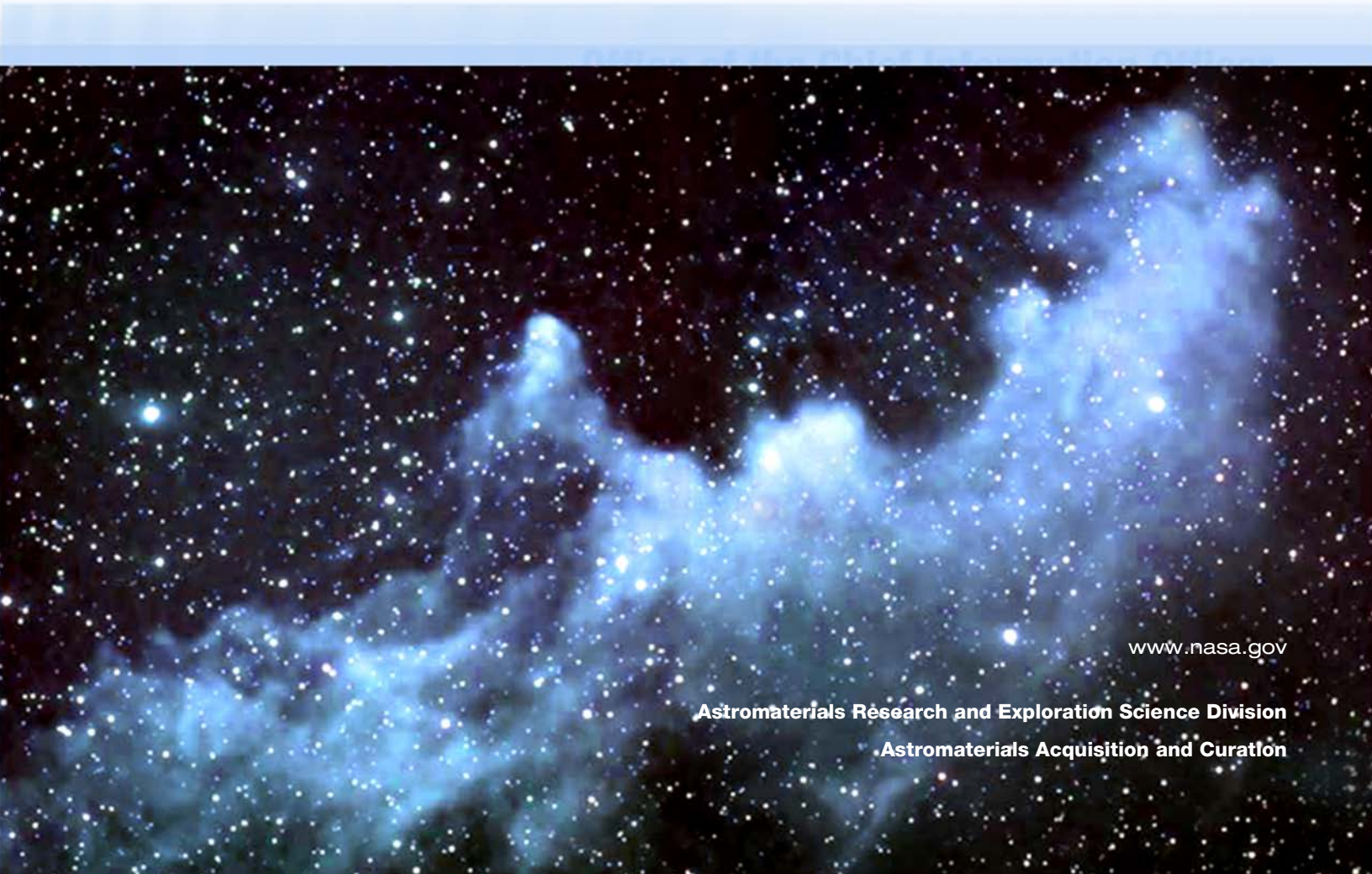




# Cosmic Dust Catalog Volume 21

Particles from Collectors L2098, L2099, L2100,  
L2101, L2103, and L2105



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Astromaterials Research and Exploration Science Division  
Astromaterials Acquisition and Curator



# Cosmic Dust Catalog

Volume 21

Particles from Collectors L2098, L2099, L2100,  
L2101, L2103, and L2105

Compiled By:

Cosmic Dust Preliminary  
Examination Team (CDPET)

K. McBride <sup>1</sup>

N.S. Todd <sup>1</sup>

R.K. Bastien <sup>1</sup>

M. Rodriguez <sup>1</sup>

E.L. Berger <sup>1</sup>

D.K. Ross <sup>2</sup>

M.E. Zolensky<sup>3</sup>

<sup>1</sup> Jacobs JETS Contract

<sup>2</sup> University of Texas, El Paso/  
Jacobs JETS Contract

<sup>3</sup> NASA Johnson Space Center  
Houston, TX 77058

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## Introduction

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Since May 1981, the National Aeronautics and Space Administration (NASA) has used aircraft to collect cosmic dust (CD) particles from Earth's stratosphere. Specially designed dust collectors are prepared for flight and processed after flight in an ultraclean (Class-100) laboratory constructed for this purpose at the Lyndon B. Johnson Space Center (JSC) in Houston, Texas. Particles are individually retrieved from the collectors, examined and cataloged, and then made available to the scientific community for research. Cosmic dust thereby joins lunar samples and meteorites as an additional source of extraterrestrial materials for scientific study.

This catalog summarizes preliminary observations on particles retrieved from collection surfaces L2098, L2099, L2100, L2101, L2103, and L2105. These surfaces were flat plate collectors which were coated with silicone oil (dimethyl siloxane) and then flown aboard NASA ER-2 aircraft during a series of flights as follows:

**L2098, L2099,  
L2100 & L2101**

Unspecified flight time during June 2015 over Southern California, S.F. Bay Area and Central California out over the Pacific Ocean

**L2103 & L2105**

60 hours of flight time during September 2016 for the Oracles ER-2 mission over Namibia, Africa

All of the collectors were installed in specially constructed wing pylons which ensured that the necessary level of cleanliness was maintained between periods of active sampling. During successive periods of high altitude (20 km) cruise, the collectors were exposed in the stratosphere by barometric controls and then retracted into sealed storage containers prior to descent.

## Processing of Particles

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Particle mounts designed for the JEOL 100CX scanning transmission electron microscope (STEM) are currently the standard receptacles for CD particles in the JSC laboratory. Each mount consists of a graphite frame (size ~3x6x24 mm) onto which a Nucleopore filter (0.4  $\mu\text{m}$  pore size) is attached. A conductive coat of carbon is vacuum evaporated onto the mount and then a microscopic reference pattern is "stenciled" onto the carbon-coated filter by vacuum evaporation of aluminum through an appropriately sized template. Particles are individually removed from collectors using glass-needle micromanipulators under a binocular stereo-microscope. Each particle is positioned on an aluminum-free area of a Freon-cleaned (Freon 113), carbon-coated filter and washed in place with hexane to remove silicone oil. Each mount is normally limited to 16 particles. All processing and storage of each particle is performed in a Class-100 clean room.

## Preliminary Examination of Particles

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Each rinsed particle is examined, before leaving the Class-100 clean room processing area, with a petrographic research microscope equipped with transmitted, reflected and oblique light illuminators. At a magnification of 200-500X, size, shape, transparency, color, and luster are determined and recorded for each particle.

After optical description, each mount (with uncoated particles) is examined by scanning electron microscopy (SEM) and X-ray energy-dispersive spectrometry (EDS). Secondary-electron imaging of each particle was performed with an ISI SEM at an accelerating voltage of 15 kV. Images are therefore of relatively low contrast and resolution due to deliberate avoidance of conventionally applied conductive coats (carbon or gold-palladium) which might interfere with later elemental analyses of particles. EDS data are collected with the same SEM. Using an accelerating voltage of 20 kV, each particle is raster scanned and its X-ray spectrum recorded over the 0-10 keV range by counting for 30 sec. No system (artifact) peaks of significance appear in the spectra.

## Catalog Format

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Each page in the main body of the catalog is devoted to one particle and consists of an SEM image, an EDS spectrum, and a brief summary of preliminary examination data obtained by optical microscopy. The unique identification number assigned to the particle appears at the top of the page. Sources of the descriptive data are as follows:

### Size

Size ( $\mu\text{m}$ ) is measured using the original SEM image and its known magnification factor. For an irregularly shaped particle, the minimum dimension in the plane of the field of view is located and determined; then a second (maximum) dimension is measured at a right angle to the first. For a spherical or equidimensional particle, only a single size is recorded.

### Shape

Shape is generalized to be spherical (S), equidimensional (E), or irregular (I).

### Transparency

Transparency is determined by optical microscopy to be transparent (T), translucent (TL), or opaque (O). Significant variations in transparency within a particle are annotated on the SEM image.

### Color

Color is determined by optical microscopy using oblique (fiber optic, quartz halogen) illumination supplemented with normal reflected (tungsten-lamp) illumination.

## Luster

Luster is determined by optical microscopy using reflected normal (tungsten lamp) illumination and supplemented with oblique (fiber optic, quartz halogen) illumination. Commonly applied descriptions, adopted from mineralogical usage, include Dull (D), Metallic (M), Submetallic (SM), Subvitreous (SV), and Vitreous (V). Lusters transitional between categories or difficult to identify are indicated accordingly (Dull/Submetallic, etc.).

## Type

Type indicates a provisional first order identification of each particle based on its morphology (from SEM image), elemental composition (from EDS spectrum), and optical properties. We emphasize that, for catalog purposes, types are defined for their descriptive and curatorial utility, not as scientific classifications. These tentative categorizations, which reflect judgments based on the collective experience of the CDPET, should not be construed to be firm identifications and should not dissuade any investigator from requesting any given particle for detailed study and more complete identification. The precise identification of each particle in our inventory is beyond the scope and intent of our collection and Curation program. Indeed, the reliable identification and scientific classification of cosmic dust is one of many important research tasks that we hope this catalog will stimulate. We indicate particle "TYPE" only to aid the users of this catalog (especially those new to small particle analysis) in distinguishing possible cosmic dust particles from other particles which are invariably collected during stratospheric dust sampling.

In this catalog, particles are organized according to their type. Categories used in this catalog are defined as follows:

### **Cosmic (C)**

Interplanetary dust (variety unspecified) or other extraterrestrial material. In the strict sense, "Cosmic Dust" refers only to those particles which have not been modified during passage from interplanetary space to Earth's stratosphere. In this catalog, though, particle type "Cosmic" is used to conveniently group together all particles which are judged to be of extraterrestrial origin, including those that have apparently experienced strong ablatational heating or melting.

Type "Cosmic" particles are provisionally identified as those having one of the three following sets of attributes:

- a) Irregular to spherical, opaque, dark-colored particles composed mostly of Fe with minor S and/or Ni.
- b) Irregular to spherical, translucent to opaque, dark-colored particles containing various proportions of Mg, Si, and Fe with traces of S and/or Ni.
- c) Irregular to faceted or blocky, transparent to translucent particles containing mostly Mg, Si, and Fe but with traces S and/or Ni.

Category (a) and (b) particles commonly display either complex, porous aggregate-type morphologies or distinctively spherical shapes and dull to metallic lusters which distinguish them from terrestrial minerals. Their EDS spectra are reminiscent of those exhibited by meteoritic Fe-NiS minerals, or combinations of Fe-Ni-S phases with olivine and/or pyroxene. Category (c)



particles display morphologies and EDS spectra which suggest that they are fragments of olivine or pyroxene crystals, neither of which are significant components of stratospheric volcanic ash. Particles which do not fall easily into categories (a), (b), or (c) but which possess some of the same attributes may be classified here as “C?” or “Possibly Cosmic”.

**Artificial  
Terrestrial  
Contamination  
(TCA)**

Particles included in the “TCA” category are commonly irregular in shape (though a few may be spherical) and may be transparent, translucent, or opaque. Their EDS spectra commonly show Al, Fe, or Si as the principal peaks but with a variety of minor peaks including those of Cd, Ti, V, Cr, Mn, Ni, Cu, or Zn, and at abundances that are frequently much greater than those expected in common minerals. However, such compositions are similar to those expected for certain metal alloys.

In some cases, a high intensity (relative to intensities of characteristic X-ray peaks) of continuum radiation occurs in the EDS spectrum, suggesting that low atomic number elements not detectable by the EDS (e.g., H, C, N, O) are abundant in the particle. Such “TCA” particles are tacitly inferred to be synthetic carbon based materials. (This category probably includes particles produced by or derived from aircraft operation or collector hardware, or possibly spacecraft debris. However, some of these particles are worthy of additional research and may represent true extraterrestrial “low-Z” material).

**Natural  
Terrestrial  
Contamination  
(TCN)**

“TCN” particles may be transparent to opaque and may exhibit a variety of colors. However, they are commonly irregular in shape and distinctively rich in Si and Al with minor abundances of Na, K, Ca, or Fe. Some Fe-S particles are classified as TCN despite the fact that they may well be extraterrestrial. This action is due to the lack of conclusive investigations regarding these particular particles. Many particles containing only low-Z elements are also classified as TCN for the same reason.

Morphologies and EDS spectra of most “TCN” particles compare favorably with respective properties of silica polymorphs, feldspar, or silicic volcanic glass, three materials that are principal components of stratospheric volcanic ash. In addition, platy or porous aggregate-type particles of light color and Si, Al-rich composition may be silicic clay minerals, common phases in Earth's surface soils. Irregular, reddish Fe-rich particles may also be products of terrestrial rock weathering.

Recognition of these and other phases as “TCN” particles is based mostly on CDPET's collective mineralogical experience and comparison with reference samples. Less commonly, the “TCN” category may include distinctive particles with apparently non-random shapes which are rich in low atomic number elements (as inferred from their EDS spectra having high levels of continuum x radiation and relatively small peaks for characteristic X-rays). Those rare particles are distinguished from “TCA” particles by their unusual, organized morphologies and probably represent biological contaminants.



**Aluminum or  
Aluminum Oxide  
Sphere  
(AOS)**

An AOS particle is transparent, subvitreous, vitreous to metallic in luster, colorless to pale yellow, and at least approximately spherical. However, shape may range from nearly perfect sphericity to pronounced ellipticity and surface texture may range from very smooth to rough. Other spheres or irregularly shaped material may be attached to its surface. Al is the distinctively dominant (or only) peak in its EDS spectrum. A sphere displaying the attributes of an AOS except with major elements in addition to Al may be listed as "AOS?" or "?". Transparent Al rich particles of irregular shape would probably be listed as "TCA". Most AOS particles are products of solid fuel rocket exhausts.

Again, this system for provisional classification of particles is presented only as a first order attempt to distinguish particles which are probably extraterrestrial in origin from those which are probably contaminants. All particles will require careful research examination before they can be satisfactorily identified.

### Comments

Comments are included for particles with special features or histories. Any large "cluster" particles, which have broken apart on the collector, have small portions present in the catalog as different "sibling" grains; the comments reflect these relationships. For example, any particle with a cluster number designation in the comments field represents a much larger parent particle remaining on the collection plate, which is also available for allocation in part or in whole.

## Sample Requests

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Scientists desiring to perform detailed research on particles described in this catalog should apply in writing to:

**Curator, Cosmic Dust Program**  
 NASA Johnson Space Center  
 Code X12  
 Houston, Texas 77058 U.S.A.  
 Telephone: (281) 483-5128  
 FAX: (281) 483-5347

Sample requests should refer to specific particle identification numbers and should describe the research being proposed as well as the qualifications and facilities of the investigator making the request. Publication reprints are frequently useful in sample allocation considerations. Additionally, requests for particles not yet passed through preliminary examination will be considered if the requester can demonstrate a strong need for them. NASA will arrange for a review of the scientific merits of each request and will inform the requester of the results.

Approval of a sample request does not imply or include funding for the proposed research. Questions about NASA funding should be directed to:

**Discipline Scientist, Cosmochemistry Program**

NASA Headquarters  
Code SL  
Washington, DC 20546 U.S.A.

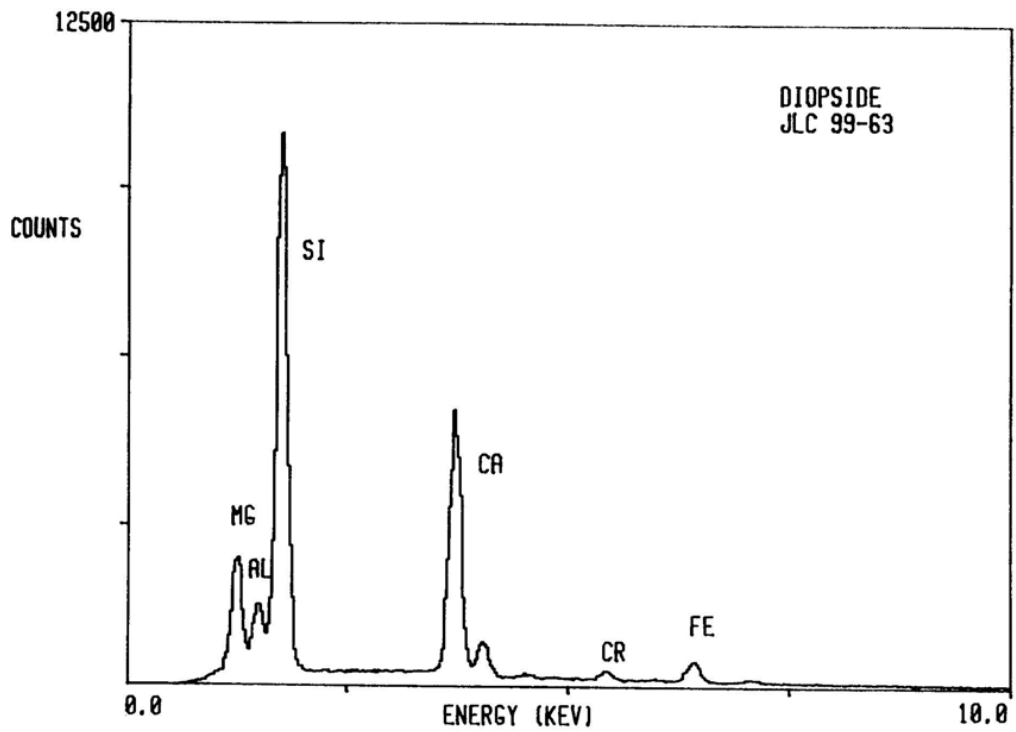
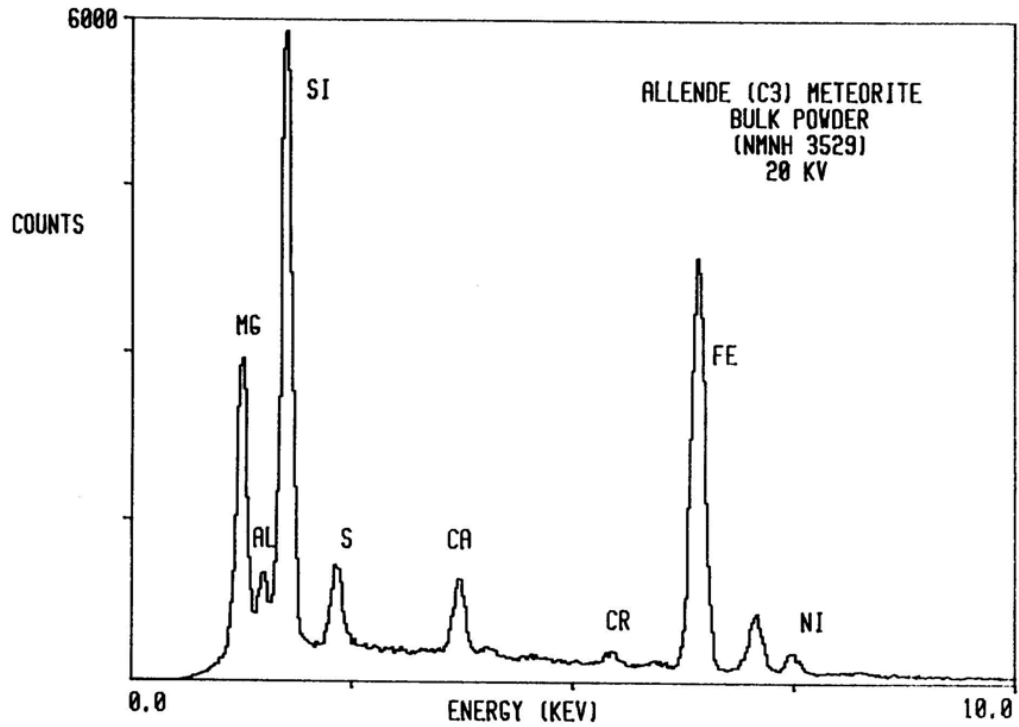
Although foreign scientists are welcome to request samples, NASA cannot provide funds to be spent outside the U.S.A. by citizens of other countries.

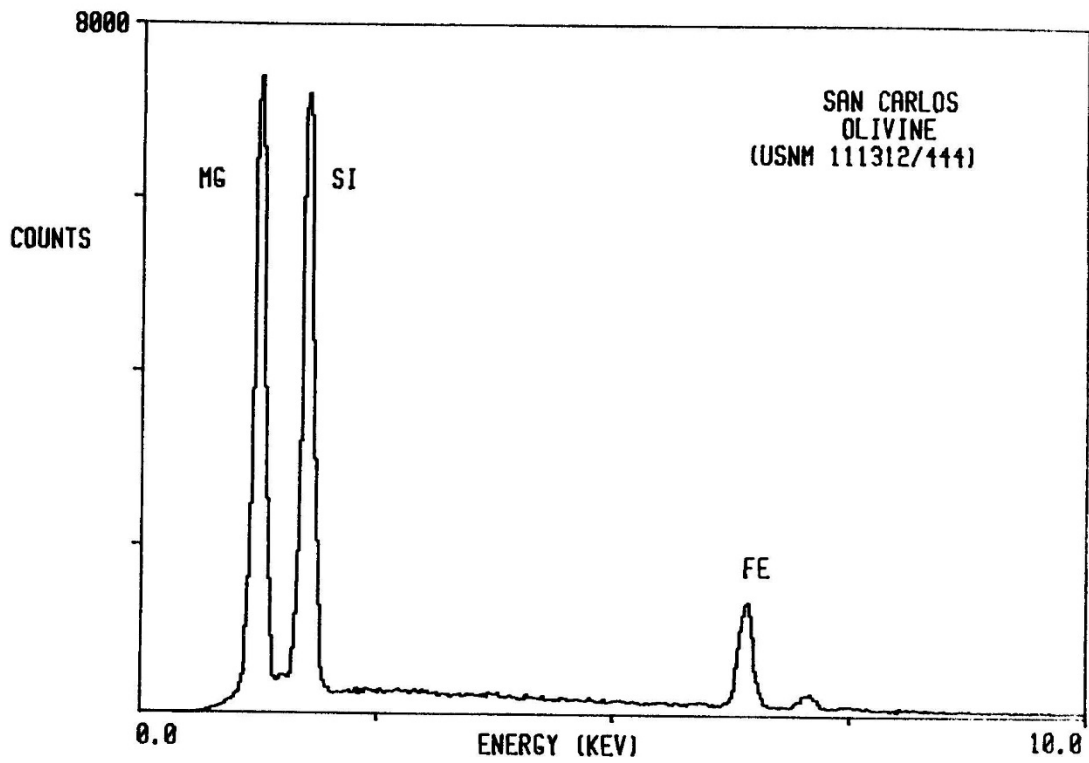
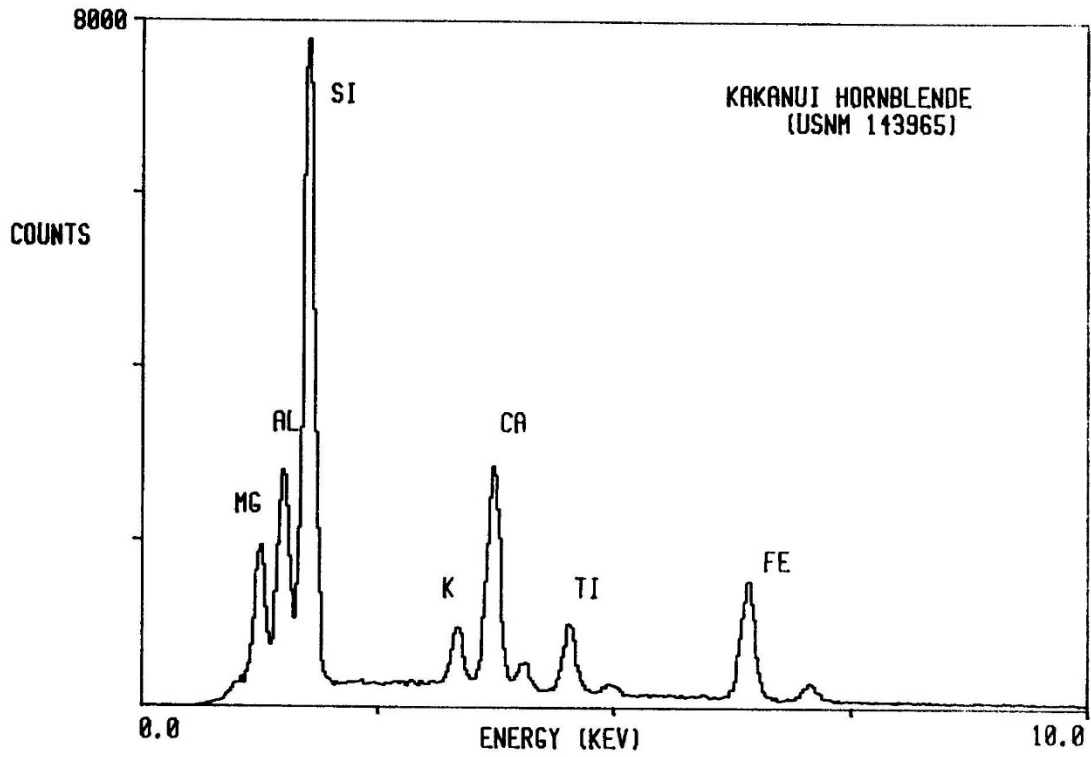
## **Acknowledgements**

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The ER-2 flight personnel at NASA Dryden Research Center performed the loading and unloading of the cosmic dust collectors on the ER-2 aircraft and provided flight log data and other critical assistance.

## Standard Spectra





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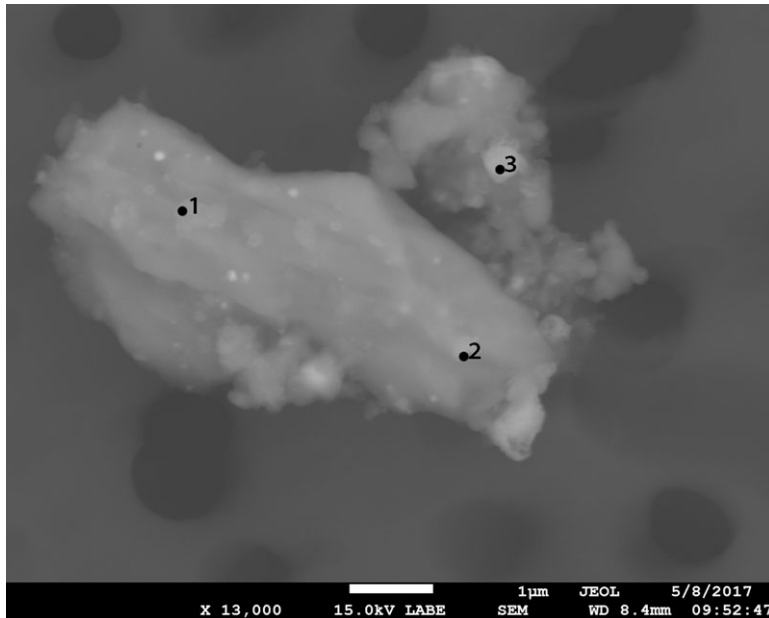
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# Particle Descriptions

## Cosmic and Possibly Cosmic Samples (C and C? Types)

## L2098 A1



<b>Particle Size:</b>	5 µm
<b>Shape:</b>	Equidimensional to Irregular
<b>Transparency:</b>	Opaque
<b>Color:</b>	BLACK
<b>Luster:</b>	Dull
<b>Particle Type:</b>	COSMIC
<b>Cluster No.:</b>	L2098 Cluster 1
<b>Comments:</b>	

SEM Photo of sample L2098 A1 with labeled EDS testing locations.

### Cluster of Origin: L2098 Cluster 1

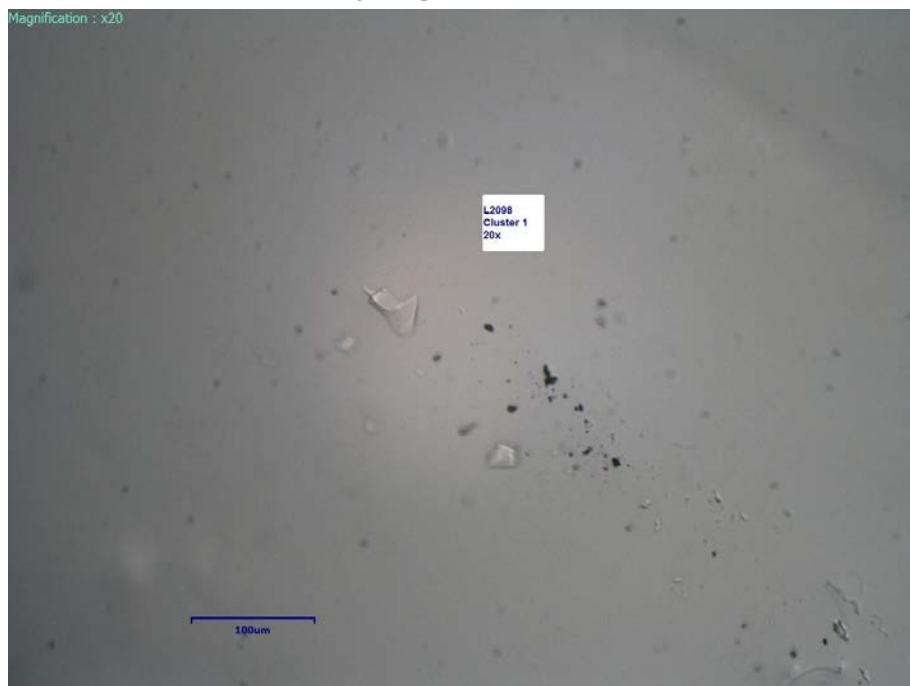


Photo of cluster L2098 Cluster 1.

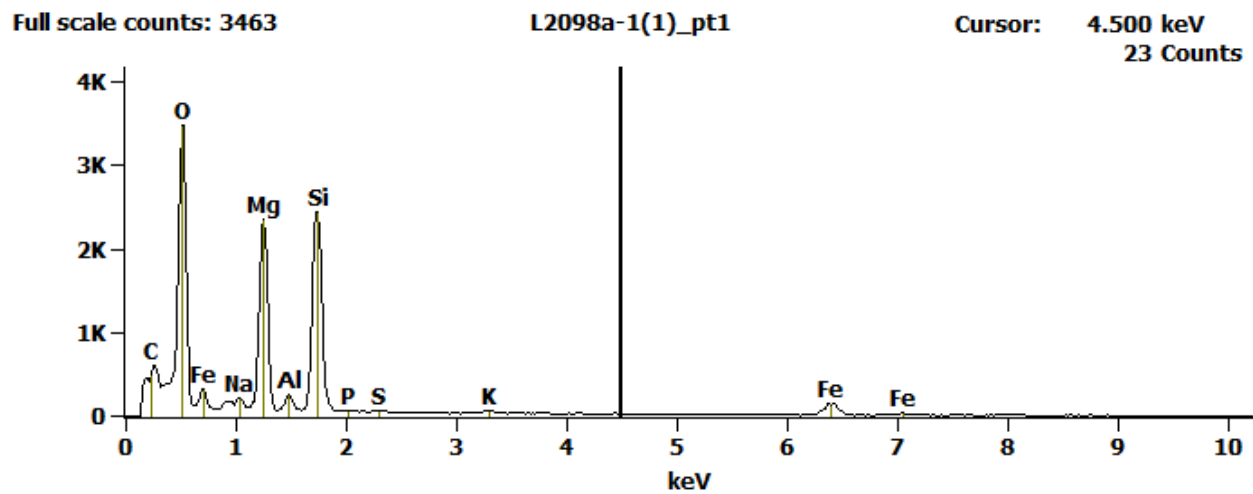
*L2098 A1 - EDS Spectra*

Figure 1. EDS Spectra for sample L2098-A-1 taken at test area 1. The test area is labeled in the particle SEM photo..

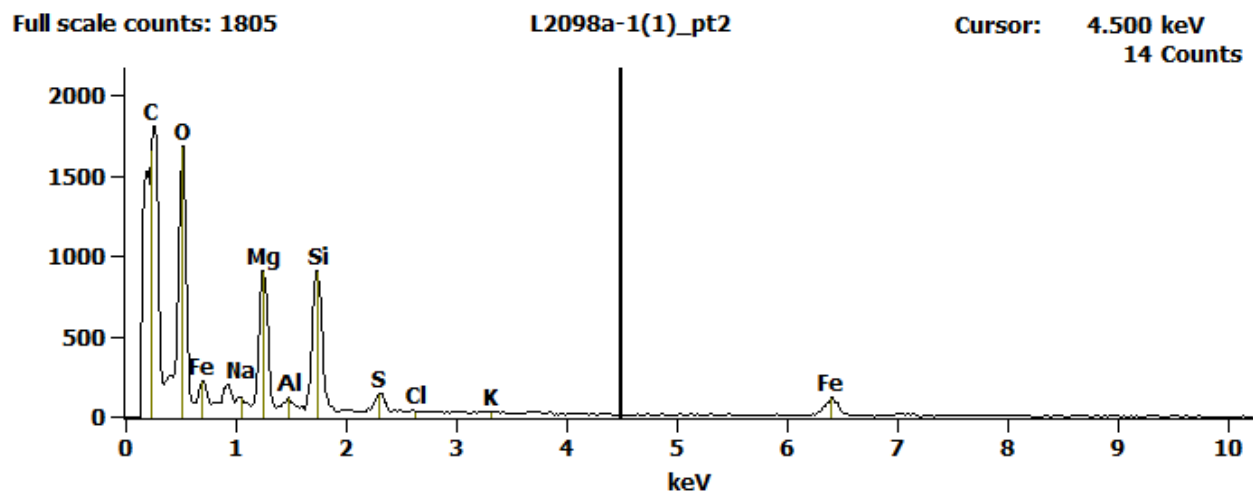


Figure 2. EDS Spectra for sample L2098-A-1 taken at test area 2. The test area is labeled in the particle SEM photo..

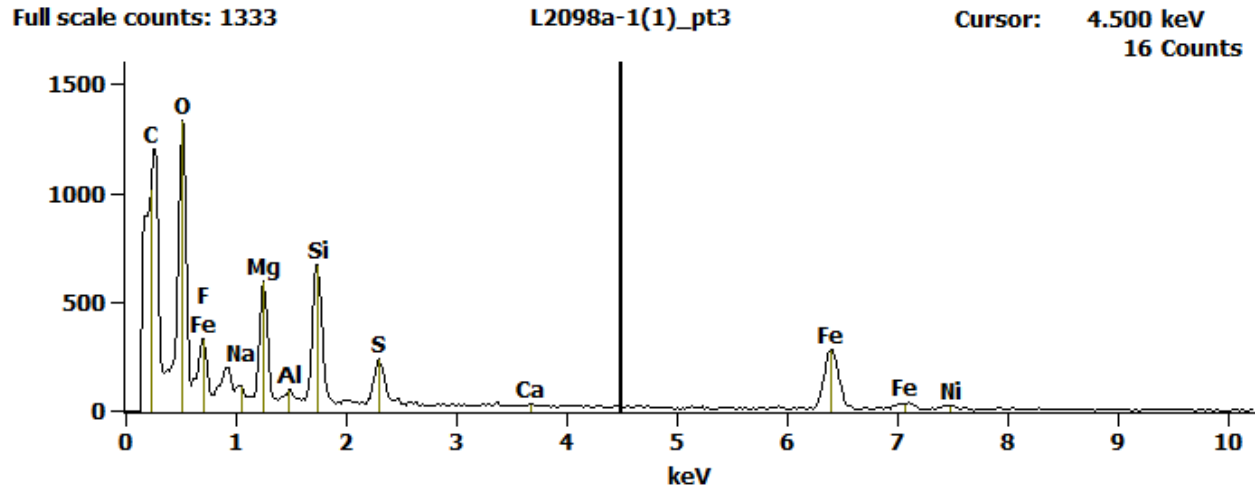
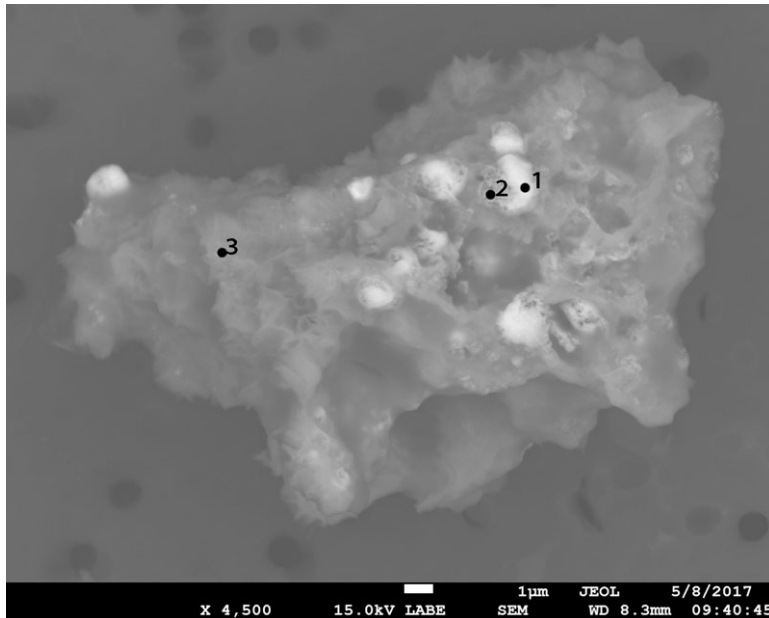


Figure 3. EDS Spectra for sample L2098-A-1 taken at test area 3. The test area is labeled in the particle SEM photo..

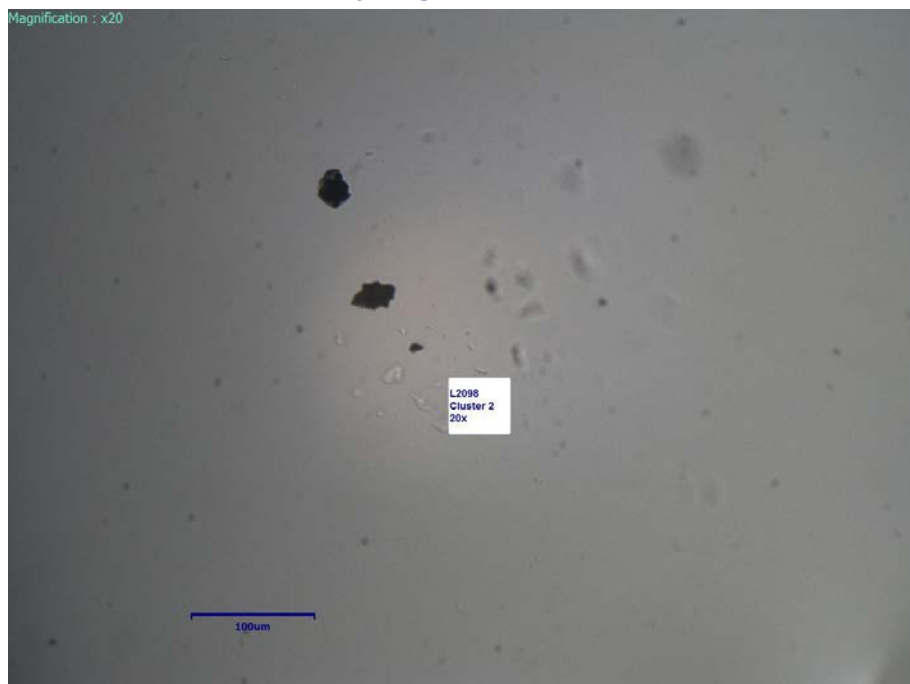
## L2098 A2



<b>Particle Size:</b>	21x18 µm
<b>Shape:</b>	Equidimensional to Irregular
<b>Transparency:</b>	Opaque
<b>Color:</b>	BLACK
<b>Luster:</b>	Dull
<b>Particle Type:</b>	COSMIC
<b>Cluster No.:</b>	L2098 Cluster 2
<b>Comments:</b>	

*SEM Photo of sample L2098 A2 with labeled EDS testing locations.*

### *Cluster of Origin: L2098 Cluster 2*



*Photo of cluster L2098 Cluster 2.*

*L2098 A2 - EDS Spectra*

Full scale counts: 1504

L2098a-2(1)\_pt1

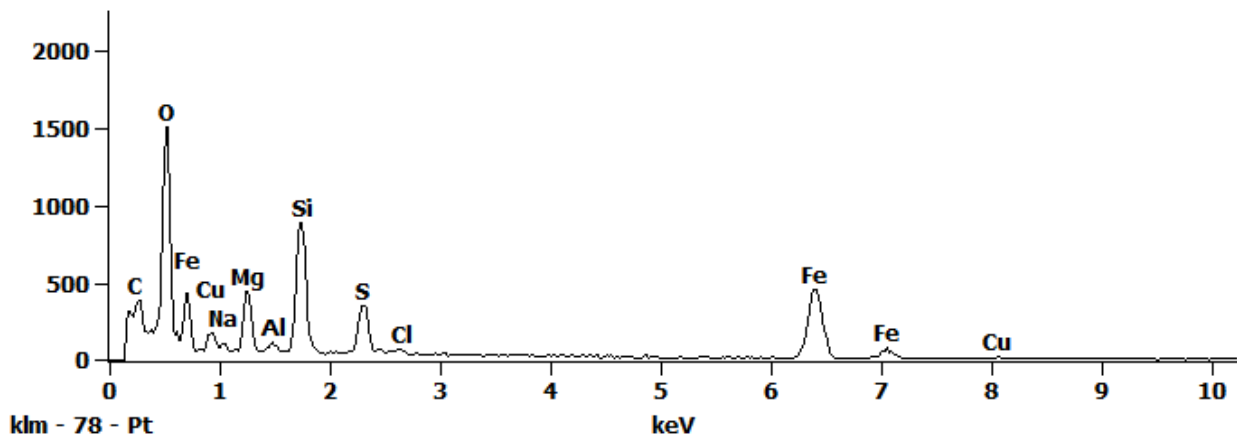


Figure 1. EDS Spectra for sample L2098-A-2 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 781

L2098a-2(1)\_pt2

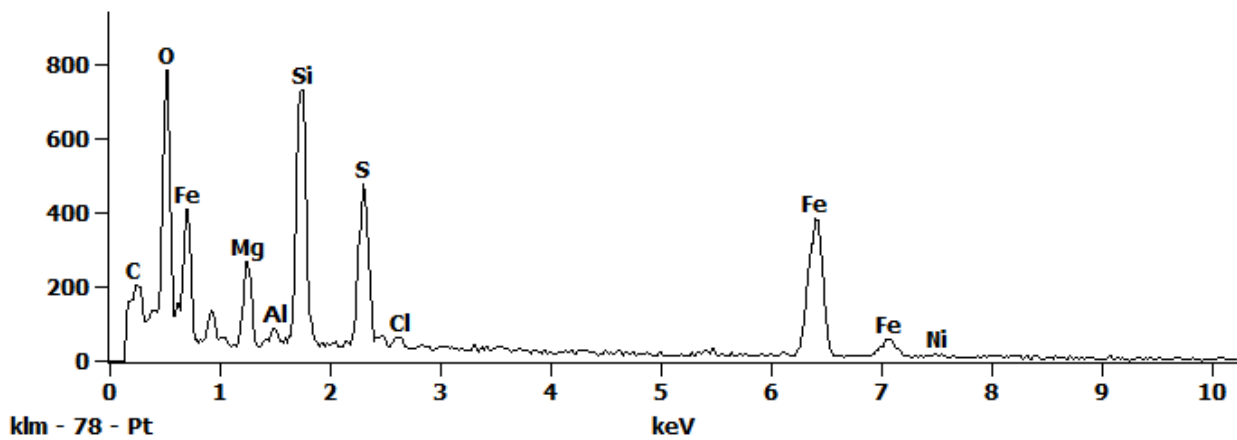


Figure 2. EDS Spectra for sample L2098-A-2 taken at test area 2. The test area is labeled in the particle SEM photo..



Full scale counts: 2492

L2098a-2(1)\_pt3

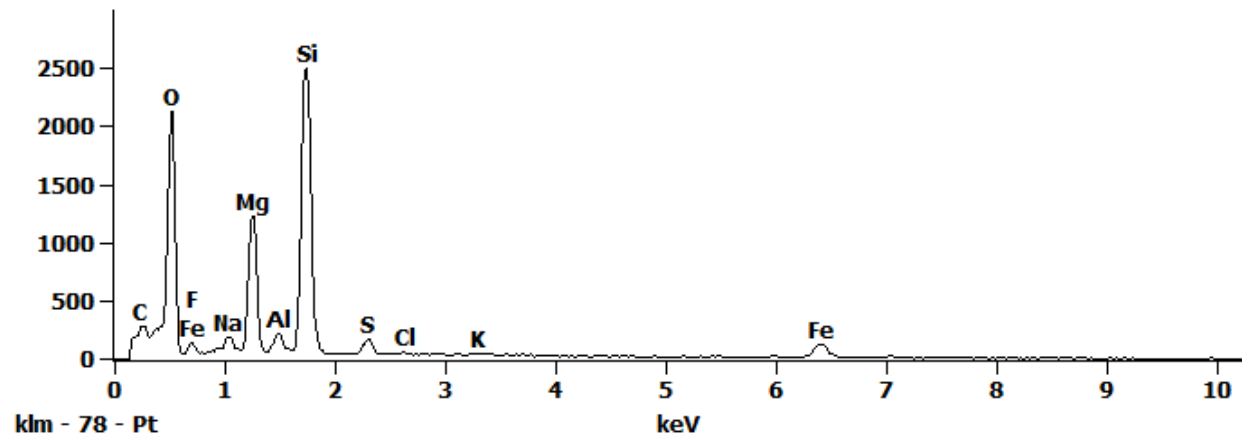
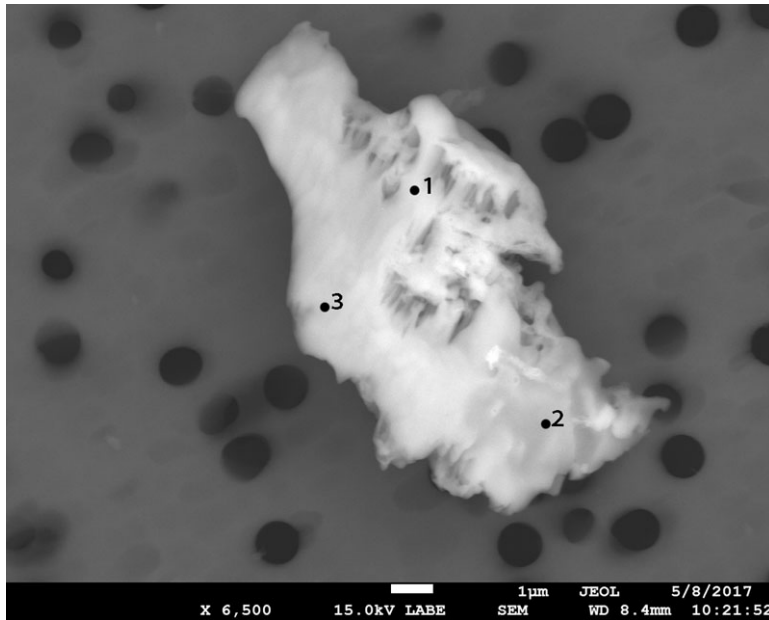


Figure 3. EDS Spectra for sample L2098-A-2 taken at test area 3. The test area is labeled in the particle SEM photo..

## L2098 A6



<b>Particle Size:</b>	5x11 µm
<b>Shape:</b>	Equidimensional to Irregular
<b>Transparency:</b>	Opaque to Translucent
<b>Color:</b>	CLEAR, GRAY
<b>Luster:</b>	Pearly to Subvitreous
<b>Particle Type:</b>	COSMIC
<b>Cluster No.:</b>	L2098 Cluster 6
<b>Comments:</b>	

SEM Photo of sample L2098 A6 with labeled EDS testing locations.

### Cluster of Origin: L2098 Cluster 6

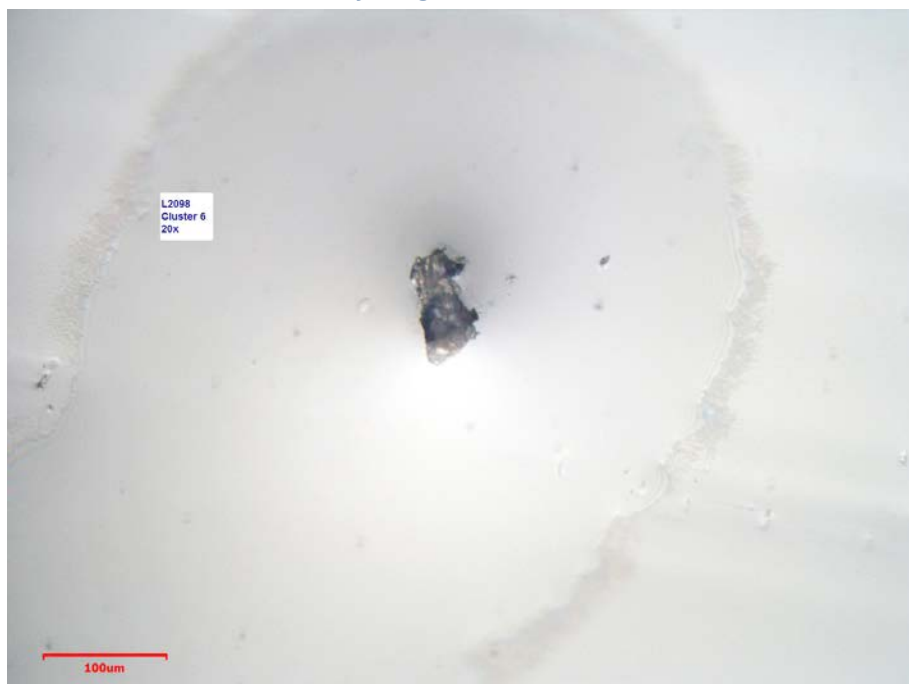


Photo of cluster L2098 Cluster 6.

*L2098 A6 - EDS Spectra*

Full scale counts: 2537

L2098a-6(1)\_pt1

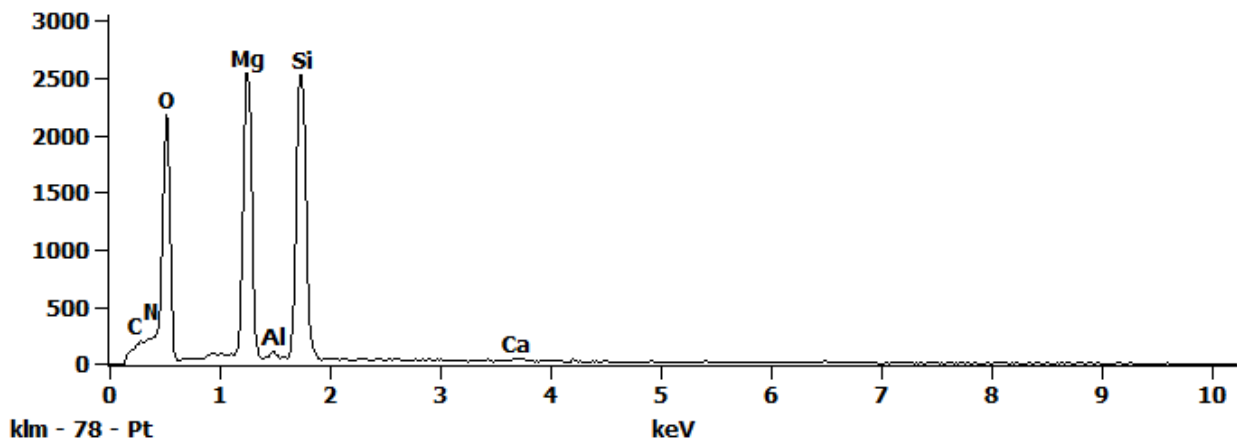


Figure 1. EDS Spectra for sample L2098-A-6 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 1751

L2098a-6(1)\_pt2

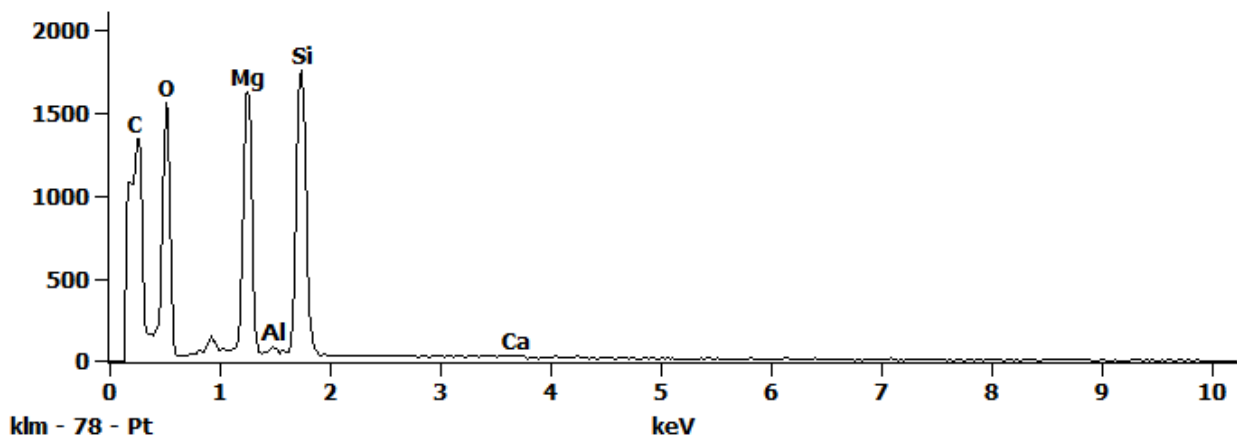


Figure 2. EDS Spectra for sample L2098-A-6 taken at test area 2. The test area is labeled in the particle SEM photo..

Full scale counts: 2977

L2098a-6(1)\_pt3

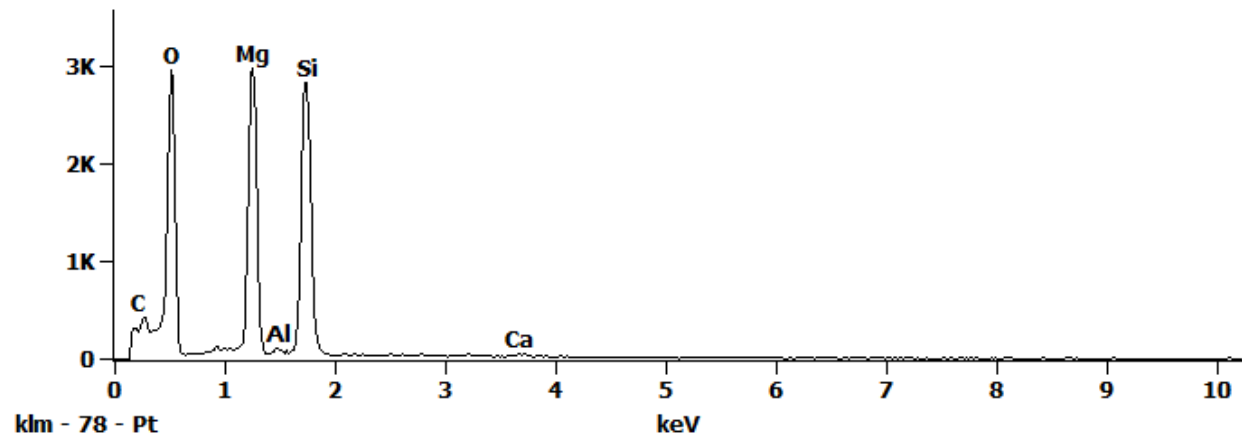
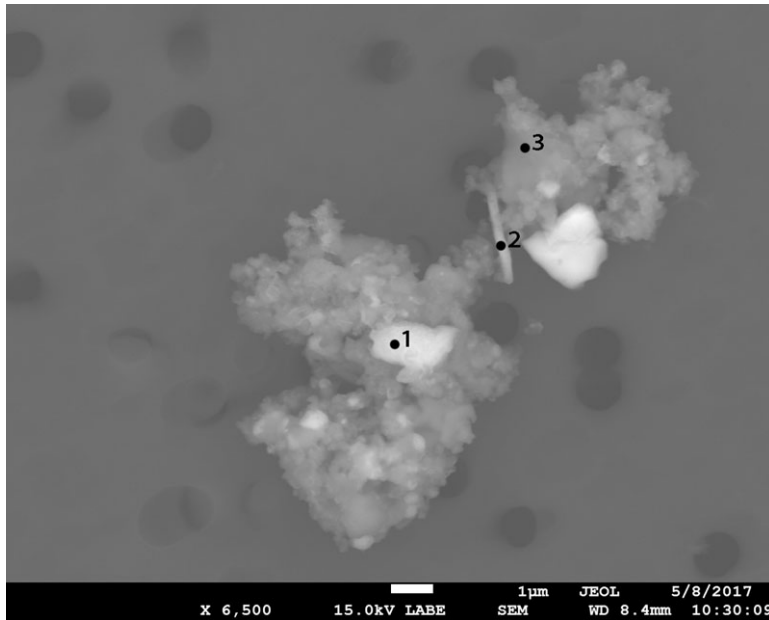


Figure 3. EDS Spectra for sample L2098-A-6 taken at test area 3. The test area is labeled in the particle SEM photo..

**L2098 A7**

<b>Particle Size:</b>	6.6x11 µm
<b>Shape:</b>	Equidimensional to Irregular
<b>Transparency:</b>	Opaque
<b>Color:</b>	BLACK, GRAY, SILVER
<b>Luster:</b>	Subvitreous to Dull
<b>Particle Type:</b>	COSMIC
<b>Cluster No.:</b>	L2098 Cluster 7
<b>Comments:</b>	

*SEM Photo of sample L2098 A7 with labeled EDS testing locations.*

*Cluster of Origin: L2098 Cluster 7*



*Photo of cluster L2098 Cluster 7.*

*L2098 A7 - EDS Spectra*

Full scale counts: 1628

L2098a-7(1)\_pt1

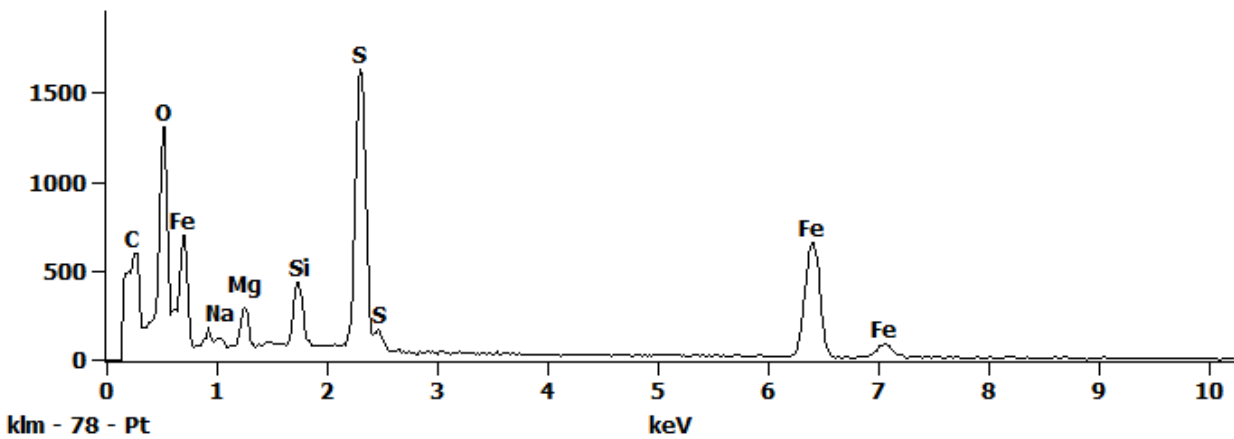


Figure 1. EDS Spectra for sample L2098-A-7 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 446

L2098a-7(1)\_pt2

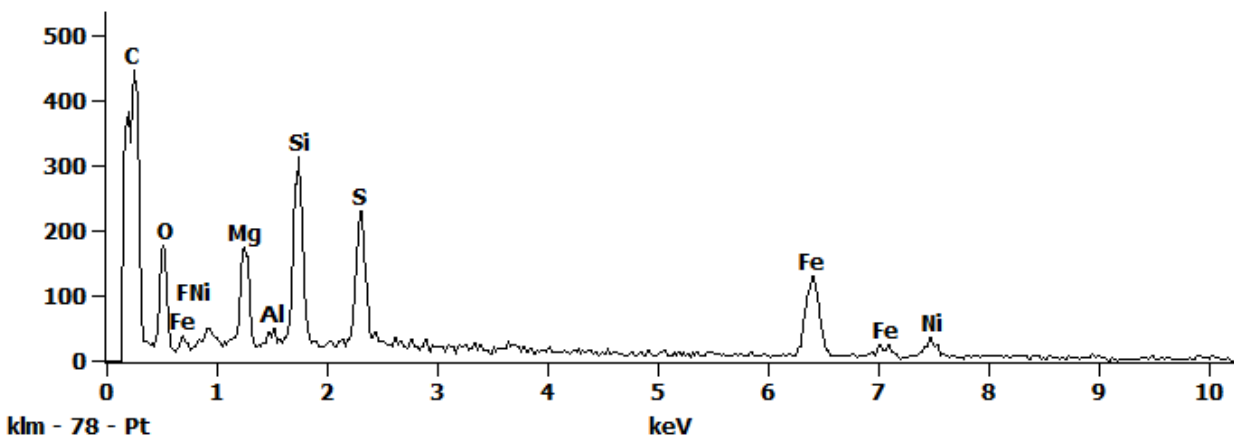


Figure 2. EDS Spectra for sample L2098-A-7 taken at test area 2. The test area is labeled in the particle SEM photo..

Full scale counts: 1555

L2098a-7(1)\_pt3

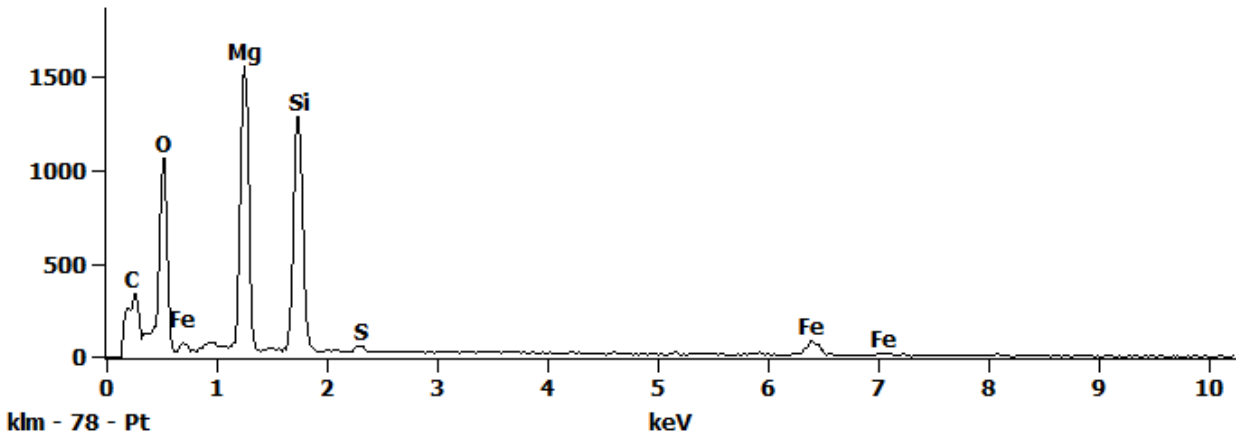
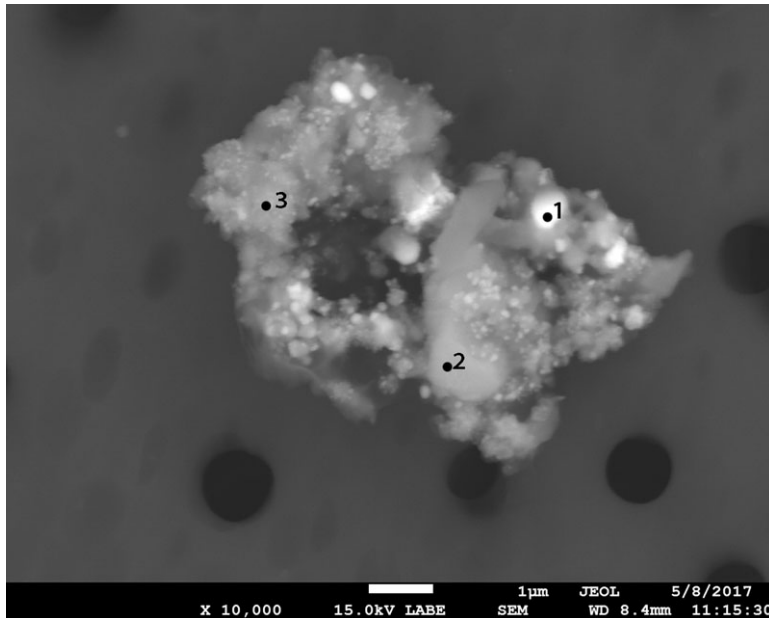


Figure 3. EDS Spectra for sample L2098-A-7 taken at test area 3. The test area is labeled in the particle SEM photo..



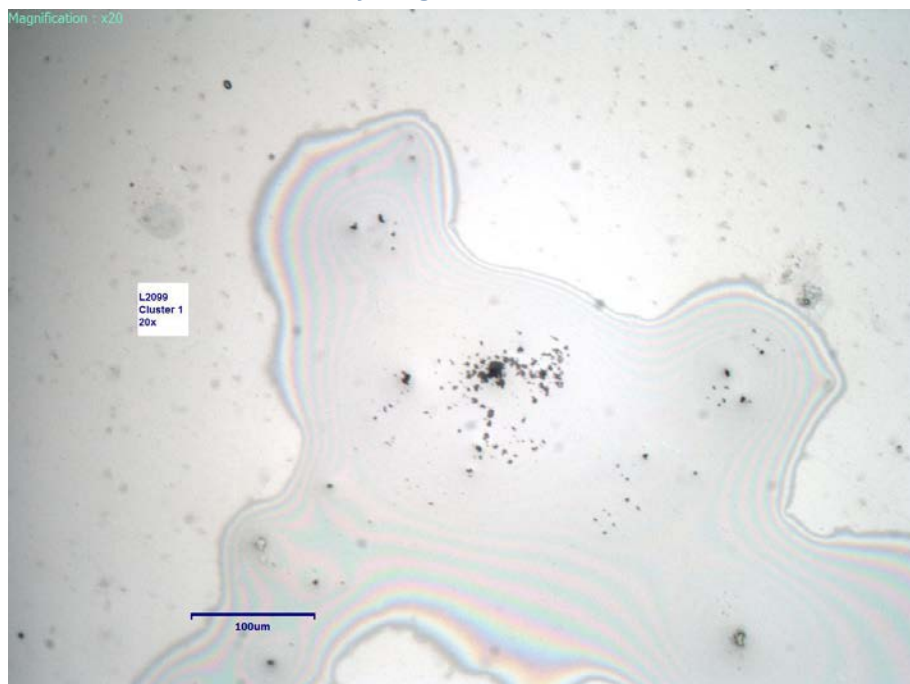
## L2099 A1



**Particle Size:** 6.5x5  $\mu\text{m}$   
**Shape:** Equidimensional to Irregular  
**Transparency:** Opaque  
**Color:** BLACK  
**Luster:** Dull  
**Particle Type:** COSMIC  
**Cluster No.:** L2099 Cluster 1  
**Comments:**

*SEM Photo of sample L2099 A1 with labeled EDS testing locations.*

### *Cluster of Origin: L2099 Cluster 1*



*Photo of cluster L2099 Cluster 1.*

*L2099 A1 - EDS Spectra*

Full scale counts: 763

L2099A-1(1)\_pt1

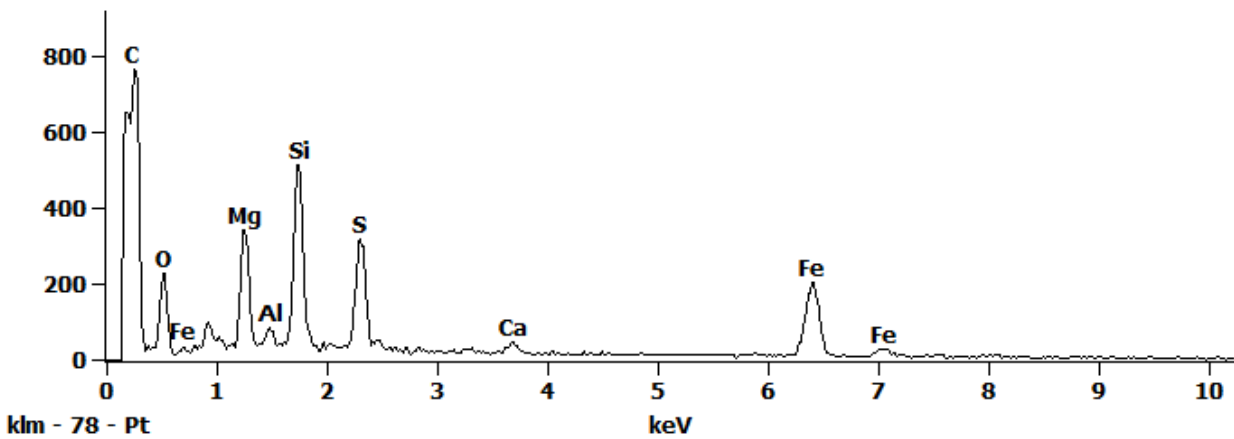


Figure 1. EDS Spectra for sample L2099-A-1 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 2572

L2099A-1(1)\_pt2

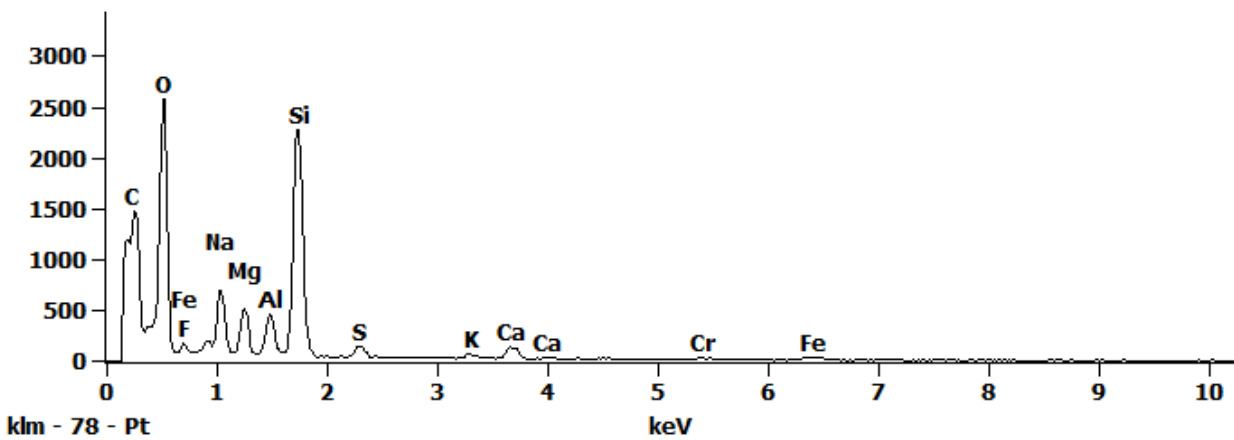


Figure 2. EDS Spectra for sample L2099-A-1 taken at test area 2. The test area is labeled in the particle SEM photo..

Full scale counts: 1651

L2099A-1(1)\_pt3

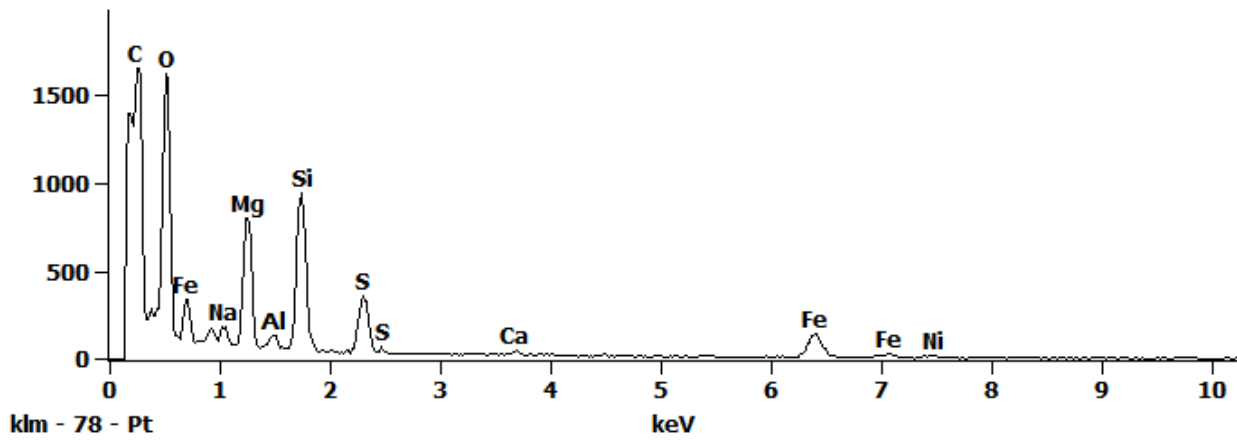
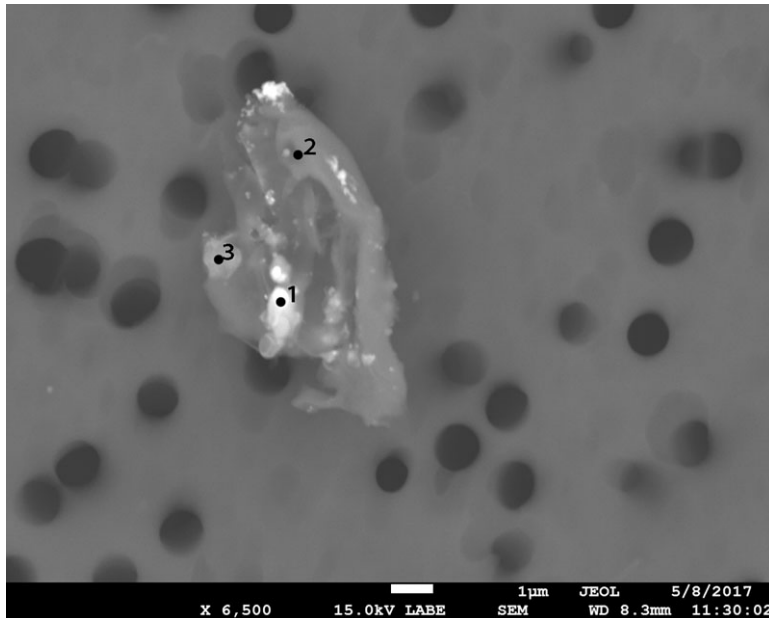


Figure 3. EDS Spectra for sample L2099A-1 taken at test area 3. The test area is labeled in the particle SEM photo..

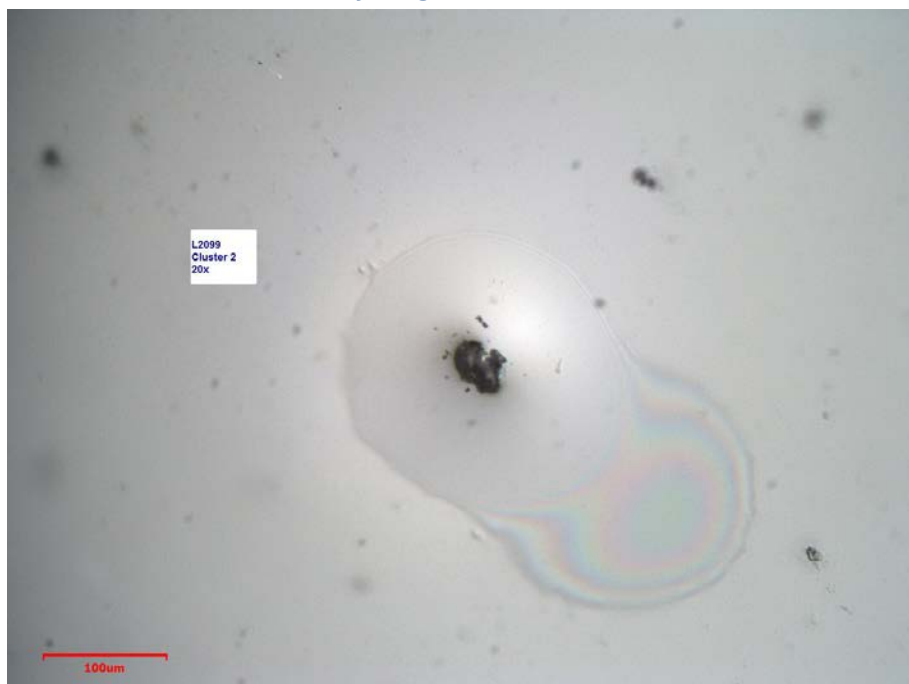
## L2099 A2



<b>Particle Size:</b>	7x3.5 μm
<b>Shape:</b>	Equidimensional to Irregular
<b>Transparency:</b>	Opaque
<b>Color:</b>	BLACK
<b>Luster:</b>	Dull
<b>Particle Type:</b>	POSSIBLY COSMIC
<b>Cluster No.:</b>	L2099 Cluster 2
<b>Comments:</b>	

*SEM Photo of sample L2099 A2 with labeled EDS testing locations.*

### *Cluster of Origin: L2099 Cluster 2*



*Photo of cluster L2099 Cluster 2.*

*L2099 A2 - EDS Spectra*

Full scale counts: 2667

L2099A-2(1)\_pt1

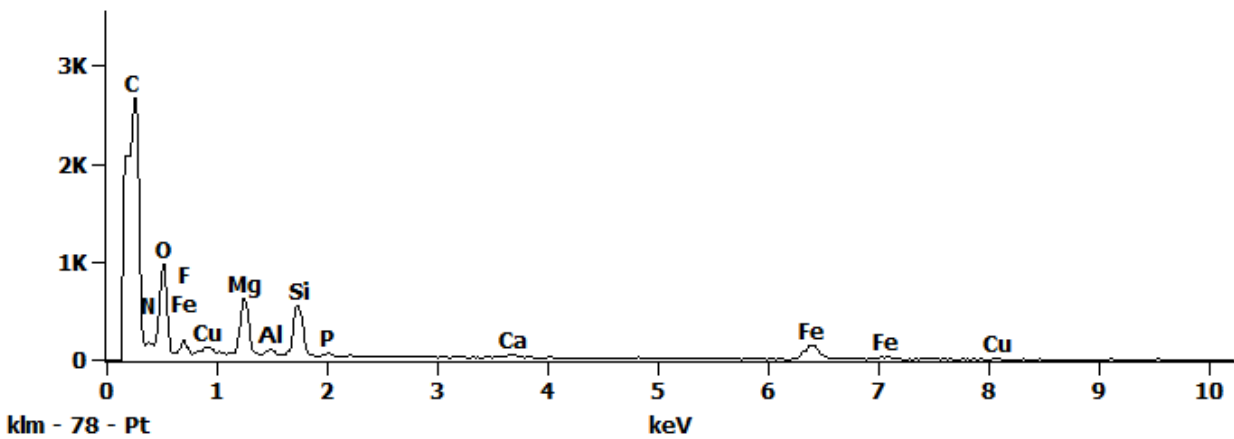


Figure 1. EDS Spectra for sample L2099-A-2 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 4023

L2099A-2(1)\_pt2

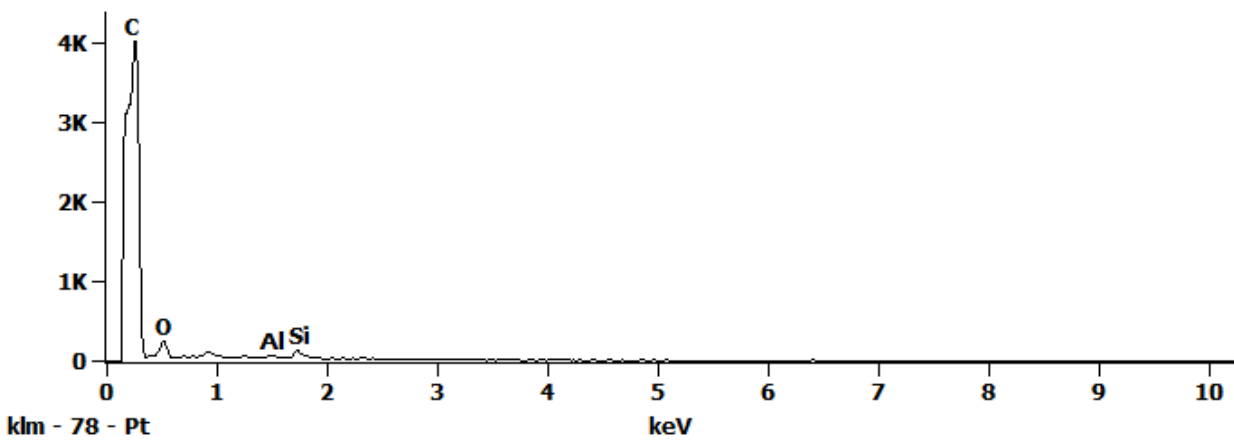


Figure 2. EDS Spectra for sample L2099-A-2 taken at test area 2. The test area is labeled in the particle SEM photo..

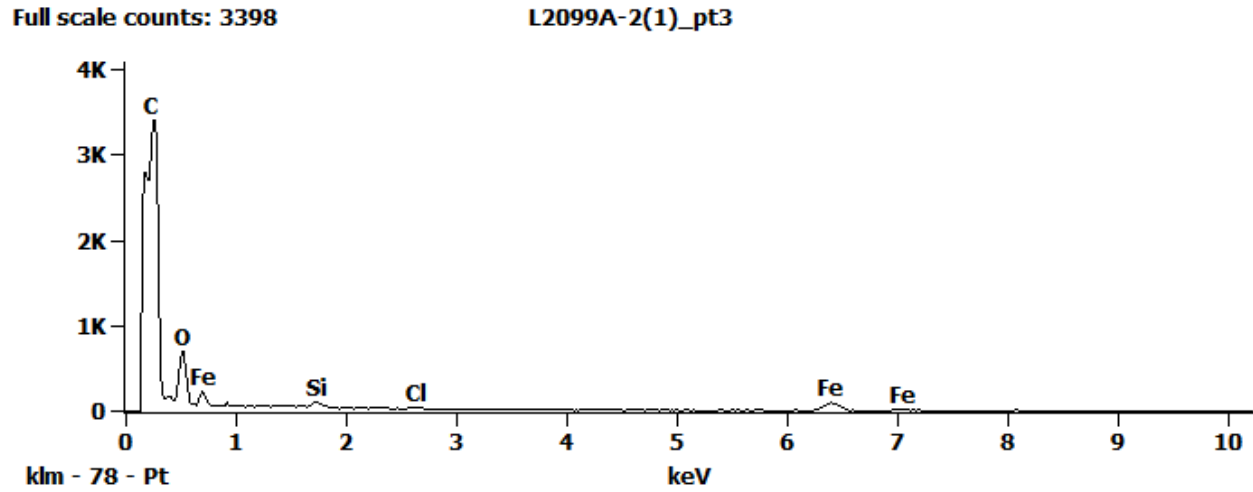
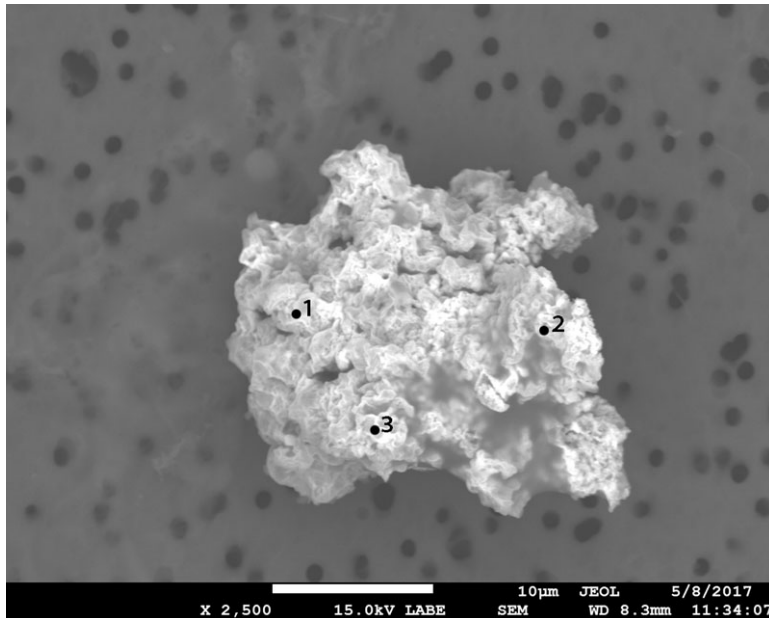


Figure 3. EDS Spectra for sample L2099-A-2 taken at test area 3. The test area is labeled in the particle SEM photo..

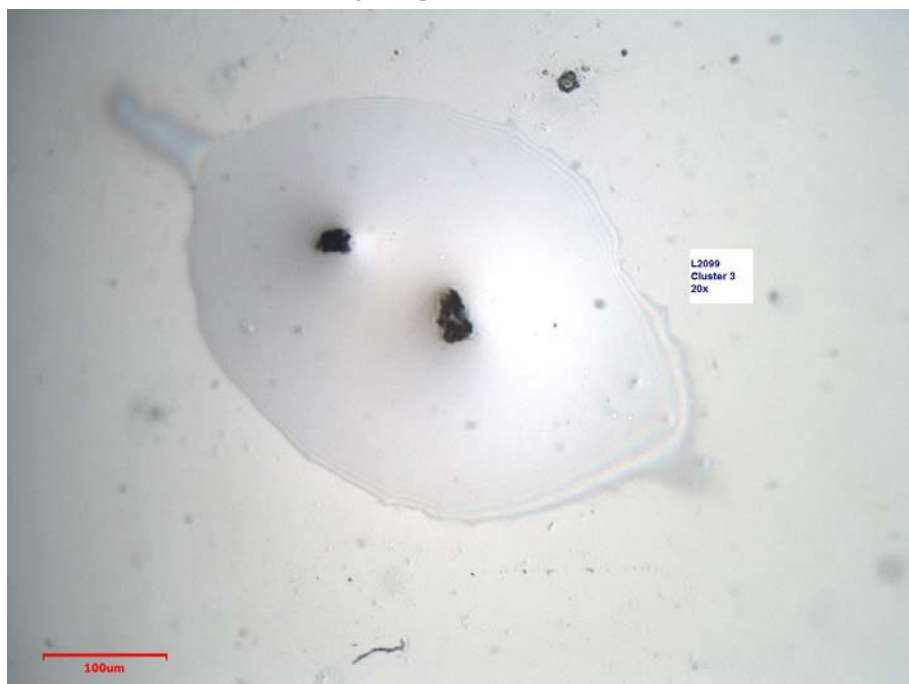
## L2099 A3



**Particle Size:** 20 µm  
**Shape:** Irregular  
**Transparency:** Opaque  
**Color:** BLACK  
**Luster:** Dull  
**Particle Type:** COSMIC  
**Cluster No.:** L2099 Cluster 3  
**Comments:**

*SEM Photo of sample L2099 A3 with labeled EDS testing locations.*

### *Cluster of Origin: L2099 Cluster 3*



*Photo of cluster L2099 Cluster 3.*



*L2099 A3 - EDS Spectra*

Full scale counts: 2766

L2099A-3(1)\_pt1

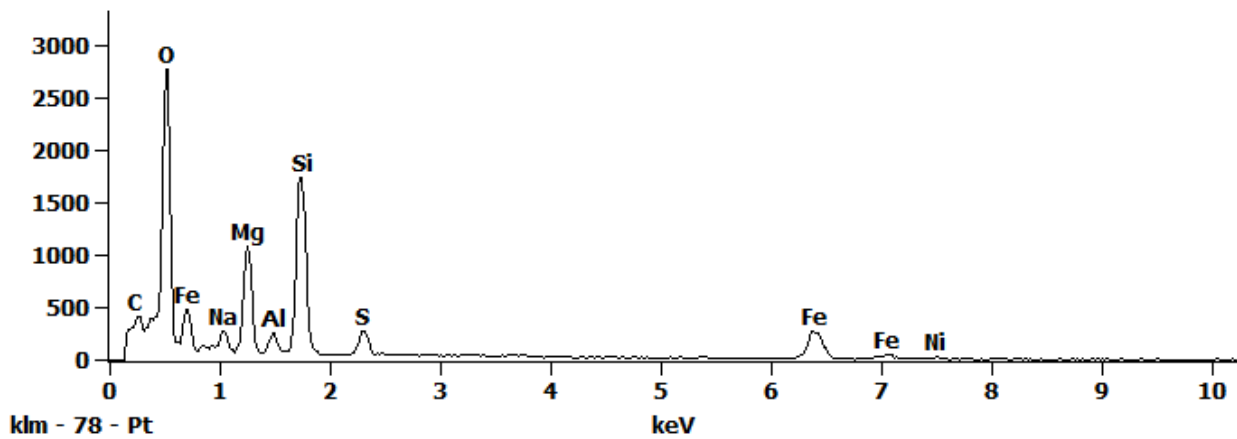


Figure 1. EDS Spectra for sample L2099-A-3 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 1819

L2099A-3(1)\_pt2

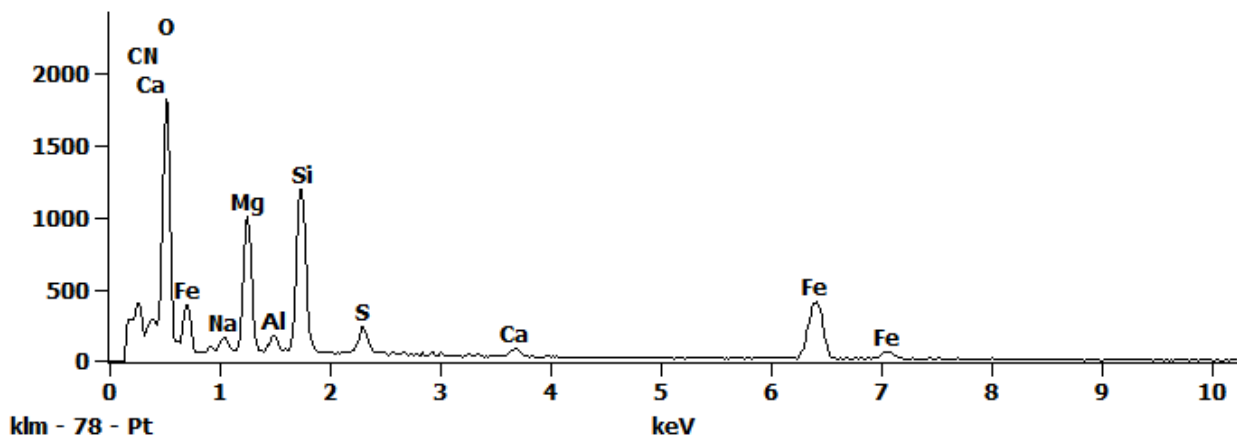


Figure 2. EDS Spectra for sample L2099-A-3 taken at test area 2. The test area is labeled in the particle SEM photo..

Full scale counts: 2800

L2099A-3(1)\_pt3

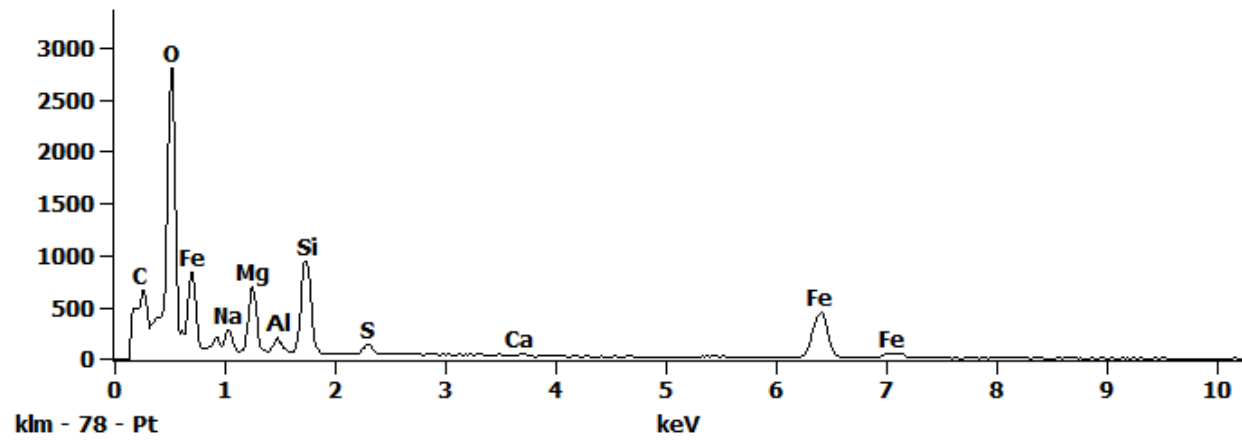
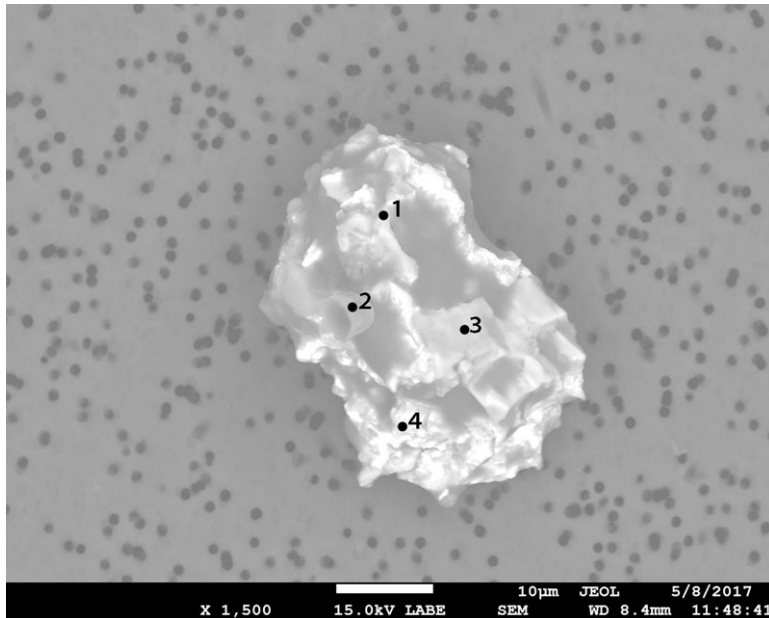


Figure 3. EDS Spectra for sample L2099-A-3 taken at test area 3. The test area is labeled in the particle SEM photo..

## L2099 A5



<b>Particle Size:</b>	36x24 µm
<b>Shape:</b>	Equidimensional to Irregular
<b>Transparency:</b>	Opaque
<b>Color:</b>	BLACK
<b>Luster:</b>	Dull
<b>Particle Type:</b>	COSMIC
<b>Cluster No.:</b>	L2099 Cluster 5
<b>Comments:</b>	

SEM Photo of sample L2099 A5 with labeled EDS testing locations.

### Cluster of Origin: L2099 Cluster 5

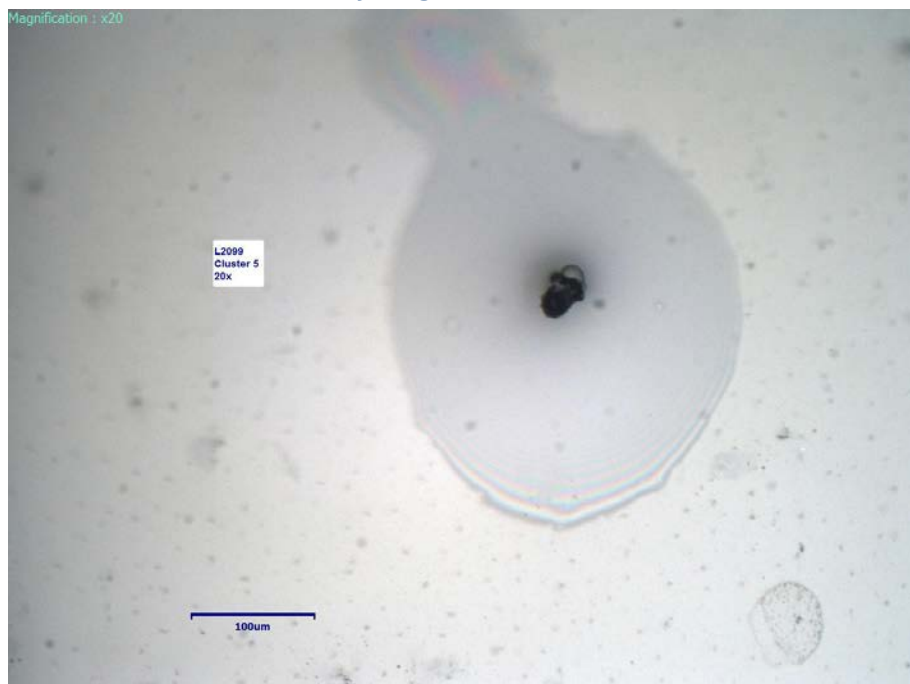


Photo of cluster L2099 Cluster 5.

*L2099 A5 - EDS Spectra*

Full scale counts: 710

L2099A-5(1)\_pt1

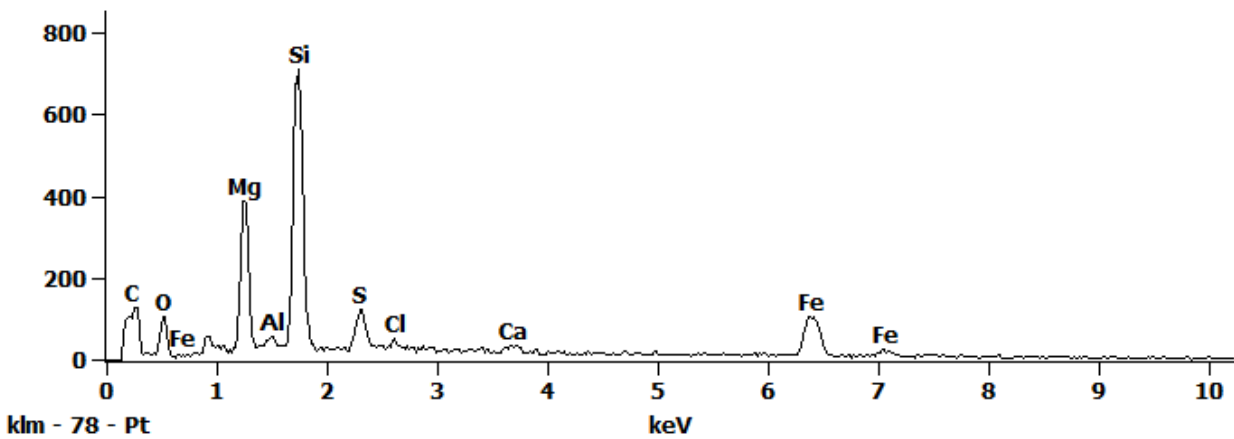


Figure 1. EDS Spectra for sample L2099-A-5 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 1172

L2099A-5(1)\_pt2

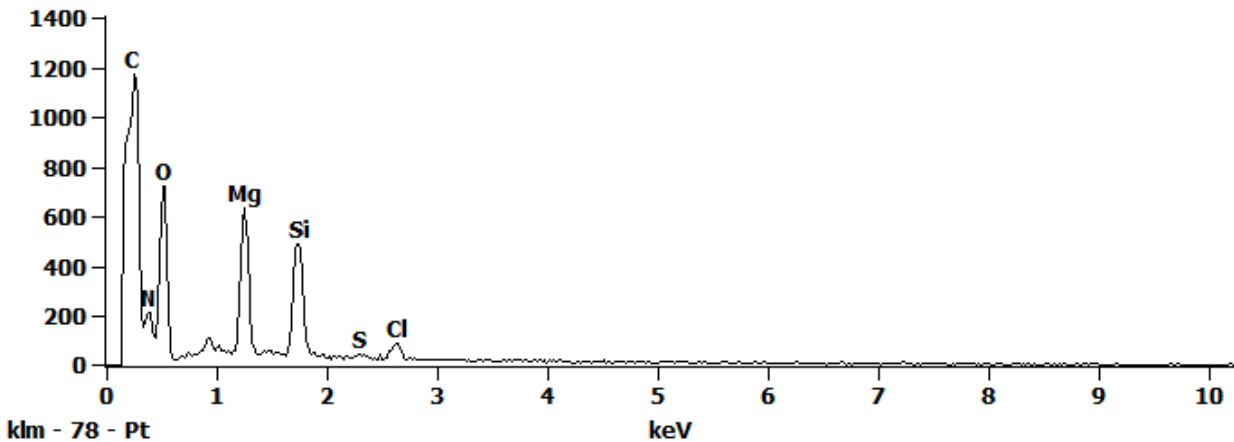


Figure 2. EDS Spectra for sample L2099-A-5 taken at test area 2. The test area is labeled in the particle SEM photo..

Full scale counts: 283

L2099A-5(1)\_pt3

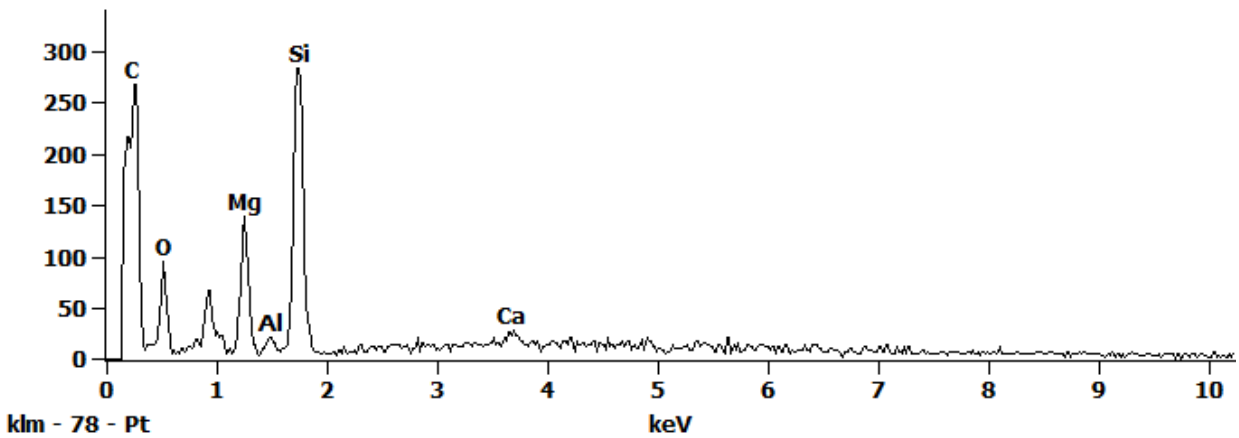


Figure 3. EDS Spectra for sample L2099-A-5 taken at test area 3. The test area is labeled in the particle SEM photo..

Full scale counts: 3106

L2099A-5(1)\_pt4

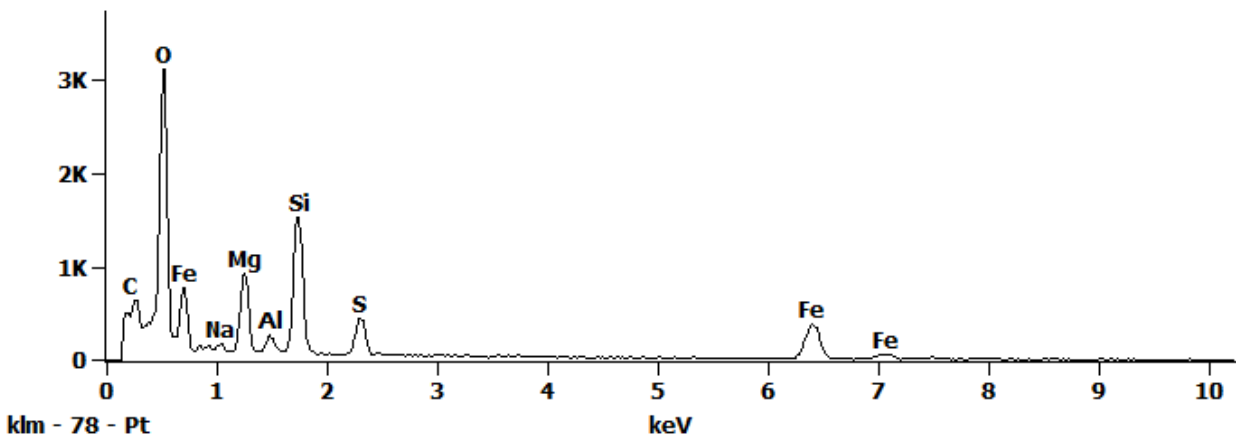
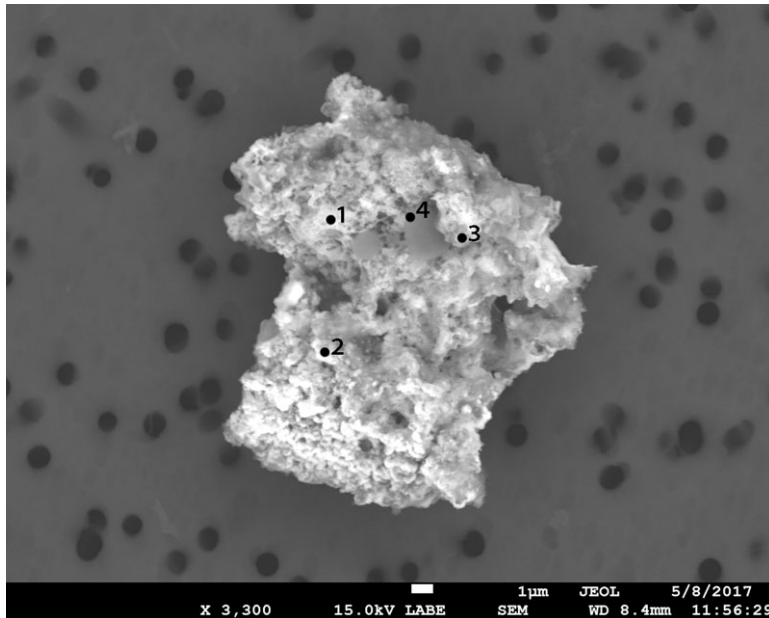


Figure 4. EDS Spectra for sample L2099-A-5 taken at test area 4. The test area is labeled in the particle SEM photo..

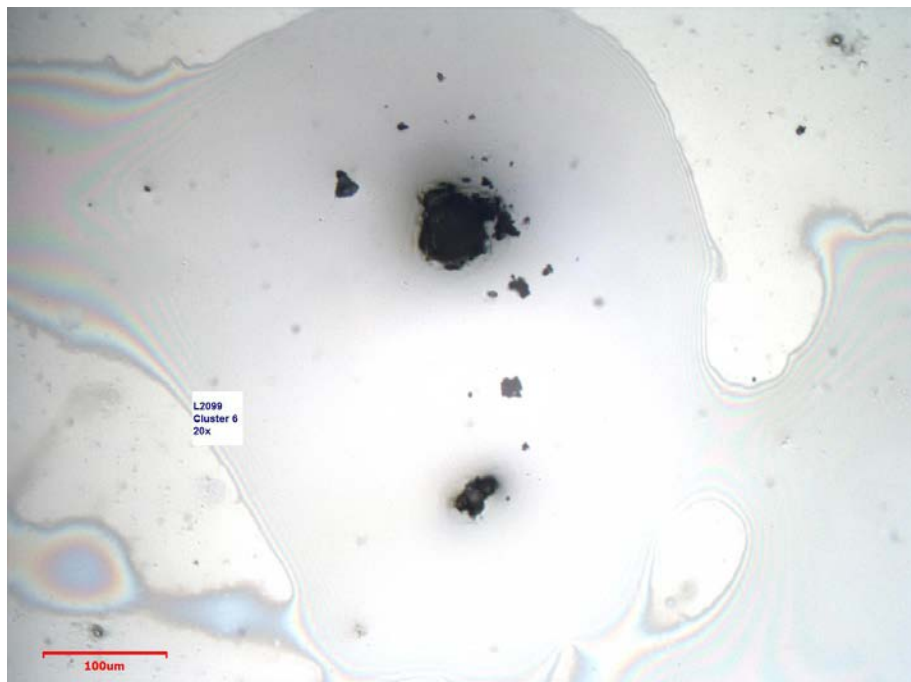
## L2099 A6



<b>Particle Size:</b>	17 µm
<b>Shape:</b>	Equidimensional to Irregular
<b>Transparency:</b>	Opaque
<b>Color:</b>	BLACK
<b>Luster:</b>	Dull
<b>Particle Type:</b>	COSMIC
<b>Cluster No.:</b>	L2099 Cluster 6
<b>Comments:</b>	

*SEM Photo of sample L2099 A6 with labeled EDS testing locations.*

### *Cluster of Origin: L2099 Cluster 6*



*Photo of cluster L2099 Cluster 6.*

*L2099 A6 - EDS Spectra*

Full scale counts: 3350

L2099A-6(1)\_pt1

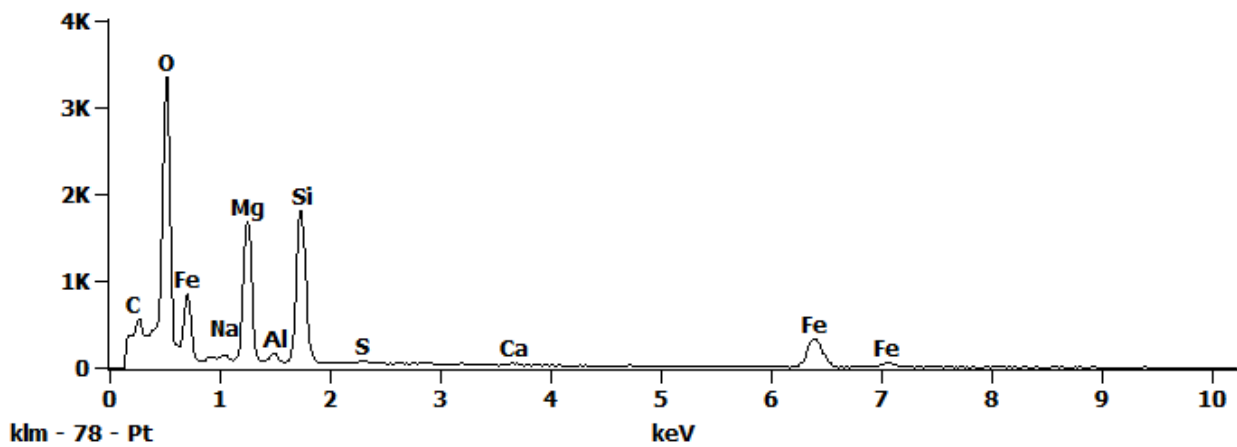


Figure 1. EDS Spectra for sample L2099-A-6 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 1647

L2099A-6(1)\_pt2

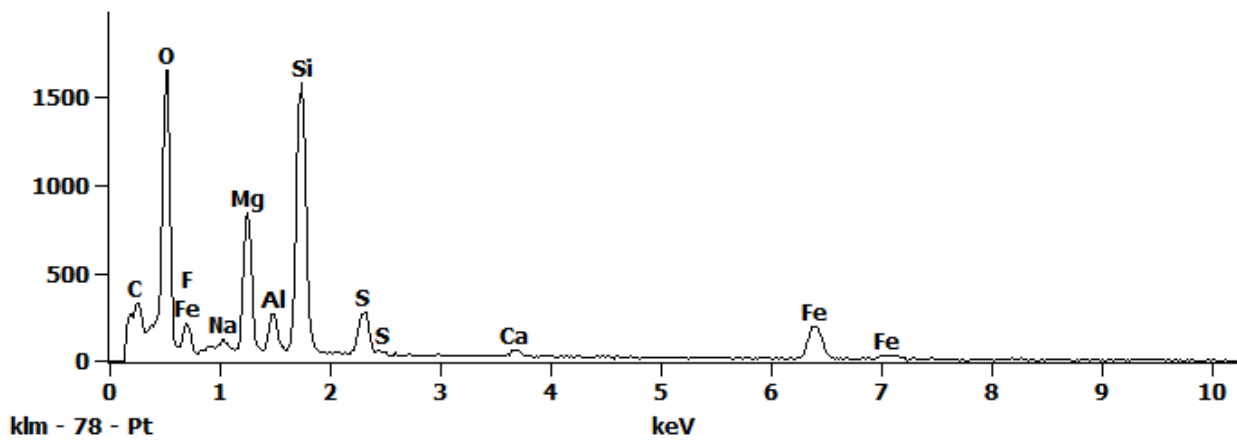


Figure 2. EDS Spectra for sample L2099-A-6 taken at test area 2. The test area is labeled in the particle SEM photo..

Full scale counts: 2724

L2099A-6(1)\_pt3

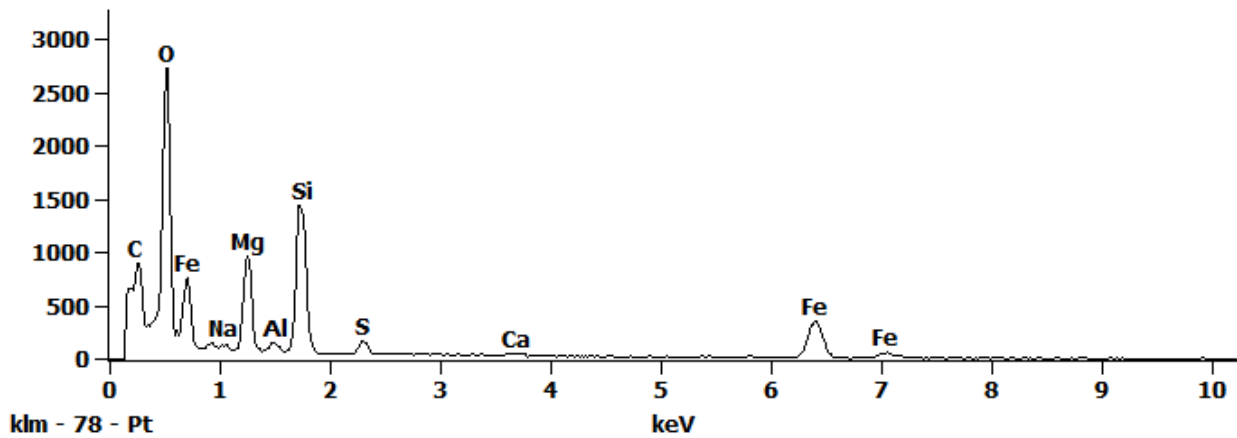


Figure 3. EDS Spectra for sample L2099-A-6 taken at test area 3. The test area is labeled in the particle SEM photo..

Full scale counts: 2330

L2099A-6(1)\_pt4

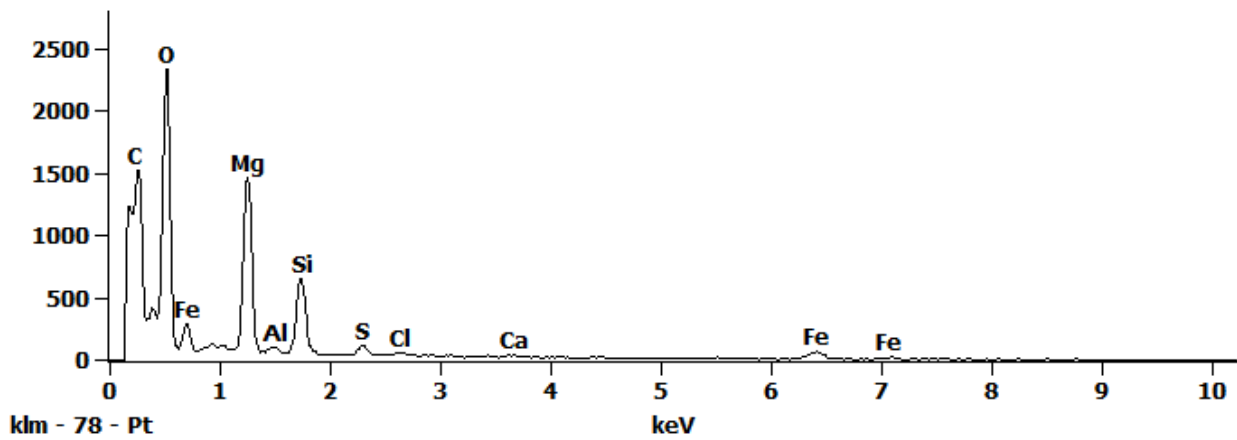
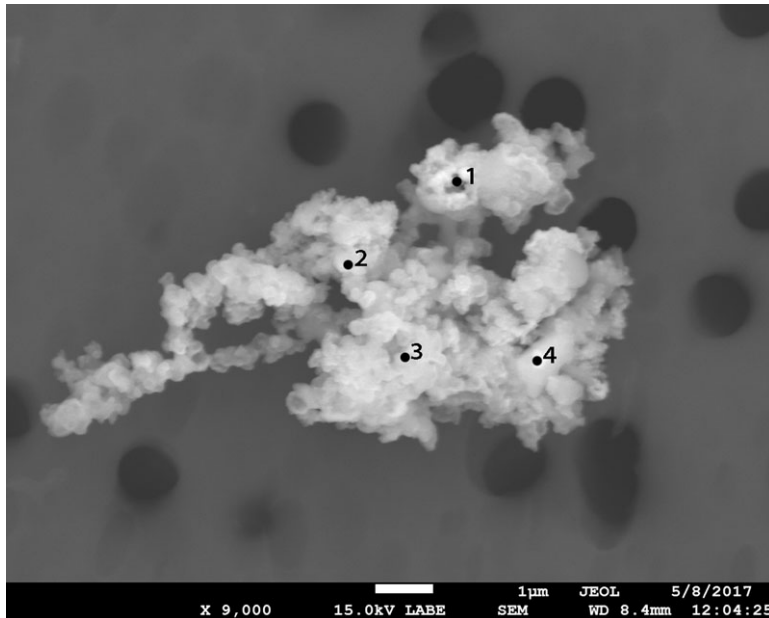


Figure 4. EDS Spectra for sample L2099-A-6 taken at test area 4. The test area is labeled in the particle SEM photo..



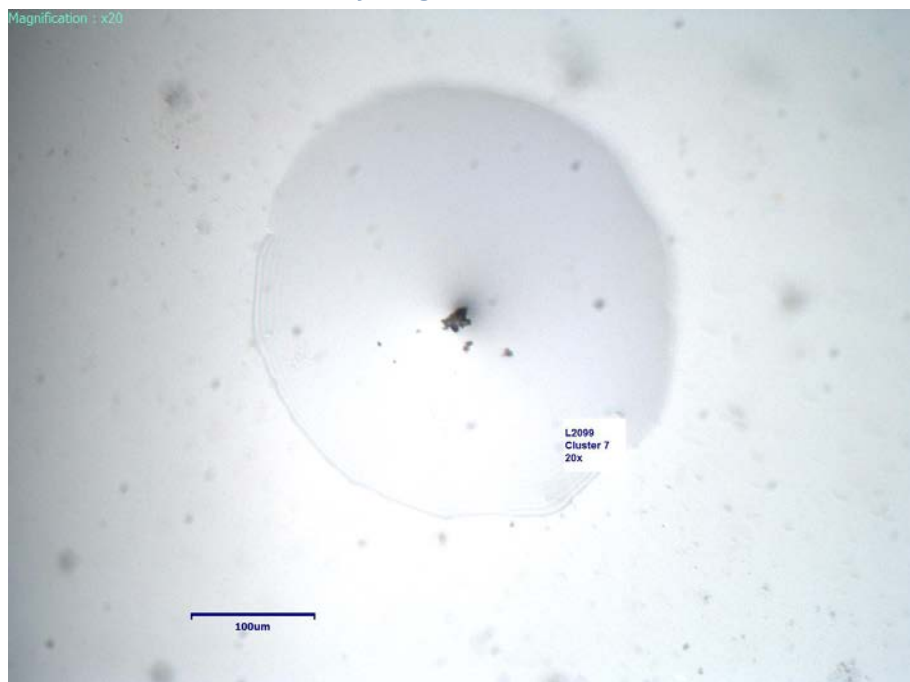
## L2099 A7



**Particle Size:** 6 µm  
**Shape:** Irregular  
**Transparency:** Opaque  
**Color:** BLACK  
**Luster:** Dull  
**Particle Type:** POSSIBLY COSMIC  
**Cluster No.:** L2099 Cluster 7  
**Comments:**

*SEM Photo of sample L2099 A7 with labeled EDS testing locations.*

### *Cluster of Origin: L2099 Cluster 7*



*Photo of cluster L2099 Cluster 7.*

*L2099 A7 - EDS Spectra*

Full scale counts: 925

L2099A-7(1)\_pt1

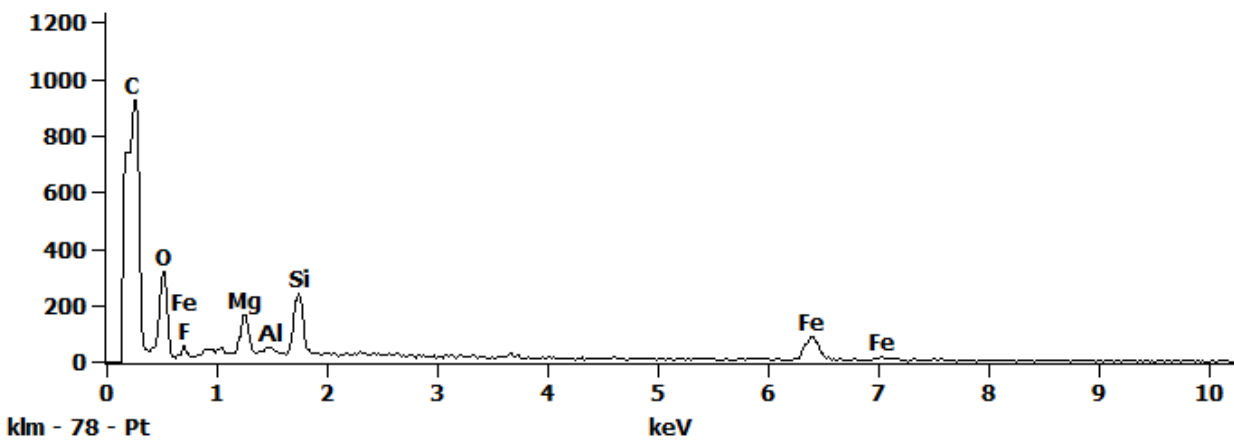


Figure 1. EDS Spectra for sample L2099-A-7 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 2459

L2099A-7(1)\_pt2

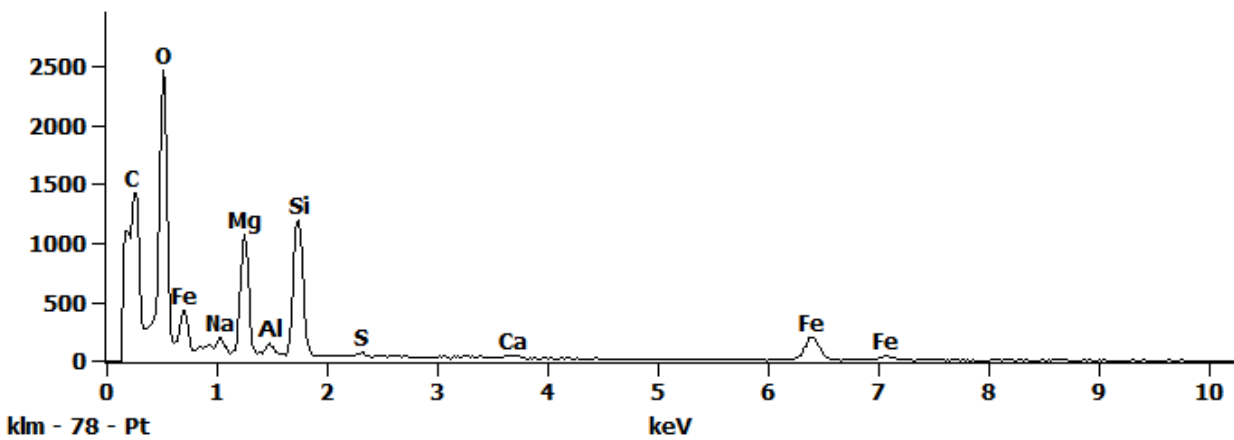


Figure 2. EDS Spectra for sample L2099-A-7 taken at test area 2. The test area is labeled in the particle SEM photo..

Full scale counts: 2408

L2099A-7(1)\_pt3

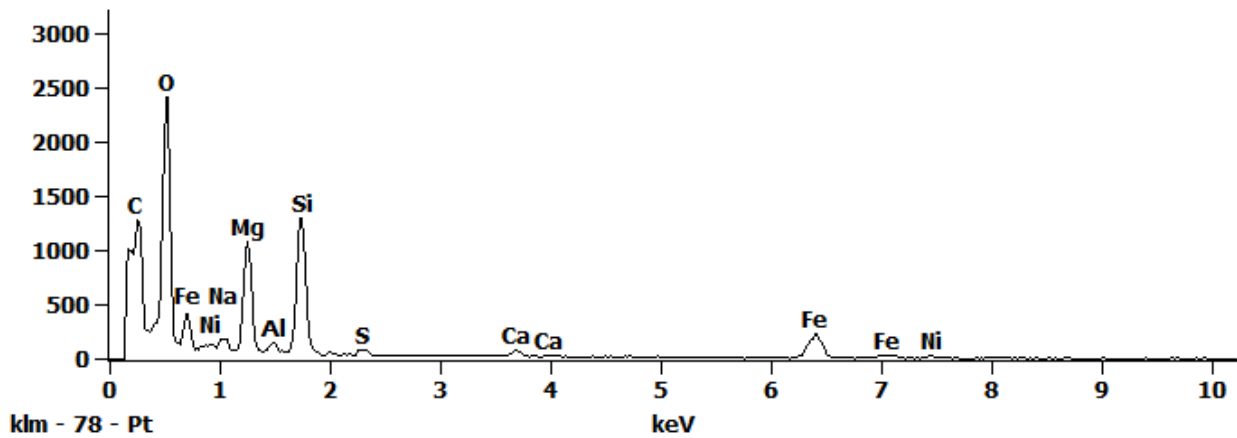


Figure 3. EDS Spectra for sample L2099-A-7 taken at test area 3. The test area is labeled in the particle SEM photo..

Full scale counts: 2707

L2099A-7(1)\_pt4

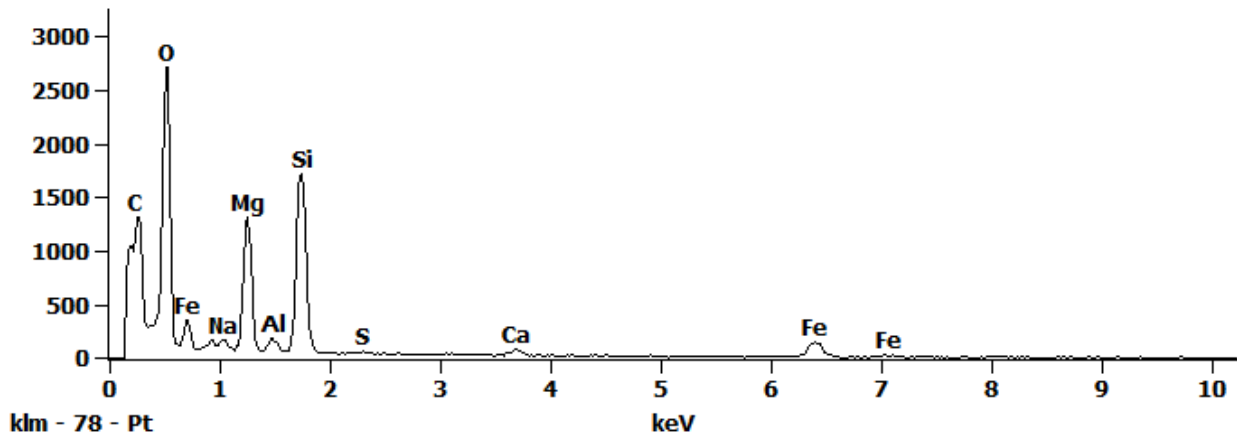
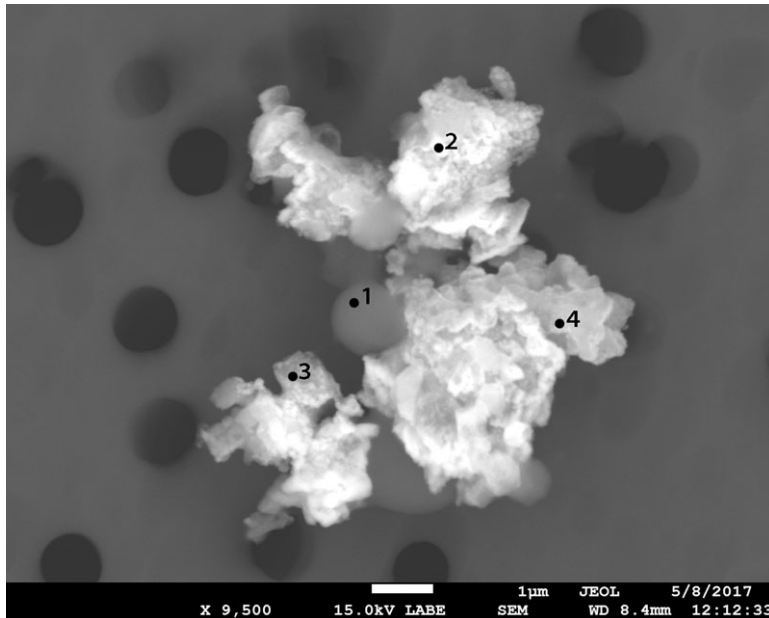


Figure 4. EDS Spectra for sample L2099-A-7 taken at test area 4. The test area is labeled in the particle SEM photo..

## L2099 A8



<b>Particle Size:</b>	9 µm
<b>Shape:</b>	Equidimensional to Irregular
<b>Transparency:</b>	Opaque
<b>Color:</b>	BLACK
<b>Luster:</b>	Dull
<b>Particle Type:</b>	COSMIC
<b>Cluster No.:</b>	L2099 Cluster 8
<b>Comments:</b>	

SEM Photo of sample L2099 A8 with labeled EDS testing locations.

### Cluster of Origin: L2099 Cluster 8



Photo of cluster L2099 Cluster 8.

*L2099 A8 - EDS Spectra*

Full scale counts: 1662

L2099A-8(1)\_pt1

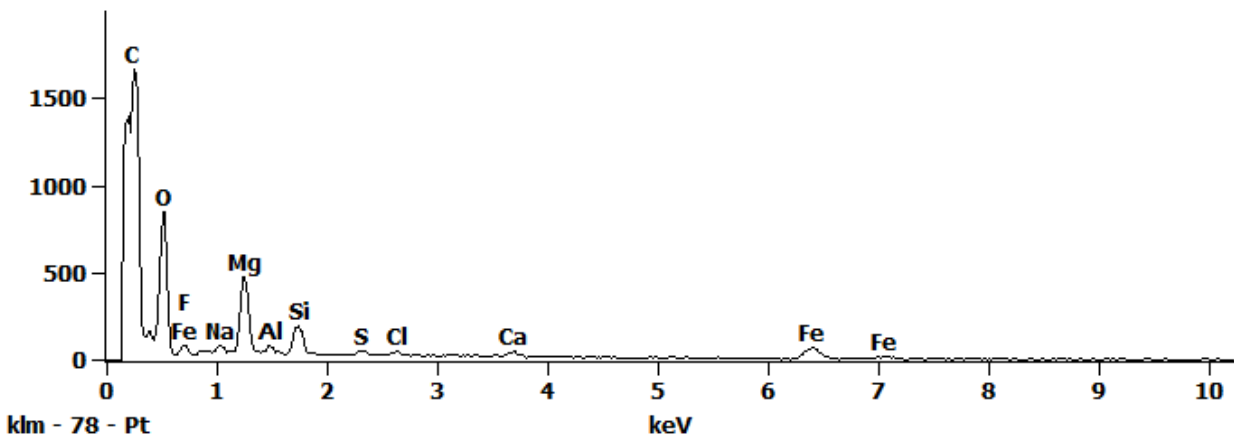


Figure 1. EDS Spectra for sample L2099-A-8 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 1789

L2099A-8(1)\_pt2

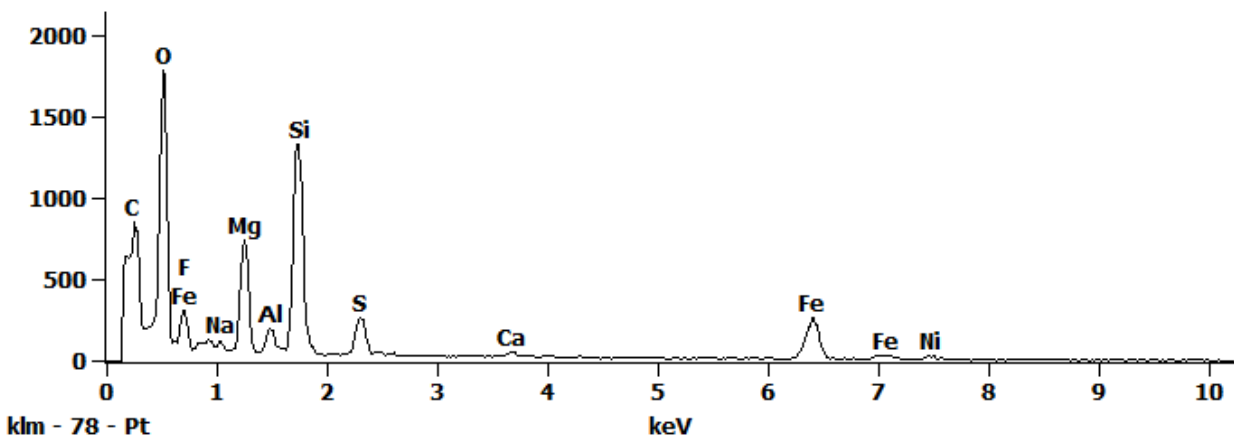


Figure 2. EDS Spectra for sample L2099-A-8 taken at test area 2. The test area is labeled in the particle SEM photo..

Full scale counts: 1640

L2099A-8(1)\_pt3

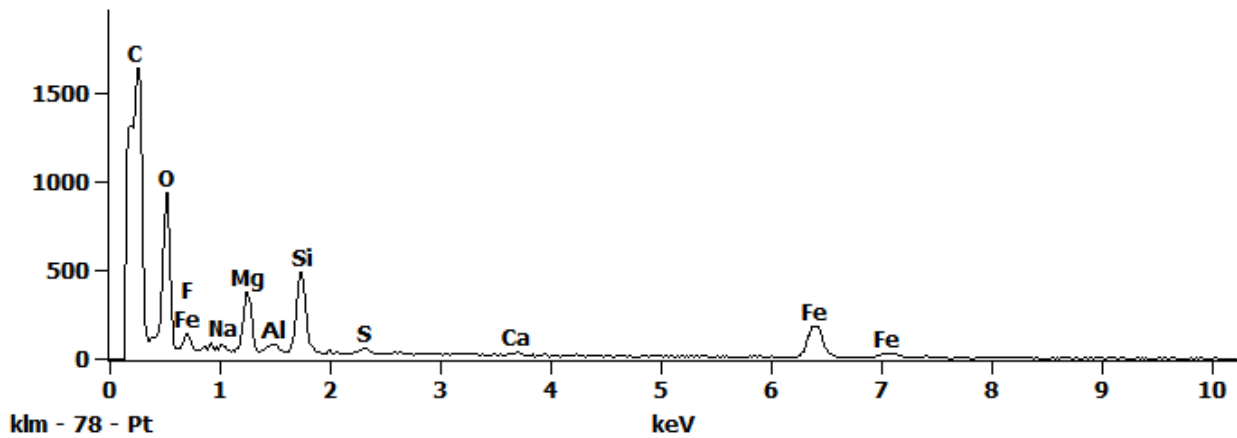


Figure 3. EDS Spectra for sample L2099-A-8 taken at test area 3. The test area is labeled in the particle SEM photo..

Full scale counts: 1510

L2099A-8(1)\_pt4

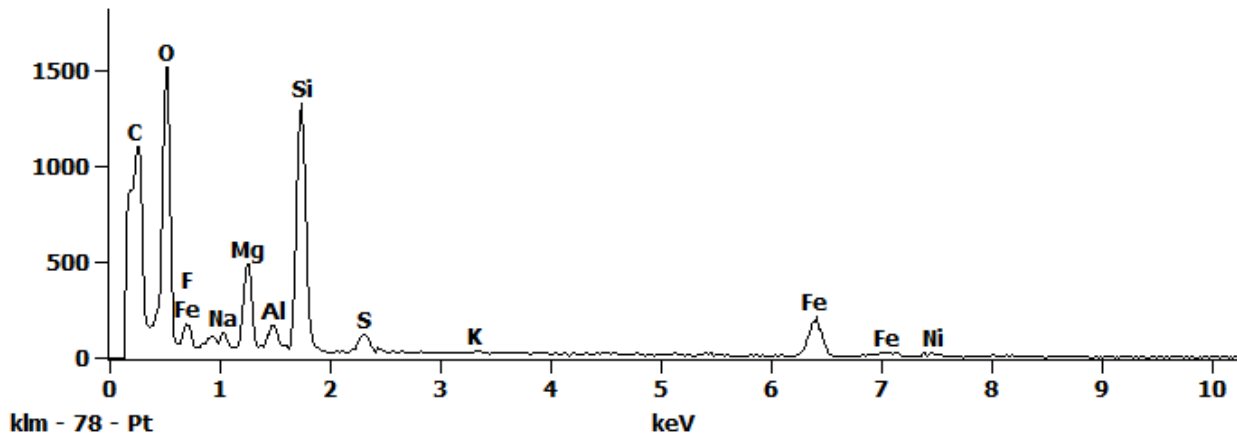
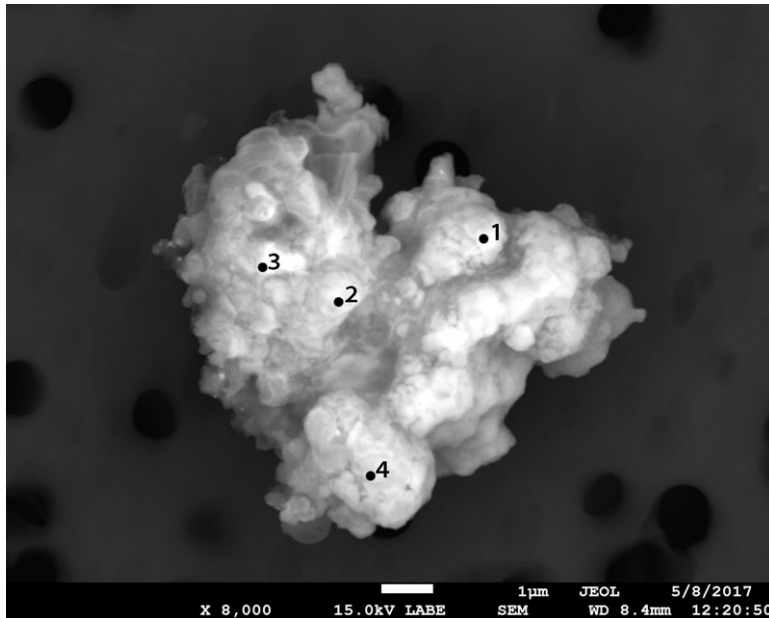


Figure 4. EDS Spectra for sample L2099-A-8 taken at test area 4. The test area is labeled in the particle SEM photo..

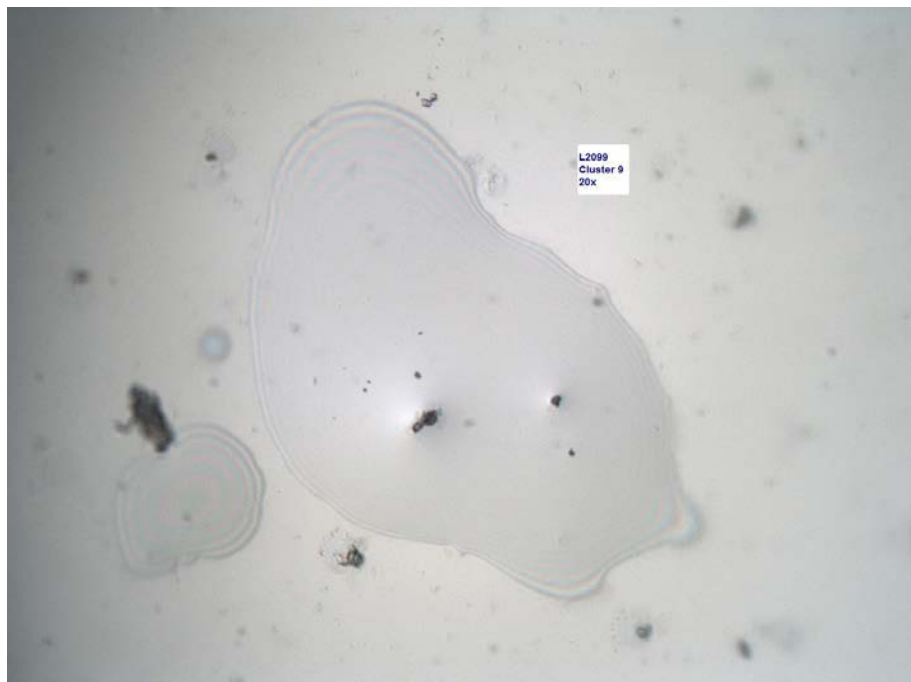
## L2099 A9



<b>Particle Size:</b>	7 µm
<b>Shape:</b>	Equidimensional to Irregular
<b>Transparency:</b>	Opaque
<b>Color:</b>	BLACK
<b>Luster:</b>	Dull
<b>Particle Type:</b>	COSMIC
<b>Cluster No.:</b>	L2099 Cluster 9
<b>Comments:</b>	

*SEM Photo of sample L2099 A9 with labeled EDS testing locations.*

### *Cluster of Origin: L2099 Cluster 9*



*Photo of cluster L2099 Cluster 9.*

*L2099 A9 - EDS Spectra*

Full scale counts: 1160

L2099A-9(1)\_pt1

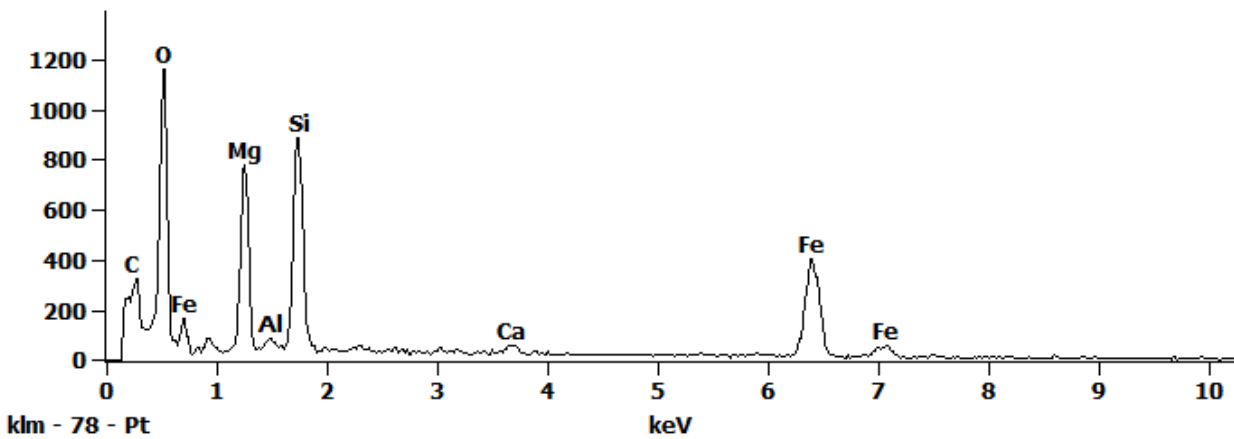


Figure 1. EDS Spectra for sample L2099-A-9 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 2823

L2099A-9(1)\_pt2

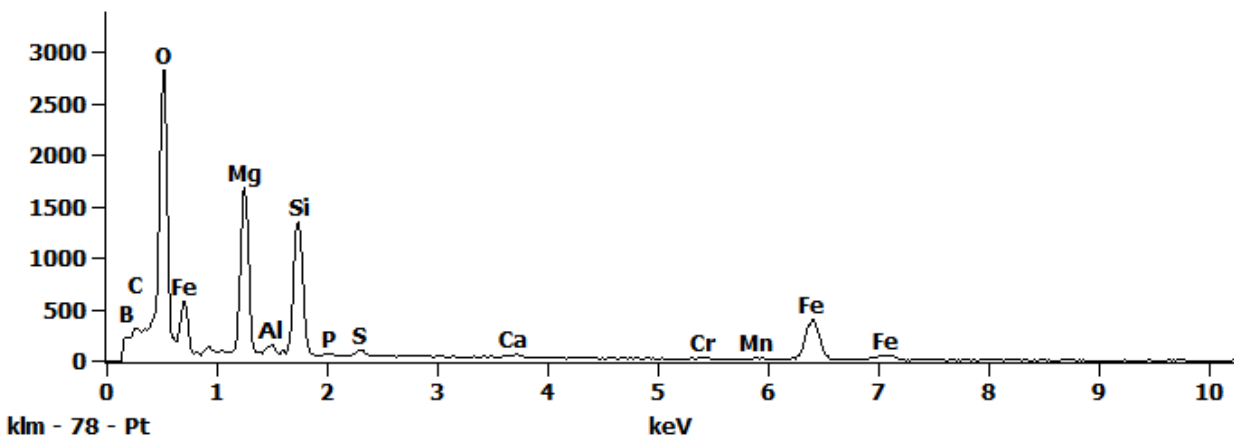


Figure 2. EDS Spectra for sample L2099-A-9 taken at test area 2. The test area is labeled in the particle SEM photo..



Full scale counts: 1577

L2099A-9(1)\_pt3

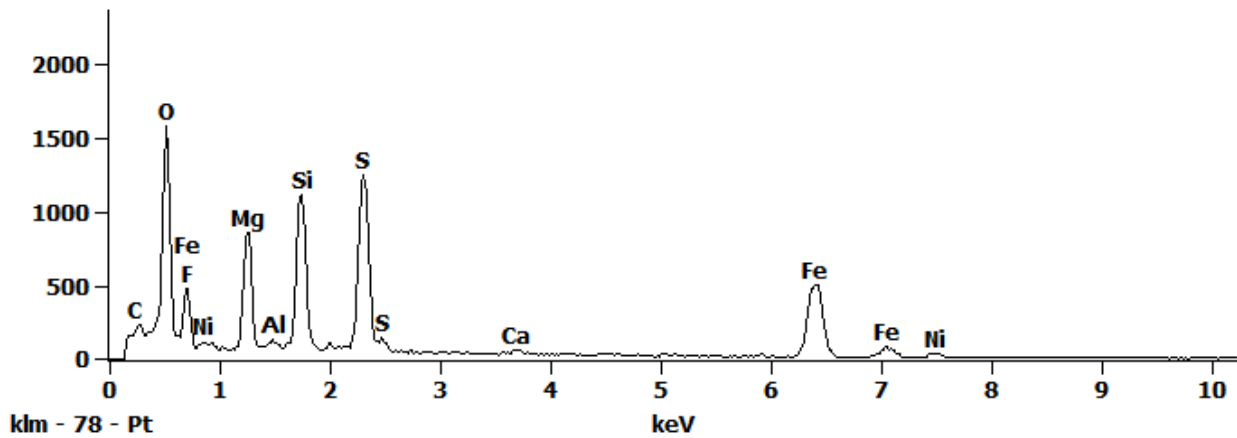


Figure 3. EDS Spectra for sample L2099-A-9 taken at test area 3. The test area is labeled in the particle SEM photo..

Full scale counts: 3366

L2099A-9(1)\_pt4

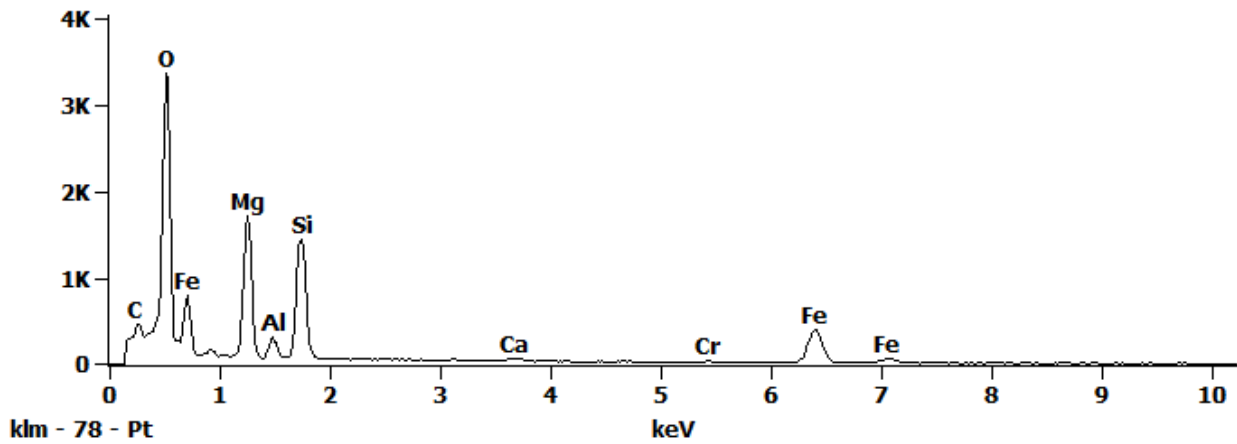
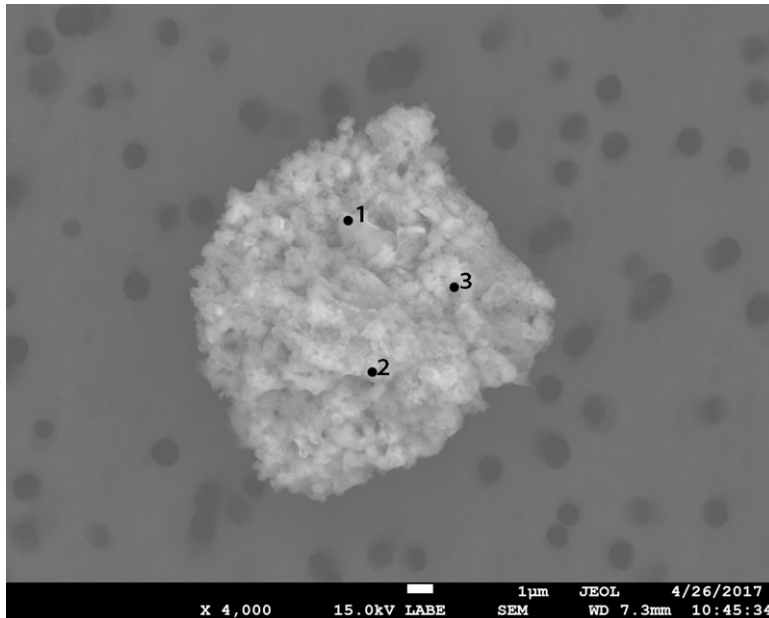


Figure 4. EDS Spectra for sample L2099-A-9 taken at test area 4. The test area is labeled in the particle SEM photo..

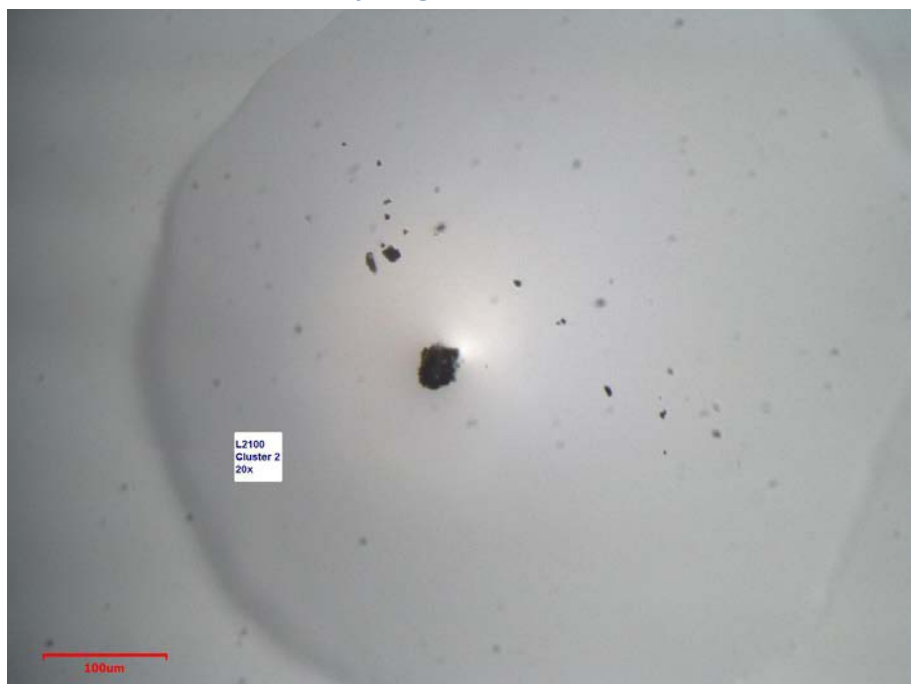
## L2100 A2



**Particle Size:** 14 µm  
**Shape:** Equidimensional  
**Transparency:** Opaque  
**Color:** BLACK  
**Luster:** Dull  
**Particle Type:** COSMIC  
**Cluster No.:** L2100 Cluster 2  
**Comments:**

*SEM Photo of sample L2100 A2 with labeled EDS testing locations.*

### *Cluster of Origin: L2100 Cluster 2*



*Photo of cluster L2100 Cluster 2.*

*L2100 A2 - EDS Spectra*

Full scale counts: 1255

L2100A-2(1)\_pt1

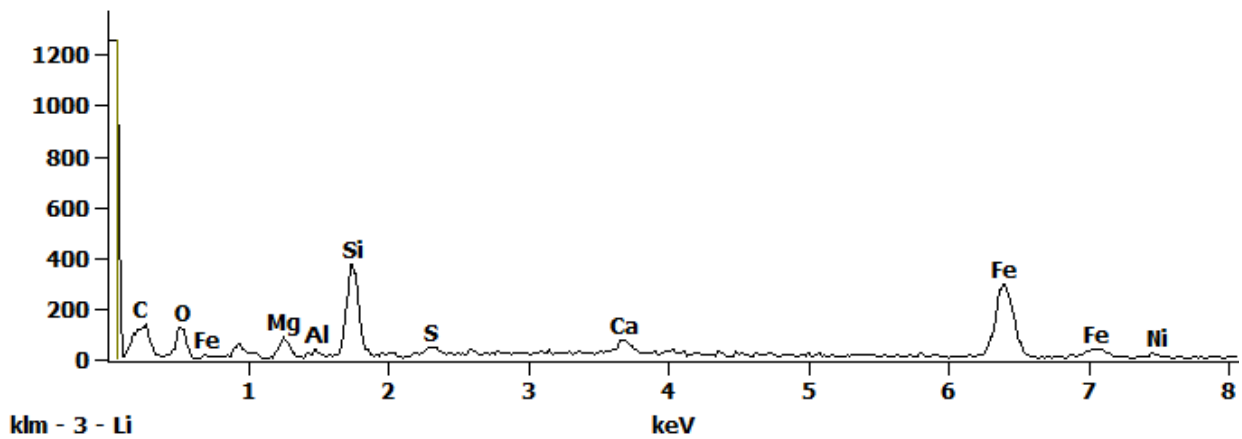


Figure 1. EDS Spectra for sample L2100-A-2 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 1255

L2100A-2(1)\_pt2

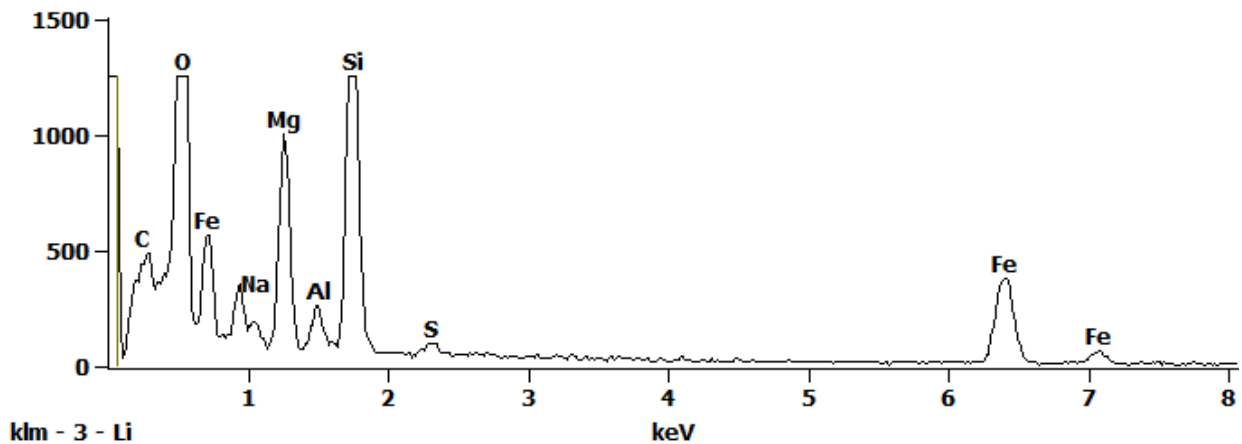


Figure 2. EDS Spectra for sample L2100-A-2 taken at test area 2. The test area is labeled in the particle SEM photo..

Full scale counts: 1255

L2100A-2(1)\_pt3

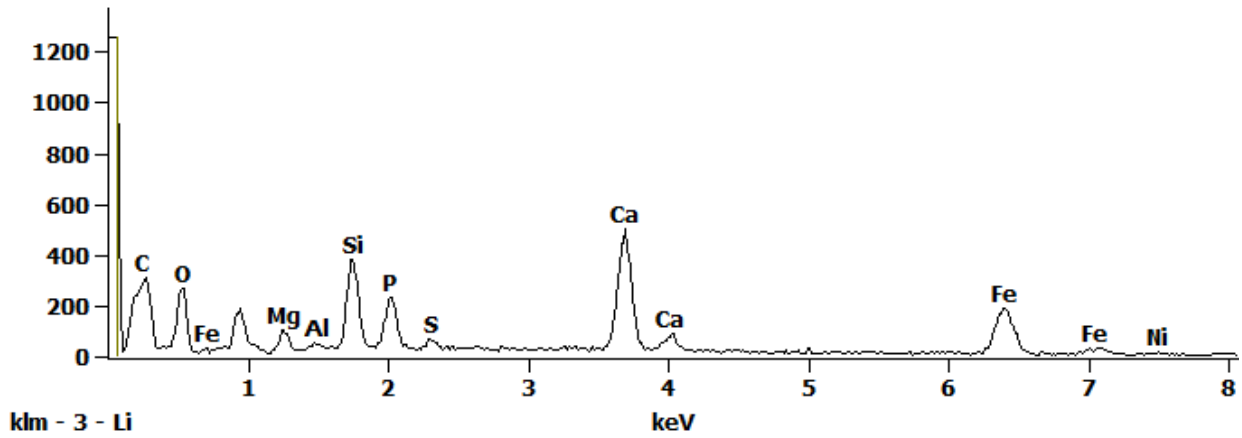
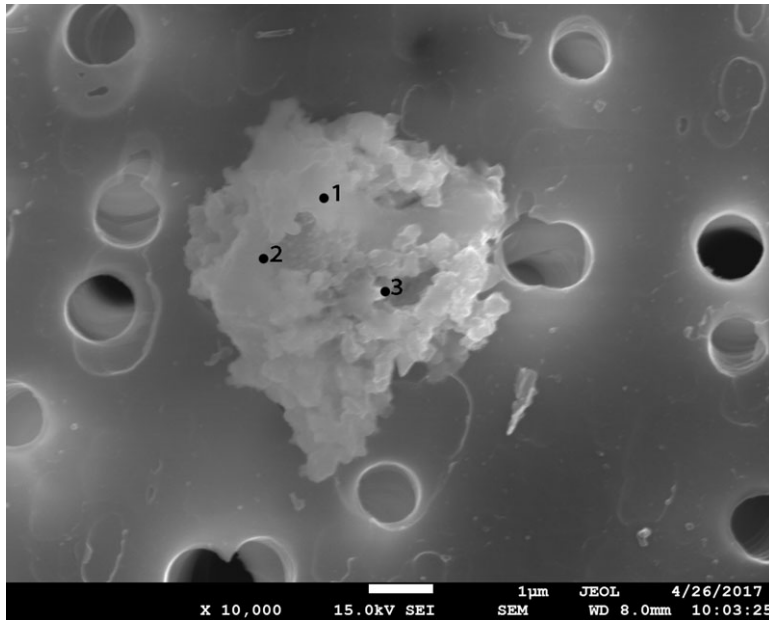


Figure 3. EDS Spectra for sample L2100-A-2 taken at test area 3. The test area is labeled in the particle SEM photo..

## L2100 A3



<b>Particle Size:</b>	6 µm
<b>Shape:</b>	Equidimensional
<b>Transparency:</b>	Opaque
<b>Color:</b>	BLACK
<b>Luster:</b>	Dull
<b>Particle Type:</b>	COSMIC
<b>Cluster No.:</b>	L2100 Cluster 3
<b>Comments:</b>	

SEM Photo of sample L2100 A3 with labeled EDS testing locations.

### Cluster of Origin: L2100 Cluster 3



Photo of cluster L2100 Cluster 3.

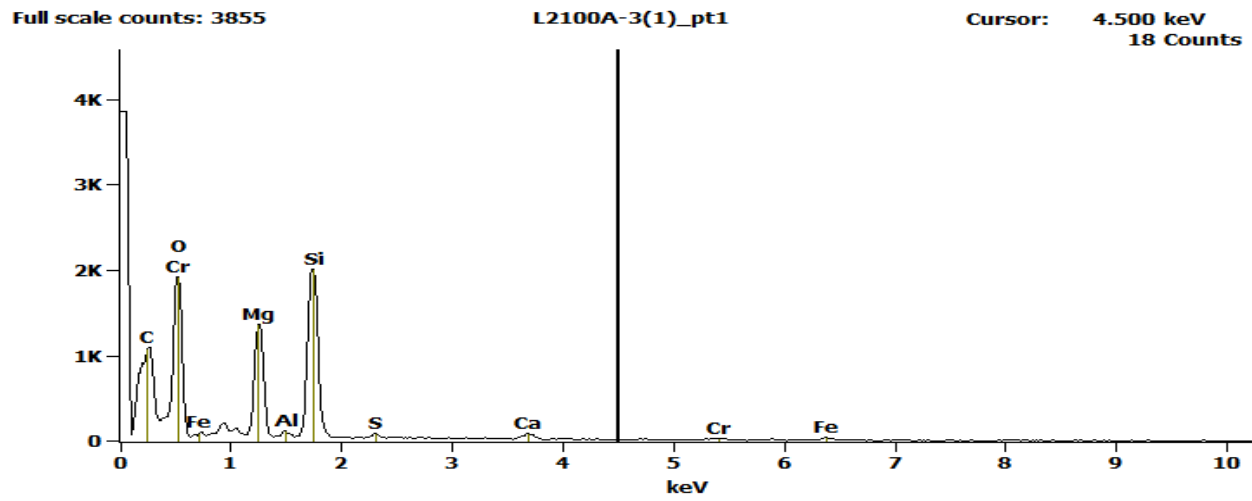
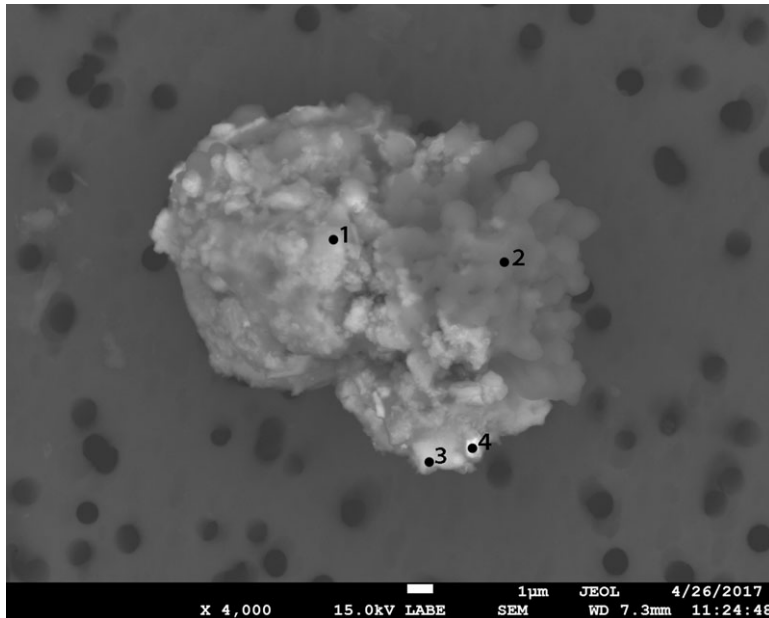
*L2100 A3 - EDS Spectra*

Figure 1. EDS Spectra for sample L2100-A-3 taken at test area 1. The test area is labeled in the particle SEM photo..

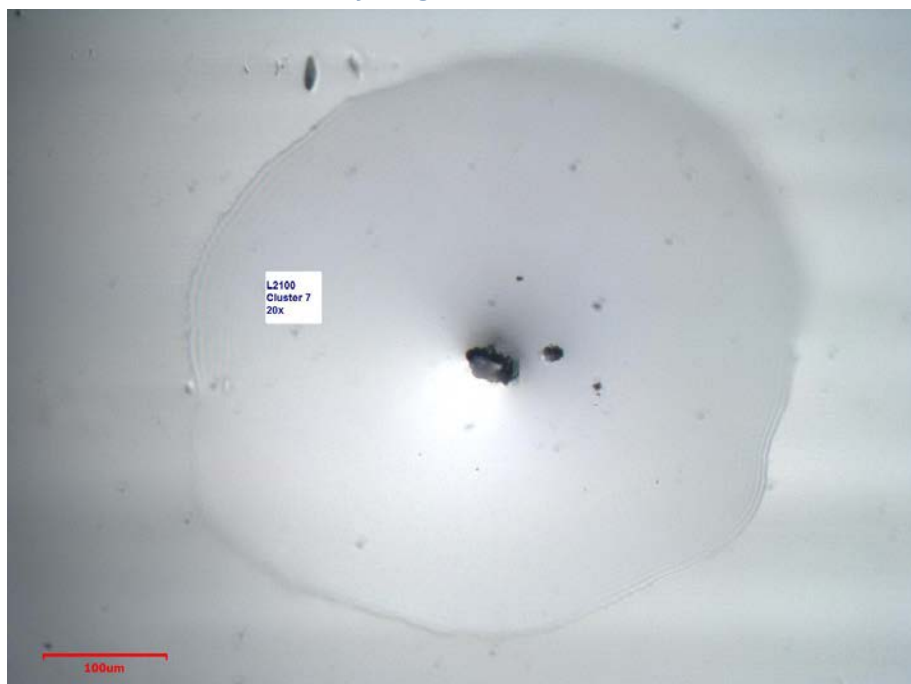
## L2100 A7



**Particle Size:** 14x16 µm  
**Shape:** Irregular to Equidimensional  
**Transparency:** Opaque  
**Color:** BLACK  
**Luster:** Pearly to Dull  
**Particle Type:** COSMIC  
**Cluster No.:** L2100 Cluster 7  
**Comments:**

*SEM Photo of sample L2100 A7 with labeled EDS testing locations.*

### *Cluster of Origin: L2100 Cluster 7*



*Photo of cluster L2100 Cluster 7.*

## L2100 A7 - EDS Spectra

Full scale counts: 1231

L2100A-7(1)\_pt1

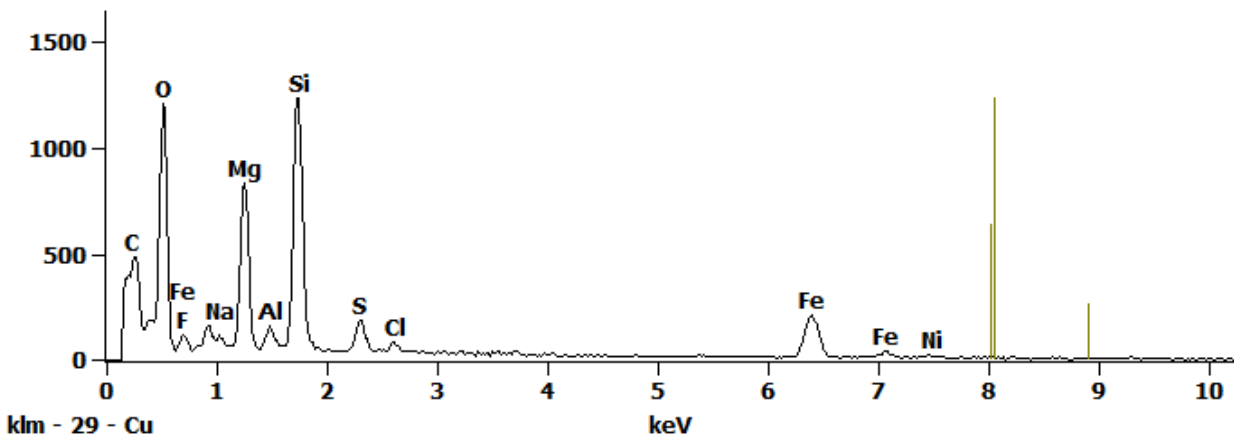


Figure 1. EDS Spectra for sample L2100-A-7 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 1316

L2100A-7(1)\_pt2

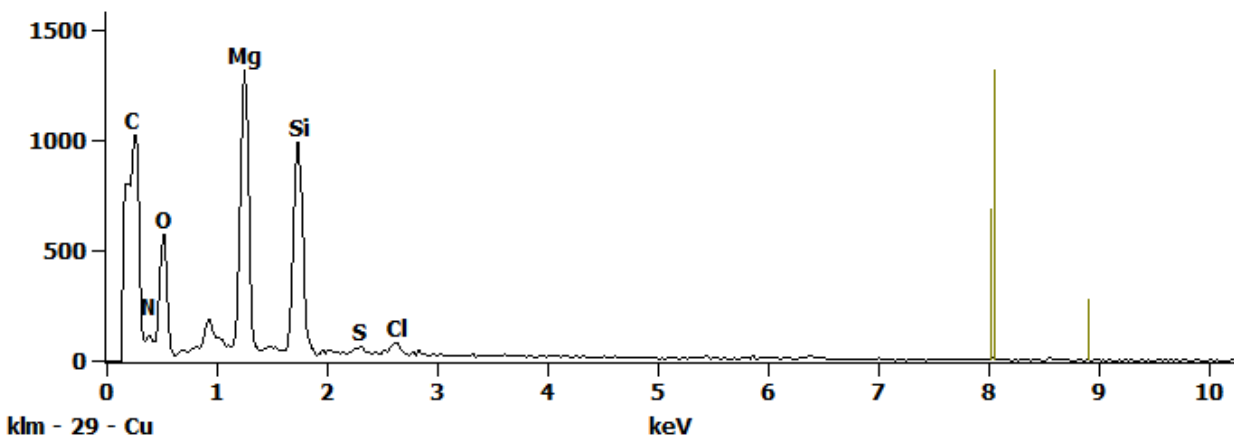


Figure 2. EDS Spectra for sample L2100-A-7 taken at test area 2. The test area is labeled in the particle SEM photo..



Full scale counts: 3246

L2100A-7(1)\_pt3

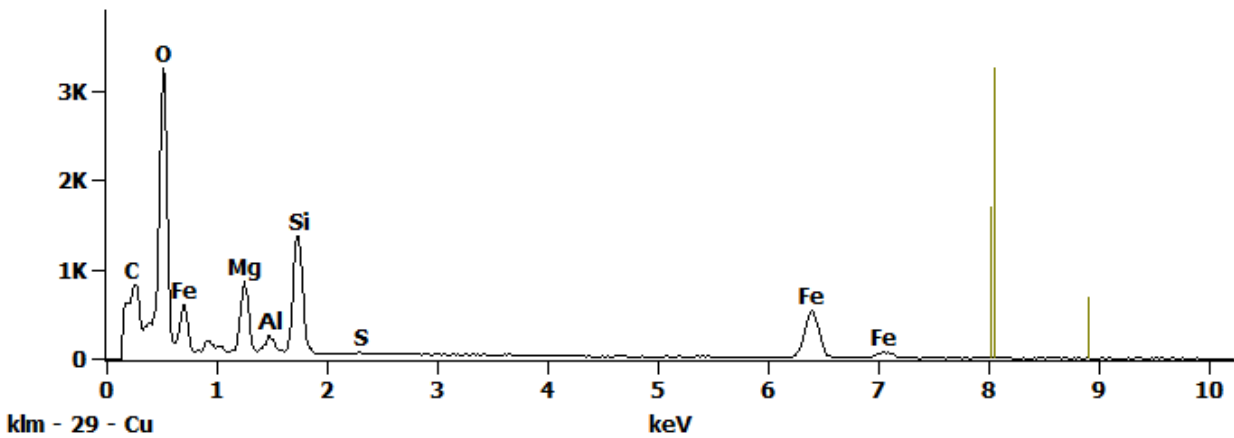


Figure 3. EDS Spectra for sample L2100-A-7 taken at test area 3. The test area is labeled in the particle SEM photo..

Full scale counts: 1848

L2100A-7(1)\_pt4

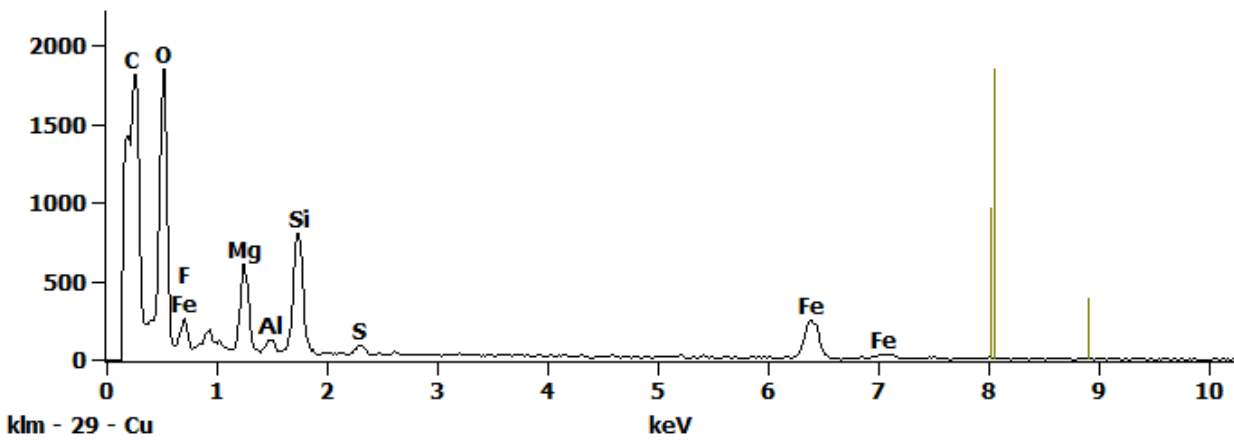
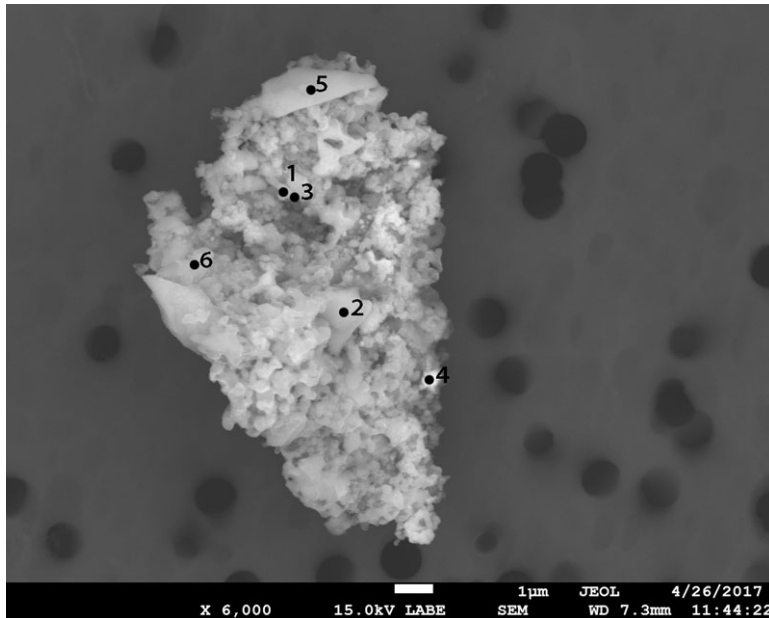


Figure 4. EDS Spectra for sample L2100-A-7 taken at test area 4. The test area is labeled in the particle SEM photo..

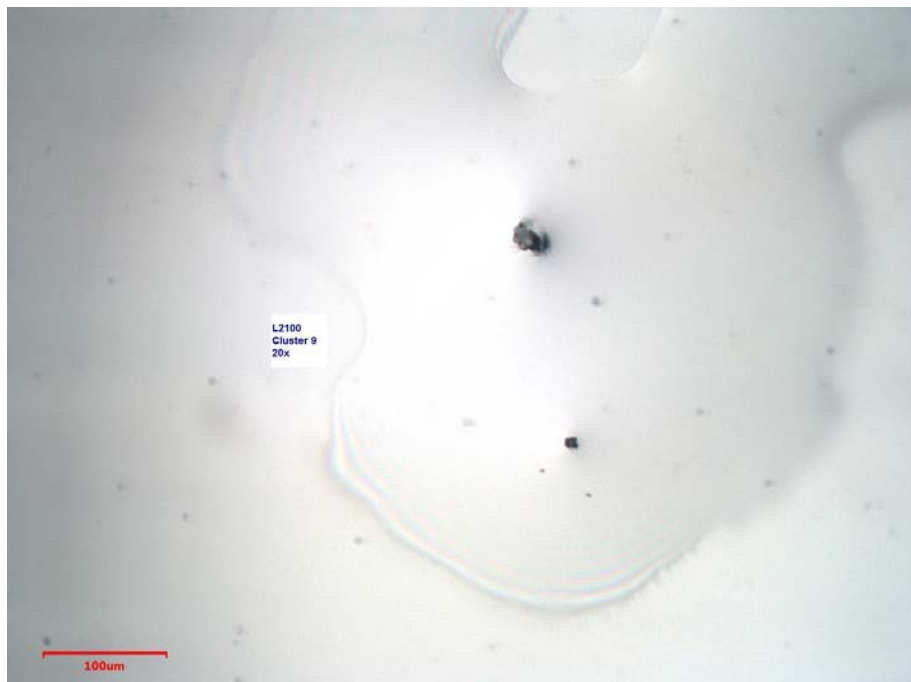
## L2100 A9



**Particle Size:** 11.5x6 µm  
**Shape:** Irregular  
**Transparency:** Opaque  
**Color:** BLACK  
**Luster:** Dull  
**Particle Type:** COSMIC  
**Cluster No.:** L2100 Cluster 9  
**Comments:**

*SEM Photo of sample L2100 A9 with labeled EDS testing locations.*

### *Cluster of Origin: L2100 Cluster 9*



*Photo of cluster L2100 Cluster 9.*

*L2100 A9 - EDS Spectra*

Full scale counts: 979

L2100A-9(1)\_pt1

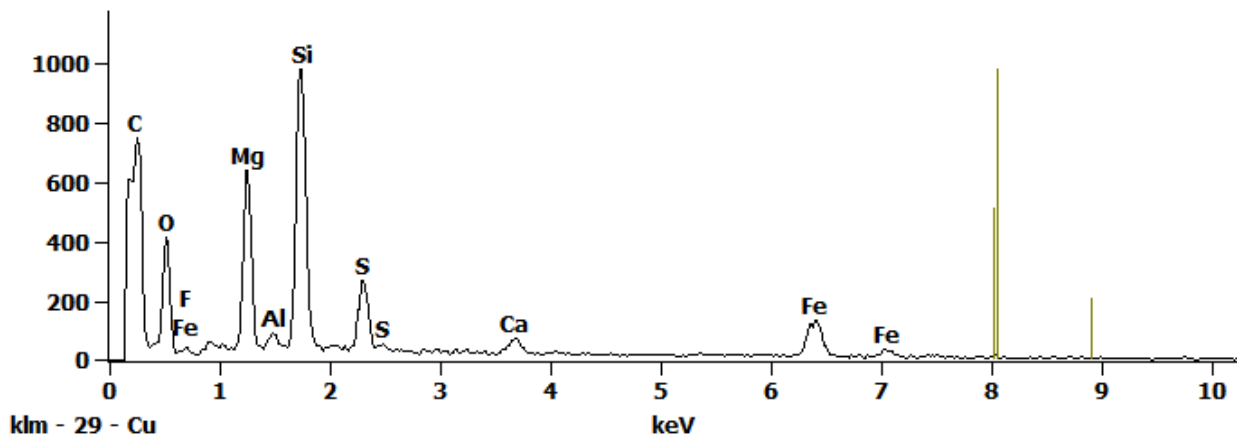


Figure 1. EDS Spectra for sample L2100-A-9 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 1173

L2100A-9(1)\_pt2

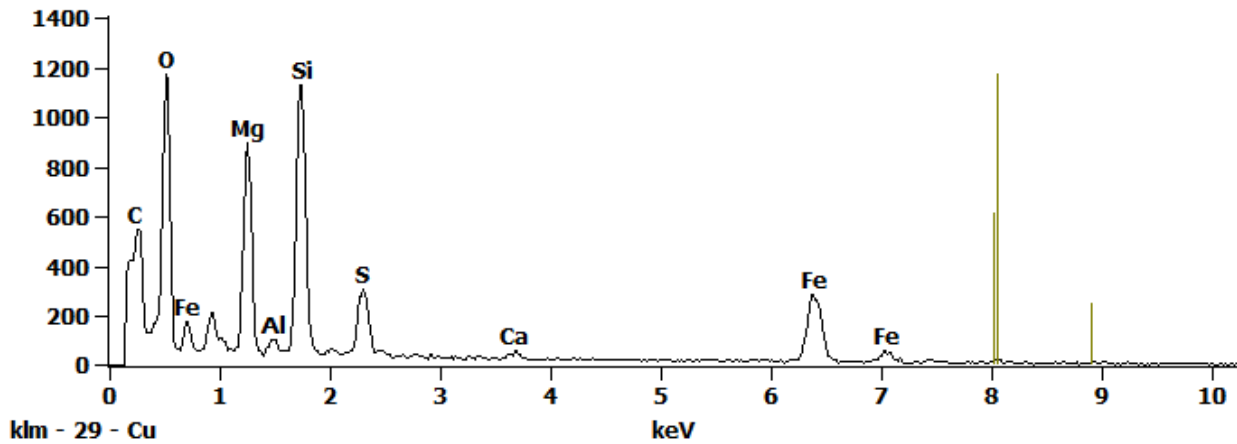


Figure 2. EDS Spectra for sample L2100-A-9 taken at test area 2. The test area is labeled in the particle SEM photo..

Full scale counts: 970

L2100A-9(1)\_pt3

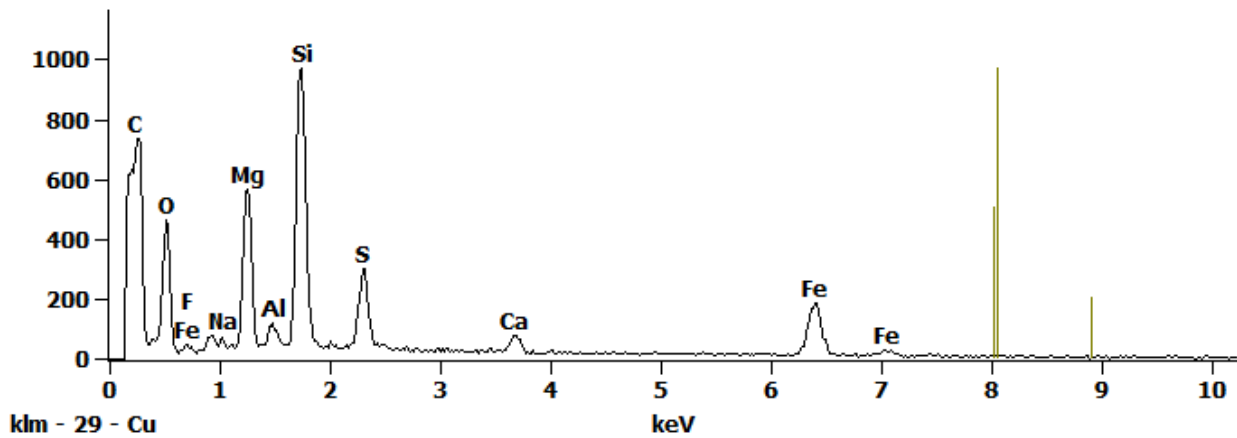


Figure 3. EDS Spectra for sample L2100-A-9 taken at test area 3. The test area is labeled in the particle SEM photo..

Full scale counts: 1360

L2100A-9(1)\_pt4

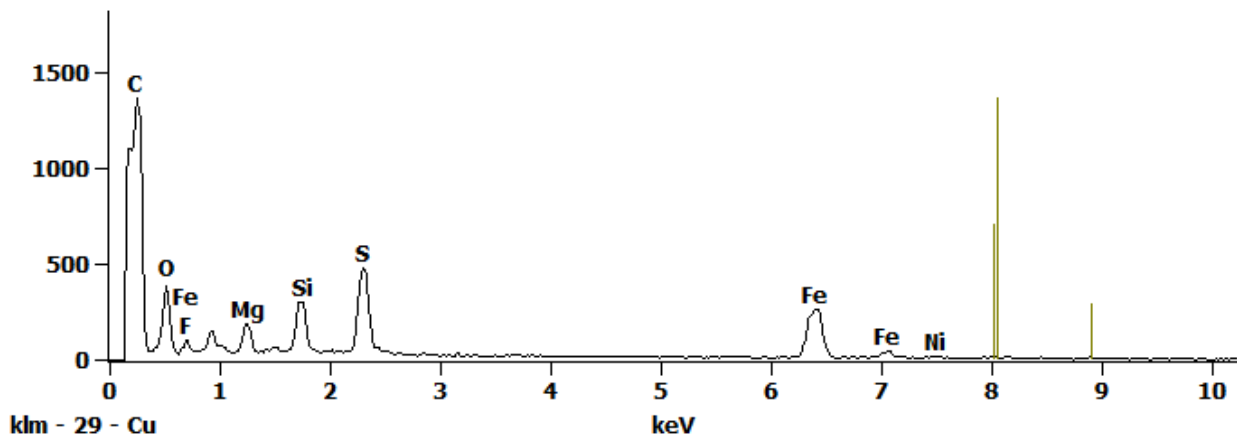


Figure 4. EDS Spectra for sample L2100-A-9 taken at test area 4. The test area is labeled in the particle SEM photo..

Full scale counts: 2752

L2100A-9(1)\_pt5

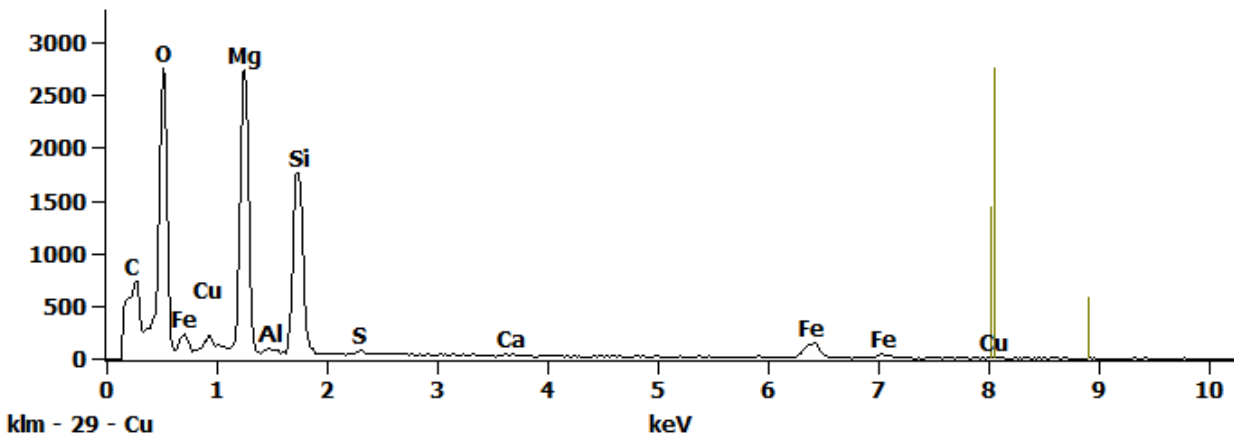


Figure 5. EDS Spectra for sample L2100-A-9 taken at test area 5. The test area is labeled in the particle SEM photo..

Full scale counts: 2365

L2100A-9(1)\_pt6

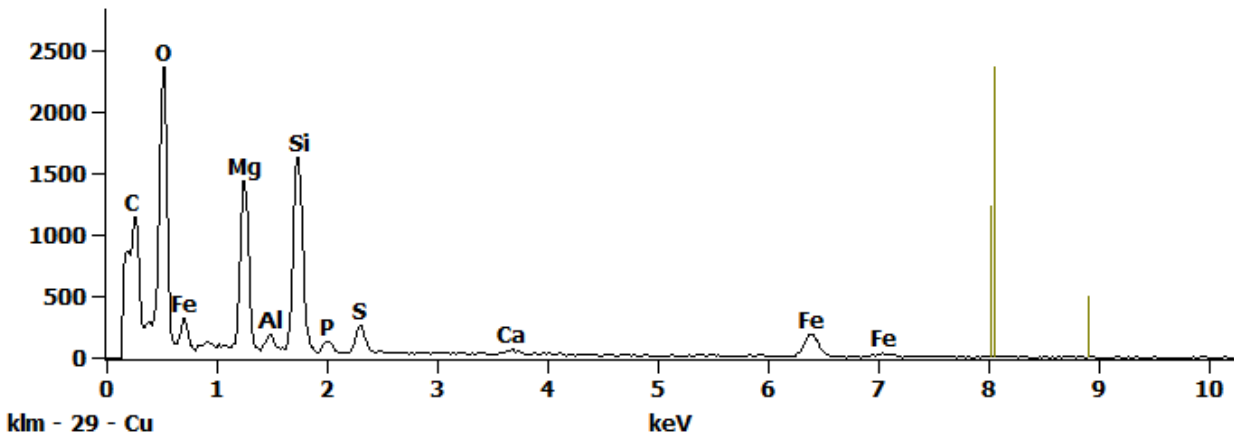


Figure 6. EDS Spectra for sample L2100-A-9 taken at test area 6. The test area is labeled in the particle SEM photo..

## L2101 A1



<b>Particle Size:</b>	8 µm
<b>Shape:</b>	Irregular
<b>Transparency:</b>	Opaque to Translucent
<b>Color:</b>	BLACK, GRAY
<b>Luster:</b>	Dull
<b>Particle Type:</b>	POSSIBLY COSMIC
<b>Cluster No.:</b>	L2101 Cluster 1
<b>Comments:</b>	

SEM Photo of sample L2101 A1 with labeled EDS testing locations.

### Cluster of Origin: L2101 Cluster 1

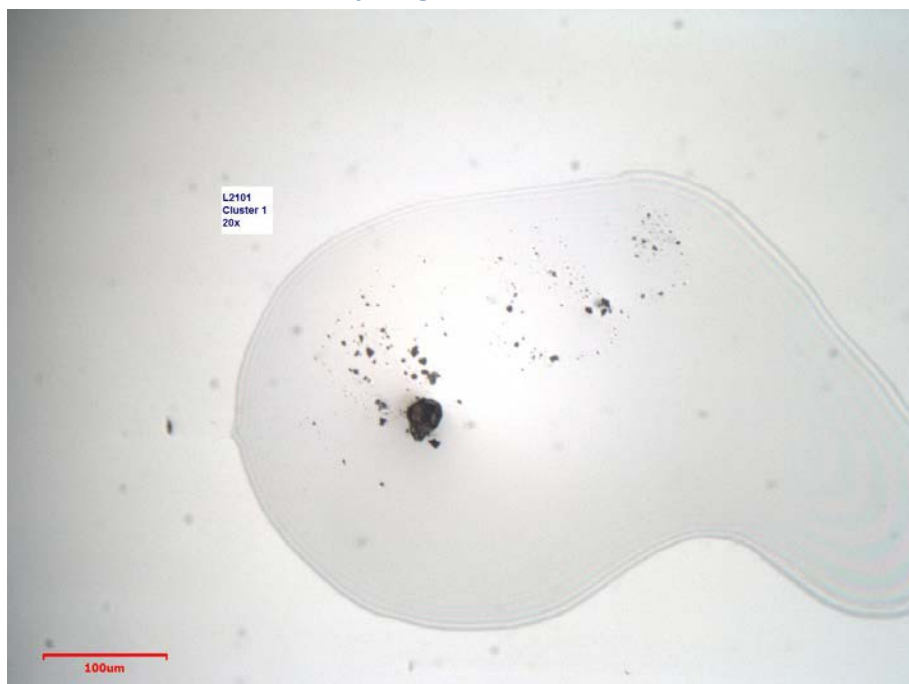


Photo of cluster L2101 Cluster 1.

*L2101 A1 - EDS Spectra*

Full scale counts: 2350

L2101A-1(1)\_pt1

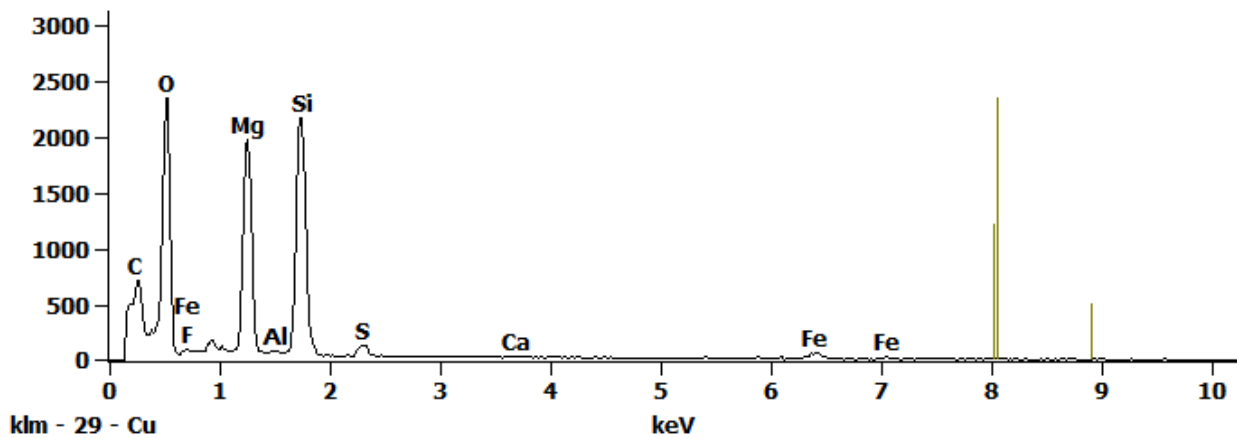


Figure 1. EDS Spectra for sample L2101-A-1 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 1861

L2101A-1(1)\_pt2

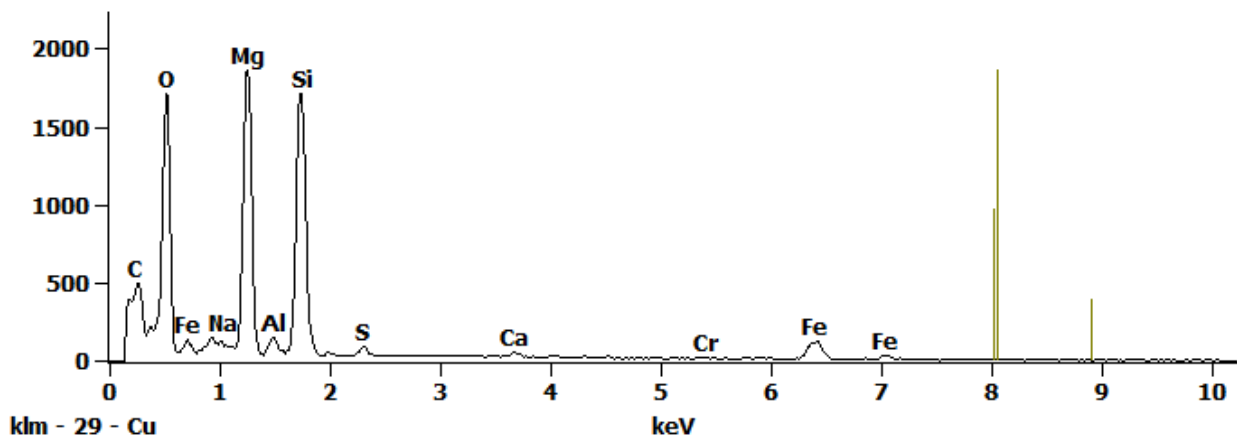


Figure 2. EDS Spectra for sample L2101-A-1 taken at test area 2. The test area is labeled in the particle SEM photo..

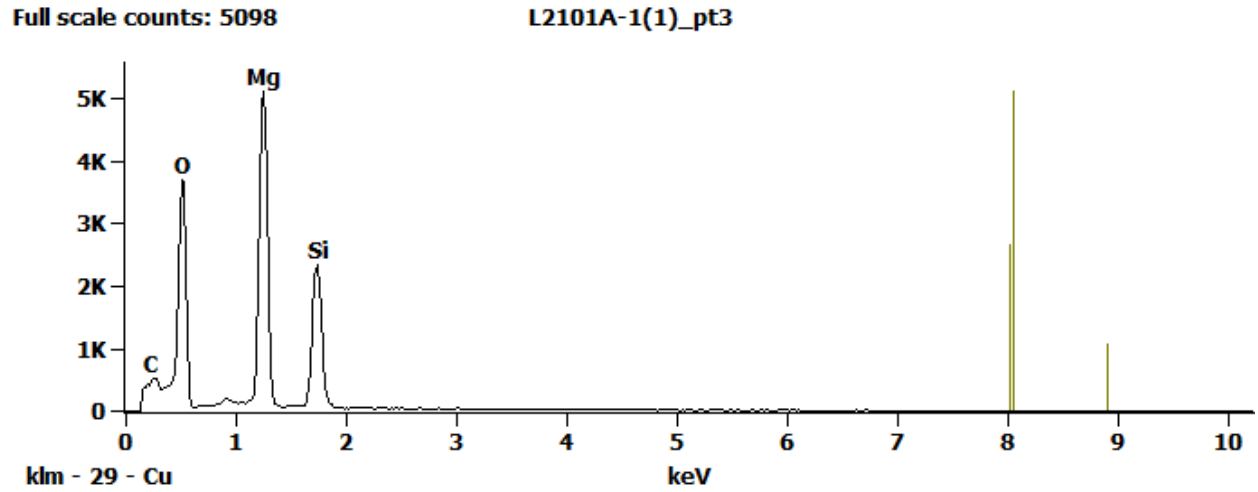
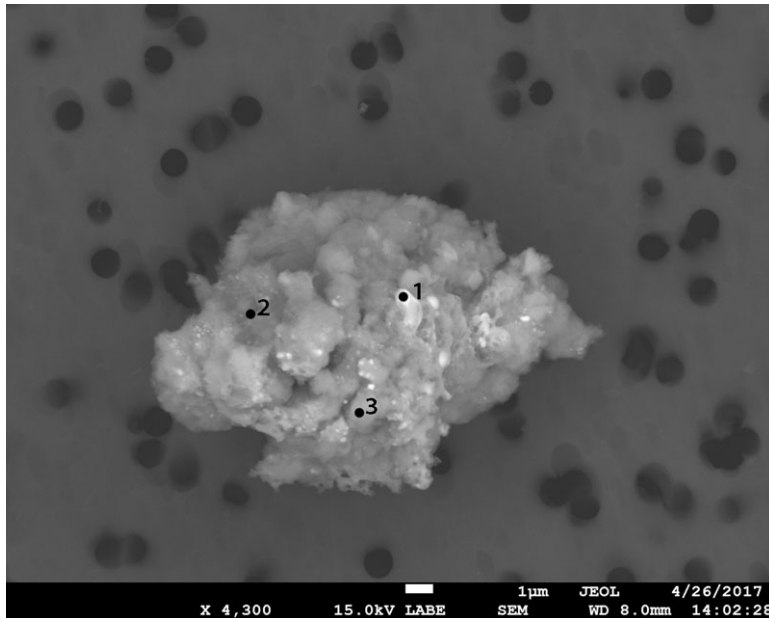


Figure 3. EDS Spectra for sample L2101-A-1 taken at test area 3. The test area is labeled in the particle SEM photo..



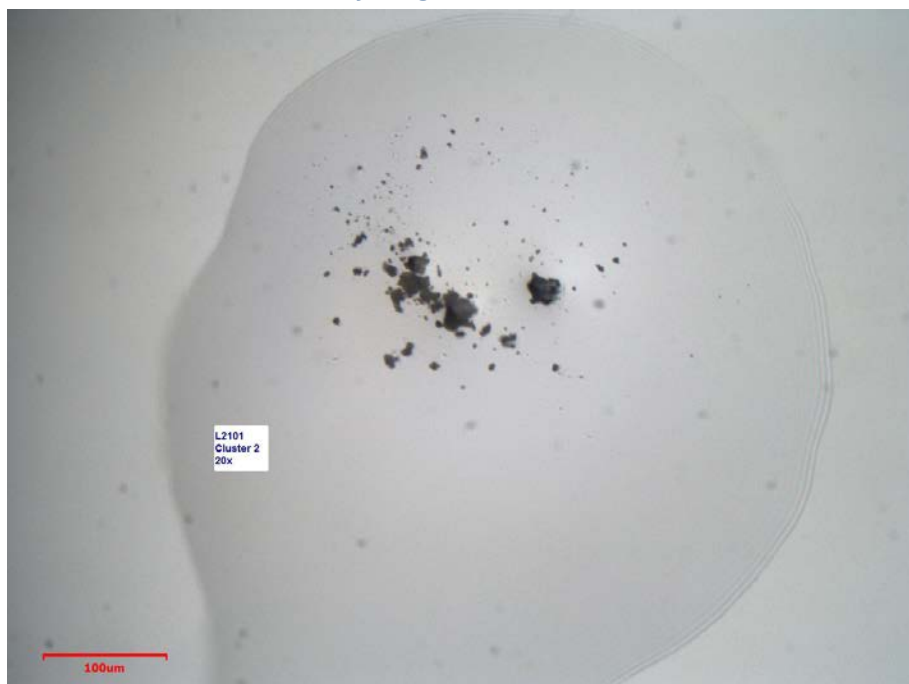
## L2101 A2



<b>Particle Size:</b>	13 µm
<b>Shape:</b>	Equidimensional
<b>Transparency:</b>	Opaque to Translucent
<b>Color:</b>	BLACK, GRAY
<b>Luster:</b>	Dull
<b>Particle Type:</b>	COSMIC
<b>Cluster No.:</b>	L2101 Cluster 2
<b>Comments:</b>	

*SEM Photo of sample L2101 A2 with labeled EDS testing locations.*

### *Cluster of Origin: L2101 Cluster 2*



*Photo of cluster L2101 Cluster 2.*

*L2101 A2 - EDS Spectra*

Full scale counts: 470

L2101A-2(1)\_pt1

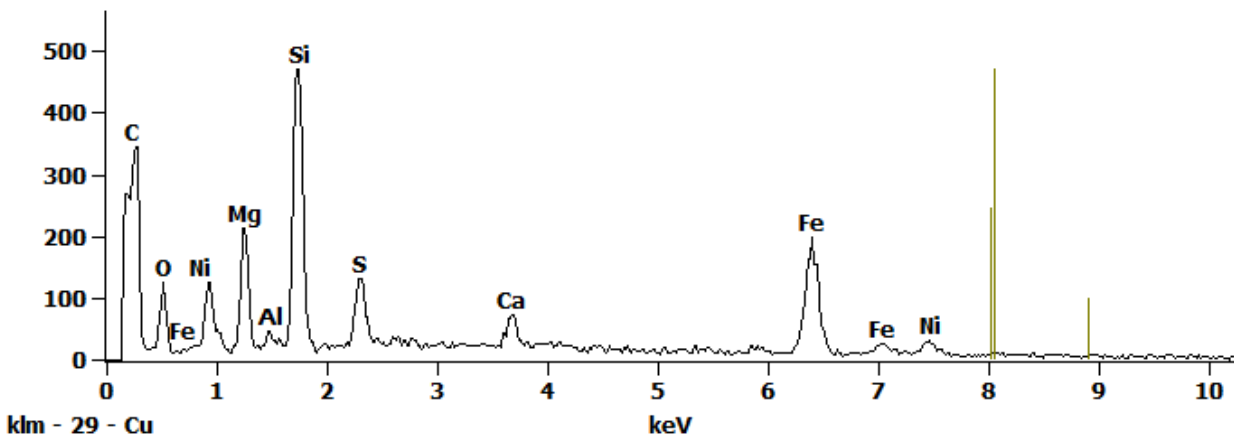


Figure 1. EDS Spectra for sample L2101-A-2 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 1211

L2101A-2(1)\_pt2

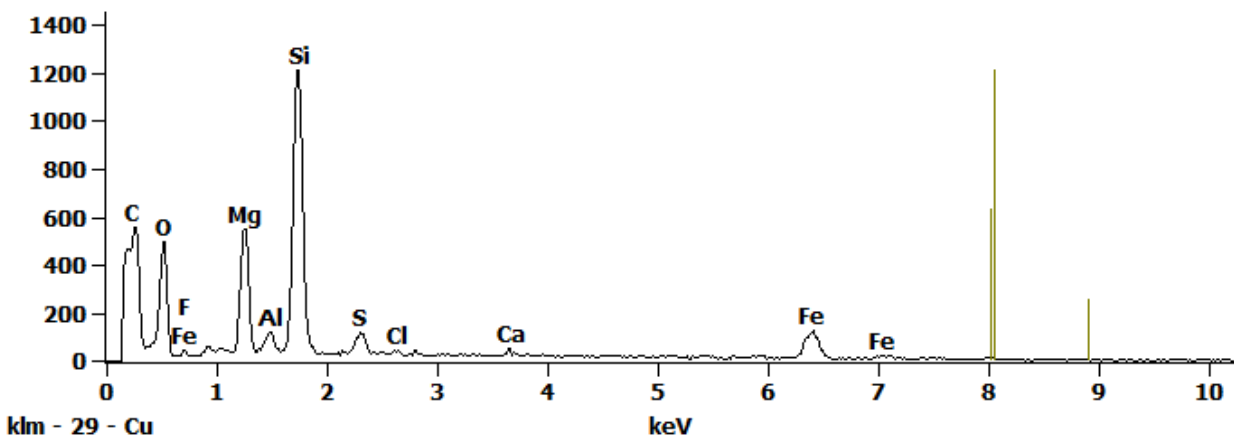


Figure 2. EDS Spectra for sample L2101-A-2 taken at test area 2. The test area is labeled in the particle SEM photo..

Full scale counts: 2449

L2101A-2(1)\_pt3

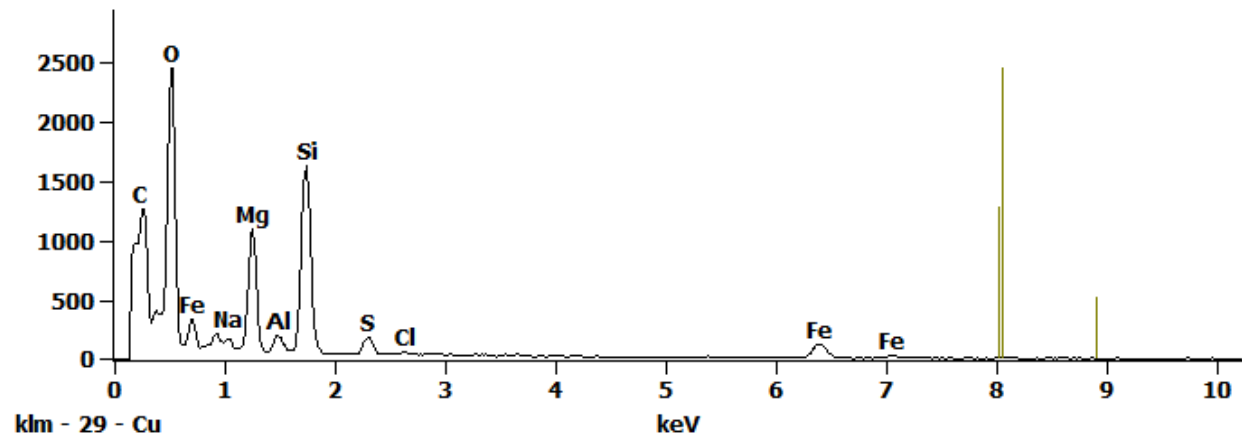
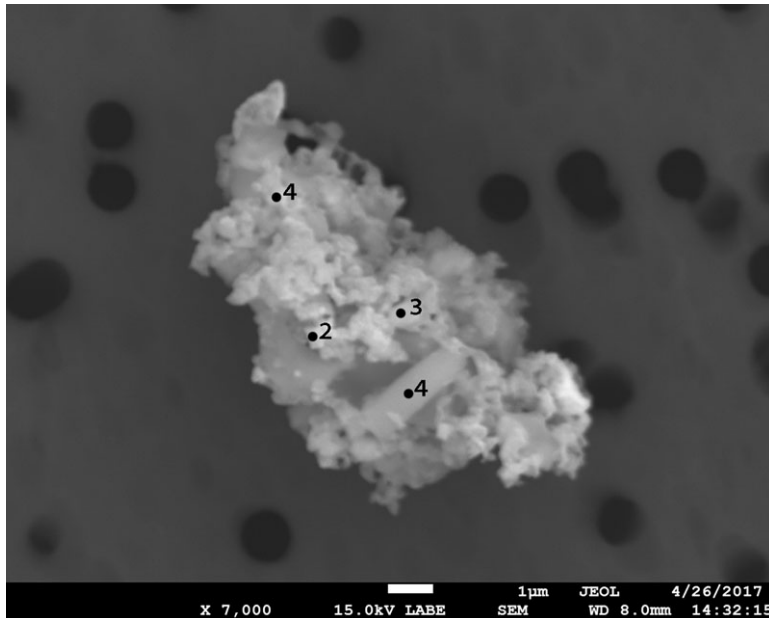


Figure 3. EDS Spectra for sample L2101A-2 taken at test area 3. The test area is labeled in the particle SEM photo..

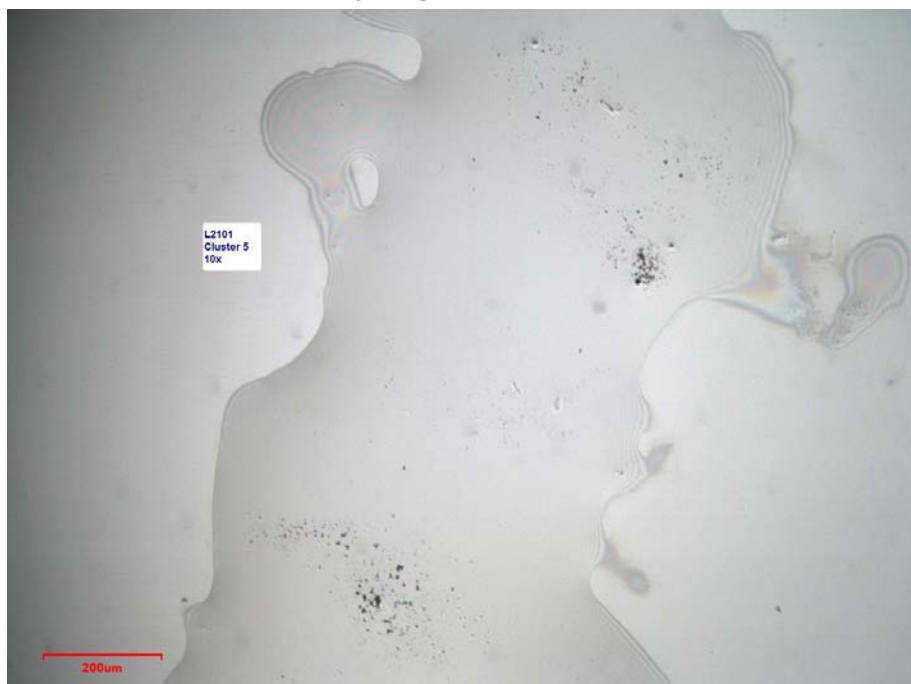
## L2101 A5



**Particle Size:** 6 µm  
**Shape:** Irregular  
**Transparency:** Opaque to Translucent  
**Color:** BLACK, GRAY  
**Luster:** Pearly to Dull  
**Particle Type:** POSSIBLY COSMIC  
**Cluster No.:** L2101 Cluster 5  
**Comments:**

*SEM Photo of sample L2101 A5 with labeled EDS testing locations.*

### *Cluster of Origin: L2101 Cluster 5*



*Photo of cluster L2101 Cluster 5.*

*L2101 A5 - EDS Spectra*

Full scale counts: 3655

L2101A-5(1)\_pt1

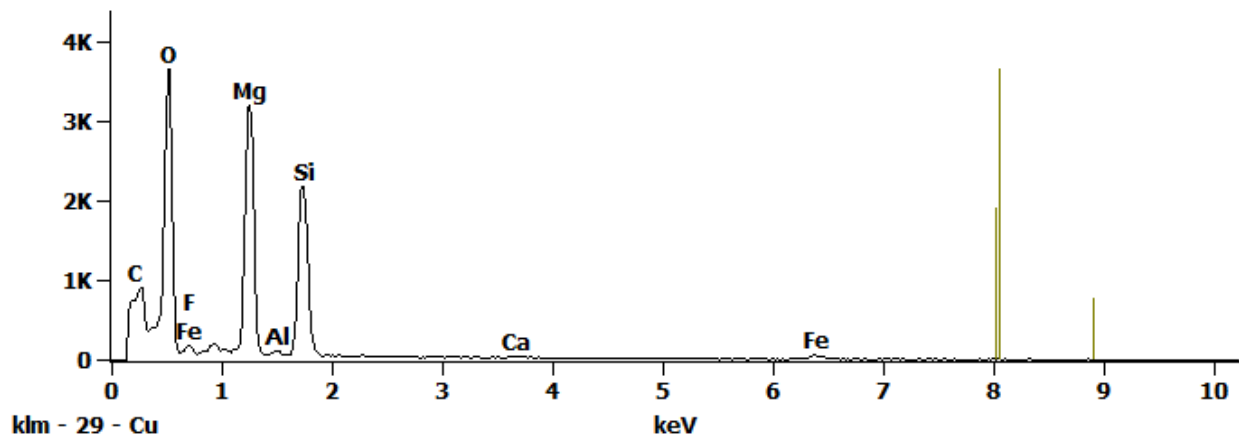


Figure 1. EDS Spectra for sample L2101-A-5 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 3386

L2101A-5(1)\_pt2

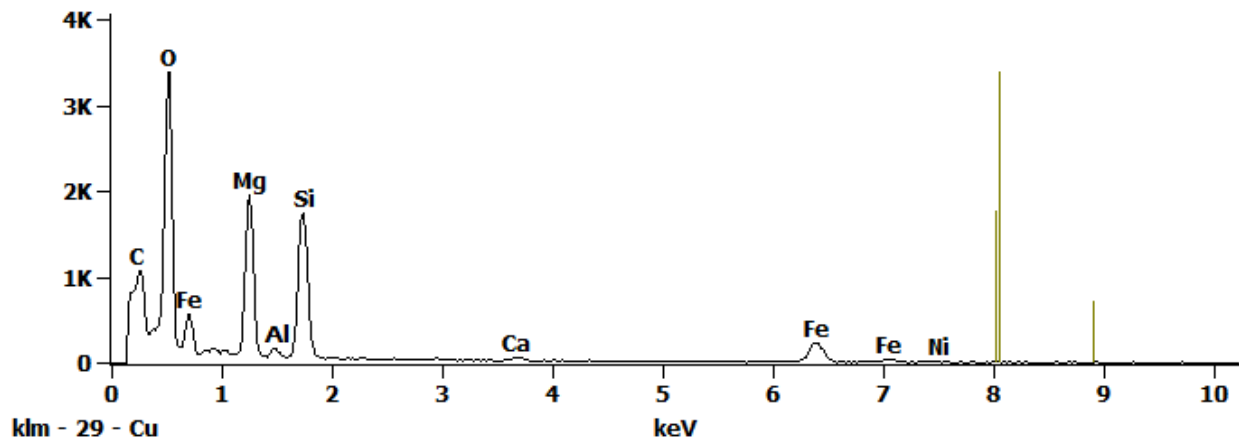


Figure 2. EDS Spectra for sample L2101-A-5 taken at test area 2. The test area is labeled in the particle SEM photo..

Full scale counts: 2523

L2101A-5(1)\_pt3

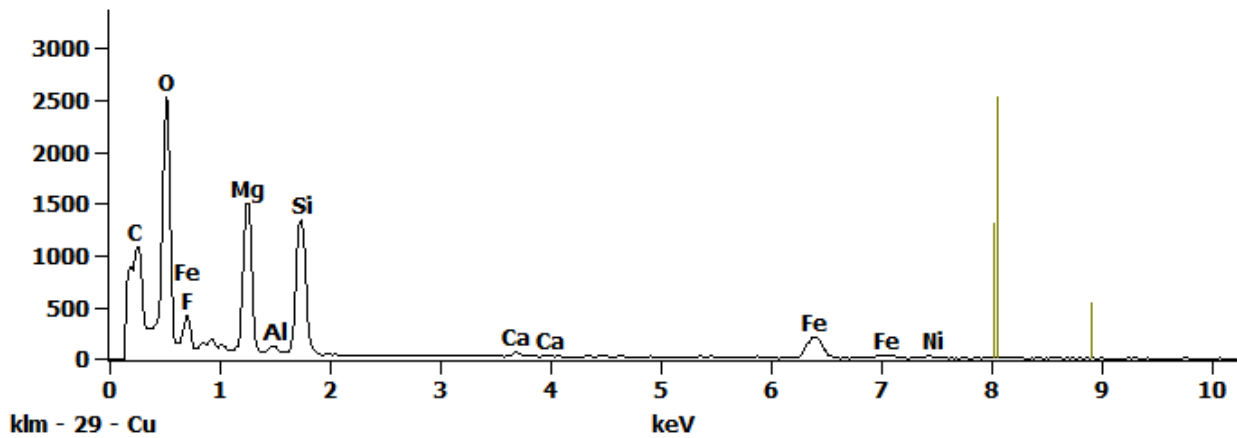


Figure 3. EDS Spectra for sample L2101-A-5 taken at test area 3. The test area is labeled in the particle SEM photo..

Full scale counts: 2110

L2101A-5(1)\_pt4

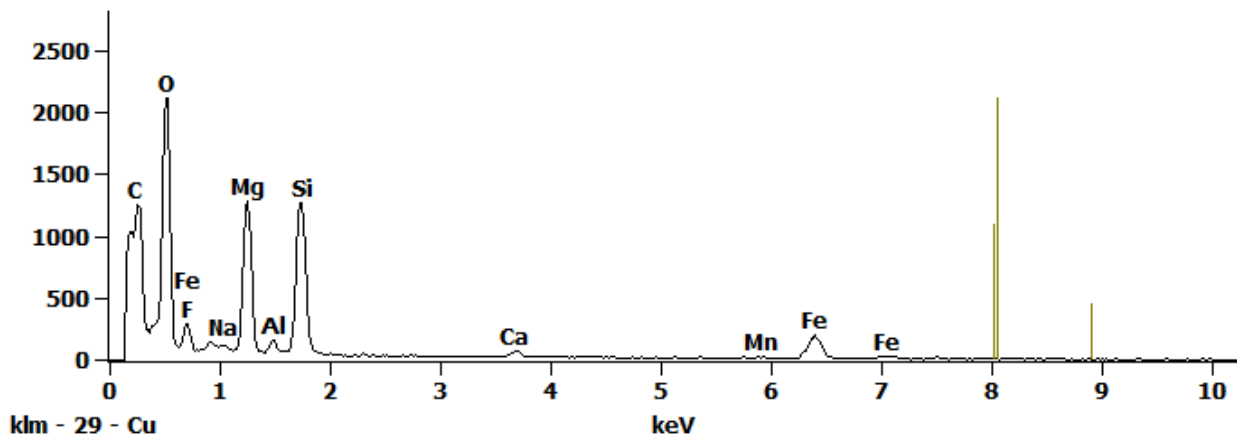
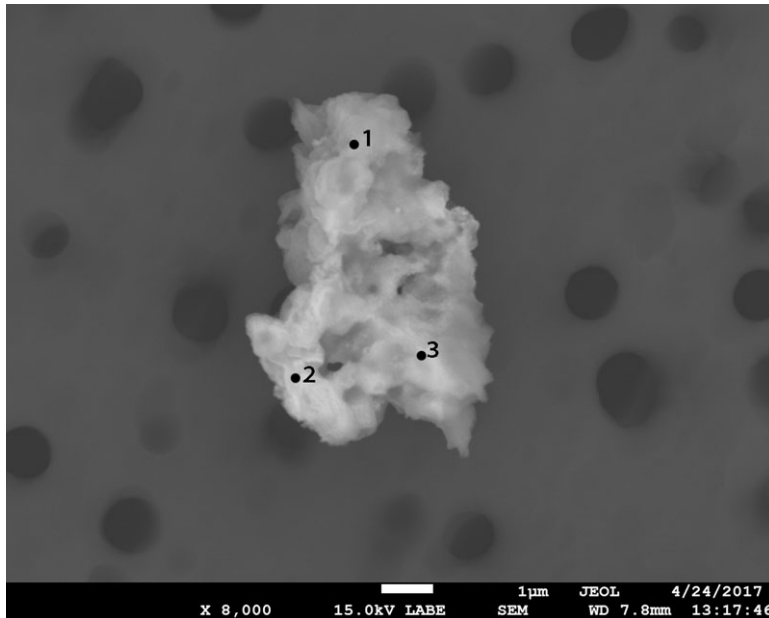


Figure 4. EDS Spectra for sample L2101-A-5 taken at test area 4. The test area is labeled in the particle SEM photo..

## L2103 A1



<b>Particle Size:</b>	7.5 µm
<b>Shape:</b>	Equidimensional to Irregular
<b>Transparency:</b>	Opaque to Translucent
<b>Color:</b>	GRAY
<b>Luster:</b>	Pearly to Subvitreous
<b>Particle Type:</b>	POSSIBLY COSMIC
<b>Cluster No.:</b>	L2103 Cluster 1
<b>Comments:</b>	

SEM Photo of sample L2103 A1 with labeled EDS testing locations.

### Cluster of Origin: L2103 Cluster 1

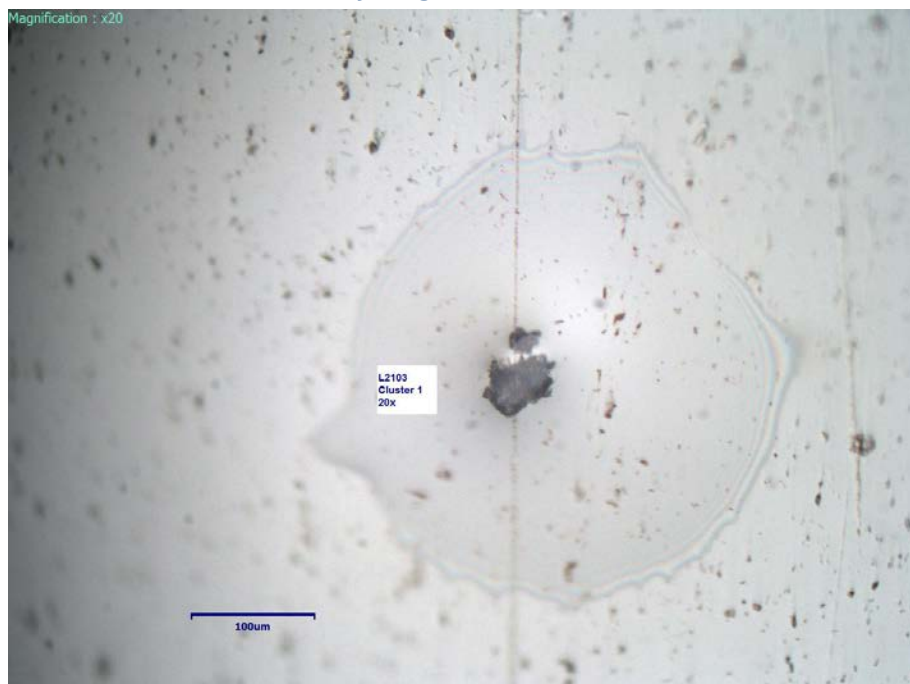


Photo of cluster L2103 Cluster 1.

*L2103 A1 - EDS Spectra*

Full scale counts: 1876

L2103-A1(1)\_pt1

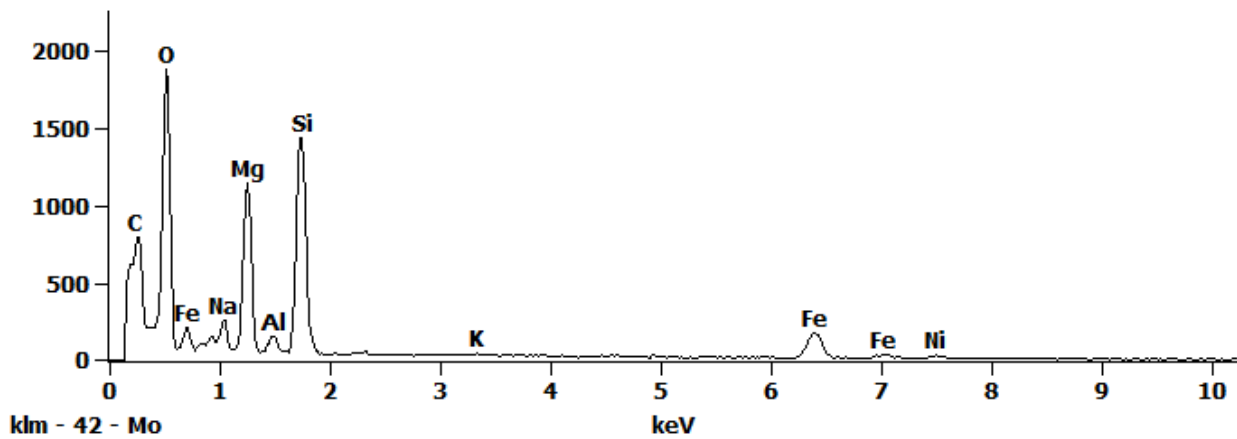


Figure 1. EDS Spectra for sample L2103-A-1 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 2548

L2103-A1(1)\_pt2

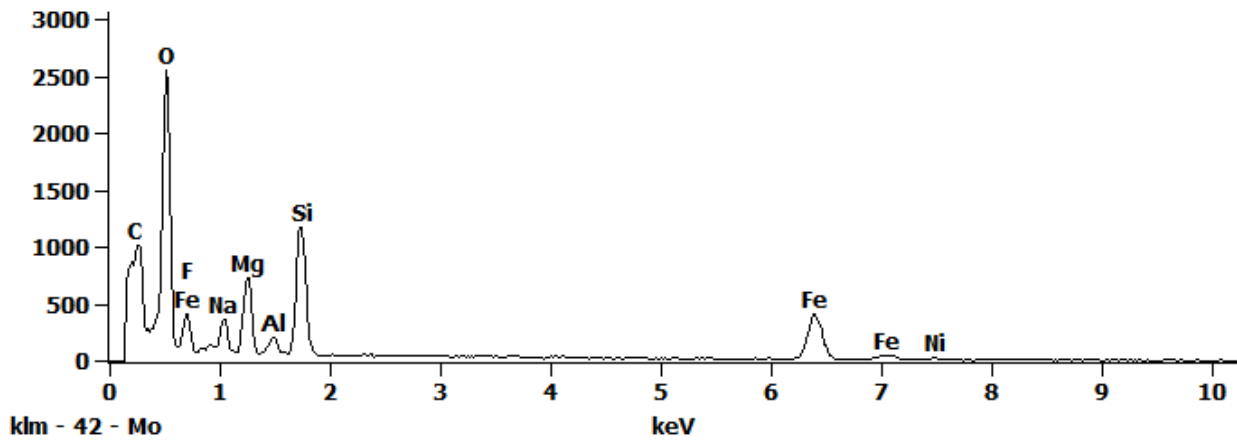


Figure 2. EDS Spectra for sample L2103-A-1 taken at test area 2. The test area is labeled in the particle SEM photo..



Full scale counts: 2799

L2103-A1(1)\_pt3

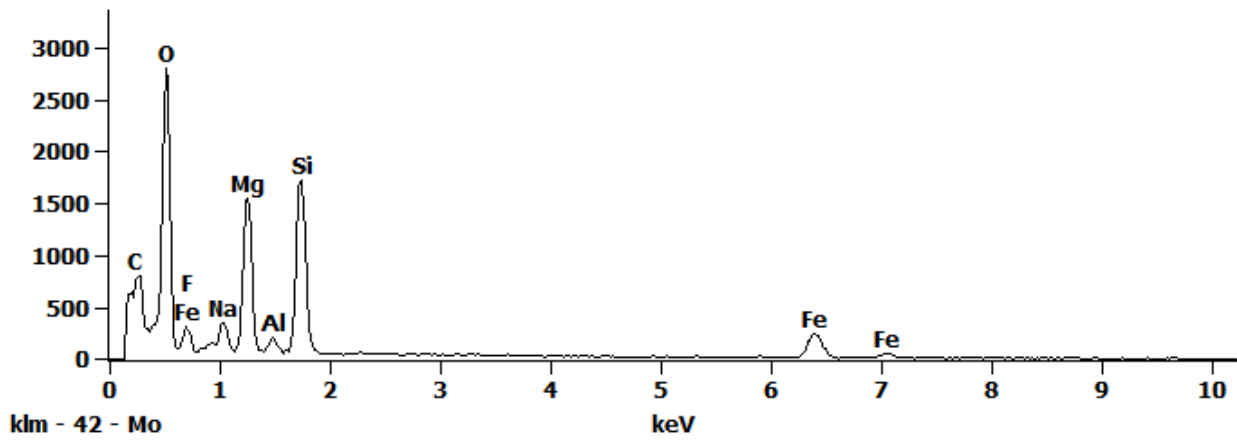
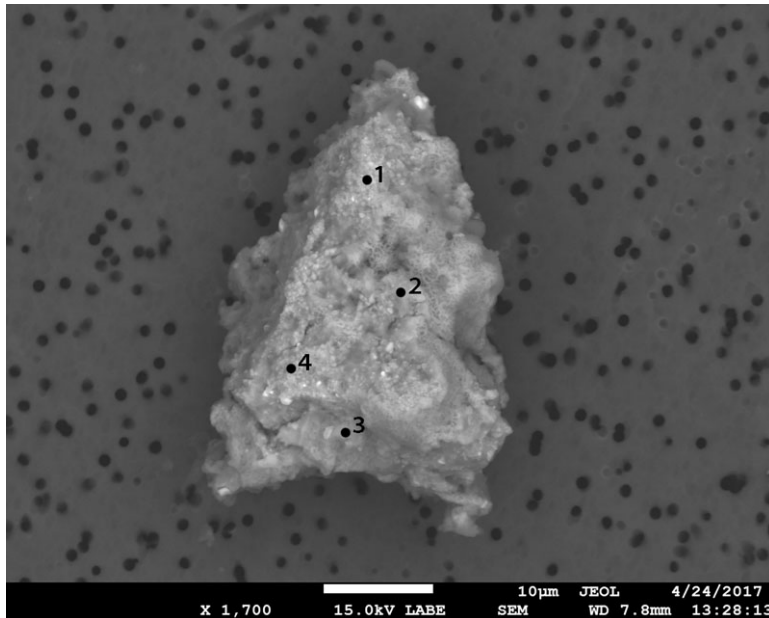


Figure 3. EDS Spectra for sample L2103-A-1 taken at test area 3. The test area is labeled in the particle SEM photo..

## L2103 A3



**Particle Size:** 45 µm  
**Shape:** Irregular  
**Transparency:** Opaque  
**Color:** BLACK  
**Luster:** Pearly to Dull  
**Particle Type:** POSSIBLY COSMIC  
**Cluster No.:** L2103 Cluster 3  
**Comments:**

*SEM Photo of sample L2103 A3 with labeled EDS testing locations.*

### *Cluster of Origin: L2103 Cluster 3*



*Photo of cluster L2103 Cluster 3.*

*L2103 A3 - EDS Spectra*

Full scale counts: 1402

L2103-A3(1)\_pt1

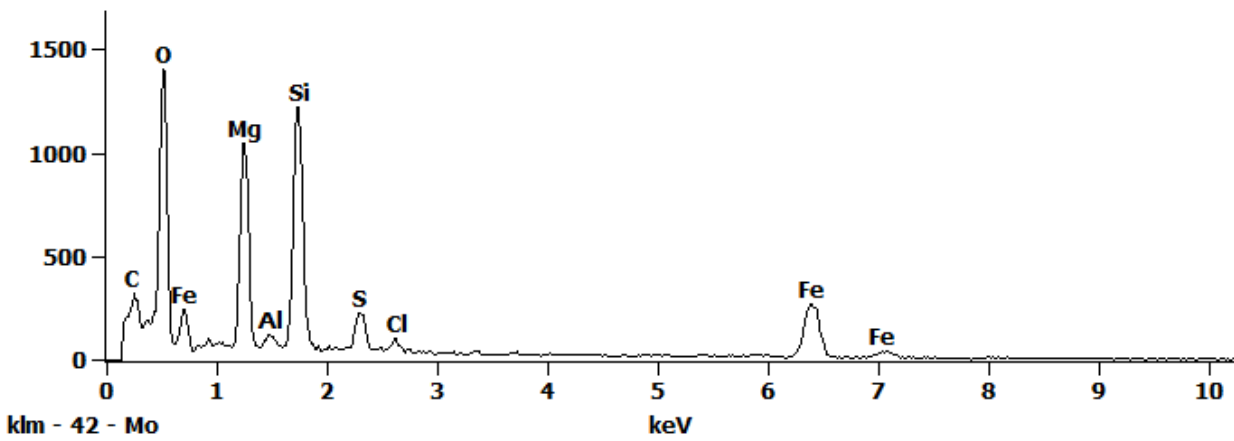


Figure 1. EDS Spectra for sample L2103-A-3 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 2311

L2103-A3(1)\_pt2

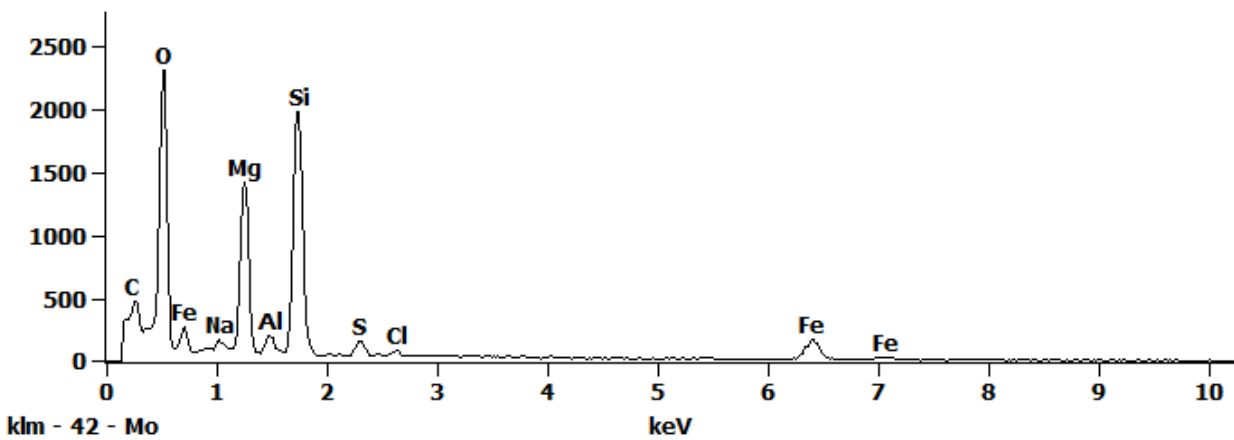


Figure 2. EDS Spectra for sample L2103-A-3 taken at test area 2. The test area is labeled in the particle SEM photo..

Full scale counts: 2692

L2103-A3(1)\_pt3

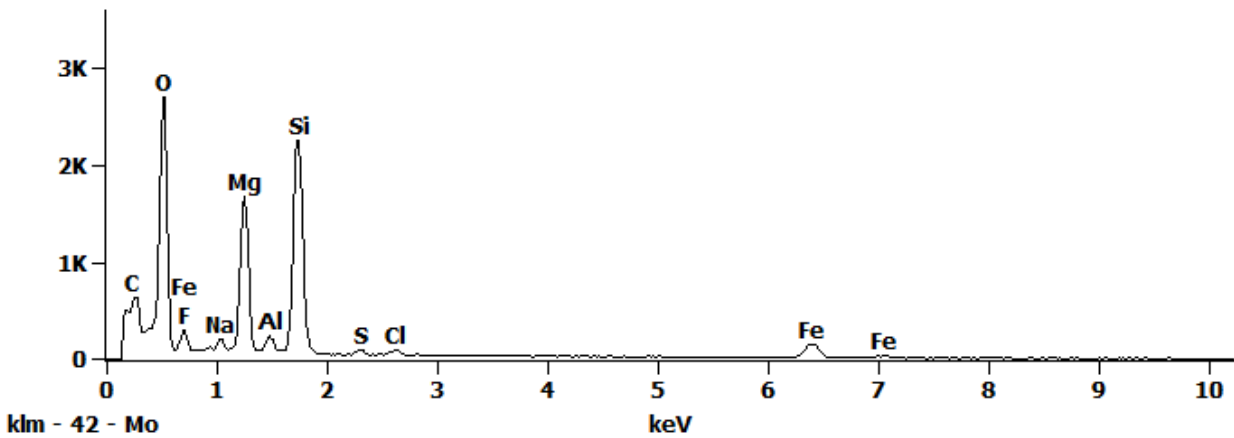


Figure 3. EDS Spectra for sample L2103-A-3 taken at test area 3. The test area is labeled in the particle SEM photo..

Full scale counts: 2332

L2103-A3(1)\_pt4

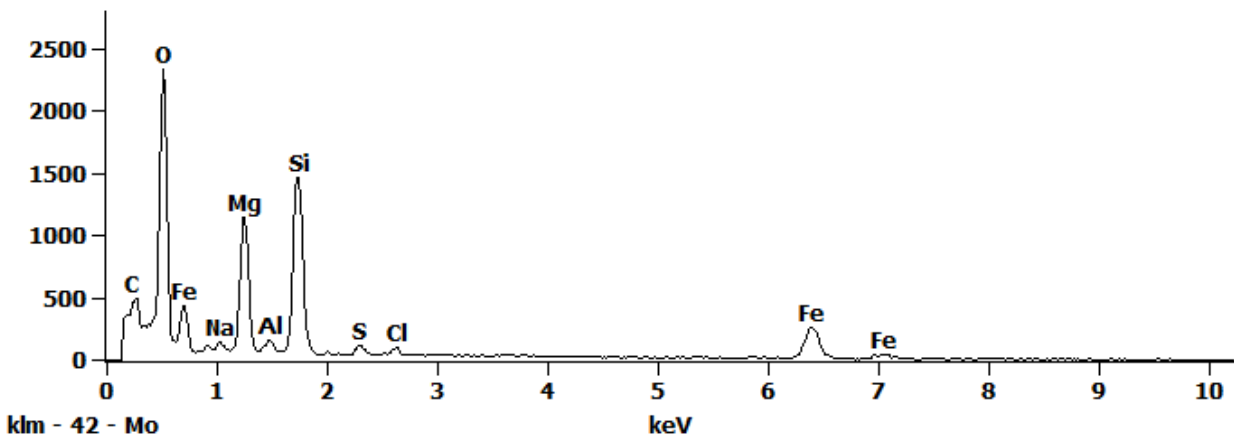
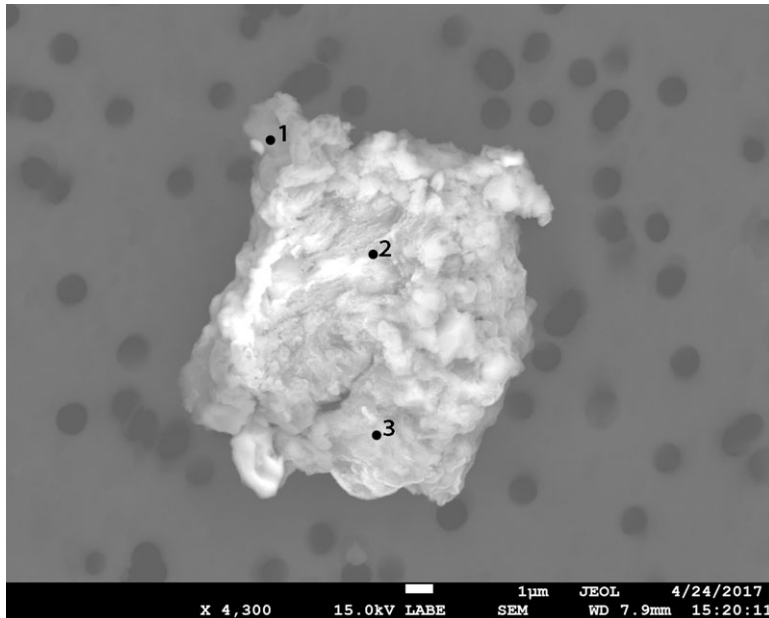


Figure 4. EDS Spectra for sample L2103-A-3 taken at test area 4. The test area is labeled in the particle SEM photo..

## L2103 A15



<b>Particle Size:</b>	13 µm
<b>Shape:</b>	Irregular to Equidimensional
<b>Transparency:</b>	Opaque
<b>Color:</b>	BLACK
<b>Luster:</b>	Dull
<b>Particle Type:</b>	COSMIC
<b>Cluster No.:</b>	
<b>Comments:</b>	

SEM Photo of sample L2103 A15 with labeled EDS testing locations.

### L2103 A15 - EDS Spectra

Full scale counts: 2977

L2103-A15(1)\_pt1

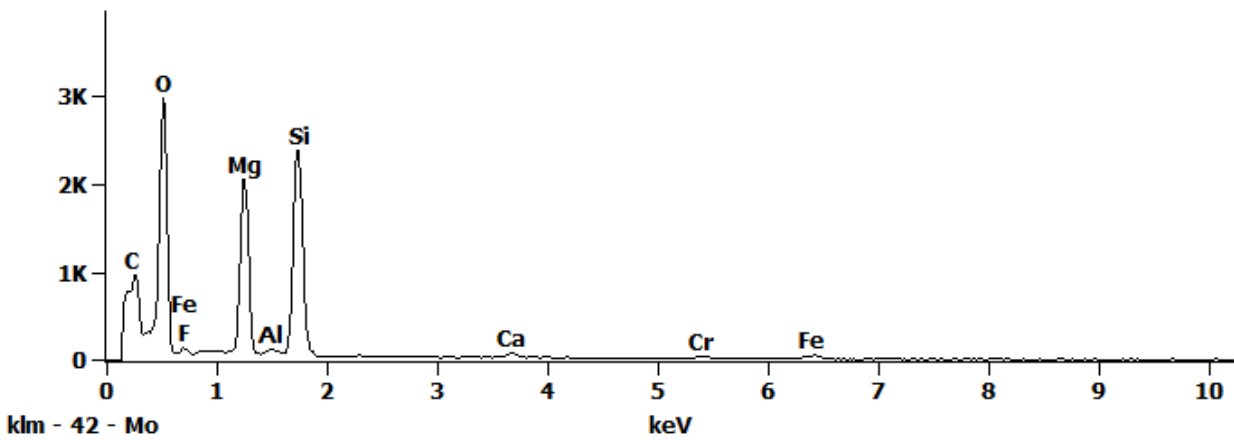


Figure 1. EDS Spectra for sample L2103-A-15 taken at test area 1. The test area is labeled in the particle SEM photo.

Full scale counts: 1413

L2103-A15(1)\_pt2

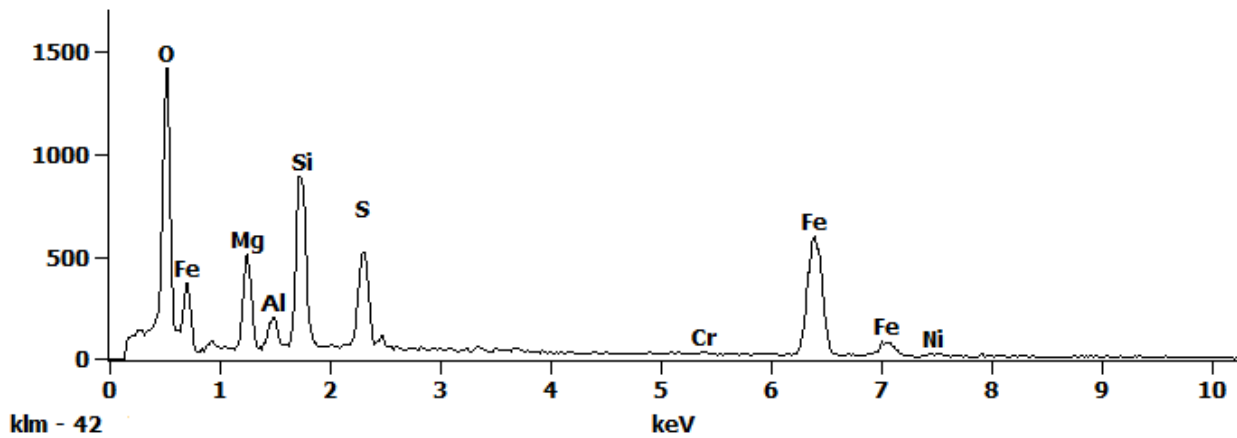


Figure 2. EDS Spectra for sample L2103-A-15 taken at test area 2. The test area is labeled in the particle SEM photo..

Full scale counts: 1758

L2103-A15(1)\_pt3

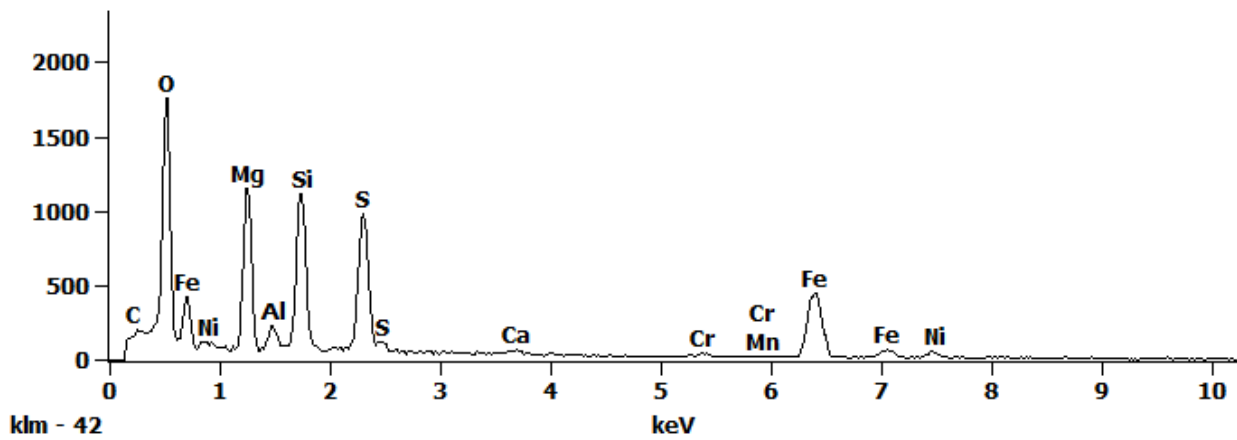
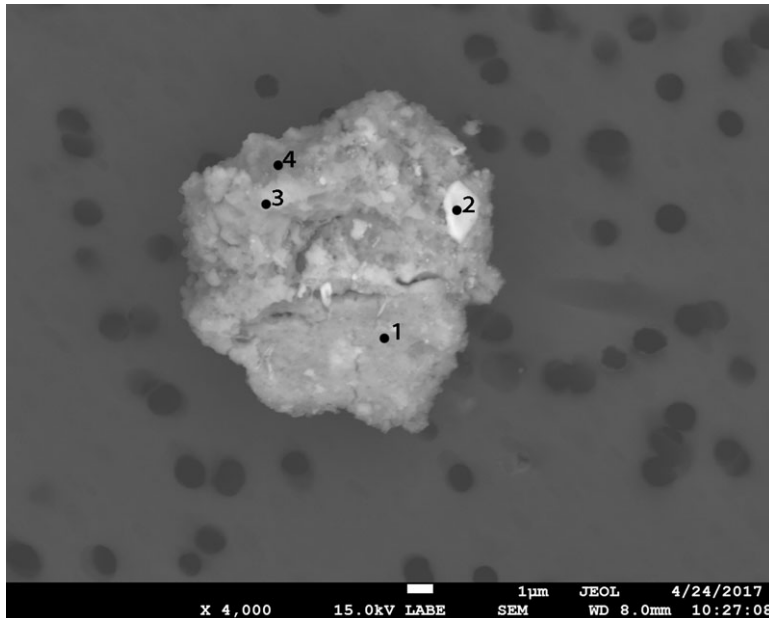


Figure 3. EDS Spectra for sample L2103-A-15 taken at test area 3. The test area is labeled in the particle SEM photo..

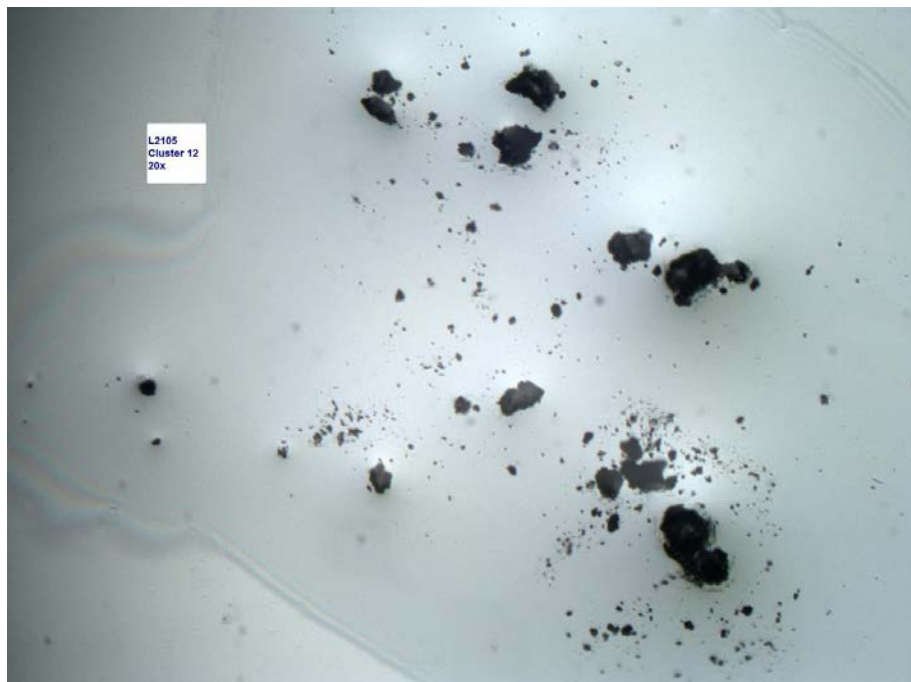
## L2105 A12



<b>Particle Size:</b>	13 µm
<b>Shape:</b>	Equidimensional to Spherical
<b>Transparency:</b>	Opaque
<b>Color:</b>	BLACK
<b>Luster:</b>	Dull
<b>Particle Type:</b>	COSMIC
<b>Cluster No.:</b>	L2105 Cluster 12
<b>Comments:</b>	

*SEM Photo of sample L2105 A12 with labeled EDS testing locations.*

### *Cluster of Origin: L2105 Cluster 12*



*Photo of cluster L2105 Cluster 12.*

*L2105 A12 - EDS Spectra*

Full scale counts: 2723

L2105A-12(1) pt 1

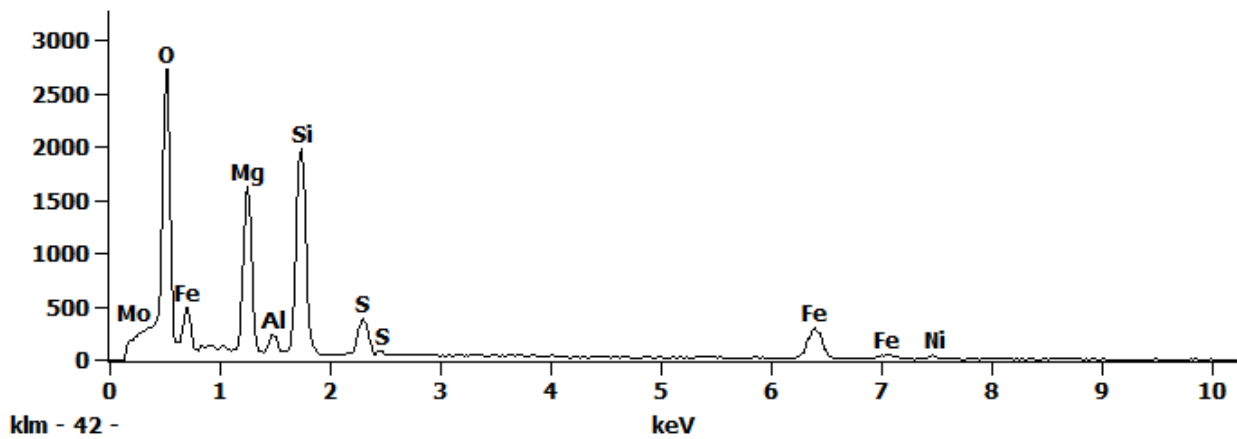


Figure 1. EDS Spectra for sample L2105-A-12 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 1020

L2105A-A12(1)\_pt2

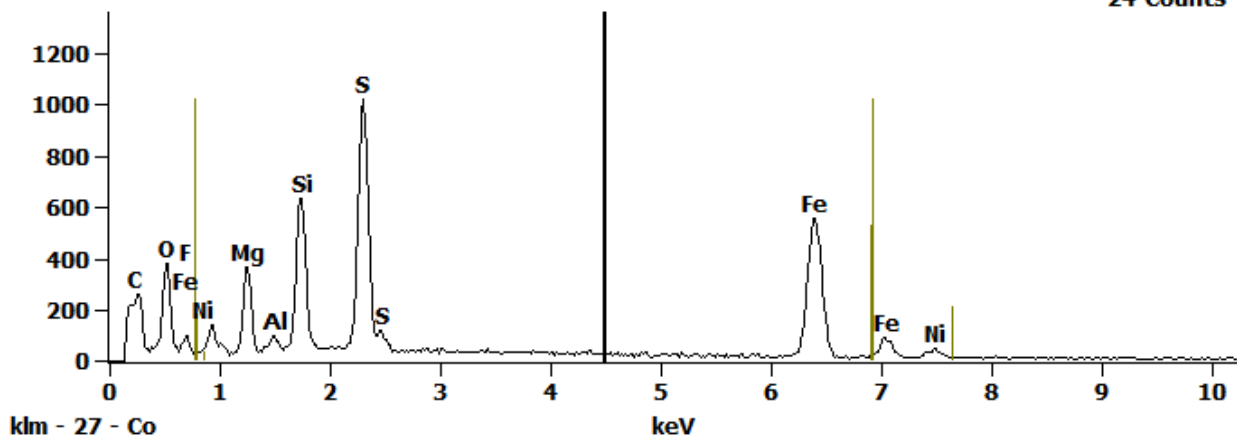
Cursor: 4.500 keV  
24 Counts

Figure 2. EDS Spectra for sample L2105-A-12 taken at test area 2. The test area is labeled in the particle SEM photo..



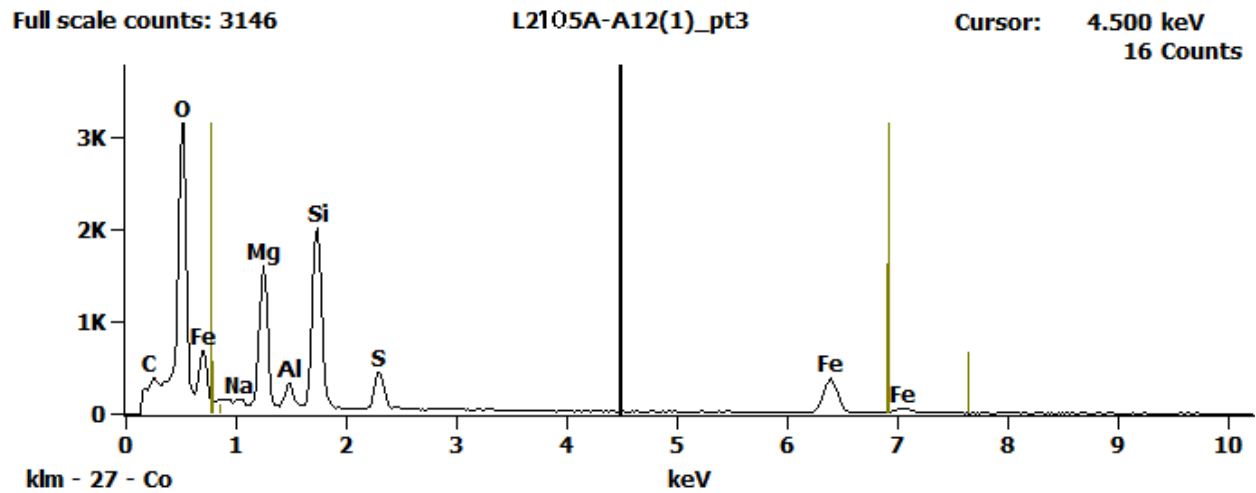


Figure 3. EDS Spectra for sample L2105-A-12 taken at test area 3. The test area is labeled in the particle SEM photo..

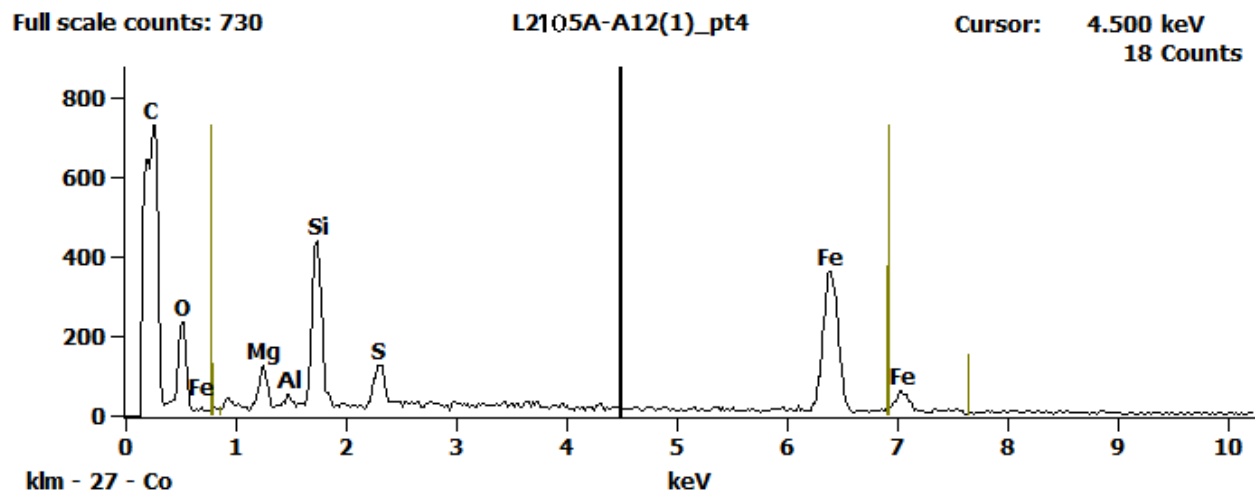


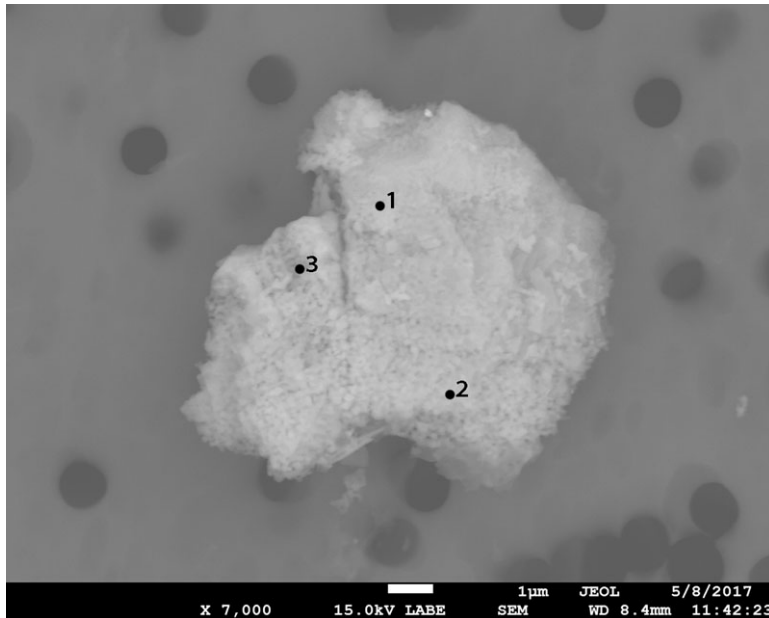
Figure 4. EDS Spectra for sample L2105-A-12 taken at test area 4. The test area is labeled in the particle SEM photo..

# Particle Descriptions

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## Artificial Terrestrial Contamination (TCA Type)

## L2099 A4



<b>Particle Size:</b>	7 µm
<b>Shape:</b>	Equidimensional to Spherical
<b>Transparency:</b>	Translucent to Opaque
<b>Color:</b>	CLEAR, GRAY
<b>Luster:</b>	Pearly
<b>Particle Type:</b>	ARTIFICIAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	L2099 Cluster 4
<b>Comments:</b>	

*SEM Photo of sample L2099 A4 with labeled EDS testing locations.*

### *Cluster of Origin: L2099 Cluster 4*



*Photo of cluster L2099 Cluster 4.*

*L2099 A4 - EDS Spectra*

Full scale counts: 6689

L2099A-4(1)\_pt1

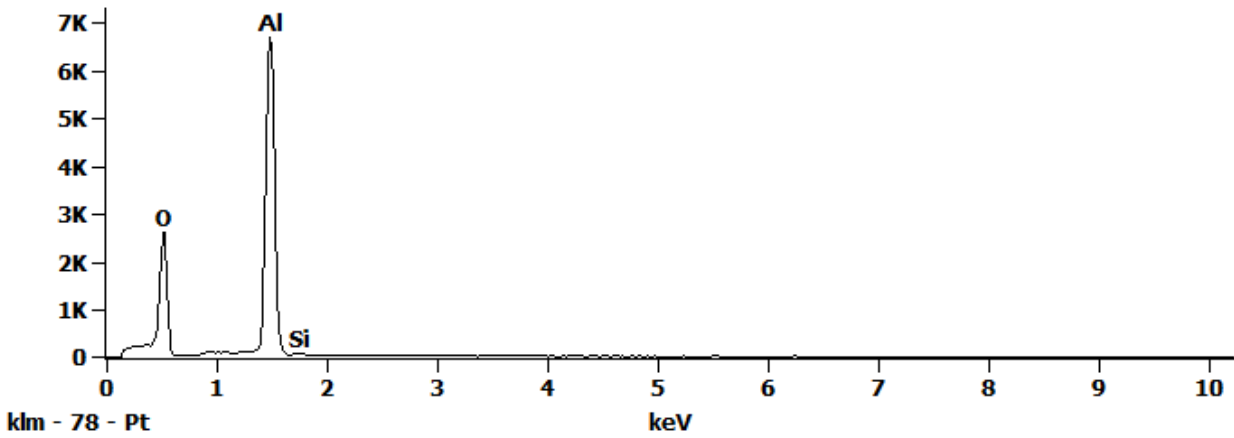


Figure 1. EDS Spectra for sample L2099-A-4 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 6860

L2099A-4(1)\_pt2

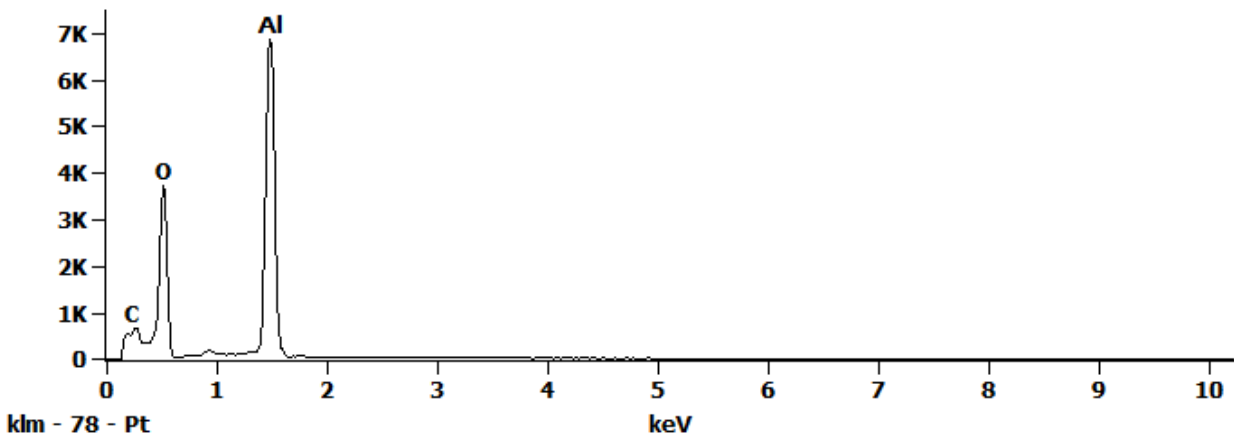


Figure 2. EDS Spectra for sample L2099-A-4 taken at test area 2. The test area is labeled in the particle SEM photo..

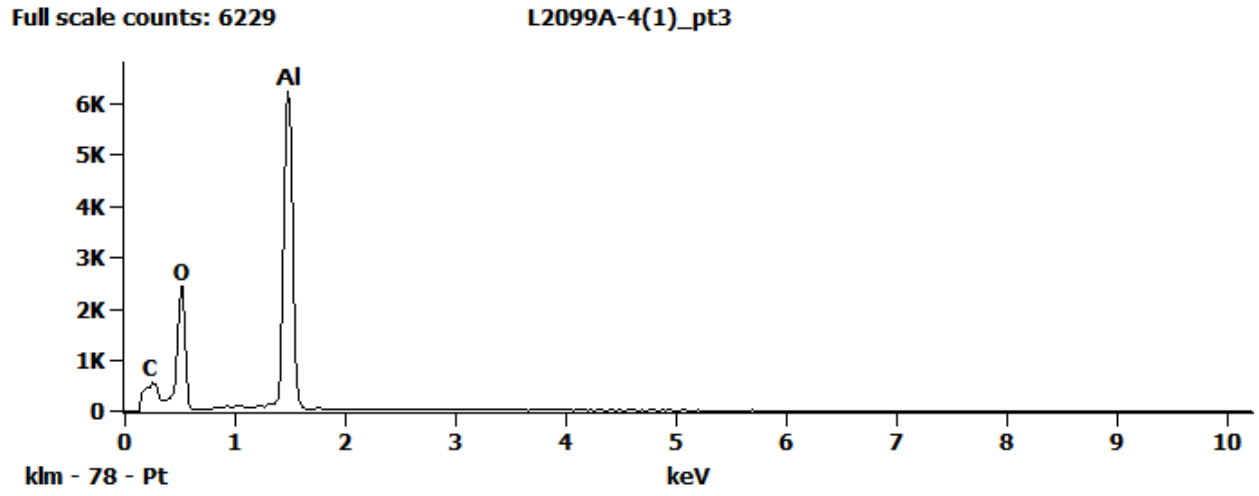
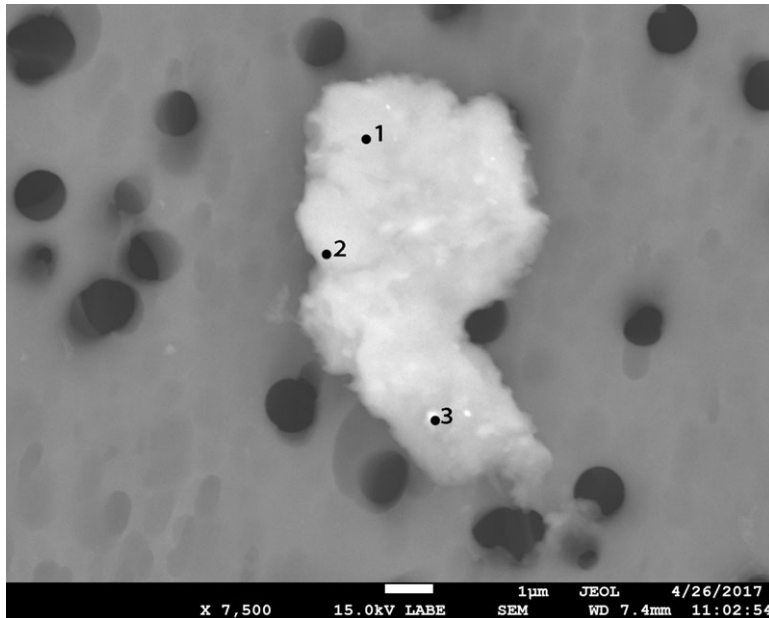


Figure 3. EDS Spectra for sample L2099-A-4 taken at test area 3. The test area is labeled in the particle SEM photo..

## L2100 A4



<b>Particle Size:</b>	14x7 µm
<b>Shape:</b>	Irregular
<b>Transparency:</b>	Opaque
<b>Color:</b>	BLACK
<b>Luster:</b>	Dull
<b>Particle Type:</b>	ARTIFICIAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	L2100 Cluster 4
<b>Comments:</b>	

SEM Photo of sample L2100 A4 with labeled EDS testing locations.

### Cluster of Origin: L2100 Cluster 4

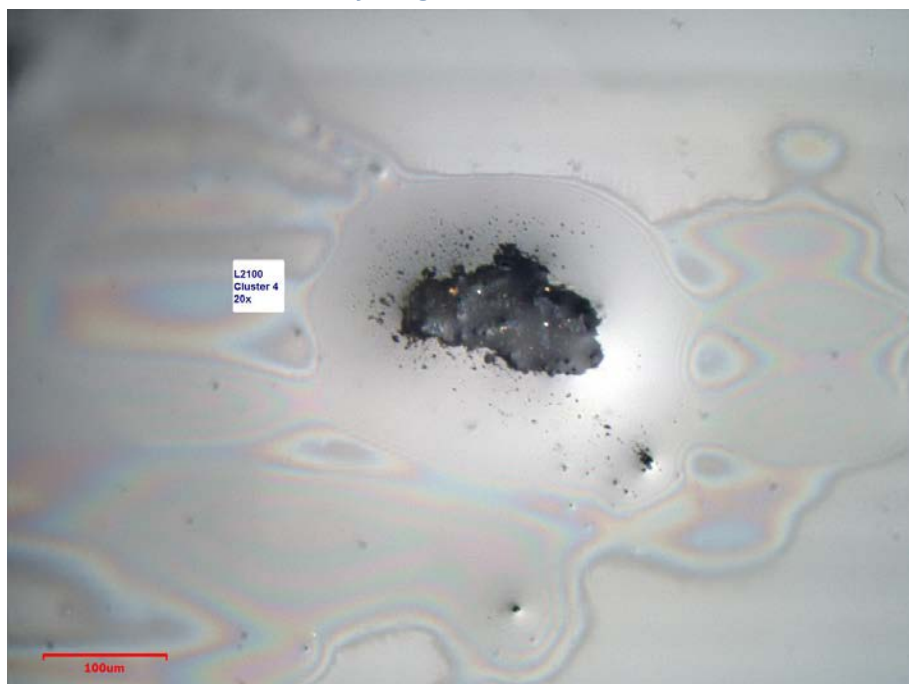


Photo of cluster L2100 Cluster 4.

*L2100 A4 - EDS Spectra*

Full scale counts: 1199

L2100A-4(1)\_pt1

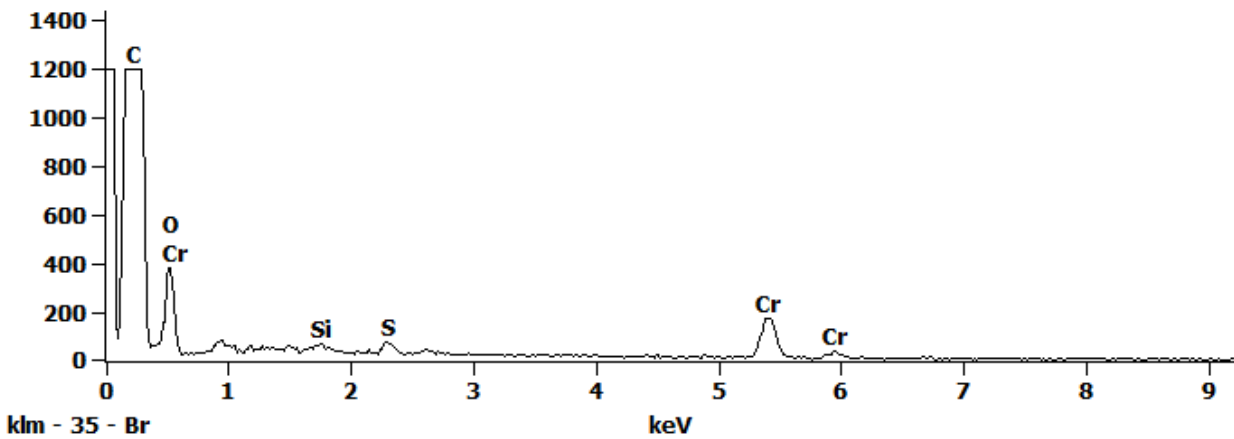


Figure 1. EDS Spectra for sample L2100-A-4 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 1199

L2100A-4(1)\_pt2

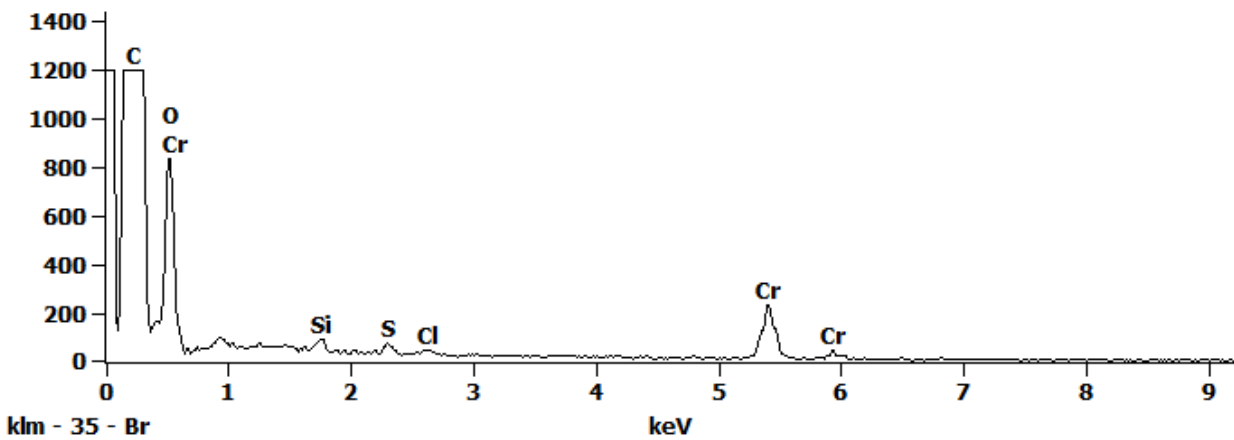


Figure 2. EDS Spectra for sample L2100-A-4 taken at test area 2. The test area is labeled in the particle SEM photo..

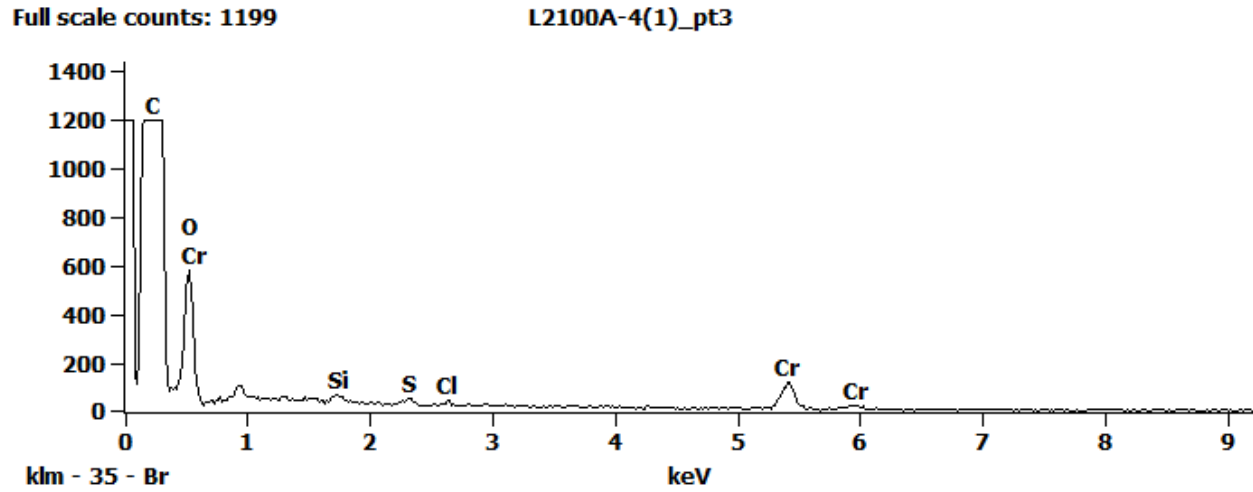
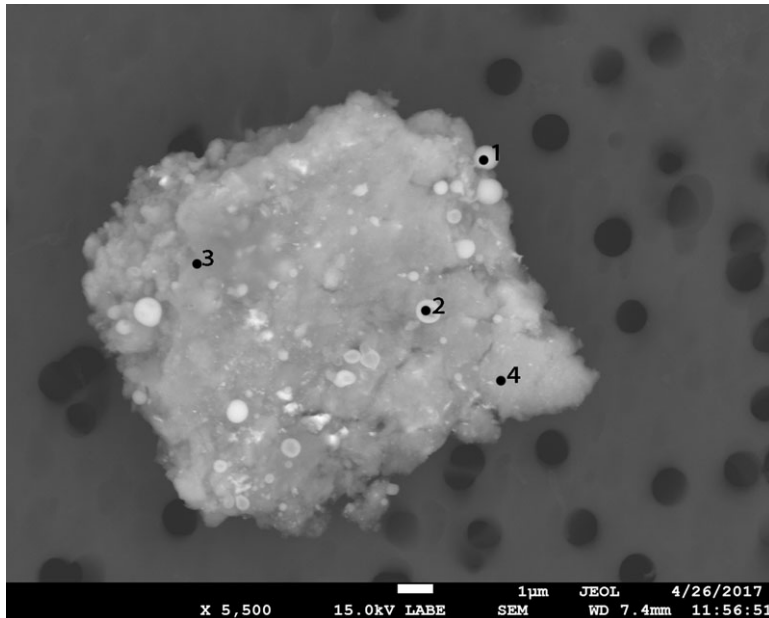


Figure 3. EDS Spectra for sample L2100-A-4 taken at test area 3. The test area is labeled in the particle SEM photo..



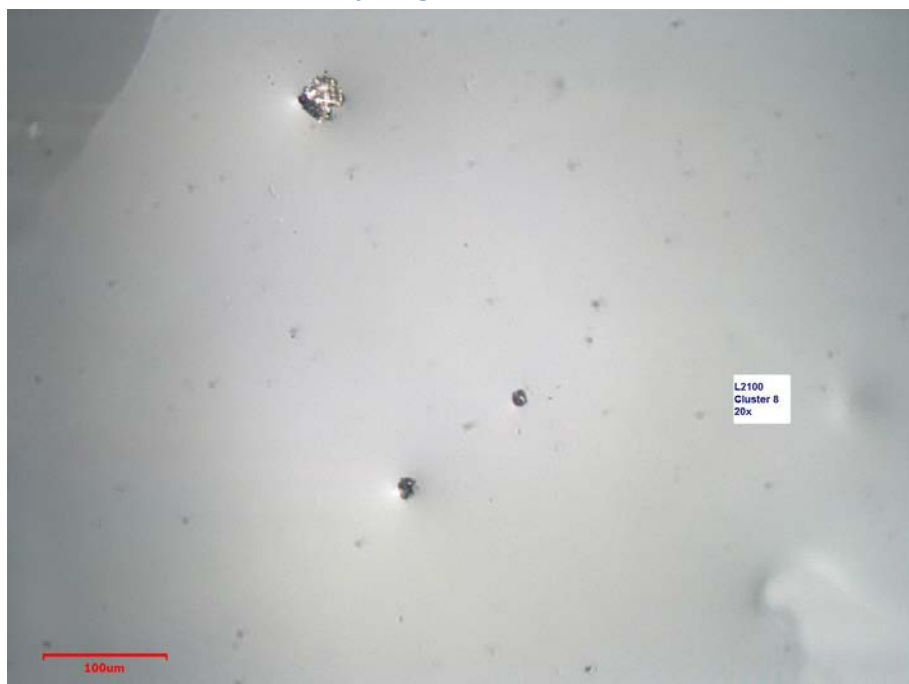
## L2100 A8



<b>Particle Size:</b>	12 µm
<b>Shape:</b>	Equidimensional to Spherical
<b>Transparency:</b>	Opaque
<b>Color:</b>	BLACK, SILVER
<b>Luster:</b>	Metallic to Dull
<b>Particle Type:</b>	ARTIFICIAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	L2100 Cluster 8
<b>Comments:</b>	

*SEM Photo of sample L2100 A8 with labeled EDS testing locations.*

### *Cluster of Origin: L2100 Cluster 8*



*Photo of cluster L2100 Cluster 8.*

*L2100 A8 - EDS Spectra*

Full scale counts: 385

L2100A-8(1)\_pt1

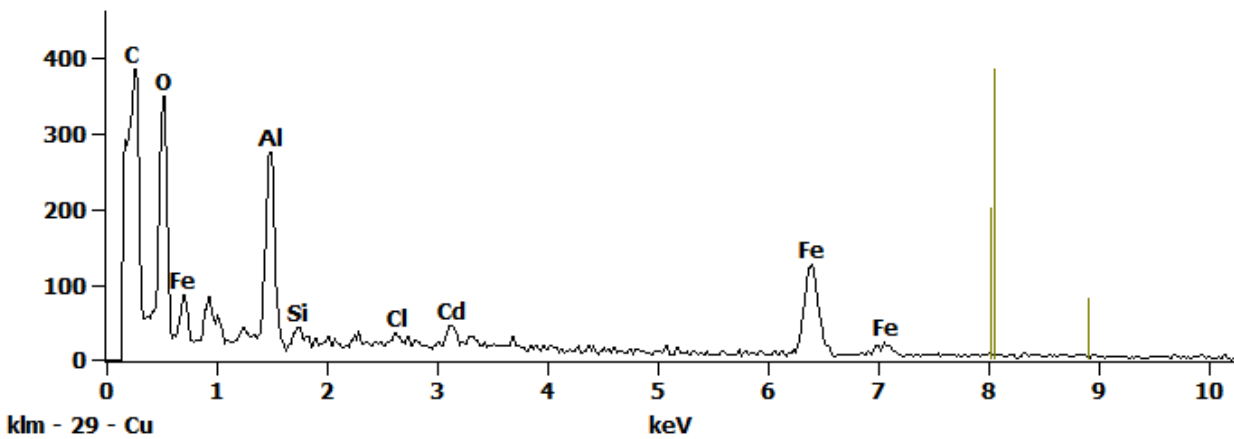


Figure 1. EDS Spectra for sample L2100-A-8 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 6552

L2100A-8(1)\_pt2

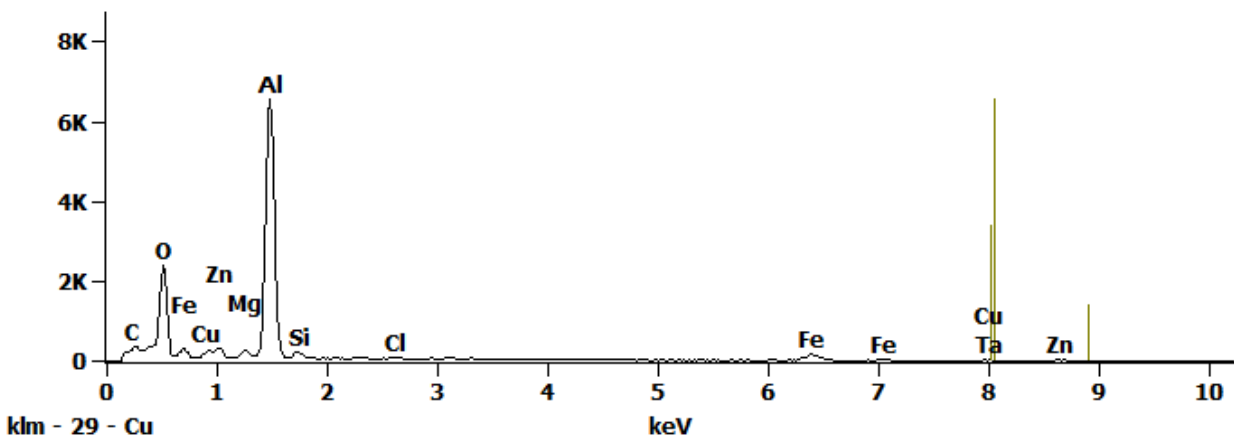


Figure 2. EDS Spectra for sample L2100-A-8 taken at test area 2. The test area is labeled in the particle SEM photo..

Full scale counts: 4900

L2100A-8(1)\_pt3

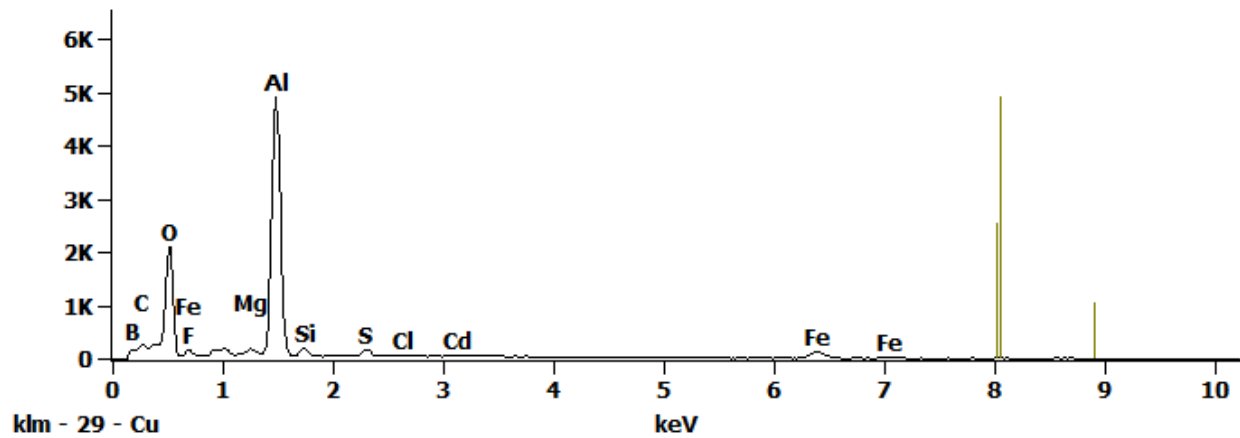


Figure 3. EDS Spectra for sample L2100-A-8 taken at test area 3. The test area is labeled in the particle SEM photo..

Full scale counts: 4982

L2100A-8(1)\_pt4

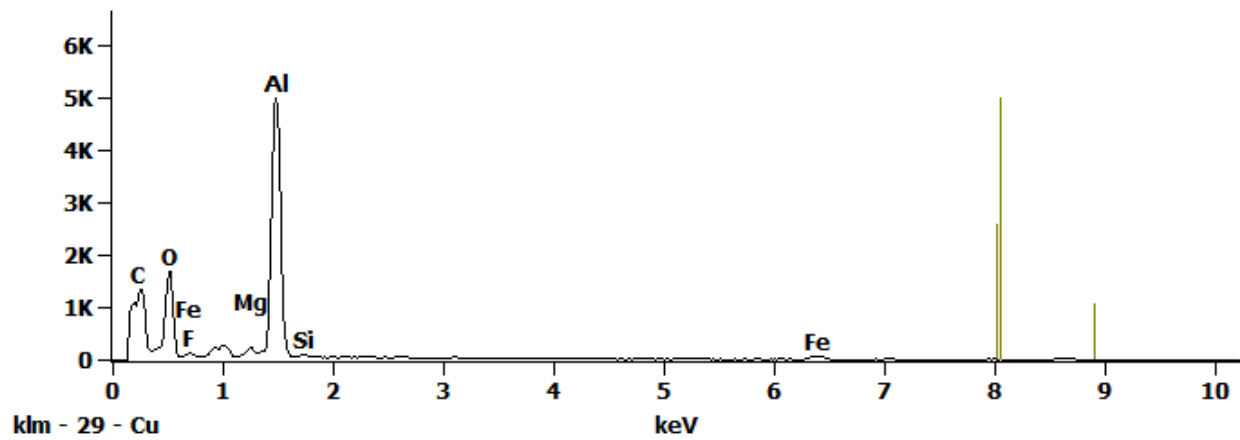
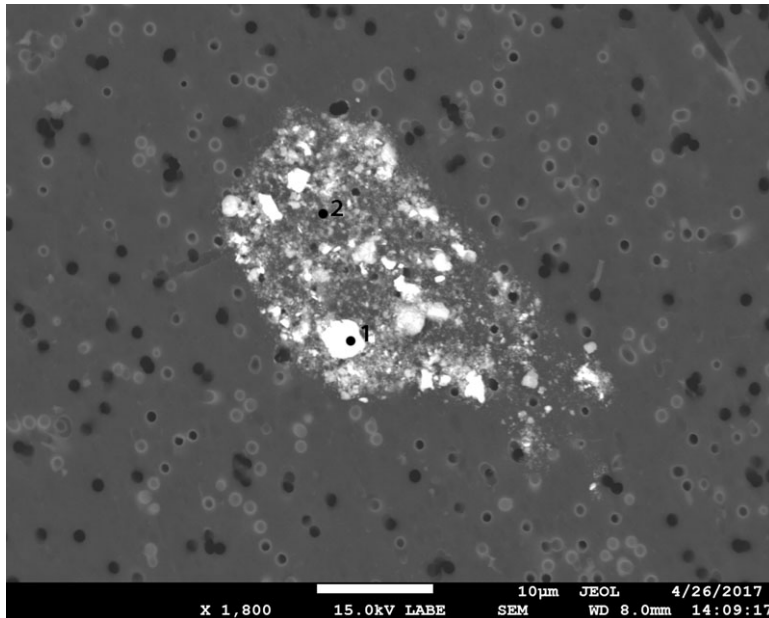


Figure 4. EDS Spectra for sample L2100-A-8 taken at test area 4. The test area is labeled in the particle SEM photo..

## L2101 A3



<b>Particle Size:</b>	23 µm
<b>Shape:</b>	Irregular to Equidimensional
<b>Transparency:</b>	Opaque to Translucent
<b>Color:</b>	BLACK, GRAY
<b>Luster:</b>	Pearly to Dull
<b>Particle Type:</b>	ARTIFICIAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	L2101 Cluster 3
<b>Comments:</b>	

*SEM Photo of sample L2101 A3 with labeled EDS testing locations.*

### *Cluster of Origin: L2101 Cluster 3*



*Photo of cluster L2101 Cluster 3.*

*L2101 A3 - EDS Spectra*

Full scale counts: 764

L2101A-3(1)\_pt1

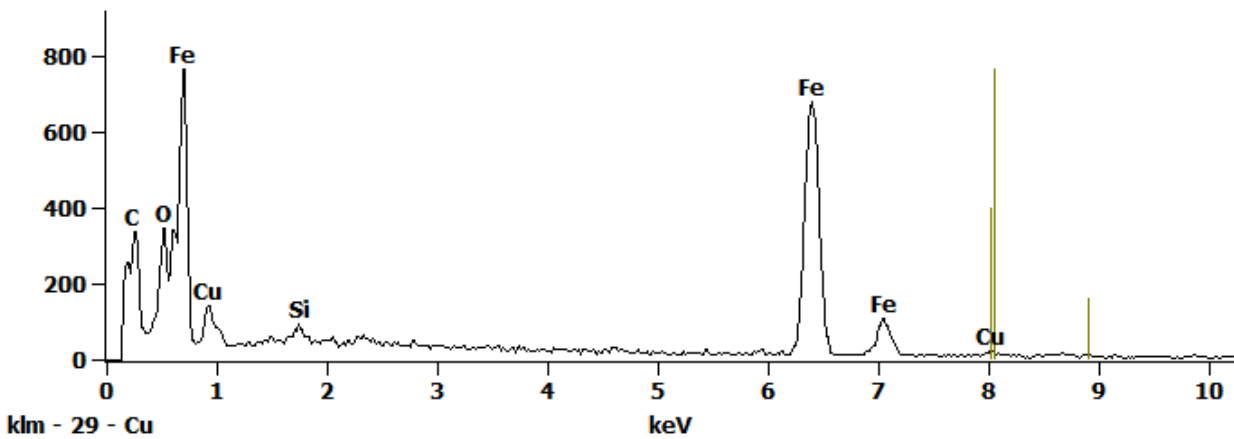


Figure 1. EDS Spectra for sample L2101-A-3 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 912

L2101A-3(1)\_pt2

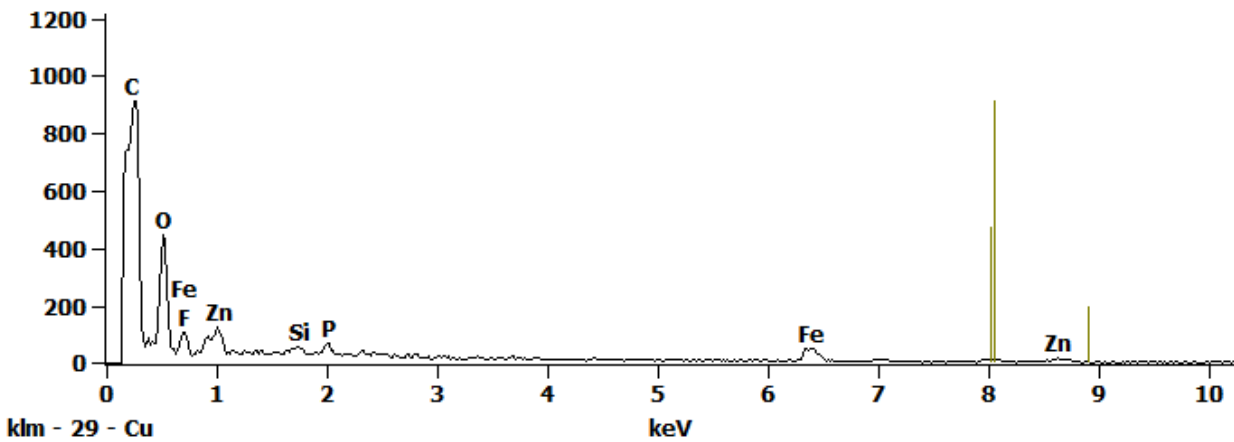
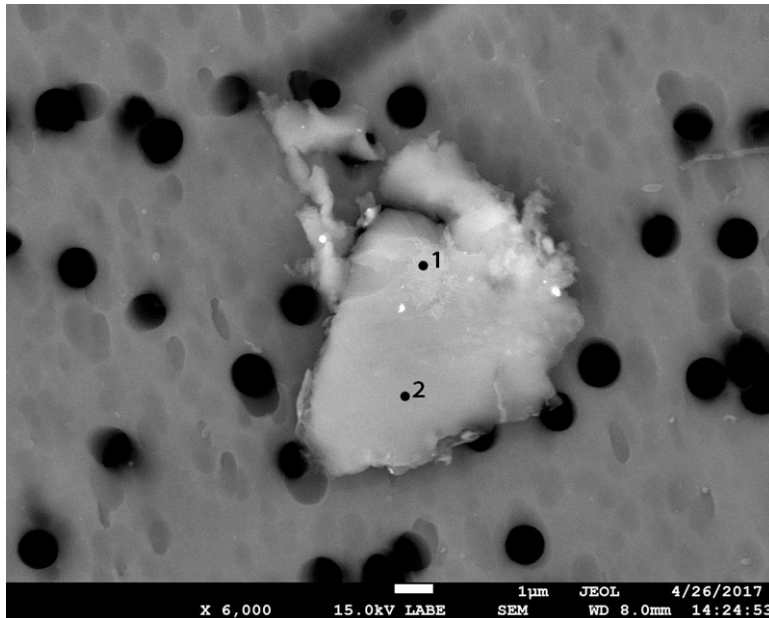


Figure 2. EDS Spectra for sample L2101-A-3 taken at test area 2. The test area is labeled in the particle SEM photo..

## L2101 A4



<b>Particle Size:</b>	5 µm
<b>Shape:</b>	Equidimensional
<b>Transparency:</b>	Translucent
<b>Color:</b>	GRAY
<b>Luster:</b>	Pearly to Subvitreous
<b>Particle Type:</b>	ARTIFICIAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	L2101 Cluster 4
<b>Comments:</b>	

SEM Photo of sample L2101 A4 with labeled EDS testing locations.

### Cluster of Origin: L2101 Cluster 4

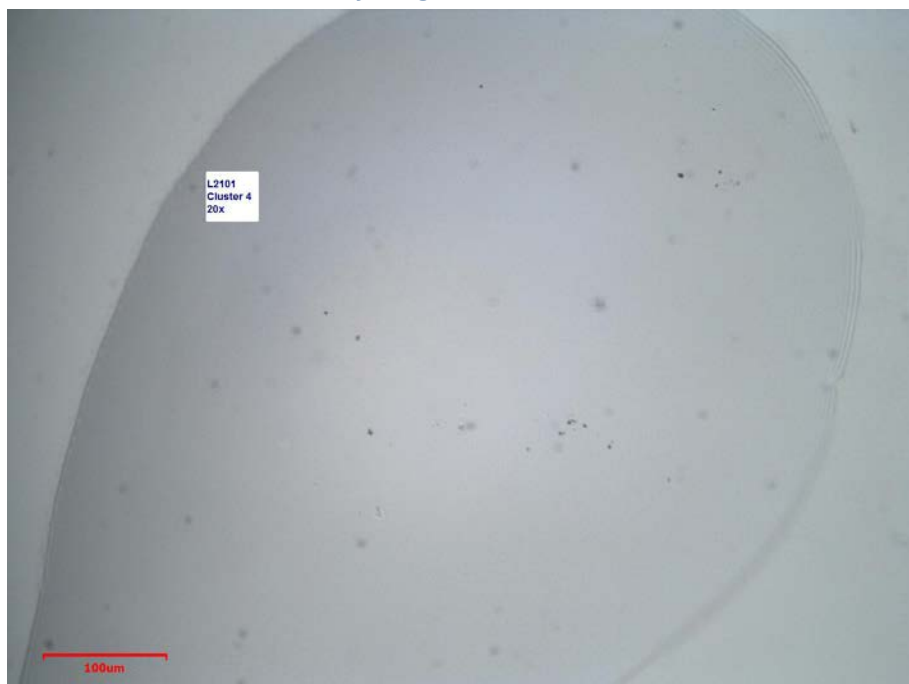


Photo of cluster L2101 Cluster 4.

*L2101 A4 - EDS Spectra*

Full scale counts: 1438

L2101A-4(2)\_pt1

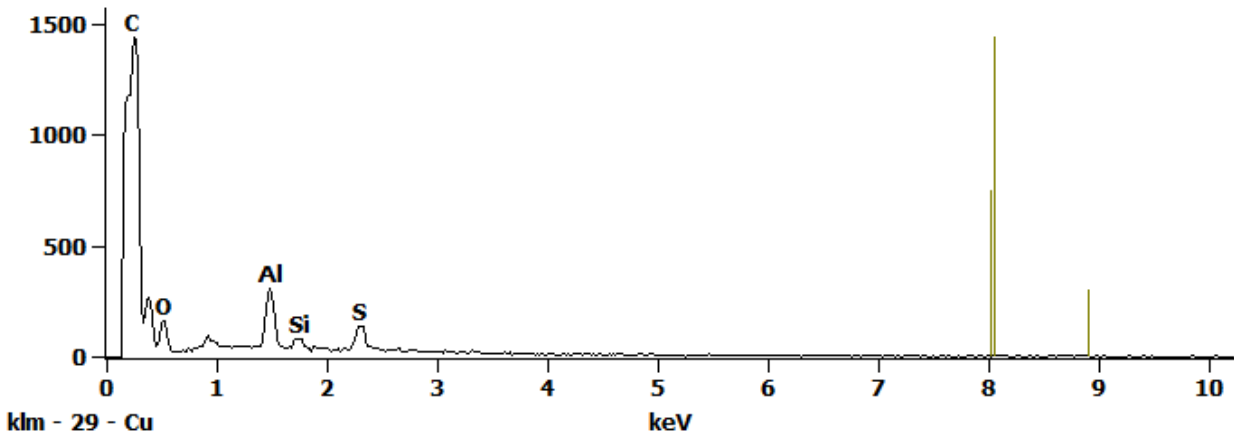


Figure 1. EDS Spectra for sample L2101-A-4 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 1897

L2101A-4(2)\_pt2

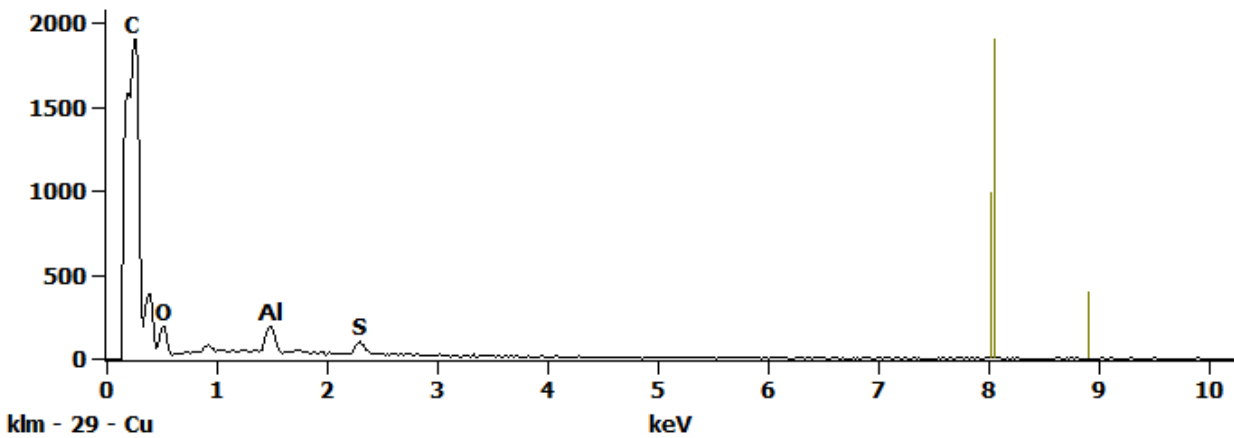
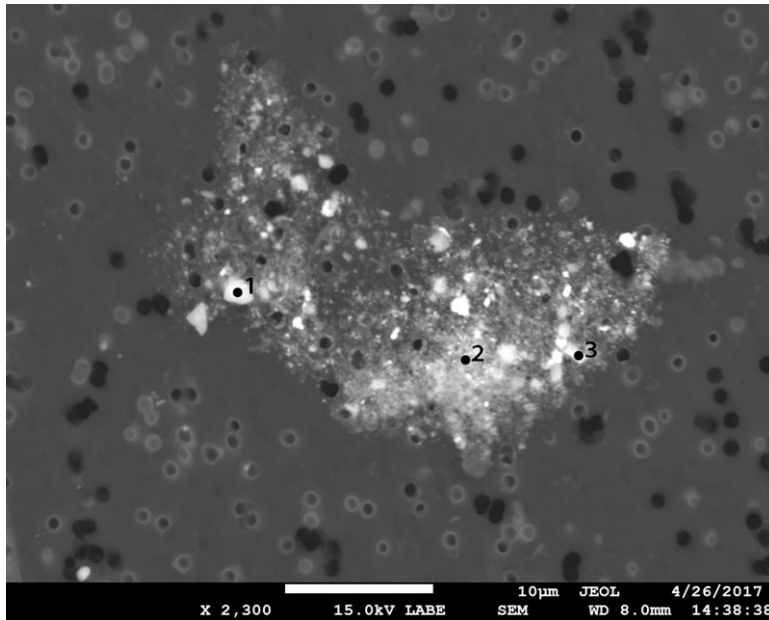


Figure 2. EDS Spectra for sample L2101-A-4 taken at test area 2. The test area is labeled in the particle SEM photo..

## L2101 A6



<b>Particle Size:</b>	26x16 µm
<b>Shape:</b>	Irregular
<b>Transparency:</b>	Translucent to Opaque
<b>Color:</b>	BLACK, CLEAR, GRAY
<b>Luster:</b>	Subvitreous to Dull
<b>Particle Type:</b>	ARTIFICIAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	L2101 Cluster 6
<b>Comments:</b>	

SEM Photo of sample L2101 A6 with labeled EDS testing locations.

### Cluster of Origin: L2101 Cluster 6

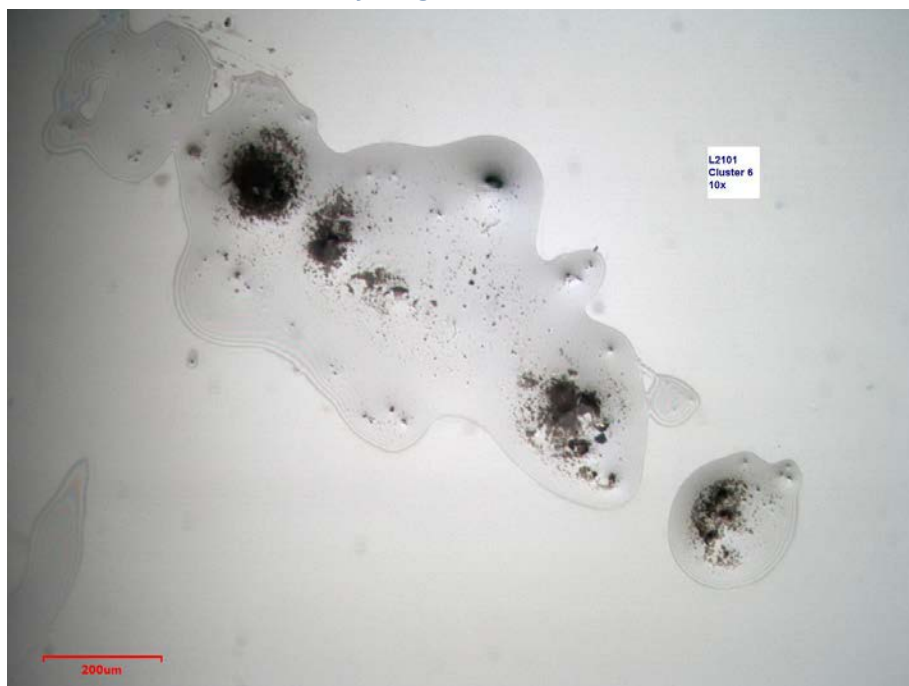


Photo of cluster L2101 Cluster 6.



*L2101 A6 - EDS Spectra*

Full scale counts: 1042

L2101A-6(1)\_pt1

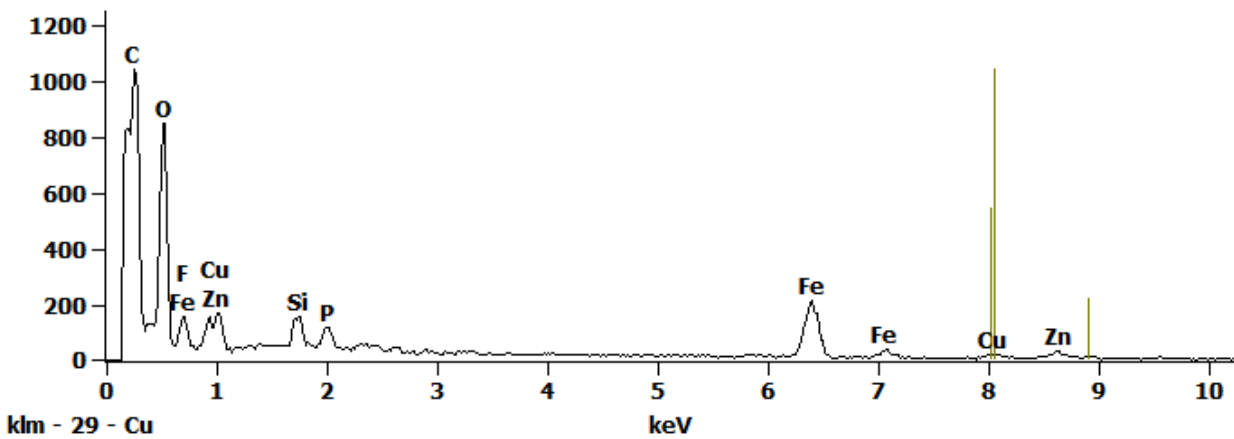


Figure 1. EDS Spectra for sample L2101-A-6 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 1058

L2101A-6(1)\_pt2

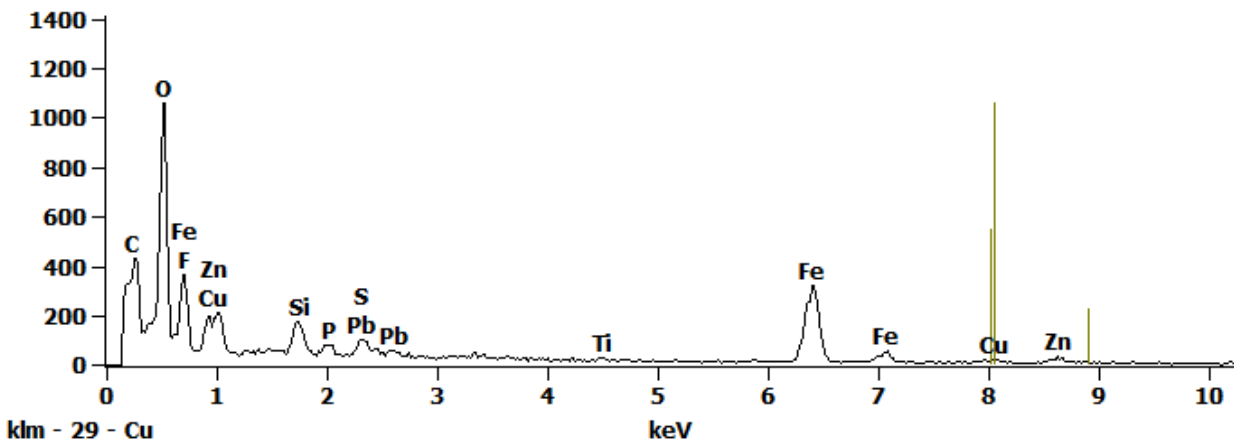


Figure 2. EDS Spectra for sample L2101-A-6 taken at test area 2. The test area is labeled in the particle SEM photo..

Full scale counts: 934

L2101A-6(1)\_pt3

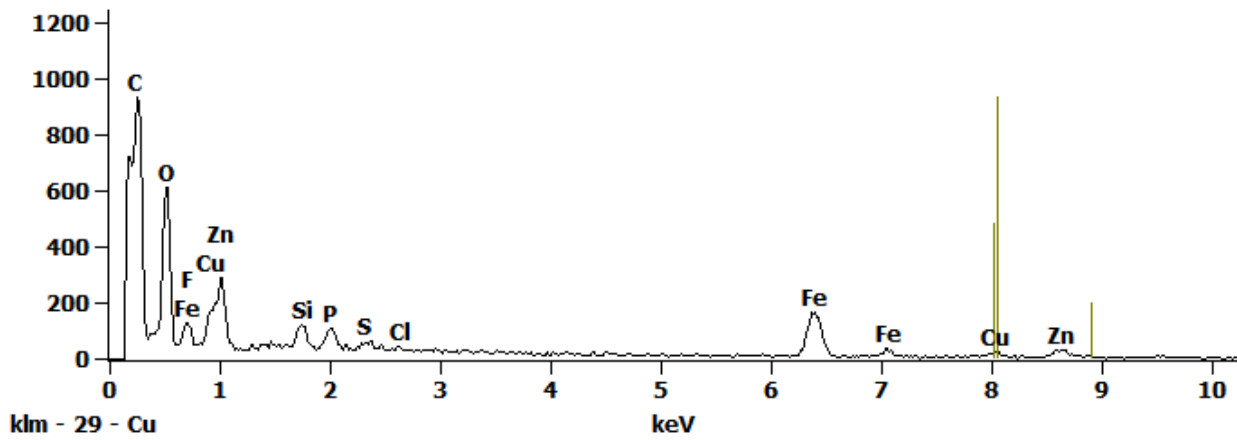
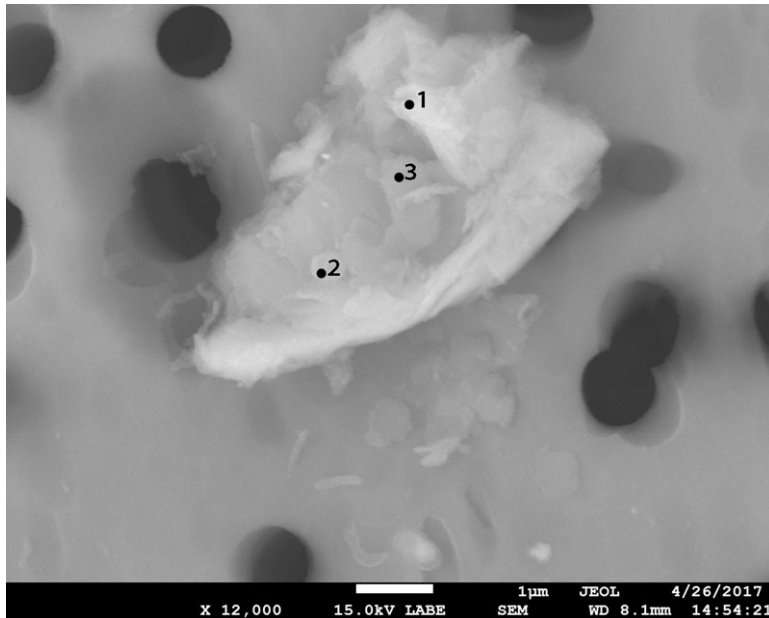


Figure 3. EDS Spectra for sample L2101-A-6 taken at test area 3. The test area is labeled in the particle SEM photo..

## L2101 A8



<b>Particle Size:</b>	9 µm
<b>Shape:</b>	Equidimensional
<b>Transparency:</b>	Opaque
<b>Color:</b>	BLACK, BROWN
<b>Luster:</b>	Dull
<b>Particle Type:</b>	ARTIFICIAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	L2101 Cluster 8
<b>Comments:</b>	

SEM Photo of sample L2101 A8 with labeled EDS testing locations.

### Cluster of Origin: L2101 Cluster 8



Photo of cluster L2101 Cluster 8.

*L2101 A8 - EDS Spectra*

Full scale counts: 4367

L2101A-8(1)\_pt1

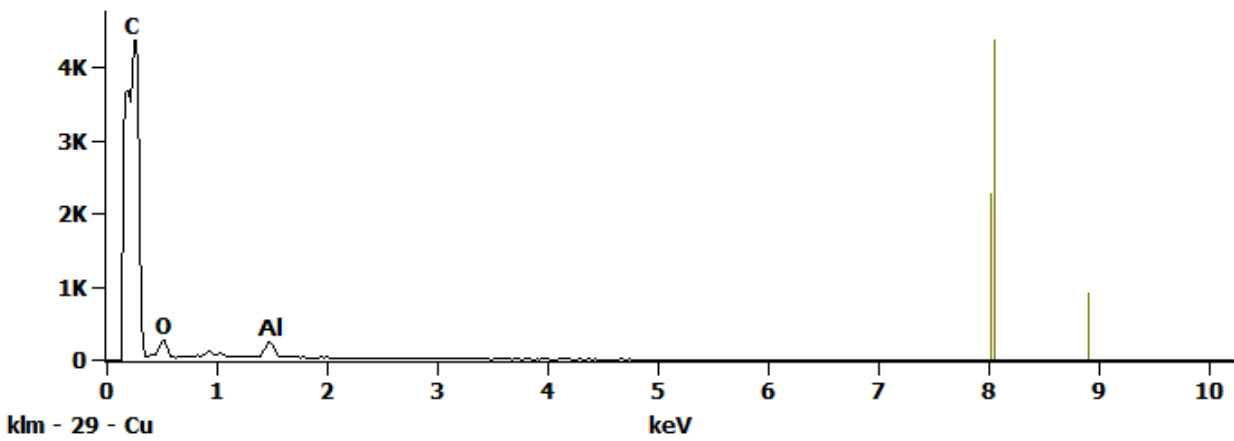


Figure 1. EDS Spectra for sample L2101-A-8 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 3060

L2101A-8(1)\_pt2

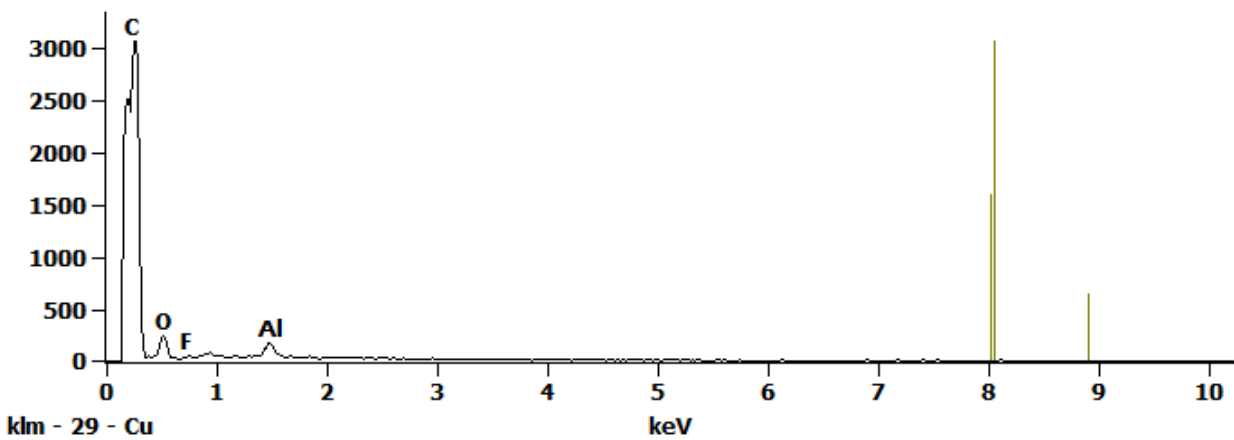


Figure 2. EDS Spectra for sample L2101-A-8 taken at test area 2. The test area is labeled in the particle SEM photo..

Full scale counts: 3244

L2101A-8(1)\_pt3

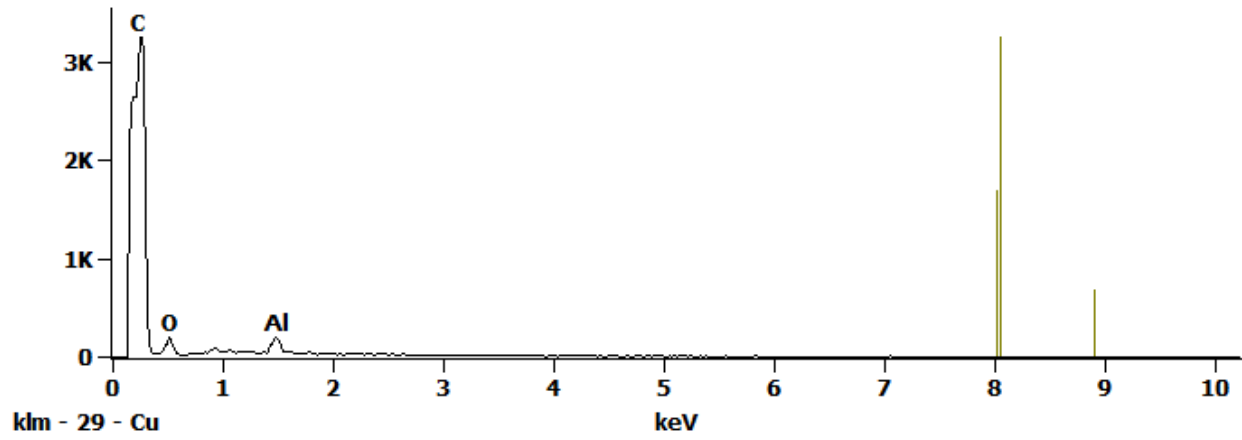
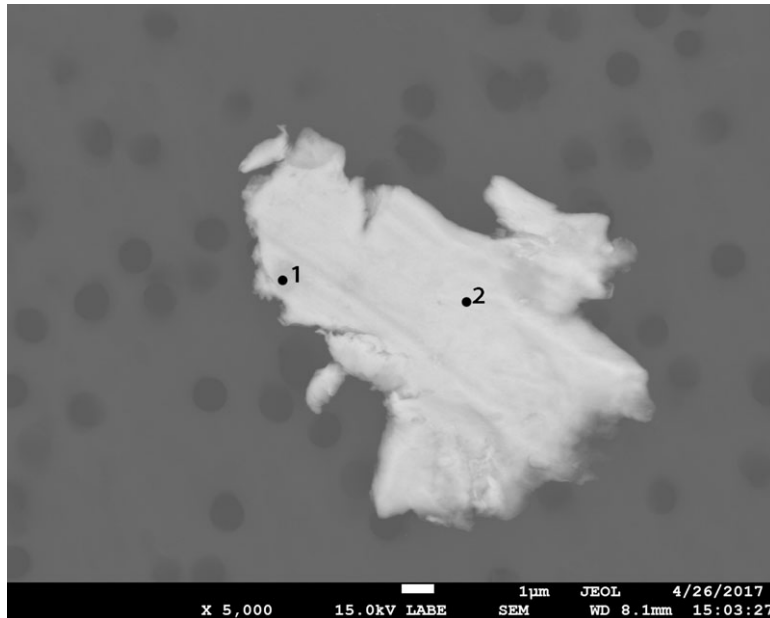


Figure 3. EDS Spectra for sample L2101-A-8 taken at test area 3. The test area is labeled in the particle SEM photo..

## L2101 A9



<b>Particle Size:</b>	7x14 µm
<b>Shape:</b>	Irregular
<b>Transparency:</b>	Opaque
<b>Color:</b>	SILVER
<b>Luster:</b>	Metallic
<b>Particle Type:</b>	POSSIBLY ARTIFICIAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	L2101 Cluster 9
<b>Comments:</b>	

SEM Photo of sample L2101 A9 with labeled EDS testing locations.

### Cluster of Origin: L2101 Cluster 9

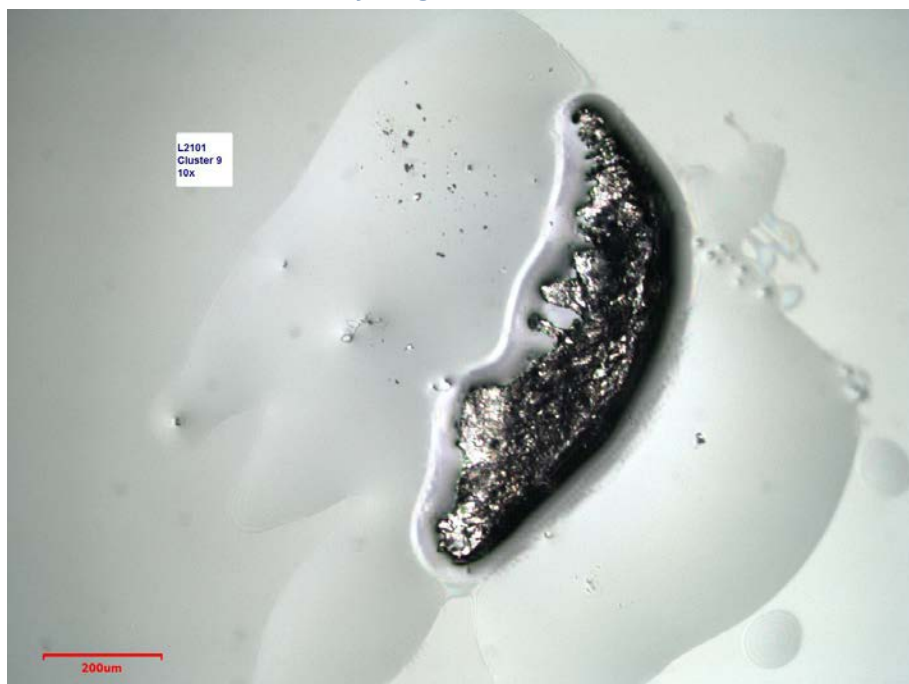


Photo of cluster L2101 Cluster 9.

*L2101 A9 - EDS Spectra*

Full scale counts: 990

L2101A-9(1)\_pt1

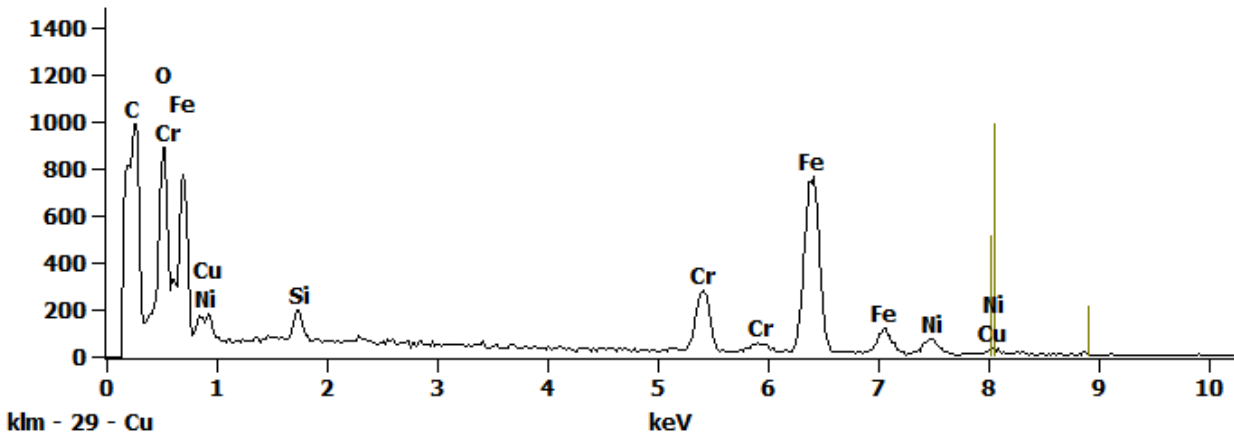


Figure 1. EDS Spectra for sample L2101-A-9 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 1105

L2101A-9(1)\_pt2

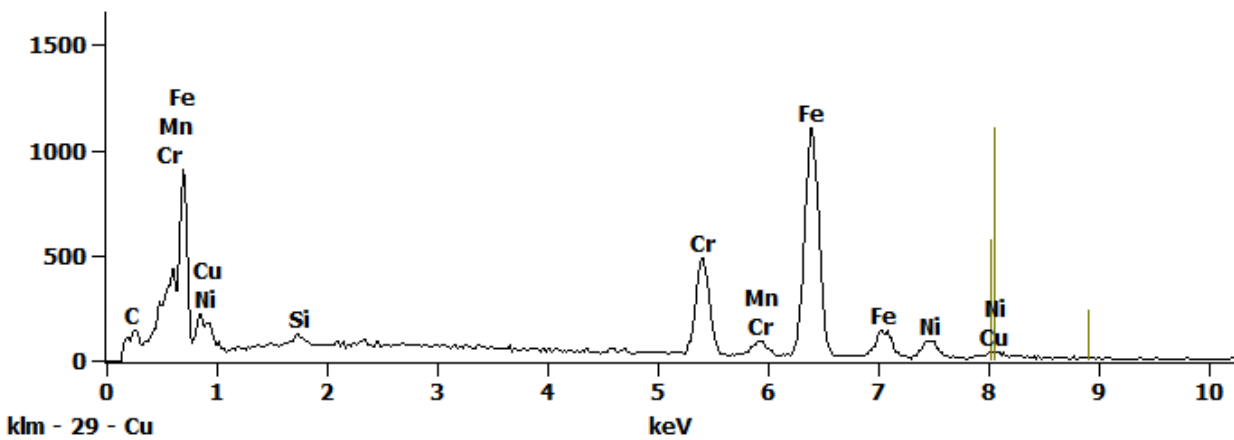
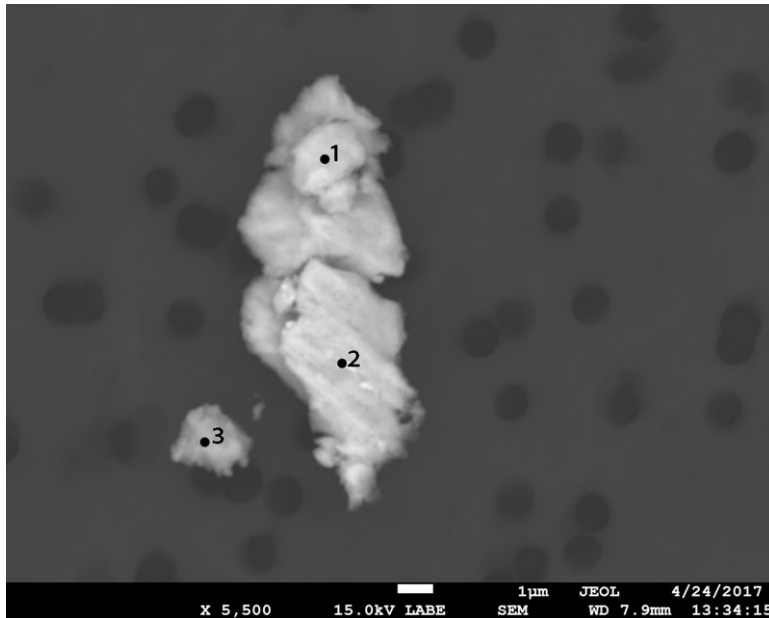


Figure 2. EDS Spectra for sample L2101-A-9 taken at test area 2. The test area is labeled in the particle SEM photo..

## L2103 A4



SEM Photo of sample L2103 A4 with labeled EDS testing locations.

<b>Particle Size:</b>	8x5 µm
<b>Shape:</b>	Equidimensional to Irregular
<b>Transparency:</b>	Opaque to Translucent
<b>Color:</b>	AMBER, BROWN, BRONZE, CLEAR
<b>Luster:</b>	Pearly to Subvitreous
<b>Particle Type:</b>	ARTIFICIAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	L2103 Cluster 4
<b>Comments:</b>	

### Cluster of Origin: L2103 Cluster 4

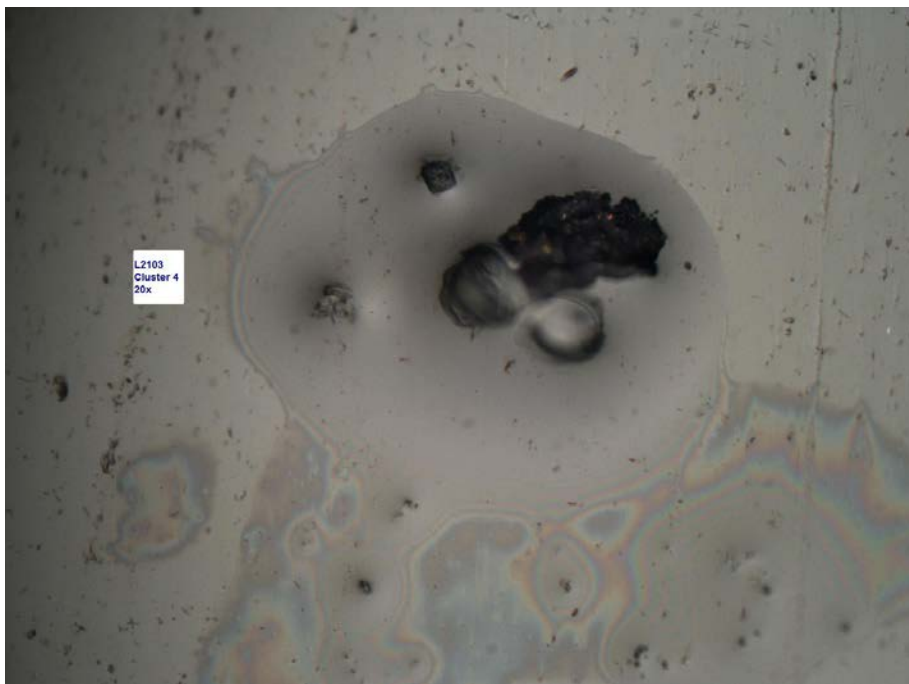


Photo of cluster L2103 Cluster 4.



## L2103 A4 - EDS Spectra

Full scale counts: 3790

L2103-A4(1)\_pt1

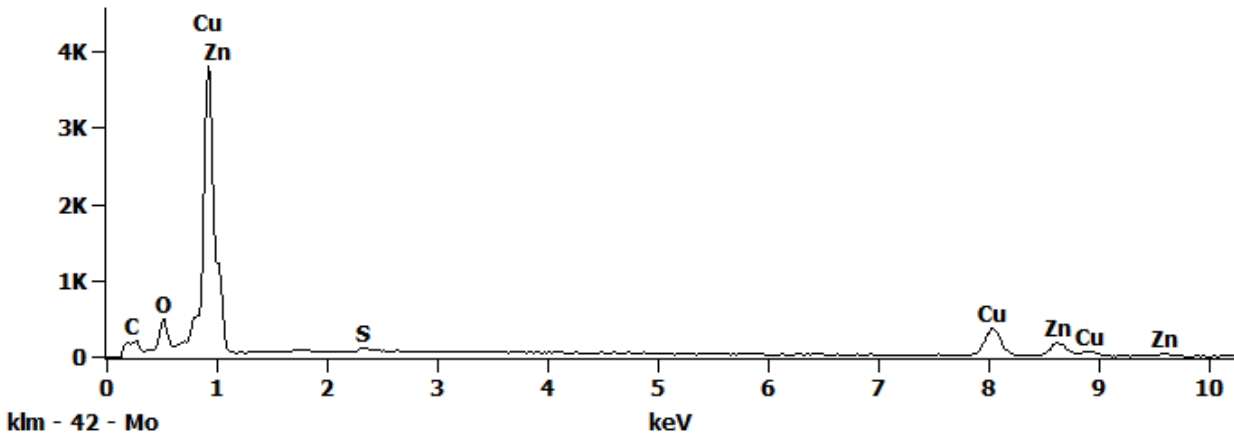


Figure 1. EDS Spectra for sample L2103-A-4 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 3569

L2103-A4(1)\_pt2

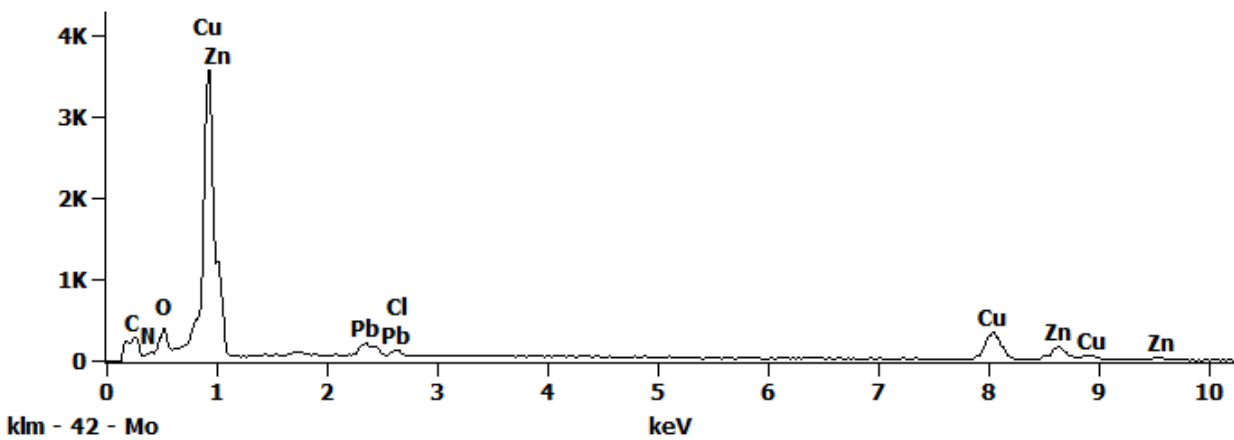


Figure 2. EDS Spectra for sample L2103-A-4 taken at test area 2. The test area is labeled in the particle SEM photo..

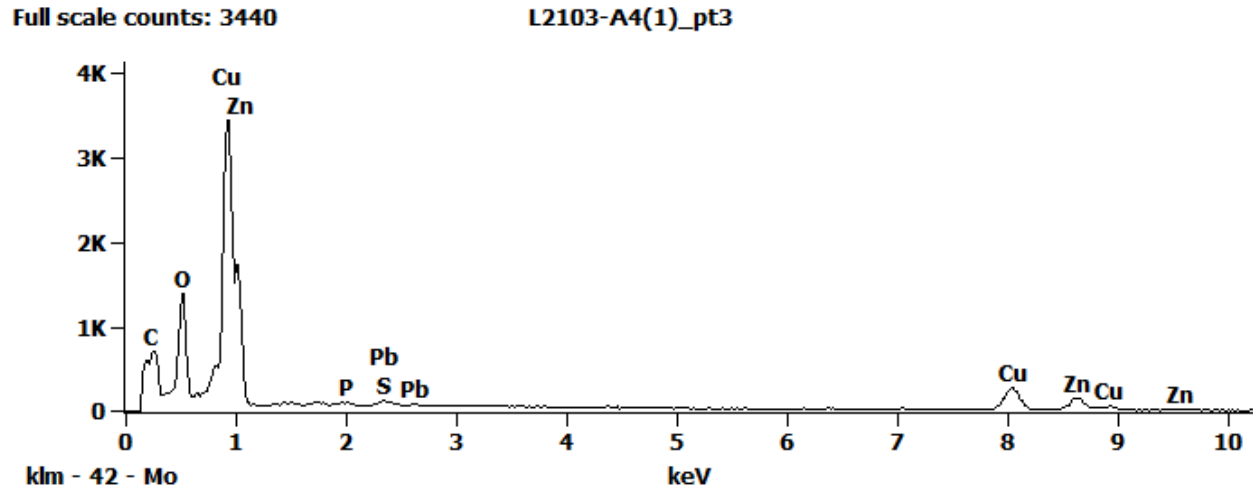
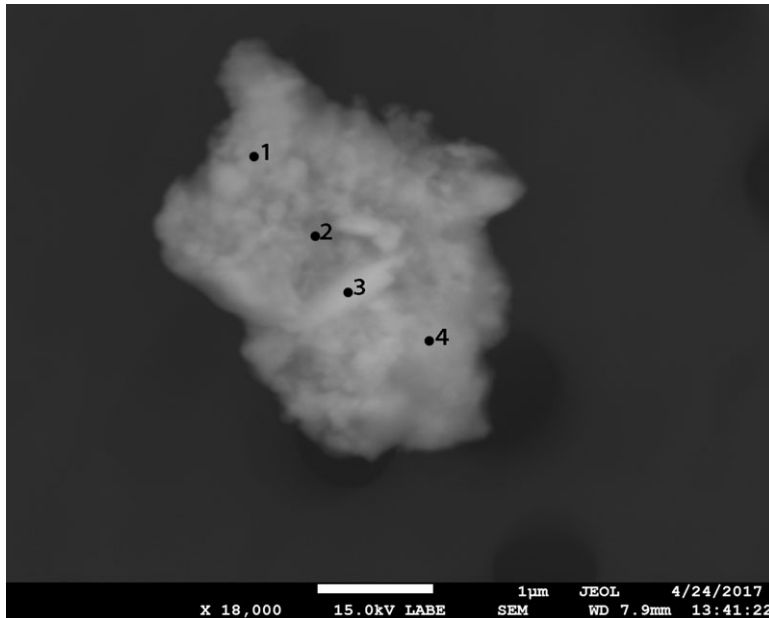


Figure 3. EDS Spectra for sample L2103-A-4 taken at test area 3. The test area is labeled in the particle SEM photo..

## L2103 A5



<b>Particle Size:</b>	5 µm
<b>Shape:</b>	Equidimensional to Spherical
<b>Transparency:</b>	Translucent
<b>Color:</b>	CLEAR
<b>Luster:</b>	Subvitreous
<b>Particle Type:</b>	ARTIFICIAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	L2103 Cluster 5
<b>Comments:</b>	

SEM Photo of sample L2103 A5 with labeled EDS testing locations.

### Cluster of Origin: L2103 Cluster 5

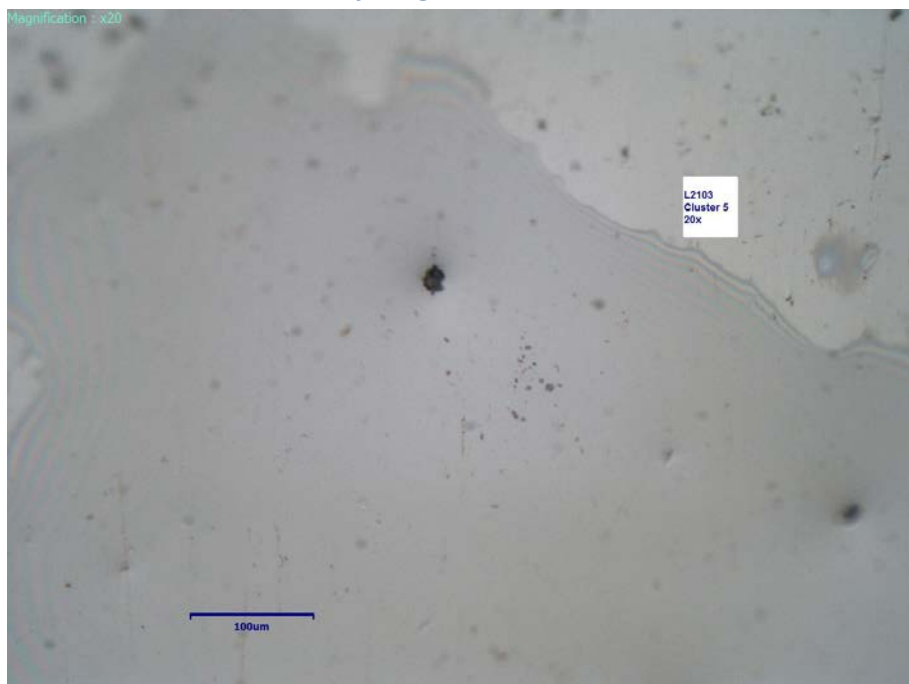


Photo of cluster L2103 Cluster 5.

*L2103 A5 - EDS Spectra*

Full scale counts: 2192

L2103-A5(1)\_pt1

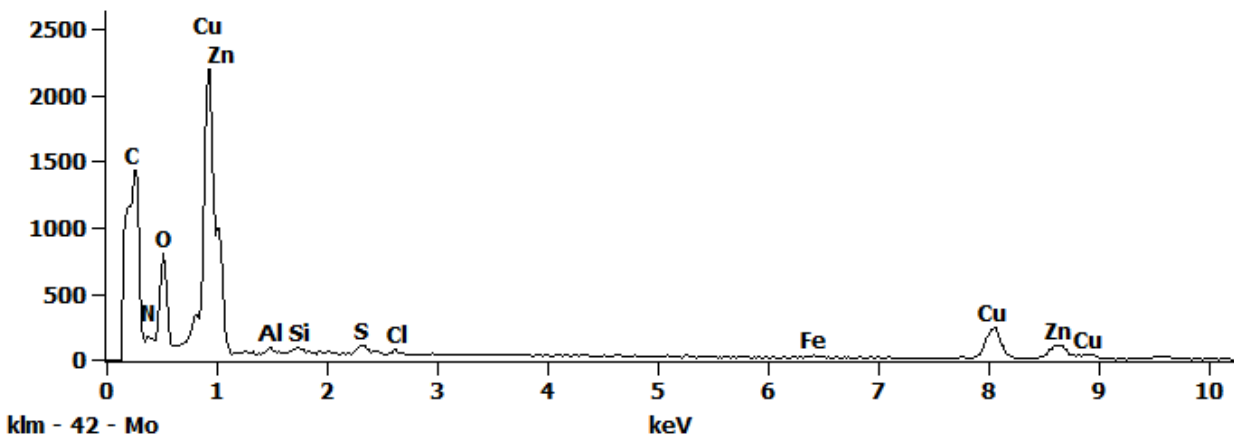


Figure 1. EDS Spectra for sample L2103-A-5 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 1054

L2103-A5(1)\_pt2

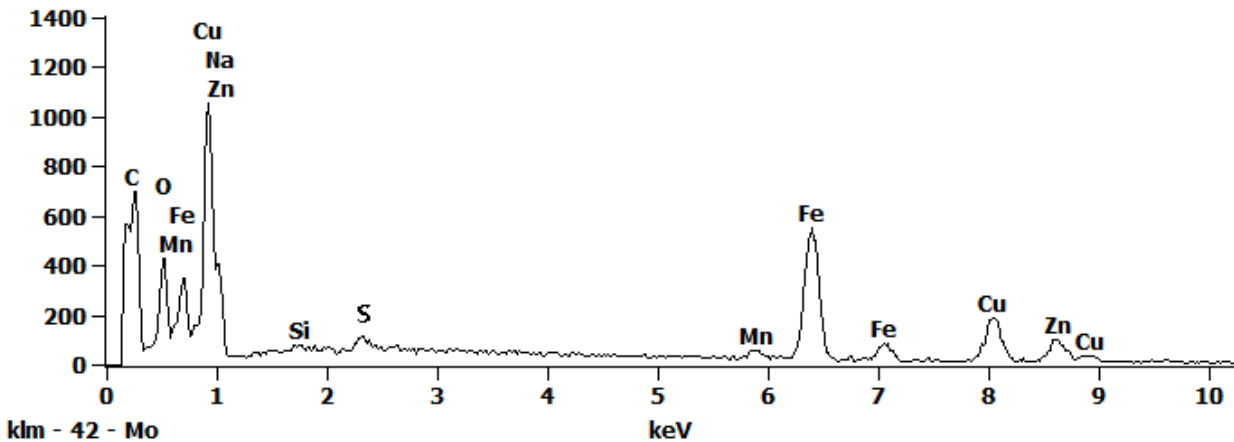


Figure 2. EDS Spectra for sample L2103-A-5 taken at test area 2. The test area is labeled in the particle SEM photo..

Full scale counts: 2456

L2103-A5(1)\_pt3

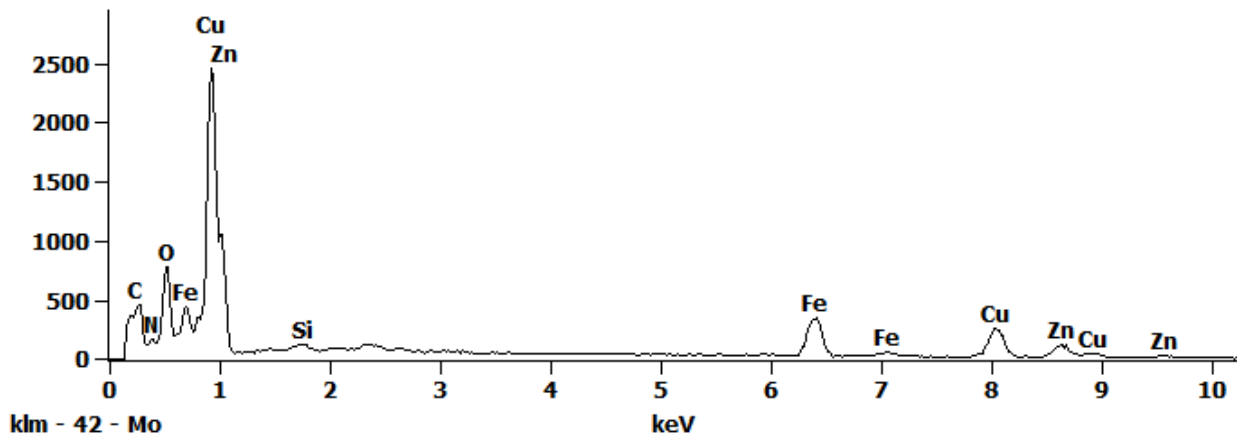


Figure 3. EDS Spectra for sample L2103-A-5 taken at test area 3. The test area is labeled in the particle SEM photo..

Full scale counts: 1587

L2103-A5(1)\_pt4

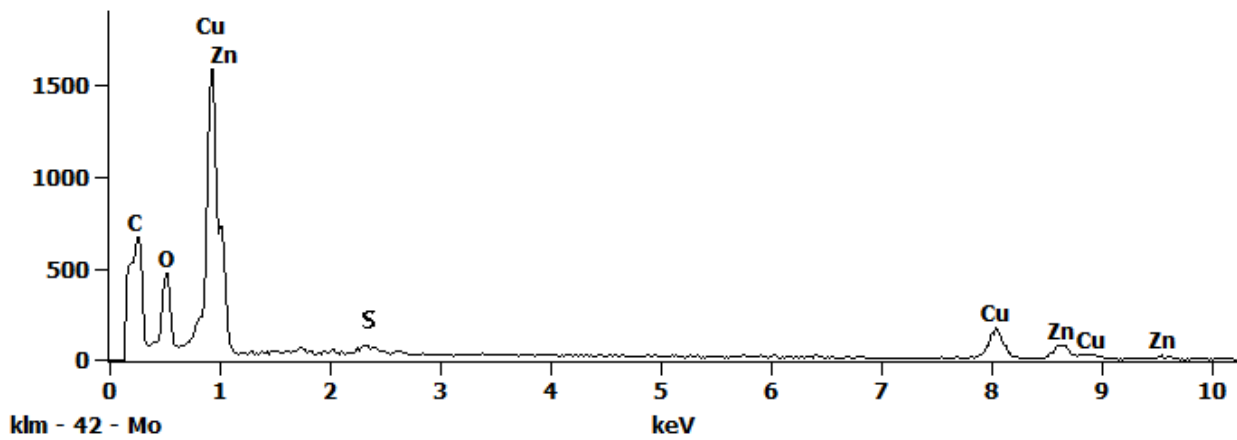
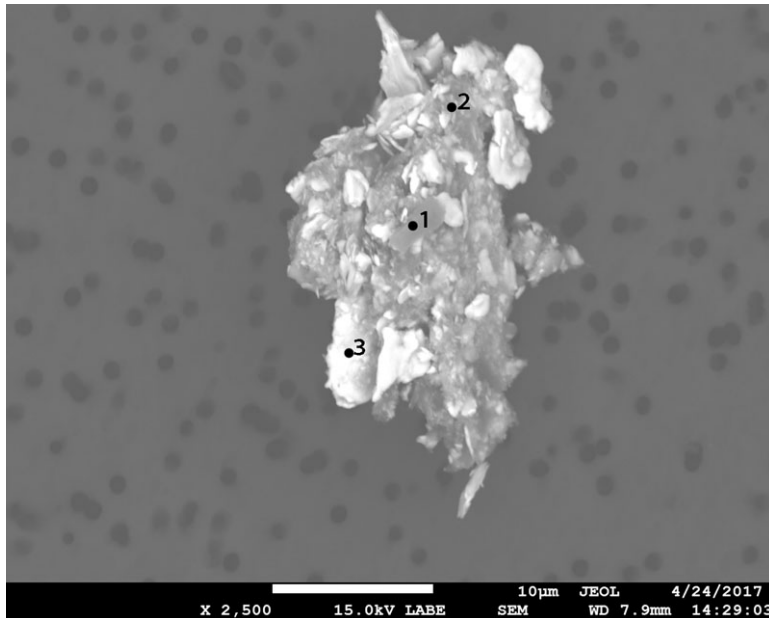


Figure 4. EDS Spectra for sample L2103-A-5 taken at test area 4. The test area is labeled in the particle SEM photo..

## L2103 A9



<b>Particle Size:</b>	50x30 µm
<b>Shape:</b>	Irregular
<b>Transparency:</b>	Translucent
<b>Color:</b>	CLEAR
<b>Luster:</b>	Subvitreous
<b>Particle Type:</b>	ARTIFICIAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	L2103 Cluster 9
<b>Comments:</b>	

SEM Photo of sample L2103 A9 with labeled EDS testing locations.

### Cluster of Origin: L2103 Cluster 9

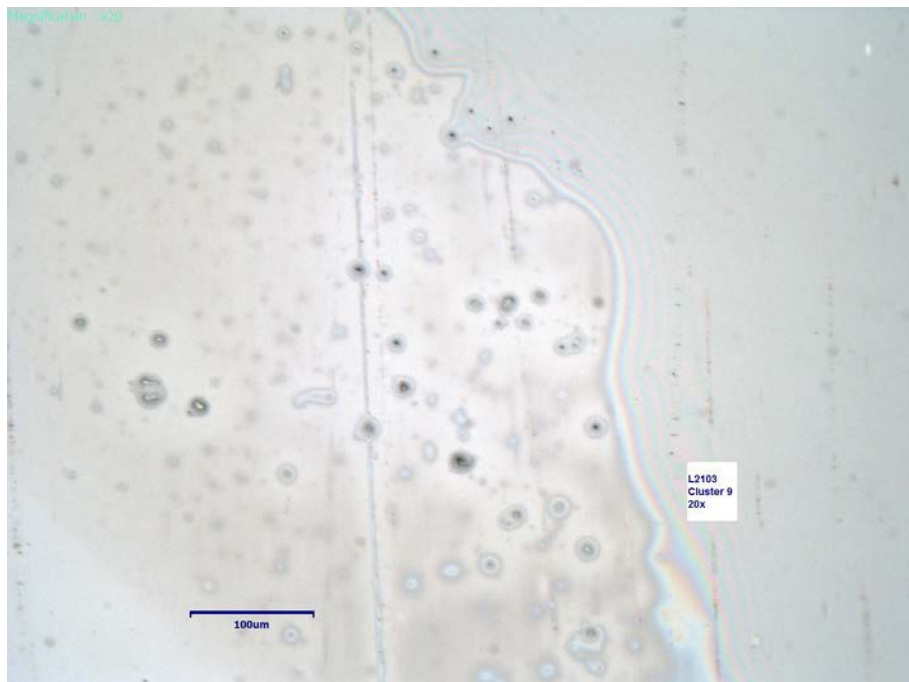


Photo of cluster L2103 Cluster 9.

*L2103 A9 - EDS Spectra*

Full scale counts: 4436

L2103-A9(1)\_pt1

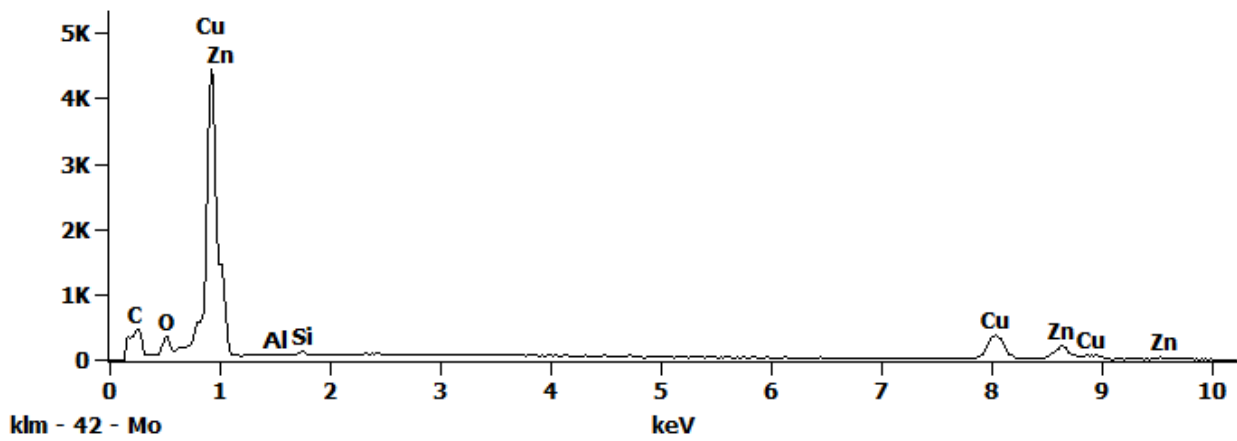


Figure 1. EDS Spectra for sample L2103-A-9 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 488

L2103-A9(1)\_pt2

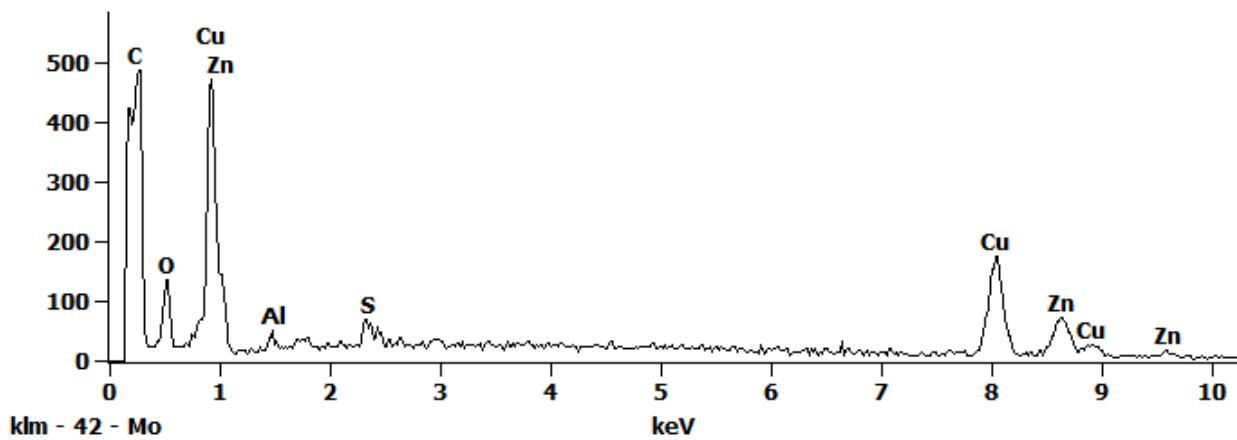


Figure 2. EDS Spectra for sample L2103-A-9 taken at test area 2. The test area is labeled in the particle SEM photo..

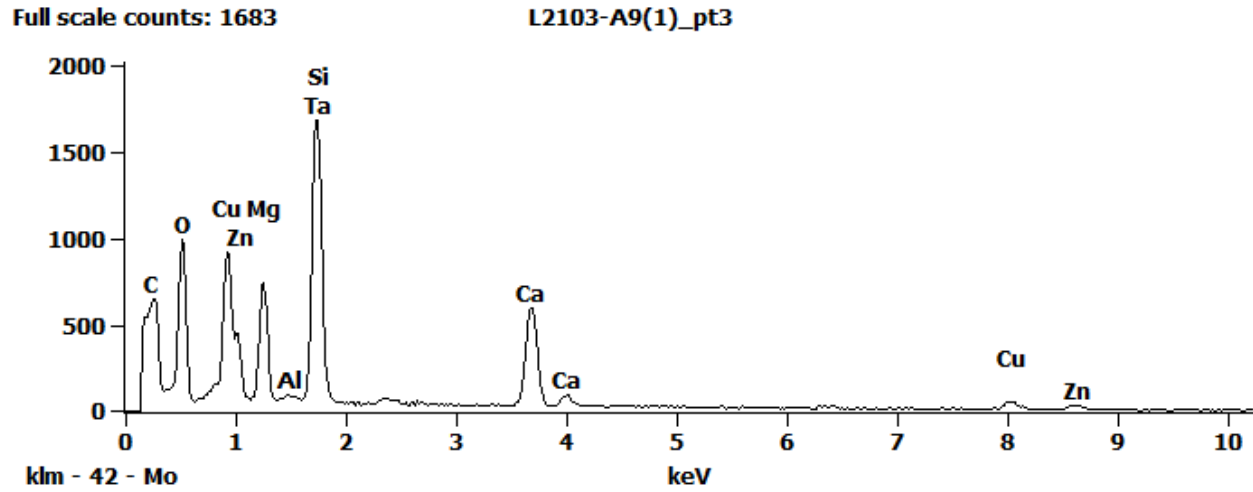
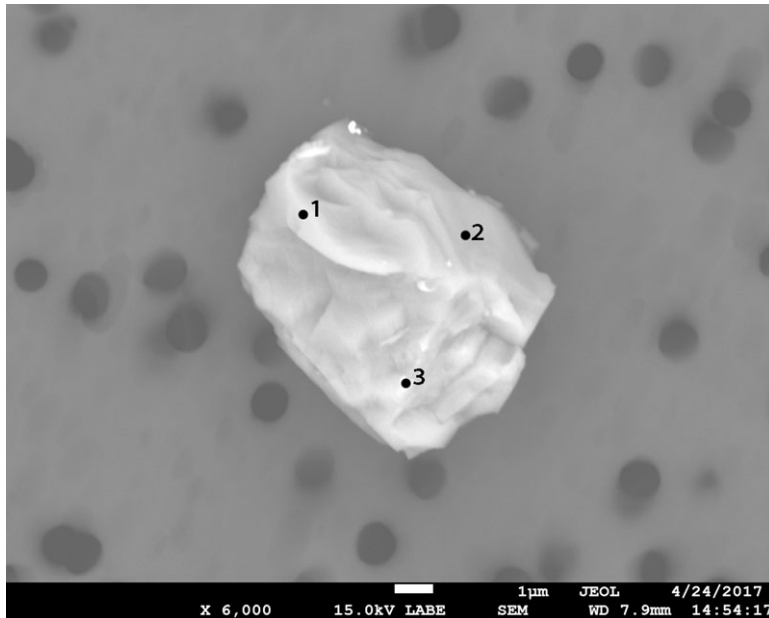


Figure 3. EDS Spectra for sample L2103-A-9 taken at test area 3. The test area is labeled in the particle SEM photo..



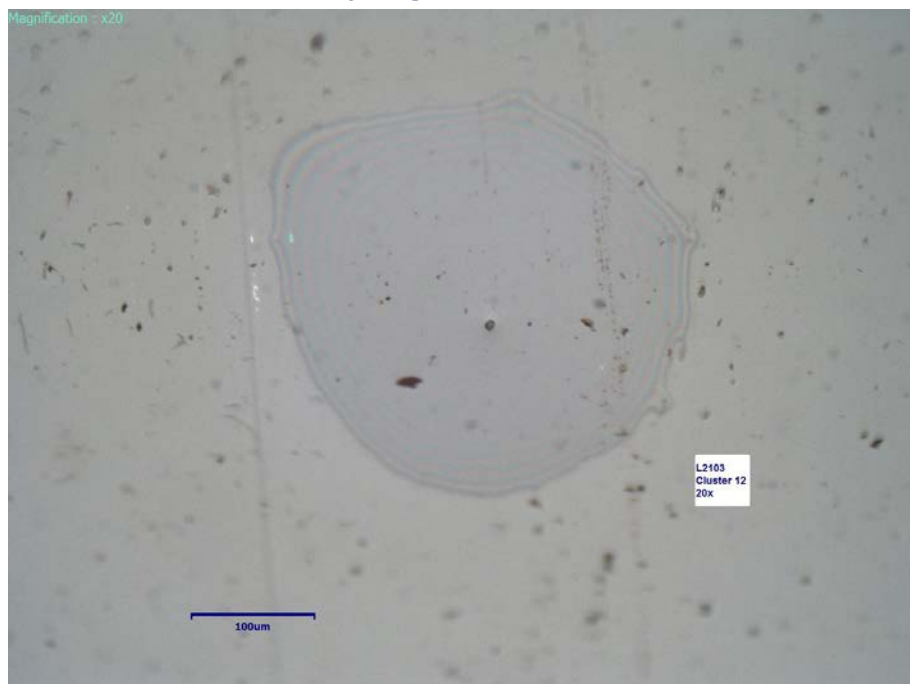
## L2103 A12



**Particle Size:** 6 µm  
**Shape:** Equidimensional  
**Transparency:** Translucent  
**Color:** CLEAR  
**Luster:** Subvitreous  
**Particle Type:** ARTIFICIAL  
TERRESTRIAL  
CONTAMINATION  
**Cluster No.:** L2103 Cluster 12  
**Comments:**

*SEM Photo of sample L2103 A12 with labeled EDS testing locations.*

### *Cluster of Origin: L2103 Cluster 12*



*Photo of cluster L2103 Cluster 12.*

*L2103 A12 - EDS Spectra*

Full scale counts: 7482

L2103-A12(1)\_pt1

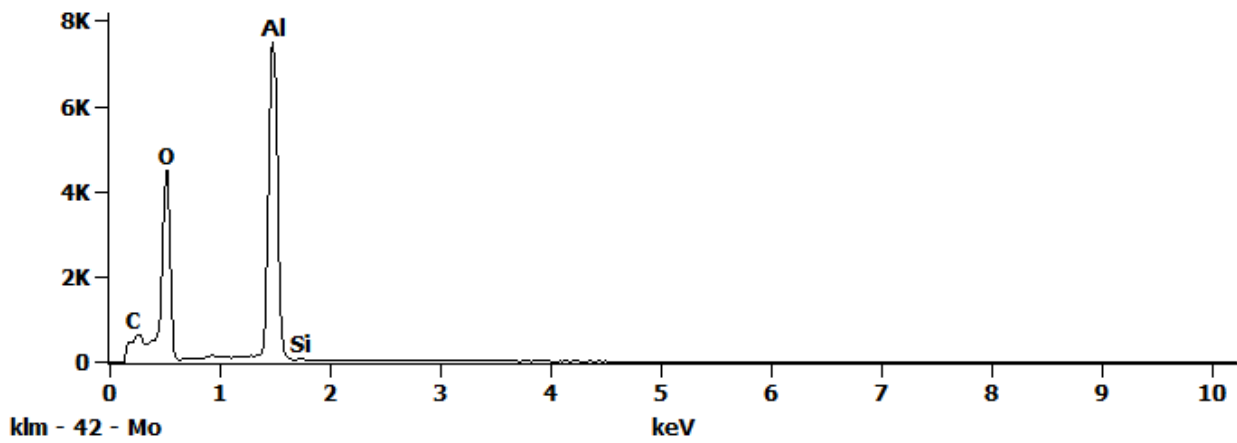


Figure 1. EDS Spectra for sample L2103-A-12 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 3830

L2103-A12(1)\_pt2

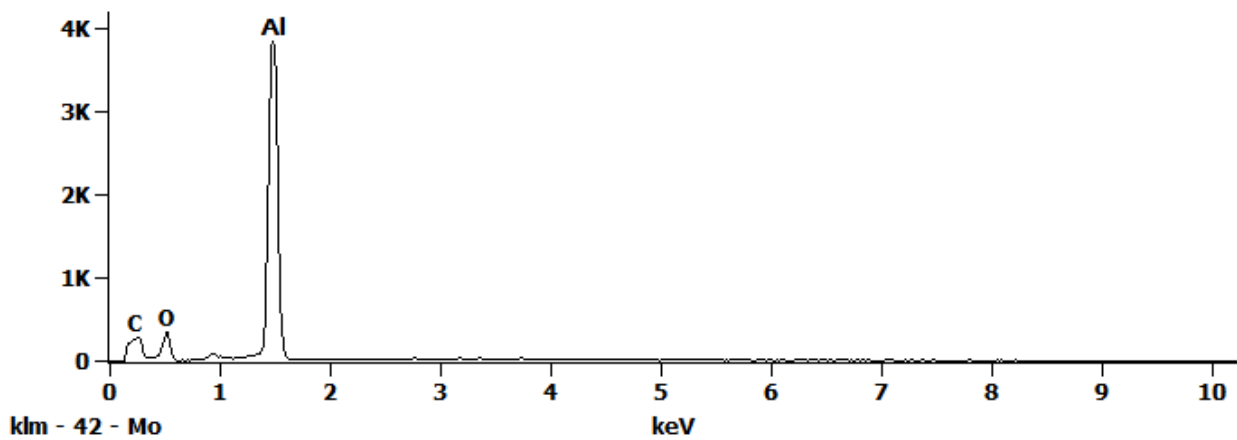


Figure 2. EDS Spectra for sample L2103-A-12 taken at test area 2. The test area is labeled in the particle SEM photo..

Full scale counts: 7579

L2103-A12(1)\_pt3

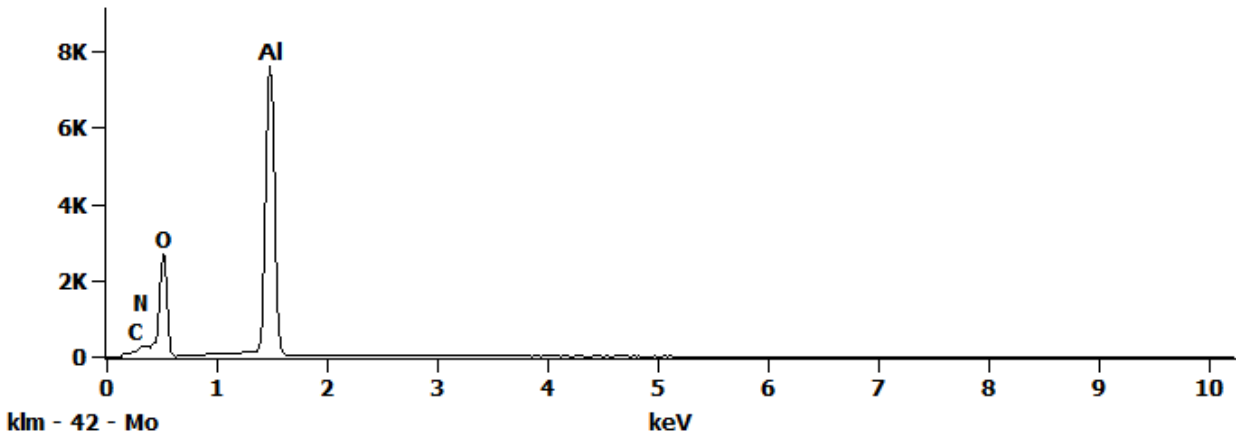
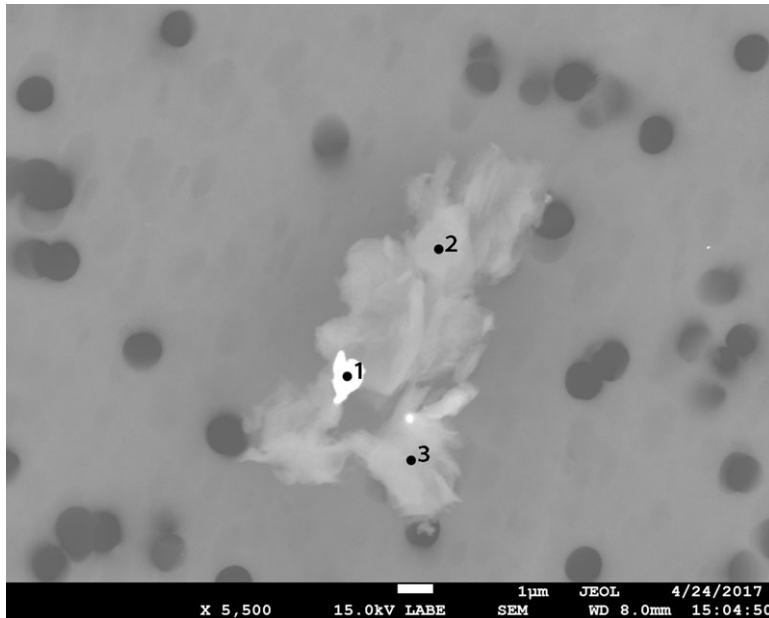


Figure 3. EDS Spectra for sample L2103-A-12 taken at test area 3. The test area is labeled in the particle SEM photo..

## L2103 A13



<b>Particle Size:</b>	50 µm
<b>Shape:</b>	Irregular
<b>Transparency:</b>	Opaque
<b>Color:</b>	BLACK
<b>Luster:</b>	Pearly to Dull
<b>Particle Type:</b>	ARTIFICIAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	
<b>Comments:</b>	

SEM Photo of sample L2103 A13 with labeled EDS testing locations.

### L2103 A13 - EDS Spectra

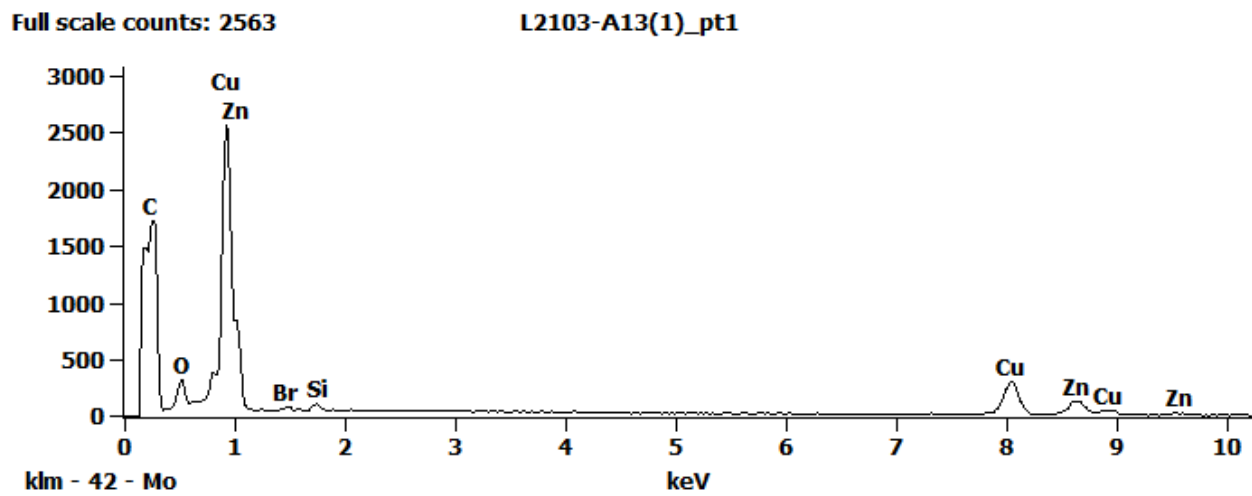


Figure 1. EDS Spectra for sample L2103-A-13 taken at test area 1. The test area is labeled in the particle SEM photo.

Full scale counts: 2673

L2103-A13(1)\_pt2

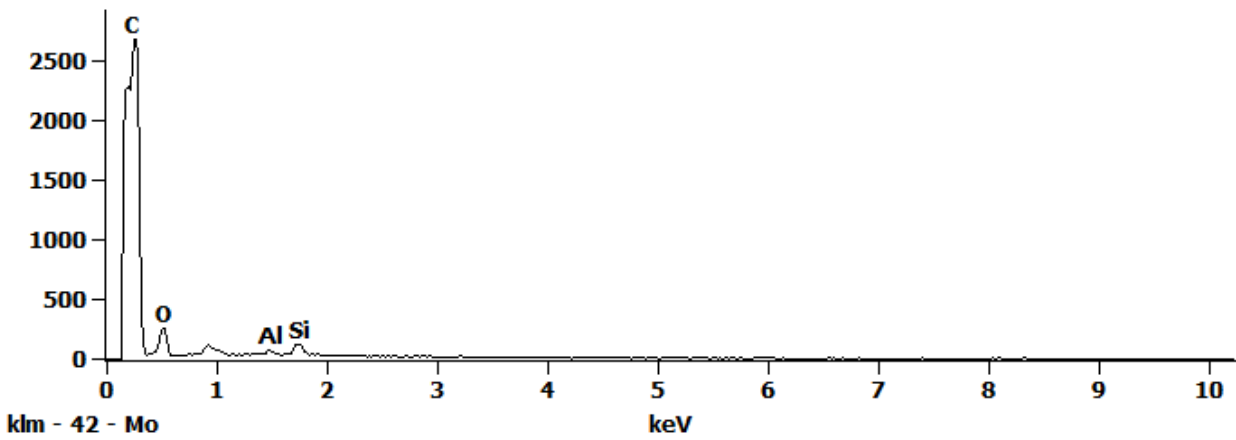


Figure 2. EDS Spectra for sample L2103-A-13 taken at test area 2. The test area is labeled in the particle SEM photo..

Full scale counts: 3620

L2103-A13(1)\_pt3

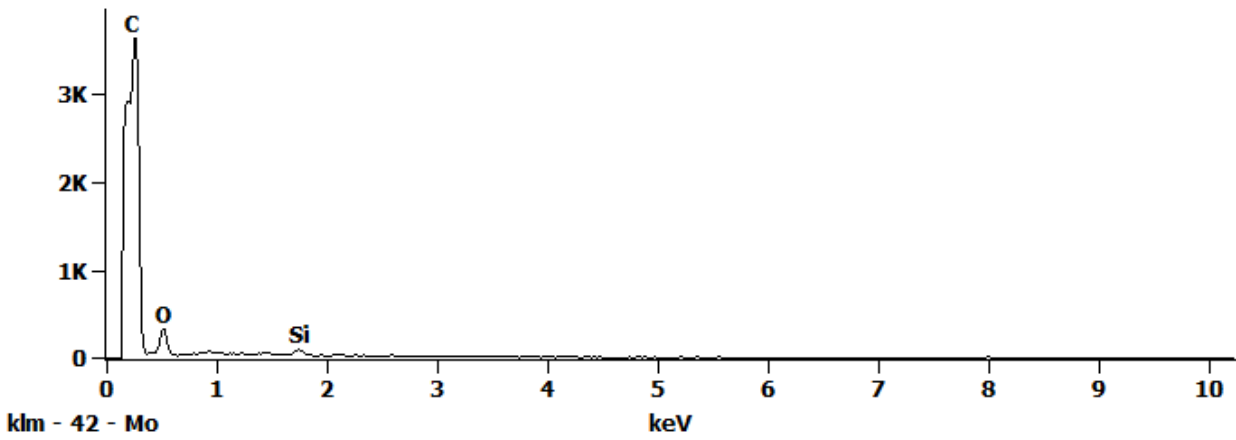


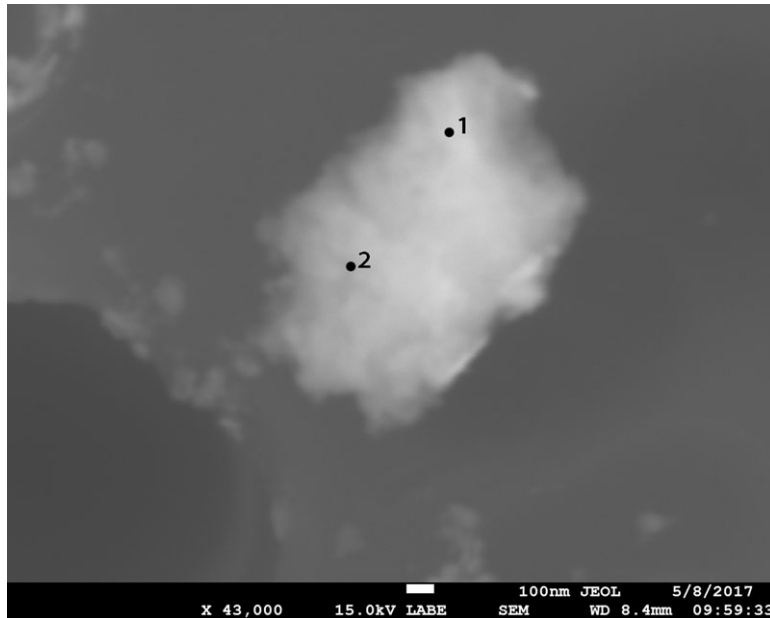
Figure 3. EDS Spectra for sample L2103-A-13 taken at test area 3. The test area is labeled in the particle SEM photo..

# Particle Descriptions

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## Natural Terrestrial Contamination (TCN Type)

## L2098 A3



<b>Particle Size:</b>	10x19 $\mu\text{m}$
<b>Shape:</b>	Equidimensional to Irregular
<b>Transparency:</b>	Opaque to Translucent
<b>Color:</b>	BLACK, GRAY
<b>Luster:</b>	Pearly to Dull
<b>Particle Type:</b>	NATURAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	L2098 Cluster 3
<b>Comments:</b>	

SEM Photo of sample L2098 A3 with labeled EDS testing locations.

### Cluster of Origin: L2098 Cluster 3



Photo of cluster L2098 Cluster 3.

*L2098 A3 - EDS Spectra*

Full scale counts: 1605

L2098a-3(1)\_pt1

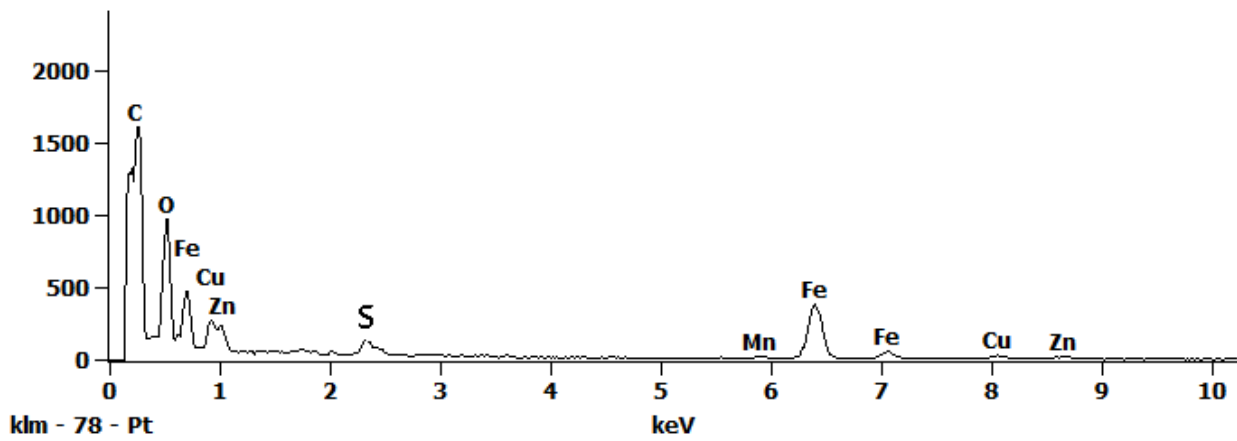


Figure 1. EDS Spectra for sample L2098-A-3 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 2053

L2098a-3(1)\_pt2

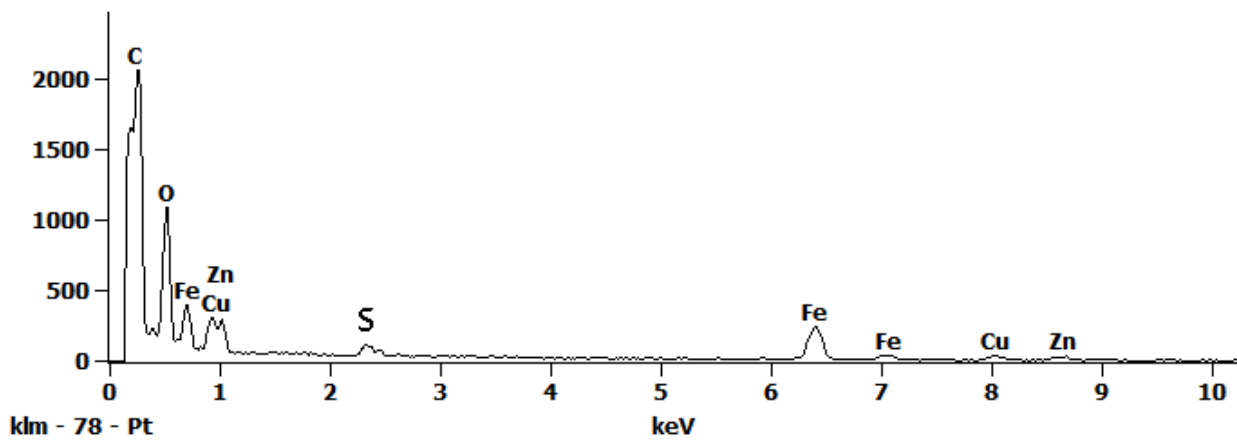
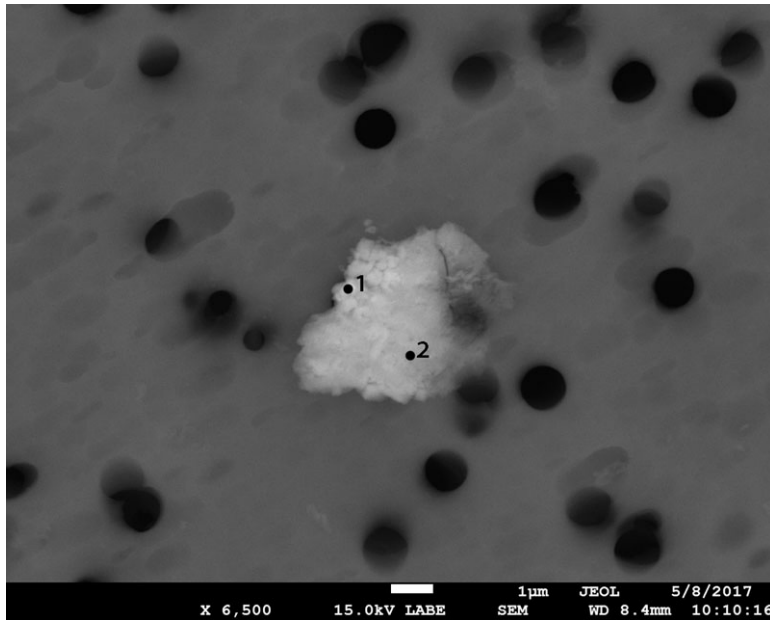


Figure 2. EDS Spectra for sample L2098-A-3 taken at test area 2. The test area is labeled in the particle SEM photo..



## L2098 A4



SEM Photo of sample L2098 A4 with labeled EDS testing locations.

<b>Particle Size:</b>	6 µm
<b>Shape:</b>	Equidimensional to Irregular
<b>Transparency:</b>	Opaque
<b>Color:</b>	BLACK, GRAY, SILVER
<b>Luster:</b>	Subvitreous to Dull
<b>Particle Type:</b>	NATURAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	L2098 Cluster 4
<b>Comments:</b>	

### Cluster of Origin: L2098 Cluster 4

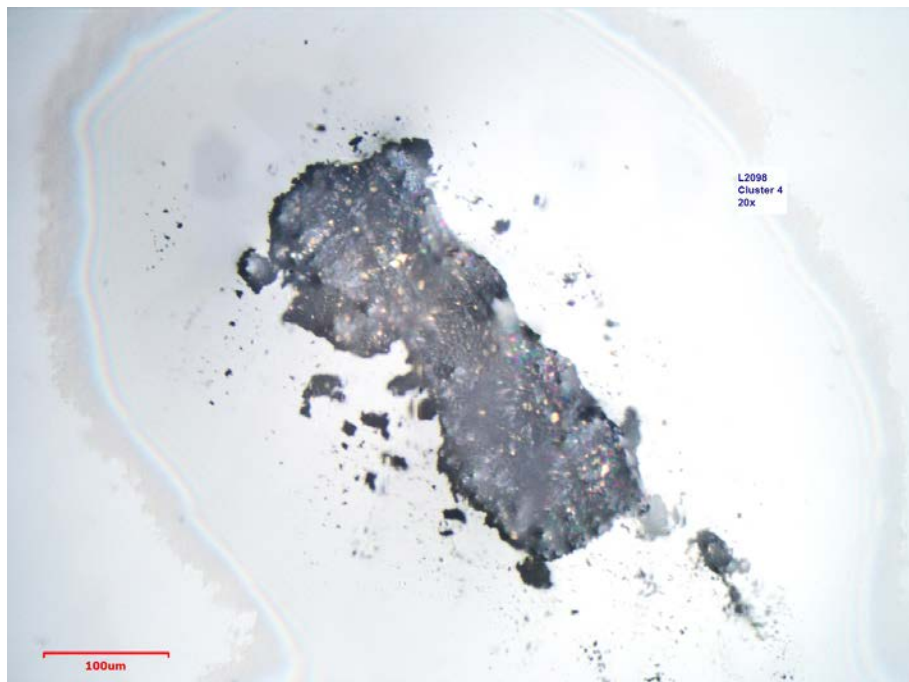


Photo of cluster L2098 Cluster 4.

*L2098 A4 - EDS Spectra*

Full scale counts: 1318

L2098a-4(1)\_pt1

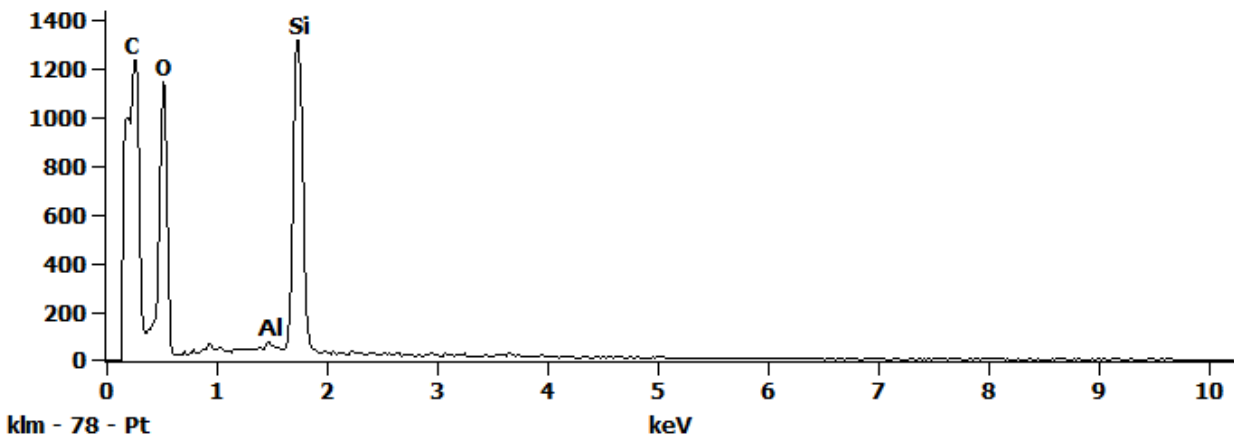


Figure 1. EDS Spectra for sample L2098-A-4 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 1896

L2098a-4(1)\_pt2

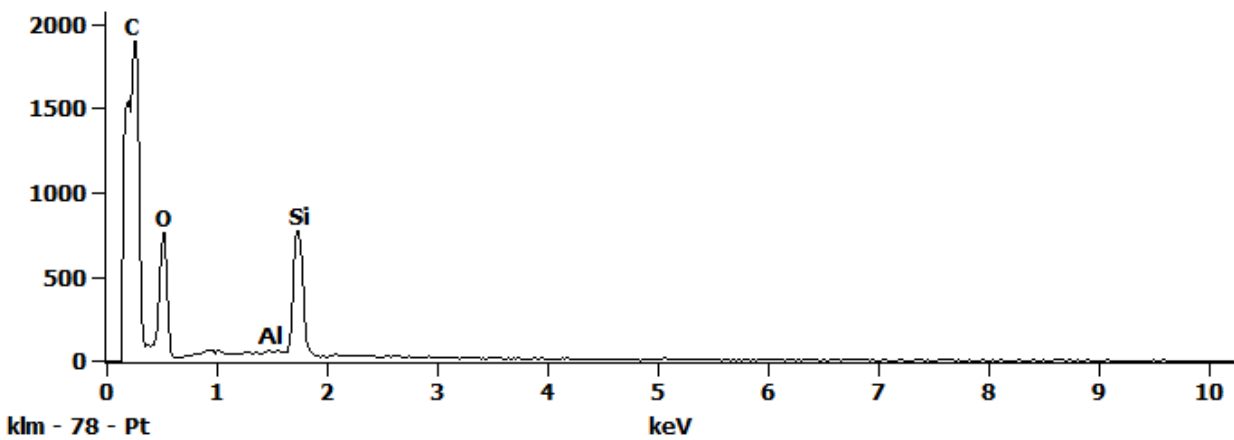
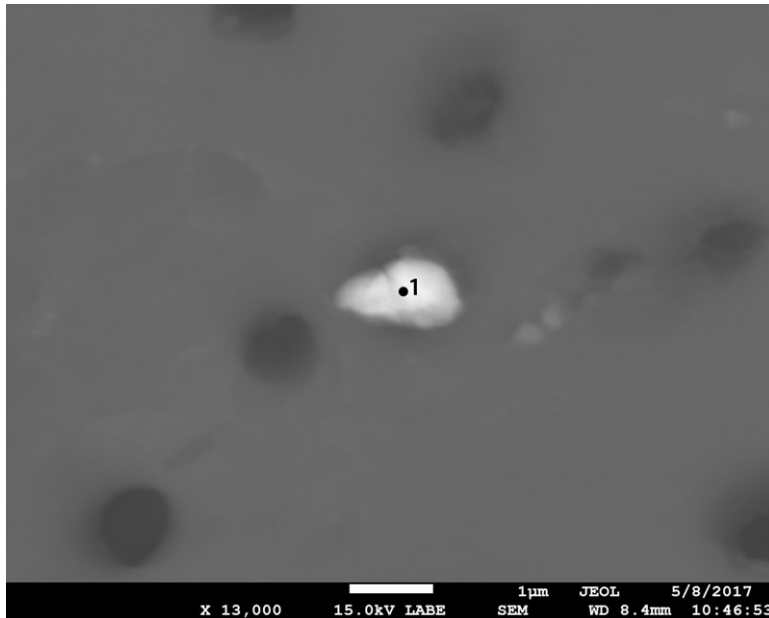


Figure 2. EDS Spectra for sample L2098-A-4 taken at test area 2. The test area is labeled in the particle SEM photo..

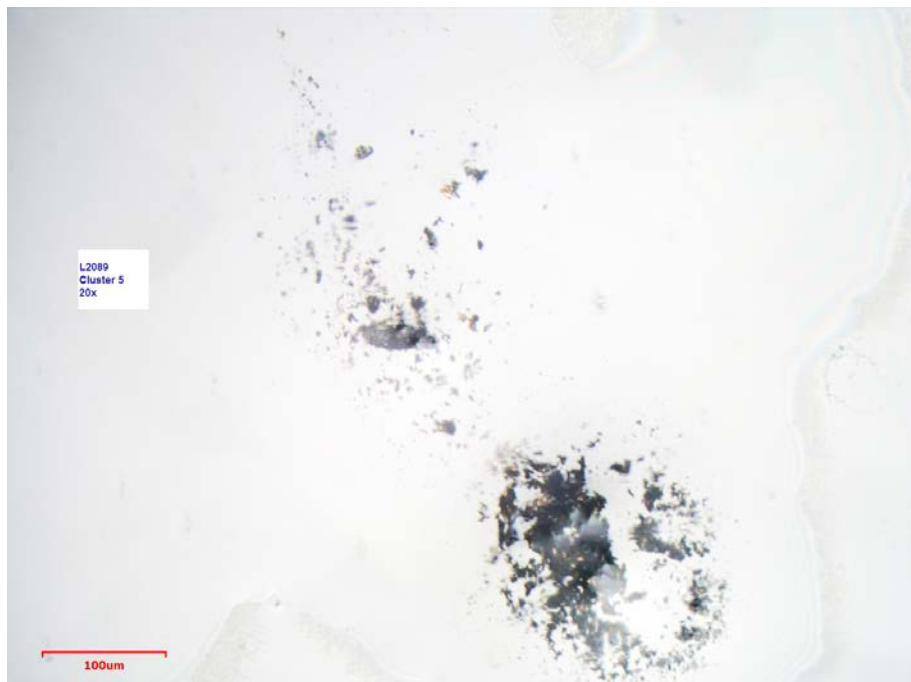
## L2098 A5



<b>Particle Size:</b>	5x11 µm
<b>Shape:</b>	Equidimensional to Irregular
<b>Transparency:</b>	Opaque
<b>Color:</b>	BLACK
<b>Luster:</b>	Dull
<b>Particle Type:</b>	NATURAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	L2098 Cluster 5
<b>Comments:</b>	

*SEM Photo of sample L2098 A5 with labeled EDS testing locations.*

### *Cluster of Origin: L2098 Cluster 5*

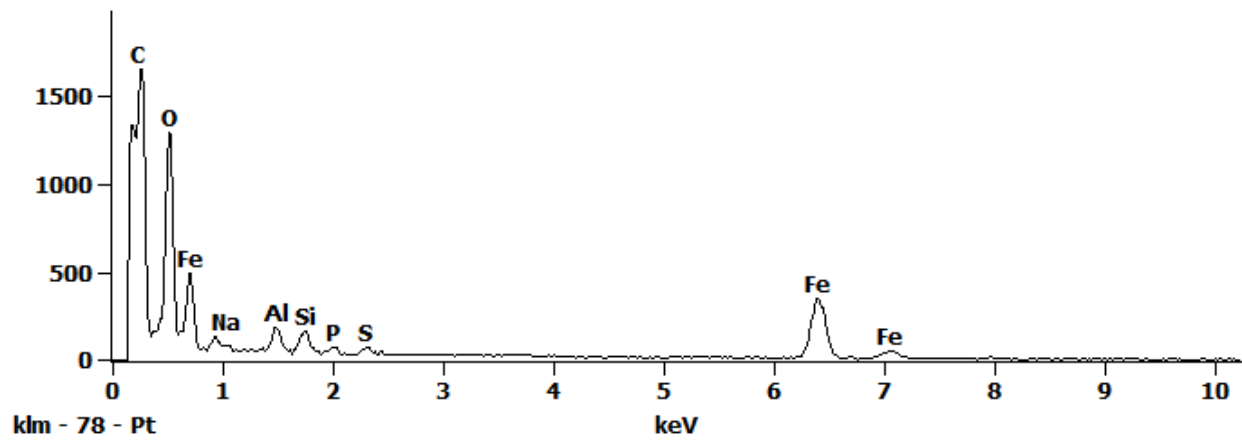


*Photo of cluster L2098 Cluster 5.*

*L2098 A5 - EDS Spectra*

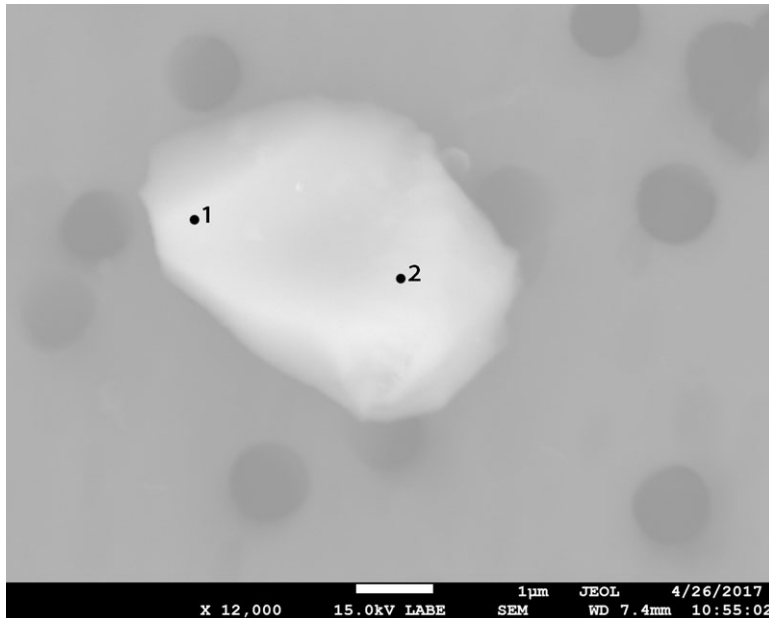
Full scale counts: 1646

L2098a-5(1)\_pt1



*Figure 1. EDS Spectra for sample L2098-A-5 taken at test area 1. The test area is labeled in the particle SEM photo..*

## L2100 A1



<b>Particle Size:</b>	4x6 μm
<b>Shape:</b>	Equidimensional to Irregular
<b>Transparency:</b>	Opaque
<b>Color:</b>	BLACK
<b>Luster:</b>	Dull
<b>Particle Type:</b>	NATURAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	
<b>Comments:</b>	

SEM Photo of sample L2100 A1 with labeled EDS testing locations.

### L2100 A1 - EDS Spectra

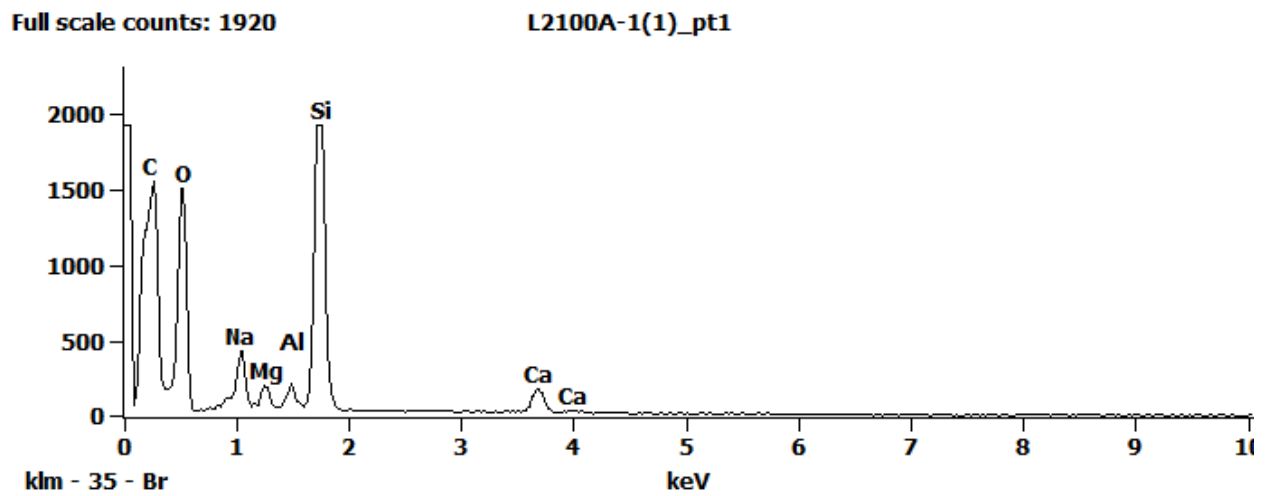


Figure 1. EDS Spectra for sample L2100-A-1 taken at test area 1. The test area is labeled in the particle SEM photo..

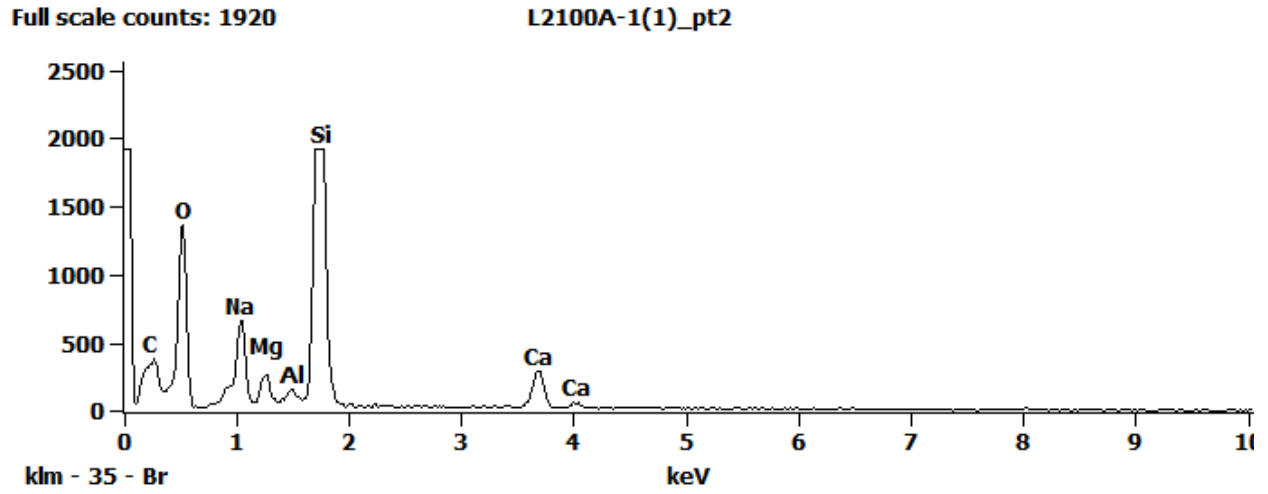
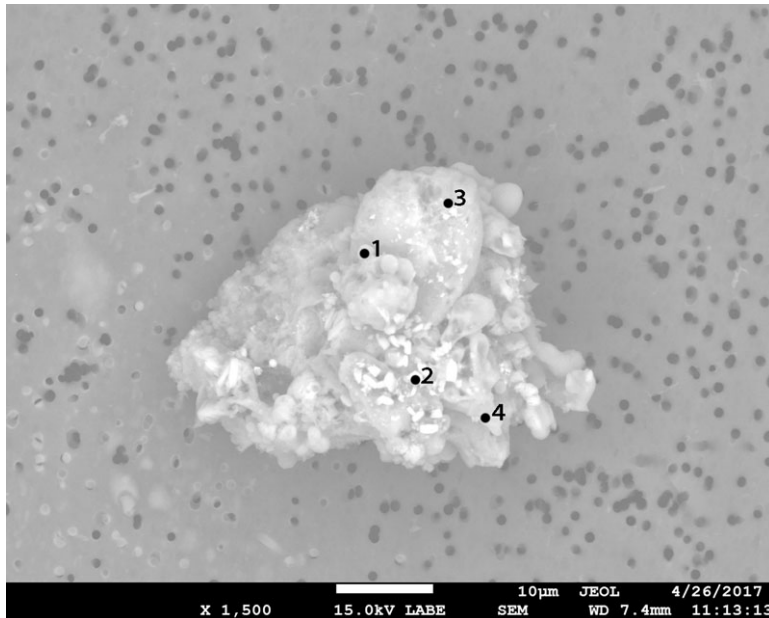


Figure 2. EDS Spectra for sample L2100-A-1 taken at test area 2. The test area is labeled in the particle SEM photo..

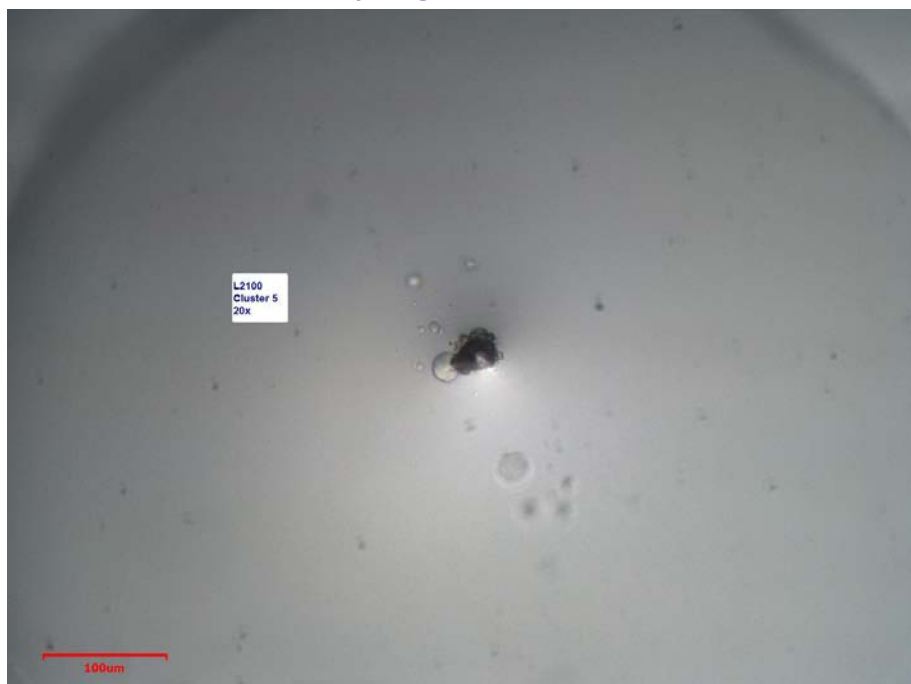
## L2100 A5



**Particle Size:** 30x38 µm  
**Shape:** Irregular  
**Transparency:** Opaque  
**Color:** BLACK, GRAY  
**Luster:** Dull  
**Particle Type:** NATURAL  
TERRESTRIAL  
CONTAMINATION  
**Cluster No.:** L2100 Cluster 5  
**Comments:**

*SEM Photo of sample L2100 A5 with labeled EDS testing locations.*

### *Cluster of Origin: L2100 Cluster 5*



*Photo of cluster L2100 Cluster 5.*

*L2100 A5 - EDS Spectra*

Full scale counts: 527

L2100A-5(1)\_pt1

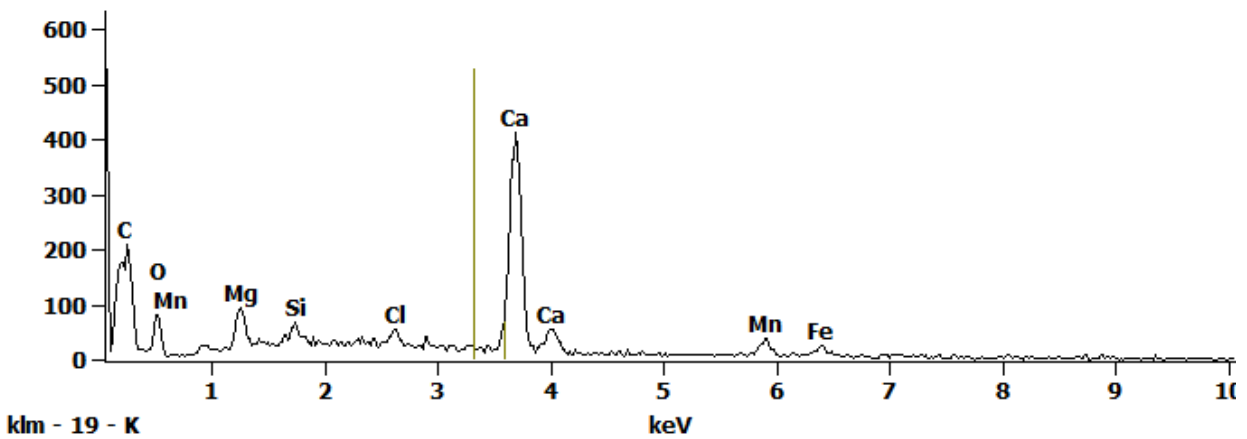


Figure 1. EDS Spectra for sample L2100-A-5 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 810

L2100A-5(1)\_pt2

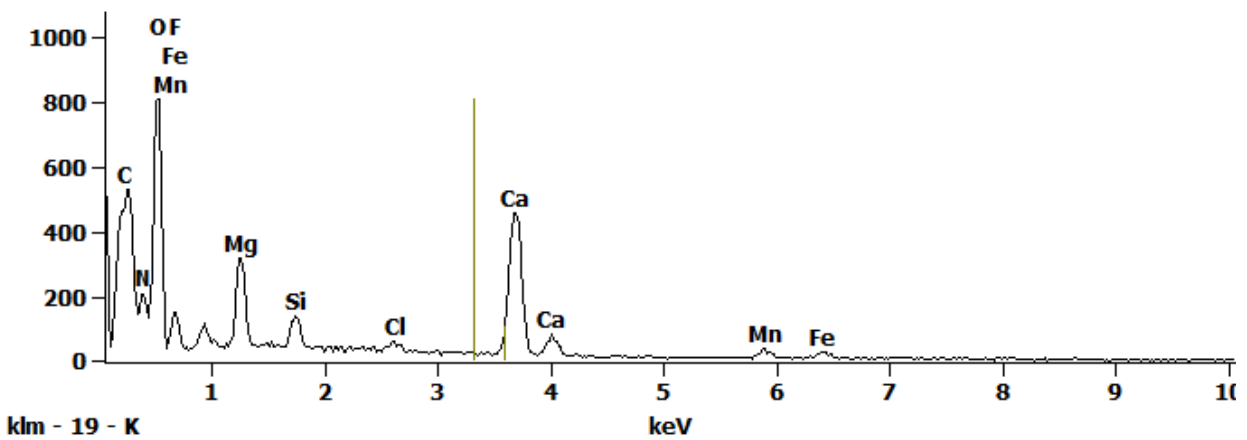


Figure 2. EDS Spectra for sample L2100-A-5 taken at test area 2. The test area is labeled in the particle SEM photo..



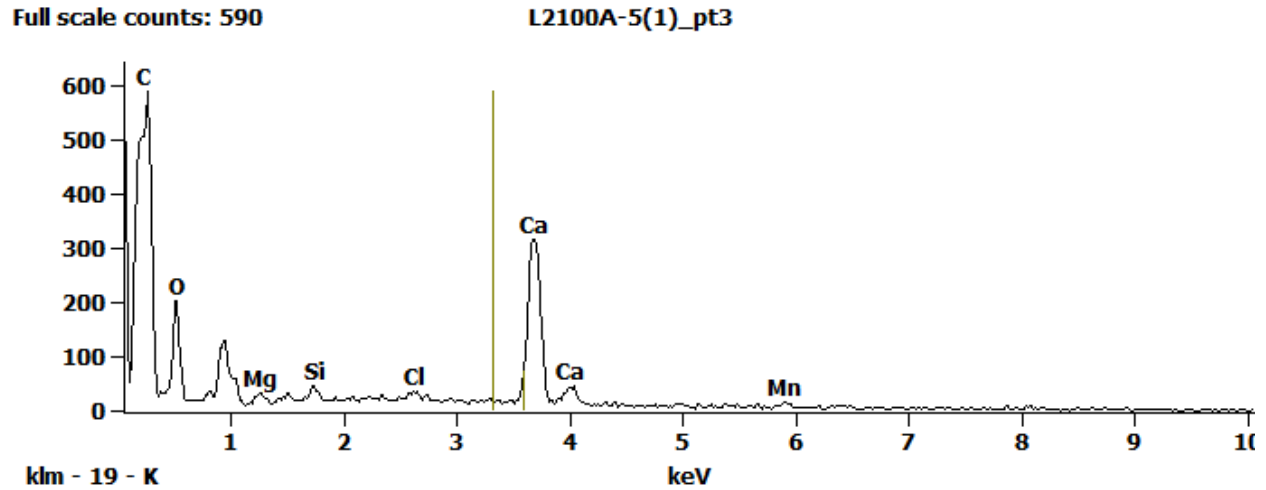


Figure 3. EDS Spectra for sample L2100-A-5 taken at test area 3. The test area is labeled in the particle SEM photo..

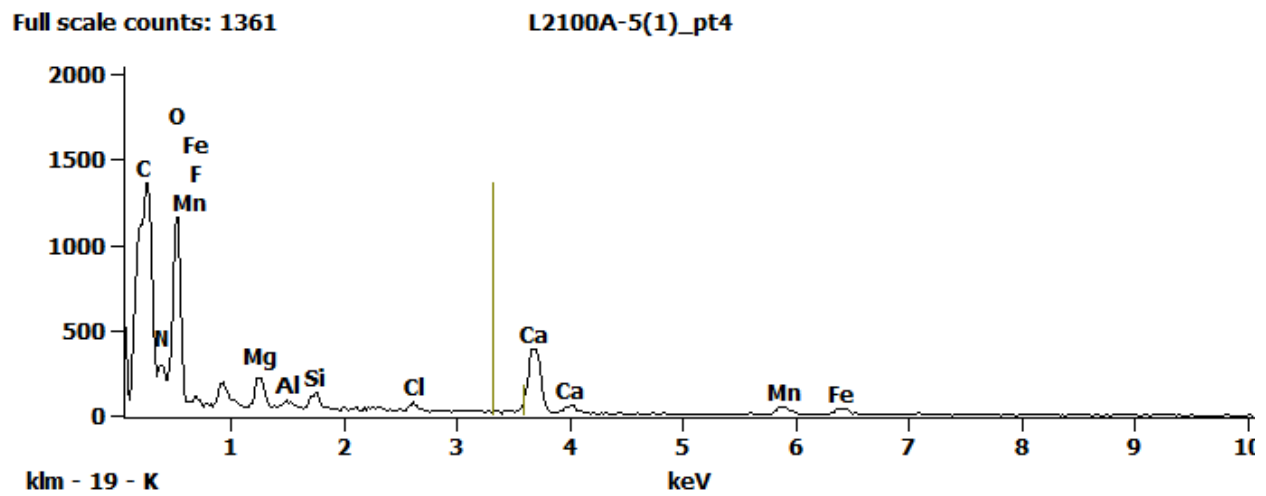
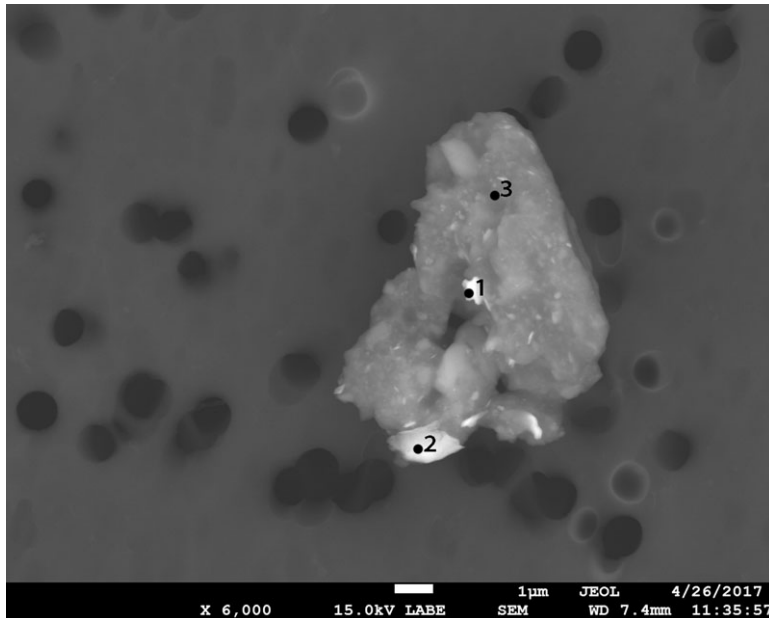


Figure 4. EDS Spectra for sample L2100-A-5 taken at test area 4. The test area is labeled in the particle SEM photo..

## L2100 A6



<b>Particle Size:</b>	9x6 µm
<b>Shape:</b>	Irregular
<b>Transparency:</b>	Opaque
<b>Color:</b>	BLACK, SILVER
<b>Luster:</b>	Metallic to Dull
<b>Particle Type:</b>	NATURAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	L2100 Cluster 6
<b>Comments:</b>	

SEM Photo of sample L2100 A6 with labeled EDS testing locations.

### Cluster of Origin: L2100 Cluster 6

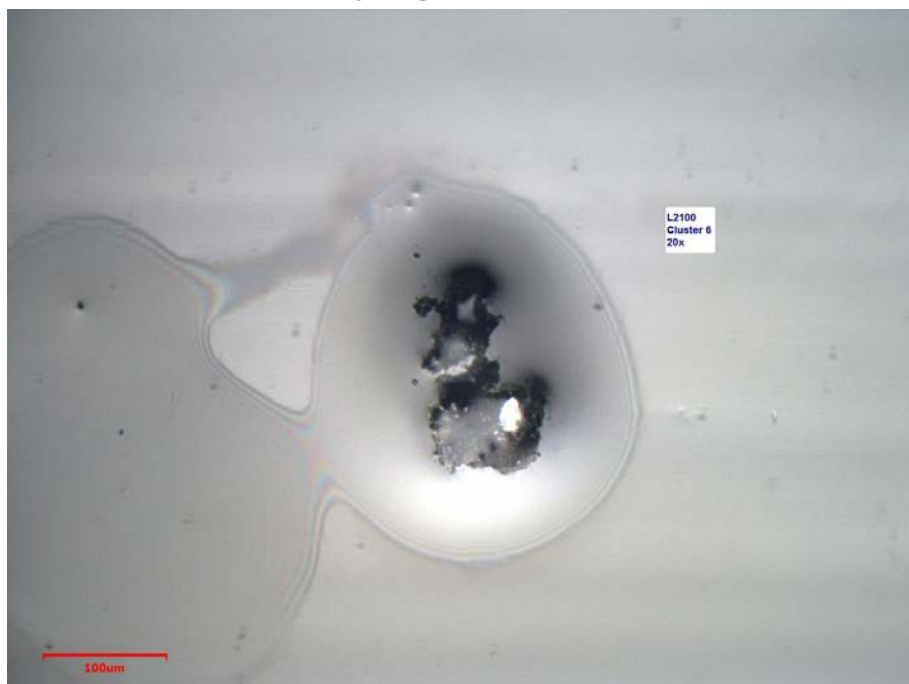


Photo of cluster L2100 Cluster 6.

*L2100 A6 - EDS Spectra*

Full scale counts: 1573

L2100A-6 (1)\_pt1

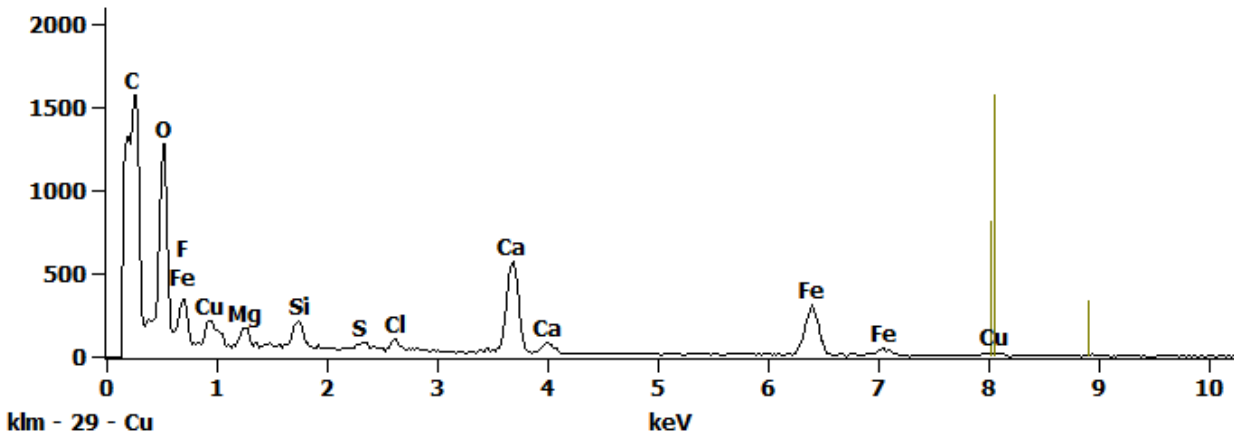


Figure 1. EDS Spectra for sample L2100-A-6 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 1653

L2100A-6 (1)\_pt2

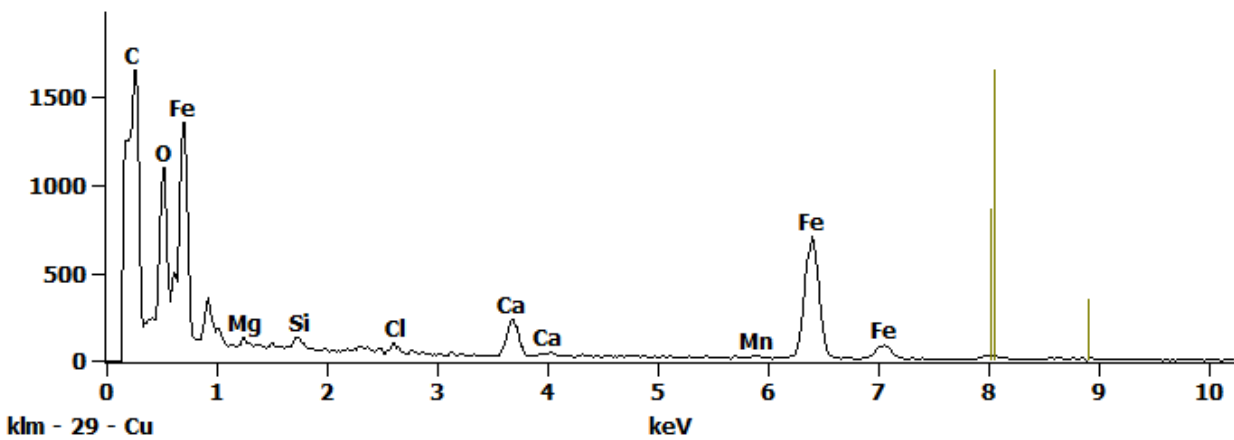


Figure 2. EDS Spectra for sample L2100-A-6 taken at test area 2. The test area is labeled in the particle SEM photo..

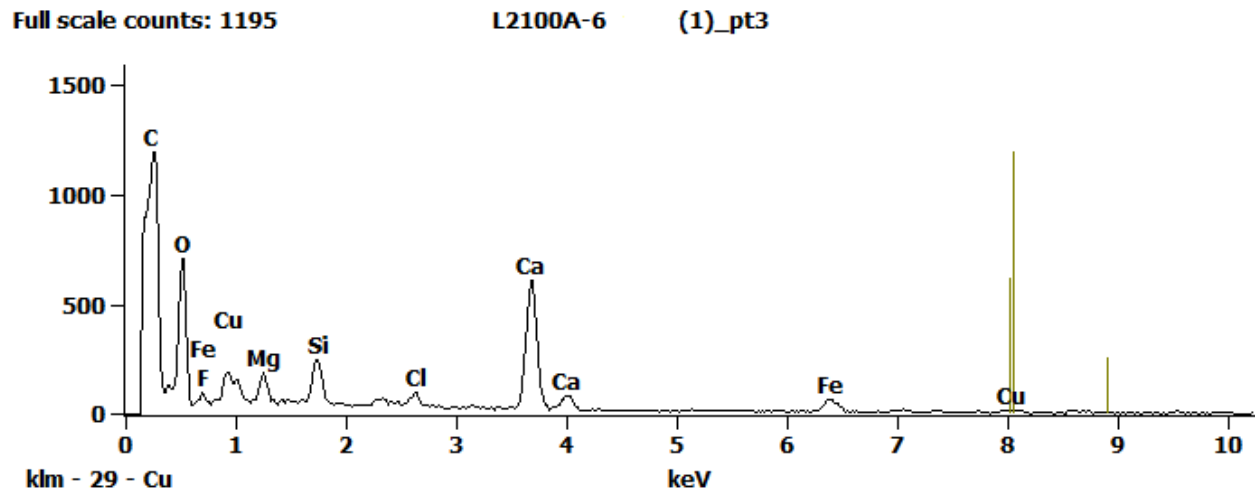
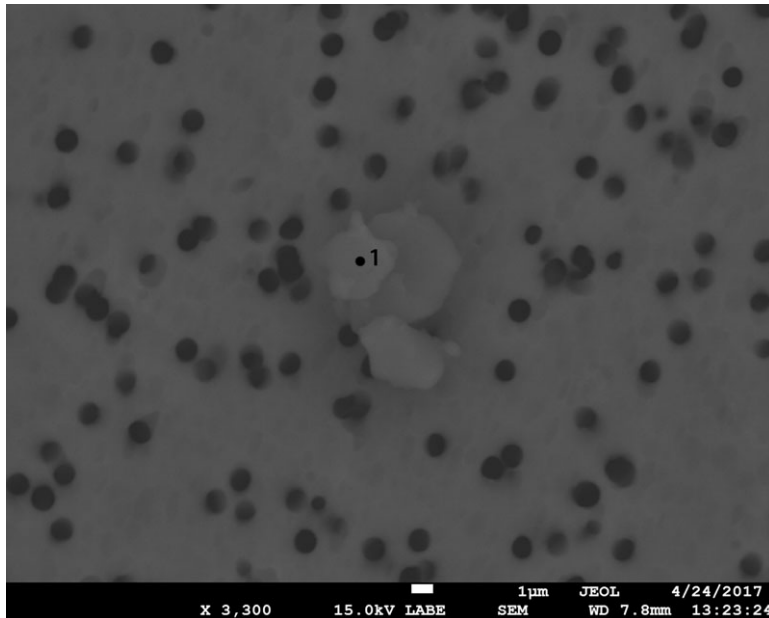


Figure 3. EDS Spectra for sample L2100-A-6 taken at test area 3. The test area is labeled in the particle SEM photo..

## L2103 A2



<b>Particle Size:</b>	9 µm
<b>Shape:</b>	Irregular
<b>Transparency:</b>	Opaque to Translucent
<b>Color:</b>	GREEN
<b>Luster:</b>	Pearly to Subvitreous
<b>Particle Type:</b>	NATURAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	L2103 Cluster 2
<b>Comments:</b>	

*SEM Photo of sample L2103 A2 with labeled EDS testing locations.*

### *Cluster of Origin: L2103 Cluster 2*

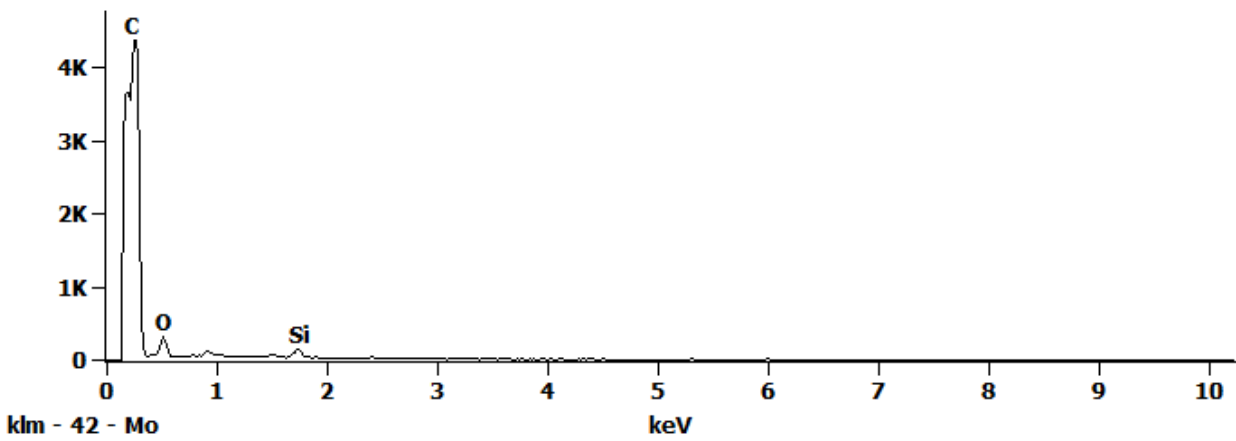


*Photo of cluster L2103 Cluster 2.*

*L2103 A2 - EDS Spectra*

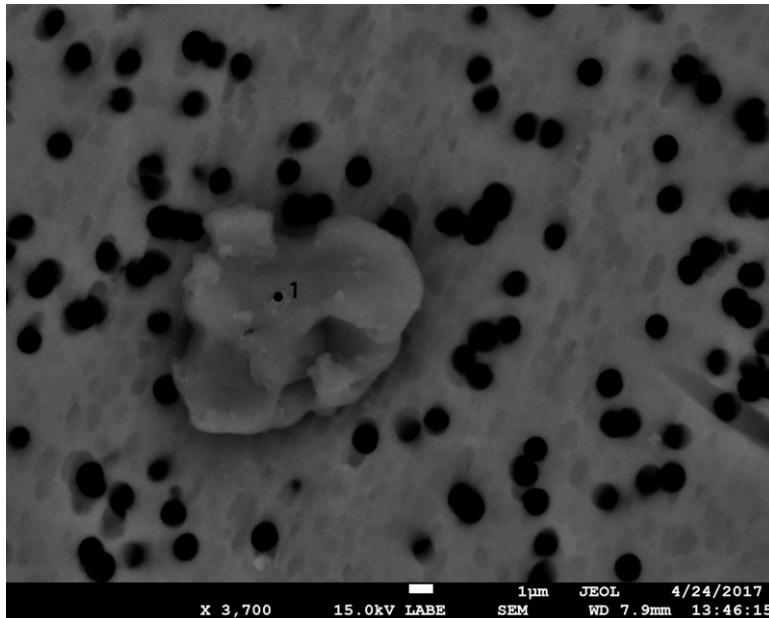
Full scale counts: 4355

L2103-A2(2)\_pt1



*Figure 1. EDS Spectra for sample L2103-A-2 taken at test area 1. The test area is labeled in the particle SEM photo..*

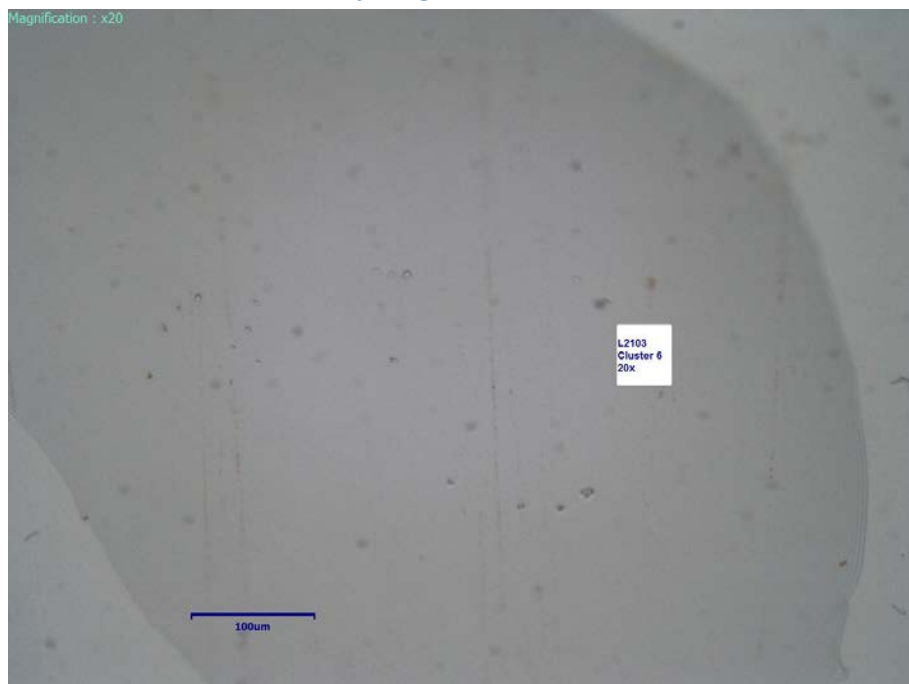
## L2103 A6



<b>Particle Size:</b>	14 µm
<b>Shape:</b>	Equidimensional to Spherical
<b>Transparency:</b>	Translucent
<b>Color:</b>	CLEAR
<b>Luster:</b>	Subvitreous
<b>Particle Type:</b>	NATURAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	L2103 Cluster 6
<b>Comments:</b>	

*SEM Photo of sample L2103 A6 with labeled EDS testing locations.*

### *Cluster of Origin: L2103 Cluster 6*

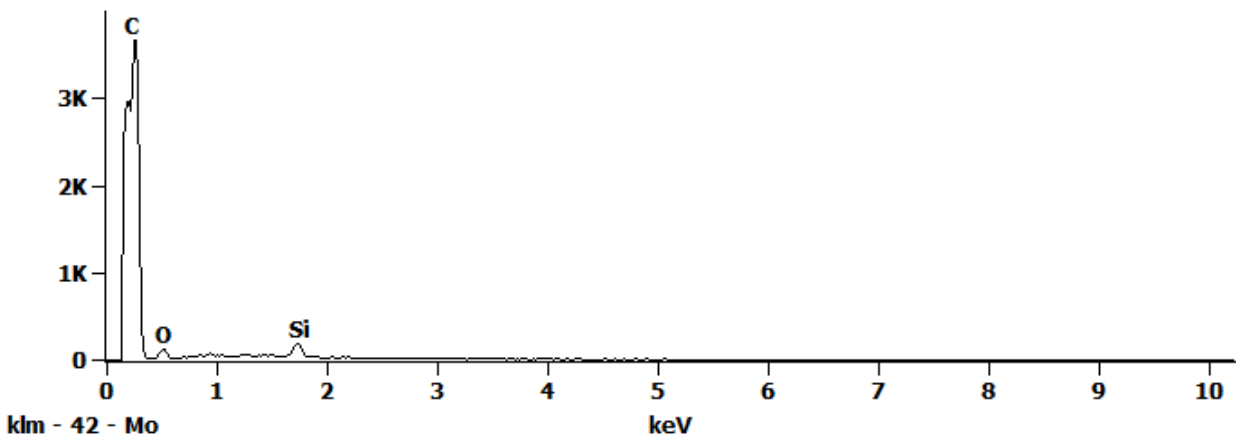


*Photo of cluster L2103 Cluster 6.*

*L2103 A6 - EDS Spectra*

Full scale counts: 3653

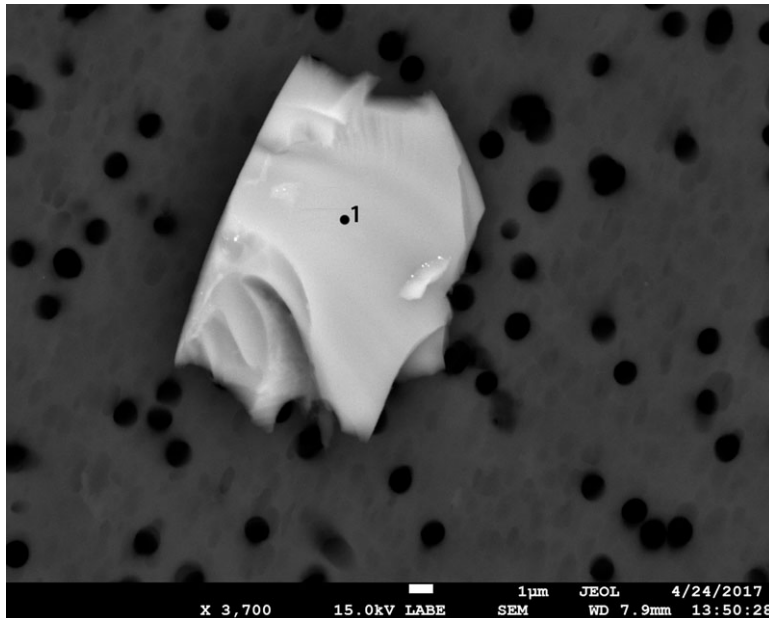
L2103-A6(1)\_pt1



*Figure 1. EDS Spectra for sample L2103-A-6 taken at test area 1. The test area is labeled in the particle SEM photo..*



## L2103 A7



<b>Particle Size:</b>	15 µm
<b>Shape:</b>	Equidimensional to Irregular
<b>Transparency:</b>	Translucent
<b>Color:</b>	CLEAR
<b>Luster:</b>	Subvitreous
<b>Particle Type:</b>	NATURAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	L2103 Cluster 7
<b>Comments:</b>	

SEM Photo of sample L2103 A7 with labeled EDS testing locations.

### Cluster of Origin: L2103 Cluster 7

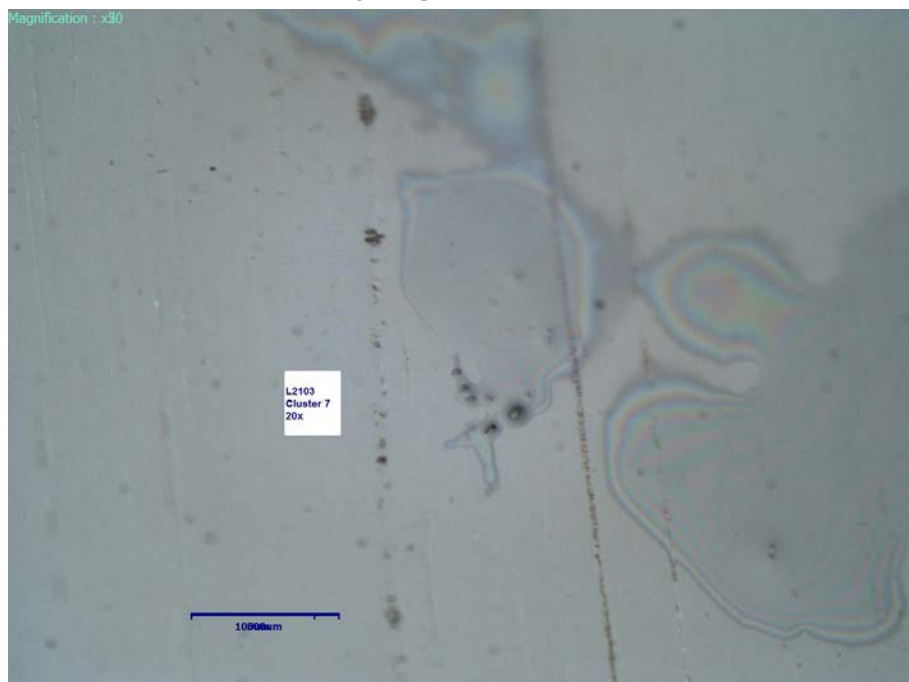
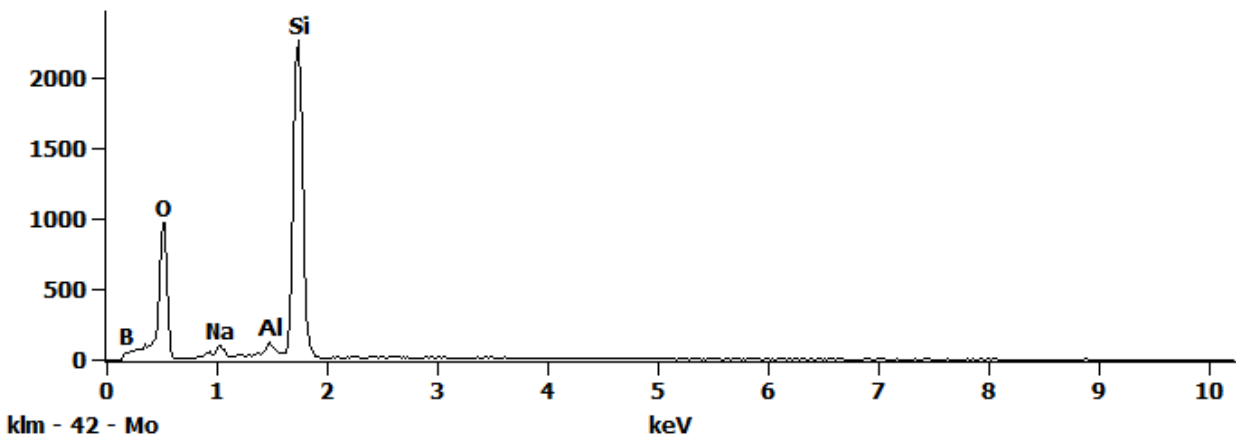


Photo of cluster L2103 Cluster 7.

*L2103 A7 - EDS Spectra*

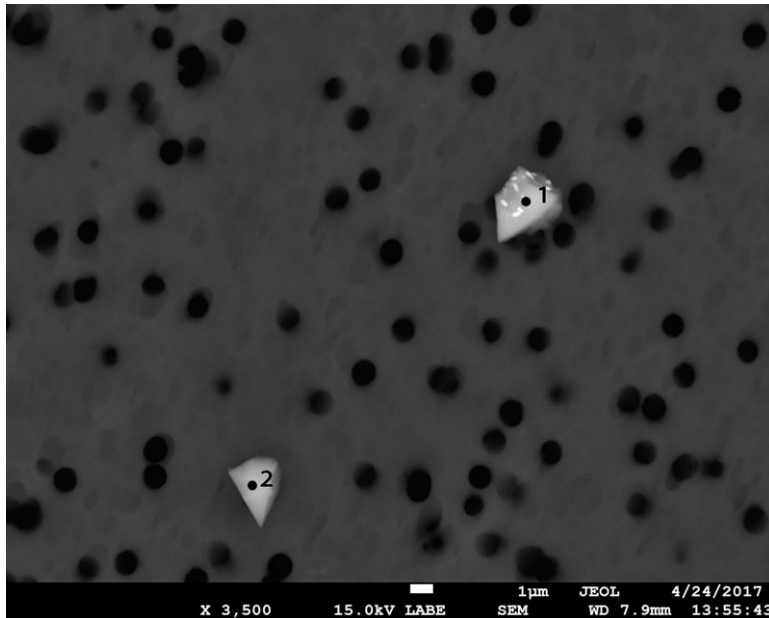
Full scale counts: 2269

L2103-A7(1)\_pt1



*Figure 1. EDS Spectra for sample L2103-A-7 taken at test area 1. The test area is labeled in the particle SEM photo..*

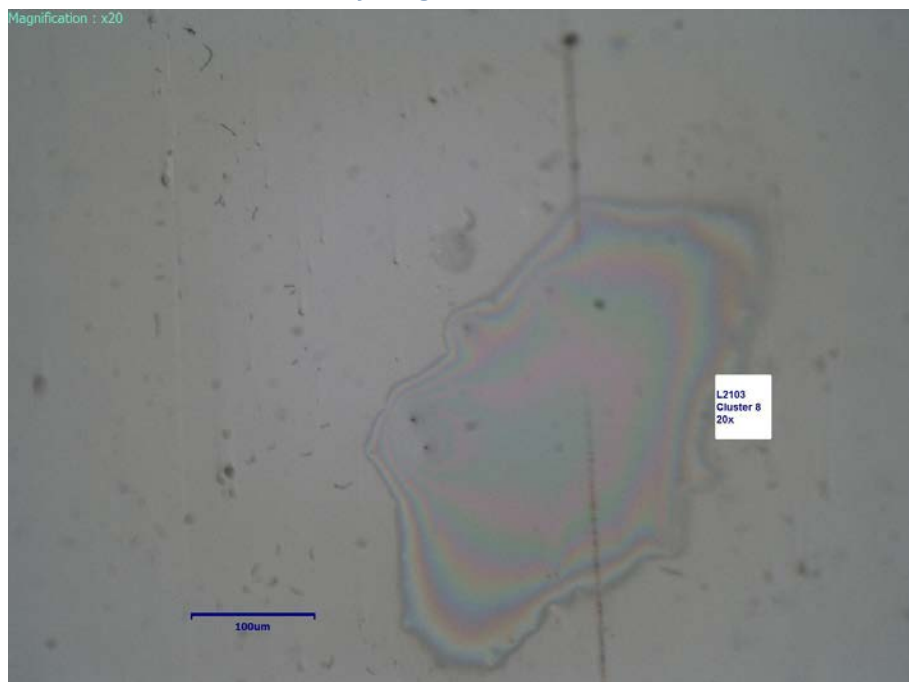
## L2103 A8



<b>Particle Size:</b>	11 µm
<b>Shape:</b>	Irregular
<b>Transparency:</b>	Translucent
<b>Color:</b>	CLEAR
<b>Luster:</b>	Subvitreous
<b>Particle Type:</b>	NATURAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	L2103 Cluster 8
<b>Comments:</b>	

*SEM Photo of sample L2103 A8 with labeled EDS testing locations.*

### *Cluster of Origin: L2103 Cluster 8*



*Photo of cluster L2103 Cluster 8.*

*L2103 A8 - EDS Spectra*

Full scale counts: 2983

L2103-A8(1)\_pt1

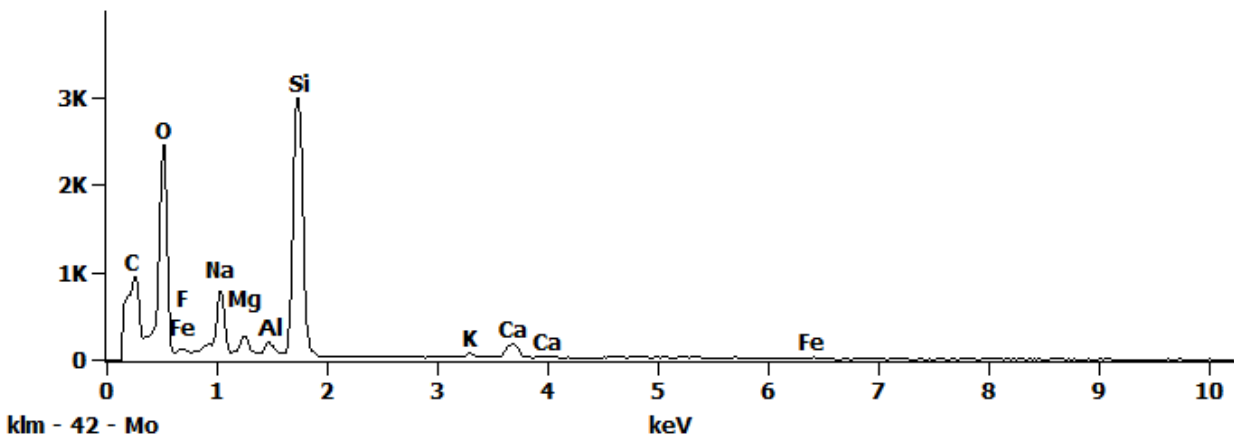


Figure 1. EDS Spectra for sample L2103-A-8 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 3110

L2103-A8(1)\_pt2

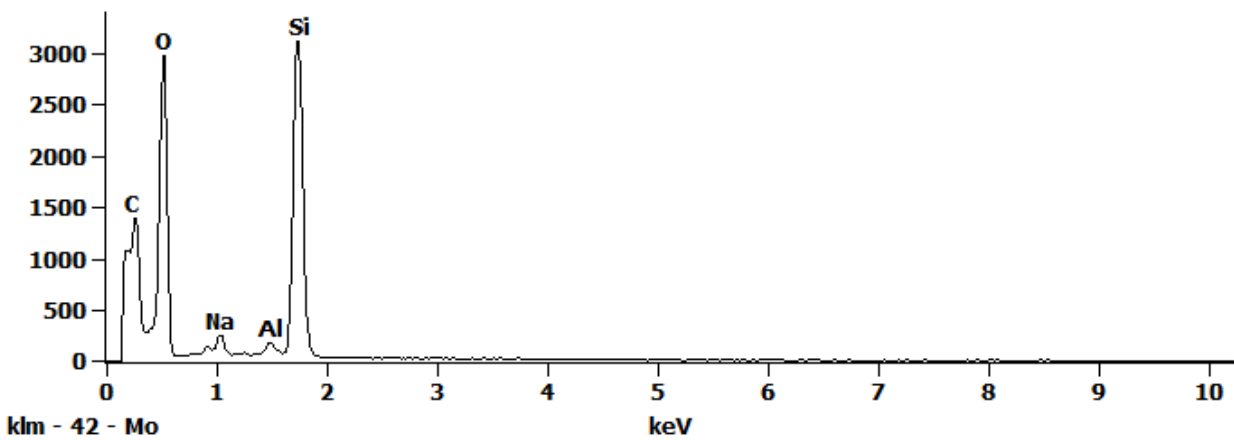
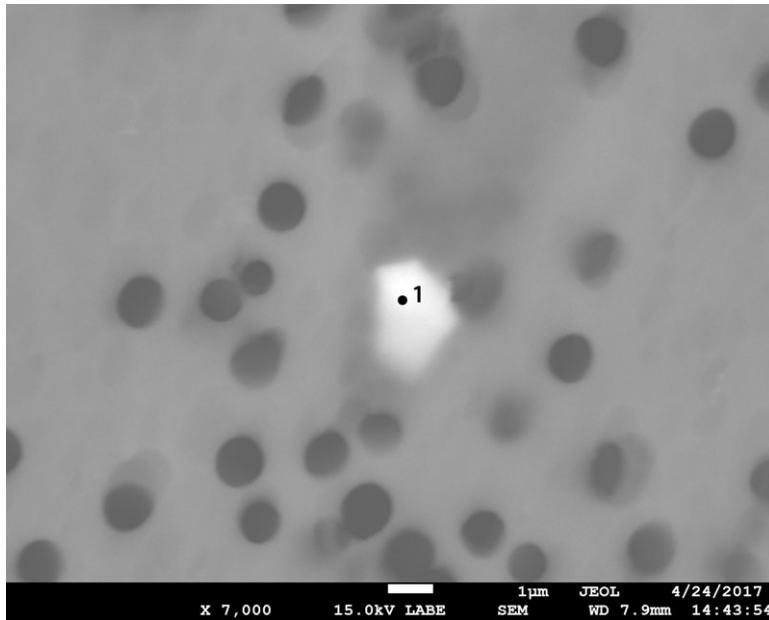


Figure 2. EDS Spectra for sample L2103-A-8 taken at test area 2. The test area is labeled in the particle SEM photo..

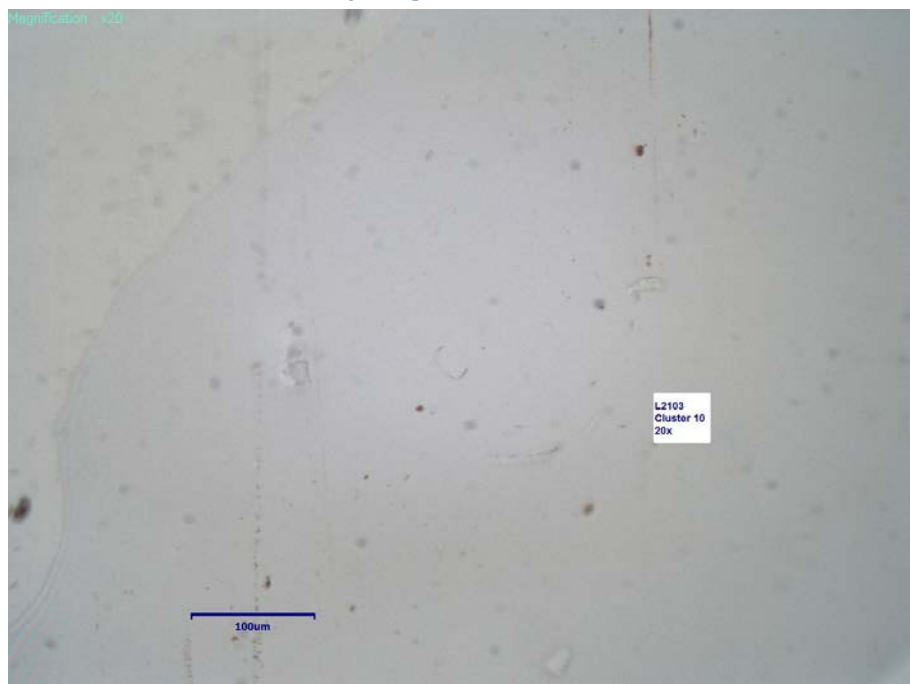
## L2103 A10



**Particle Size:** 32x22 µm  
**Shape:** Irregular  
**Transparency:** Translucent  
**Color:** CLEAR  
**Luster:** Subvitreous  
**Particle Type:** NATURAL  
TERRESTRIAL  
CONTAMINATION  
**Cluster No.:** L2103 Cluster 10  
**Comments:**

*SEM Photo of sample L2103 A10 with labeled EDS testing locations.*

### *Cluster of Origin: L2103 Cluster 10*



*Photo of cluster L2103 Cluster 10.*

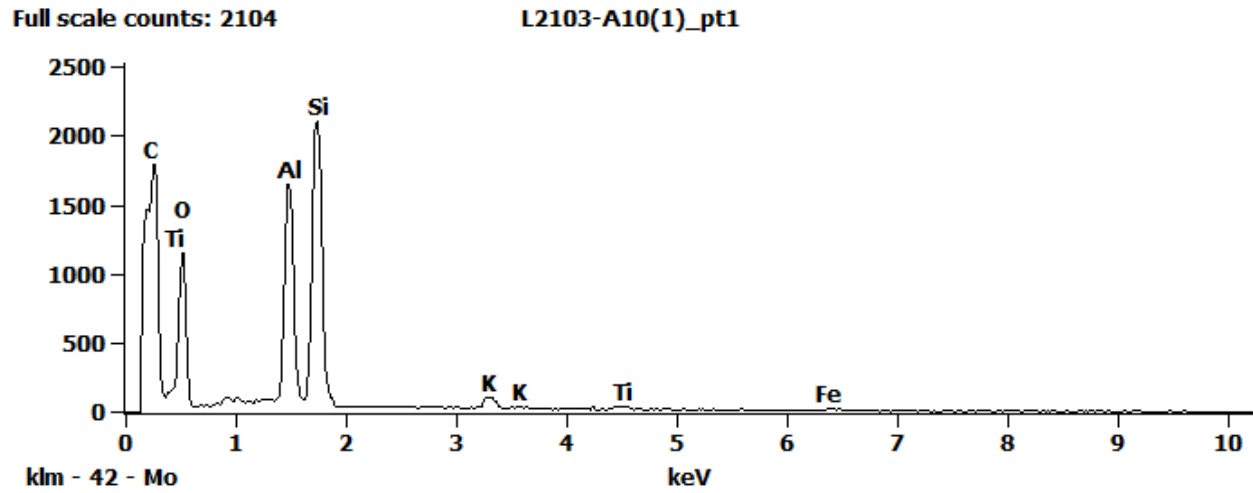
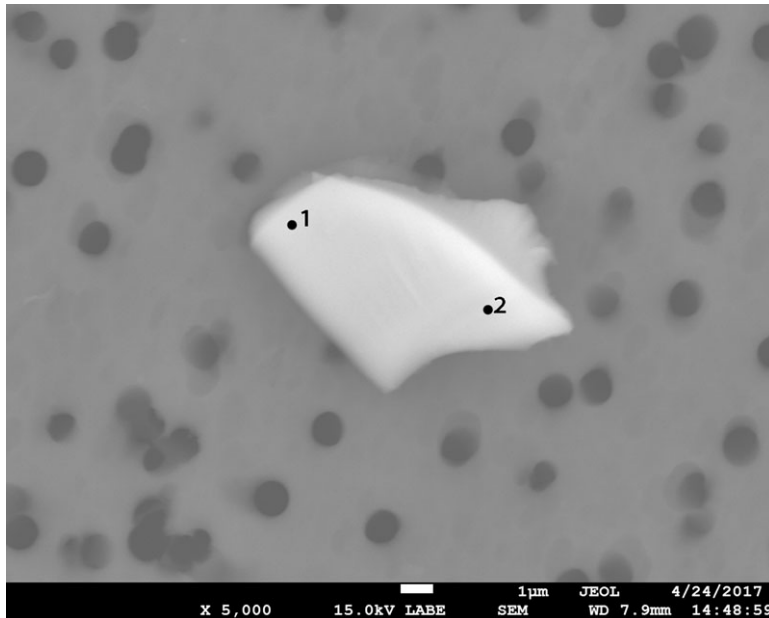
*L2103 A10 - EDS Spectra*

Figure 1. EDS Spectra for sample L2103-A-10 taken at test area 1. The test area is labeled in the particle SEM photo..

## L2103 A11



<b>Particle Size:</b>	7 µm
<b>Shape:</b>	Irregular
<b>Transparency:</b>	Translucent
<b>Color:</b>	CLEAR
<b>Luster:</b>	Subvitreous
<b>Particle Type:</b>	NATURAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	L2103 Cluster 11
<b>Comments:</b>	

SEM Photo of sample L2103 A11 with labeled EDS testing locations.

### Cluster of Origin: L2103 Cluster 11

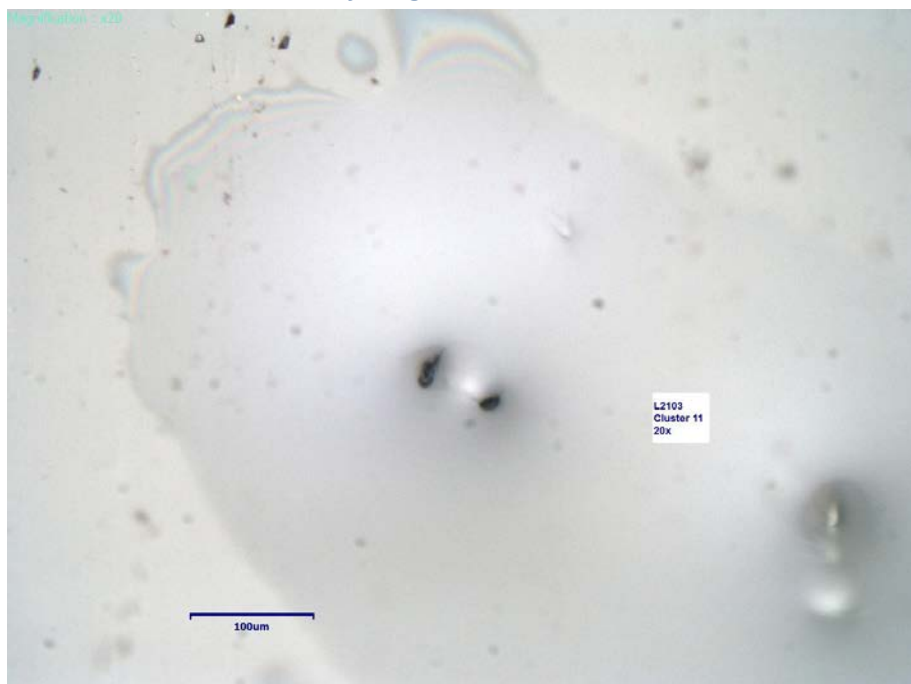


Photo of cluster L2103 Cluster 11.

*L2103 A11 - EDS Spectra*

Full scale counts: 4440

L2103-A11(1)\_pt1

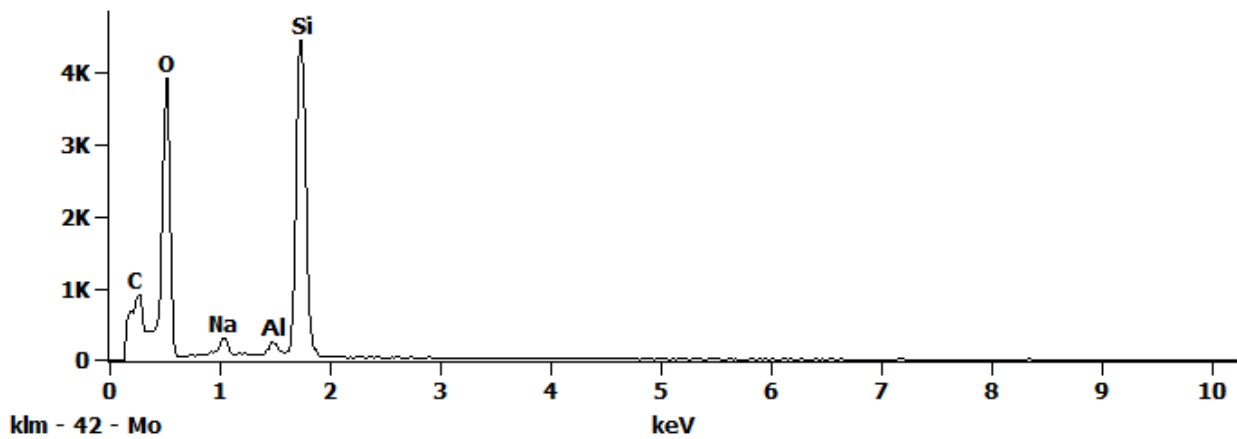


Figure 1. EDS Spectra for sample L2103-A-11 taken at test area 1. The test area is labeled in the particle SEM photo..

Full scale counts: 4738

L2103-A11(1)\_pt2

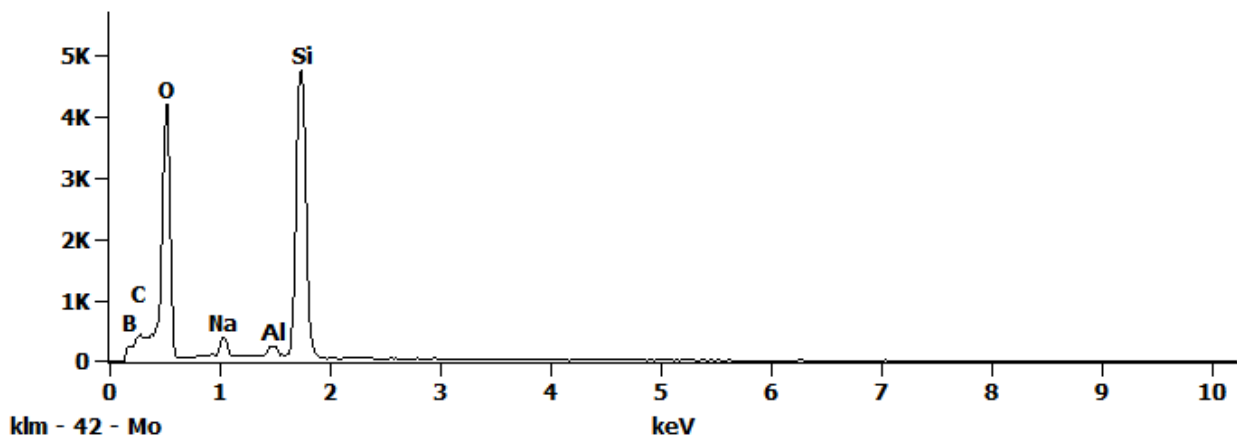
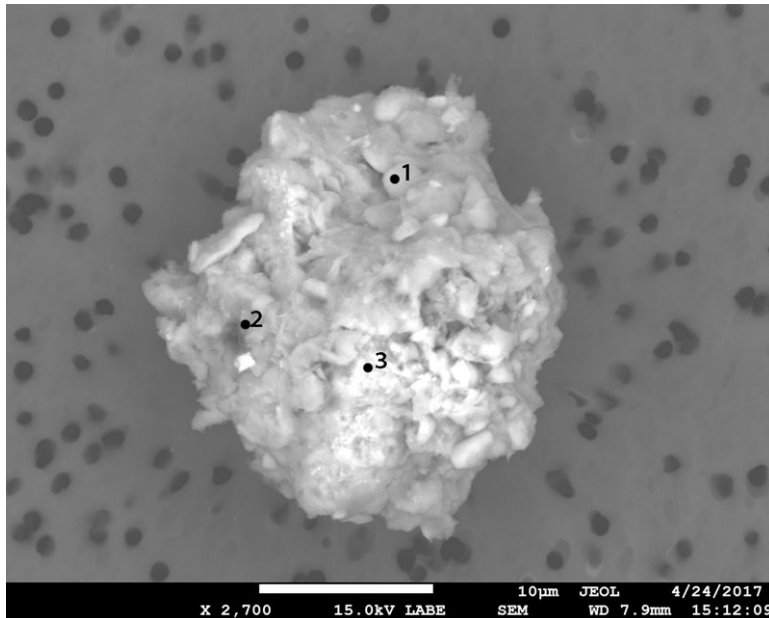


Figure 2. EDS Spectra for sample L2103-A-11 taken at test area 2. The test area is labeled in the particle SEM photo..



## L2103 A14



<b>Particle Size:</b>	26 μm
<b>Shape:</b>	Irregular to Equidimensional
<b>Transparency:</b>	Opaque
<b>Color:</b>	BLACK
<b>Luster:</b>	Pearly to Dull
<b>Particle Type:</b>	NATURAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	
<b>Comments:</b>	

SEM Photo of sample L2103 A14 with labeled EDS testing locations.

### L2103 A14 - EDS Spectra

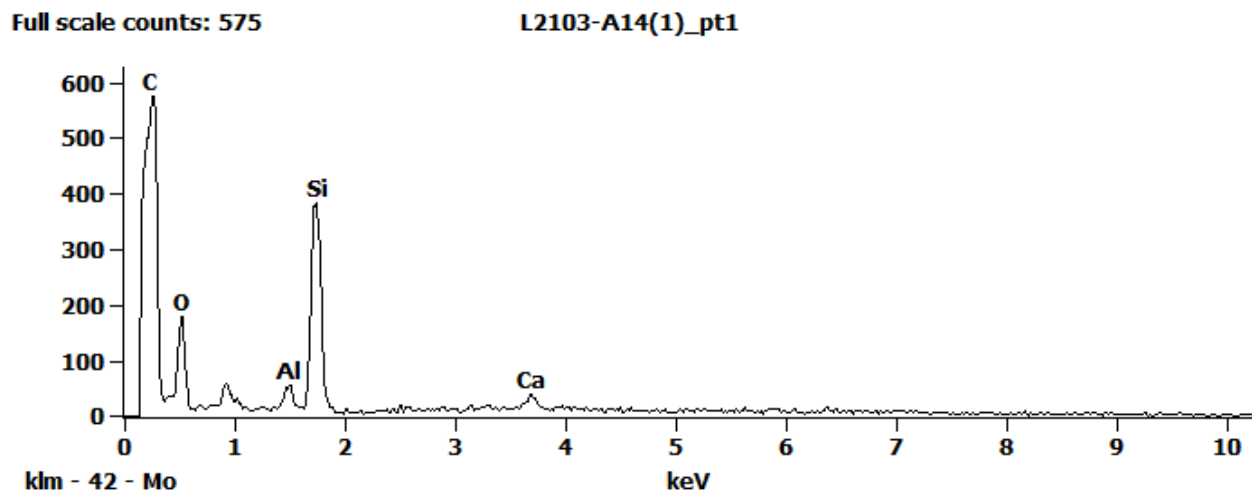


Figure 1. EDS Spectra for sample L2103-A-14 taken at test area 1. The test area is labeled in the particle SEM photo.

Full scale counts: 2803

L2103-A14(1)\_pt2

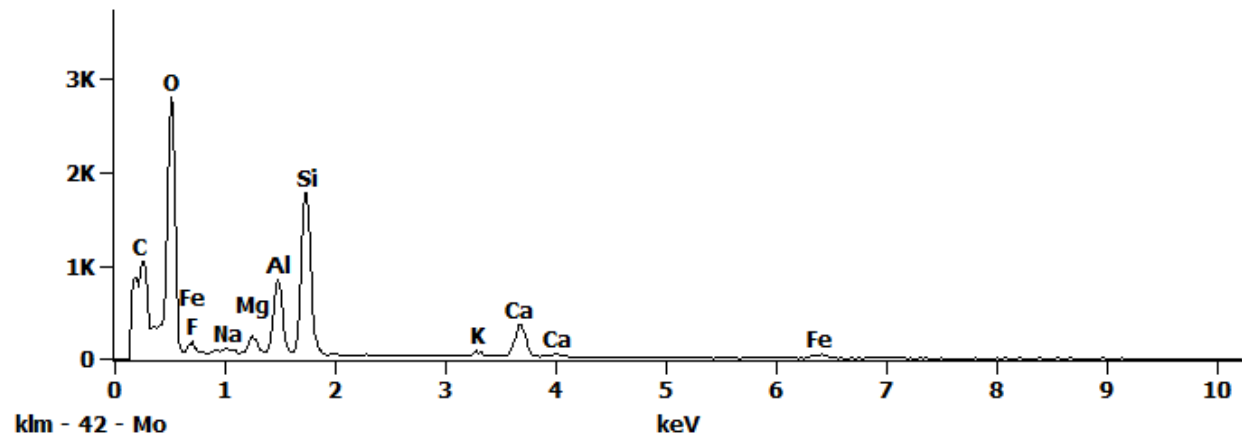


Figure 2. EDS Spectra for sample L2103-A-14 taken at test area 2. The test area is labeled in the particle SEM photo..

Full scale counts: 964

L2103-A14(1)\_pt3

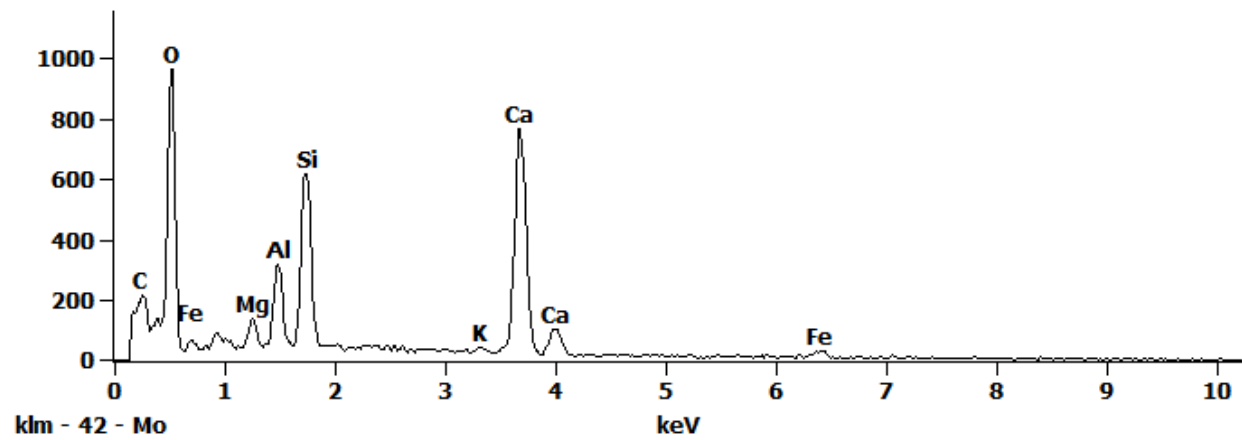
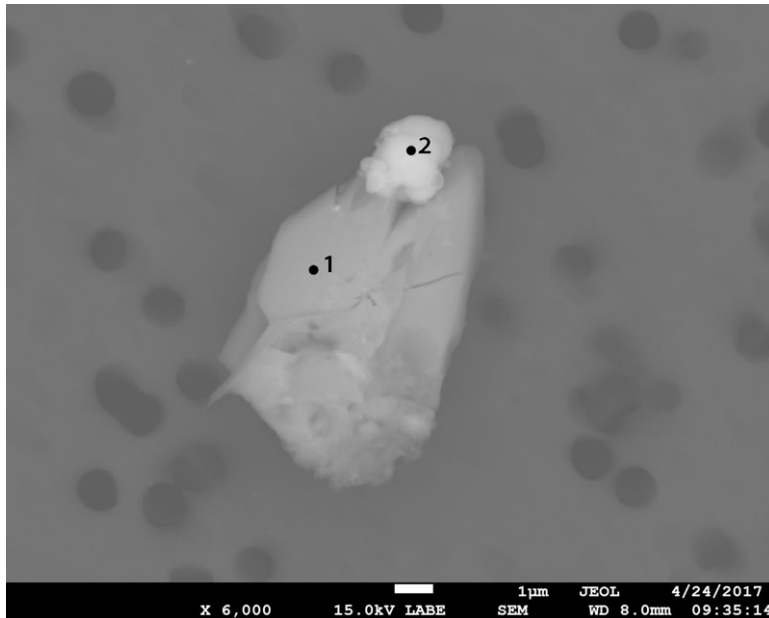


Figure 3. EDS Spectra for sample L2103-A-14 taken at test area 3. The test area is labeled in the particle SEM photo..

## L2105 A1



<b>Particle Size:</b>	9 µm
<b>Shape:</b>	Equidimensional
<b>Transparency:</b>	Translucent to Transparent
<b>Color:</b>	CLEAR
<b>Luster:</b>	Pearly to Subvitreous
<b>Particle Type:</b>	POSSIBLY NATURAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	
<b>Comments:</b>	

SEM Photo of sample L2105 A1 with labeled EDS testing locations.

### L2105 A1 - EDS Spectra

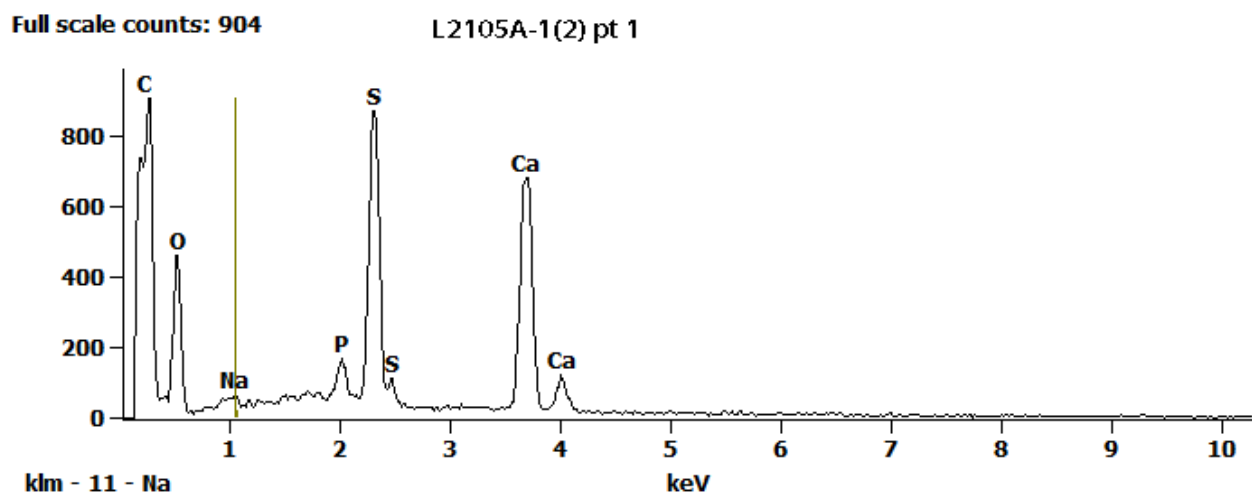


Figure 1. EDS Spectra for sample L2105-A-1 taken at test area 1. The test area is labeled in the particle SEM photo..

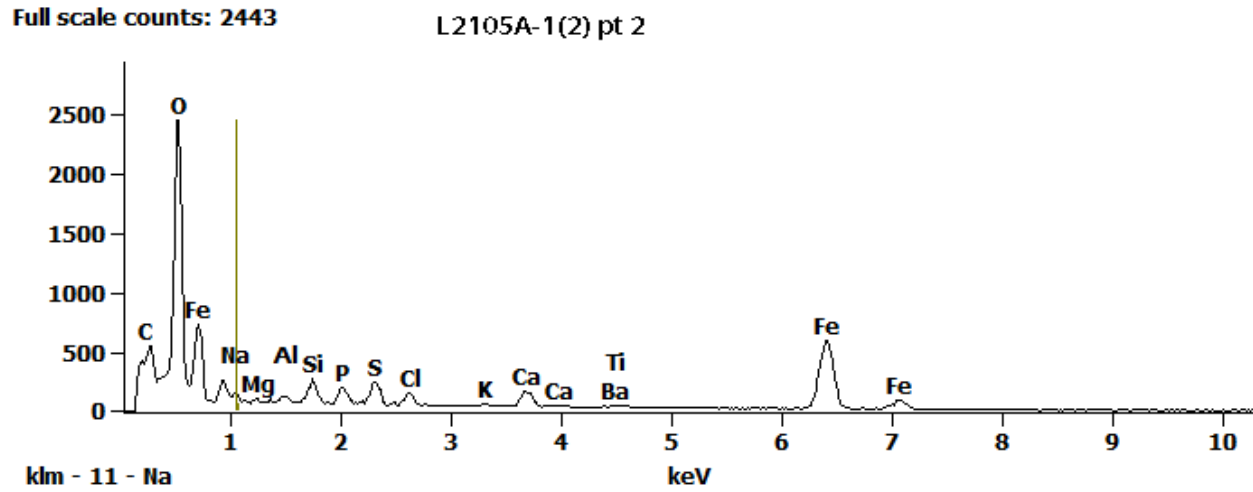
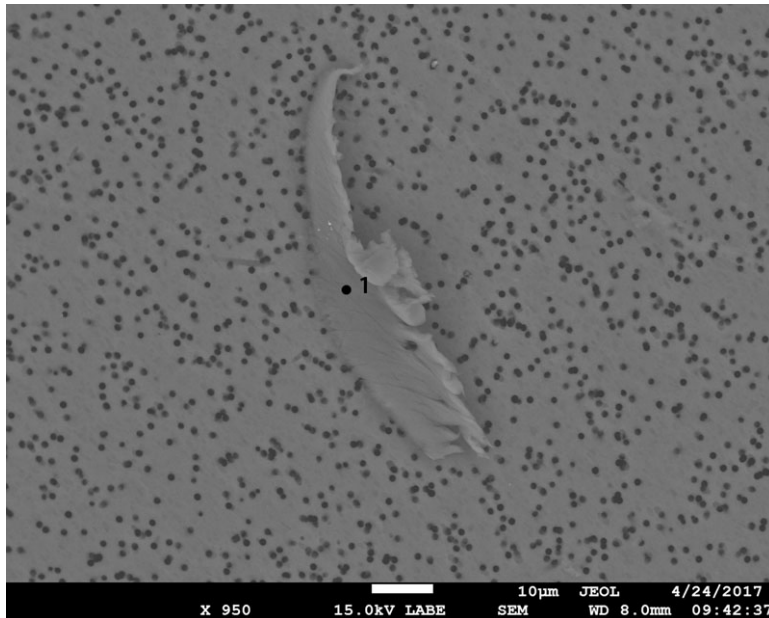


Figure 2. EDS Spectra for sample L2105-A-1 taken at test area 2. The test area is labeled in the particle SEM photo..

## L2105 A2



<b>Particle Size:</b>	16x50 µm
<b>Shape:</b>	Equidimensional to Irregular
<b>Transparency:</b>	Opaque to Subvitreous
<b>Color:</b>	BLACK
<b>Luster:</b>	Pearly to Dull
<b>Particle Type:</b>	NATURAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	L2105 Cluster 2
<b>Comments:</b>	

SEM Photo of sample L2105 A2 with labeled EDS testing locations.

### Cluster of Origin: L2105 Cluster 2

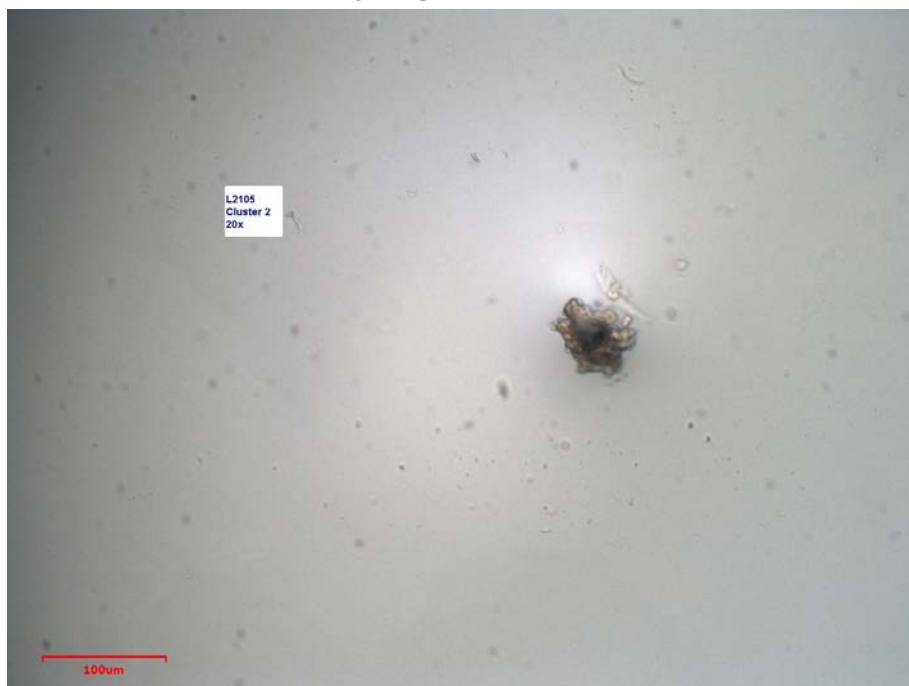
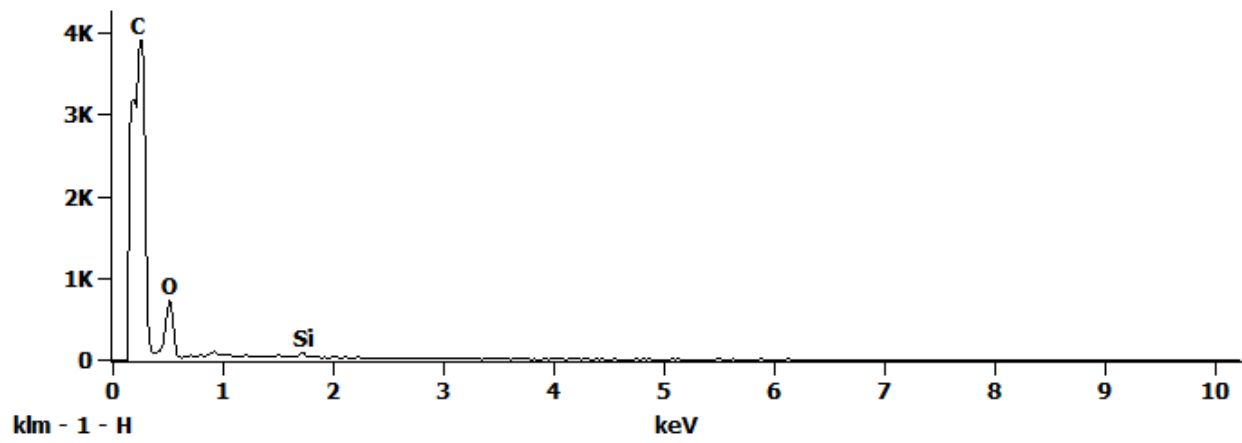


Photo of cluster L2105 Cluster 2.

*L2105 A2 - EDS Spectra*

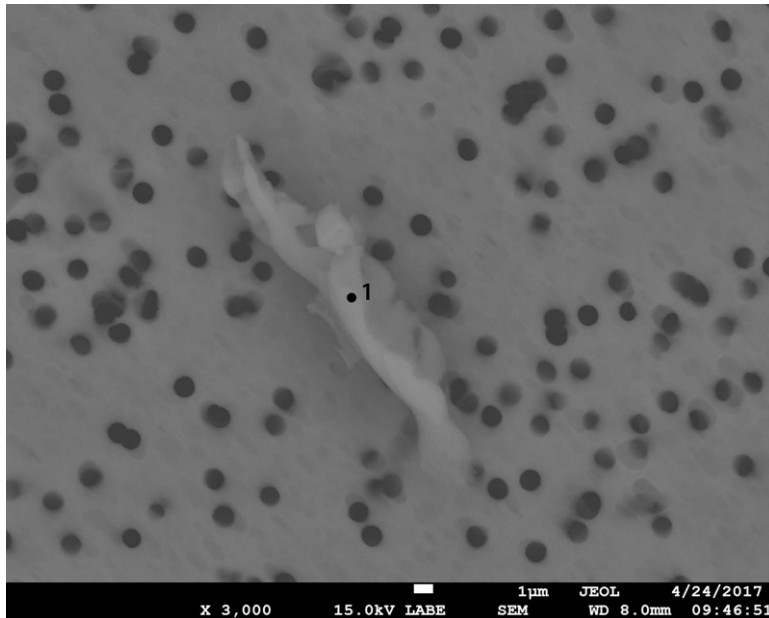
Full scale counts: 3900

L2105A-2(1) pt 1



*Figure 1. EDS Spectra for sample L2105-A-2 taken at test area 1. The test area is labeled in the particle SEM photo..*

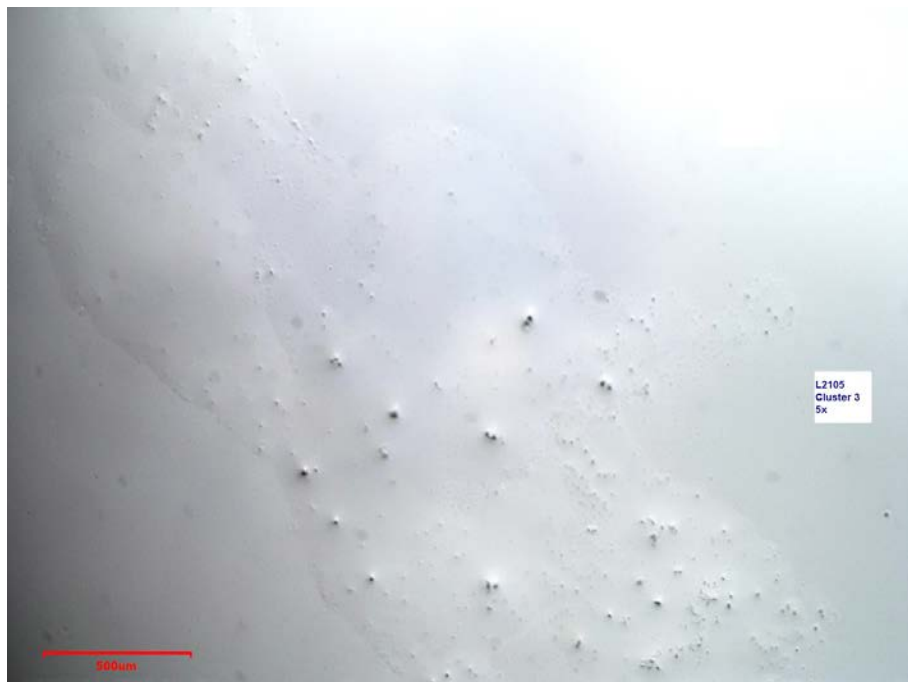
## L2105 A3



<b>Particle Size:</b>	23x6 µm
<b>Shape:</b>	Equidimensional
<b>Transparency:</b>	Translucent to Transparent
<b>Color:</b>	CLEAR
<b>Luster:</b>	Pearly to Subvitreous
<b>Particle Type:</b>	NATURAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	L2105 Cluster 3
<b>Comments:</b>	

*SEM Photo of sample L2105 A3 with labeled EDS testing locations.*

### *Cluster of Origin: L2105 Cluster 3*

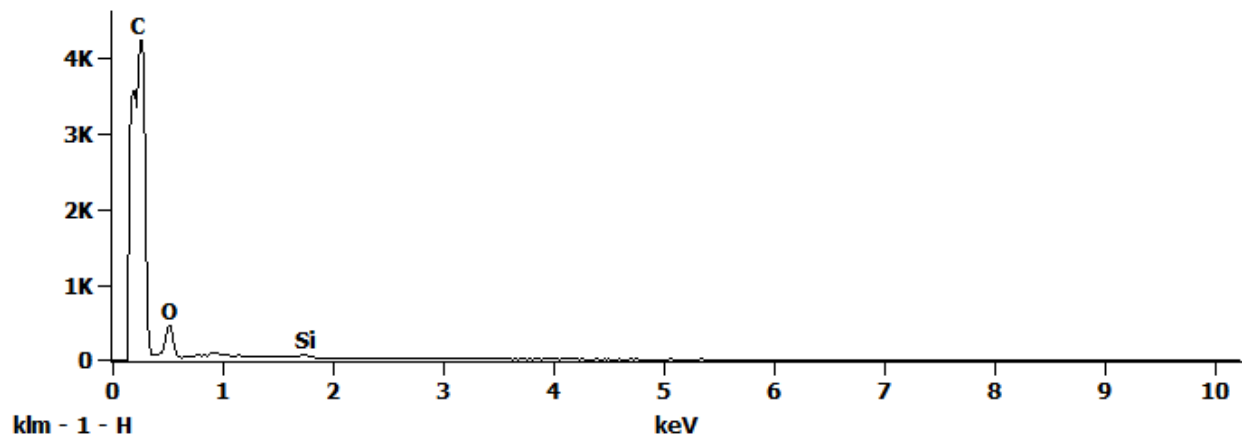


*Photo of cluster L2105 Cluster 3.*

*L2105 A3 - EDS Spectra*

Full scale counts: 4225

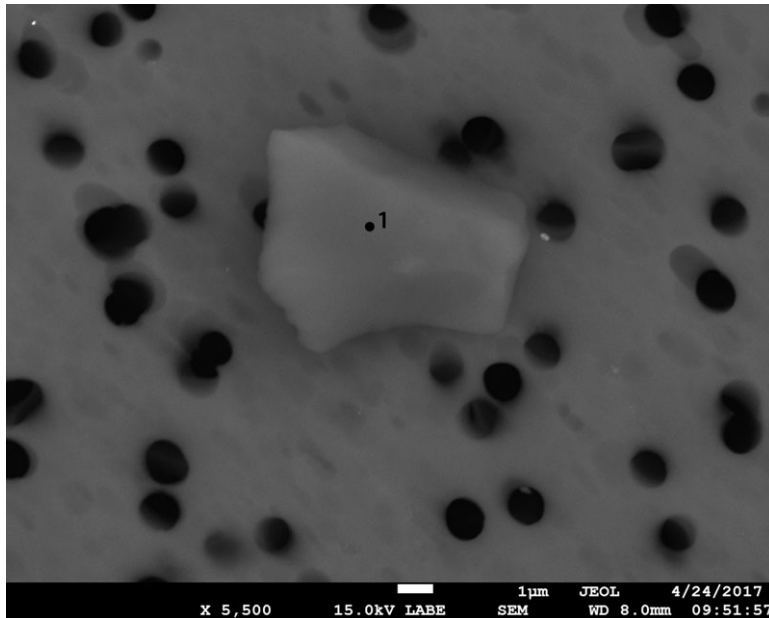
L2105A-3(1) pt 1



*Figure 1. EDS Spectra for sample L2105-A-3 taken at test area 1. The test area is labeled in the particle SEM photo..*



## L2105 A4



SEM Photo of sample L2105 A4 with labeled EDS testing locations.

<b>Particle Size:</b>	6 µm
<b>Shape:</b>	Equidimensional to Spherical
<b>Transparency:</b>	Translucent to Transparent
<b>Color:</b>	CLEAR
<b>Luster:</b>	Pearly to Subvitreous
<b>Particle Type:</b>	NATURAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	L2105 Cluster 4
<b>Comments:</b>	

### Cluster of Origin: L2105 Cluster 4

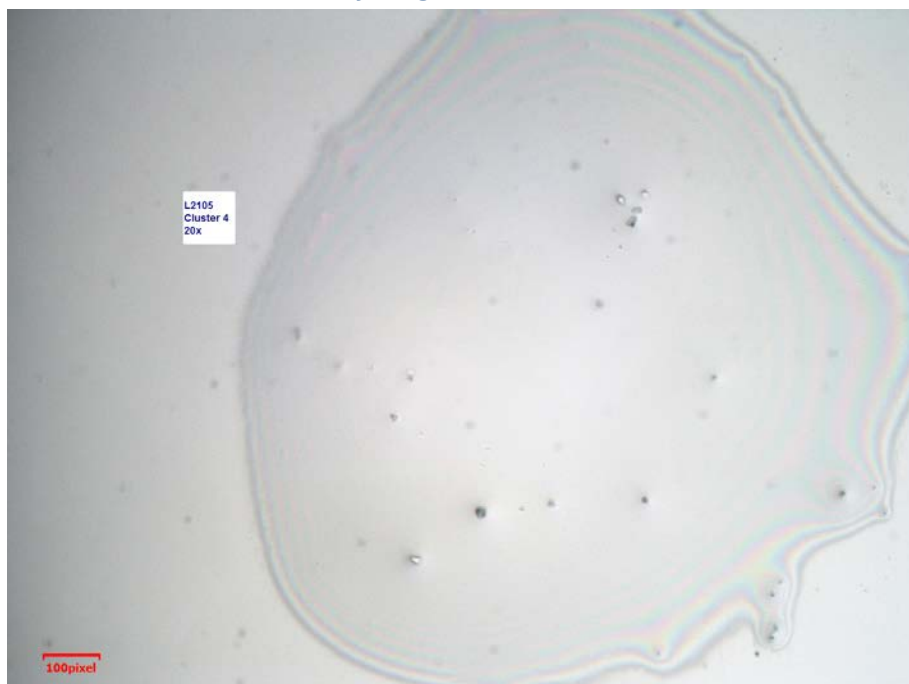


Photo of cluster L2105 Cluster 4.

*L2105 A4 - EDS Spectra*

Full scale counts: 4575

L2105A-4(2) pt 1

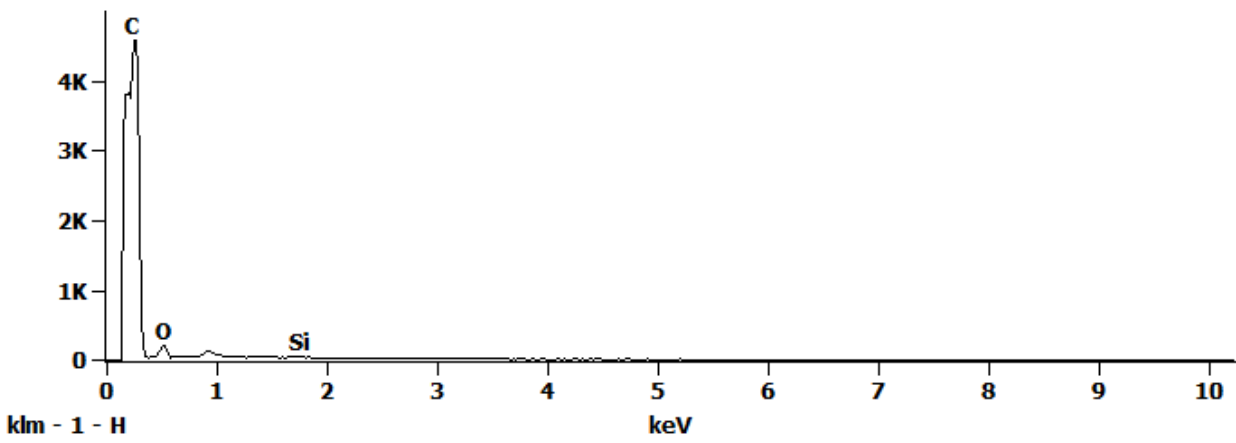
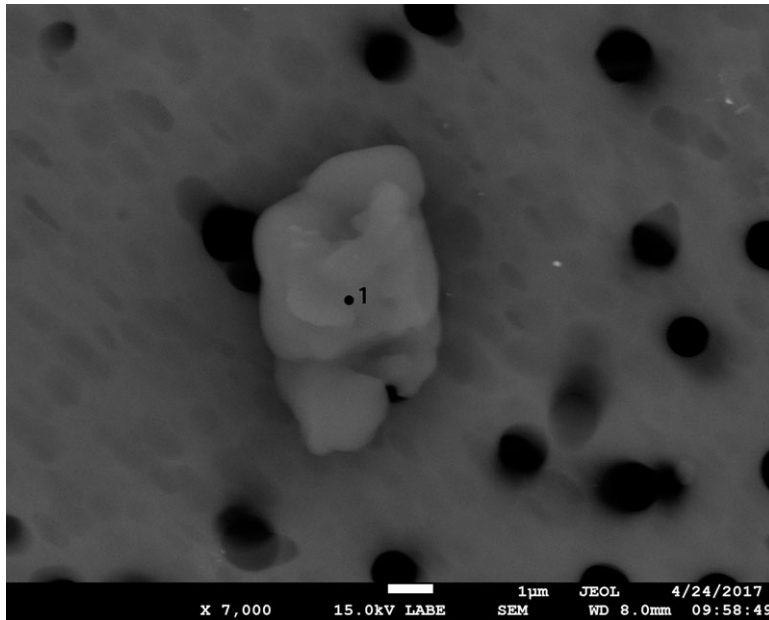


Figure 1. EDS Spectra for sample L2105-A-4 taken at test area 1. The test area is labeled in the particle SEM photo..

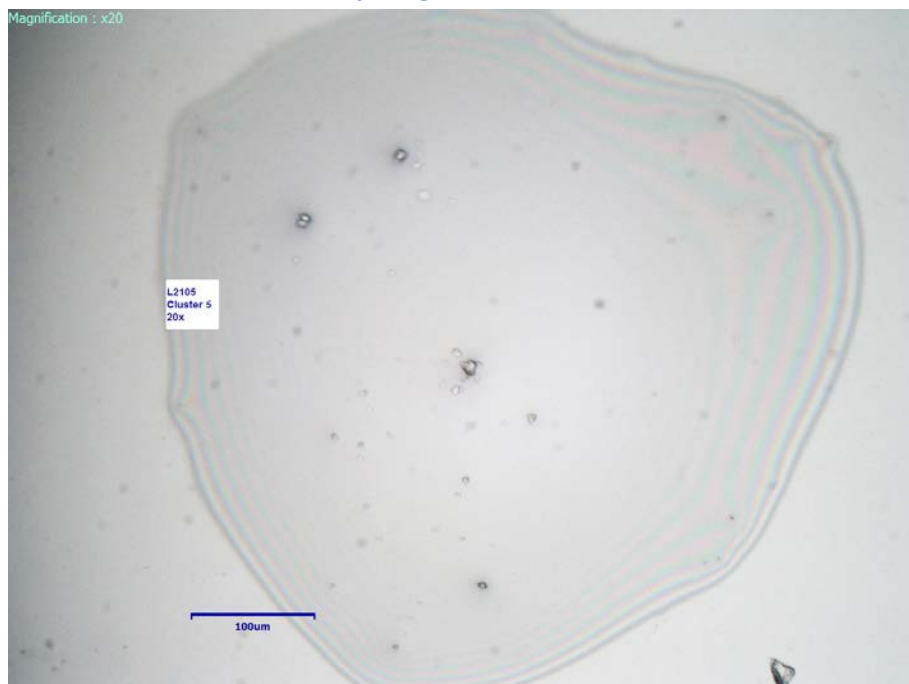
## L2105 A5



<b>Particle Size:</b>	12 µm
<b>Shape:</b>	Equidimensional
<b>Transparency:</b>	Translucent to Transparent
<b>Color:</b>	CLEAR
<b>Luster:</b>	Pearly to Subvitreous
<b>Particle Type:</b>	NATURAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	L2105 Cluster 5
<b>Comments:</b>	

*SEM Photo of sample L2105 A5 with labeled EDS testing locations.*

### *Cluster of Origin: L2105 Cluster 5*

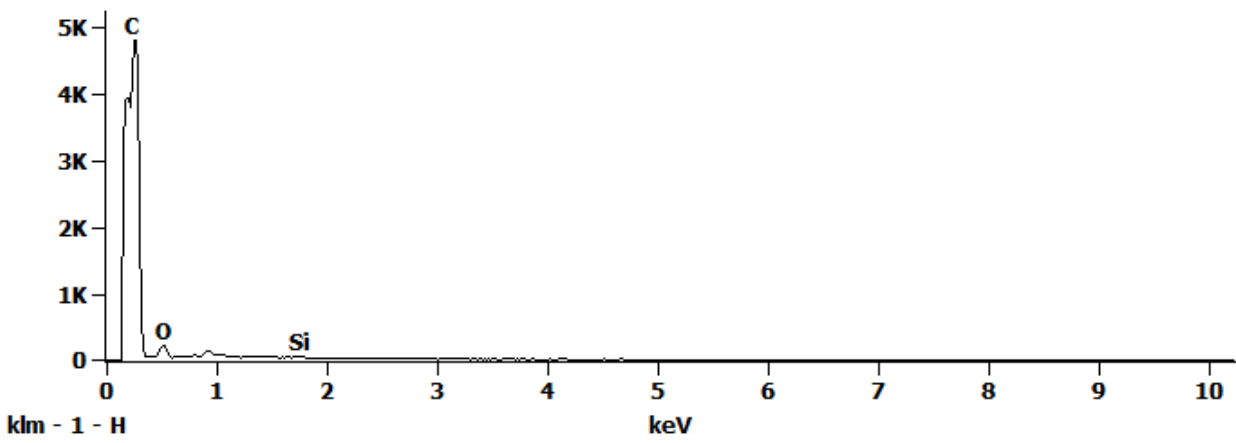


*Photo of cluster L2105 Cluster 5.*

*L2105 A5 - EDS Spectra*

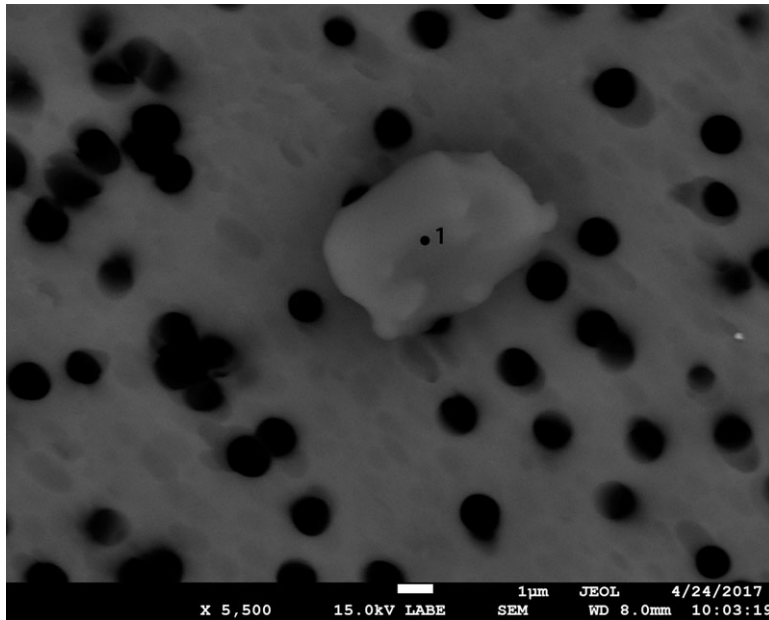
Full scale counts: 4792

L2105A-5(1) pt 1



*Figure 1. EDS Spectra for sample L2105-A-5 taken at test area 1. The test area is labeled in the particle SEM photo..*

## L2105 A6



SEM Photo of sample L2105 A6 with labeled EDS testing locations.

<b>Particle Size:</b>	8 µm
<b>Shape:</b>	Equidimensional to Spherical
<b>Transparency:</b>	Translucent to Transparent
<b>Color:</b>	CLEAR
<b>Luster:</b>	Pearly to Subvitreous
<b>Particle Type:</b>	NATURAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	L2105 Cluster 6
<b>Comments:</b>	

### Cluster of Origin: L2105 Cluster 6

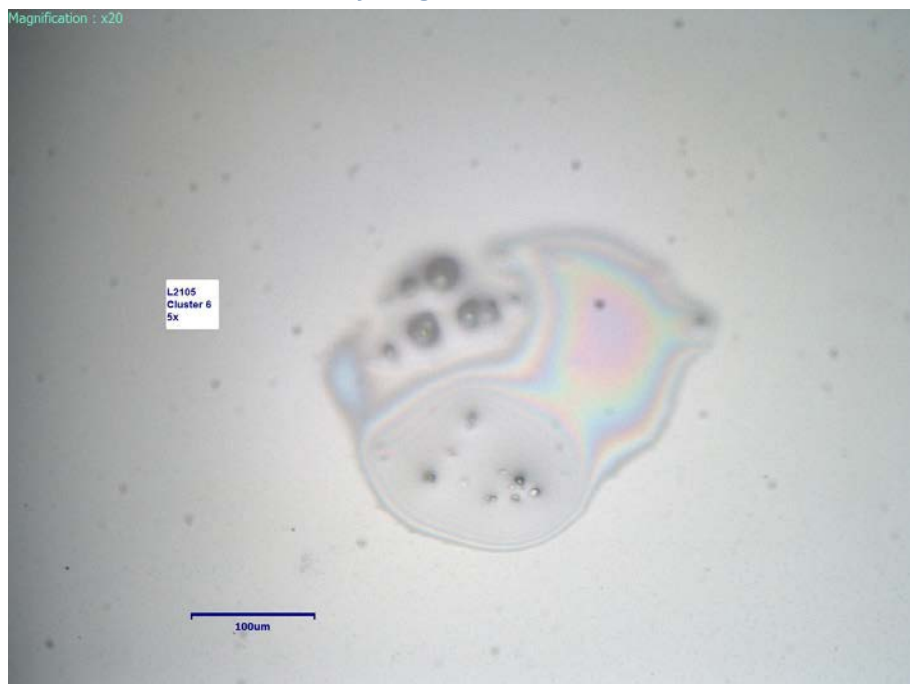


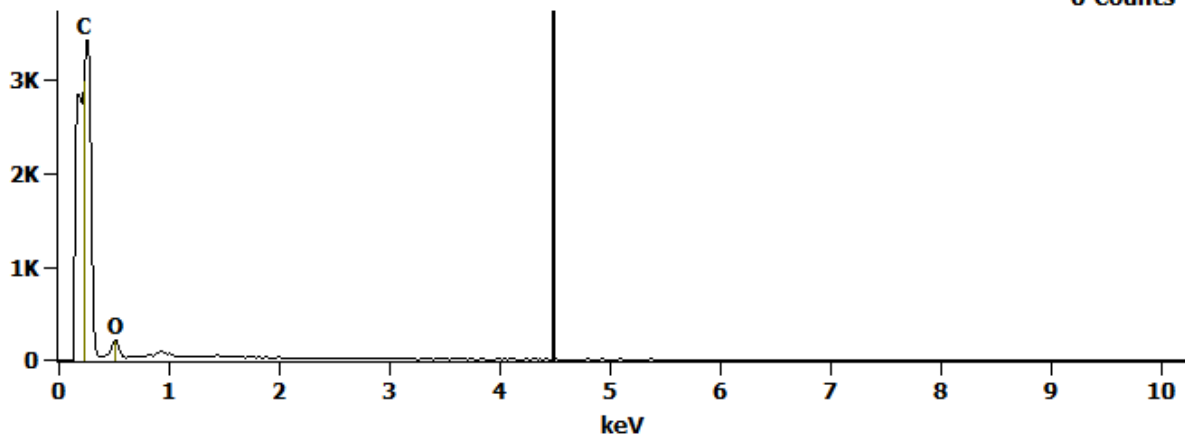
Photo of cluster L2105 Cluster 6.

*L2105 A6 - EDS Spectra*

Full scale counts: 3407

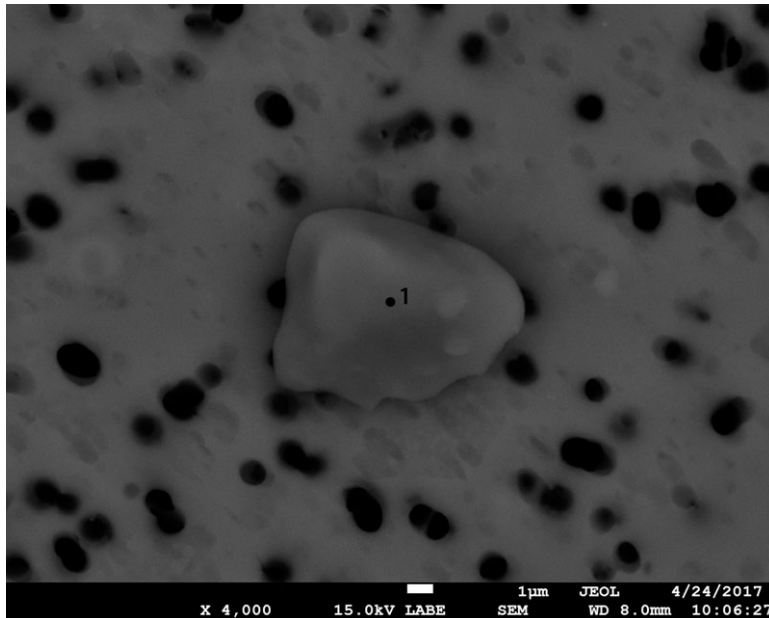
L2105A-A6(1)\_pt1

Cursor: 4.500 keV  
6 Counts



*Figure 1. EDS Spectra for sample L2105-A-6 taken at test area 1. The test area is labeled in the particle SEM photo..*

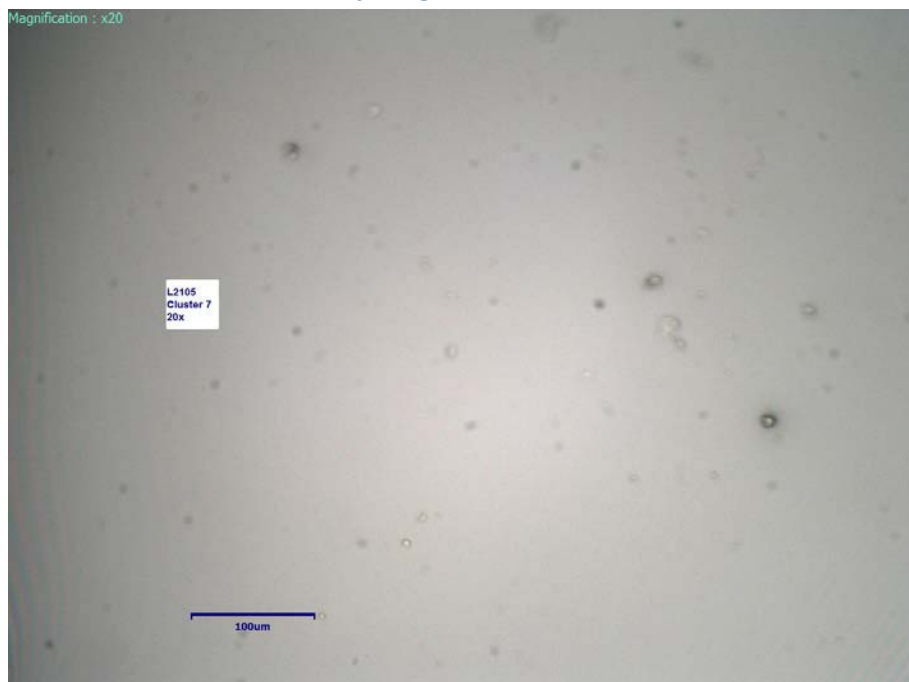
## L2105 A7



<b>Particle Size:</b>	10.5 µm
<b>Shape:</b>	Equidimensional
<b>Transparency:</b>	Translucent to Transparent
<b>Color:</b>	CLEAR
<b>Luster:</b>	Pearly to Subvitreous
<b>Particle Type:</b>	NATURAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	L2105 Cluster 7
<b>Comments:</b>	

*SEM Photo of sample L2105 A7 with labeled EDS testing locations.*

### *Cluster of Origin: L2105 Cluster 7*

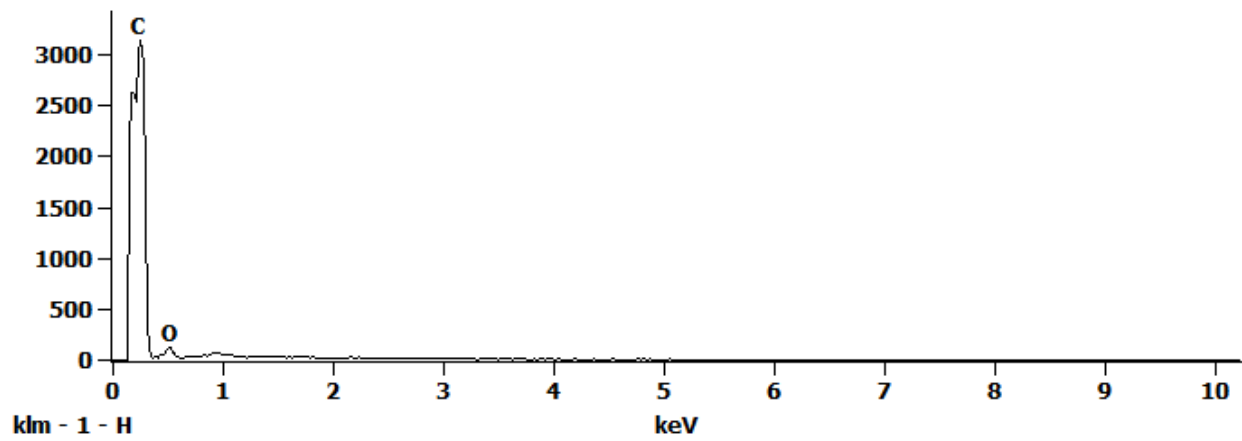


*Photo of cluster L2105 Cluster 7.*

*L2105 A7 - EDS Spectra*

Full scale counts: 3131

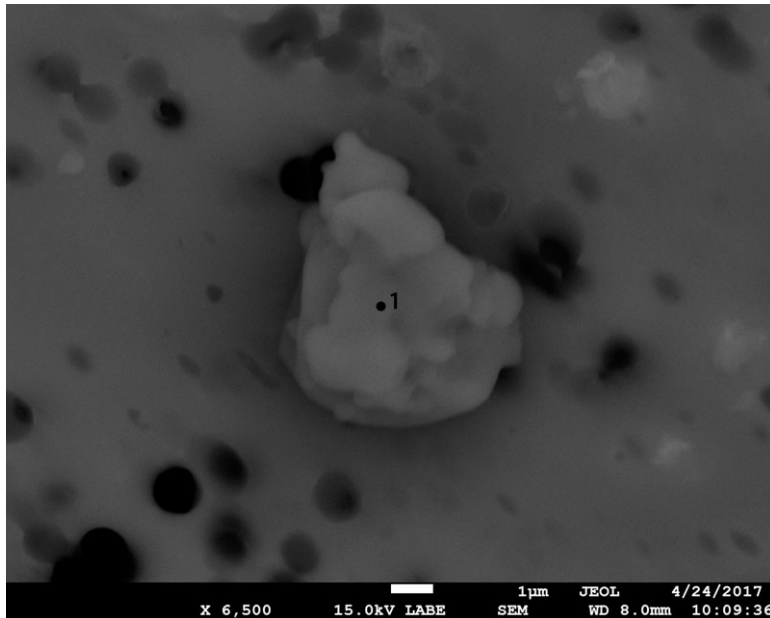
L2105A-7(1) pt1



*Figure 1. EDS Spectra for sample L2105-A-7 taken at test area 1. The test area is labeled in the particle SEM photo..*



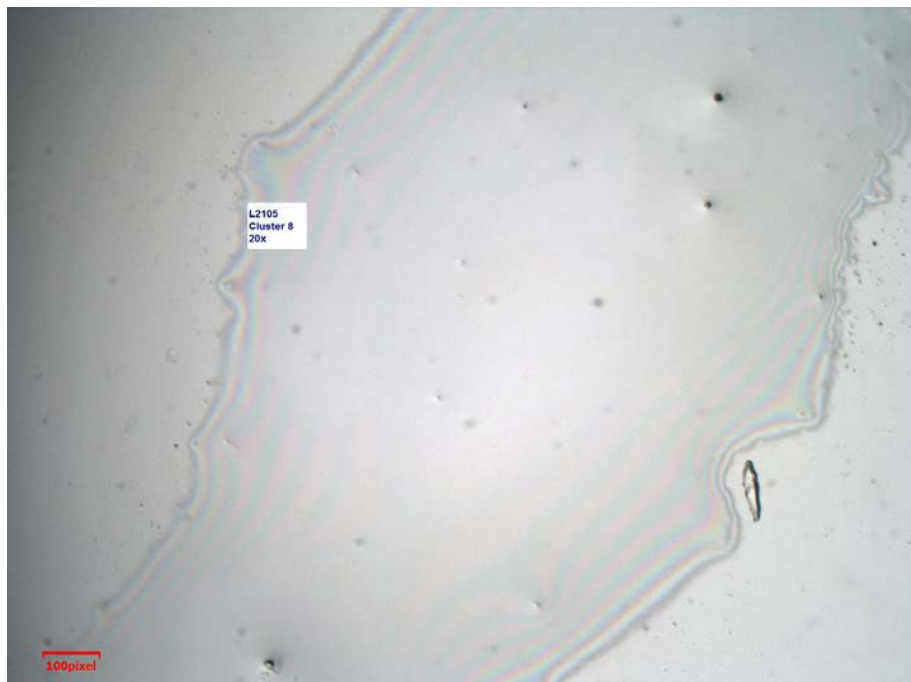
## L2105 A8



<b>Particle Size:</b>	13 µm
<b>Shape:</b>	Equidimensional
<b>Transparency:</b>	Translucent to Transparent
<b>Color:</b>	CLEAR
<b>Luster:</b>	Pearly to Subvitreous
<b>Particle Type:</b>	NATURAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	L2105 Cluster 8
<b>Comments:</b>	

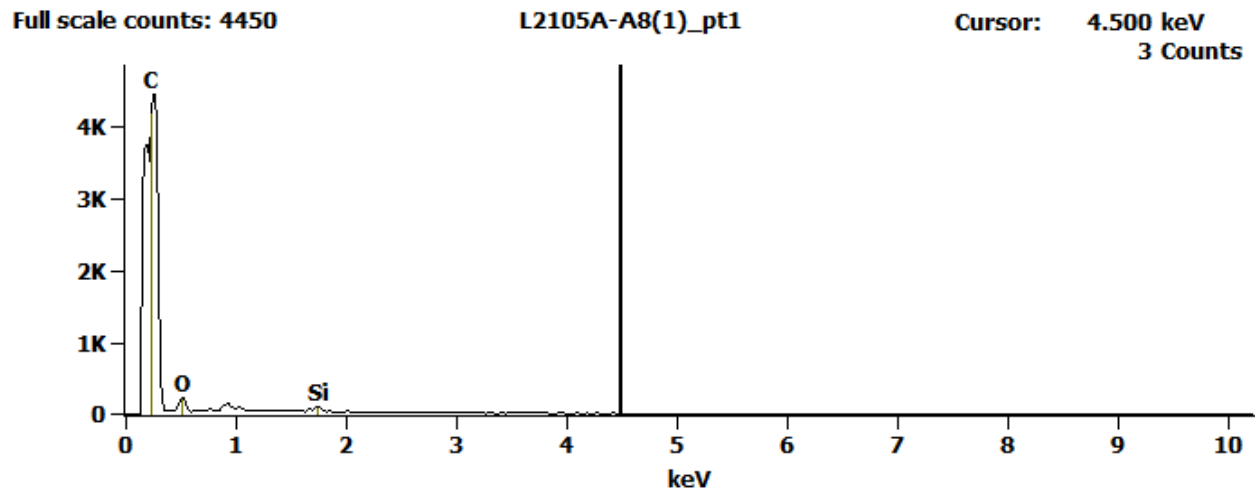
*SEM Photo of sample L2105 A8 with labeled EDS testing locations.*

### *Cluster of Origin: L2105 Cluster 8*



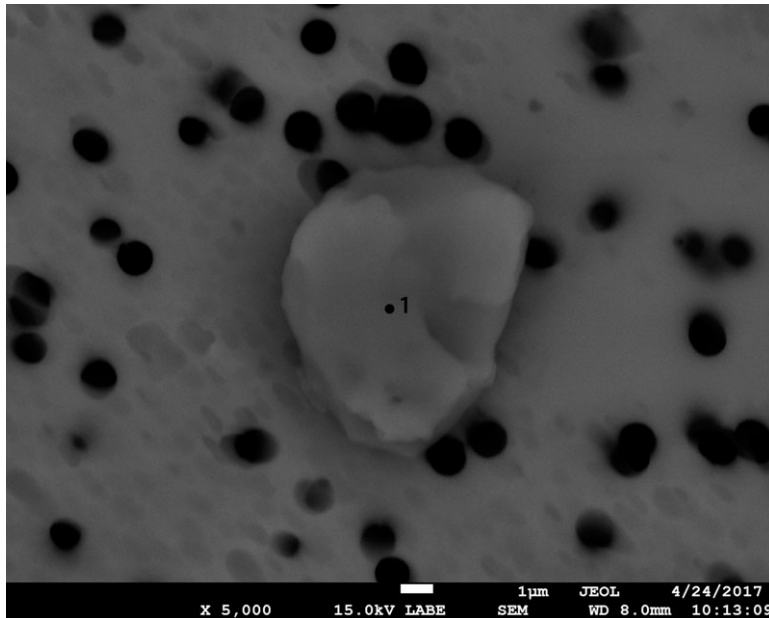
*Photo of cluster L2105 Cluster 8.*

*L2105 A8 - EDS Spectra*



*Figure 1. EDS Spectra for sample L2105-A-8 taken at test area 1. The test area is labeled in the particle SEM photo..*

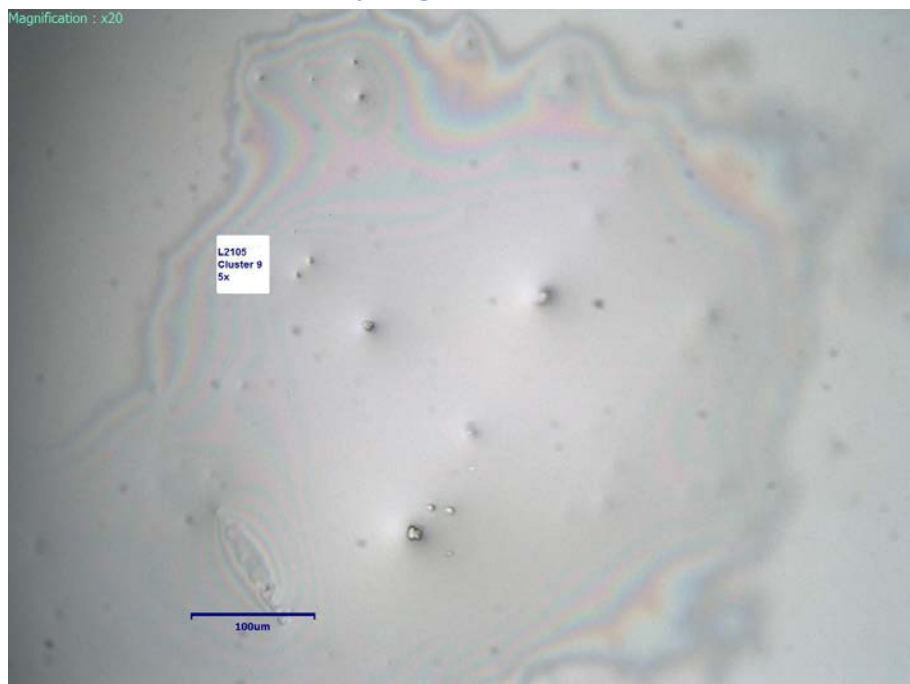
## L2105 A9



<b>Particle Size:</b>	10 µm
<b>Shape:</b>	Equidimensional to Irregular
<b>Transparency:</b>	Translucent to Transparent
<b>Color:</b>	CLEAR
<b>Luster:</b>	Pearly to Subvitreous
<b>Particle Type:</b>	NATURAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	L2105 Cluster 9
<b>Comments:</b>	

*SEM Photo of sample L2105 A9 with labeled EDS testing locations.*

### *Cluster of Origin: L2105 Cluster 9*



*Photo of cluster L2105 Cluster 9.*

*L2105 A9 - EDS Spectra*

Full scale counts: 4307

L2105A-A9(1)\_pt1

Cursor: 4.500 keV  
4 Counts

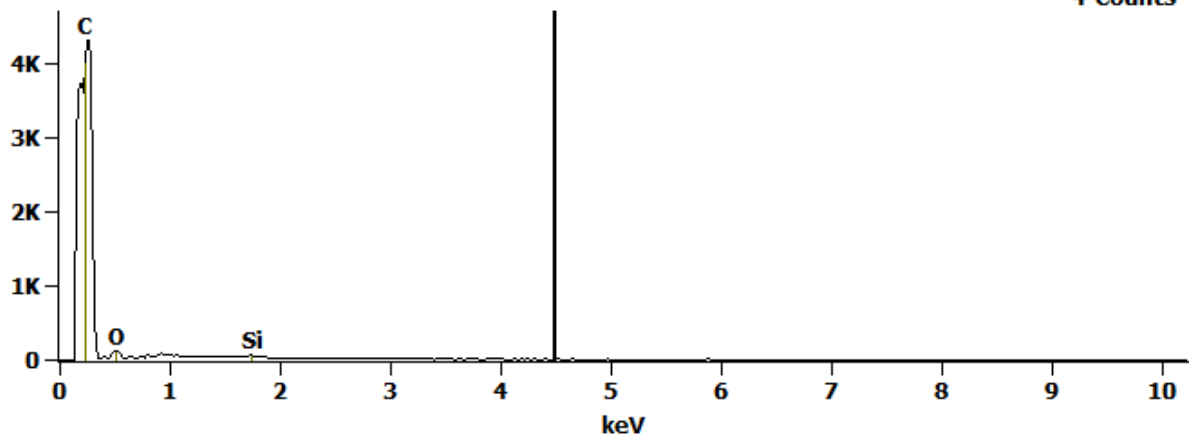
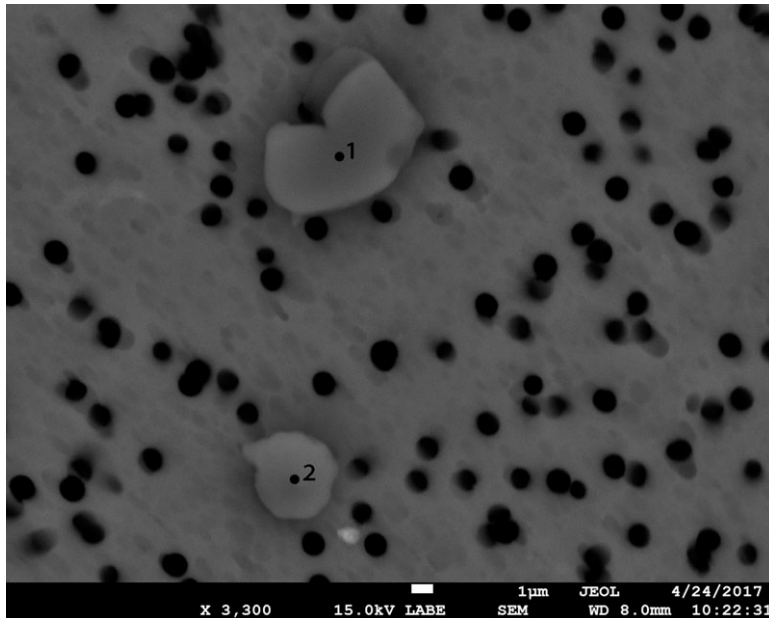


Figure 1. EDS Spectra for sample L2105-A-9 taken at test area 1. The test area is labeled in the particle SEM photo..

## L2105 A11



<b>Particle Size:</b>	7 µm
<b>Shape:</b>	Equidimensional
<b>Transparency:</b>	Translucent to Transparent
<b>Color:</b>	CLEAR
<b>Luster:</b>	Pearly to Subvitreous
<b>Particle Type:</b>	NATURAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	L2105 Cluster 11
<b>Comments:</b>	

SEM Photo of sample L2105 A11 with labeled EDS testing locations.

### Cluster of Origin: L2105 Cluster 11

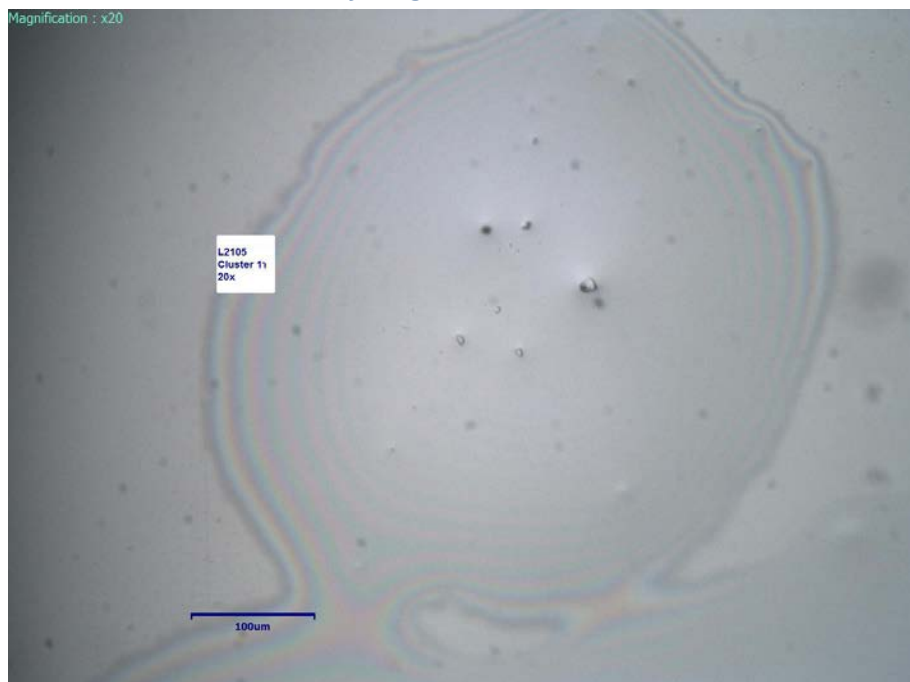


Photo of cluster L2105 Cluster 11.

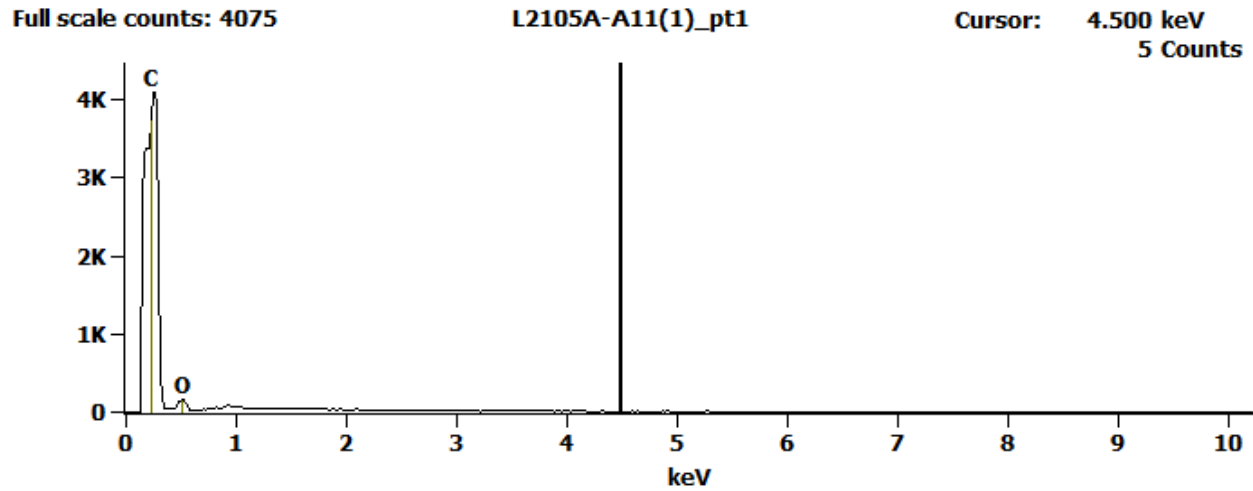
*L2105 A11 - EDS Spectra*

Figure 1. EDS Spectra for sample L2105-A-11 taken at test area 1. The test area is labeled in the particle SEM photo..

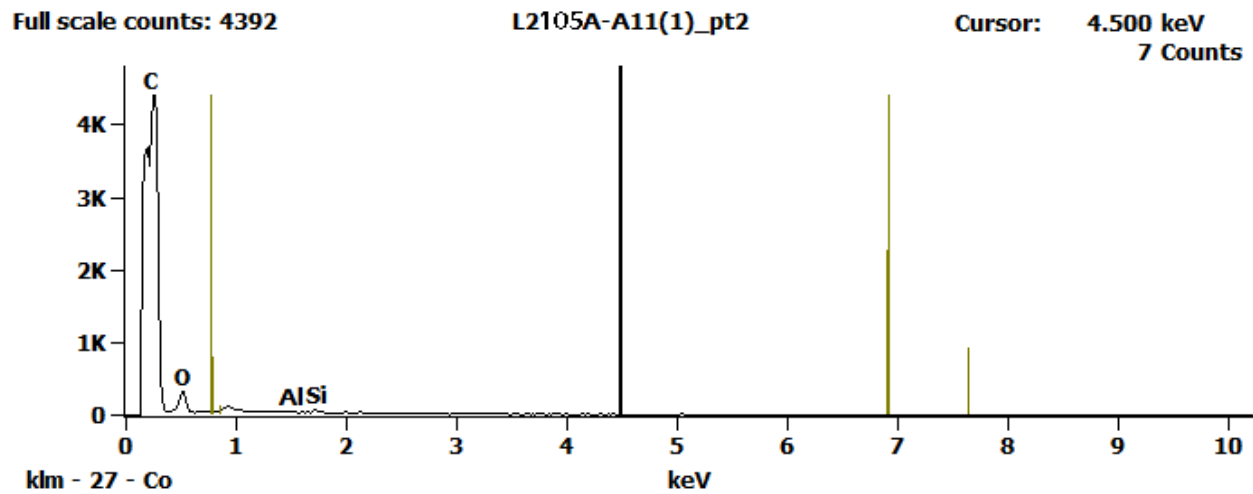
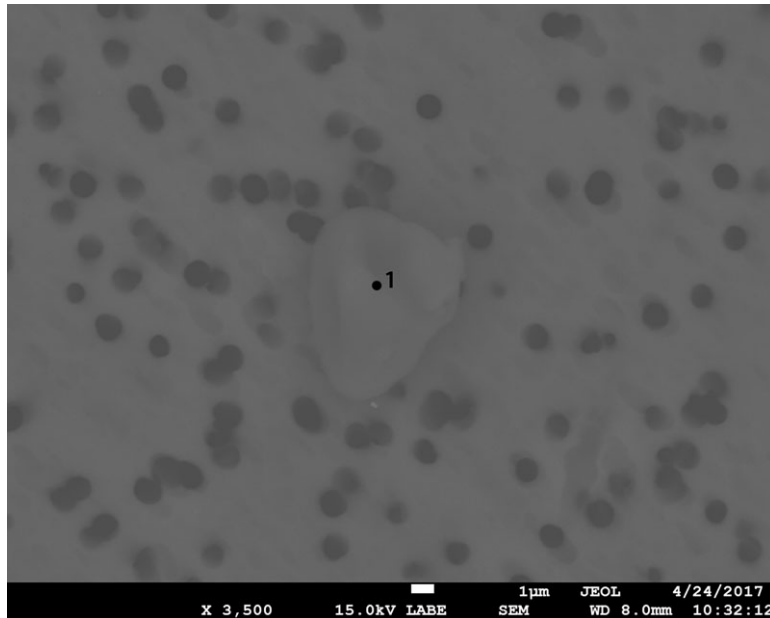


Figure 2. EDS Spectra for sample L2105-A-11 taken at test area 2. The test area is labeled in the particle SEM photo..

## L2105 A13



SEM Photo of sample L2105 A13 with labeled EDS testing locations.

<b>Particle Size:</b>	8 µm
<b>Shape:</b>	Equidimensional to Spherical
<b>Transparency:</b>	Translucent to Transparent
<b>Color:</b>	CLEAR
<b>Luster:</b>	Pearly to Subvitreous
<b>Particle Type:</b>	NATURAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	L2105 Cluster 13
<b>Comments:</b>	

### Cluster of Origin: L2105 Cluster 13

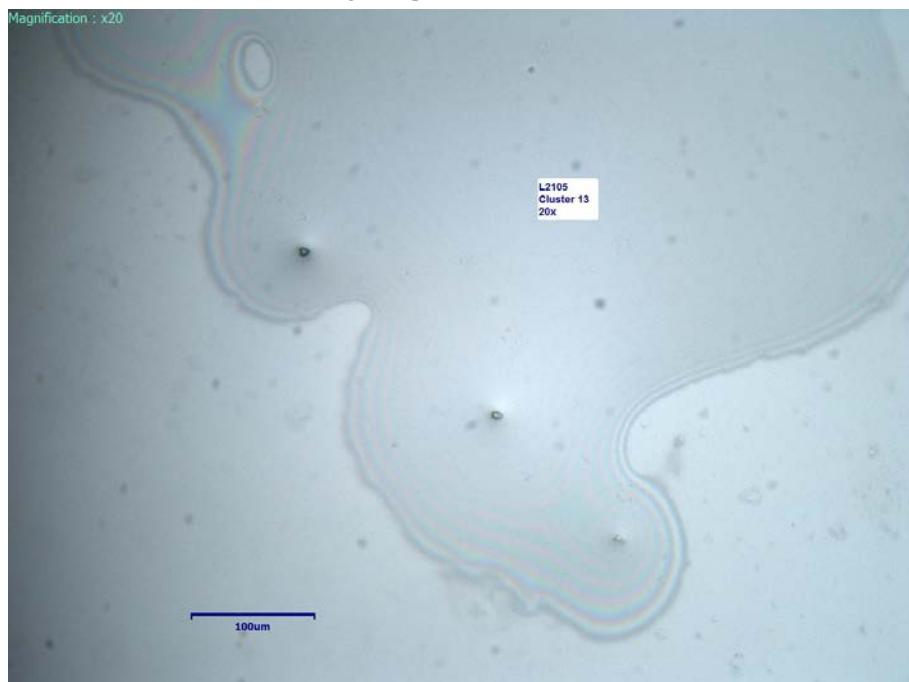
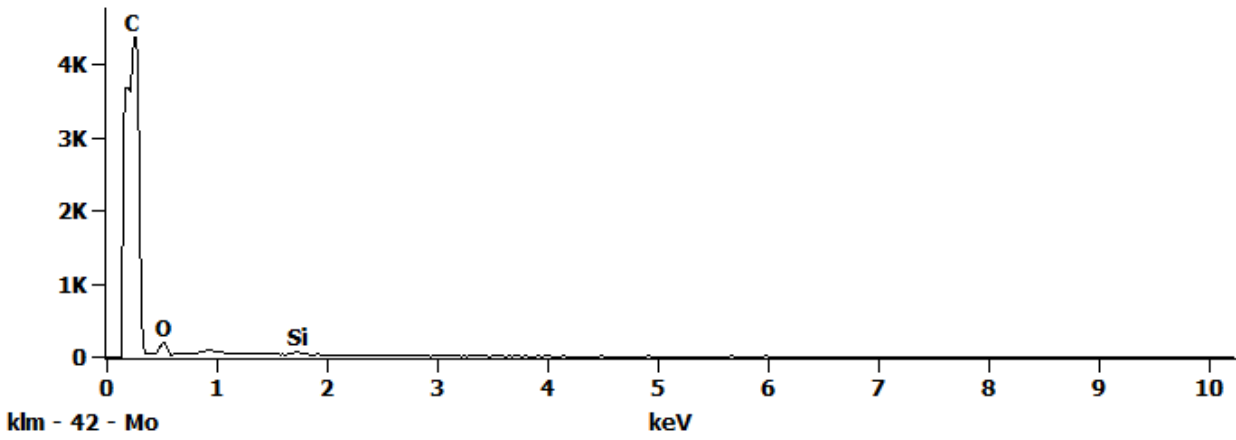


Photo of cluster L2105 Cluster 13.

*L2105 A13 - EDS Spectra*

Full scale counts: 4359

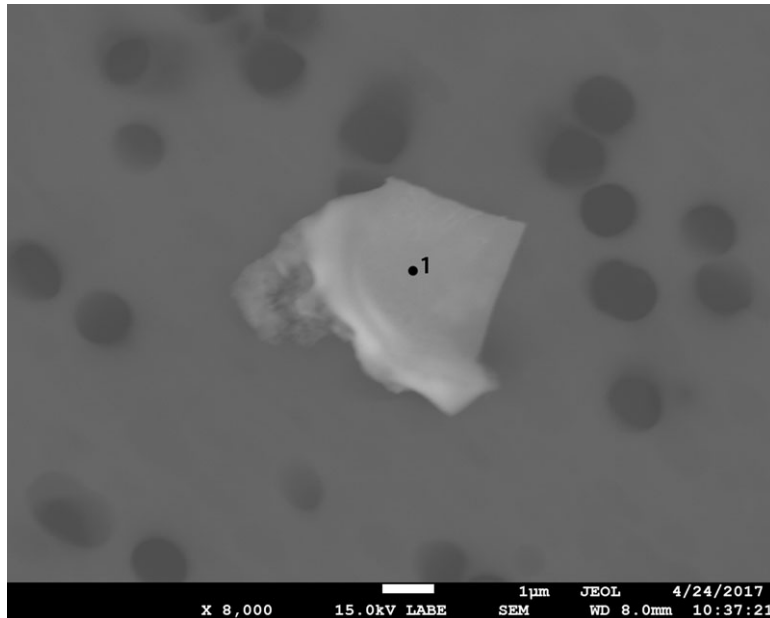
L2105A-13(1) pt 1



*Figure 1. EDS Spectra for sample L2105-A-13 taken at test area 1. The test area is labeled in the particle SEM photo..*



## L2105 A14



SEM Photo of sample L2105 A14 with labeled EDS testing locations.

<b>Particle Size:</b>	10 µm
<b>Shape:</b>	Equidimensional to Spherical
<b>Transparency:</b>	Translucent to Transparent
<b>Color:</b>	CLEAR
<b>Luster:</b>	Pearly to Subvitreous
<b>Particle Type:</b>	NATURAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	L2105 Cluster 14
<b>Comments:</b>	

### Cluster of Origin: L2105 Cluster 14

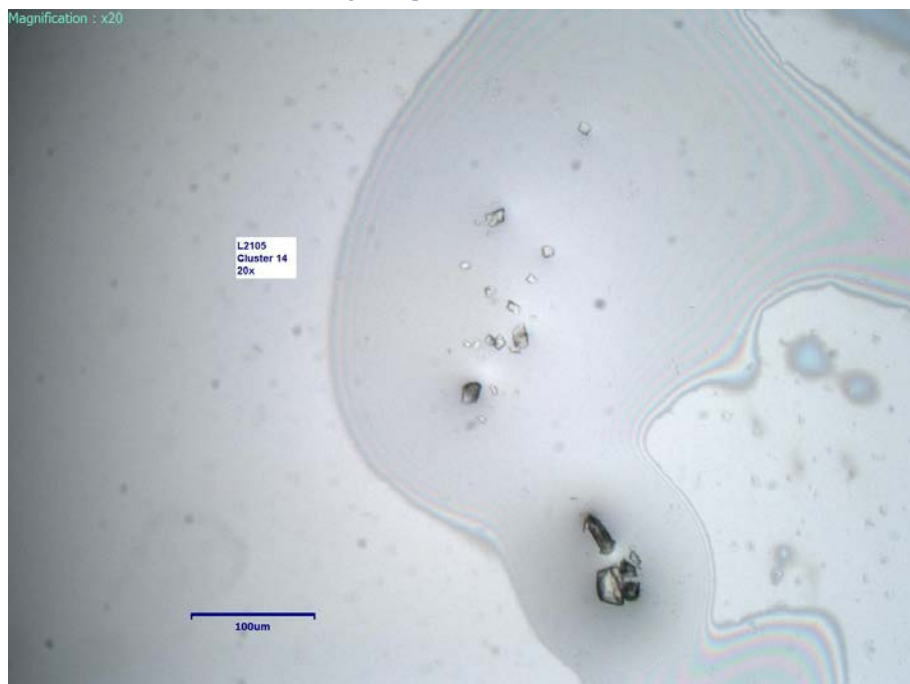


Photo of cluster L2105 Cluster 14.

*L2105 A14 - EDS Spectra*

Full scale counts: 3467

L2105A-14(1) pt 1

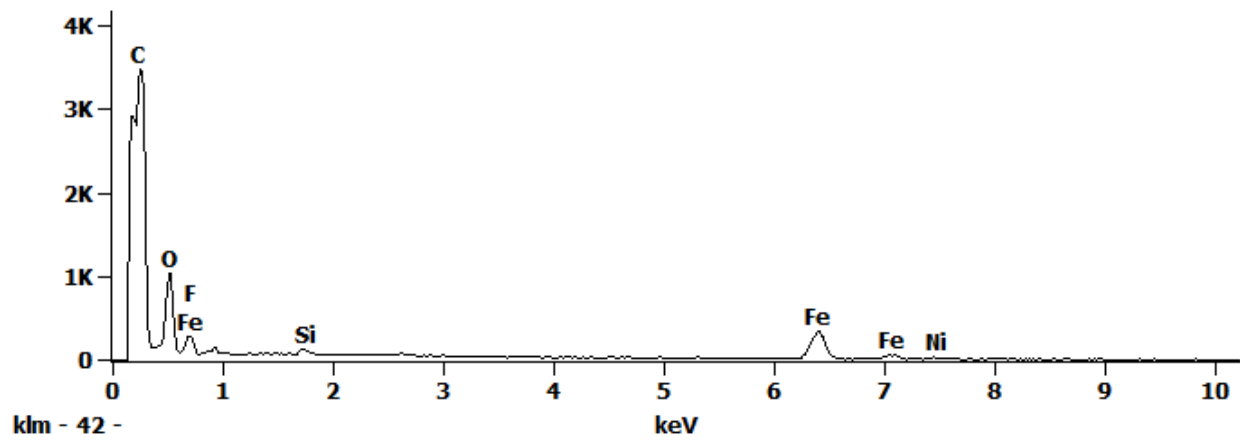
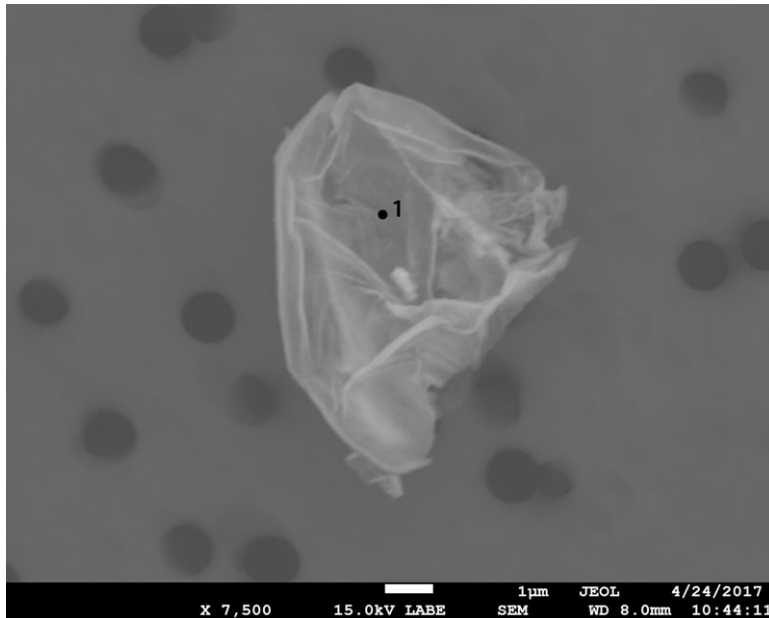


Figure 1. EDS Spectra for sample L2105-A-14 taken at test area 1. The test area is labeled in the particle SEM photo..

## L2105 A14b



SEM Photo of sample L2105 A14b with labeled EDS testing locations.

<b>Particle Size:</b>	10 µm
<b>Shape:</b>	Equidimensional to Spherical
<b>Transparency:</b>	Translucent to Transparent
<b>Color:</b>	CLEAR
<b>Luster:</b>	Pearly to Subvitreous
<b>Particle Type:</b>	NATURAL TERRESTRIAL CONTAMINATION
<b>Cluster No.:</b>	L2105 Cluster 14
<b>Comments:</b>	

### Cluster of Origin: L2105 Cluster 14

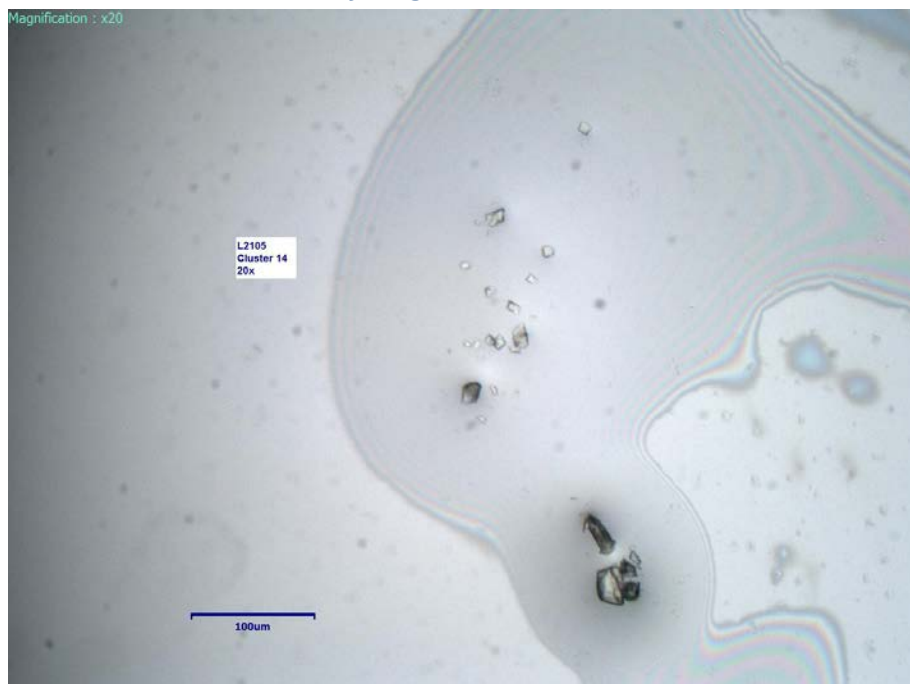
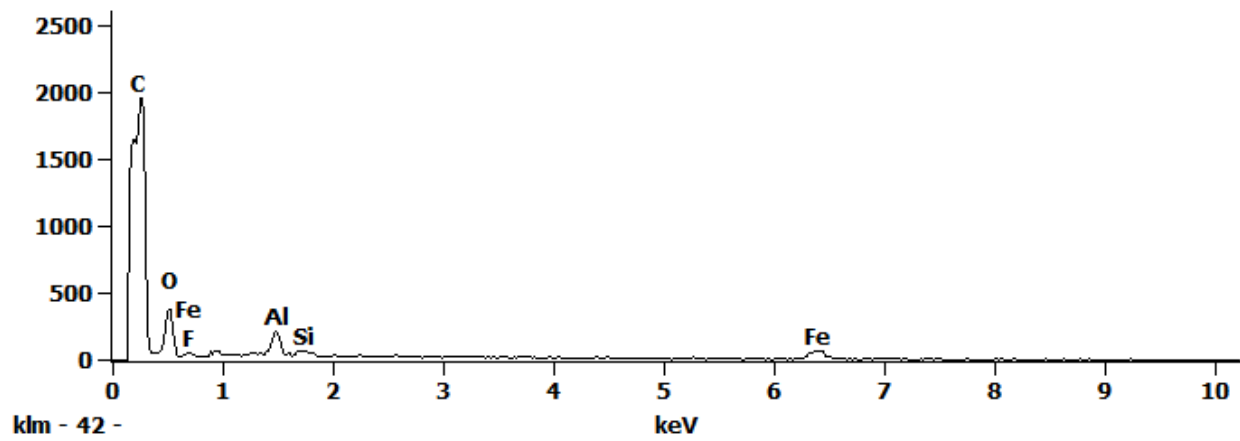


Photo of cluster L2105 Cluster 14.

*L2105 A14b - EDS Spectra*

Full scale counts: 1953

L2105A-14b(1) pt 1



*Figure 1. EDS Spectra for sample L2105-A-14b taken at test area 1. The test area is labeled in the particle SEM photo..*