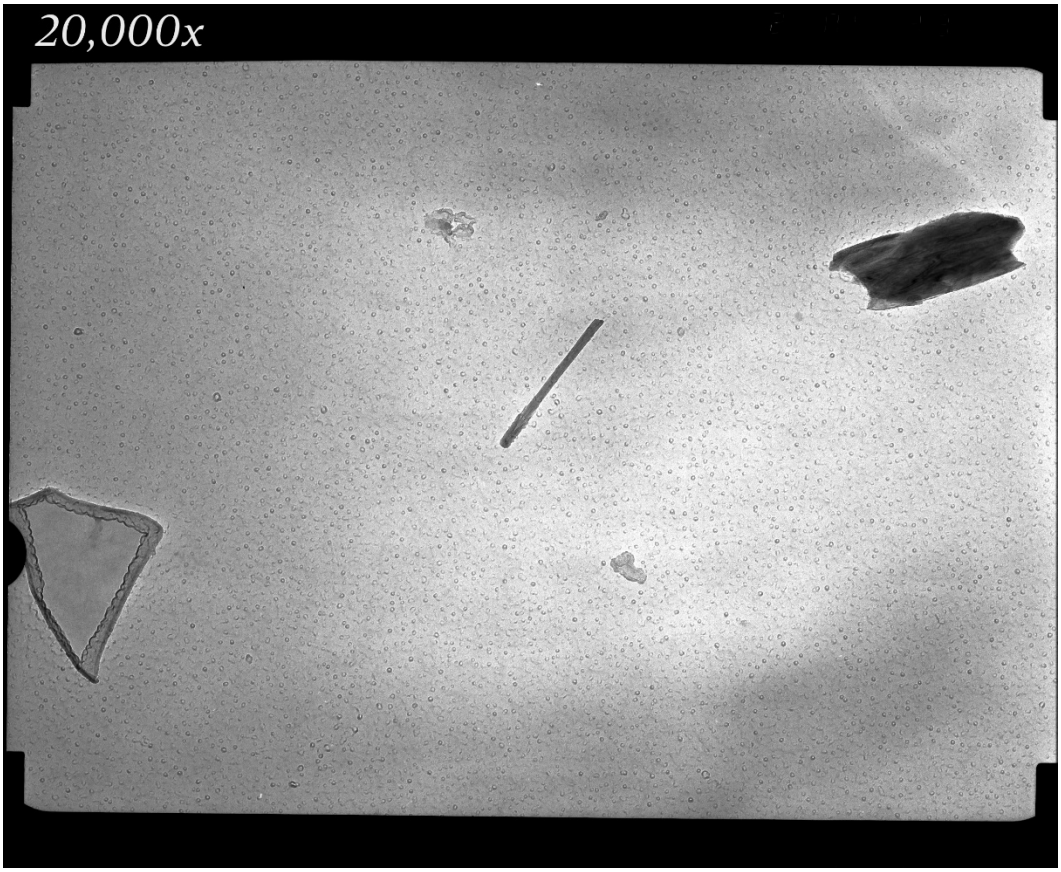
Diffraction pattern from the Tremolite Structure pictured above.



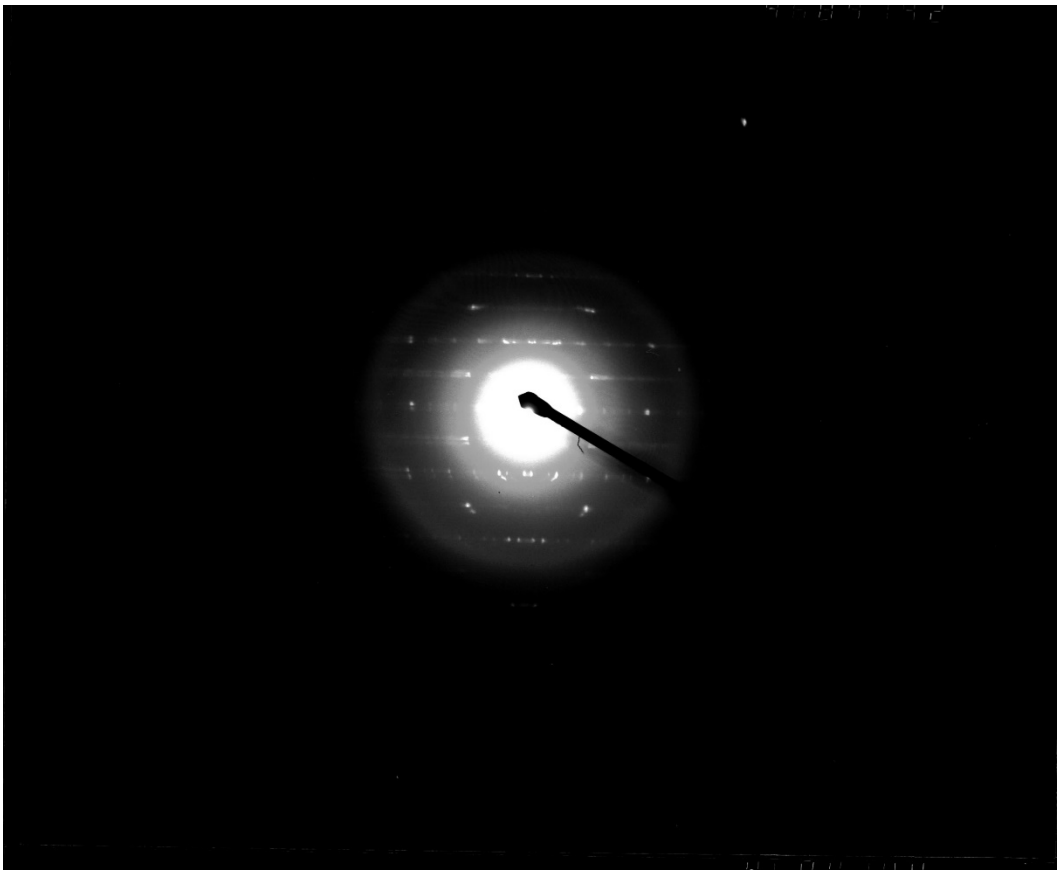
Chemistry from the Tremolite Structure pictured above.



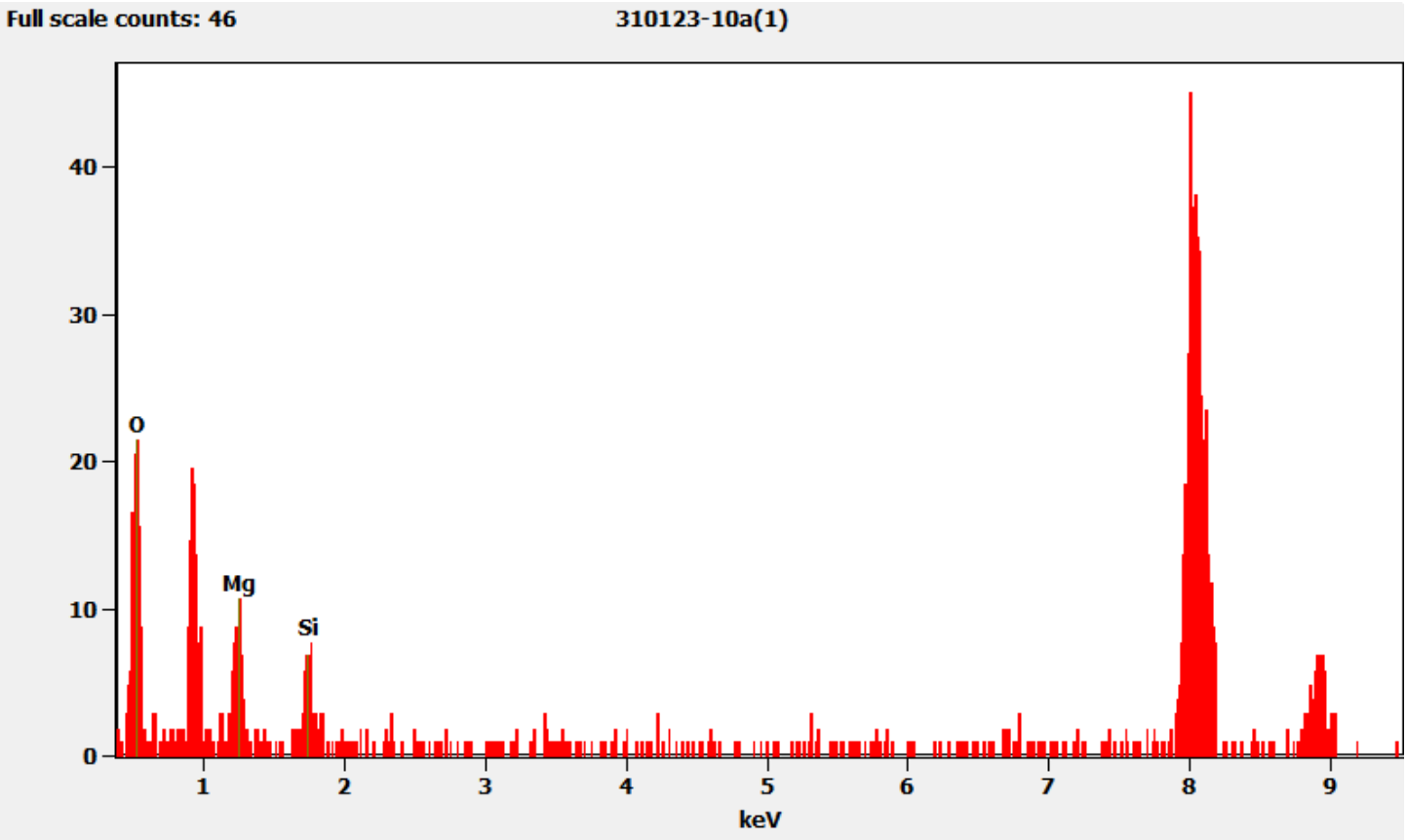
Sample 310123-10A, Chrysotile Structure 1



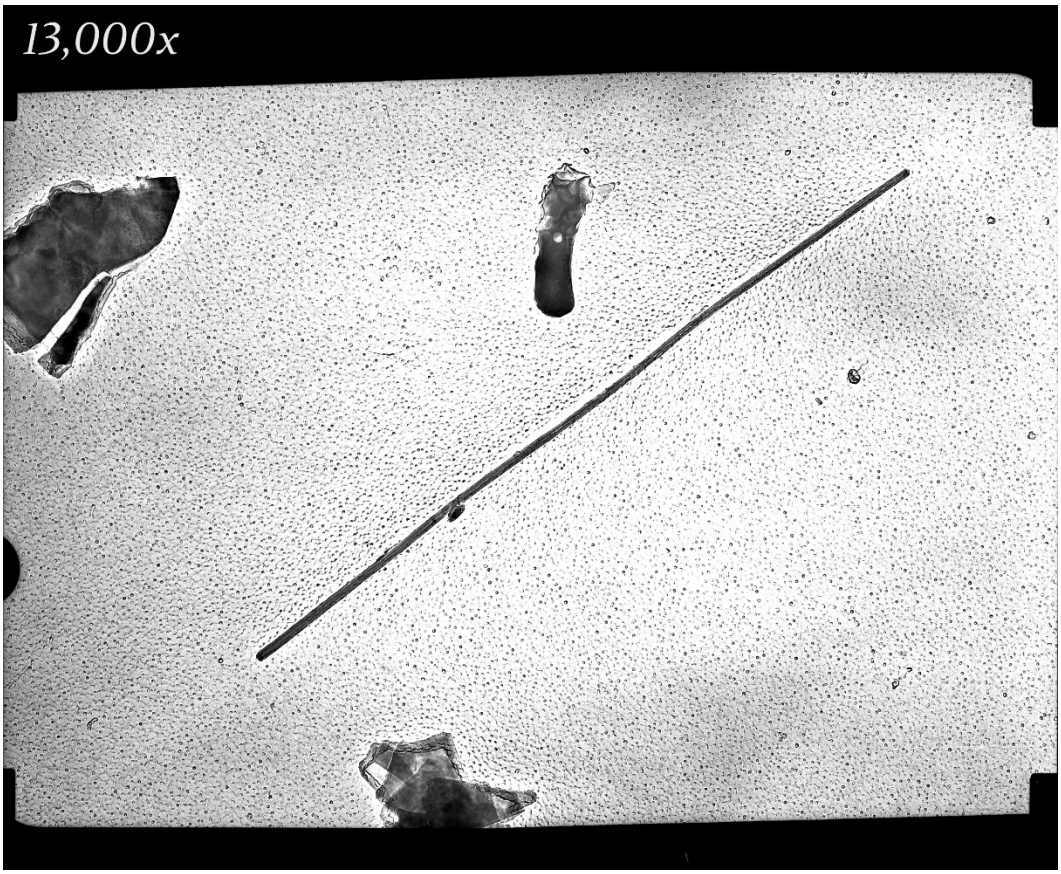
Diffraction pattern from the Chrysotile Structure pictured above.



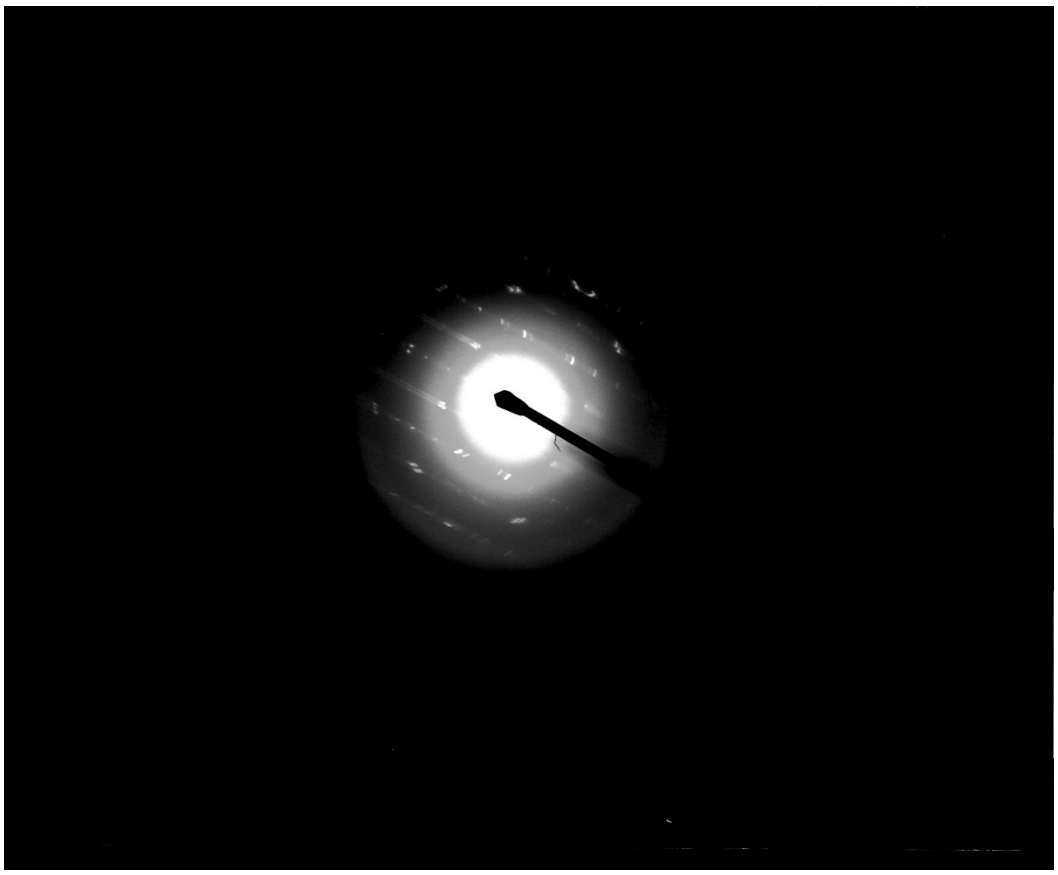
Chemistry from the Chrysotile Structure pictured above



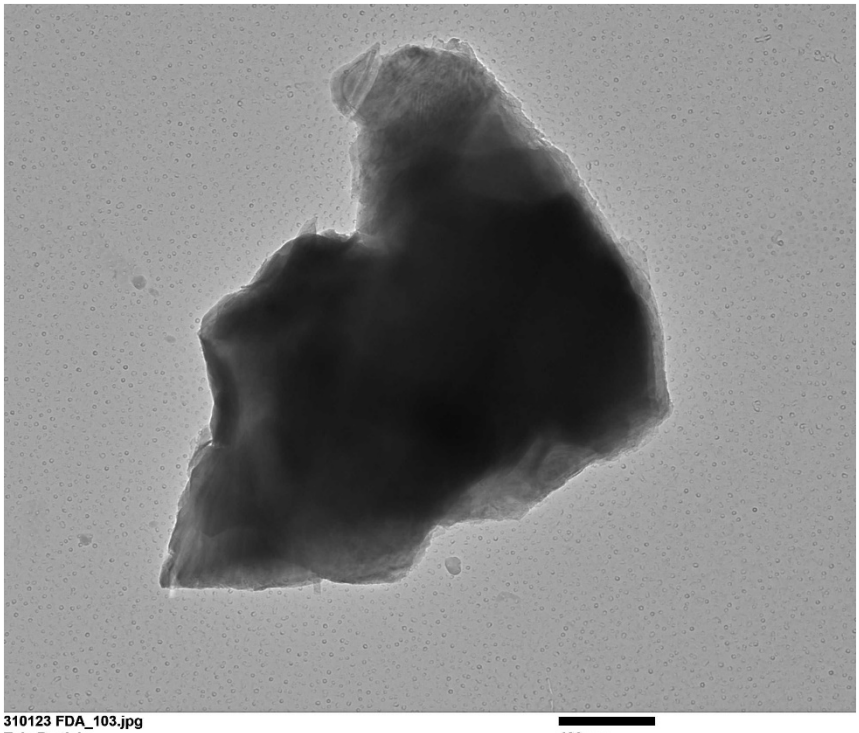
310123-10A, Chrysotile Structure 3



Diffraction Pattern from the Chrysotile Structure pictured above



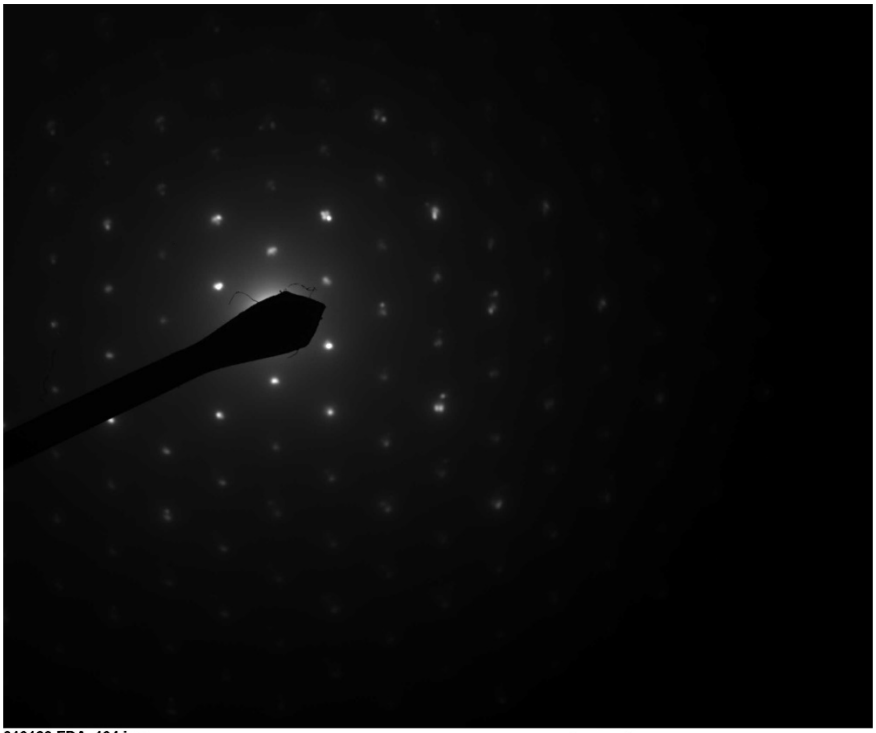
310123-10, Talc Particle



310123 FDA_103.jpg
Talc Particle
Cal: 0.001429 µm/pix
14:58 9/22/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

400 nm
HV=100kV
Direct Mag: 7200 x
AMA Analytical Services, Inc

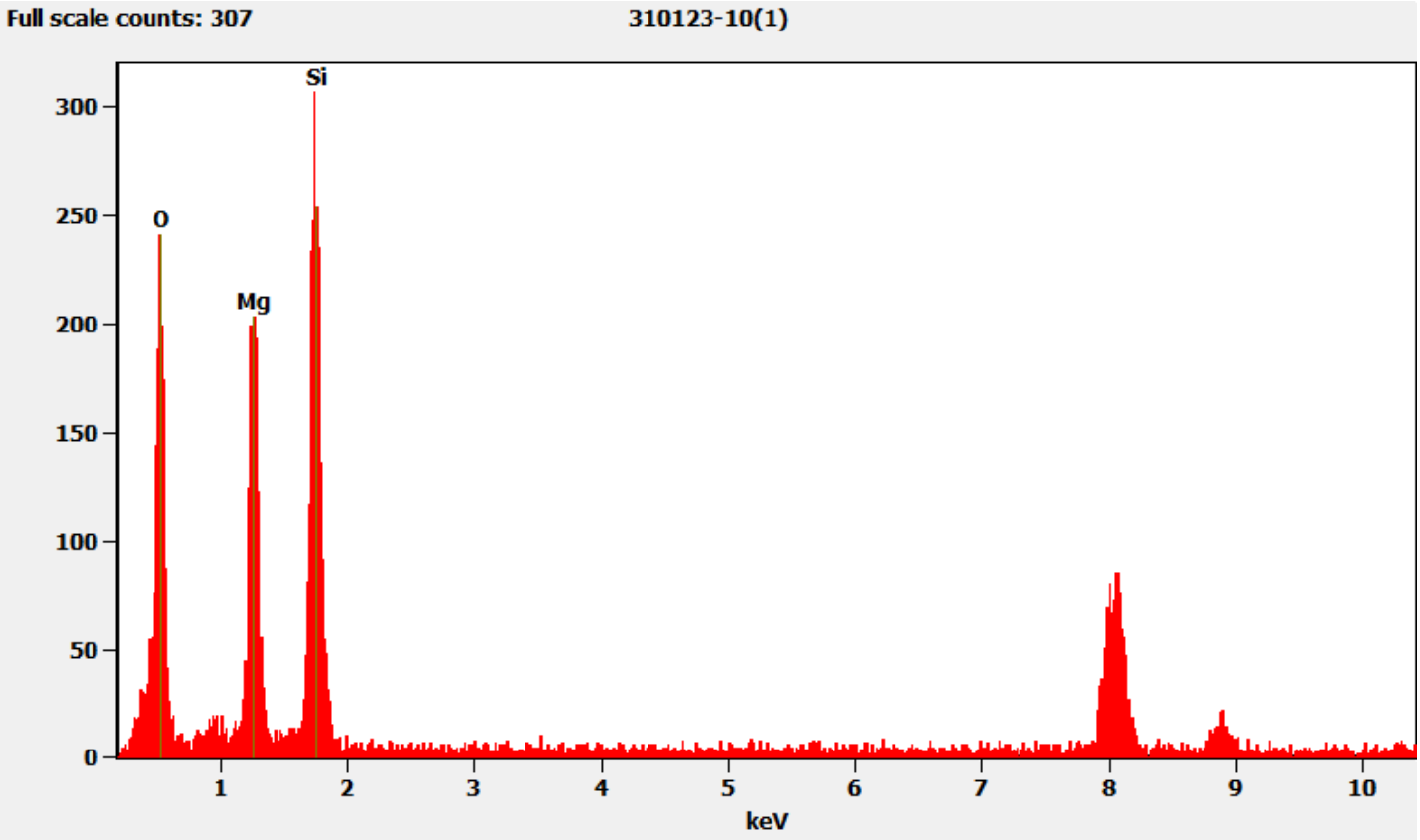
Hexagonal diffraction pattern from the Talc Particle pictured above



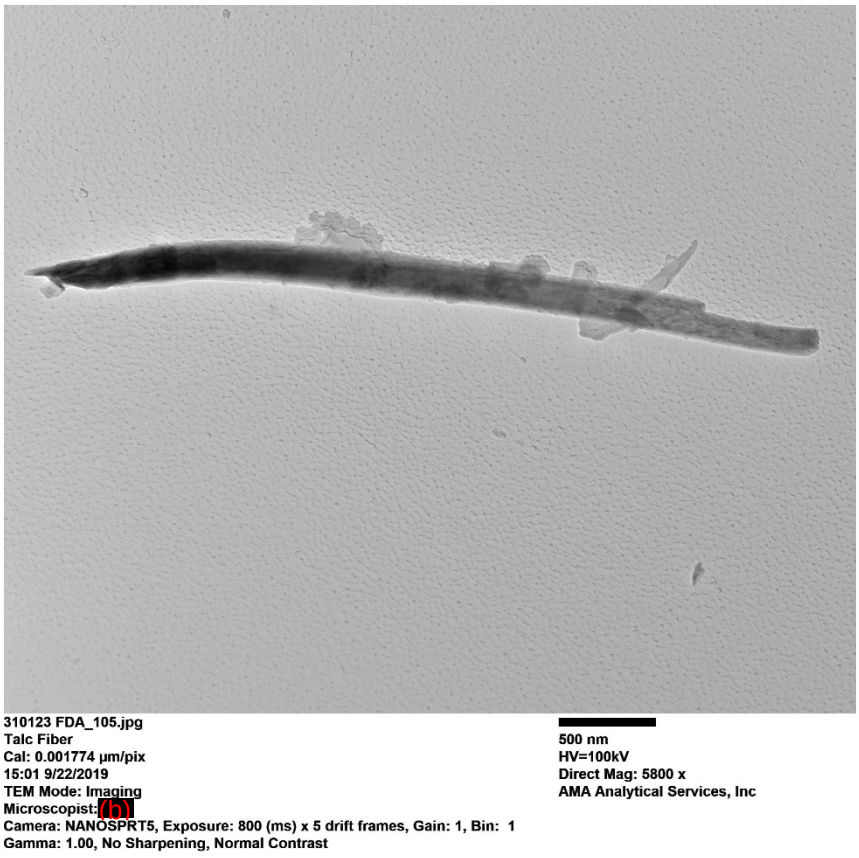
310123 FDA_104.jpg
Talc Particle
14:59 9/22/2019
TEM Mode: Diffraction
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

100 (1/Å)
HV=100kV
Cam Len: 0.2200 m
AMA Analytical Services, Inc

Chemistry from the Talc Particle pictured above.

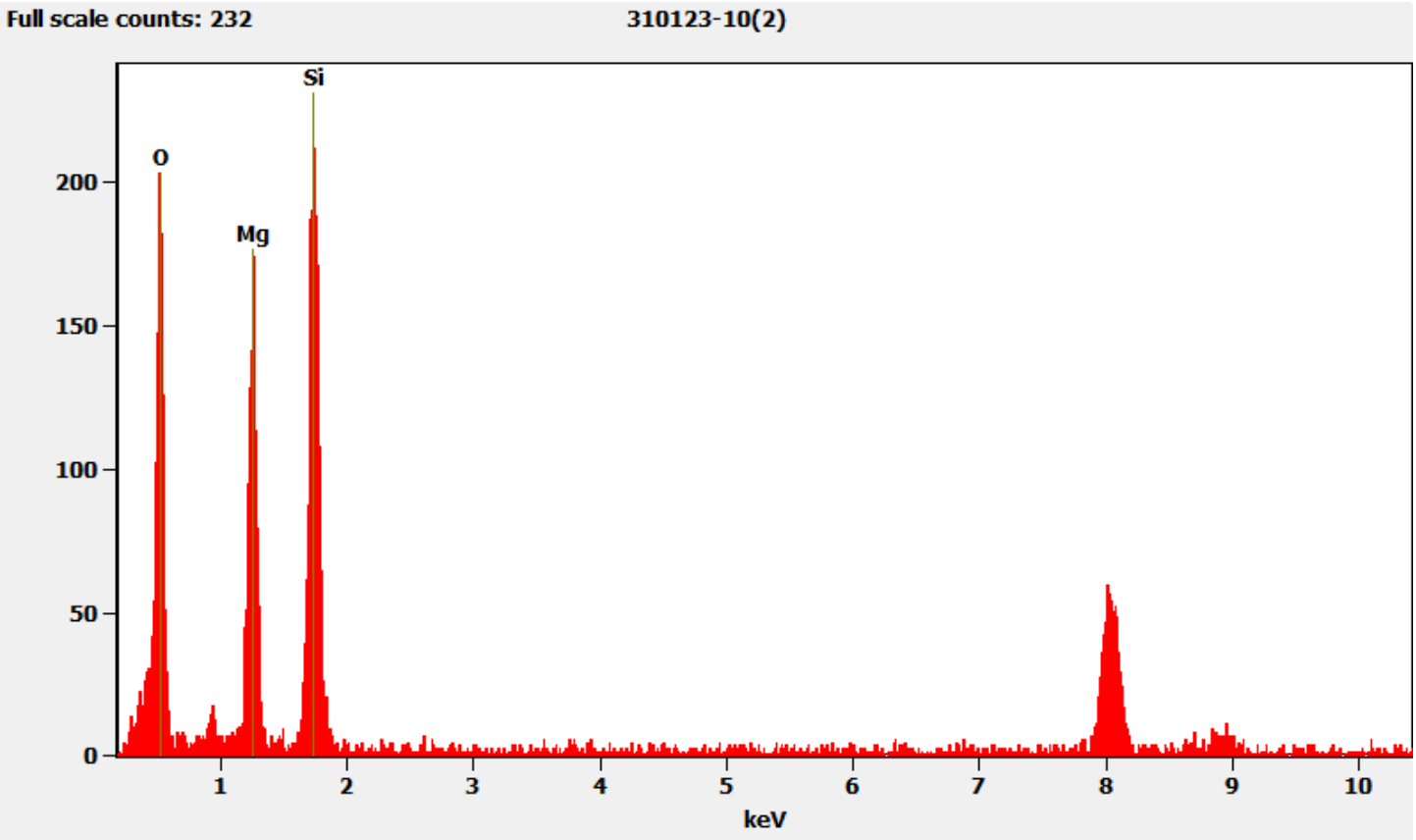


Sample 310123-10, Talc Fiber

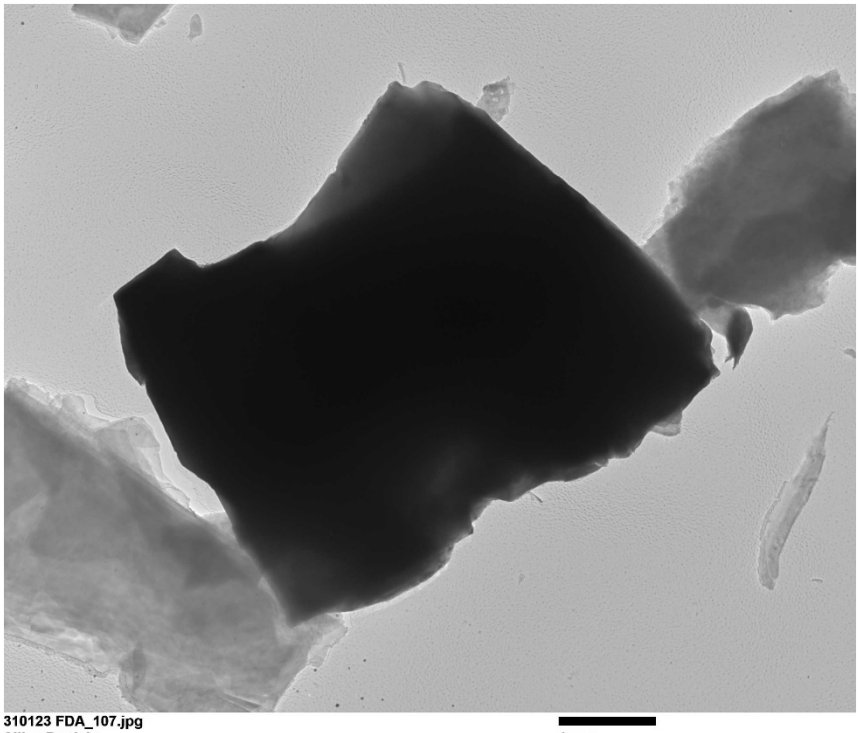


Hexagonal diffraction pattern from the Talc Fiber pictured above

Chemistry from the Talc Fiber pictured above



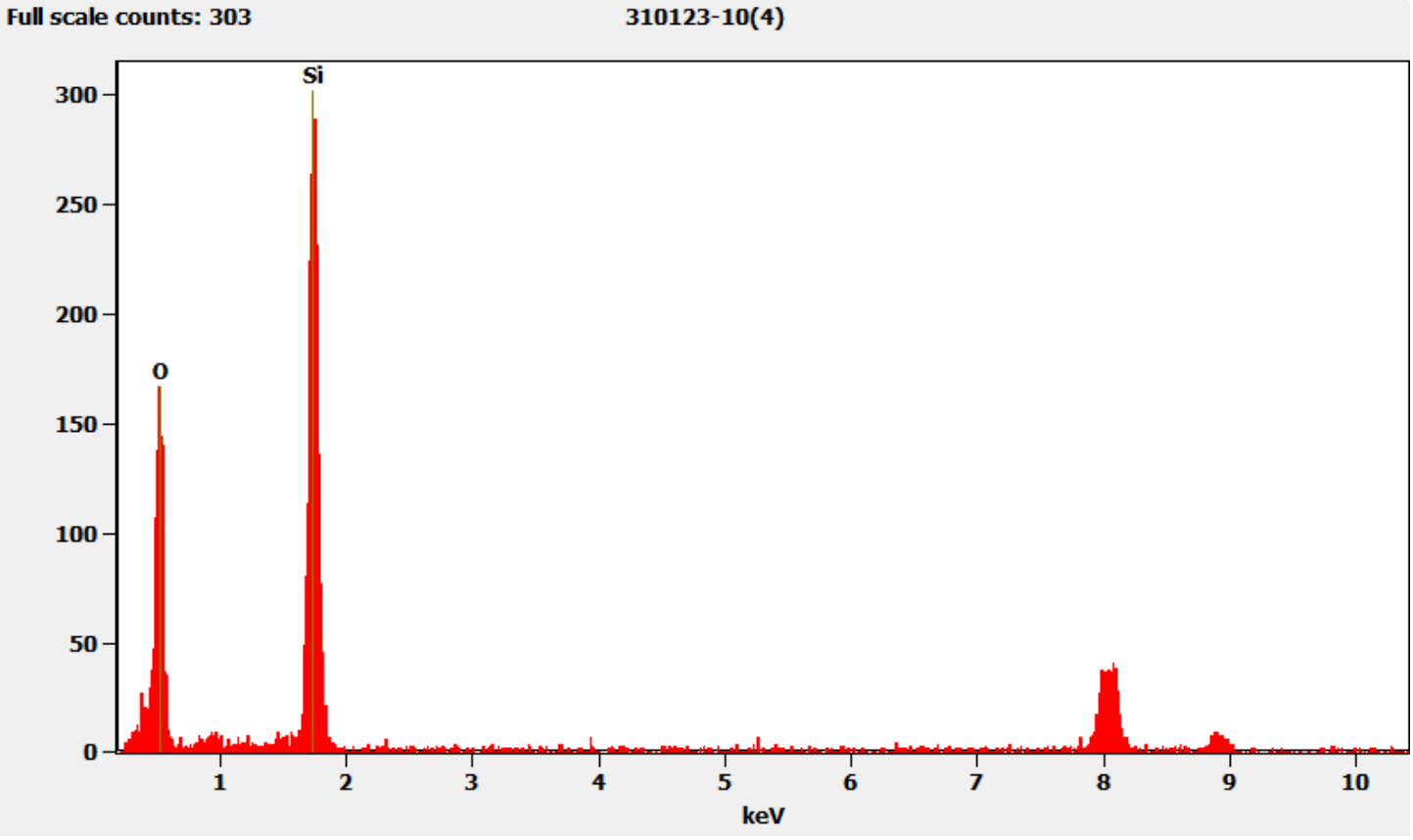
310123-10, Silica Particle



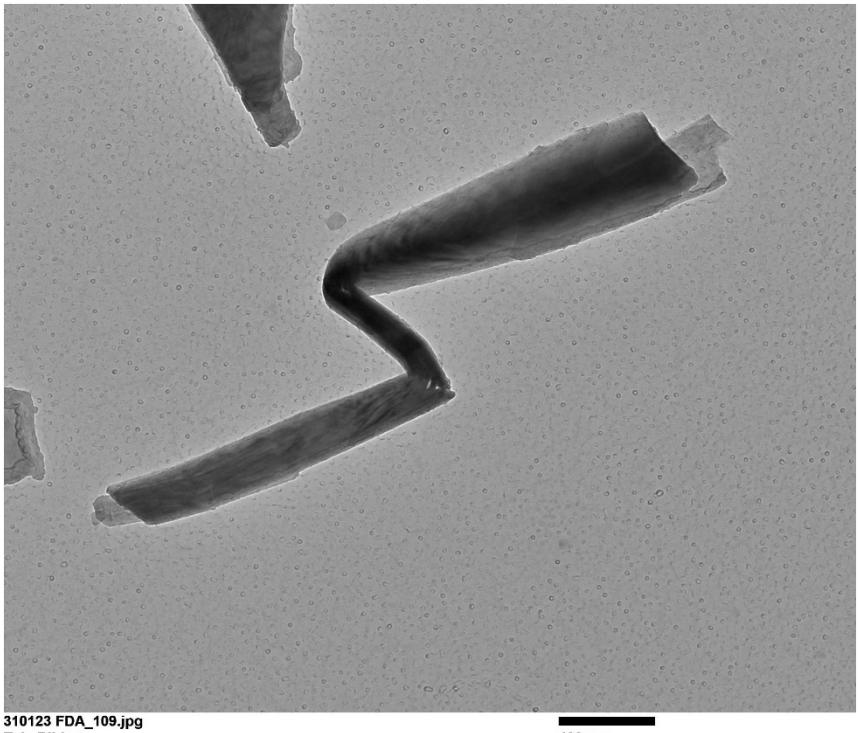
310123 FDA_107.jpg
Silica Particle
Cal: 0.003548 µm/pix
15:24 9/22/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

1 µm
HV=100kV
Direct Mag: 2900 x
AMA Analytical Services, Inc

Chemistry from the Silica Particle pictured above.



310123-10, Talc Ribbon



310123 FDA_109.jpg
Talc Ribbon
Cal: 0.001429 µm/pix
15:53 9/22/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

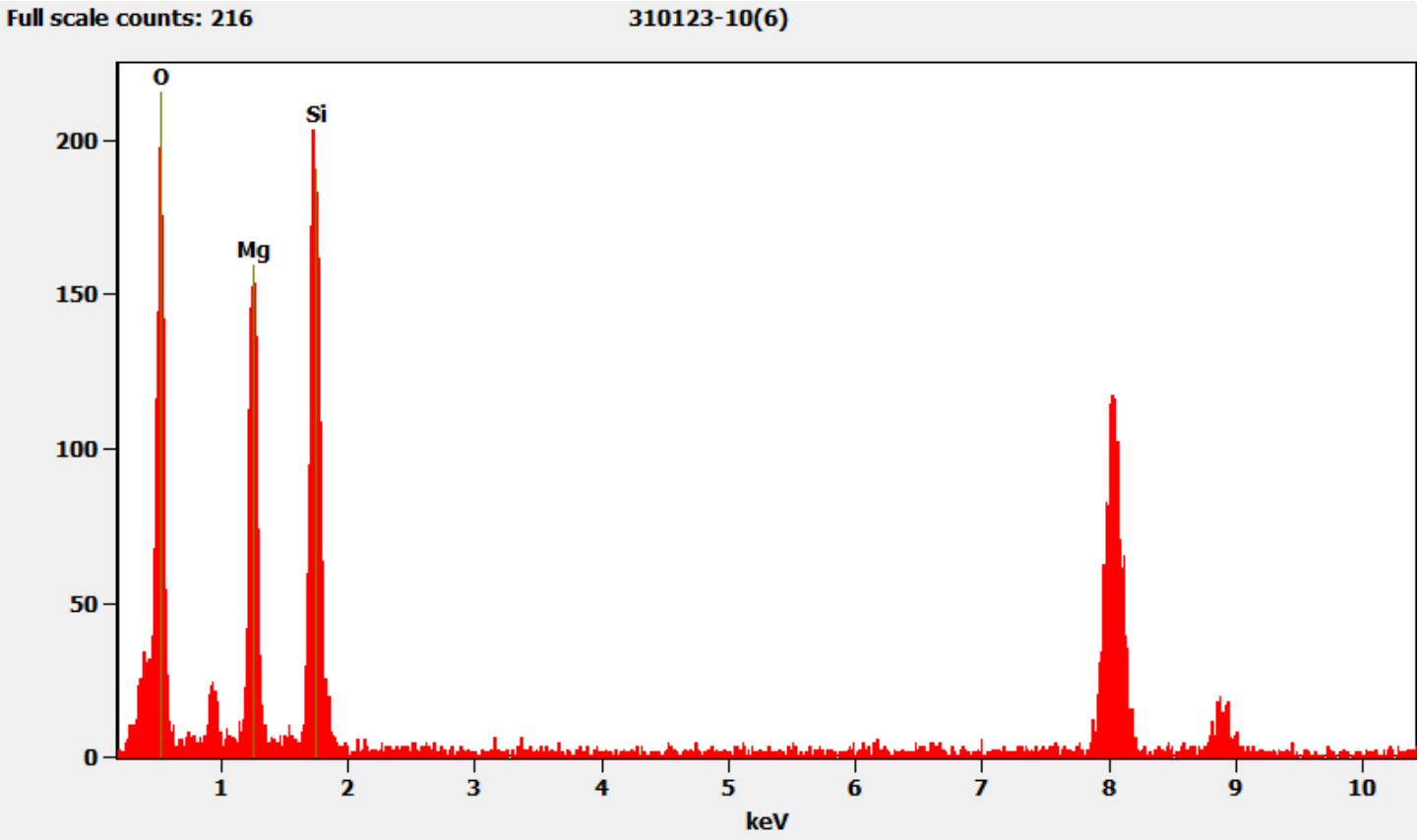
400 nm
HV=100kV
Direct Mag: 7200 x
AMA Analytical Services, Inc

Diffraction pattern from the Talc Ribbon pictured above

310123 FDA_110.jpg
Talc Ribbon
15:54 9/22/2019
TEM Mode: Diffraction
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

100 (1/Å)
HV=100kV
Cam Len: 0.2200 m
AMA Analytical Services, Inc

Chemistry from the Talc Ribbon pictured above.



<u>310123-11, 11A, 11B, Client Sample D-78</u>

PLM

All three aliquots of sample D-78 were analyzed by (b) (6) on September 26, 2019. No asbestos or non-asbestos amphibole variants were detected the samples. The results were calculated using the equations detailed in the calculations section.

310123-11	NAD
310123-11A	NAD
310123-11B	NAD

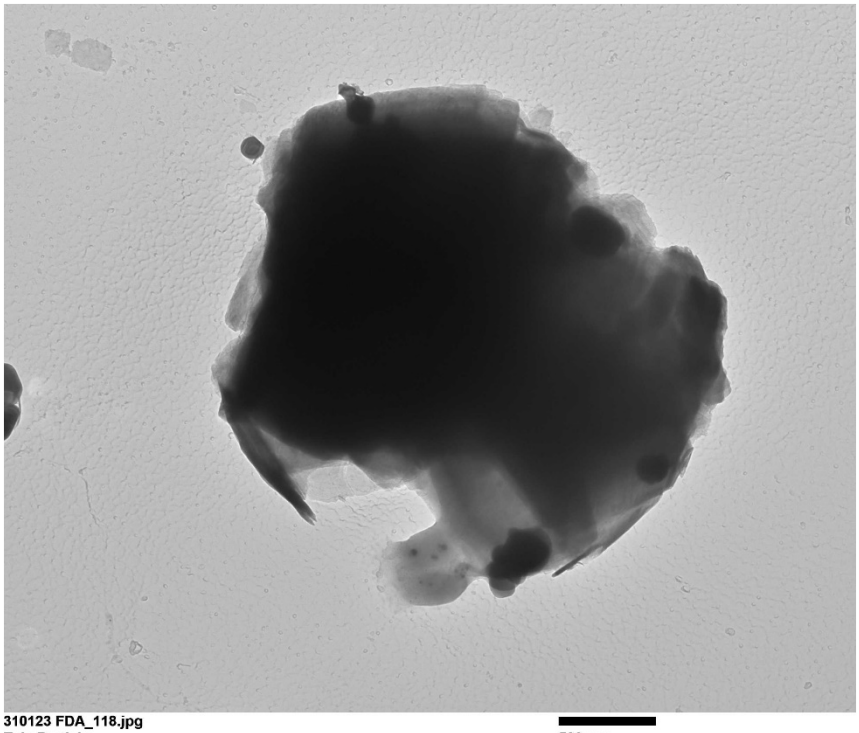
TEM

(b) (6) analyzed sample 11 on September 25, 2019 and sample 11A on September 30, 2019. (b) (6) analyzed sample 11B on September 30, 2019. The primary particles observed were talc and mica along with some silica sphere and titanium particles, and a few talc fibers, titanium fibers, titanium coated fibers and very few talc ribbons. No asbestos or non-asbestos amphibole variants were detected in the samples. The results were calculated using the equations detailed in the calculations section.

310123-11	NAD
310123-11A	NAD
310123-11B	NAD

Below are pictures, diffraction patterns, and chemistry from some of the counted particles. The unidentified peaks in chemistry spectra are copper, zinc, and carbon. Those peaks are from the TEM specimen holder and specimen grid.

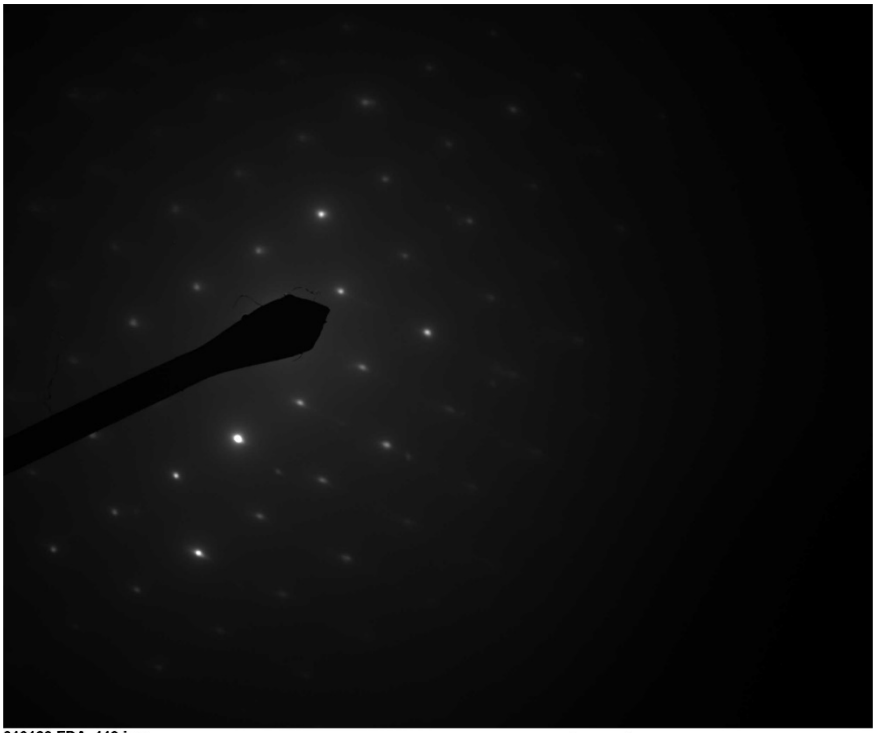
Sample 310123-11, Talc Particle



310123 FDA_118.jpg
Talc Particle
Cal: 0.001774 µm/pix
13:23 9/25/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

500 nm
HV=100kV
Direct Mag: 5800 x
AMA Analytical Services, Inc

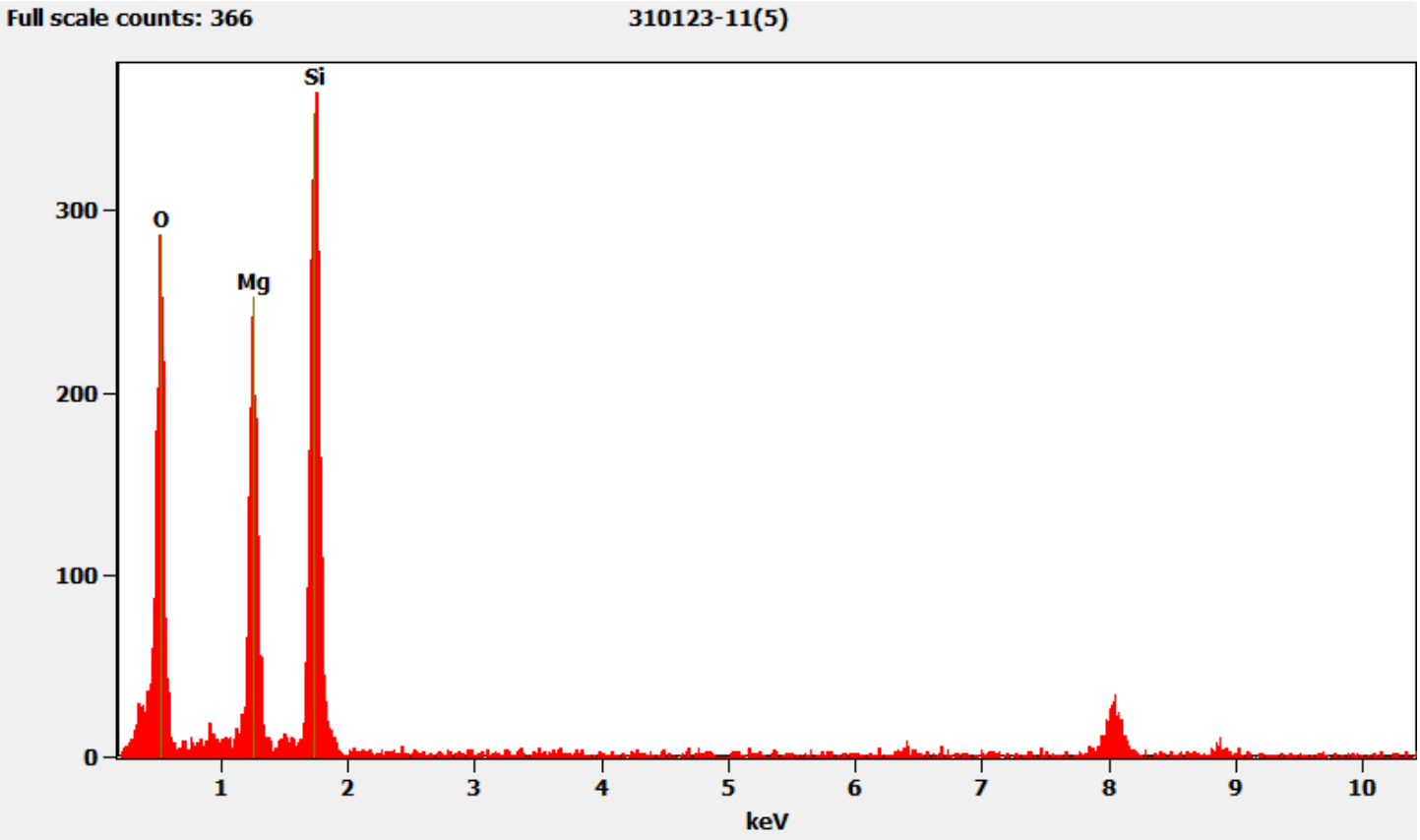
Hexagonal diffraction from the Talc Particle pictured above.



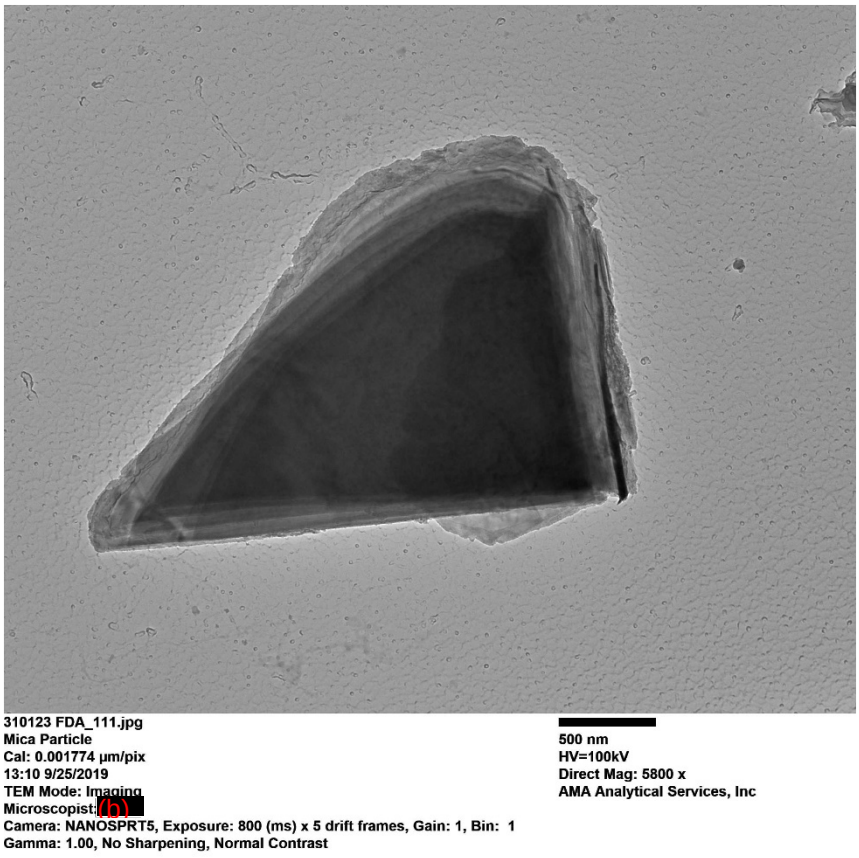
310123 FDA_119.jpg
Talc Particle
13:25 9/25/2019
TEM Mode: Diffraction
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

100 (1/Å)
HV=100kV
Cam Len: 0.2200 m
AMA Analytical Services, Inc

Chemistry from the Talc particle pictured above.

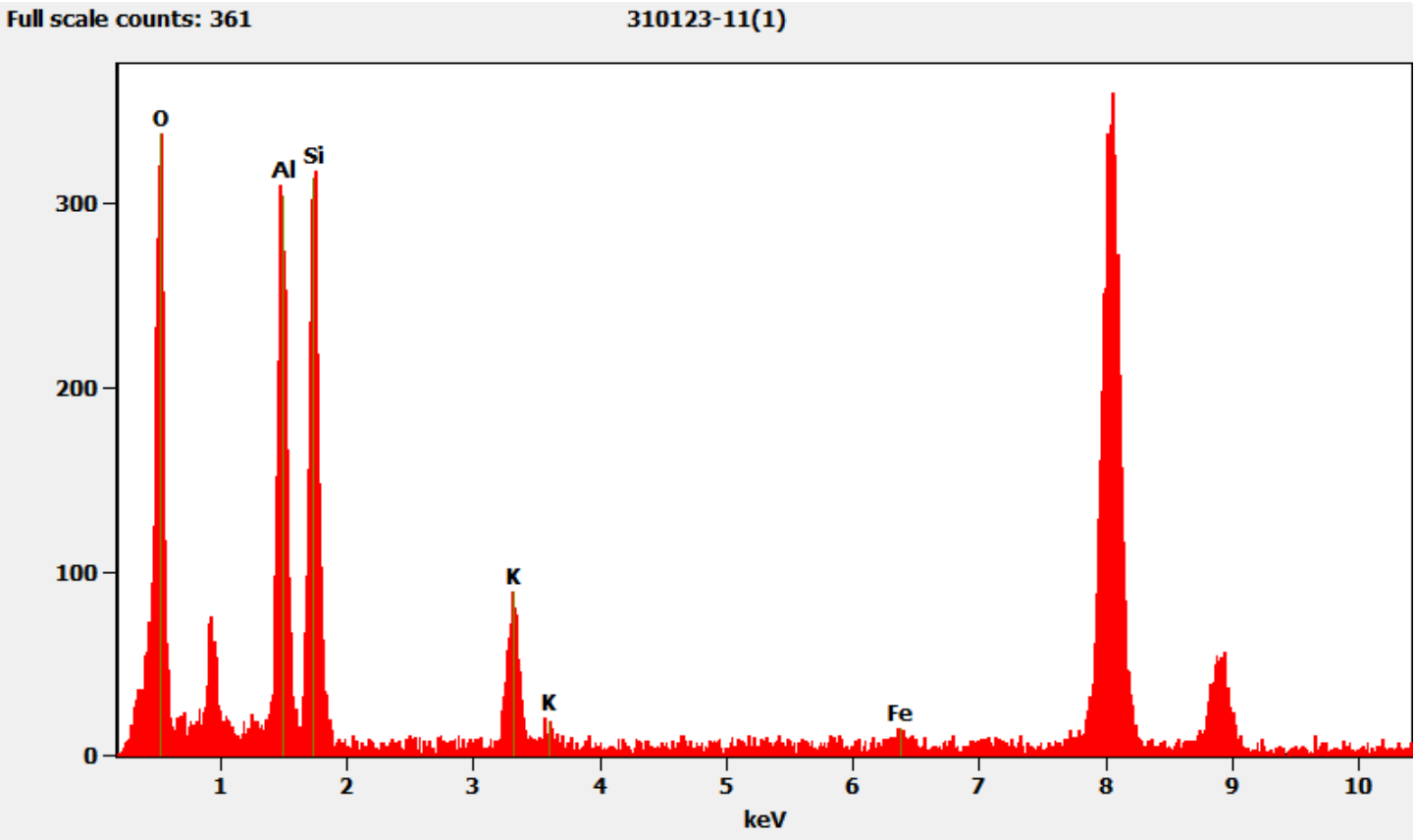


Sample 310123-11, Mica Particle

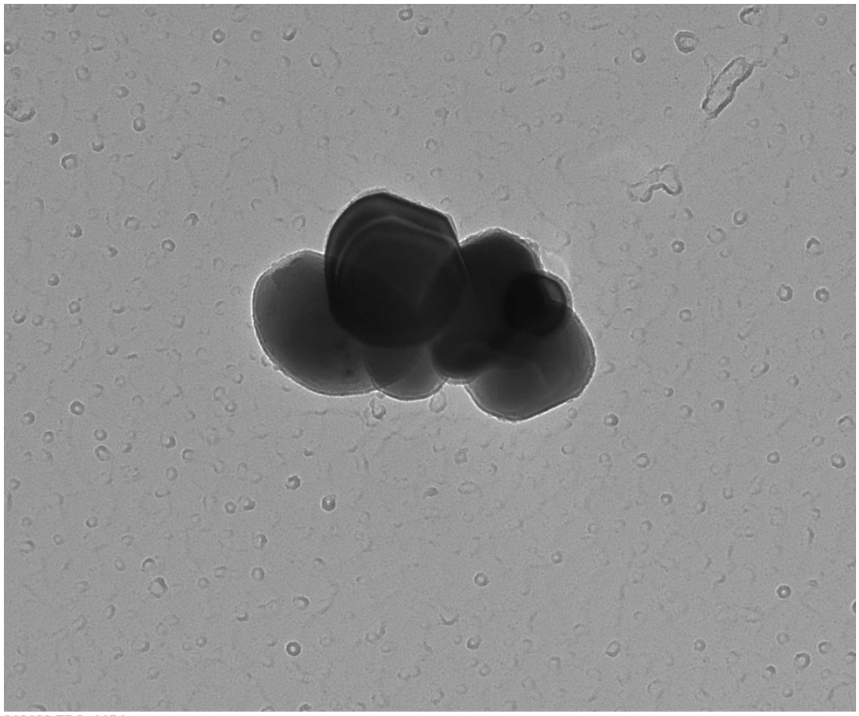


Diffraction pattern from the Mica Particle pictured above.

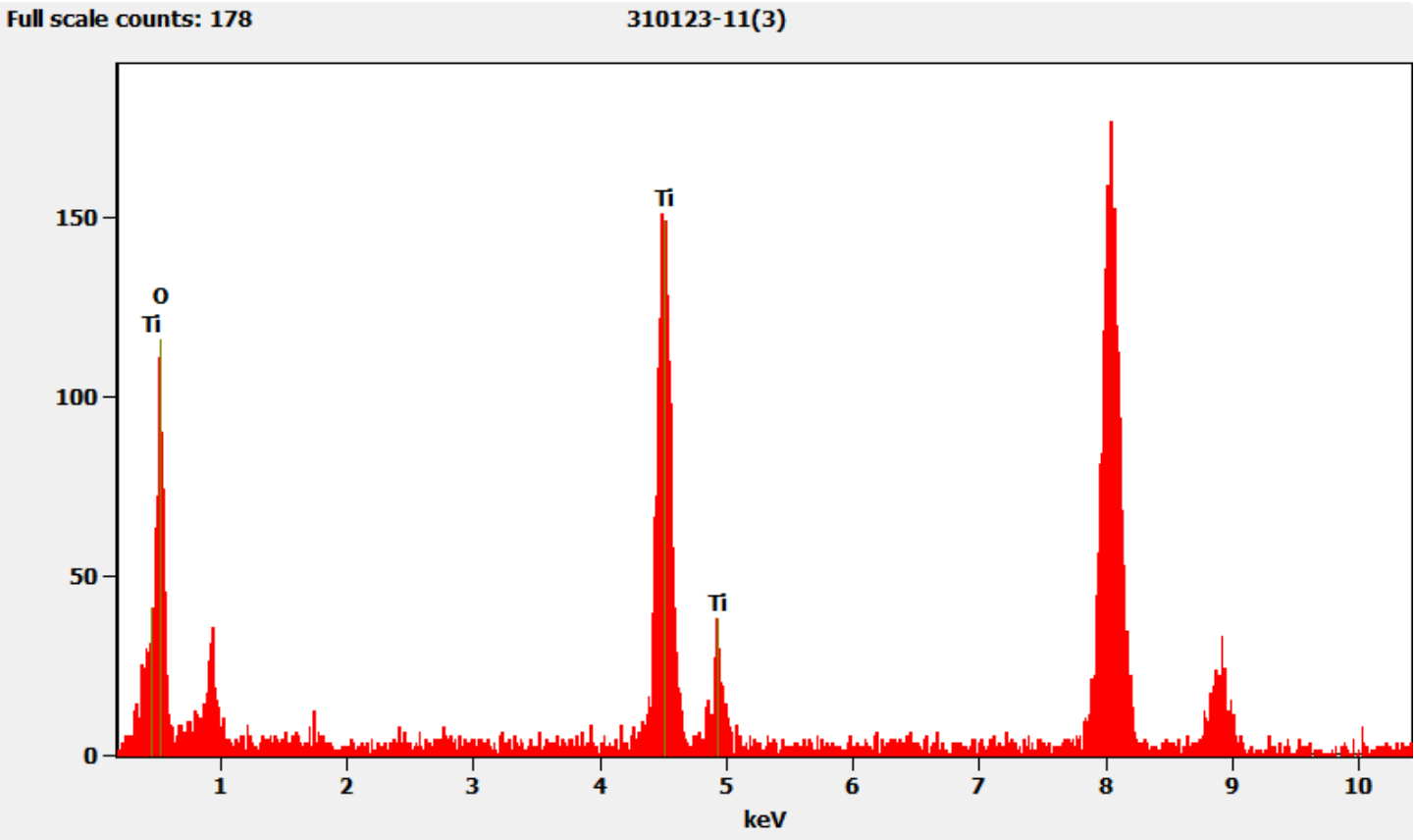
Chemistry from the Mica Particle pictured above



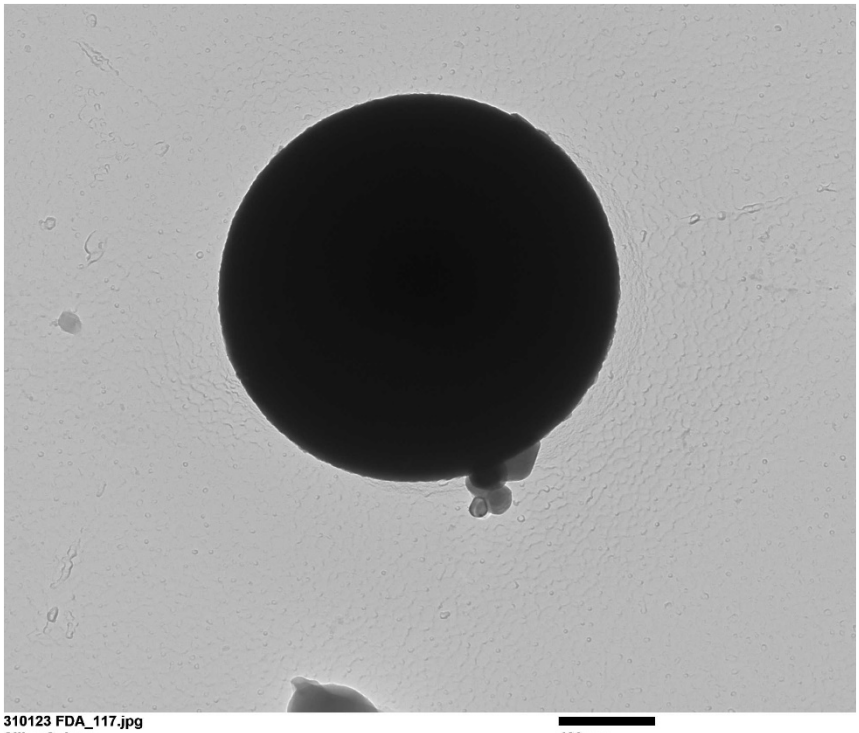
Sample 310123-11, Titanium Particle



Chemistry from the Titanium Particle pictured above.



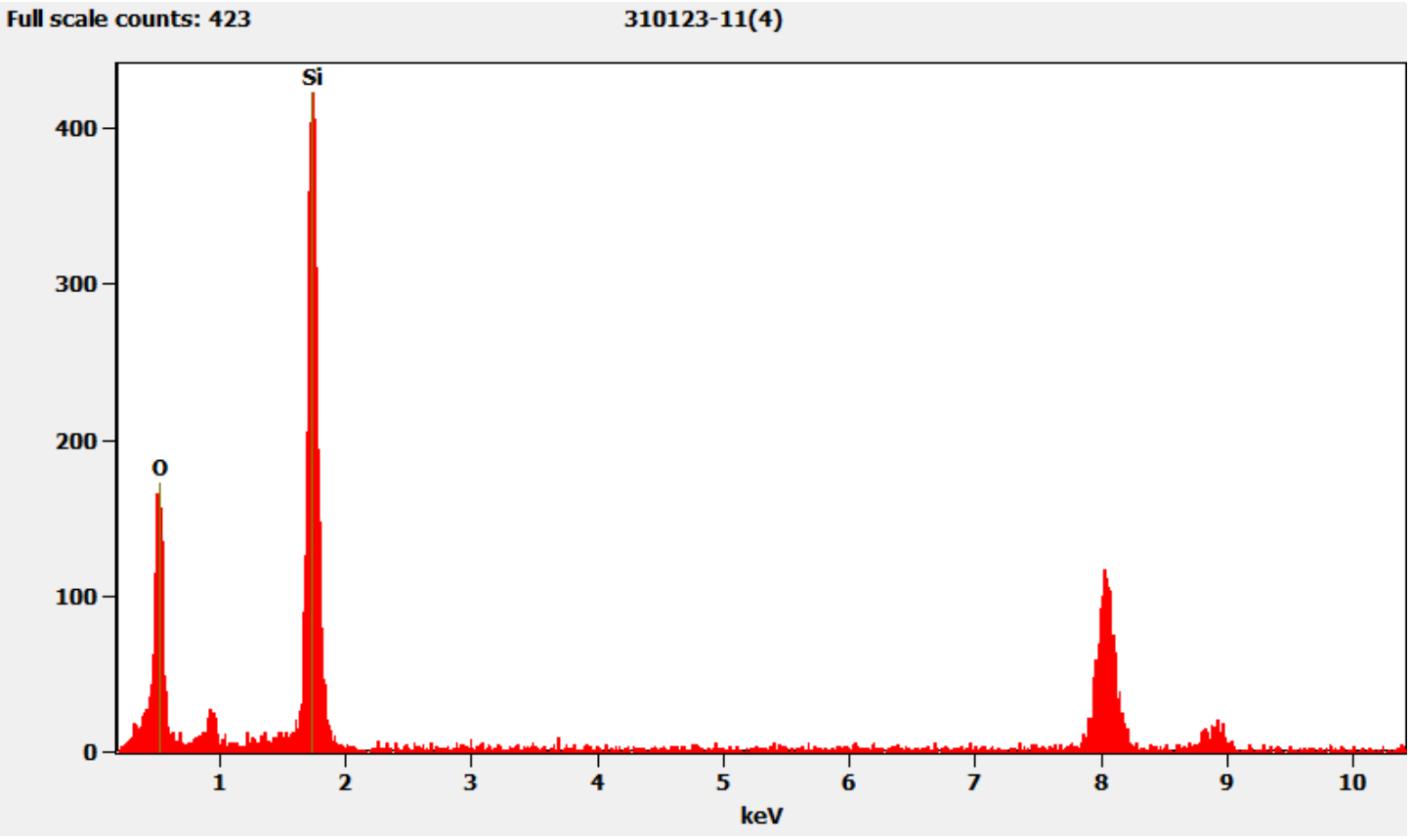
Sample 310123-11, Silica Sphere



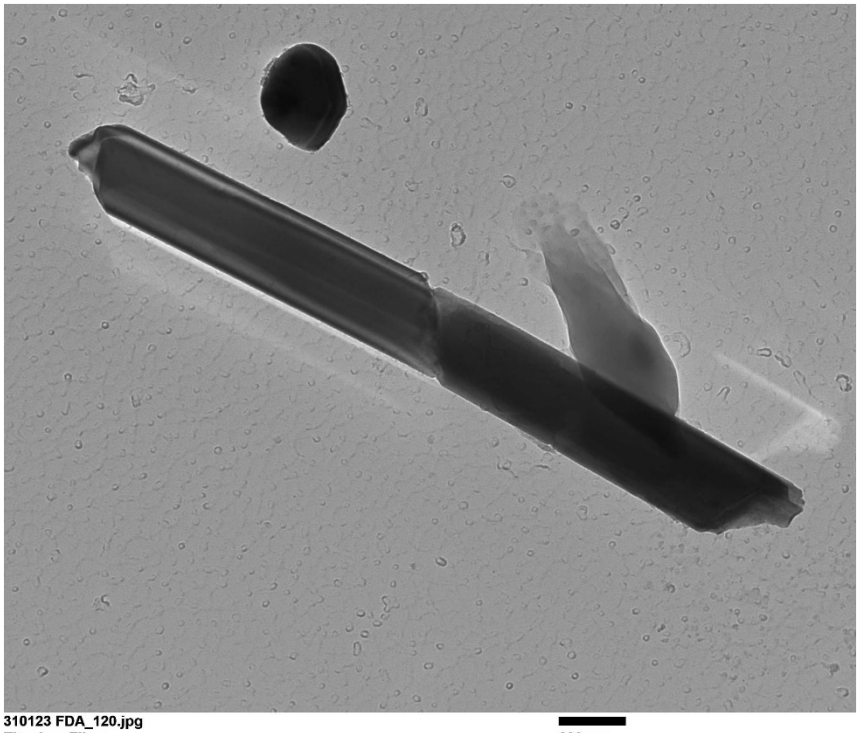
310123 FDA_117.jpg
Silica Sphere
Cal: 0.001429 µm/pix
13:19 9/25/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

400 nm
HV=100kV
Direct Mag: 7200 x
AMA Analytical Services, Inc

Chemistry from the Silica Sphere pictured above



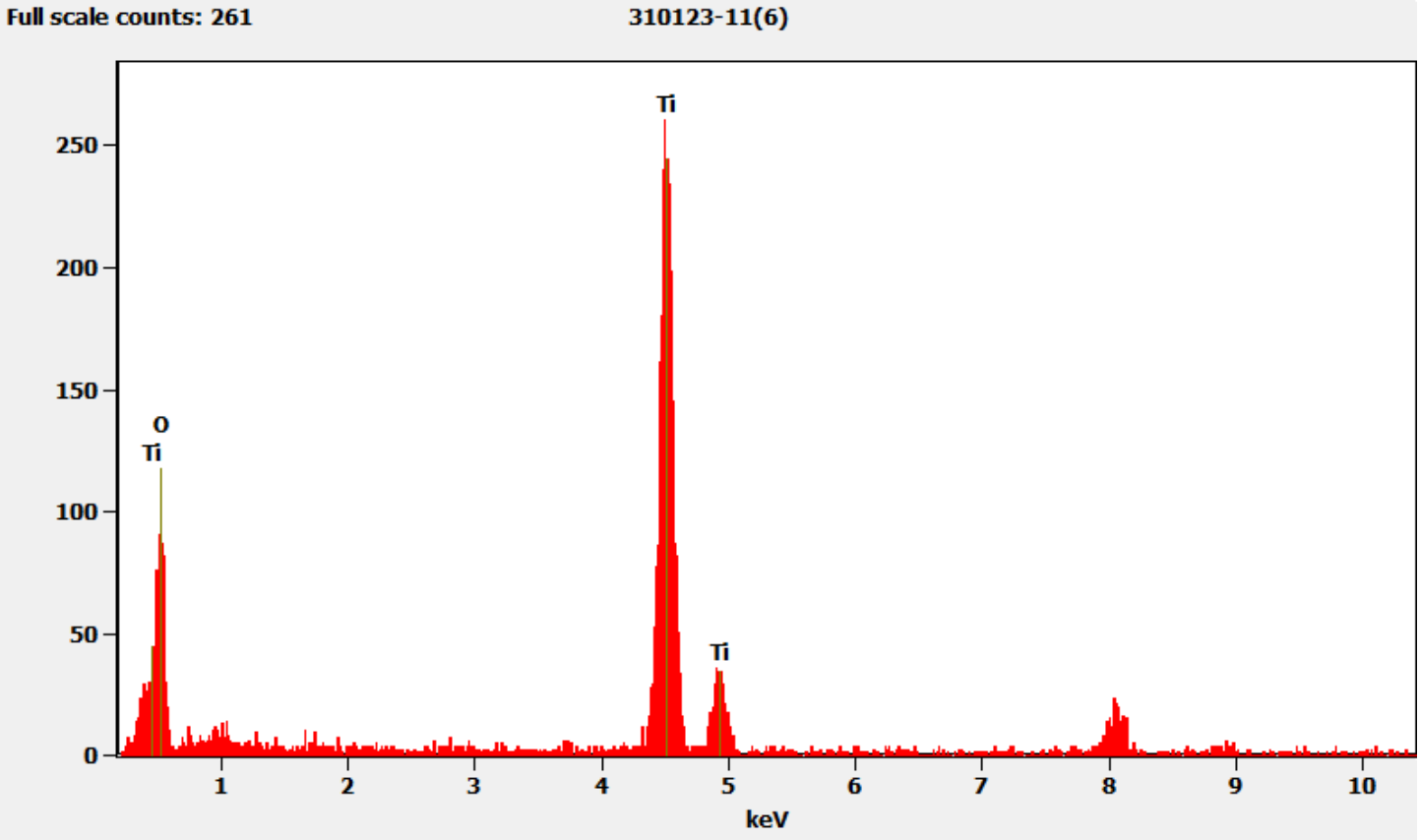
Sample 310123-11, Titanium Fiber



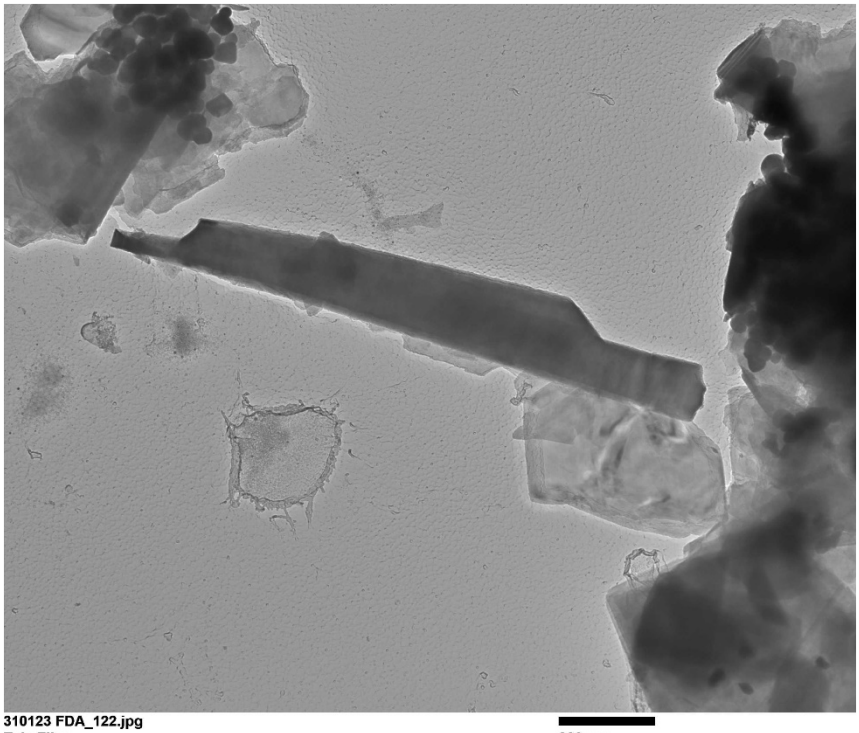
310123 FDA_120.jpg
Titanium Fiber
Cal: 0.001029 µm/pix
13:28 9/25/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

200 nm
HV=100kV
Direct Mag: 10000 x
AMA Analytical Services, Inc

Chemistry from the Titanium Fiber pictured above.



Sample 310123-11, Talc Fiber



310123 FDA_122.jpg
Talc Fiber
Cal: 0.002858 µm/pix
13:32 9/25/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

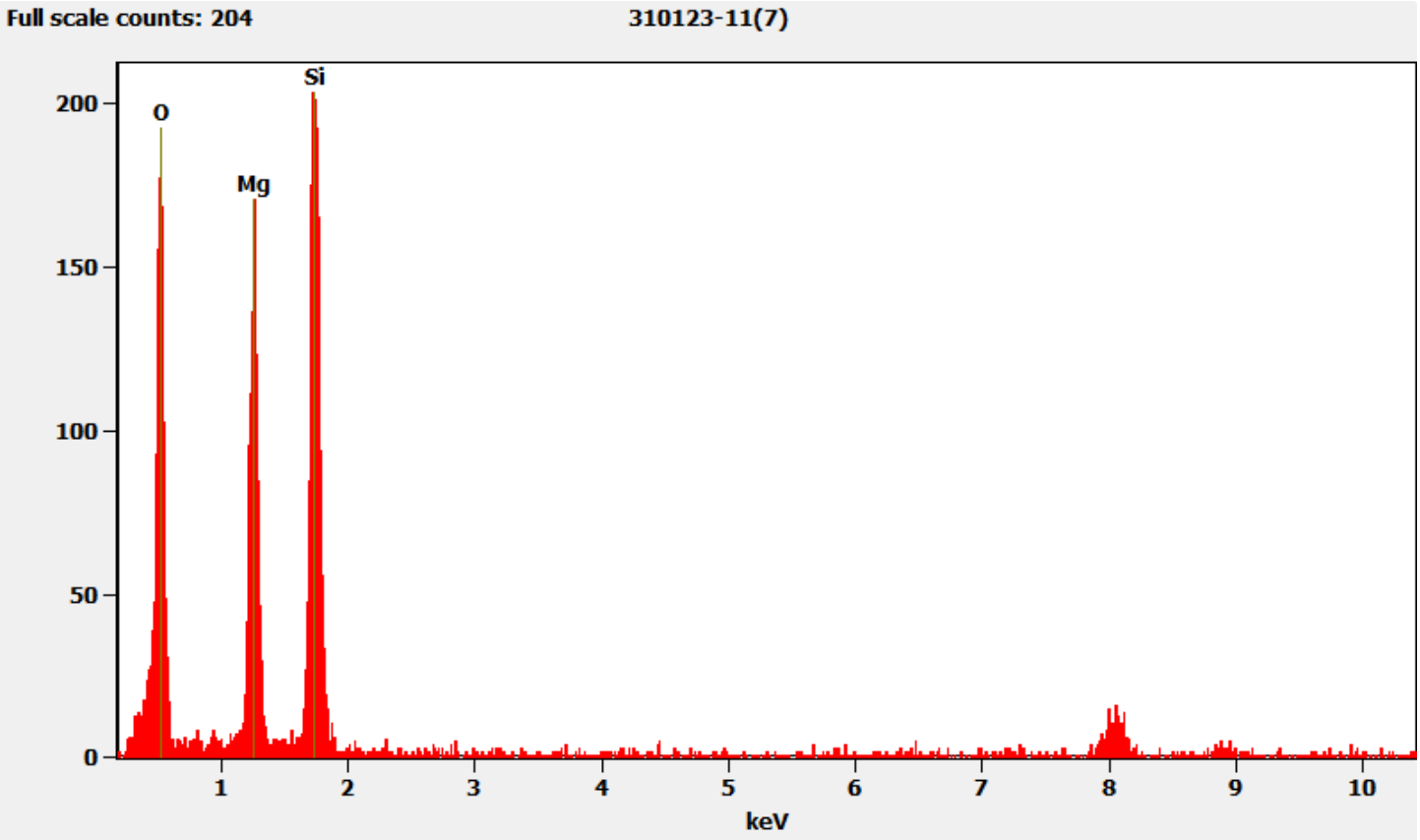
800 nm
HV=100kV
Direct Mag: 3600 x
AMA Analytical Services, Inc

Diffraction pattern from the Talc Fiber pictured above.

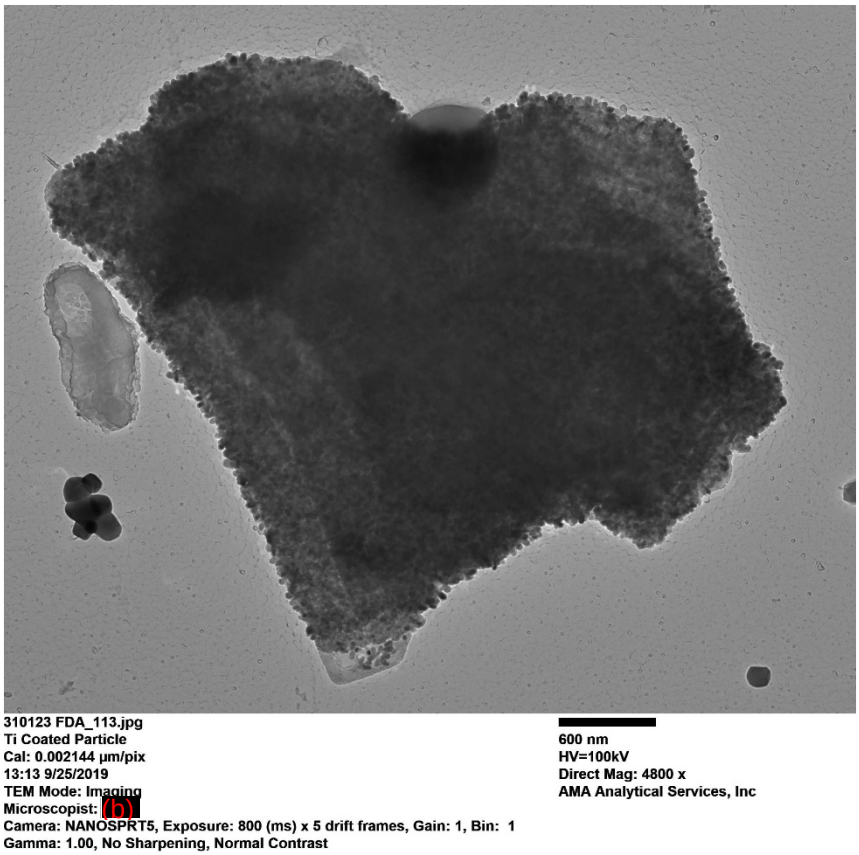
310123 FDA_123.jpg
Talc Fiber
13:34 9/25/2019
TEM Mode: Diffraction
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

100 (1/Å)
HV=100kV
Cam Len: 0.2200 m
AMA Analytical Services, Inc

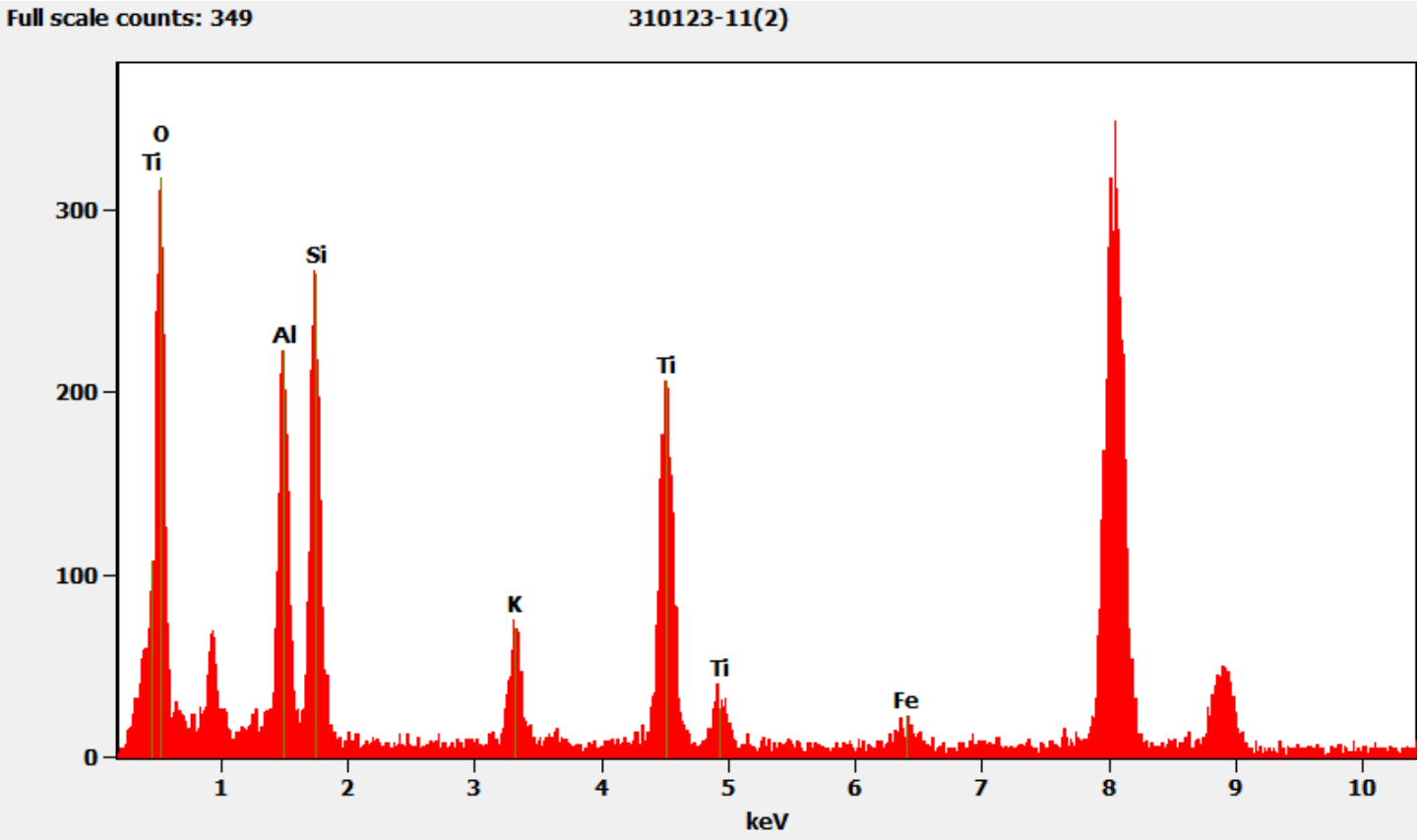
Chemistry from the Talc Fiber pictured above.



Sample 310123-11, Titanium Coated Particle



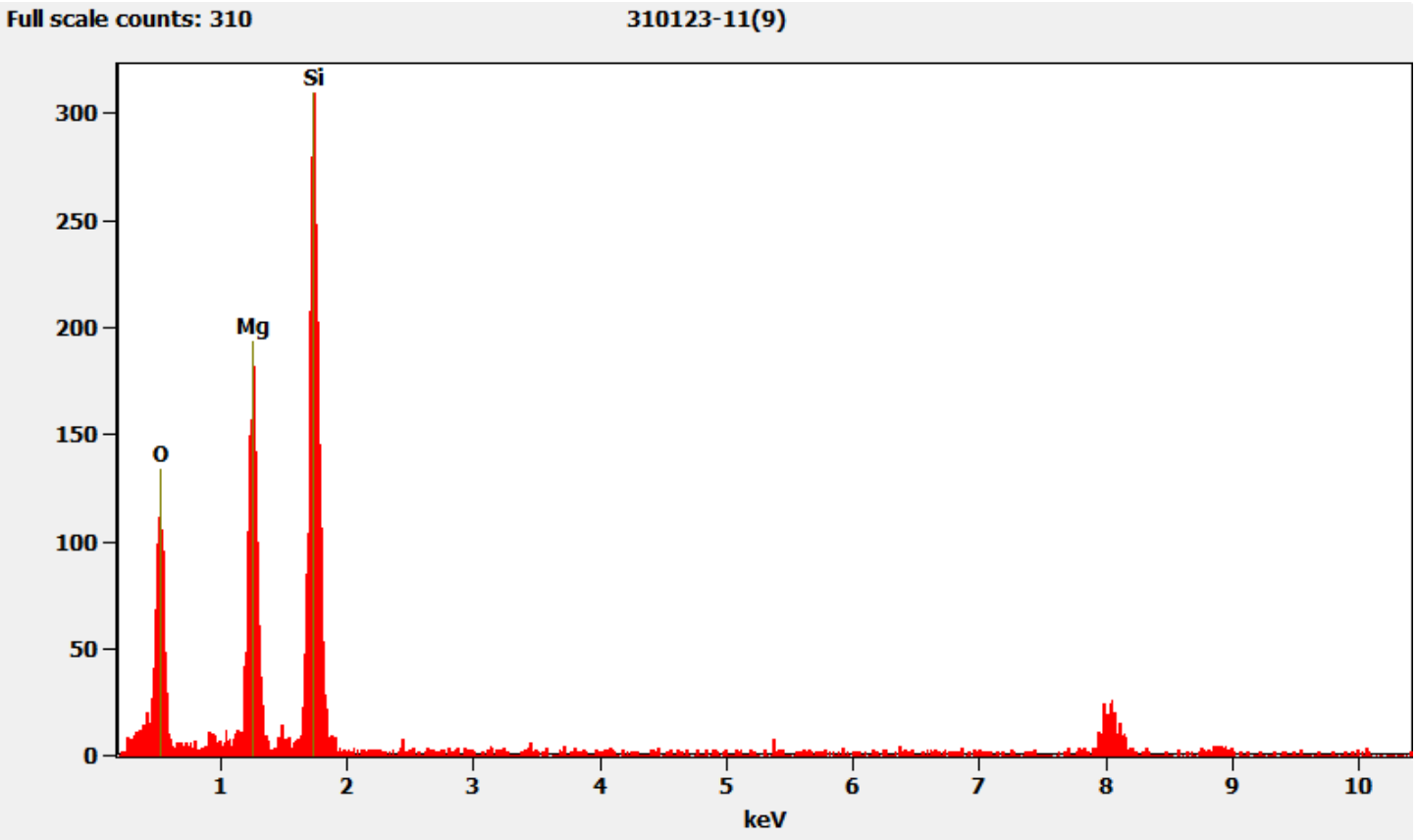
Chemistry from the Titanium Coated Particle pictured above.



Sample 310123-11, Talc Ribbon

Diffraction pattern from the Talc Ribbon pictured above.

Chemistry from the Talc Ribbon pictured above.



310123-12, 12A, 12B, Client Sample D-79

PLM

All three aliquots of sample D-79 were analyzed by (b) (6) on September 26, 2019. No asbestos or non-asbestos amphibole variants were detected the samples. The results were calculated using the equations detailed in the calculations section.

310123-12	NAD
310123-12A	NAD
310123-12B	NAD

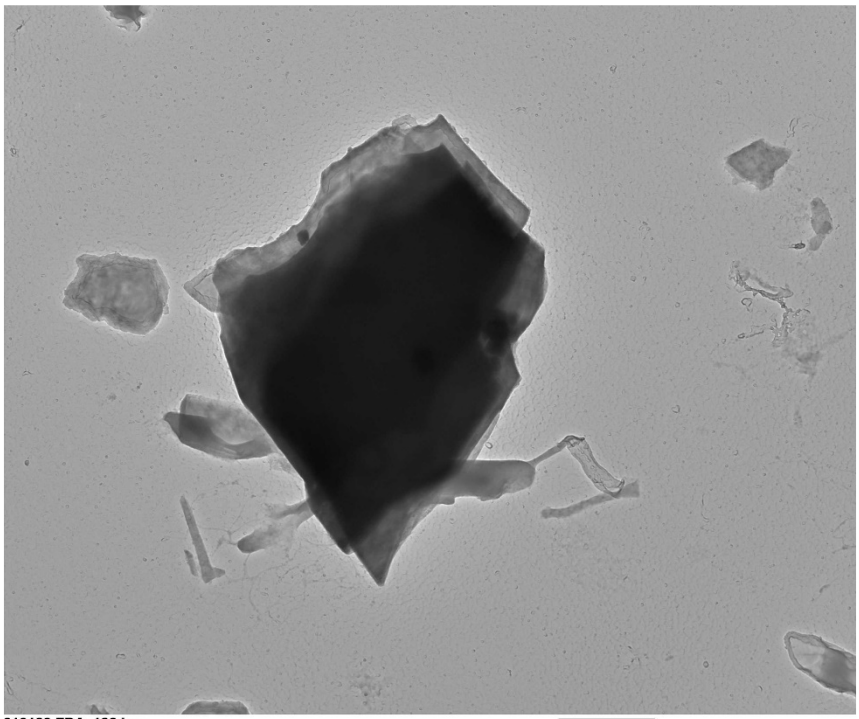
TEM

(b) (6) analyzed sample 12 on September 25, 2019 and sample 12A on September 30, 2019. (b) (6) analyzed sample 12B on September 30, 2019. The primary particle observed was talc along with some mica particles, talc fibers and titanium particles and a few titanium coated particles, iron particles, silica spheres and talc ribbons. No asbestos or non-asbestos amphibole variants were detected in the samples. The results were calculated using the equations detailed in the calculations section.

310123-12	NAD
310123-12A	NAD
310123-12B	NAD

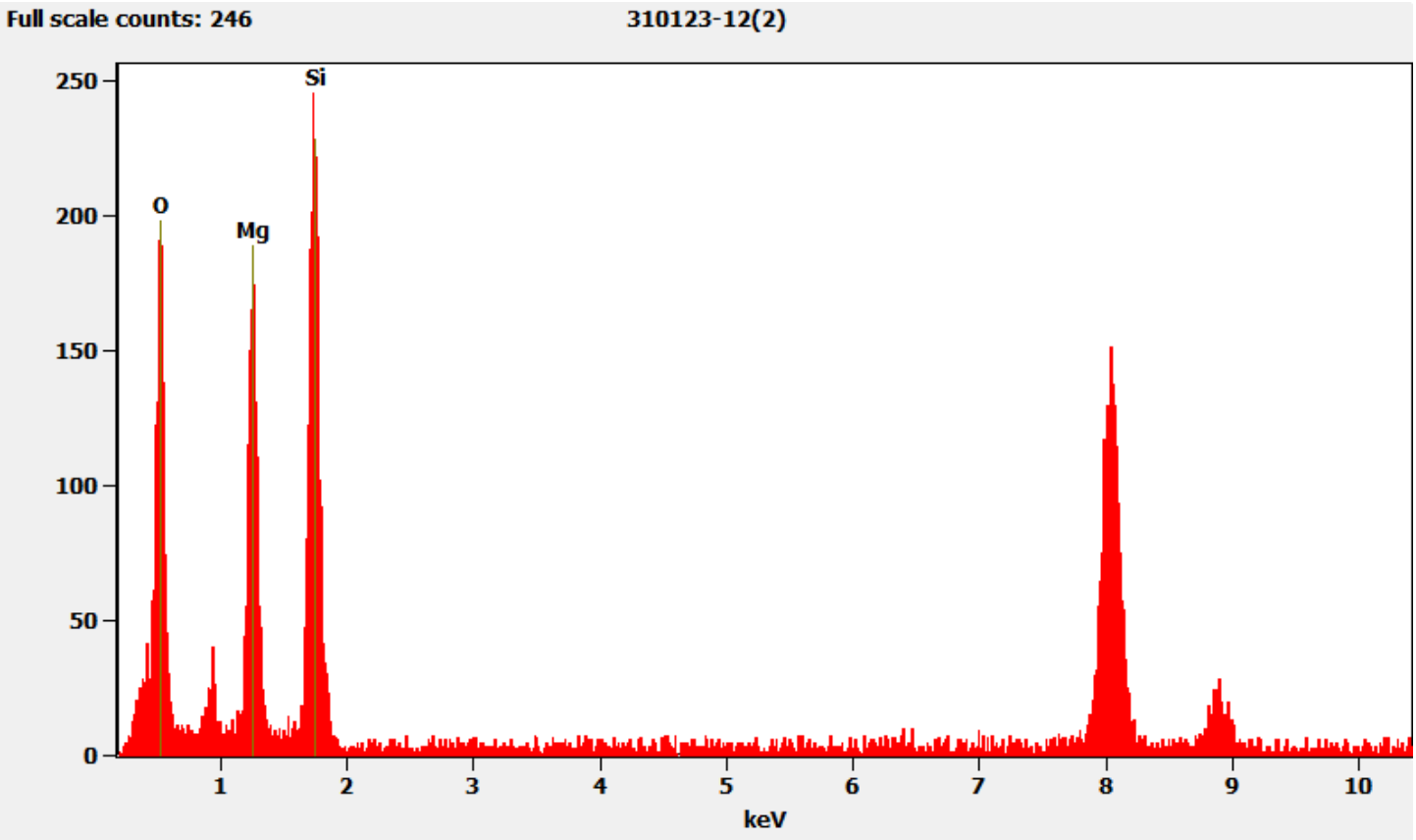
Below are pictures, diffraction patterns, and chemistry from some of the counted particles. The unidentified peaks in chemistry spectra are copper, zinc, and carbon. Those peaks are from the TEM specimen holder and specimen grid.

Sample 310123-12, Talc Particle

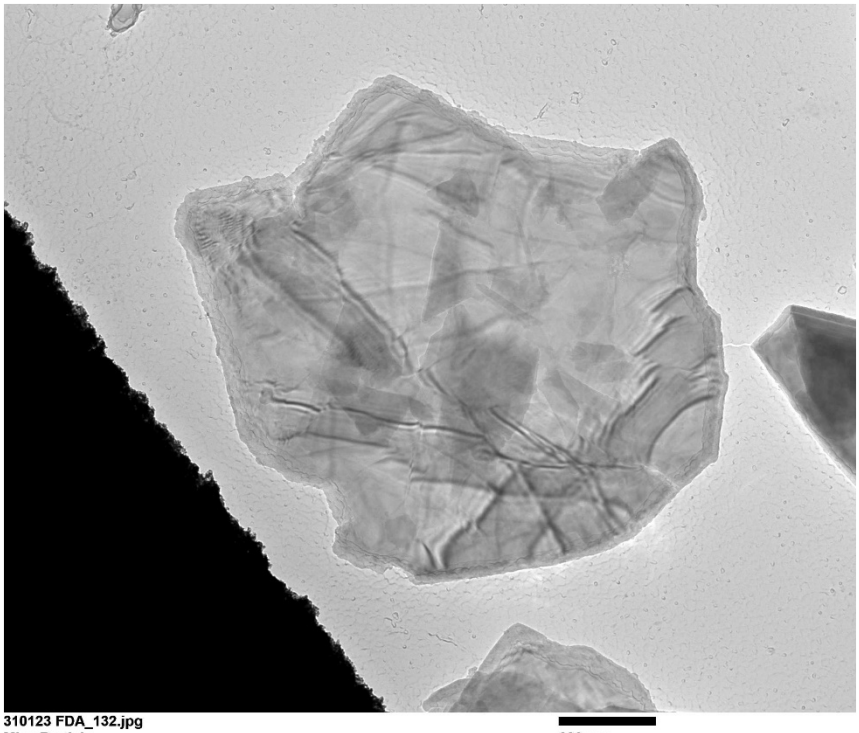


Hexagonal diffraction pattern from the Talc Particle pictured above.

Chemistry from the Talc Particle pictured above.



Sample 310123-12, Mica Particle



310123 FDA_132.jpg
Mica Particle
Cal: 0.002144 µm/pix
14:58 9/25/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

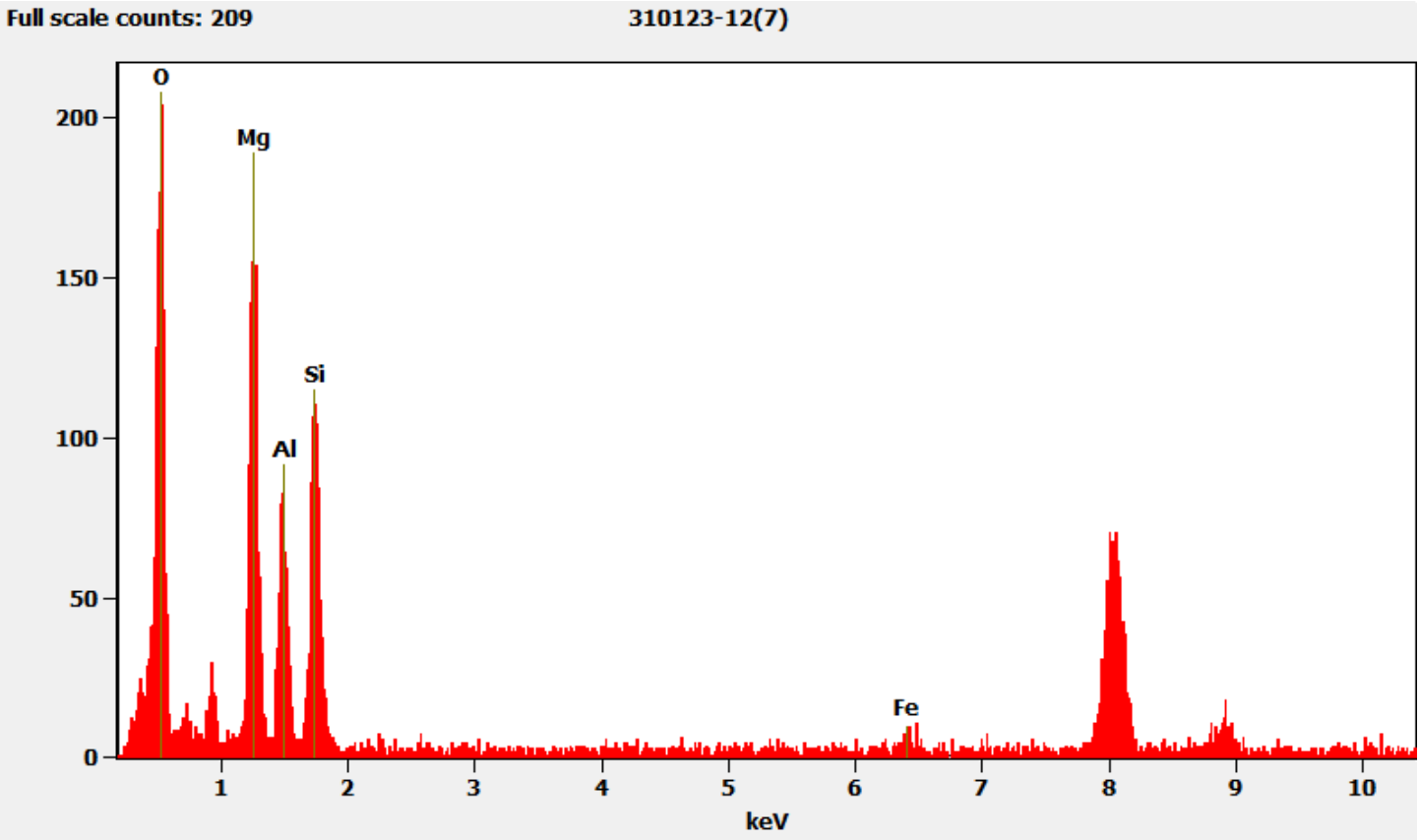
600 nm
HV=100kV
Direct Mag: 4800 x
AMA Analytical Services, Inc

Diffraction pattern from the Mica Particle pictured above.

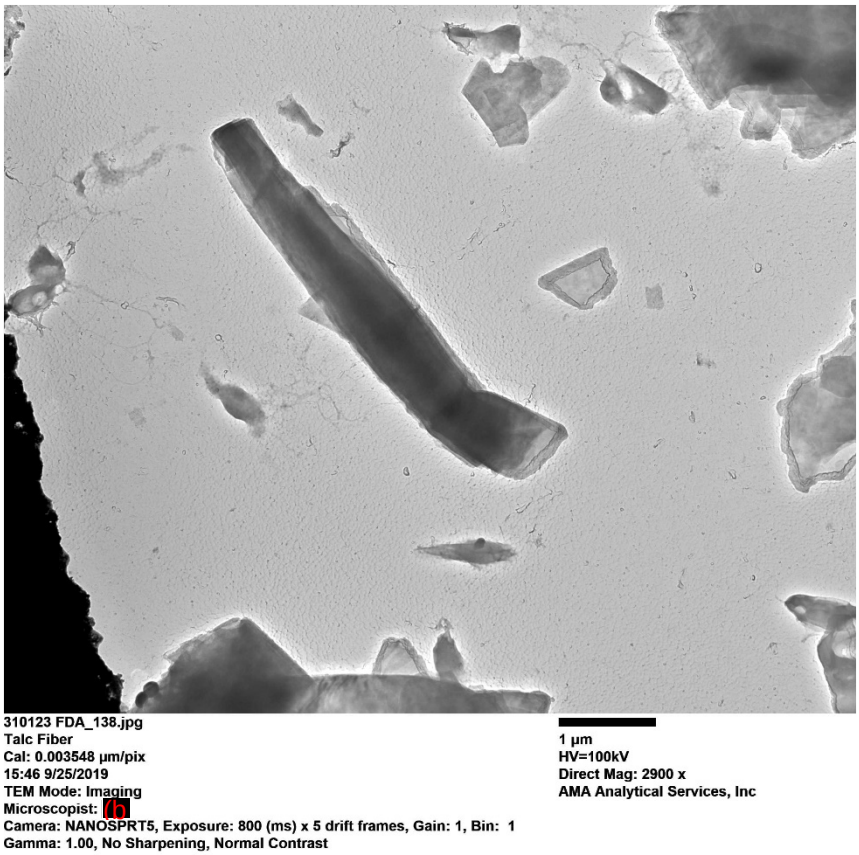
310123 FDA_133.jpg
Mica Particle
14:59 9/25/2019
TEM Mode: Diffraction
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

100 (1/Å)
HV=100kV
Cam Len: 0.2200 m
AMA Analytical Services, Inc

Chemistry from the Mica Particle pictured above

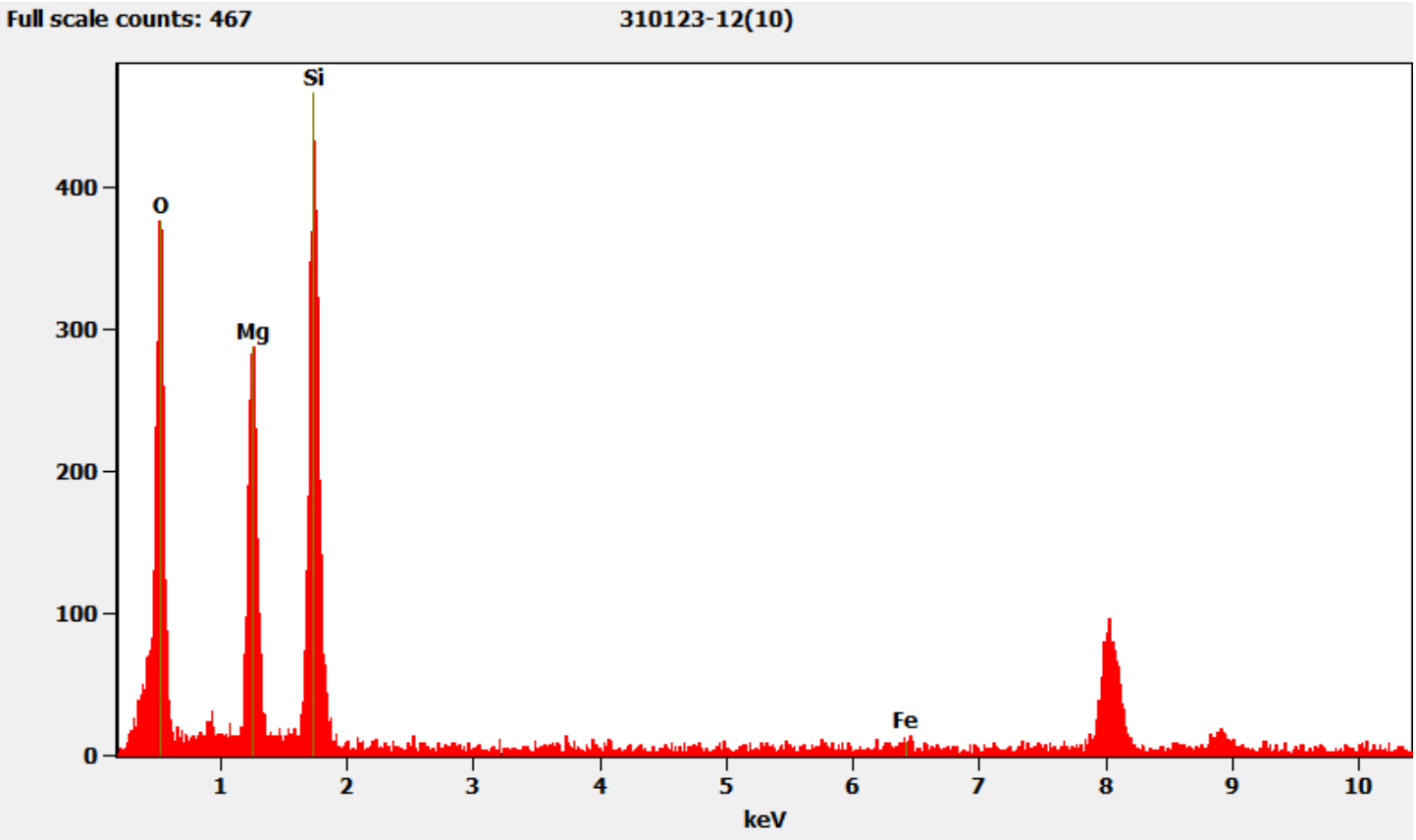


Sample 310123-12, Talc Fiber

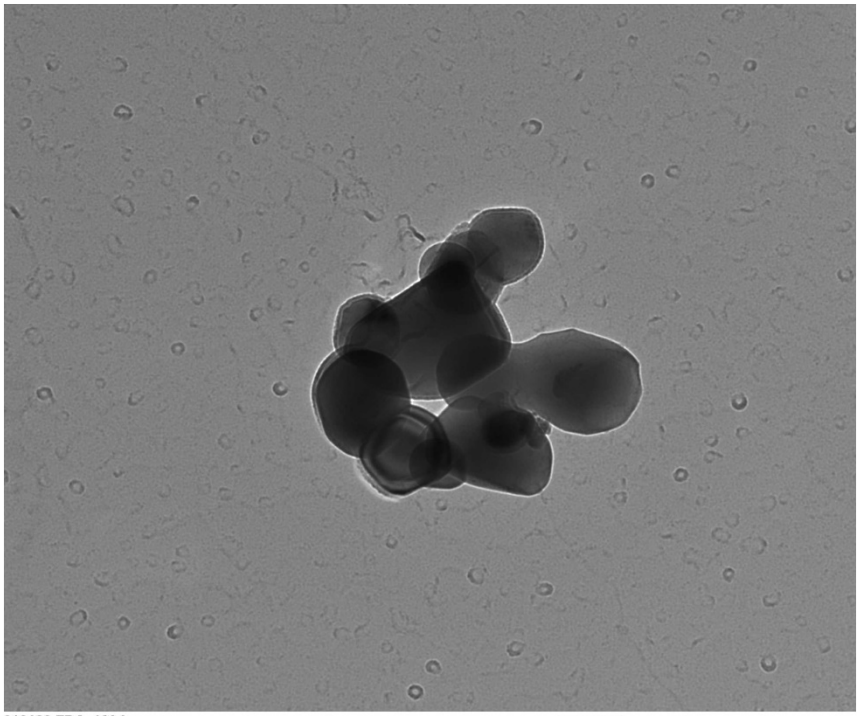


Hexagonal diffraction pattern from the Talc Fiber pictured above.

Chemistry from the Talc Fiber pictured above.



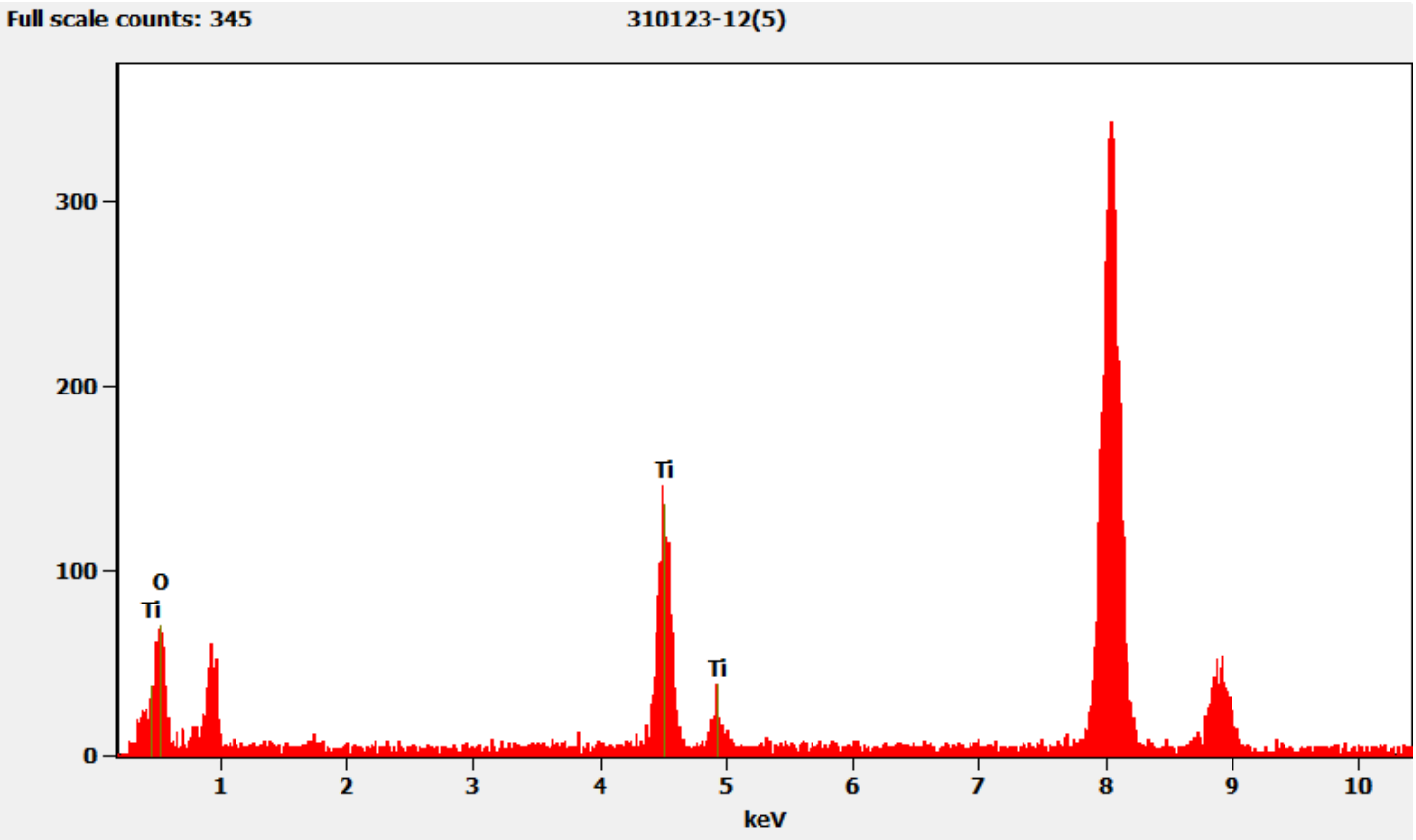
Sample 310123-12, Titanium Particles



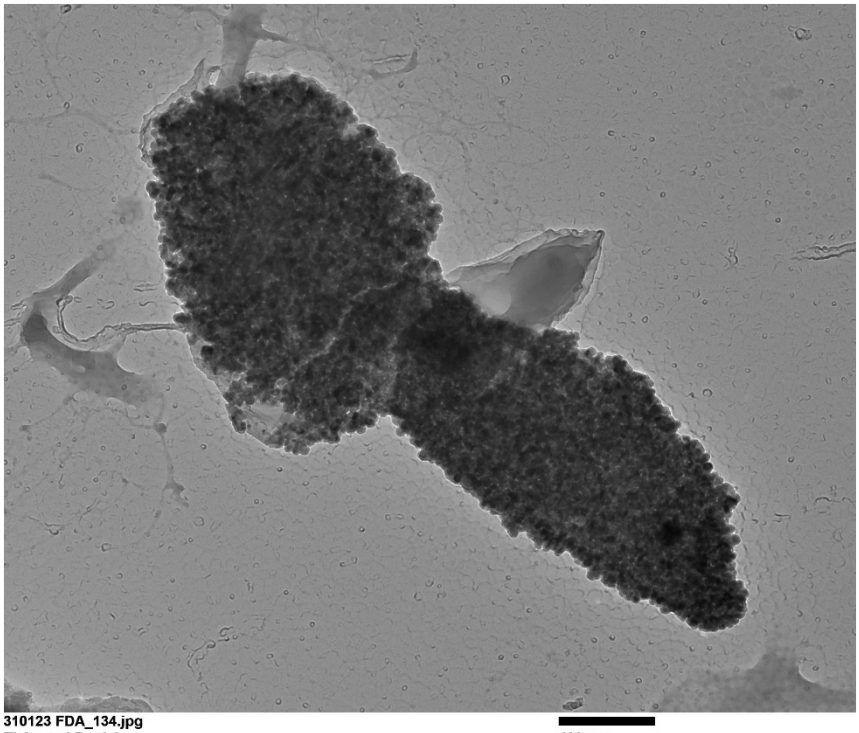
310123 FDA_130.jpg
Titanium Particles
Cal: 0.541520 nm/pix
14:53 9/25/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

100 nm
HV=100kV
Direct Mag: 19000 x
AMA Analytical Services, Inc

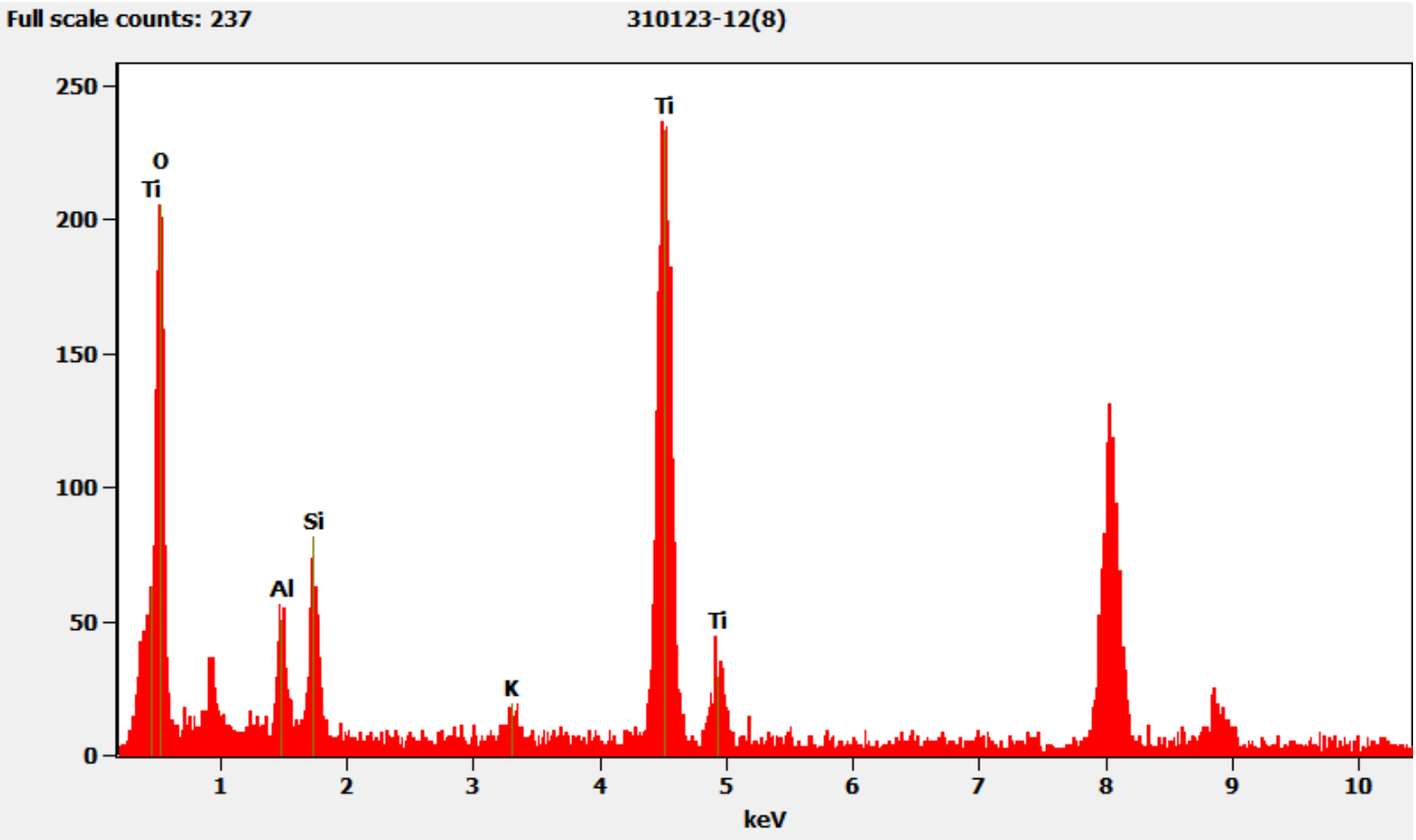
Chemistry from the Titanium Particles pictured above



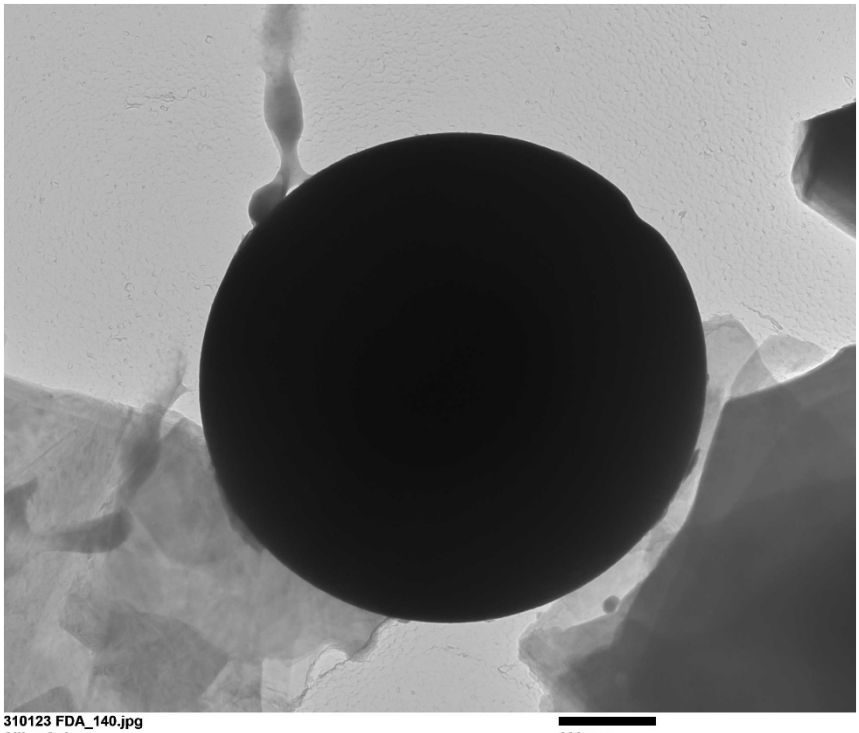
310123-12, Titanium Coated Particle



Chemistry from the Titanium Coated pictured above



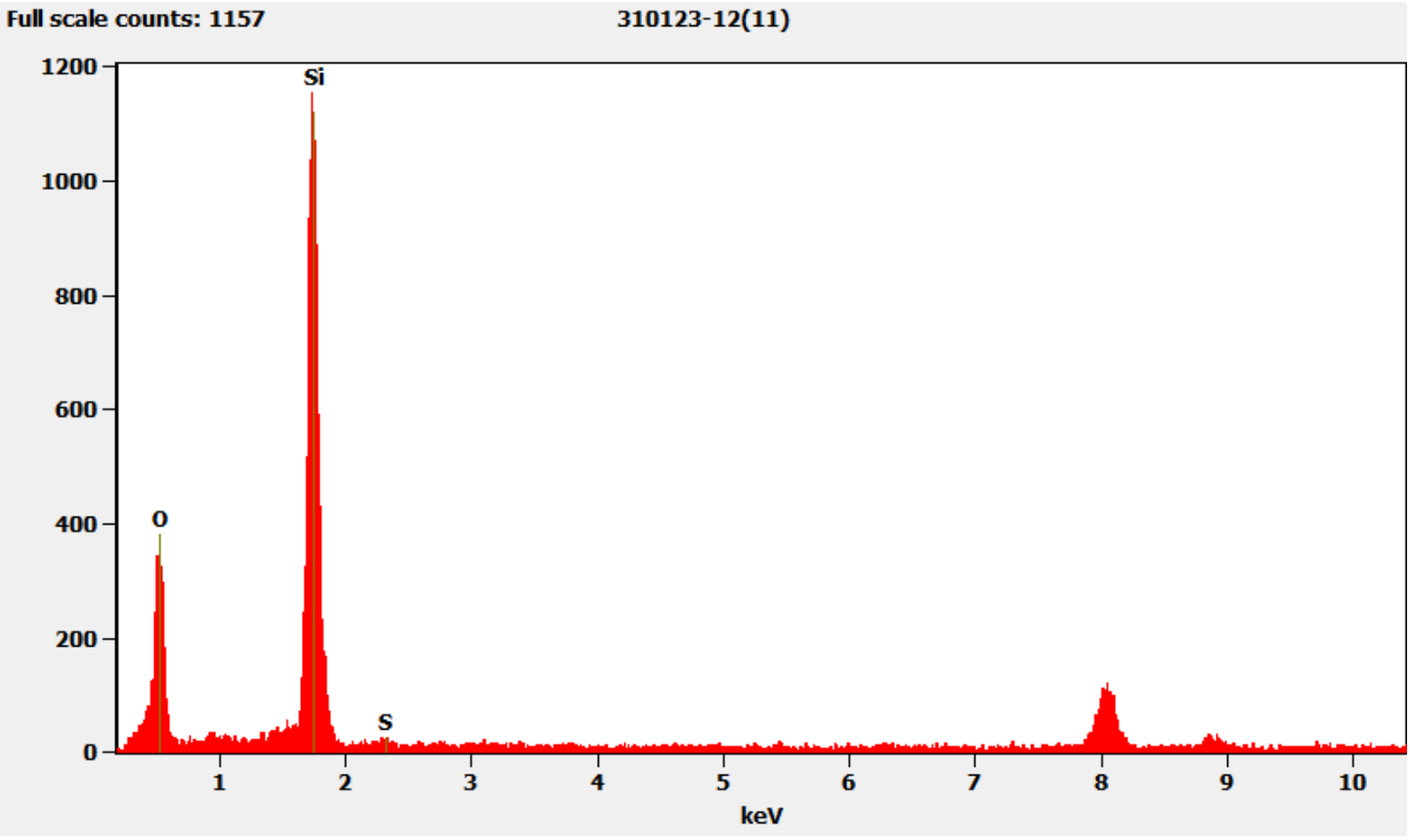
310123-13, Silica Sphere



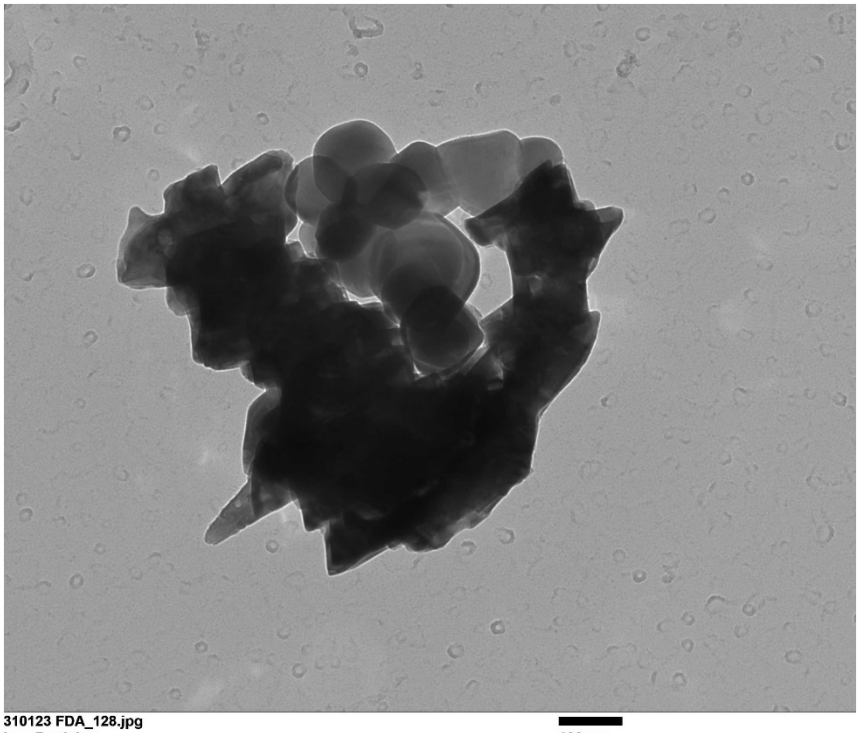
310123 FDA_140.jpg
Silica Sphere
Cal: 0.002144 µm/pix
15:51 9/25/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

600 nm
HV=100kV
Direct Mag: 4800 x
AMA Analytical Services, Inc

Chemistry from the Silica Sphere pictured above



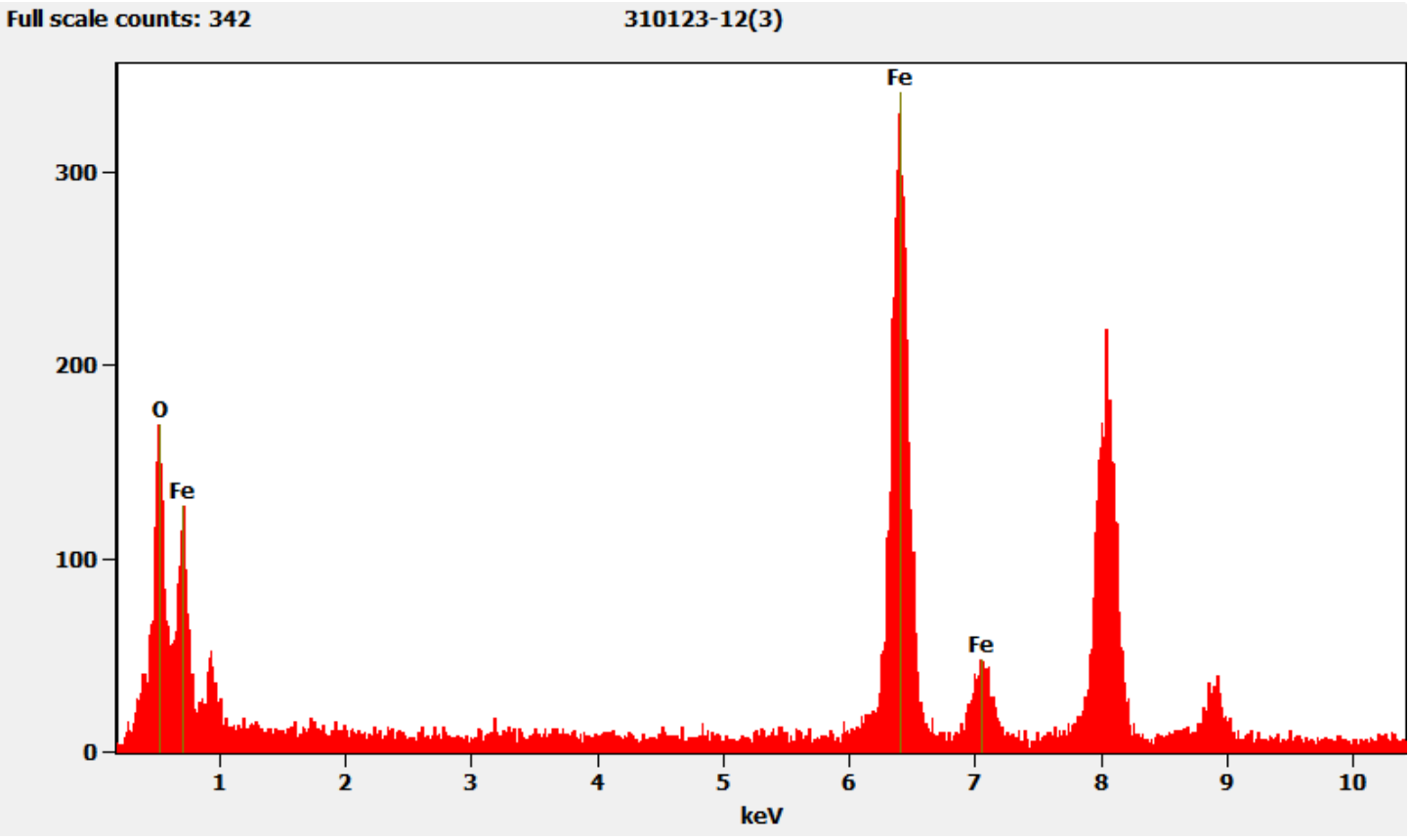
310123-12, Iron Particles



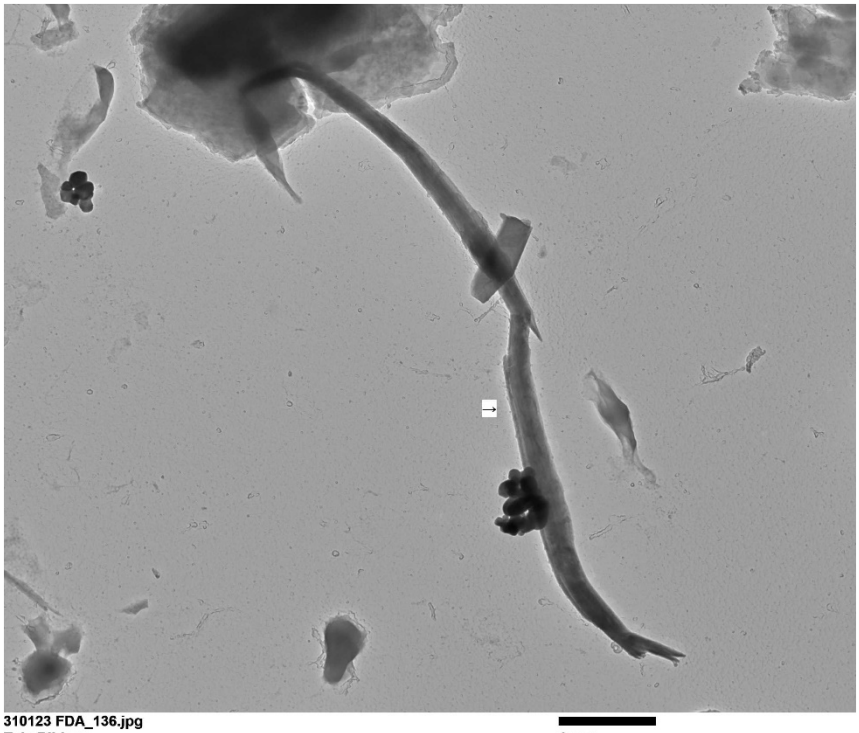
310123 FDA_128.jpg
Iron Particles
Cal: 0.541520 nm/pix
14:50 9/25/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

100 nm
HV=100kV
Direct Mag: 19000 x
AMA Analytical Services, Inc

Chemistry from the Iron Particles pictured above



310123-12, Talc Ribbon



310123 FDA_136.jpg
Talc Ribbon
Cal: 0.003548 µm/pix
15:15 9/25/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

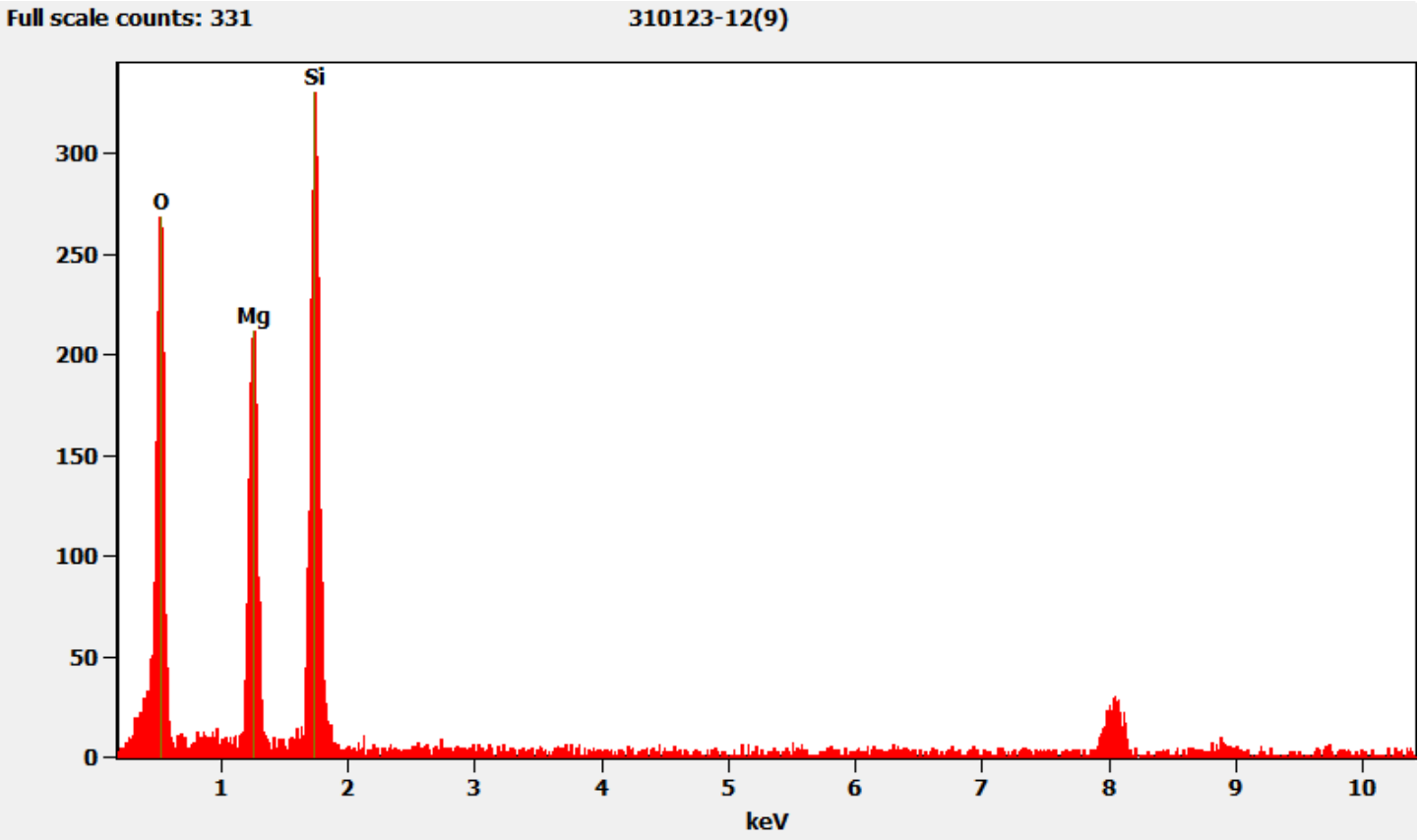
1 µm
HV=100kV
Direct Mag: 2900 x
AMA Analytical Services, Inc

Diffraction pattern from the Talc Ribbon pictured above

310123 FDA_137.jpg
Talc Ribbon
15:16 9/25/2019
TEM Mode: Diffraction
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

100 (1/Å)
HV=100kV
Cam Len: 0.2200 m
AMA Analytical Services, Inc

Chemistry from the Talc Ribbon pictured above



<u>310123-13, 13A, 13B, Client Sample D-80</u>

PLM

All three aliquots of sample D-80 were analyzed by (b) (6) on September 26, 2019. No asbestos or non-asbestos amphibole variants were detected the samples. The results were calculated using the equations detailed in the calculations section.

310123-13	NAD
310123-13A	NAD
310123-13B	NAD

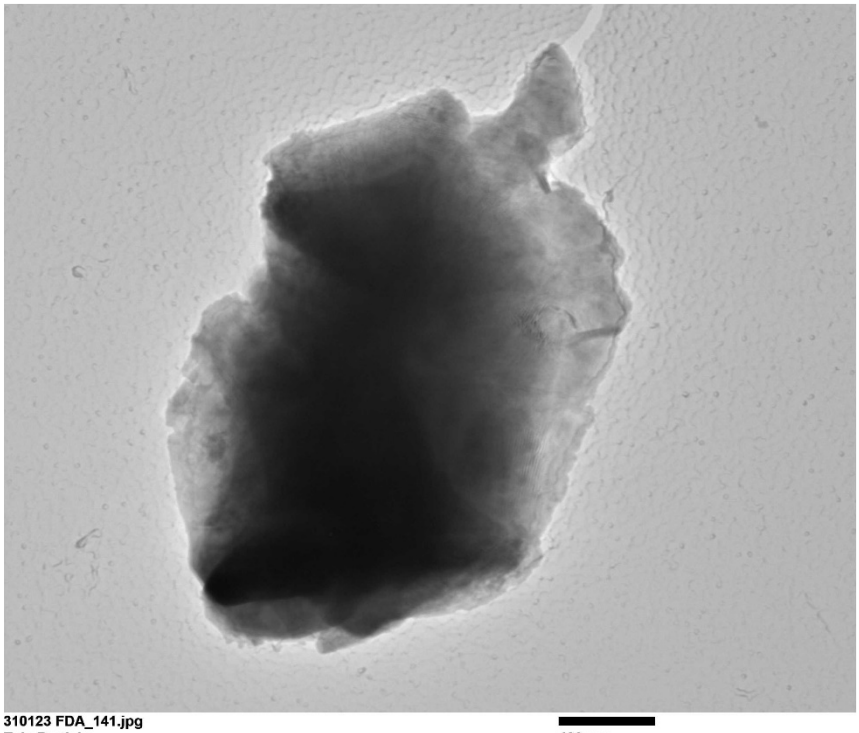
TEM

(b) (6) analyzed sample 13 on September 25, 2019 and sample 13A on September 30, 2019. (b) (6) analyzed sample 13B on September 30, 2019. The primary particles observed were talc and mica along with a few talc fibers. No asbestos or non-asbestos amphibole variants were detected in the samples. The results were calculated using the equations detailed in the calculations section.

310123-13	NAD
310123-13A	NAD
310123-13B	NAD

Below are pictures, diffraction patterns, and chemistry from some of the counted particles. The unidentified peaks in chemistry spectra are copper, zinc, and carbon. Those peaks are from the TEM specimen holder and specimen grid.

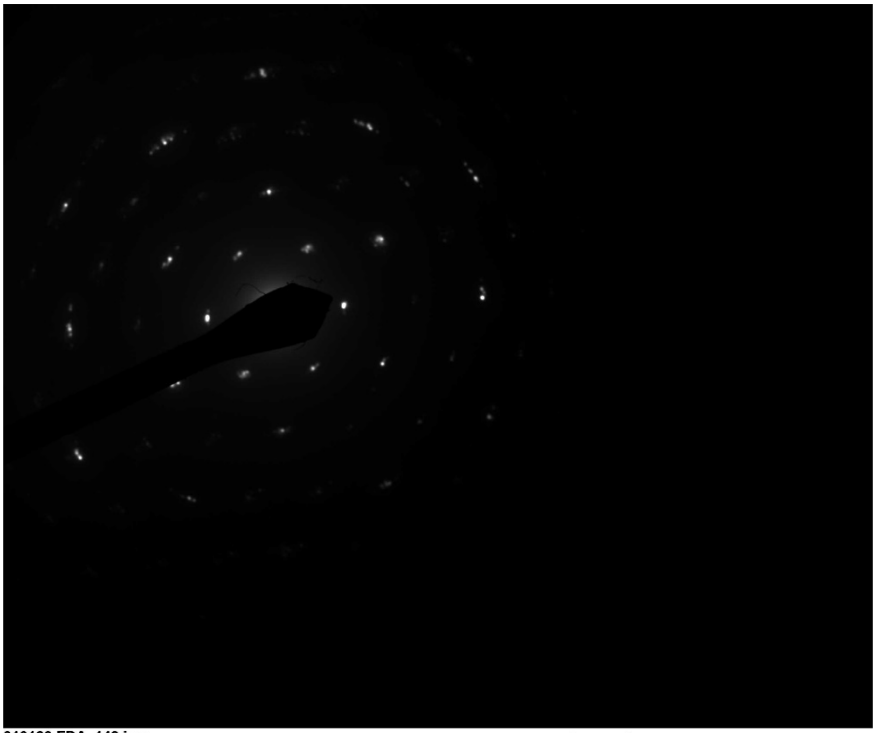
Sample 310123-13, Talc Particle



310123 FDA_141.jpg
Talc Particle
Cal: 0.001429 µm/pix
16:21 9/25/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

400 nm
HV=100kV
Direct Mag: 7200 x
AMA Analytical Services, Inc

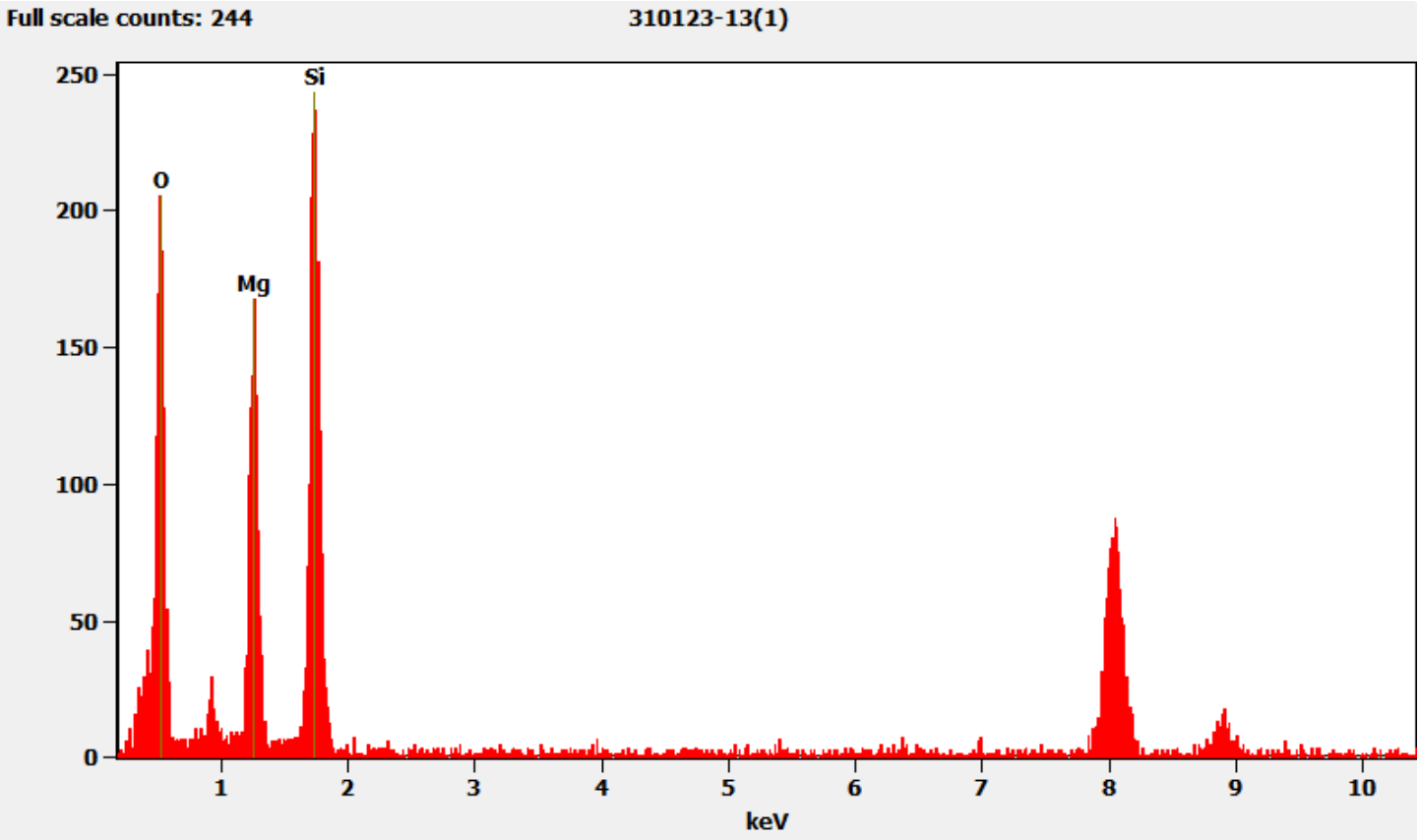
Hexagonal diffraction from the Talc Particle pictured above.



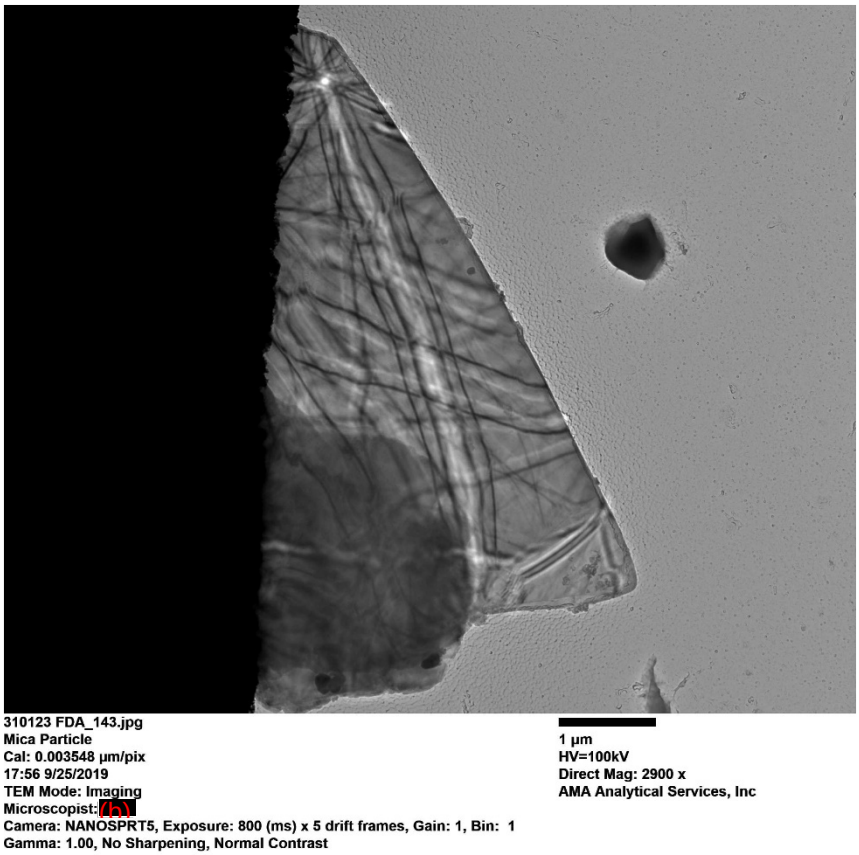
310123 FDA_142.jpg
Talc Particle
16:22 9/25/2019
TEM Mode: Diffraction
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

100 (1/Å)
HV=100kV
Cam Len: 0.2200 m
AMA Analytical Services, Inc

Chemistry from the Talc particle pictured above.

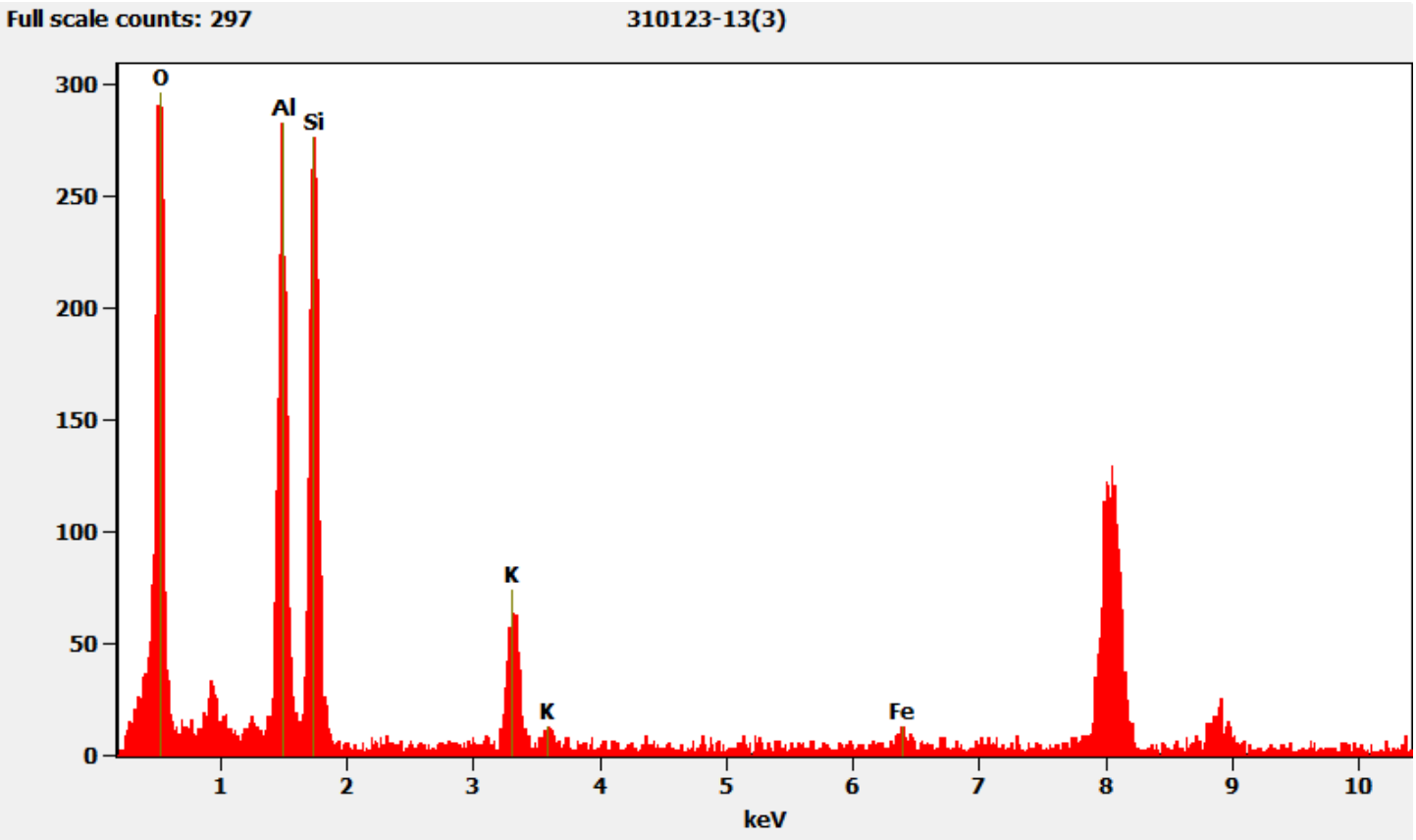


Sample 310123-13, Mica Particle

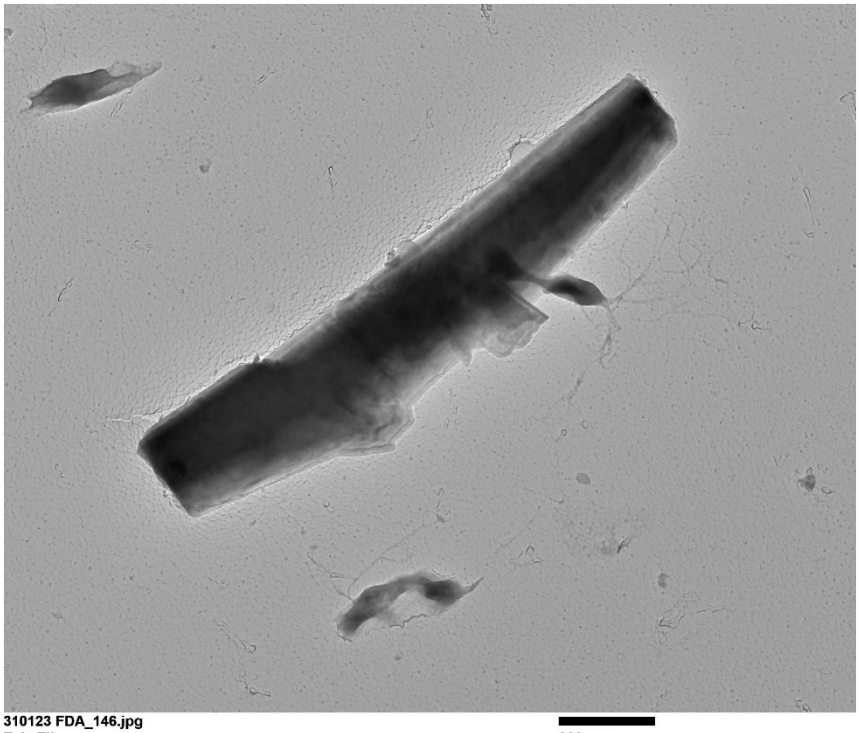


Diffraction pattern from the Mica Particle pictured above.

Chemistry from the Mica Particle pictured above



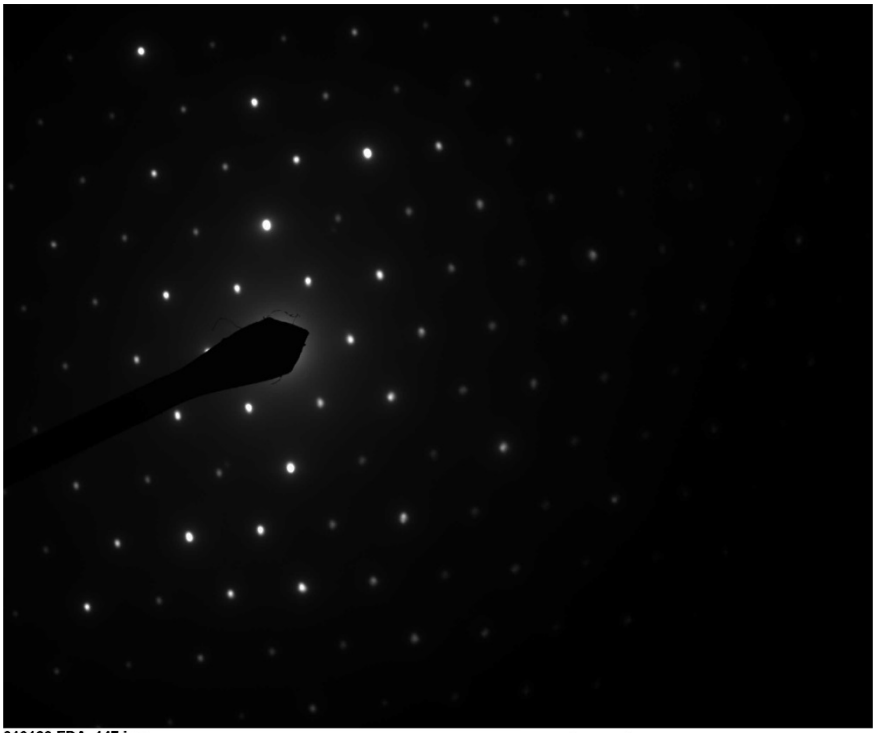
Sample 310123-13, Talc Fiber



310123 FDA_146.jpg
Talc Fiber
Cal: 0.002858 µm/pix
14:59 9/26/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

800 nm
HV=100kV
Direct Mag: 3600 x
AMA Analytical Services, Inc

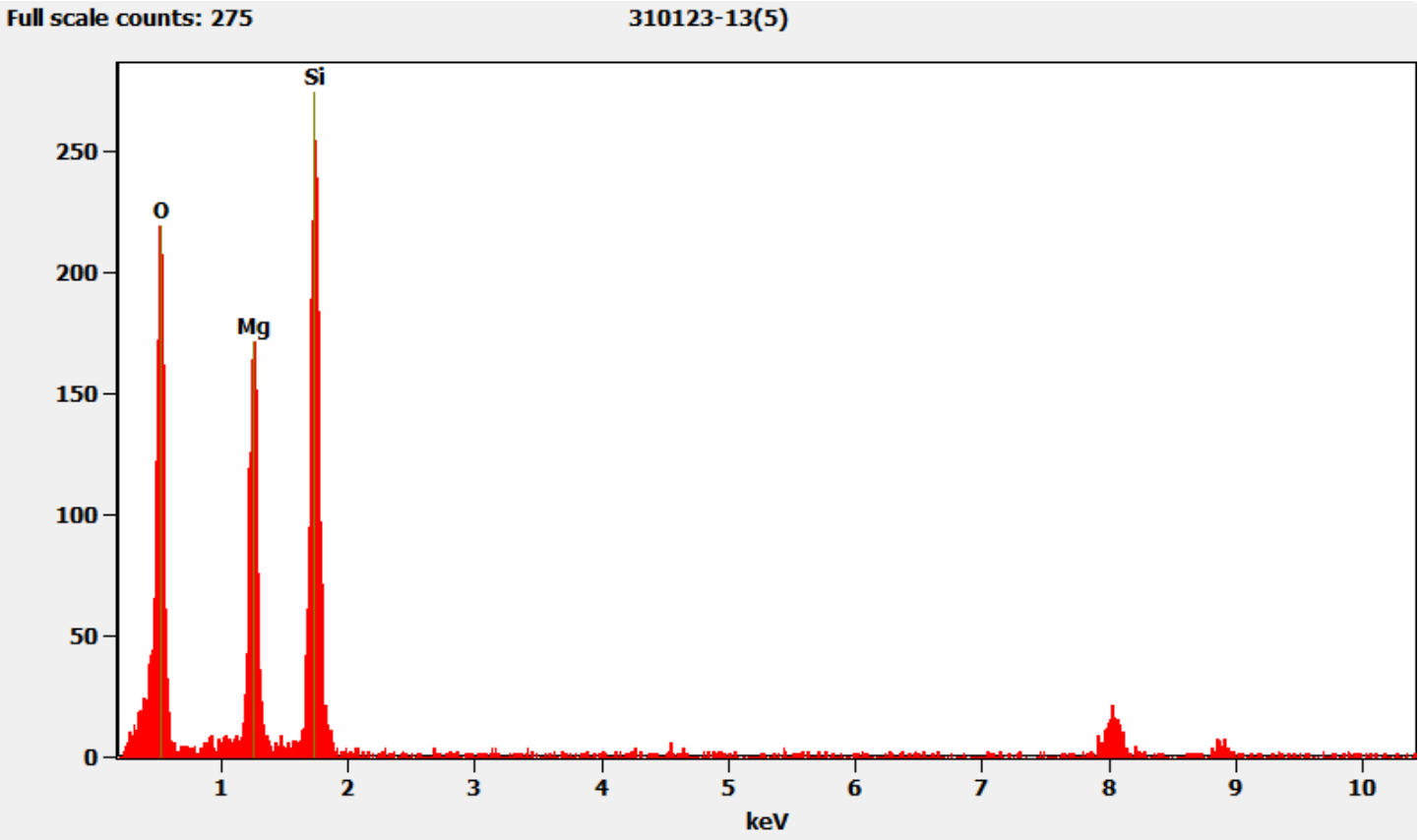
Hexagonal diffraction pattern from the Talc Fiber pictured above.



310123 FDA_147.jpg
Talc Fiber
15:00 9/26/2019
TEM Mode: Diffraction
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

100 (1/Å)
HV=100kV
Cam Len: 0.2200 m
AMA Analytical Services, Inc

Chemistry from the Talc Fiber particle pictured above.



310123-14, 14A, 14B, Client Sample D-81

PLM

All three aliquots of sample D-81 were analyzed by (b) (6) on September 26, 2019. No asbestos or non-asbestos amphibole variants were detected the samples. The results were calculated using the equations detailed in the calculations section.

310123-14	NAD
310123-14A	NAD
310123-14B	NAD

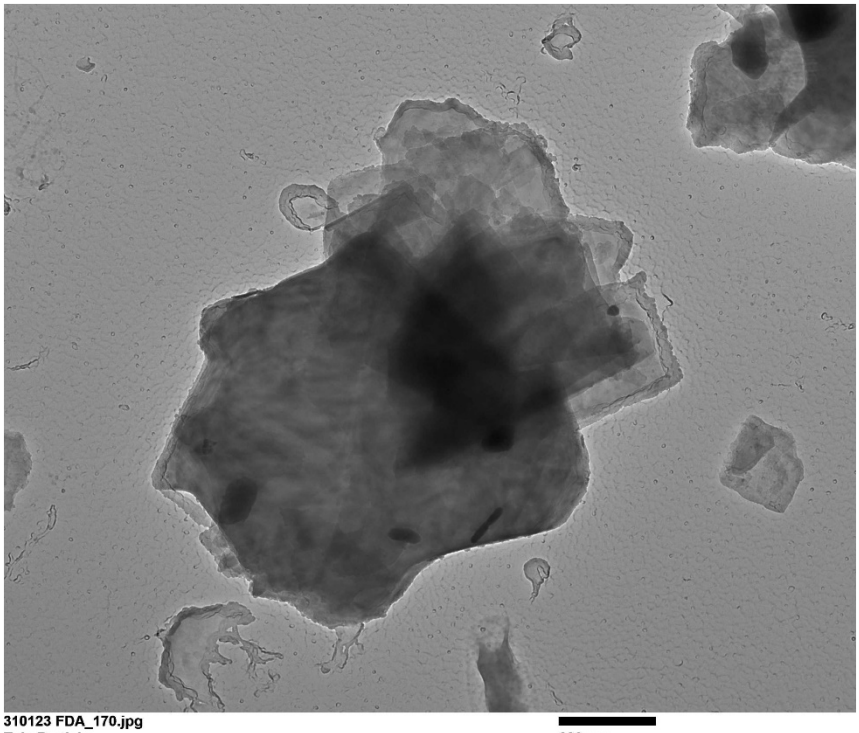
TEM

Sample 14 was analyzed by (b) (6) on September 27, 2019. (b) (6) analyzed samples 14A and 14B on September 30, 2019. The primary particle observed was talc along with lots of titanium particles, some silica particles, silica spheres, and a few talc fibers and talc ribbons. No asbestos or non-asbestos amphibole variants were detected in the samples. The results were calculated using the equations detailed in the calculations section.

310123-14	NAD
310123-14A	NAD
310123-14B	NAD

Below are pictures, diffraction patterns, and chemistry from some of the counted particles. The unidentified peaks in chemistry spectra are copper, zinc, and carbon. Those peaks are from the TEM specimen holder and specimen grid.

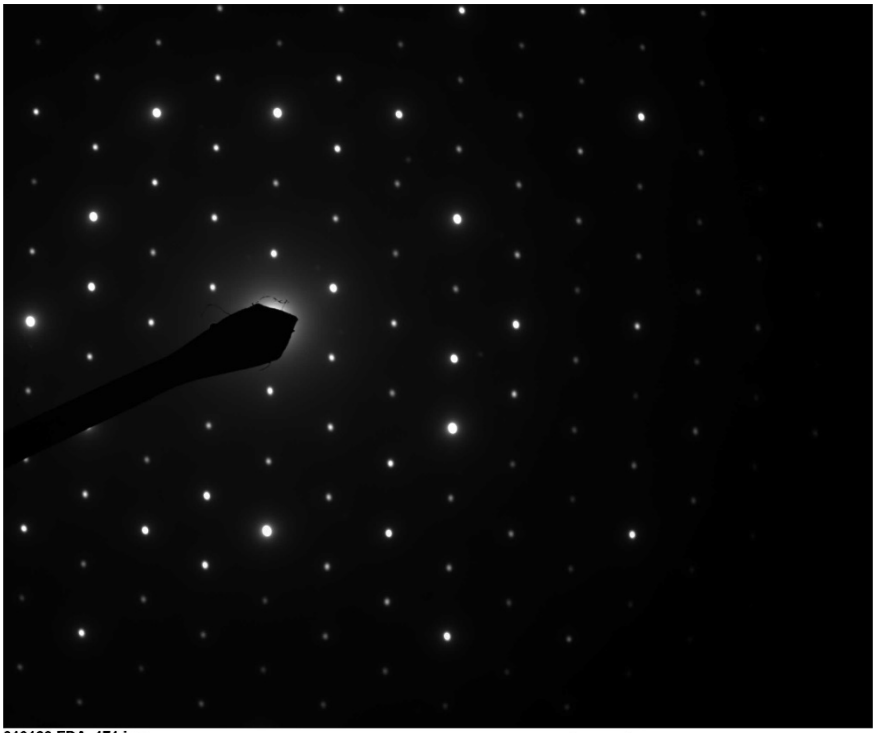
Sample 310123-14, Talc Particle



310123 FDA_170.jpg
Talc Particle
Cal: 0.002144 µm/pix
16:27 10/17/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

600 nm
HV=100kV
Direct Mag: 4800 x
AMA Analytical Services, Inc

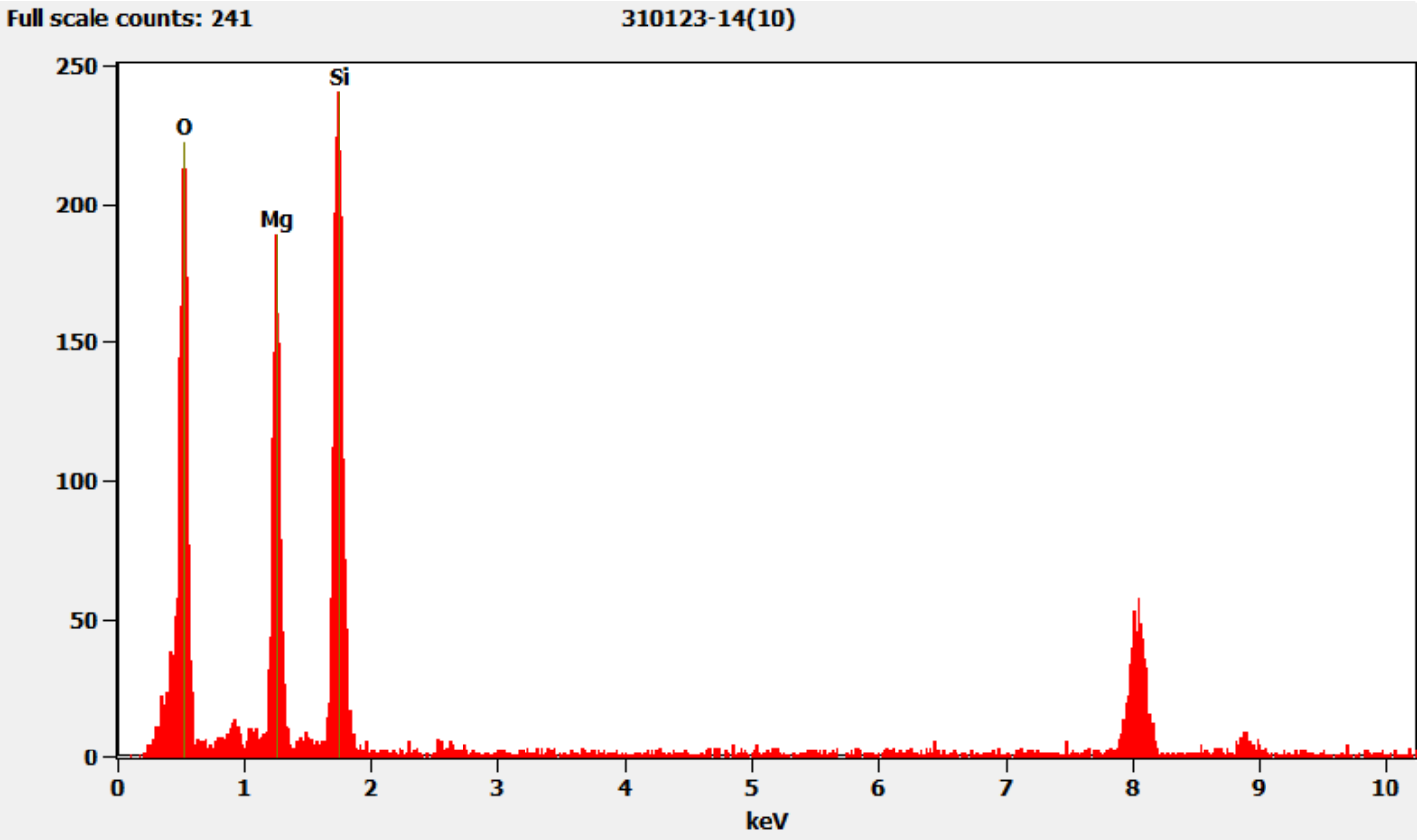
Hexagonal diffraction from the Talc particle pictured above.



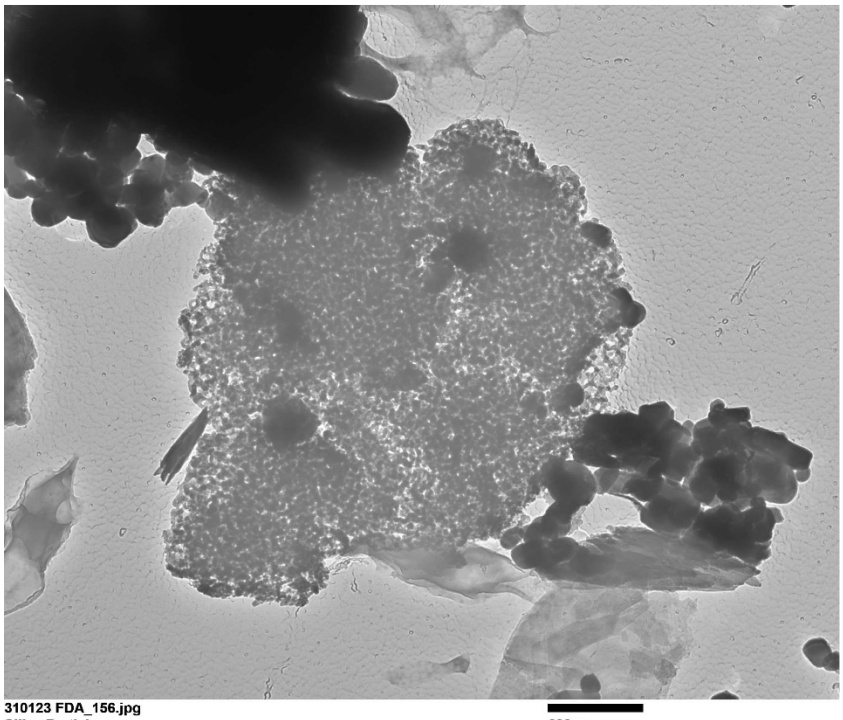
310123 FDA_171.jpg
Talc Particle
16:31 10/17/2019
TEM Mode: Diffraction
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

100 (1/Å)
HV=100kV
Cam Len: 0.2200 m
AMA Analytical Services, Inc

Chemistry from the Talc particle pictured above.



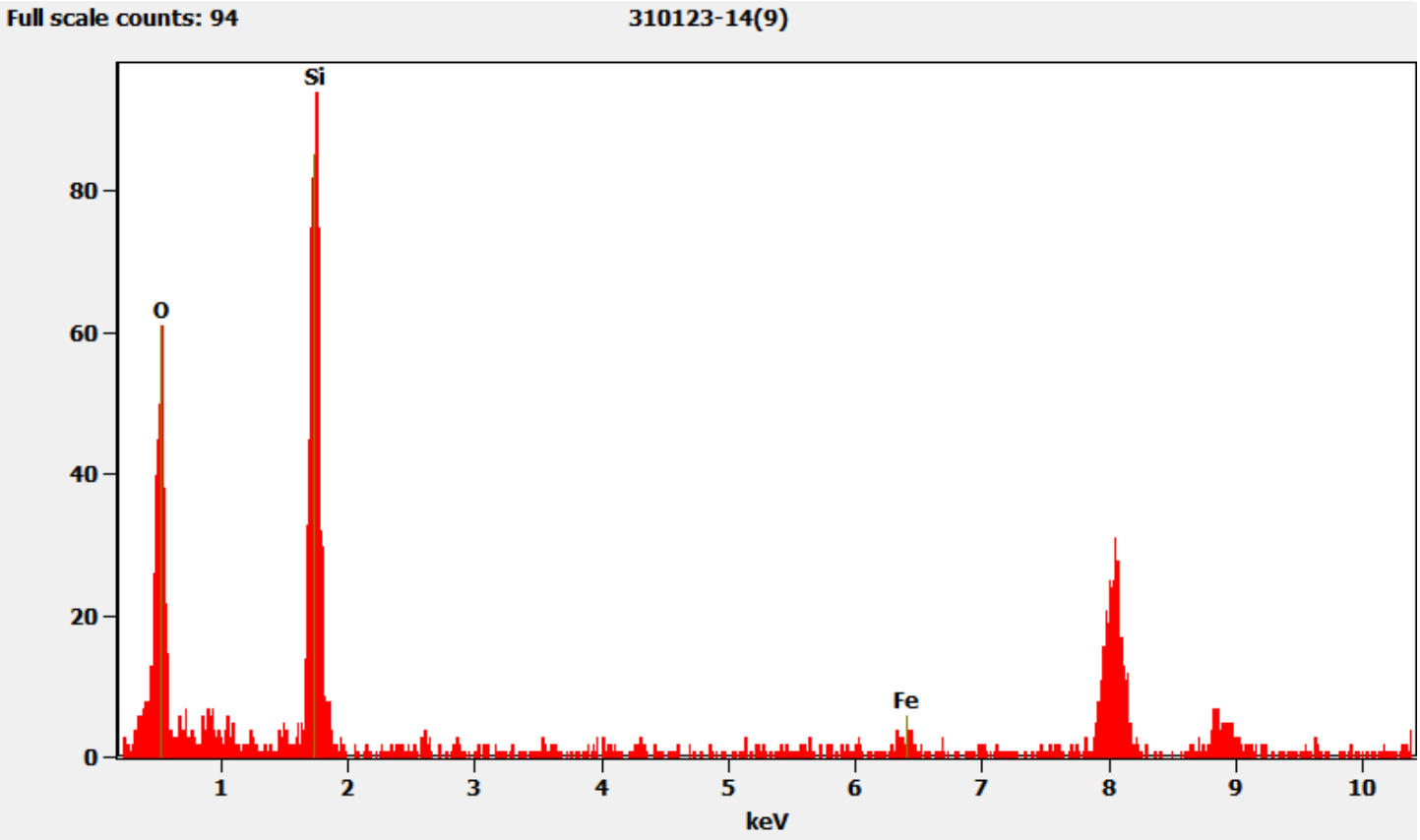
Sample 310123-14, Silica Particle



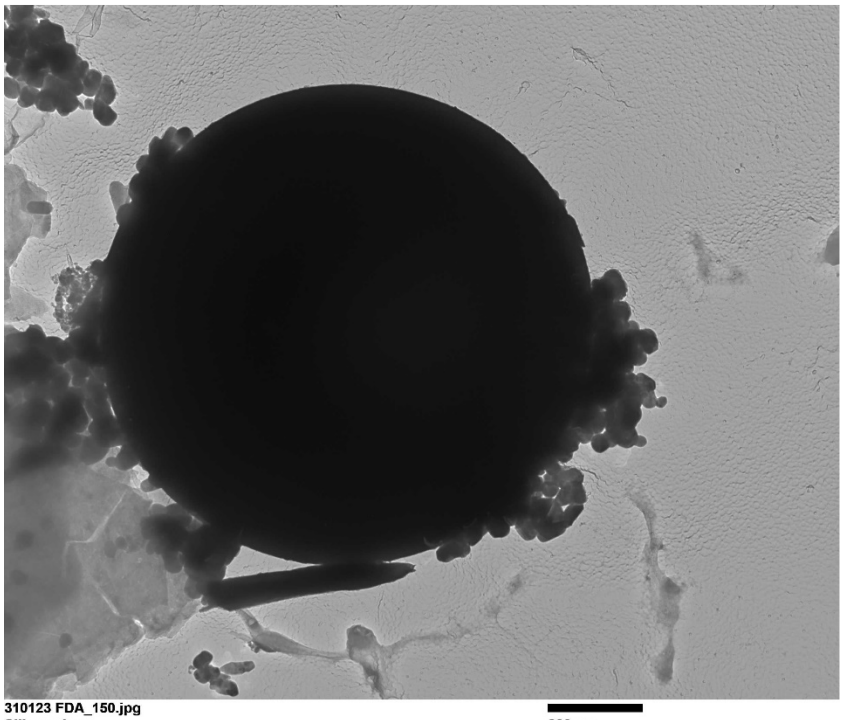
310123 FDA_156.jpg
Silica Particles
310123-14
Cal: 0.002144 µm/pix
10:25 9/27/2019
TEM Mode: Imaging
Microscopist: [redacted]
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 std. frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

600 nm
HV=100kV
Direct Mag: 4800 x
AMA Analytical Services, Inc

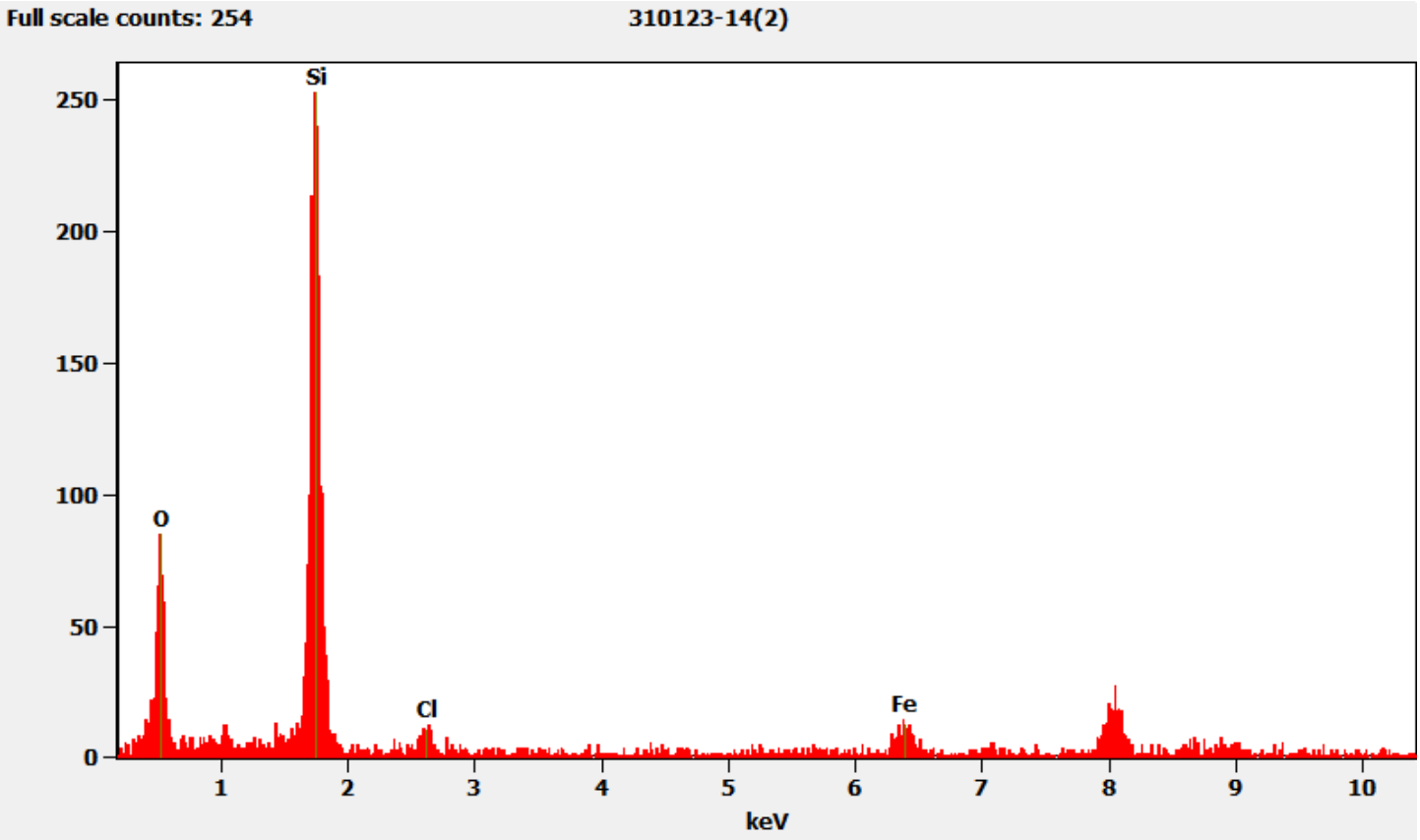
Chemistry from the Silica Particle pictured above



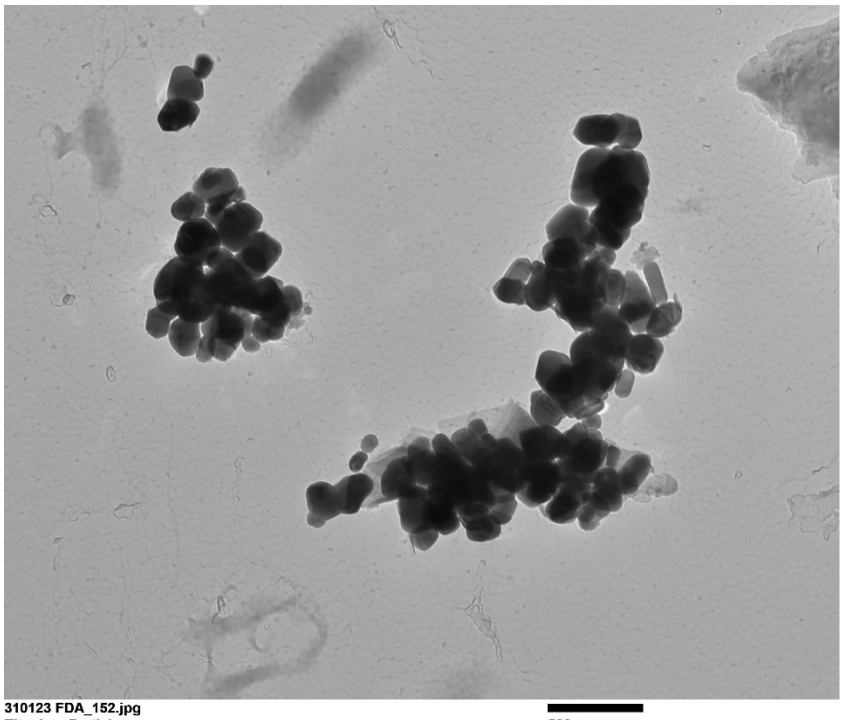
Sample 310123-14, Silica Sphere



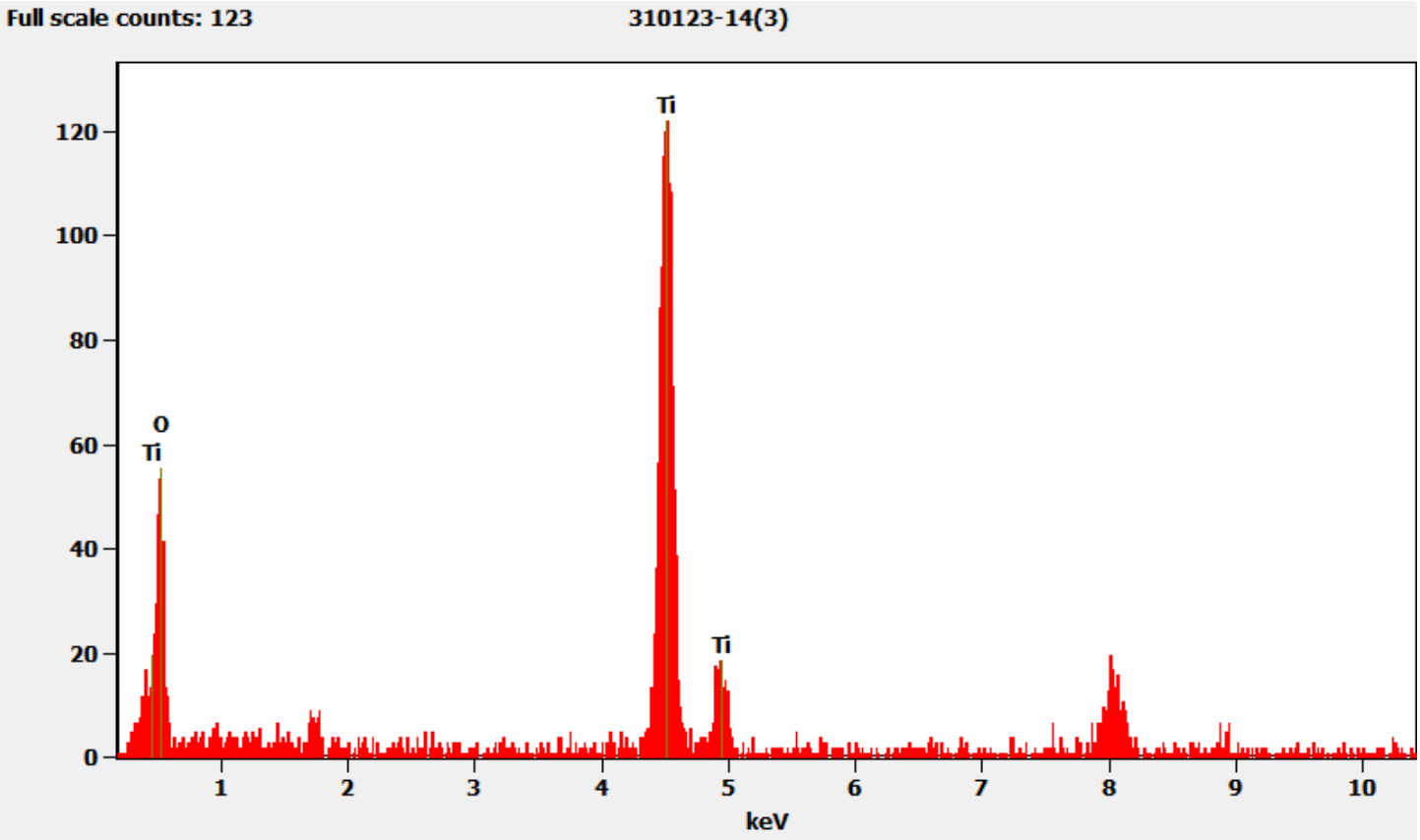
Chemistry from the Silica Sphere pictured above.



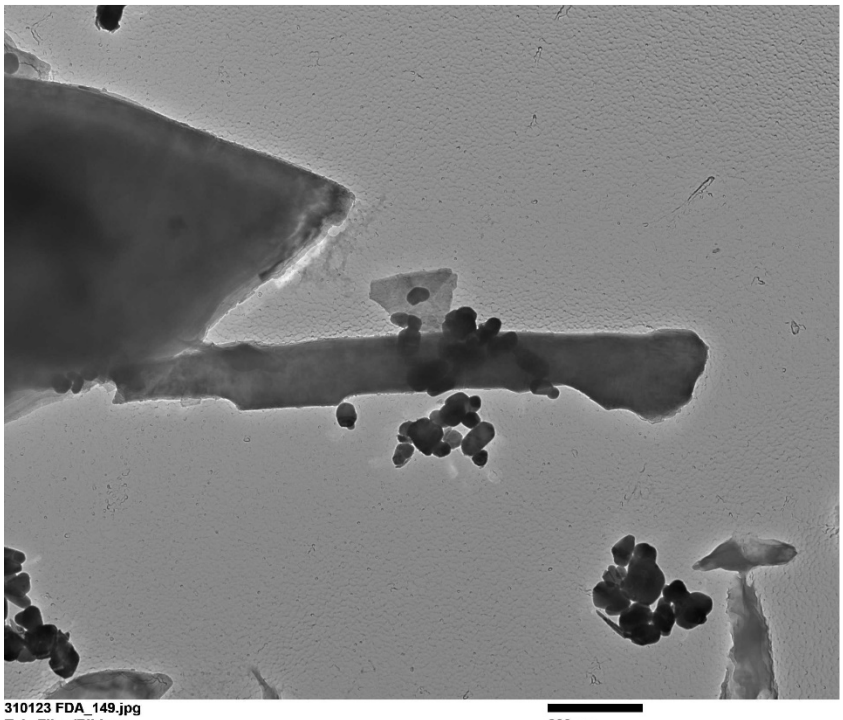
Sample 310123-14, Titanium Particles



Chemistry from the Titanium particles pictured above



Sample 310123-14, Talc Fiber



310123 FDA_149.jpg
Talc Fiber/Ribbon
310123-14
Cal: 0.002858 µm/pix
09:54 9/27/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 std. frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

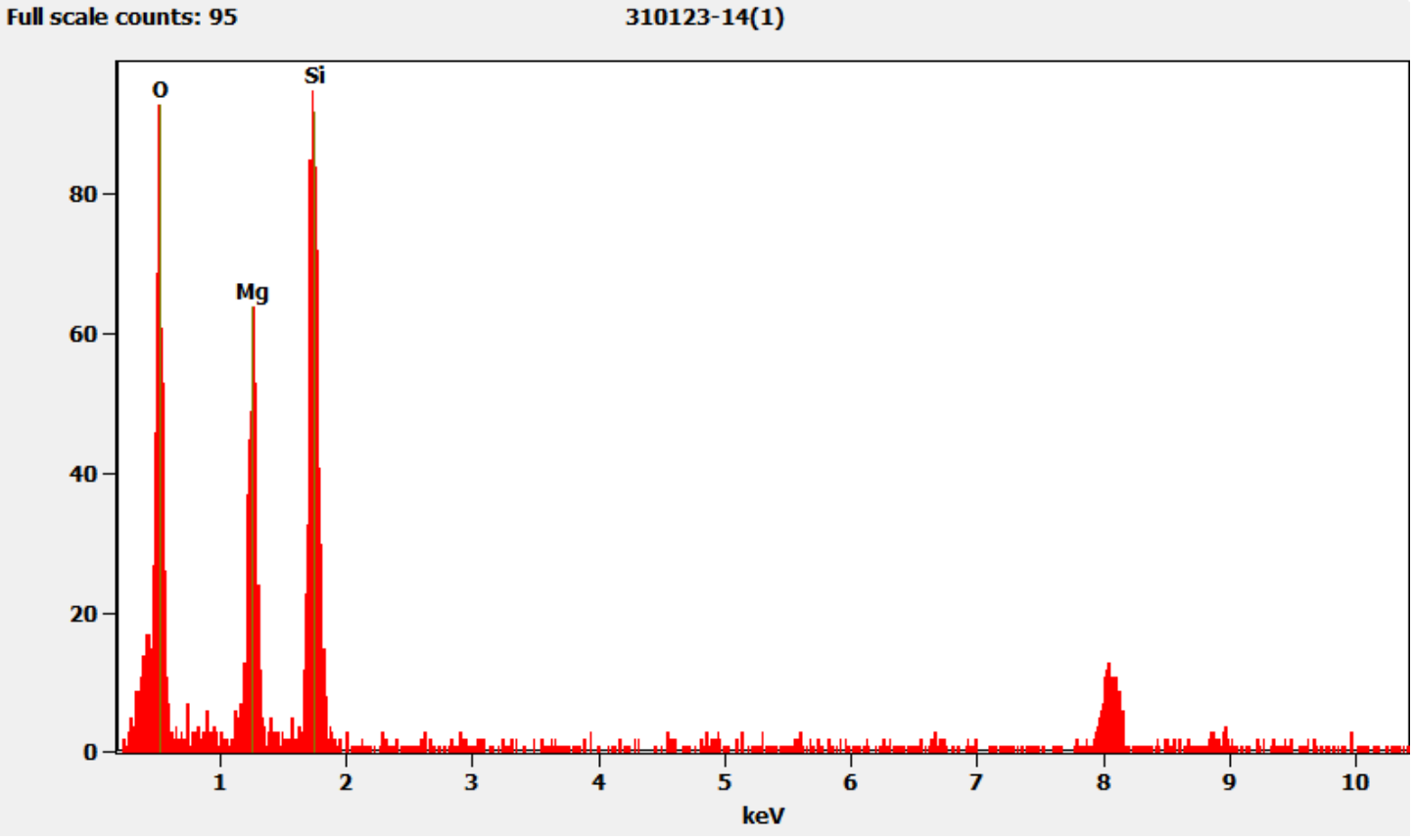
800 nm
HV=100kV
Direct Mag: 3600 x
AMA Analytical Services, Inc

Hexagonal Diffraction pattern from the Talc Fiber pictured above

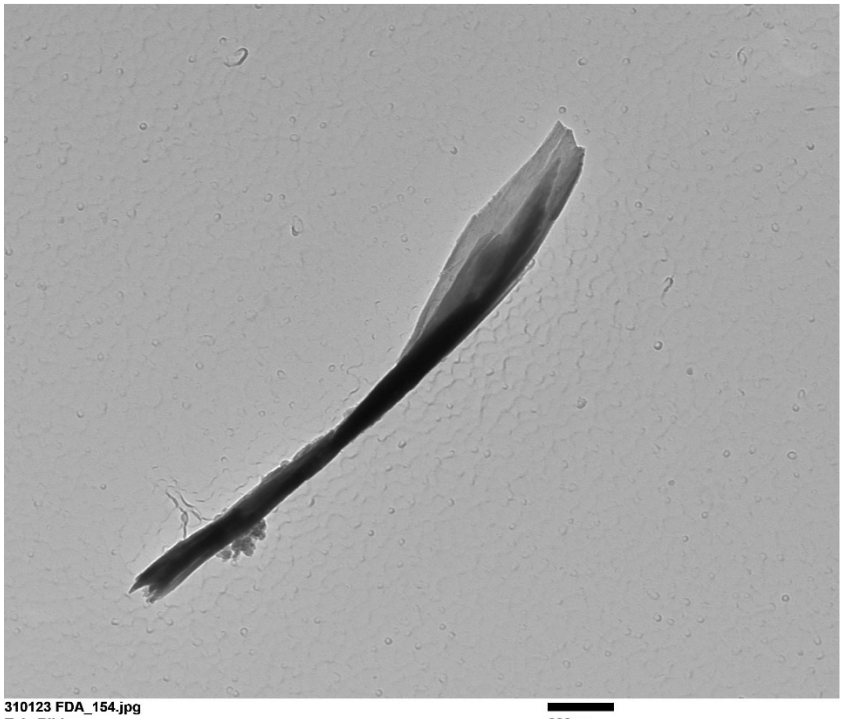
310123 FDA_148.jpg
Talc Fiber/Ribbon
310123-14
09:51 9/27/2019
TEM Mode: Diffraction
Microscopist:
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 std. frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

100 (1/Å)
HV=100kV
Cam Len: 0.2200 m
AMA Analytical Services, Inc

Chemistry from the Talc Fiber pictured above



Sample 310123-14, Talc Ribbon



310123 FDA_154.jpg
Talc Ribbon
310123-14
Cal: 0.001029 µm/pix
10:07 9/27/2019
TEM Mode: Imaging
Microscopist:
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 std. frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

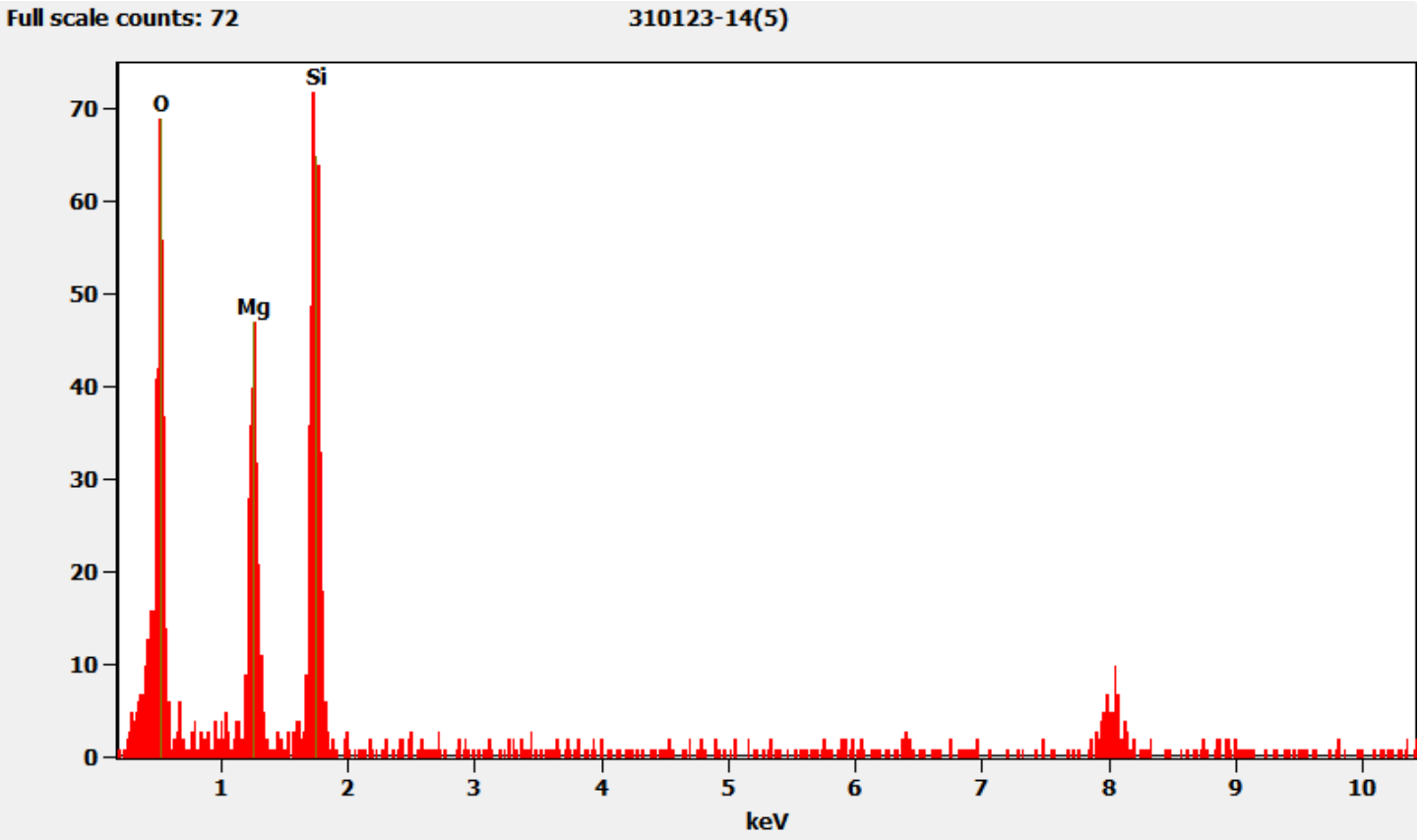
200 nm
HV=100kV
Direct Mag: 10000 x
AMA Analytical Services, Inc

Diffraction pattern from the Talc Ribbon pictured above

310123 FDA_153.jpg
Talc Ribbon Dif
310123-14
10:06 9/27/2019
TEM Mode: Diffraction
Microscopist:
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 std. frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

100 (1/Å)
HV=100kV
Cam Len: 0.2200 m
AMA Analytical Services, Inc

Chemistry from the Talc Ribbon pictured above



<u>310123-15, 15A, 15B, Client Sample D-82</u>

PLM

All three aliquots of sample D-82 were analyzed by (b) (6) on September 26, 2019. No asbestos or non-asbestos amphibole variants were detected the samples. The results were calculated using the equations detailed in the calculations section.

310123-15	NAD
310123-15A	NAD
310123-15B	NAD

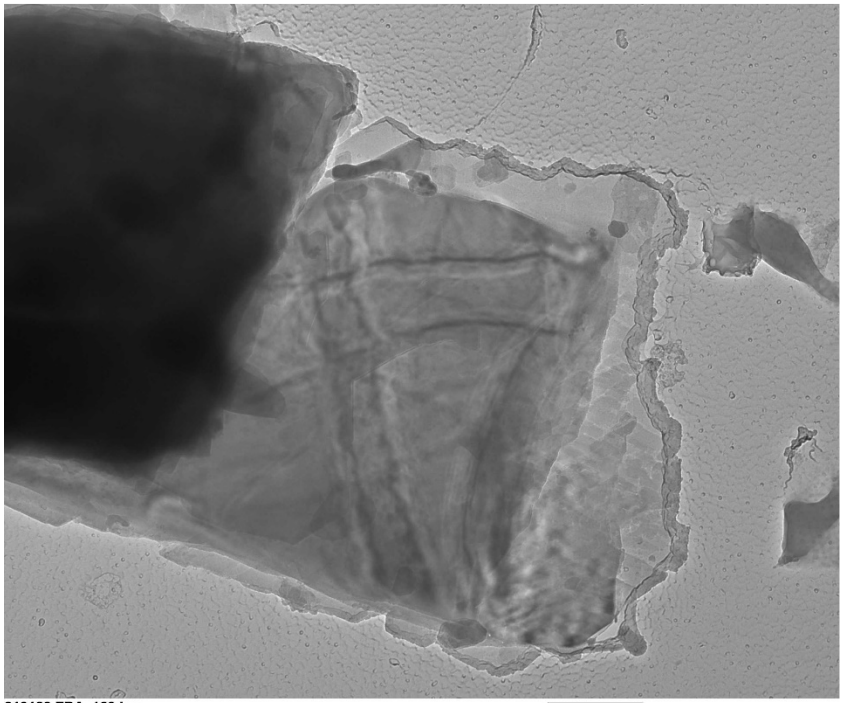
TEM

Sample 15 was analyzed by (b) (6) on September 27, 2019. (b) (6) analyzed samples 15A and 15B on September 30, 2019. The primary particle observed was mica along with titanium fibers, some silica particles and spheres, titanium particles, and a few mica fibers. No talc, asbestos or non-asbestos amphibole variants were detected in the samples. The results were calculated using the equations detailed in the calculations section.

310123-15	NAD
310123-15A	NAD
310123-15B	NAD

Below are pictures, diffraction patterns, and chemistry from some of the counted particles. The unidentified peaks in chemistry spectra are copper, zinc, and carbon. Those peaks are from the TEM specimen holder and specimen grid.

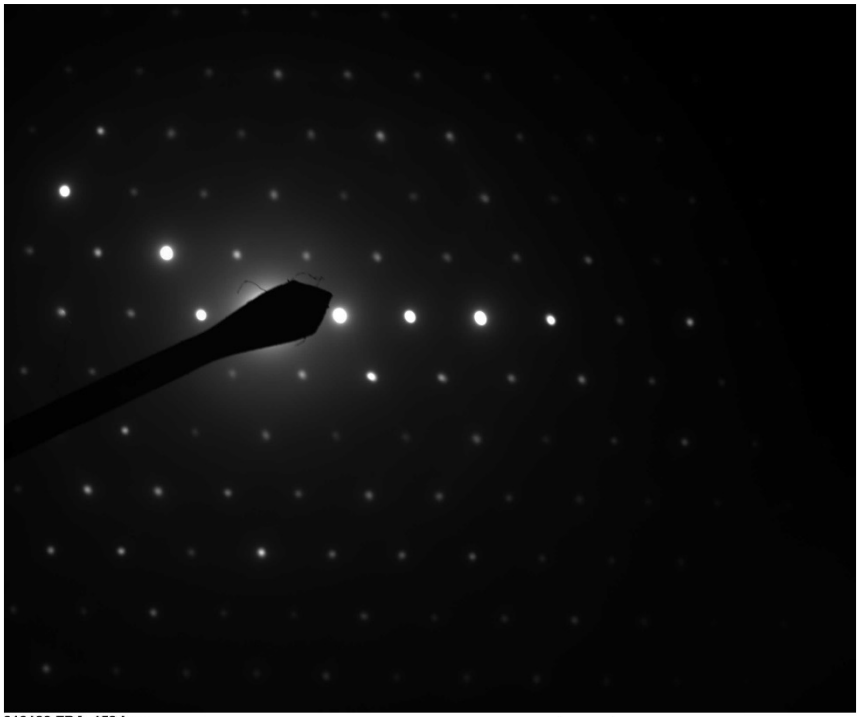
Sample 310123-15, Mica Particle



310123 FDA_160.jpg
Mica Particle
310123-15
Cal: 0.001774 µm/pix
11:34 9/27/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 std. frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

500 nm
HV=100kV
Direct Mag: 5800 x
AMA Analytical Services, Inc

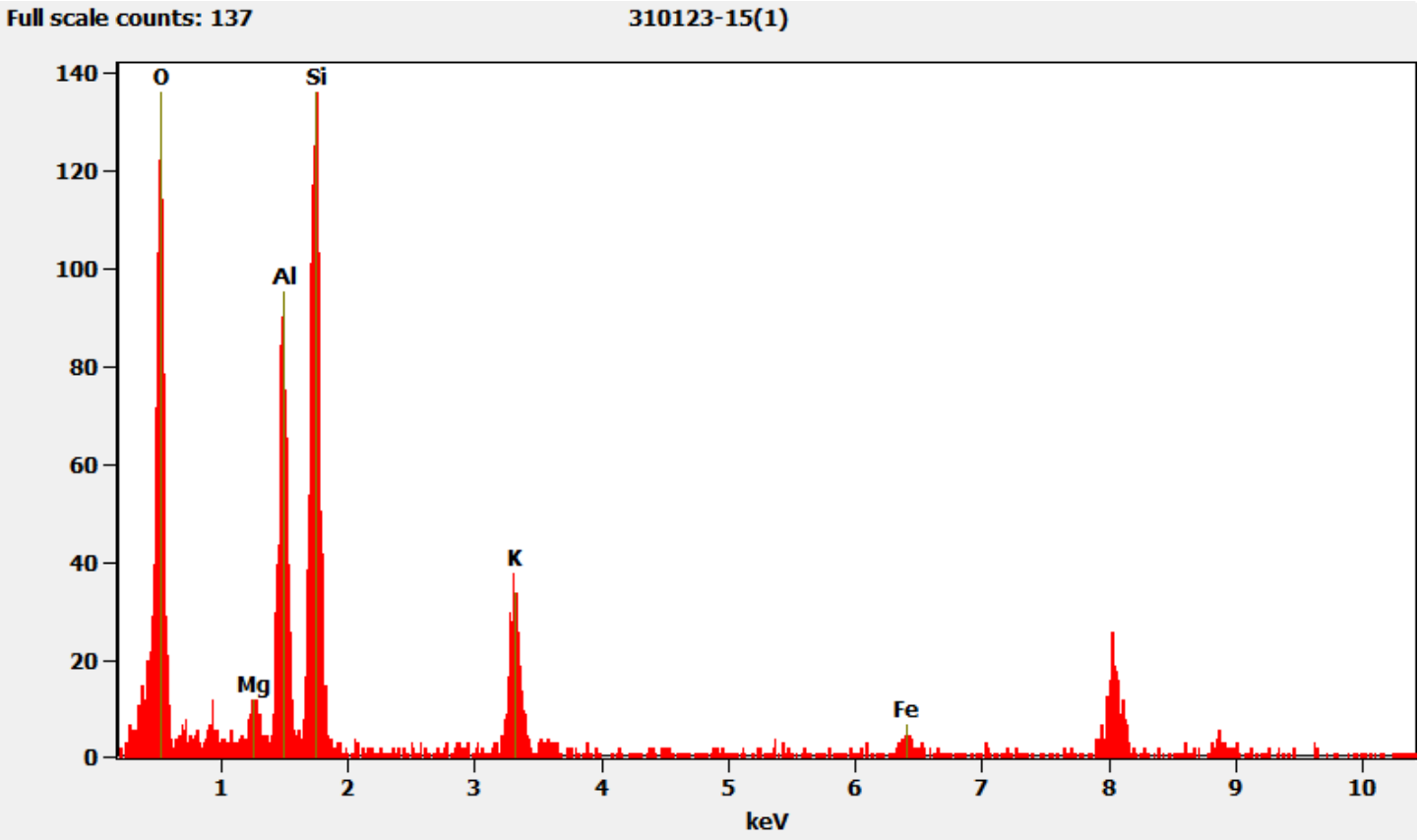
Diffraction from the Mica Particle pictured above.



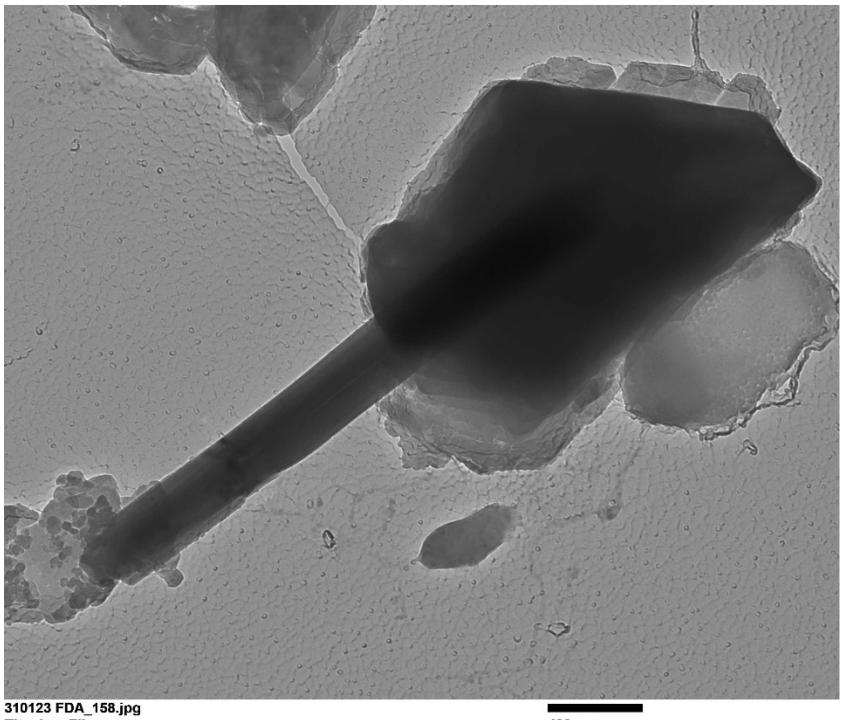
310123 FDA_159.jpg
Mica Dif
310123-15
11:33 9/27/2019
TEM Mode: Diffraction
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 std. frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

100 (1/Å)
HV=100kV
Cam Len: 0.2200 m
AMA Analytical Services, Inc

Chemistry from the Mica Particle pictured above.



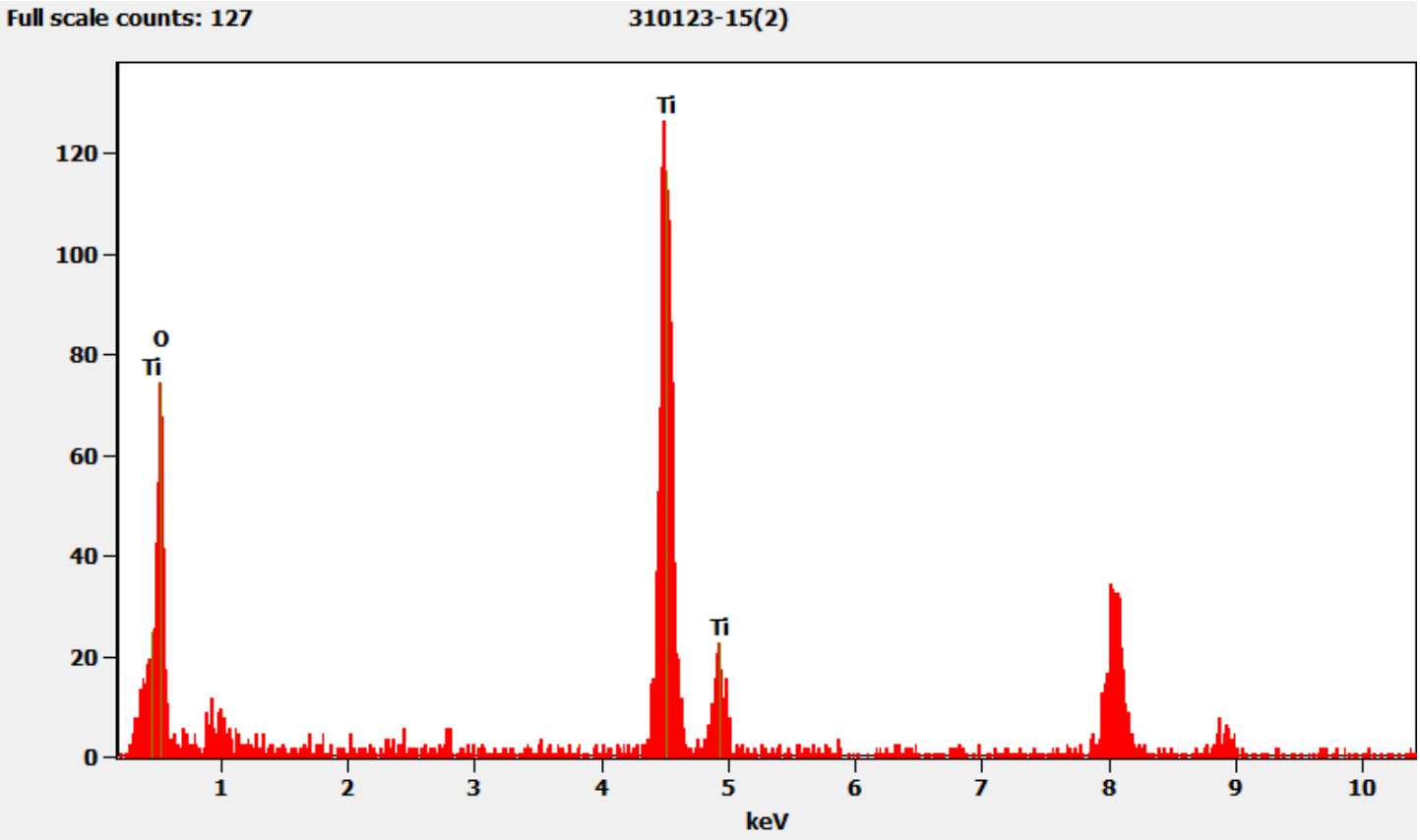
Sample 310123-15, Titanium Fiber



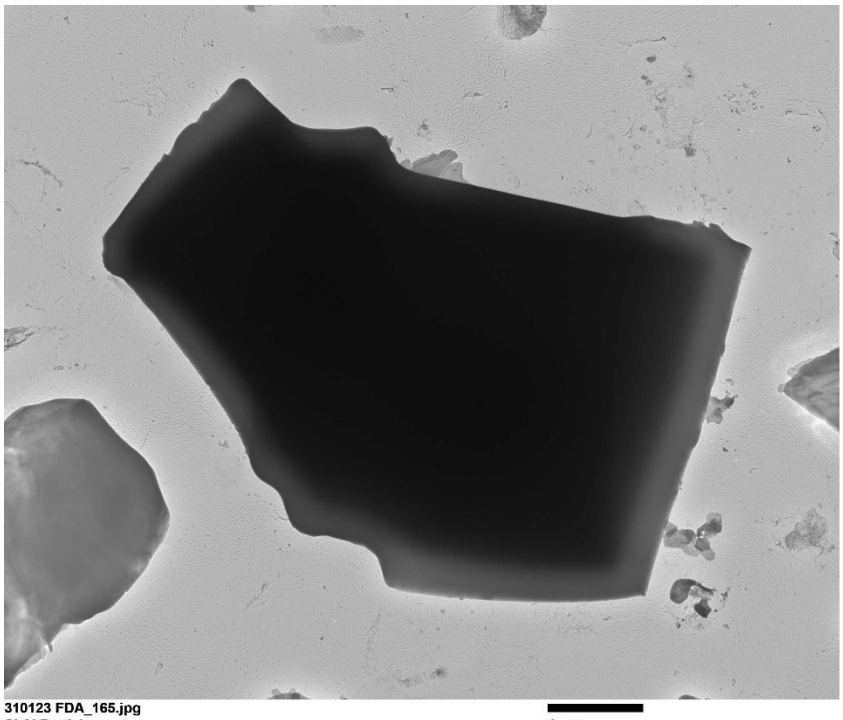
310123 FDA_158.jpg
Titanium Fiber
310123-15
Cal: 0.001429 µm/pix
11:31 9/27/2019
TEM Mode: Imaging
Microscopist:
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 std. frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

400 nm
HV=100kV
Direct Mag: 7200 x
AMA Analytical Services, Inc

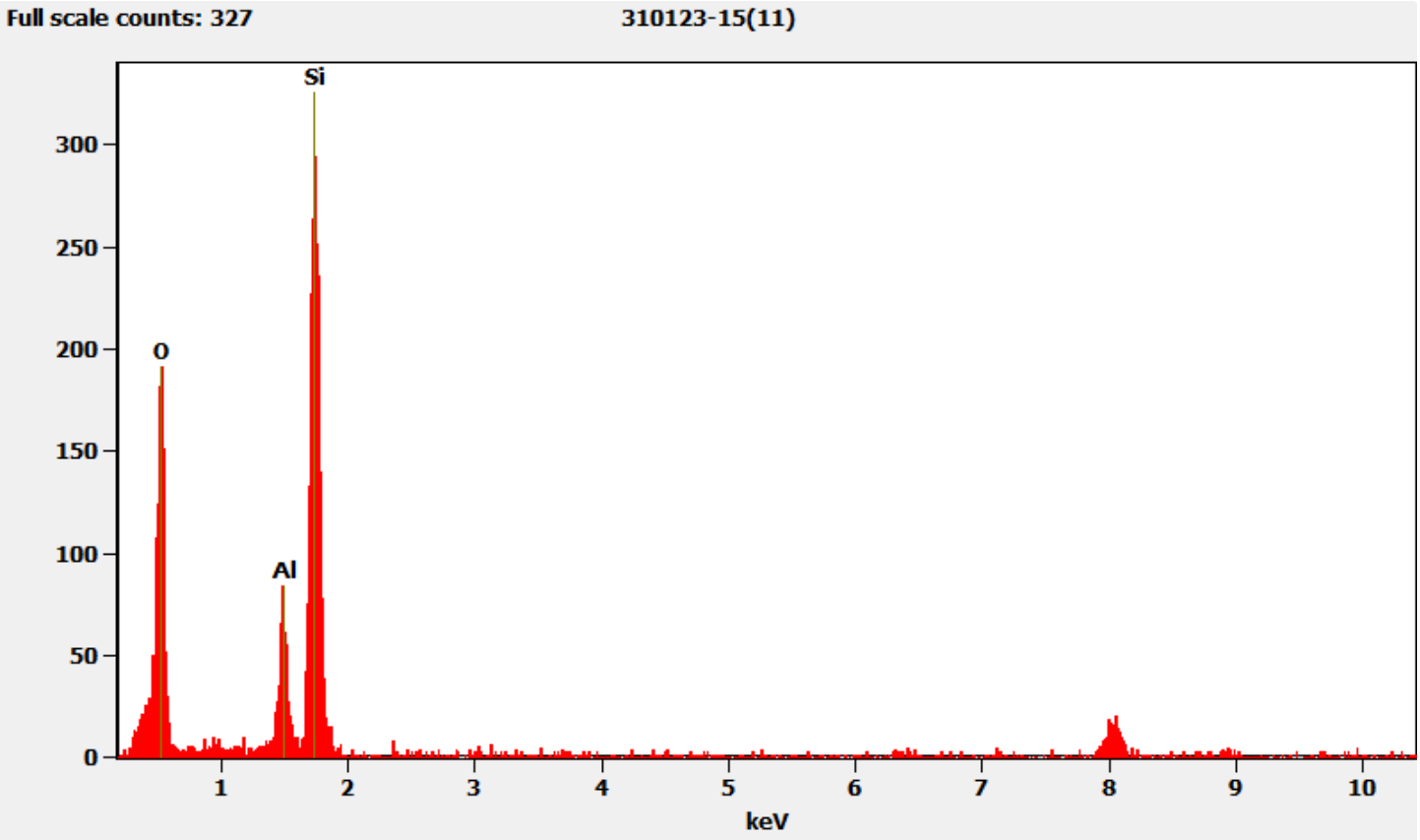
Chemistry from the Titanium Fiber pictured above



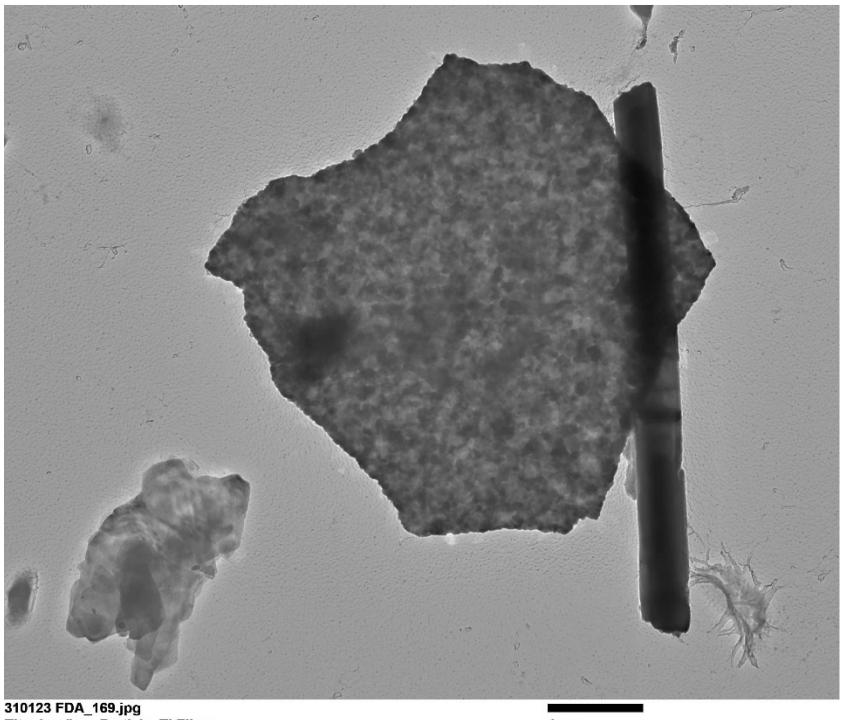
Sample 310123-15, Silica Particle



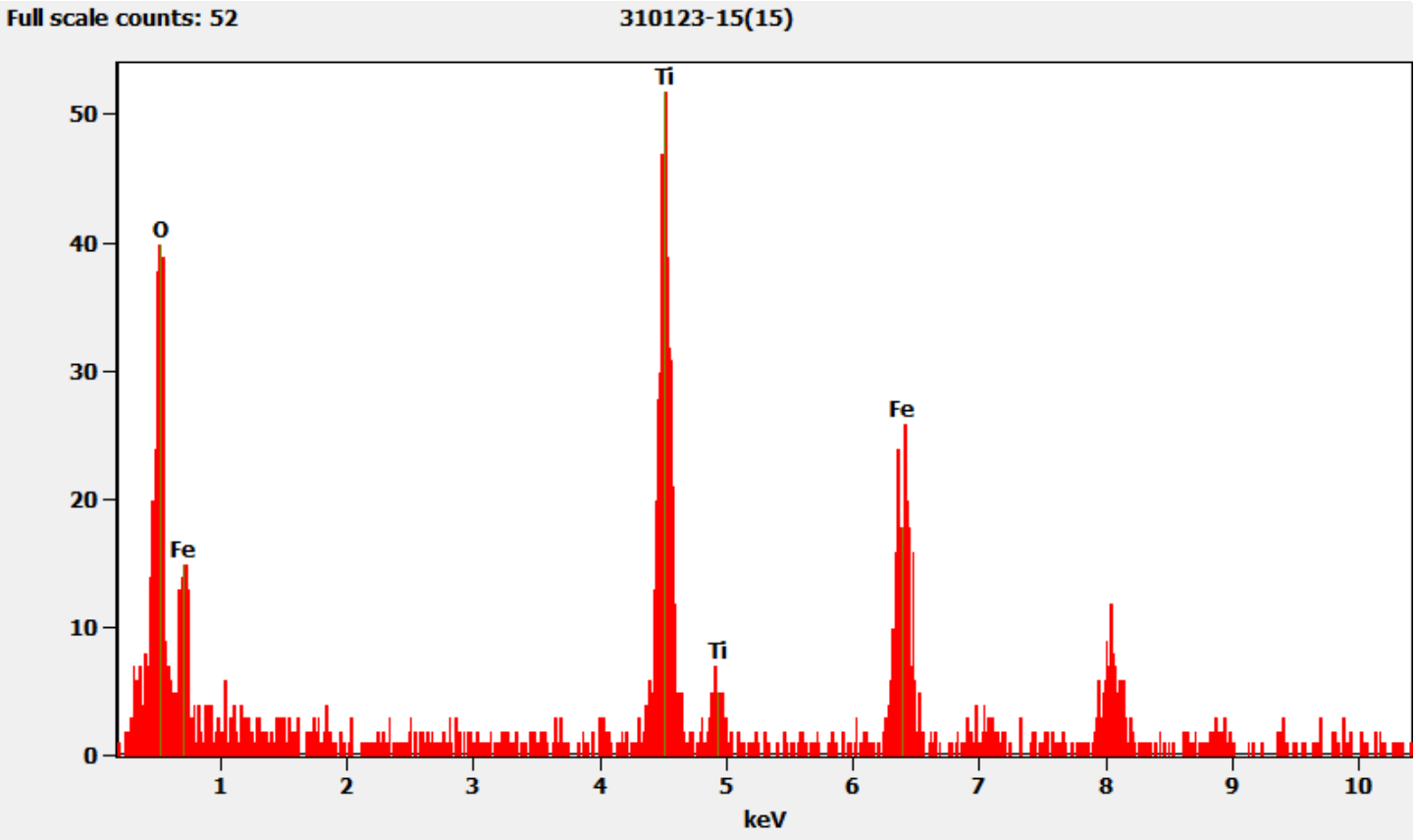
Chemistry from the Silica Particle pictured above



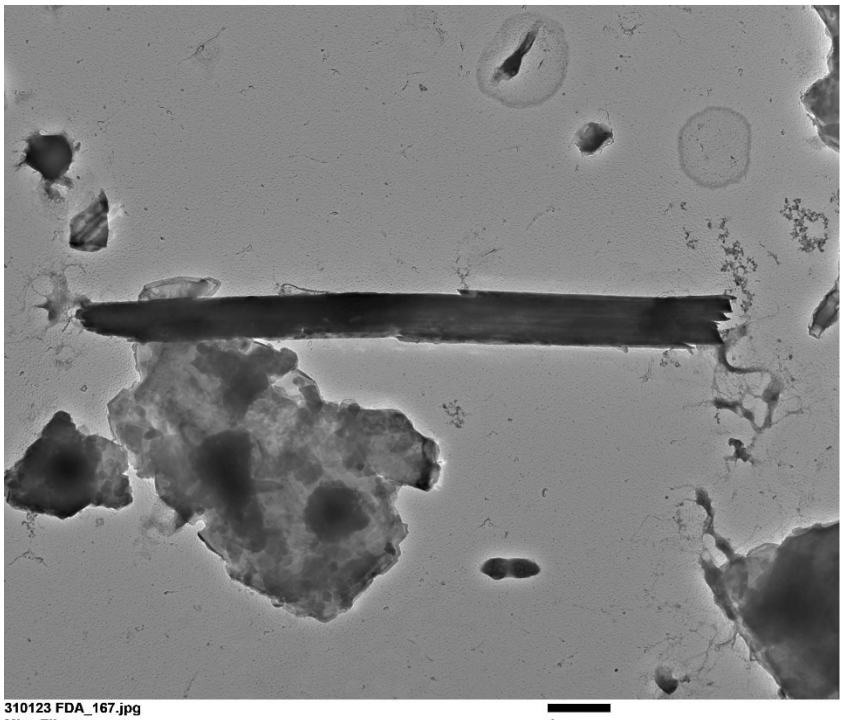
Sample 310123-15, Titanium Particle & Titanium Fiber



Chemistry from the Titanium Particle/Titanium Fiber pictured above



Sample 310123-15, Mica Fiber

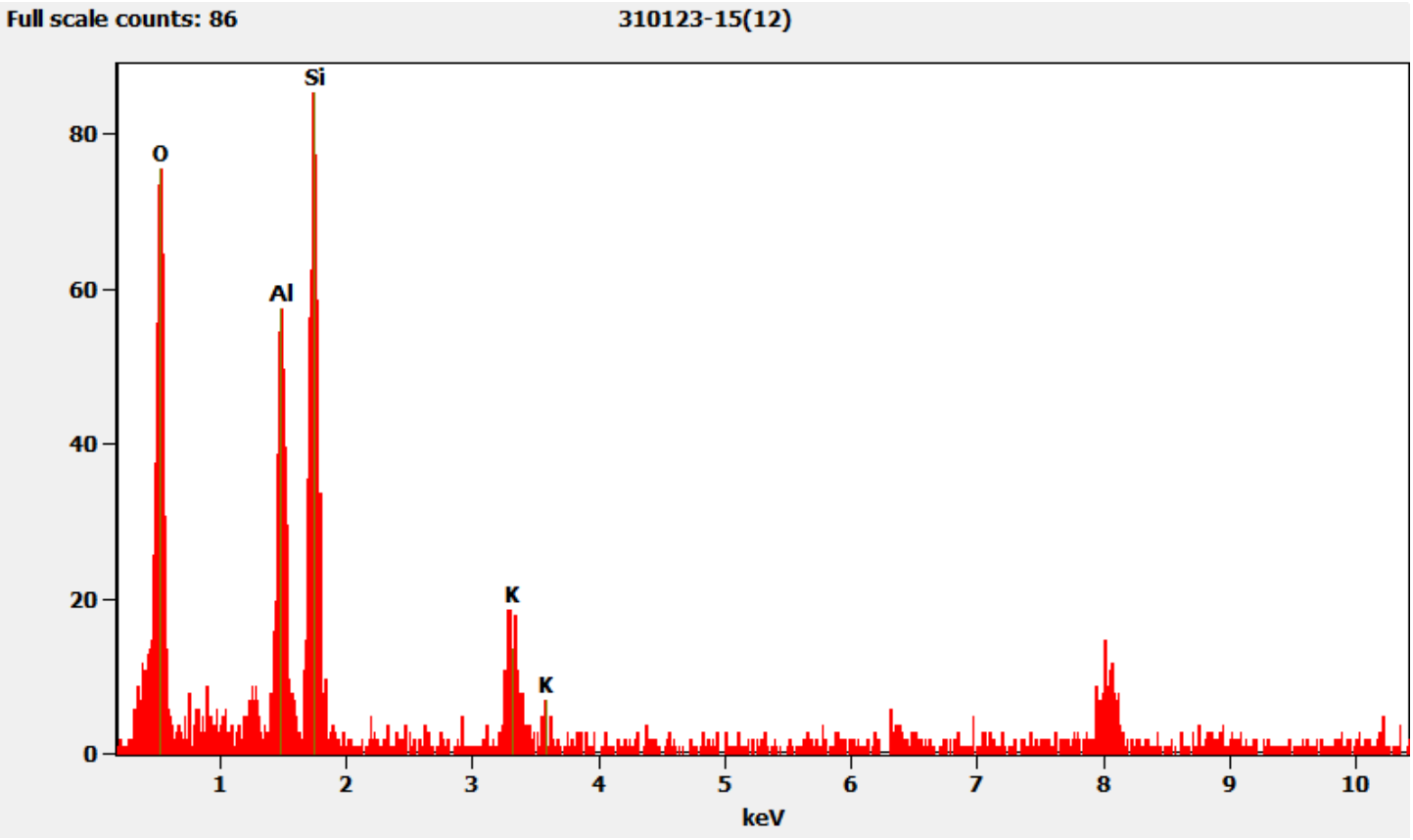


Diffraction pattern from the Mica Fiber pictured above

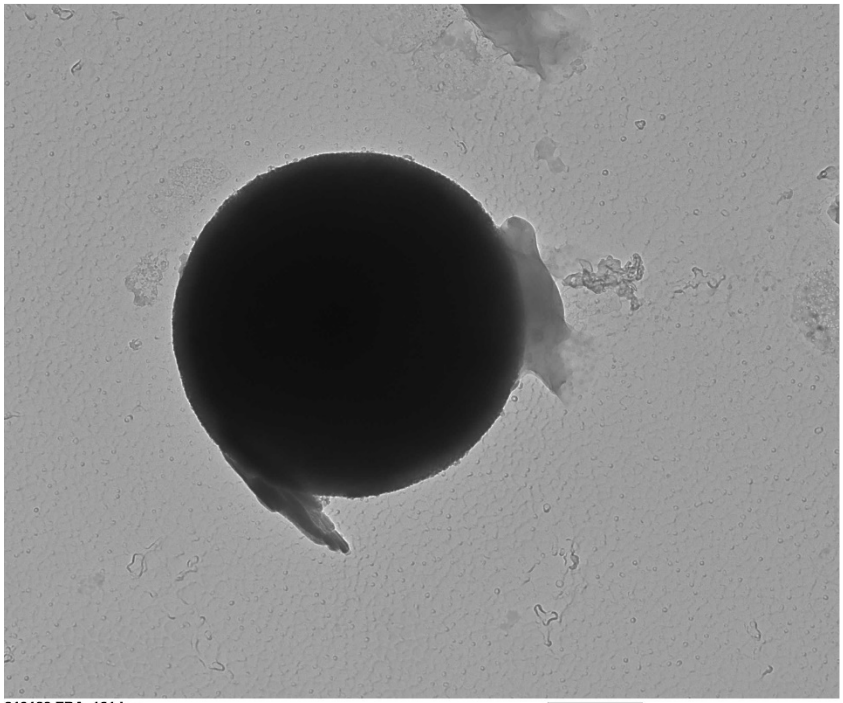
310123 FDA_166.jpg
Mica Fiber Dif
310123-15
12:28 9/27/2019
TEM Mode: Diffraction
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 std. frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

100 (1/Å)
HV=100kV
Cam Len: 0.2200 m
AMA Analytical Services, Inc

Chemistry from the Mica Fiber pictured above



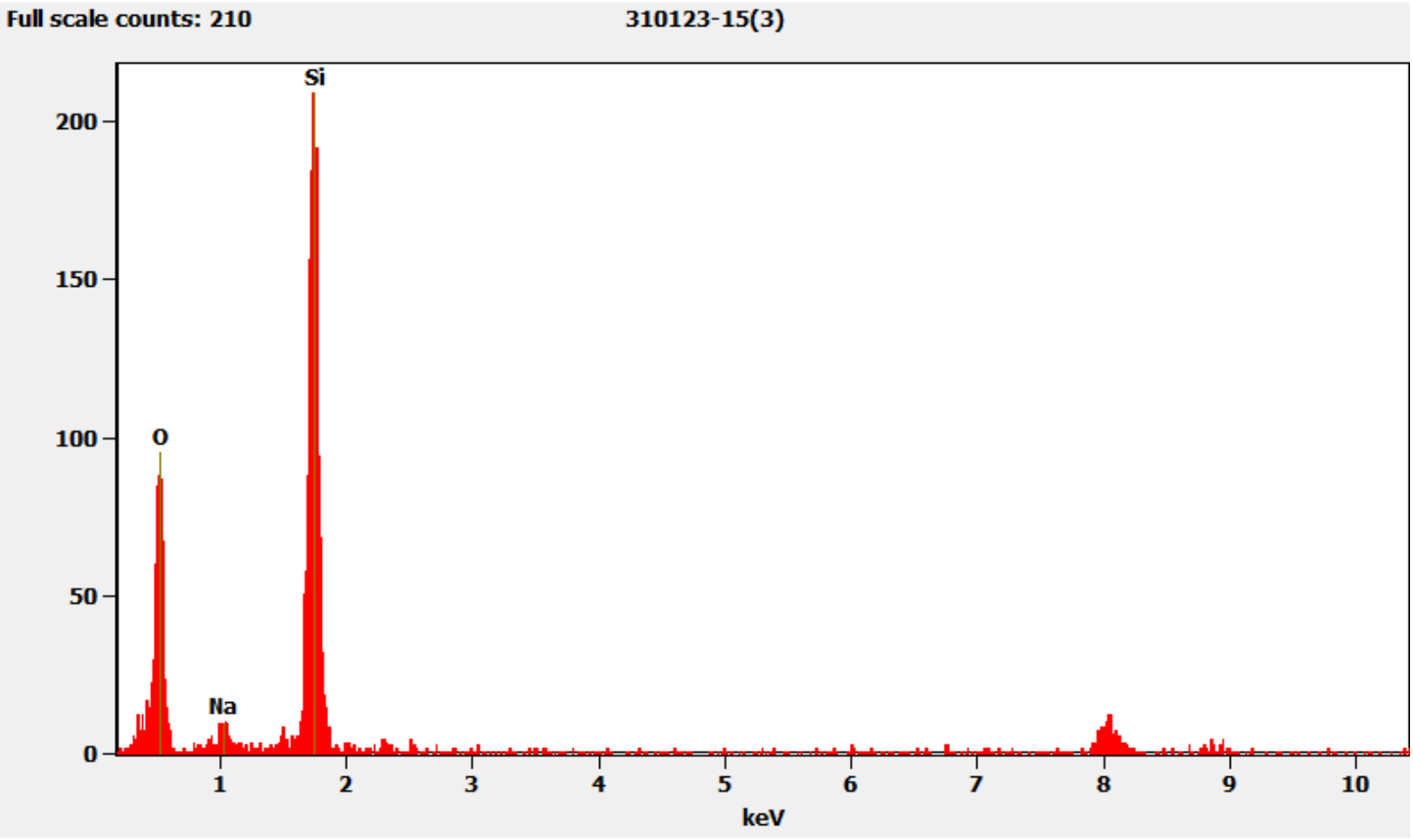
310123-15, Silica Sphere



310123 FDA_161.jpg
Silica Sphere
310123-15
Cal: 0.001429 µm/pix
11:39 9/27/2019
TEM Mode: Imaging
Microscopist: (b)
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 std. frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

400 nm
HV=100kV
Direct Mag: 7200 x
AMA Analytical Services, Inc

Chemistry from the Silica Sphere pictured above



QC Discussion:
During preparation, three blank control samples and one reference control sample were prepared. These samples were prepared alongside the customer samples. The blank samples were prepared using Sigma-Aldrich Talc Powder, <10 micron (Product No. 643604-500G; Batch No. 10830AJ) and were analyzed by (b) (6) on September 30, 2019. No asbestos was detected on the blank samples. The reference sample was made from the same Sigma-Aldrich talc powder spiked with 0.4% Chrysotile. The reference sample was analyzed by (b) (6) on September 30, 2019 and found to be within acceptable limits. Additionally, filter blanks were prepared with each batch of carbon coated filters. Filter blank number EB-54243 was associated with the carbon coating for sample 310123-4/D-71. Filter blank number EB-54249 was associated with the carbon coating for sample 310123-10A/D-77. No asbestos was detected on the filter blank samples.

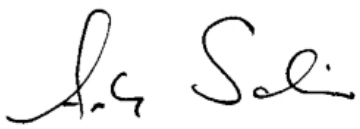
Our laboratory information management system (LIMS) randomly selected sample 310123-9/D-76 for additional duplicate QC analysis. Separate preparations were made for PLM and TEM analysis. The duplicate QC analysis was performed on September 26, 2019 for PLM and October 17, 2019 for TEM and were consistent with the original findings.

Our LIMS randomly selected 310123-14/D-82 for additional replicate QC analysis. Separate preparations were made for PLM and TEM analysis. The replicate QC analysis was performed by (b) (6) on September 26, 2019 for PLM and by (b) (6) on October 17, 2019 for TEM. The QC results were consistent with the original findings.

Attachments:
The following items are attached to this case narrative for your reference:

1) Sample Log-In Sheet
2) Daily PLM Scope Calibration Log
3) Refractive Index Oil Calibration Log
4) Daily TEM Scope Calibration Log
5) QC Results Summary
6) Replicate & Duplicate QC Chart for (b) (6) for samples analyzed between 1/1/2019 and 9/30/2019
7) Replicate & Duplicate QC Chart for (b) (6) for samples analyzed between 1/1/2019 and 9/30/2019
8) Replicate & Duplicate QC Chart for (b) (6) for samples analyzed between 1/1/2019 and 9/30/2019
9) Replicate & Duplicate QC Charge for (b) (6) for samples analyzed between 1/1/2019 and 9/30/2019
10) Raw Data Sheets
    a. Gravimetric Data
    b. Filtration Worksheets
    c. PLM Analysis
    d. TEM Analysis
    e. QC Samples

I certify that all information contained in this report pertaining to laboratory events, procedures, and protocols is true and accurately describes the handling of this project by AMA Analytical Services, Inc. and its personnel.



10/24/2019

Andreas Saldivar
Laboratory Director

Date