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Cosmic Dust Catalog

Volume 15

Particles from Collectors L2036 and L2021

Space and Life Sciences Directorate
Solar System Exploration Divison
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Compiled by
Cosmic Dust Preliminary Examination Team (CDPET)

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Cosmic Dust Catalog, Volume 15
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1. Introduction

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 468 particles retrieved from collection surfaces L2021 and L2036. These surfaces were flat plate Large Area Collectors (with a 300 cm2 surface area each) which was coated with silicone oil (dimethyl siloxane) and then flown aboard a NASA ER-2 aircraft during a series of flights that were made during January and February of 1994 (L2021) and June 7 through July 5 of 1994 (L2036). Collector L2021 was flown across the entire southern margin of the US (California to Florida), and collector L2036 was flown from California to Wallops Island, VA and on to New England. These collectors were installed in a specially constructed wing pylon 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. In this manner, a total of 35.8 hours of stratospheric exposure was accumulated for collector L2021, and 26 hours for collector L2036.

2. Processing of Particles

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 μ 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.

This catalog is the fifth to be produced from the Large Area Cosmic Dust Collectors (LACs). These collectors have approximately one order of magnitude more collection surface area than the conventional collectors used for Cosmic Dust Catalogs 1-10.

3. Preliminary Examination of Particles

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 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 is performed with a JEOL-35CF SEM at an accelerating voltage of 20 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 JEOL-35CF SEM equipped with a Si(Li) detector and PGT 4000T analyzer. 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 100 sec. No system (artifact) peaks of significance appear in the spectra.

It should be pointed out that the SEM/EDS procedure used in preparing this catalog is different than that used in preparing Cosmic Dust Catalogs, Volumes 1-3 and 8. In these catalogs, EDS analysis was performed using the JEOL 100CX STEM operated at 40 kV. Only the EDS spectra exhibit differences that are likely to be noticed. These differences are a slightly higher background and more efficient excitation of high atomic number elements for EDS spectra collected at 40kV relative to those collected at 20kV. However, each catalog includes spectra of the same selected comparison standards, which allows comparison of spectra from one catalog to the next to be made. Please refer to Section 5 for a more complete discussion.

Following SEM/EDS examination, each particle mount is stored in a dry nitrogen gas atmosphere in a sealed cabinet.

4. Catalog Format

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** (μ 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** is generalized to be spherical (S), equidimensional (E), or irregular (I). Particles having shape intermediate between S and E, or E and I, are not uncommon and may be denoted as S/E or E/I, etc.
- **TRANSPARENCY** (abbreviated TRANS.) 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** is determined by optical microscopy using oblique (fiber optic, quartz halogen) illumination supplemented with normal reflected (tungsten-lamp) illumination. The distinction of dark (Dk.) from light (Lt.) particles is unambiguous, although the distinction of colorless (CL) from pale-colored conditions is sometimes problematical. Complex colorations of individual particles may be noted in the "COMMENTS" column and annotated on the SEM image.
- **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), vitreous (V), and resinous (R). Lusters transitional between categories or difficult to identify are indicated accordingly (D/SM, SV/V, etc.).

- **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:

    - **C:** Cosmic 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 "C" is used to conveniently group together all particles which are judged to be of extraterrestrial origin, including those that have apparently experienced strong ablational heating or melting. Type "C" 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?".

    - **TCA:** Terrestrial contamination (artificial or man-made). 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 which 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 by 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).

    - **TCN:** Terrestrial contamination (natural). "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 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 which 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.

- **AOS:** Aluminum or aluminum oxide sphere. An AOS 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** are included for particles with special features or histories. Any large cluster particles, which have broken apart on the LAC plate, 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 LAC plate, which is also available for allocation in part or in whole.

5. Analyses of Reference Materials

The usefulness of the SEM images and EDS spectra provided for particles in this catalog is enhanced by comparison with similar data products obtained for mineral standards of known composition. Accordingly, a typical EDS spectrum is presented for each of three standard minerals prepared as polished grain mounts (San Carlos olivine, USNM 111312/444; diopside JLC 99 63; Kakanui hornblende, USNM 143965; Allende Meteorite Bulk Powder, NMNH 3529). Analyses of these optically flat surfaces eliminate inter-sample geometrical variations so that effects of detection limits and compositional variations, in general, on relative peak heights in the raw spectra can be more readily assessed. Even so, the polished grain spectra should not be over interpreted because no corrections have been attempted for atomic number, absorption, or fluorescence effects. The spectra are presented simply as additional aids to the meaningful use of the sample particle EDS spectra. Investigators who might wish to compare performance characteristics of their EDS analytical systems with those of the system used by CDPET in preparing these catalog data should contact Curator/Cosmic Dust at the address given in Section 6. A short-term loan of a polished grain mineral standard can then be arranged.

As pointed out in Section 3, the EDS spectra included in this catalog were obtained using a primary electron energy of 20 kV whereas spectra in Catalogs 1-3 and 8 were obtained with a different instrument operated at 40 kV. Although the effects on EDS spectra to be expected from such a change are well known from X-ray spectrometric analysis, they are worth pointing out to avoid confusion among the readers of this catalog. The major effects of concern to Cosmic Dust Catalog users can be seen by comparing the two "Allende (CV3) Meteorite Bulk Powder" spectra, one of which was obtained at 20 kV and the other at 40

kV, as presented in Cosmic Dust Catalogs 1-3 and 8 (only spectra collected at 20kV are presented in this catalog). In the 20 kV spectrum, the Si peak is more intense than the principal peak of Fe whereas the opposite is true for the 40 kV spectrum. In general, the 20 kV spectra in this catalog will show peaks of light elements enhanced relative to peaks of heavy elements when compared with 40 kV spectra published in Catalogs 1-3 and 8. The explanation is based both on geometrical differences between X-ray paths in the two EDS systems (the JEOL-35CF system is actually more favorable for light element analysis) and on electron and X-ray physics (X-ray emission by heavy elements is more intense at 40 kV than at 20 kV). Thus, readers are cautioned against attempting to quantitatively intercompare 40 kV spectra with 20 kV spectra. Still, the spectra in each catalog should continue to serve as originally intended. Namely, the sample and standard spectra in any given catalog will represent a self consistent data set.

6.Sample Requests

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

Curator/Cosmic Dust
Telephone: (281) 483-5128
Code SN2
NASA/Johnson Space Center
FAX: (281) 483-5347
Houston, Texas 77058
U.S.A.

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:

Dr. Joseph Boyce
Discipline Scientist
Planetary Materials and Geochemistry Program
Code SR
NASA Headquarters
Washington, DC 20546

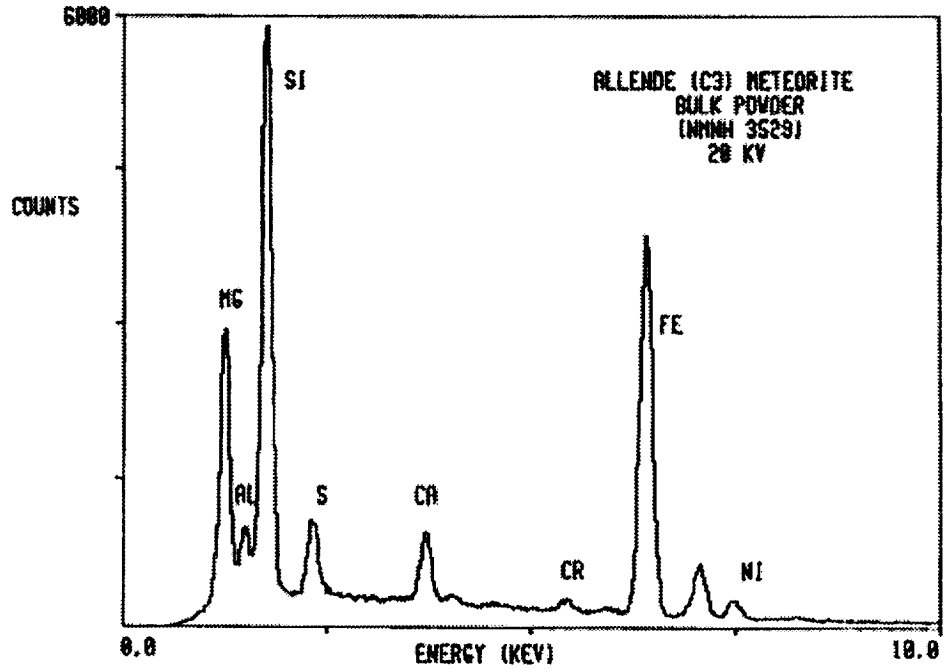
Although foreign scientists are welcome to request samples, NASA cannot provide funds to be spent outside the U.S.A. by citizens of other countries.

7. Acknowledgements

The ER-2 flight personnel at NASA/Ames Research Center, Moffett Field, California) performed the loading and unloading of the cosmic dust collectors on the ER-2 aircraft and provided flight log data and other critical assistance.

Eugene Jarosewich (Smithsonian Institution, Washington, D.C.) kindly provided mineral standards and the Allende chondrite powder.

Standard Spectra


6000
COUNTS
SI
ALLENDE (C3) METEORITE
BULK POWDER
(NMNH 3529)
20 KV
MG
AL
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CR
FE
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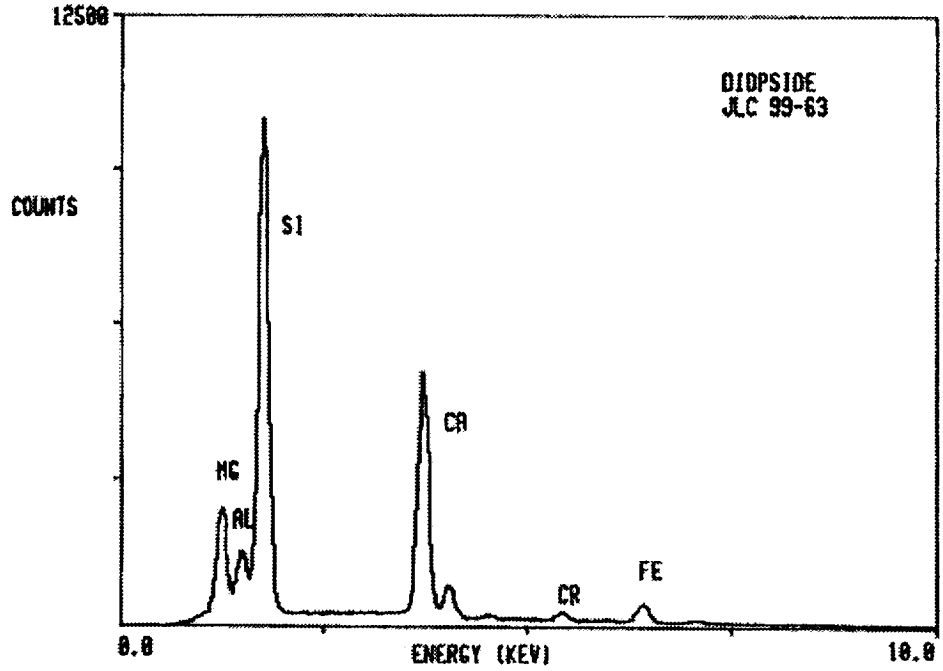
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DIOPSIDE
JLC 99-63
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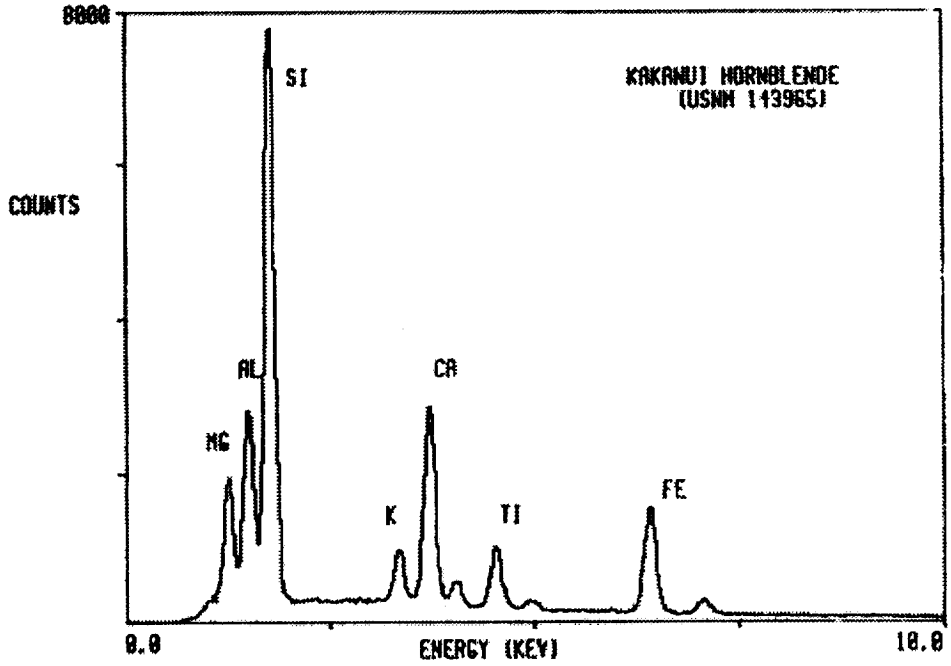
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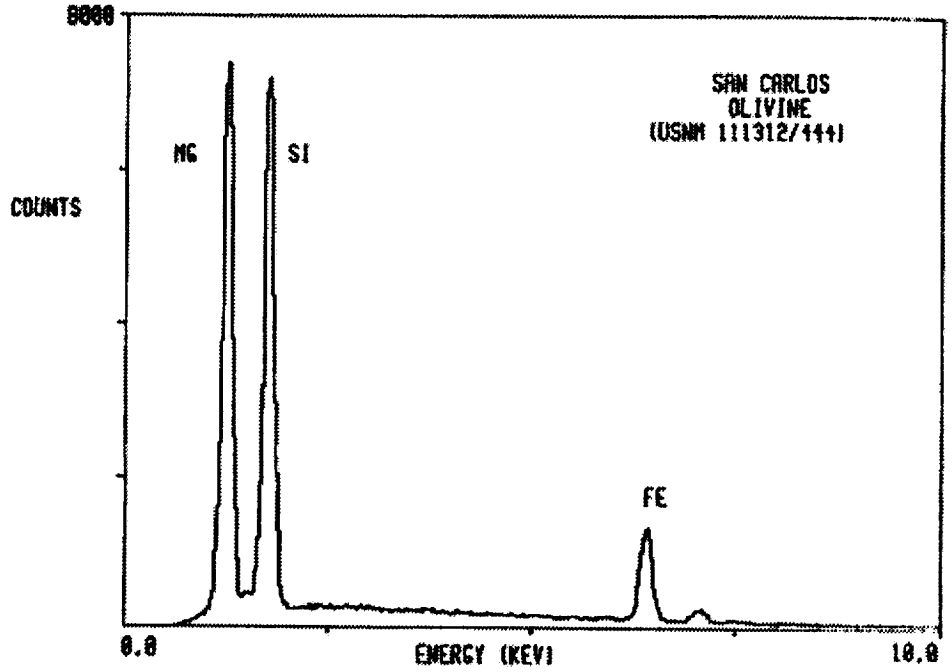
SI
KAKANUI HORNBLENDE
(USNM 143965)
AL
CR
MG
K
TI
FE
0.0
ENERGY (KEV)
10.0


8000
COUNTS
SAN CARLOS
OLIVINE
(USNM 111312/444)
MG
SI
FE
0.0
ENERGY (KEV)
10.0

Cosmic Dust Catalog 15 - Particle Particle Descriptions

*The links to the individual particles point to .pdf (Portable Document Format) files. To view these documents you may need to configure **Acrobat Reader** as your helper application.*

Particle	Size	Shape	Trans	Color	Luster	Type	Comments	Photo #
Aluminum Oxide Sphere								
L2021F4	7	S	T	Colorless	V	AOS		97E00411
L2021F10	18	S	T	Colorless	V	AOS		97E00417
L2021F12	8	S	T	Colorless	V	AOS		97E00419
L2021F14	14x6	I	TL	Brown	SV	AOS		97E00421
L2021F15	6	S	T	Colorless	V	AOS		97E00422
L2021F16	7	S	T	Colorless	V	AOS		97E00423
L2021F18	7	S	T	Colorless	V	AOS		97E00425
L2021F19	8	S	O	Black	M	AOS		97E00426
L2021F20	10x4	S	O	Black	D	AOS		97E00427
L2021F23	20	S	O	White	SV	AOS		97E00430
L2021G1	8	S	T	Colorless	V	AOS		97E00437
L2021G2	9	S	T	Colorless	V	AOS		97E00438
L2021G3	8	S	T	Colorless	V	AOS		97E00439
L2021G4	8	S	T	Colorless	V	AOS		97E00440
L2021G5	7	S	T	Colorless	V	AOS		97E00441
L2021G6	6	S	T	Colorless	V	AOS		97E00442
L2021G7	8	S	T	Colorless	V	AOS		97E00443
L2021G8	8	S	T	Colorless	V	AOS		97E00444
L2036I28	15x11	S	O	Black	P	AOS		97E00174
L2036K3	6	S	T	Colorless	V	AOS		97E00194
L2036K10	11	S	O	Silver	M	AOS		97E00201
L2036N5	10	S	O	Silver	M	AOS		97E00285
L2036N33	27	S	T	Colorless	V	AOS		97E00313
Cosmic Dust								
L2021A1	16	I	TL	Black-White	D	C	Cluster 1	97E00328
L2021A5	9	E	O	Black	D	C	Cluster 4	97E00332
L2021A6	9	E	O	Black	D	C	Cluster 5	97E00333
L2021A7	14x9	I	O	Black-Gray	D	C	Cluster 6	97E00334
L2021B1	32x26	I	O	Black-Gray	D	C		97E00335
L2021B2	17x16	E	O	Black-Gray	D	C		97E00336
L2021B4	14	I	O	Black	D	C		97E00338
L2021B5	80x60	I	O	Black	P	C		97E00339
L2021B6	10x6	I	O	Black	P	C	Pair of particles	97E00340
L2021B7	20x12	I	O	Black	D	C		97E00341
L2021B8	18x12	I	O	Black	P	C		97E00342
L2021B9	40x30	I	O	Black	D	C		97E00343
L2021B10	16	I	O	Black	D	C		97E00344
L2021B11	11	I	O	Black	P	C		97E00345
L2021B13	11	S	O	Black	P	C?		97E00347
L2021B14	25x20	I	O	Black	D	C?		97E00348
L2021B15	8	S	O	Black	D	C		97E00349
L2021B16	15	S	O	Black	D	C?		97E00350
L2021B17	40x34	I	O	Black-Gray	D	C		97E00351
L2021B18	18x12	I	O	Black-Gray	P	C		97E00352
L2021B19	30x25	I	O	Black	M	C		97E00353
L2021C1	20x15	I	O	Black-Gray	D	C		97E00354
L2021C3	26x18	E	O	Black-Gray	D	C?		97E00356
L2021C4	8	E	O	Black	D	C		97E00357
L2021C5	32x10	I	O	Black	D	C		97E00358
L2021C6	20x16	I	O	Black	M	C		97E00359
L2021C7	23x10	E	O	Black	M	C		97E00360
L2021C8	23x16	I	O	Black	D	C		97E00361
L2021C9	25x23	E	O	Black	D	C		97E00362
L2021C10	10	E	O	Black	D	C		97E00363
L2021C12	5	I	O	Black	D	C		97E00365
L2021C13	12x10	I	O	Black	D	C		97E00366
L2021C14	12x6	I	O	Black	D	C		97E00367
L2021C15	36x25	I	O/TL	Black-Colorless	P	C		97E00368
L2021C17	95x65	I	O	Black	M	C		97E00370
L2021C18	15x14	I	O	Black	D	C		97E00371
L2021C19	14	S	O	Black	P	C?		97E00372
L2021C20	14	S	O	Black	P	C		97E00373
L2021C21	24	E	O	Black	D	C		97E00374
L2021D2	26x16	I	TL	White	SV	C		97E00376
L2021D3	26	I	O	Gray	M	C		97E00377
L2021D4	16x14	E	O	Black	P	C		97E00378

L2021D5	14x10	I	O	Black	D	C		97E00379
L2021D6	15x12	I	O	Black	P	C		97E00380
L2021D7	25x16	I	O	Black	SM	C		97E00381
L2021D8	27x14	I	O	Black	SM	C		97E00382
L2021D9	12	E	O	Black	SM	C		97E00383
L2021D10	12	E	O	Gray	D	C	Related to L2021 D11	97E00384
L2021D11	70x65	E	O	Gray	D	C	Related to L2021 D10; Field of particles	97E00385
L2021D12	10x8	I	O	Black	P	C		97E00386
L2021D13	50x30	I	O	Black	SM	C		97E00387
L2021D14	7	E	O	Black	P	C		97E00388
L2021E1	14	I	O	Black	M	C		97E00391
L2021E2	20x16	I	O	Black	M	C		97E00392
L2021F17	10	I	O	Black	P	C		97E00424
L2021G21	11	S	O	Black	M	C		97E00457
L2036A2	25x15	I	TL	Black-White	V/SV	C	Cluster 2	97E00008
L2036A3	8x6	I	O	Black	D	C	Cluster 2	97E00009
L2036A4	14x8	I	O	Black	D	C	Cluster 3	97E00010
L2036A5	6	I	O	Black	D	C	Cluster 4, Related to L2036 A6	97E00011
L2036A6	5	I	O	Black	D	C	Cluster 4, Related to L2036 A5	97E00012
L2036B1	10x3	I	T	Colorless	V	C	Cluster 7, Related to L2036 B2	97E00013
L2036B2	9x3	I	T	Colorless	V	C	Cluster 7, Related to L2036 B1	97E00014
L2036B3	20x11	I	O	Black-Colorless	D/SV	C	Cluster 9, Related to L2036 B4-B8	97E00015
L2036B4	5	I	O	Black-Colorless	D	C	Cluster 9, Related to L2036 B3, B5-B8	97E00016
L2036B5	5	I	O	Black-Colorless	D	C	Cluster 9, Related to L2036 B3-B4, B6-B8	97E00017
L2036B6	5	I	O	Black-Colorless	P	C	Cluster 9, Related to L2036 B3-B5, B7-B8	97E00018
L2036B7	6x3	I	O	Black-Colorless	D/SV	C	Cluster 9, Related to L2036 B3-B6, B8	97E00019
L2036B8	7x3	I	O	Black-Colorless	D/SV	C	Cluster 9, Related to L2036 B3-B7	97E00020
L2036C1	6	I	O	Black-Colorless	O/SV	C	Cluster 13	97E00021
L2036C2	6x3	I	O	Black-Colorless	O/SV	C?	Cluster 14, Related to L2036 C3	97E00022
L2036C3	5x3	I	O	Black-Colorless	O/SV	C?	Cluster 14, Related to L2036 C2	97E00023
L2036C5	5	I	TL	White	M	C	Cluster 16, Related to L2036 C6	97E00025
L2036C6	5	I	TL	White	M	C	Cluster 16, Related to L2036 C5	97E00026
L2036C9	22x11	I	O	Black	D	C	Cluster 17	97E00029
L2036C11	8x6	I	TL	White	SV	C	Cluster 18, Related to L2036 C12-C13	97E00031
L2036C12	10x9	I	O/TL	Black-Colorless	D	C	Cluster 18, Related to L2036 C11, C13	97E00032
L2036C13	5x4	I	O	Black	D	C	Cluster 18, Related to L2036 C11-C12	97E00033
L2036D1	11	I	O	Black-White	D	C	Cluster 19, Related to L2036 D2	97E00034
L2036D2	4x2	I	O	Black	D	C	Cluster 19, Related to L2036 D1	97E00035
L2036D3	11	E	O	Black	D	C	Cluster 20, Related to L2036 D4-D5	97E00036
L2036D4	15x5	I	O	Black	D	C	Cluster 20, Related to L2036 D3, D5	97E00037
L2036D5	5	I	O	Black	D	C	Cluster 20, Related to L2036 D3-D4	97E00038
L2036D6	13x6	I	O/TL	Black-Brown	P/SV	C	Cluster 21	97E00039
L2036D10	11	E	O	Black	D	C	Cluster 24, Light area is rich in Al	97E00043
L2036E1	15	S	O	Black	D	C		97E00044
L2036E3	8	S	O	Black	P	C?		97E00046
L2036E6	12x8	I	O	Black	P	C		97E00049
L2036E15	32x18	I	O	Black	D	C		97E00058
L2036E16	16	E	O	Black	D	C		97E00059
L2036E17	10x8	E	O/TL	Black-Colorless	P/SV	C		97E00060
L2036E18	9x6	I	TL	Colorless	SV	C		97E00061
L2036E19	20x12	I	O	Black-Brown	D	C		97E00062
L2036E21	8	E	O	Black	D	C		97E00064
L2036E22	12x7	I	O	Black	D	C		97E00065
L2036E23	13x11	I	O/TL	Black-Brown	P/SV	C		97E00066
L2036E24	10x8	I	TL	Colorless	SV	C?		97E00067
L2036E25	14x7	I	O/TL	Black-Colorless	SV/D	C		97E00068

L2036E26	11	S	O	Black	D	C		97E00069
L2036E27	6x4	I	O	Black	D	C		97E00070
L2036F1	16	S	O	Silver	M	C?		97E00073
L2036F2	22x14	E	O	Black	P	C		97E00074
L2036F3	19x12	I	O	Black	D	C?		97E00075
L2036F4	5x4	I	O	Black	D	C		97E00076
L2036F10	14x10	I	O	Black	P	C?		97E00082
L2036F11	22x14	I	O/TL	Black/Brown	SV/D	C?		97E00083
L2036F12	11x9	I	O	Black	P	C		97E00084
L2036F14	15x14	E	O	Sliver	M	C		97E00086
L2036F17	13	S	O	Black	M	C?		97E00089
L2036F18	16x10	I	O	Black	M	C		97E00090
L2036F19	15x12	I	O	Black	P	C		97E00091
L2036F24	13x9	I	O/TL	Black-Colorless	D/SV	C		97E00096
L2036F25	5	S	O	Black	P	C		97E00097
L2036G2	29x18	I	O	Black	M	C		97E00100
L2036G8	25x23	I	O	Black	SM	C		97E00106
L2036G9	6x3	I	O	Black	P	C		97E00107
L2036G10	22x13	I	O	Black	SM	C?		97E00108
L2036G11	33x22	I	O/TL	Black/White	D/SV	C		97E00109
L2036G12	23x19	I	O/T	Black-Colorless	P/V	C		97E00110
L2036G13	30x23	I	O	Black	P	C		97E00111
L2036G14	27x23	I	O/TL	Black-Colorless	SM/SV	C		97E00112
L2036G15	20x14	I	O/TL	Black-White	P/SV	C		97E00113
L2036G16	14x12	I	O/TL	Black-Brown	P/SV	C		97E00114
L2036G17	39x33	I	O/TL	Black-White	SM/SV	C?		97E00115
L2036G18	9x7	I	O	Black	P	C?		97E00116
L2036G19	8	I	O	Black	D	C		97E00117
L2036G20	14x10	I	O	Black	P	C		97E00118
L2036H1	20x10	I	O	Black	SM	C		97E00119
L2036H2	36x24	I	O	Black	D	C		97E00120
L2036H4	37x28	I	O	Black	D	C		97E00122
L2036H5	28x15	I	O	Black	D	C		97E00123
L2036H6	33x22	I	O	Gray-Brown	M	C		97E00124
L2036H7	15x13	I	O	Black	SM	C		97E00125
L2036H8	12	E	O	Black	D	C		97E00126
L2036H9	44x33	I	O	Silver	M	C?		97E00127
L2036H14	35x26	I	O	Black	D	C		97E00132
L2036H15	16x9	I	O	Black	D	C?		97E00133
L2036H17	50x30	I	O	Black	M	C?		97E00135
L2036H18	24x16	I	O	Black	D	C		97E00136
L2036H19	37	I	O	Black	D	C		97E00137
L2036H20	23x17	I	O	Black	P	C		97E00138
L2036H21	31x20	I	O	Black	SM	C		97E00139
L2036H22	24x18	I	O	Black	D	C		97E00140
L2036H23	28x14	I	O	Black	SM	C		97E00141
L2036H25	44x40	I	O	Gray	SM	C		97E00143
L2036H26	35x22	I	O	Gray	SM	C		97E00144
L2036I1	9	E	O	Silver	P	C		97E00147
L2036I2	15x12	I	O/T	Black-Colorless	D/V	C		97E00148
L2036I3	24x22	I	O	Black	P	C		97E00149
L2036I4	28x13	I	TL	White	SV	C		97E00150
L2036I5	24x16	I	O	Black	SM	C?		97E00151
L2036I6	13x8	I	O	Black	D	C?		97E00152
L2036I7	14x8	I	O	Black	P	C?		97E00153
L2036I8	26x19	E	O	Black	P	C		97E00154
L2036I12	16x12	I	O	Black	P	C?		97E00158
L2036I14	25x19	I	O	Gray	D	C		97E00160
L2036I15	25x14	I	O	Gray	D	C		97E00161
L2036I18	19x16	I	O	Gray	D	C		97E00164
L2036I19	17x10	I	O	Black	P	C		97E00165
L2036I20	35x24	I	TL	Black-White	D/SV	C		97E00166
L2036I21	26x18	I	O	Black-Brown	D	C		97E00167
L2036I22	37x17	I	O	Gray	D	C		97E00168
L2036I23	22x20	I	O	Gray	D	C		97E00169
L2036I24	44x26	I	TL	White-Brown	SV	C		97E00170
L2036I25	24x12	I	O	Gray	SM	C		97E00171
L2036I26	33x19	I	TL	Brown-Colorless	SV	C?		97E00172
L2036I27	22x13	I	O	Black	D	C		97E00173
L2036I29	17x13	I	O	Black	D	C?		97E00175
L2036J1	39x26	I	O	Black	M	C		97E00177
L2036J2	26x14	I	TL	Colorless	SV	C?		97E00178
L2036J3	14x8	I	O	Black	M	C		97E00179
L2036J10	24x19	I	O	Black-Gray	SM	C?		97E00186
L2036J12	9x8	I	O	Black	SM	C		97E00188
L2036J13	12x7	I	O	Black	SM	C		97E00189
L2036J15	15x10	I	O/T	Black-Colorless	P/V	C?		97E00191

L2036K30	18x14	I	TL	White	SV	C?		97E00221
L2036L6	18x14	I	T	Colorless	V	C?		97E00229
L2036L10	5	S	O	Black	D	C?		97E00233
L2036L13	9x6	I	O/T	Black-Colorless	D/SV	C	Field of particles	97E00236
L2036L19	24x16	I	TL	Colorless-Brown	SV	C?		97E00242
L2036L20	19x13	I	TL	Colorless	V	C?		97E00243
L2036L23	12x7	I	TL	White	SV	C?		97E00246
L2036M14	8x5	I	T	Colorless	V	C		97E00265
L2036M15	11x8	I	T	Colorless	V	C?		97E00266
L2036M20	12	I	O	Black	D	C		97E00271
L2036M22	14x10	I	TL	Brown-Red	SV	C?		97E00273
L2036M28	8x6	I	O	Black	D	C	Smaller particle	97E00279
L2036N4	14x10	I	TL	White	SV	C?		97E00284
L2036N10	12x10	I	TL	Colorless-Brown	V	C		97E00290
L2036N11	14x12	I	O	White	SV	C		97E00291
L2036N12	16x12	I	O	White	SV	C?		97E00292
L2036N14	11x7	I	O	Black	P	C?		97E00294
L2036N15	22x19	I	TL	Colorless	SV	C?		97E00295
L2036N17	35x14	I	O	White-Brown	SV	C?		97E00297
L2036N18	16x12	I	TL	Brown	SV	C?		97E00298
L2036N21	23x16	I	O	Black	P	C?		97E00301
L2036N34	17	S	TL	Colorless-White	SV	C		97E00314
L2036O3	3	I	O	Black	D	C	Cluster 6, Related to L2036 O4-O7	97E00320
L2036O4	4	I	O	Black	D	C	Cluster 6, Related to L2036 O3, O5-O7	97E00321
L2036O5	3	I	O	Black	D	C	Cluster 6, Related to L2036 O3-O4, O6-O7	97E00322
L2036O6	4	I	O	Black	D	C	Cluster 6, Related to L2036 O3-O5, O7	97E00323
L2036O7	2	I	O	Black	D	C	Cluster 6, Related to L2036 O3-O6	97E00324
L2036O9	9x6	I	O	Black	D	C?	Cluster 24, Related to L2036 O10	97E00326
L2036O10	13x8	I	O	Black	D	C?	Cluster 24, Related to L2036 O9	97E00327
Terrestrial Contamination - Artificial or Man-Made								
L2021A2	17x9	I	O	Black-Gray	D	TCA	Cluster 2	97E00329
L2021A3	20x16	I	O	White	P	TCA	Cluster 3, Related to L2021 A4	97E00330
L2021A4	15x10	I	O	White	D	TCA	Cluster 3, Related to L2021A3	97E00331
L2021B3	14	I	O	Black-Gray	D	TCA		97E00337
L2021C11	10	E	O	Black	D	TCA		97E00364
L2021C16	8	I	O	Black	D	TCA		97E00369
L2021E4	11	S	TL	Red	SV	TCA		97E00394
L2021E5	12	S	TL	Red	P	TCA		97E00395
L2021E6	24x17	E	TL	White	SV	TCA		97E00396
L2021E11	50x35	I	TL	Red	SV	TCA		97E00401
L2021E12	44x42	E	TL	White	SV	TCA?		97E00402
L2021E14	22x20	E	TL	White	SV	TCA		97E00404
L2021F3	20x18	E	TL	Colorless	SV	TCA?		97E00410
L2021F5	22	I	TL	Colorless	SV	TCA		97E00412
L2021F6	16	I	TL	Colorless	SV	TCA		97E00413
L2021F9	16x12	I	T	Colorless	V	TCA		97E00416
L2021F21	40x38	E	TL	White	SV	TCA		97E00428
L2021G9	50x3	I	O	White	SV	TCA		97E00445
L2021G11	38x34	I	O	White	SV	TCA		97E00447
L2021G20	38	I	TL	White	SV	TCA?		97E00456
L2021H3	44x27	E	TL	White	SV	TCA		97E00460
L2021H4	30x20	E	TL	White	SV	TCA		97E00461
L2021H9	40x34	I	O	Black-Silver	M	TCA		97E00466
L2021H10	40x28	I	O	White	P	TCA		97E00467
L2021H11	28x26	I	TL	Colorless	V	TCA		97E00468
L2021H12	14x10	I	O	Black	D	TCA		97E00469
L2021H13	32	I	TL	White	SV	TCA		97E00470
L2021H14	42x24	I	TL	White	SV	TCA		97E00471
L2021H15	22	E	TL	White	SV	TCA		97E00472
L2036A1	15x8	I	T	Colorless	V	TCA	Cluster 1	97E00007
L2036C4	3	I	O/T	Black-Colorless	P/V	TCA	Cluster 15	97E00024
L2036C10	22x19	I	O	Black	D	TCA		97E00030
L2036D7	10x8	I	O	Black	D/M	TCA	Cluster 22, Related to L2036 D8	97E00040
L2036D8	9	I	O	Black	D/M	TCA	Cluster 22, Related to L2036 D7	97E00041
L2036D9	4	E	O	Black	D	TCA	Cluster 23	97E00042
L2036E4	17x10	I	O	Black	M	TCA		97E00047
L2036E9	10x6	I	T	Colorless	V	TCA		97E00052

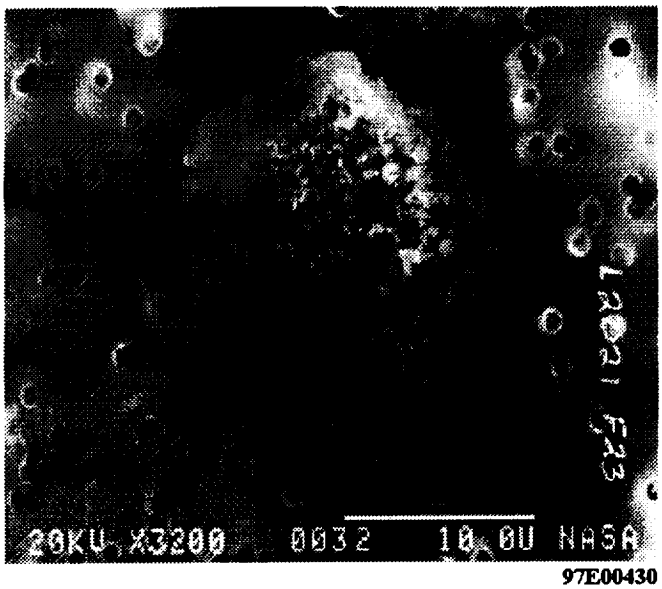
L2036E11	27x16	I	O/TL	Black-Colorless	D/SV	TCA		97E00054
L2036E13	44x26	I	O	Black-Brown	P	TCA		97E00056
L2036E20	35x16	I	O	Black	M	TCA		97E00063
L2036E29	44x24	I	O	Black-Brown	D/SV	TCA		97E00072
L2036F5	12x8	E	TL	White	SV	TCA		97E00077
L2036F6	9x8	E	O	Black	D	TCA		97E00078
L2036F7	30x22	I	O	Black	SM	TCA		97E00079
L2036F8	14x13	I	O	Sliver	M	TCA		97E00080
L2036F9	24x11	I	O	Black-Brown	SM/SV	TCA		97E00081
L2036F13	26x11	I	O/TL	Black/White	D/SV	TCA		97E00085
L2036F15	24	S	TL	White	SV	TCA		97E00087
L2036F20	25x20	I	O	Black	P	TCA		97E00092
L2036F21	20x14	I	O	Gray	SM	TCA		97E00093
L2036F22	11	S	O	Black	P	TCA		97E00094
L2036F23	15x12	I	O/TL	Black-Colorless	P/SV	TCA		97E00095
L2036F26	11x9	I	O	Black	D	TCA		97E00098
L2036G1	66x19	I	O	Silver	M	TCA		97E00099
L2036G3	52x26	I	O	Black-Gray	M	TCA		97E00101
L2036G4	63x28	I	O	Black-Brown	M/SV	TCA		97E00102
L2036G6	35x18	I	O	Gray-Brown	M	TCA		97E00104
L2036G7	18x15	I	O	Silver	M	TCA		97E00105
L2036H3	13x8	I	T	Colorless	V	TCA		97E00121
L2036H10	35x18	I	O	Silver	M	TCA		97E00128
L2036H11	19x14	I	O	Silver	M	TCA		97E00129
L2036H12	14x11	I	O/T	Black-Colorless	D/V	TCA		97E00130
L2036H13	20x12	I	O	Silver	M	TCA		97E00131
L2036H16	18x14	I	O	Black	D	TCA		97E00134
L2036H27	39x28	I	O	Black	M	TCA		97E00145
L2036I9	16x14	I	TL	Brown	SV	TCA		97E00155
L2036I10	20	I	O/TL	Black-Brown	P/SV	TCA		97E00156
L2036I11	24	I	O	Black-Silver	M	TCA		97E00157
L2036I13	16x10	I	T	Colorless	V	TCA		97E00159
L2036I30	12x6	I	O	Black	P	TCA		97E00176
L2036J4	39x26	I	O	White	SV	TCA		97E00180
L2036J6	27x14	I	TL	Colorless-Brown	SV	TCA		97E00182
L2036J11	55x26	I	O	White-Blue	SV	TCA		97E00187
L2036K4	3	I	T	Colorless	V	TCA		97E00195
L2036K5	88x68	I	O	White	SV	TCA		97E00196
L2036K7	66x44	I	TL	Colorless-White	SV	TCA		97E00198
L2036K11	57x28	I	TL	Colorless-White	SV	TCA		97E00202
L2036K12	26x20	I	TL	Colorless-White	SV	TCA		97E00203
L2036K13	18x12	I	TL	White	SV	TCA		97E00204
L2036K14	22x12	I	TL	White	SV	TCA		97E00205
L2036K15	14x10	I	O	Green	SV	TCA		97E00206
L2036K16	49x44	I	TL	White	SV	TCA		97E00207
L2036K17	14x10	I	TL	White	SV	TCA		97E00208
L2036K27	14	S	TL	Colorless	SV	TCA		97E00218
L2036K28	40x30	I	TL	White	SV	TCA		97E00219
L2036K31	42x22	I	TL	White	SV	TCA		97E00222
L2036K32	130x48	I	TL	White	SV	TCA		97E00223
L2036L1	40x18	I	TL	White	SV	TCA		97E00224
L2036L2	30x10	I	O	Gray	SV	TCA		97E00225
L2036L9	30x10	I	TL	White	SV	TCA		97E00232
L2036L15	12x7	I	TL	Colorless	V	TCA		97E00238
L2036L21	33x25	I	O/TL	Colorless-Gray	SV	TCA		97E00244
L2036L27	22x14	I	O	Black	D	TCA		97E00250
L2036M1	111x80	I	O	White	SV	TCA		97E00252
L2036M3	12x8	I	T	Colorless	V	TCA		97E00254
L2036M4	12x6	I	T	Colorless	V	TCA		97E00255
L2036M9	15x12	I	O	White	SV	TCA		97E00260
L2036M10	16x10	I	T	Colorless	V	TCA		97E00261
L2036M12	15x10	I	T	Colorless	V	TCA		97E00263
L2036M13	12x5	I	T	Colorless	V	TCA		97E00264
L2036M19	6x5	I	T	Colorless	V	TCA		97E00270
L2036M21	20x16	I	TL/O	Brown-Black	SV/D	TCA		97E00272
L2036M23	16	I	TL	Brown-Red	SV	TCA		97E00274
L2036M25	7	S	O	Black	M	TCA		97E00276
L2036M26	13x7	I	T	Colorless	V	TCA		97E00277
L2036M27	9x6	I	O	White	SV	TCA		97E00278
L2036M29	12x8	I	TL	White	SV	TCA		97E00280
L2036N1	55x33	I	T	Colorless-White	SV	TCA		97E00281
L2036N2	22	S	TL	Colorless-Brown	V	TCA		97E00282
L2036N3	24x15	I	TL	Colorless	V	TCA		97E00283
L2036N6	16x14	I	O	Brown	SV	TCA		97E00286
L2036N8	18	I	O	Black	P	TCA		97E00288
L2036N9	28x15	I	O	Black	P	TCA		97E00289
L2036N13	5	E	O	Black	D	TCA		97E00293

L2036N16	37x33	I	O	Silver	M	TCA		97E00296
L2036N19	15x12	I	O	Brown-Red	SV	TCA		97E00299
L2036N20	24x16	I	O	White	SV	TCA		97E00300
L2036N23	16x12	I	TL	Red	SV	TCA		97E00303
L2036N26	11x9	I	TL	Brown	V	TCA		97E00306
L2036N27	44x12	I	TL	Brown-Colorless	V	TCA		97E00307
L2036N28	22x14	I	O	Brown-Red	SV	TCA		97E00308
L2036N29	18x12	I	TL	Brown-Colorless	SV	TCA		97E00309
L2036N36	50	S	TL	Yellow	SV	TCA		97E00316
L2036N37	28	S	TL	Green	SV	TCA		97E00317
L2036O8	22x16	I	O	Silver	M	TCA	Cluster 23	97E00325
				Terrestrial Contamination - Natural				
L2021B12	24x18	I	O	Black	D	TCN?		97E00346
L2021C2	13x10	E	O	Black-Gray	D	TCN		97E00355
L2021D1	80x45	I	O	Black-Colorless	D	TCN		97E00375
L2021D15	16	S	O	Black	M	TCN?		97E00389
L2021D16	20x16	E	O	Black	SM	TCN?		97E00390
L2021E3	10	E	O	Gray	SV	TCN		97E00393
L2021E7	20	I	TL	Red	SV	TCN		97E00397
L2021E8	30x16	I	O	Black-Red	D/SV	TCN?		97E00398
L2021E9	95x90	E	TL	Black-Brown	SV	TCN		97E00399
L2021E10	18x14	E	TL	Red	SV	TCN		97E00400
L2021E13	41x30	I	O	Silver	M	TCN		97E00403
L2021E15	20x12	I	TL	White	SV	TCN?		97E00405
L2021E16	60x24	I	TL	Colorless	SV	TCN?		97E00406
L2021E17	46x40	I	TL	Colorless	SV	TCN?		97E00407
L2021F1	24	S	T	Colorless	V	TCN		97E00408
L2021F2	30	S	TL	Brown	SV	TCN		97E00409
L2021F7	24x12	I	TL	Colorless	V	TCN		97E00414
L2021F8	44	S	TL	White	SV	TCN		97E00415
L2021F11	25x20	I	O	Silver	M	TCN?		97E00418
L2021F13	12x9	I	TL	Colorless	SV	TCN		97E00420
L2021F22	20	E	TL	White	SV	TCN?		97E00429
L2021F24	20	S	O	White	SV	TCN		97E00431
L2021F25	32	I	O	White	SV	TCN		97E00432
L2021F26	30	S	TL	Colorless	SV	TCN		97E00433
L2021F27	20x16	E	TL	Colorless	SV	TCN		97E00434
L2021F28	20x18	E	TL	Colorless	SV	TCN		97E00435
L2021F29	22	S	TL	Colorless	SV	TCN		97E00436
L2021G10	32x24	I	TL	Brown-Colorless	SV	TCN		97E00446
L2021G12	20	S	O	Silver	M	TCN?		97E00448
L2021G13	54x30	I	O	White-Colorless	SV	TCN		97E00449
L2021G14	70x50	I	TL	Colorless	SV	TCN		97E00450
L2021G15	150x120	I	T	Colorless	V	TCN?		97E00451
L2021G16	70x64	I	O	White	SV	TCN		97E00452
L2021G17	44x24	I	O	Black	M	TCN		97E00453
L2021G18	30x23	I	O	White	SV	TCN		97E00454
L2021G19	25x22	E	TL	Colorless	SV	TCN		97E00455
L2021H1	18x16	E	O	Silver	M	TCN		97E00458
L2021H2	24	E	TL	Colorless	SV	TCN		97E00459
L2021H5	22x18	E	TL	Colorless	SV	TCN		97E00462
L2021H6	40x34	I	TL	White-Colorless	SV	TCN		97E00463
L2021H7	40x24	I	TL	Colorless	SV	TCN		97E00464
L2021H8	34x20	I	TL	White-Colorless	SV	TCN		97E00465
L2021H16	26x25	I	TL	Colorless	SV	TCN		97E00473
L2036C7	22x15	I	O/TL	Black-White	D/SV	TCN		97E00027
L2036C8	22x11	I	O	Black	D	TCN		97E00028
L2036E2	7	S	O	Black	D	TCN?		97E00045
L2036E5	12x8	I	O	Black	D	TCN		97E00048
L2036E7	5	E	O	Black	D	TCN		97E00050
L2036E8	13x8	I	TL	Brown	SV	TCN		97E00051
L2036E10	24x12	I	TL	White	SV	TCN		97E00053
L2036E12	12x9	I	O/TL	Black-Red	P/SV	TCN		97E00055
L2036E14	12	E	TL	Brown	SV	TCN		97E00057
L2036E28	5	I	O	Black	D	TCN		97E00071
L2036F16	20x10	I	O	Black	D	TCN		97E00088
L2036G5	105x46	I	O/TL	Black/White	SM/SV	TCN		97E00103
L2036H24	18x16	I	O	Black	SM	TCN		97E00142
L2036H28	68x26	I	O	Black	D	TCN		97E00146
L2036I16	20x16	I	TL	White-Brown	SV	TCN		97E00162
L2036I17	13x9	I	TL	White	SV	TCN		97E00163
L2036J5	23x17	S	O/TL	Black-Colorless	SM/SV	TCN		97E00181
L2036J7	13x9	I	O	Black	M	TCN		97E00183
L2036J8	50x42	I	TL	Colorless-White	SV	TCN		97E00184
L2036J9	44x28	I	TL	Colorless-White	SV/D	TCN		97E00185
L2036J14	10x6	I	O	Black	D	TCN		97E00190
L2036K1	18x14	I	O	Black	P	TCN?		97E00192

L2036K2	6	S	TL	Brown	SV	TCN		97E00193
L2036K6	28x16	I	O/T	Black-Colorless	D/V	TCN		97E00197
L2036K8	14	I	TL	White	SV	TCN		97E00199
L2036K9	8	I	T	Colorless	V	TCN		97E00200
L2036K18	33	S	TL	White	SV	TCN		97E00209
L2036K19	44x26	I	TL	White-Silver	SV	TCN?		97E00210
L2036K20	26x18	I	TL	Colorless	P	TCN?		97E00211
L2036K21	28x22	I	TL	Colorless	P	TCN?		97E00212
L2036K22	25	S	TL	Colorless	P	TCN		97E00213
L2036K23	15x11	I	TL	White	P	TCN		97E00214
L2036K24	12x10	I	TL	White	P	TCN?		97E00215
L2036K25	14	E	TL	White	P	TCN?		97E00216
L2036K26	19x13	I	TL	White	P	TCN		97E00217
L2036K29	28x14	I	TL	Colorless	SV	TCN		97E00220
L2036L3	22x19	I	TL	Colorless	SV	TCN		97E00226
L2036L4	28x16	I	TL	Colorless	SV	TCN		97E00227
L2036L5	12x9	I	T	Colorless	V	TCN	Two related grains	97E00228
L2036L7	17x10	I	T	Colorless	V	TCN		97E00230
L2036L8	12x10	I	TL	White	SV	TCN		97E00231
L2036L11	8	I	TL	Colorless	SV	TCN		97E00234
L2036L12	50x44	I	O	White	P	TCN		97E00235
L2036L14	26x24	I	TL	Colorless	V	TCN		97E00237
L2036L16	22x16	I	TL	White	SV	TCN		97E00239
L2036L17	48x34	I	O	White	SV	TCN		97E00240
L2036L18	22x19	I	O	Brown-Colorless	SV	TCN		97E00241
L2036L22	14x12	I	TL	White	SV	TCN		97E00245
L2036L24	10x6	I	TL	White	SV	TCN		97E00247
L2036L25	24x13	I	TL	White	SV	TCN		97E00248
L2036L26	12x8	I	TL	White	SV	TCN		97E00249
L2036L28	12x10	I	T	Colorless-Brown	V	TCN		97E00251
L2036M2	16x14	I	T	Colorless	V	TCN		97E00253
L2036M5	26x21	I	O	White	SV	TCN		97E00256
L2036M6	22x20	I	O	White	SV	TCN		97E00257
L2036M7	7	I	O	Black	D	TCN?		97E00258
L2036M8	14x10	I	O	Black	D	TCN		97E00259
L2036M11	30	I	O	White	SV	TCN		97E00262
L2036M16	22x14	I	T	Colorless	SV	TCN		97E00267
L2036M17	29x24	I	T	Colorless	V	TCN		97E00268
L2036M18	44x19	I	T	Colorless	V	TCN		97E00269
L2036M24	6	S	O	Brown-Red	SV	TCN		97E00275
L2036N7	22x19	I	TL	White	SV	TCN?		97E00287
L2036N22	16x14	I	TL	Colorless	V	TCN?		97E00302
L2036N24	16x14	I	TL	White	SV	TCN		97E00304
L2036N25	16x7	I	O	Black	P	TCN		97E00305
L2036N30	10x9	I	TL	Brown-Black	V	TCN		97E00310
L2036N31	33x26	I	TL	White	SV	TCN?		97E00311
L2036N32	35x24	I	TL	White	SV	TCN?		97E00312
L2036N35	28x13	I	TL	Brown-White	SV	TCN?		97E00315
L2036O1	4	I	O	Black	D	TCN	Cluster 5, Related to L2036 O2	97E00318
L2036O2	7x5	I	O	Black	D	TCN	Cluster 5, Related to L2036 O1	97E00319

Introduction

L2021F23



97E00430

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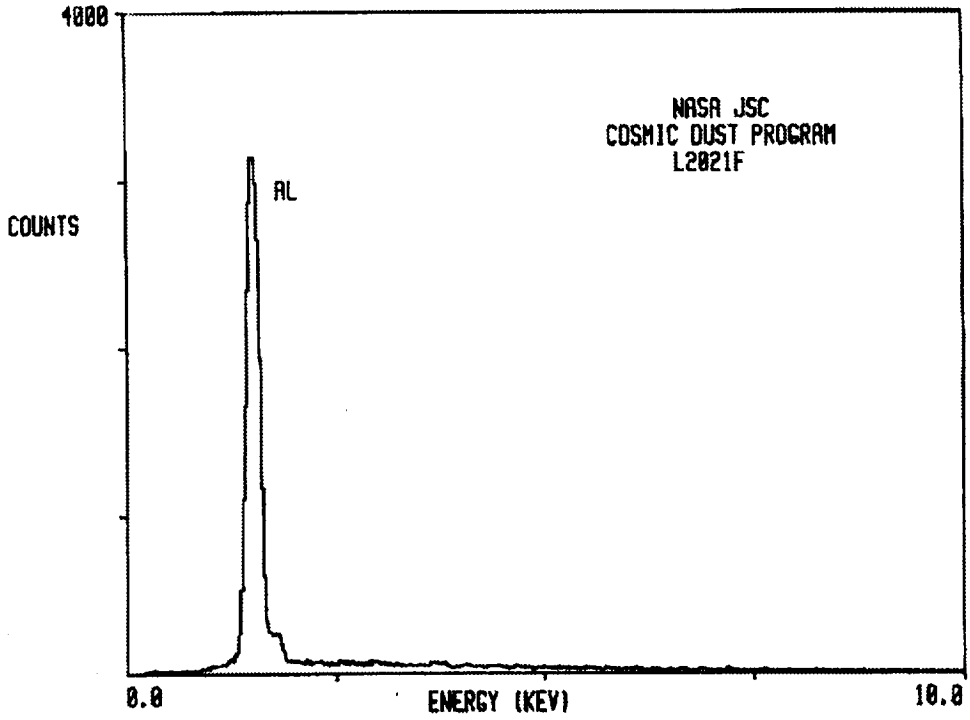
Comments:



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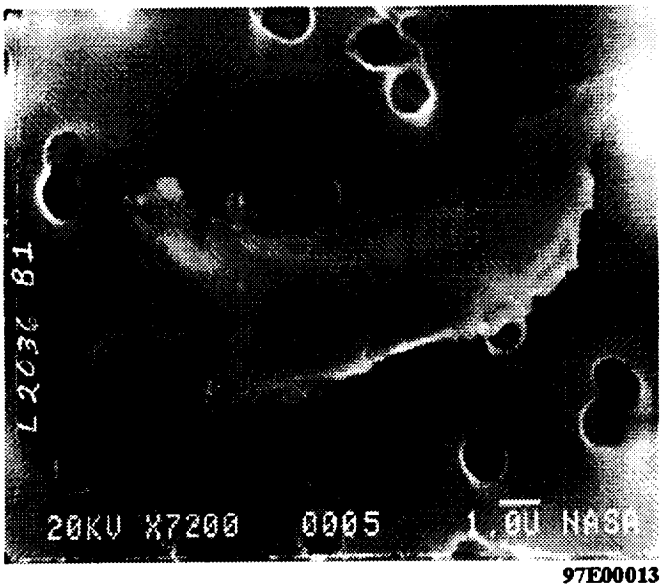

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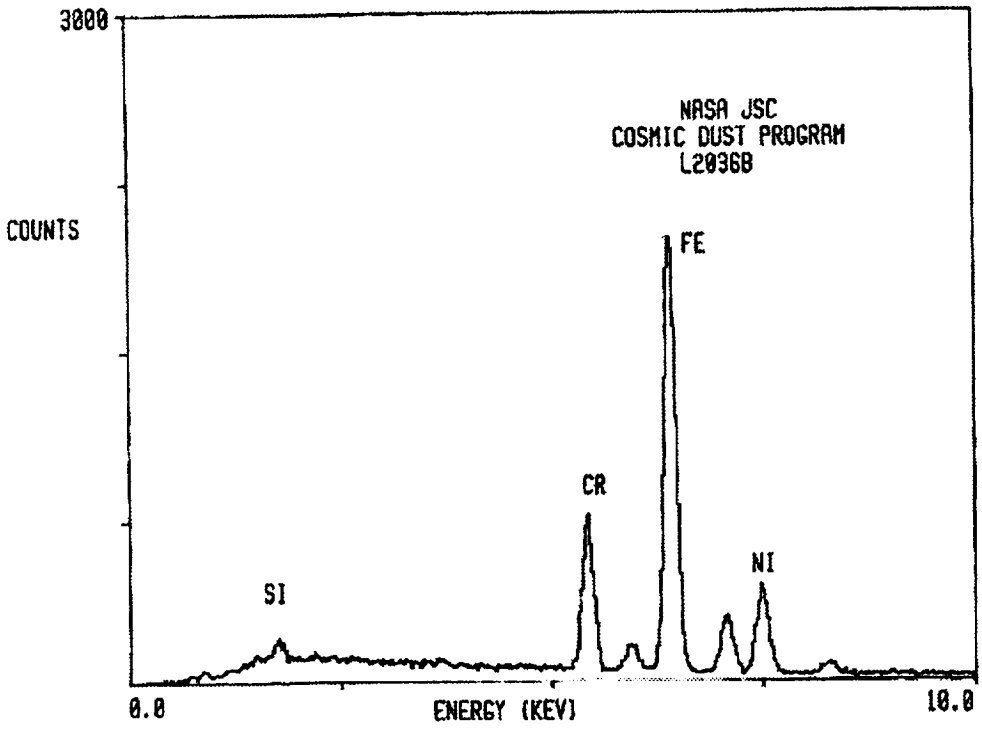

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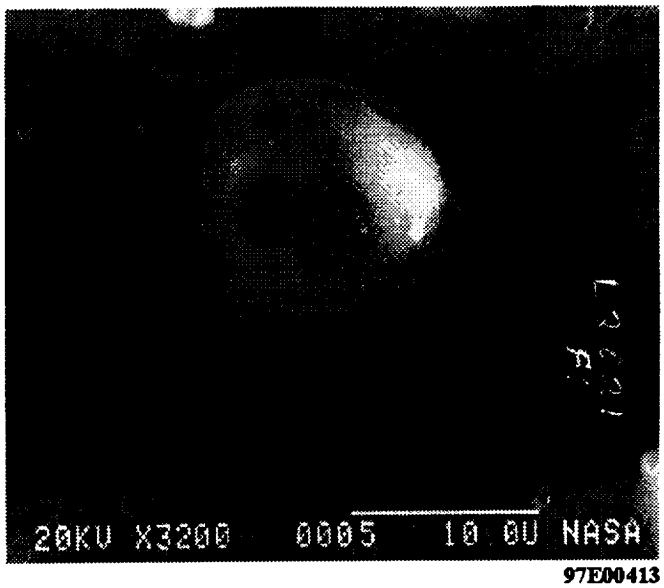

97E00413

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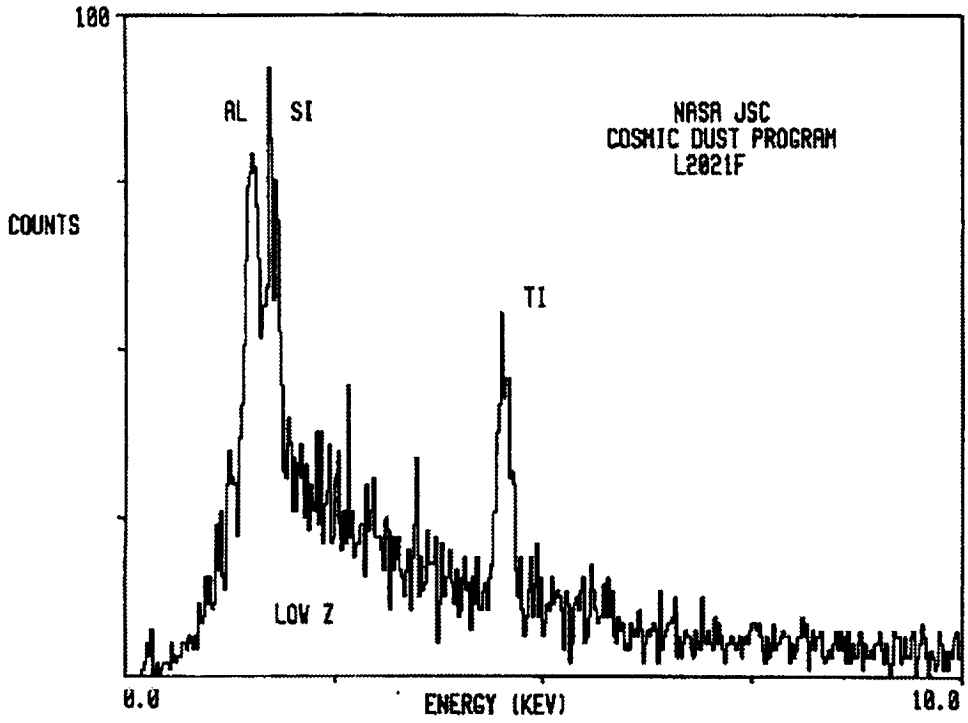
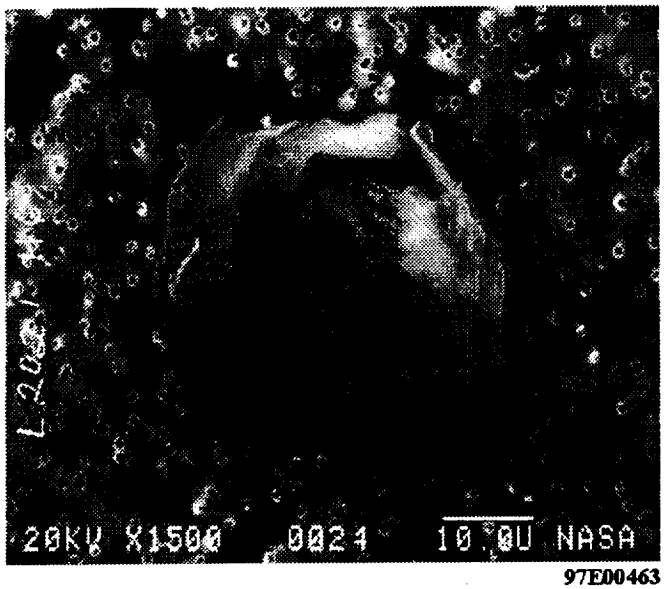


L2021H6



97E00463

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Luster: SV
Type: TCN
Comments: