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COSMIC DUST CATALOG

(PARTICLES FROM COLLECTION FLAG W7029)

COMPILED BY

COSMIC DUST PRELIMINARY EXAMINATION TEAM (CDPET)

JUNE 1982

Volume 2
Number 2

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(Particles from Collection Flag W7029)

Compiled By

Cosmic Dust Preliminary Examination Team (CDPET)*

NASA Johnson Space Center
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April 1982

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Note: Pages iii-xii missing from original.

5. ANALYSES OF REFERENCE MATERIALS

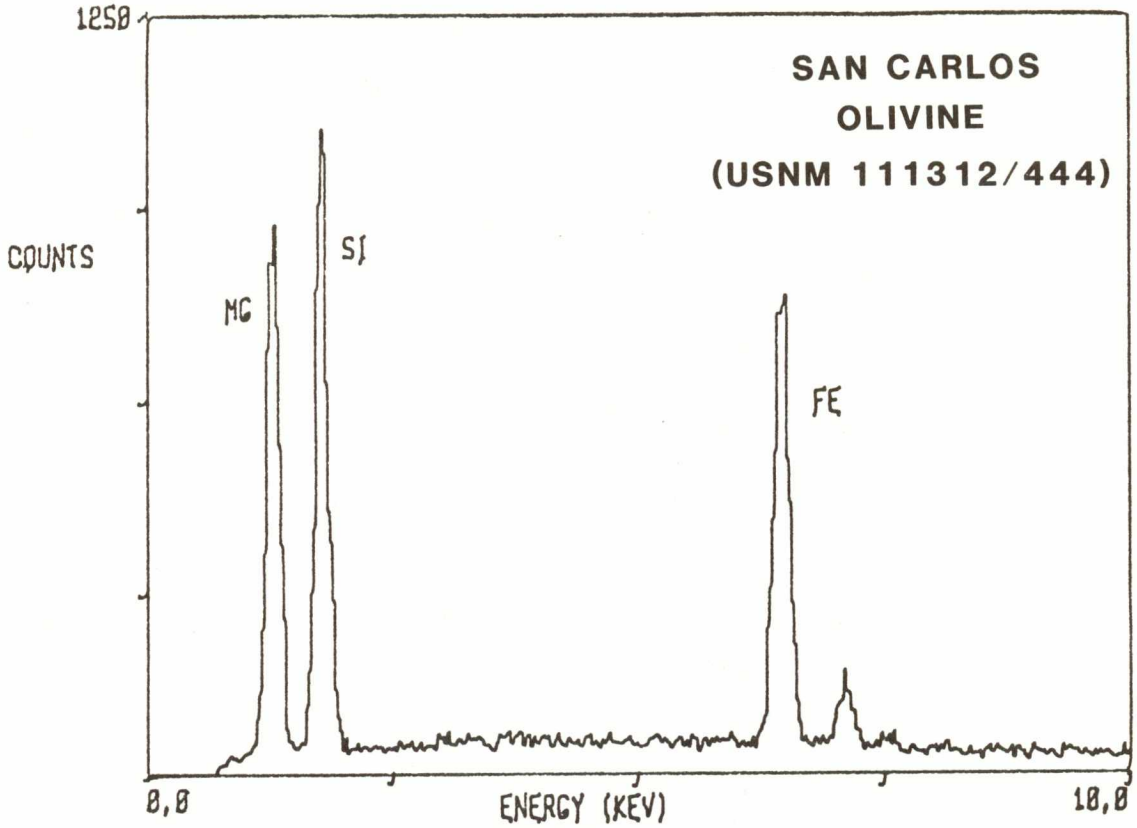
The usefulness of the SEM images and EDS spectra provided for particles in this catalog is enhanced by comparison with similar data products obtained for comparably sized particles of known composition. Accordingly, the next several pages summarize data acquired by SEM examination of reference particles under the same conditions used in the preliminary examination of particles from the stratospheric dust collections. Each reference particle represents material which has proven useful as a reference (which may be distinct from an analytical standard) in SEM and/or electron microprobe work at JSC or elsewhere. Included in this group are several members of the excellent series of microprobe standards prepared by Eugene Jarosewich (Smithsonian Institution) and identified by their USNM numbers. Other materials will be added to our reference suite in future catalogs. However, those included here provide a sampling of minerals common in meteorites (olivine, pyroxene, ilmenite) or their ablation products (magnetite). In addition, resonable analogs of stratospheric volcanic ash (rhyolite glass, sodic plagioclase) are included.

For completeness, the currently accepted bulk composition (expressed as oxide weight percent) of each reference particle is also provided. The EDS spectra included in this catalog are of quality equal to that which is routinely obtained in other state-of-the-art SEM laboratories. However, well-known geometrical and differential matrix effects prevent these raw spectra from being interpreted as quantitative analyses. Hence, we have avoided the use of peak-height ratios as diagnostic compositional indicators. Further work on comparison of reference particle spectra with sample particle spectra may later permit semi-quantitative compositional information to be inferred for the sample particles. (The Cu artifact peaks noted in the

"CATALOG FORMAT" section above also appear in some of the reference particle spectra.)

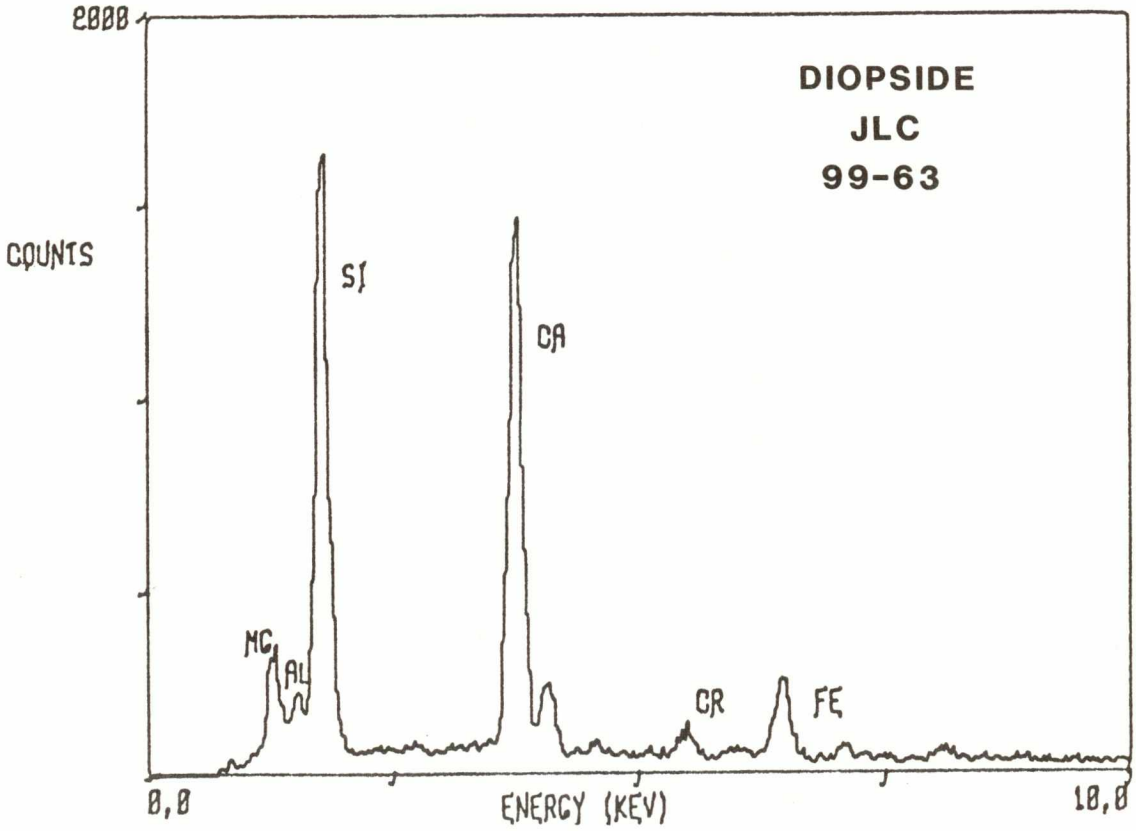
In addition to the EDS spectra of whole reference particles, a typical EDS spectrum is presented for each of three standard minerals prepared as polished grain mounts (San Carlos olivine, USNM 111312/444; diopside JLC-99-63; Kakanui hornblende, USNM 143965). Analyses of these optically flat surfaces 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.

Note: Pages xv-xxii missing from original.



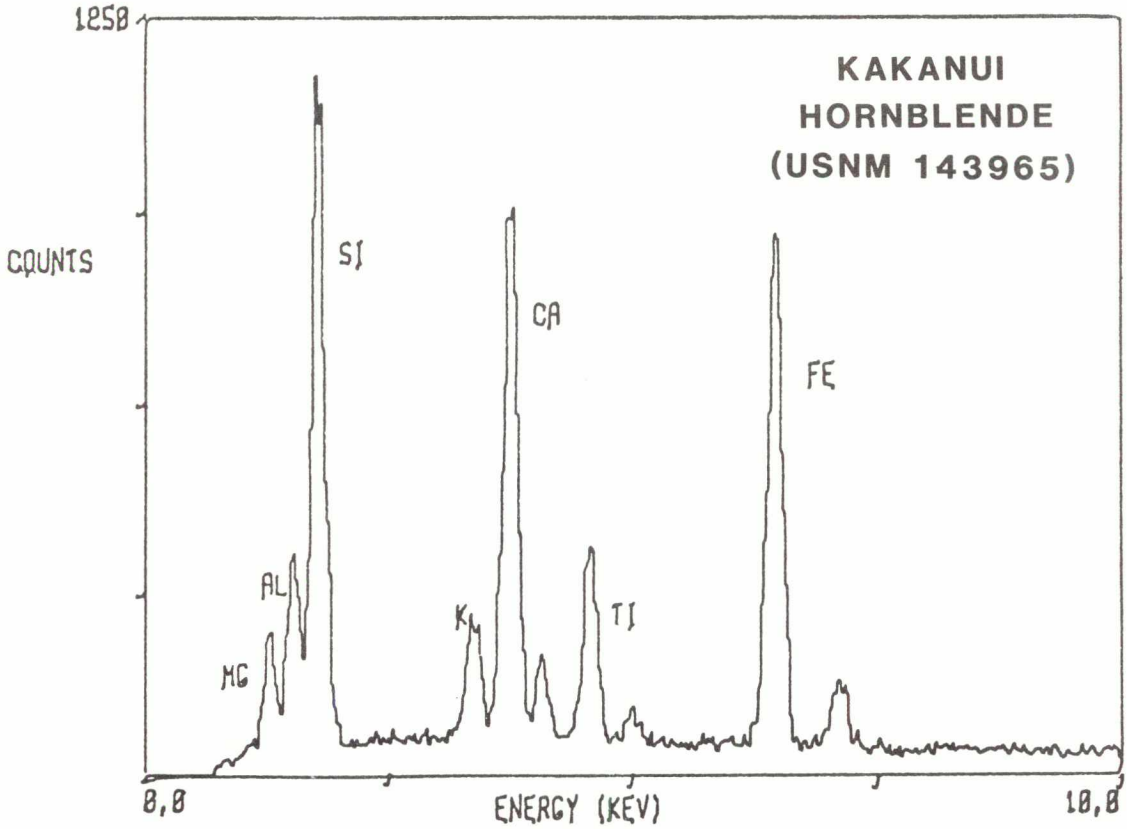
WEIGHT %

SiO_2	TiO_2	Al_2O_3	Cr_2O_3	Fe_2O_3	FeO	NiO	MnO	MgO	CaO	Na_2O	K_2O	H_2O	TOTAL
40.81	-	-	-	-	9.55	0.37	0.14	49.42	<0.05	-	-	-	100.29



WEIGHT %

SiO_2	TiO_2	Al_2O_3	Cr_2O_3	Fe_2O_3	FeO	NiO	MnO	MgO	CaO	Na_2O	K_2O	H_2O	TOTAL
51.93	0.46	6.31	0.96	1.80	2.34	0.04	0.07	16.05	18.64	1.39	-	-	99.99



WEIGHT %

SiO_2	TiO_2	Al_2O_3	Cr_2O_3	Fe_2O_3	FeO	NiO	MnO	MgO	CaO	Na_2O	K_2O	H_2O	TOTAL
40.37	4.72	14.90	-	3.30	7.95	-	0.09	12.80	10.30	2.60	2.05	0.94	100.02

6. SAMPLE REQUESTS

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

Curator/Cosmic Dust
Code SN2
NASA/Johnson Space Center
Houston, Texas 77058
U.S.A.

Telephone: (713) 483-3274

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. 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, Planetary Materials
Code EL-4
NASA Headquarters
Washington, D.C. 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.

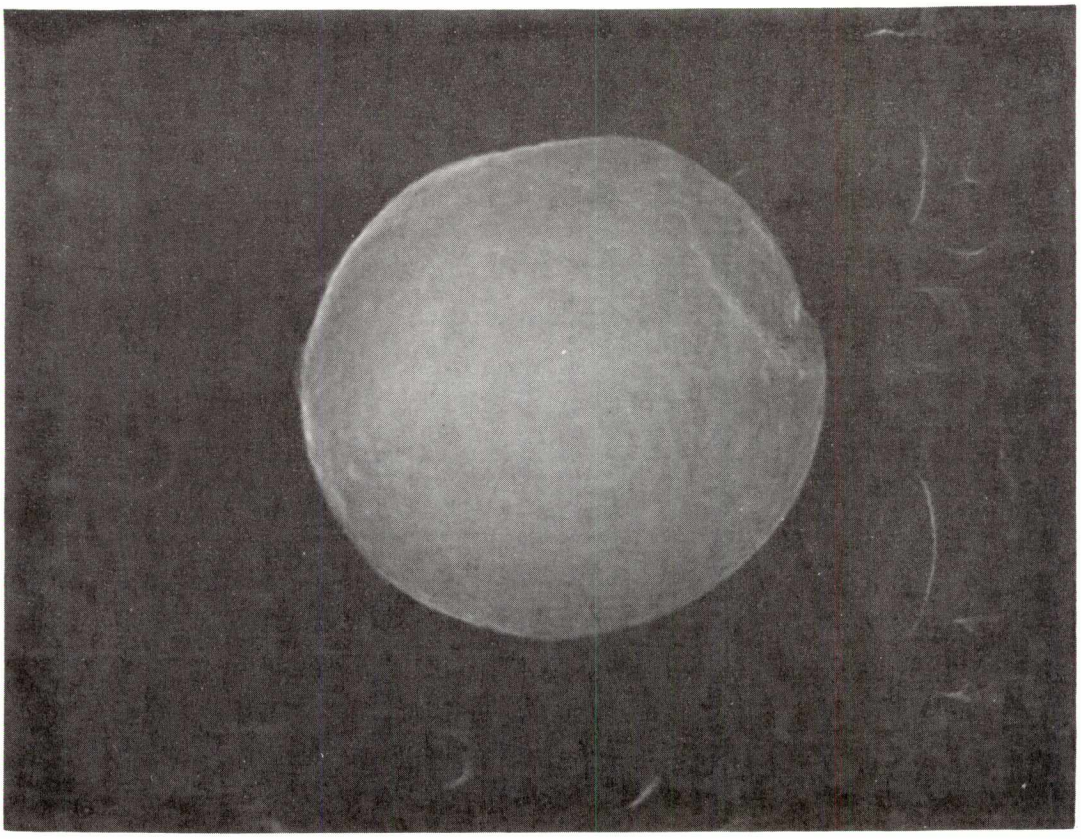
It should be noted that particles labelled W7029C have already been allocated for research and, thus, are not available from the inventory summarized in this catalog. Again, preliminary examination data for this allocated mount are included for completeness.

7. ACKNOWLEDGEMENTS

Dr. Donald E. Brownlee (University of Washington, Seattle) generously provided information, advice, and material cooperation which contributed greatly to the successful start of the JSC Cosmic Dust Program. Dr. Robert M. Walker and Dr. Philip B. Fraundorf (Washington University, St. Louis) provided informative discussions on particle identification problems. Eugene Jarosewich (Smithsonian Institution, Washington, D.C.) kindly provided several mineral standards.

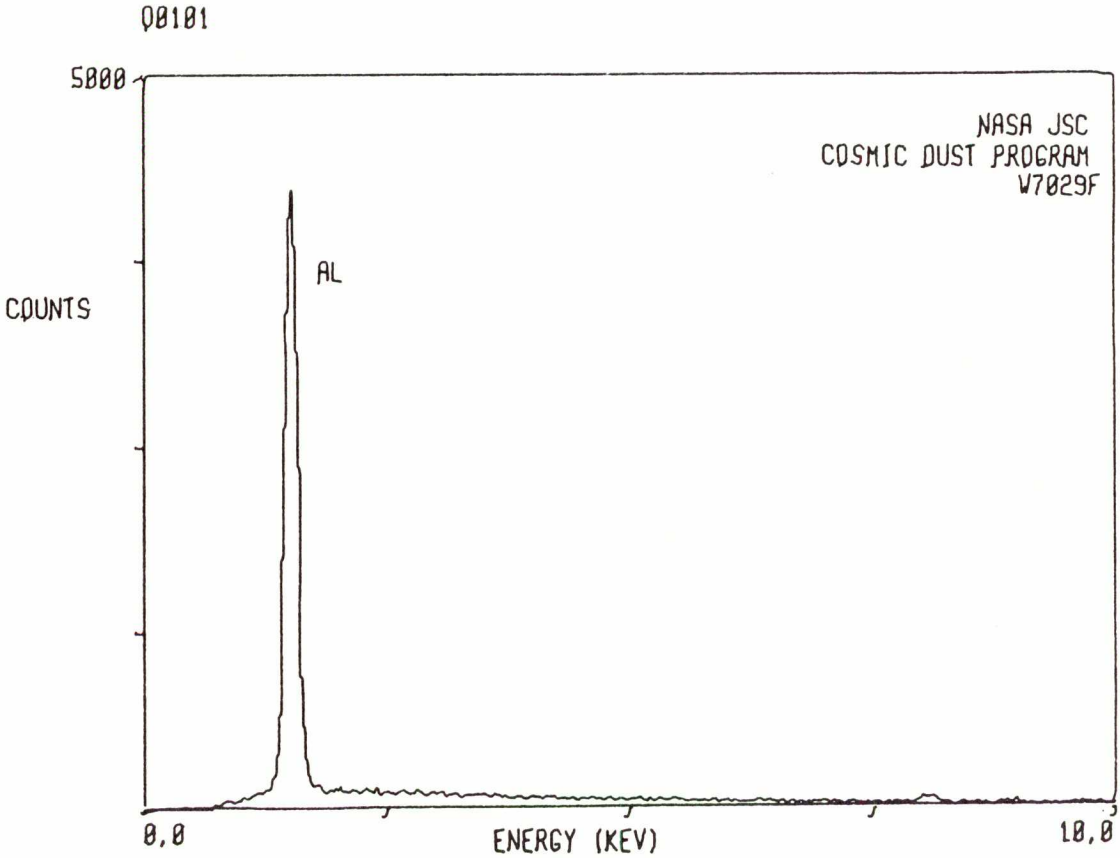
MOUNT W7029F

W7029F1

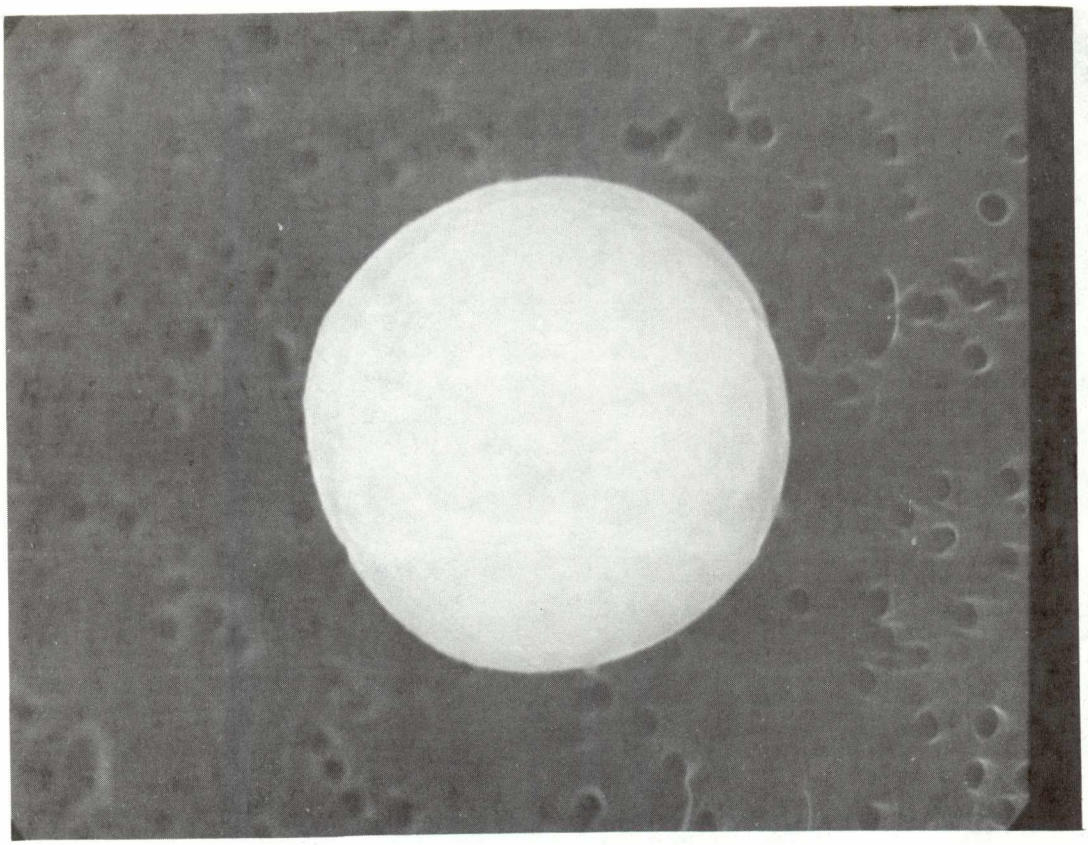


S-82-29593

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
2	S	T	CL/Pale Yellow	V	AOS	

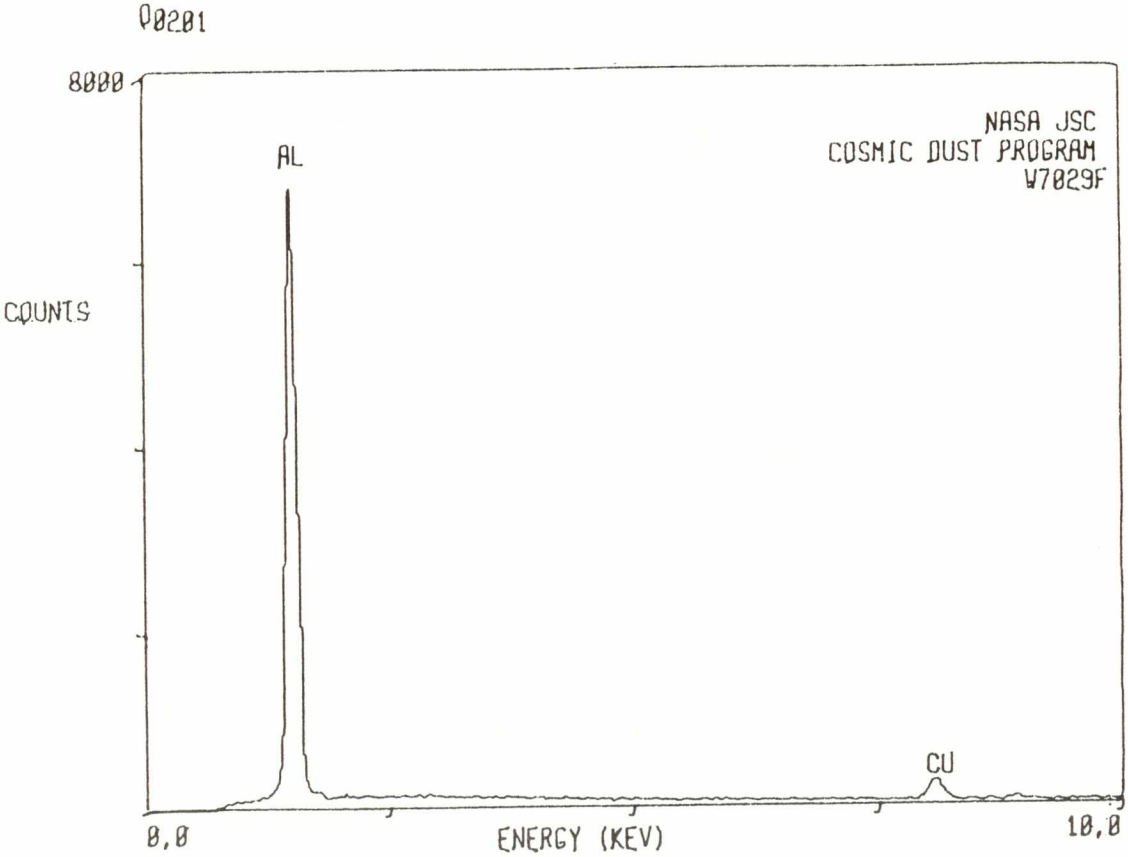


W7029F2

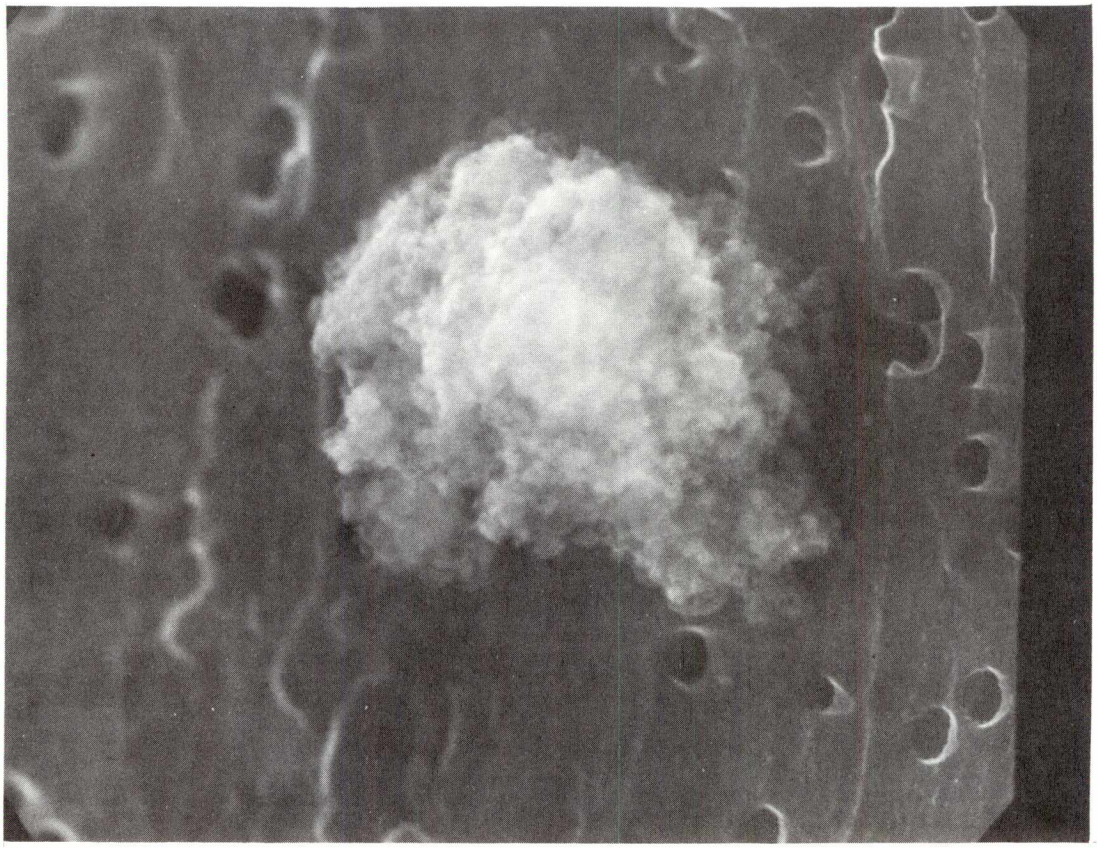


S-82-29594

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
[illegible]	S	T	CL/Pale Yellow	V	AOS	

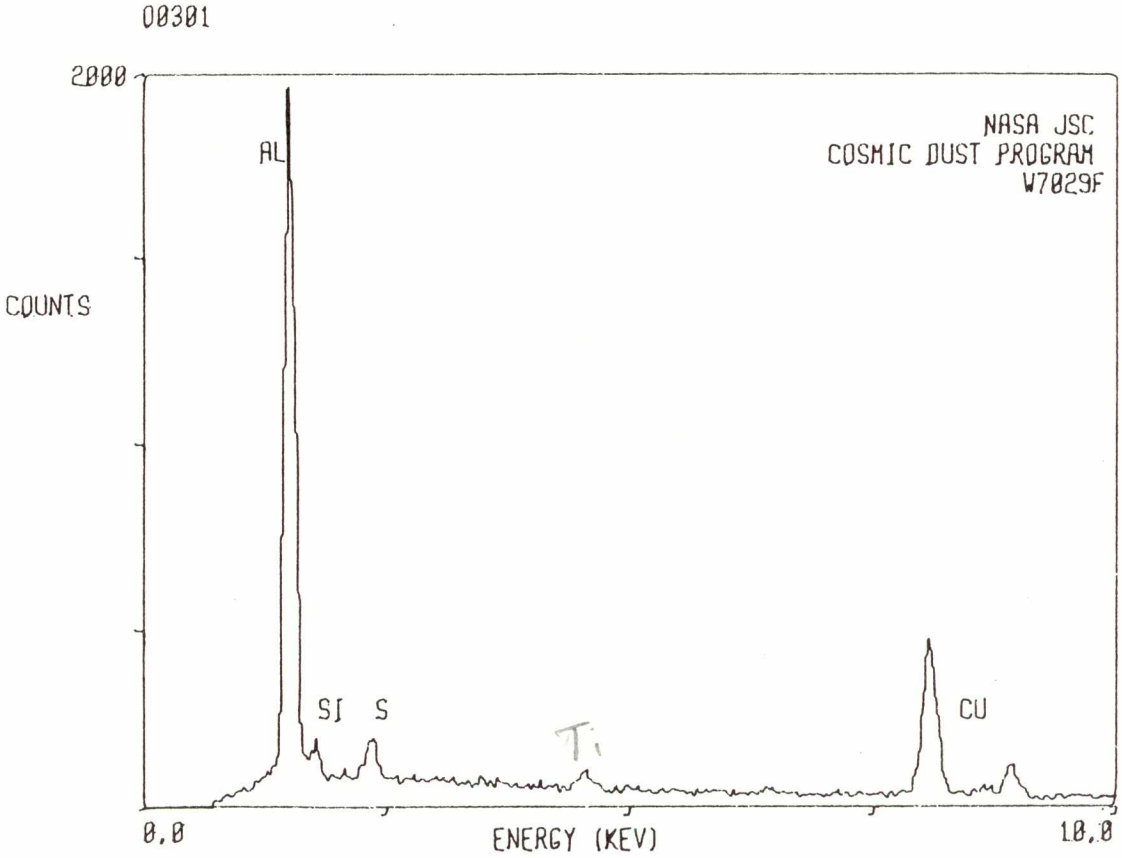


W7029F3

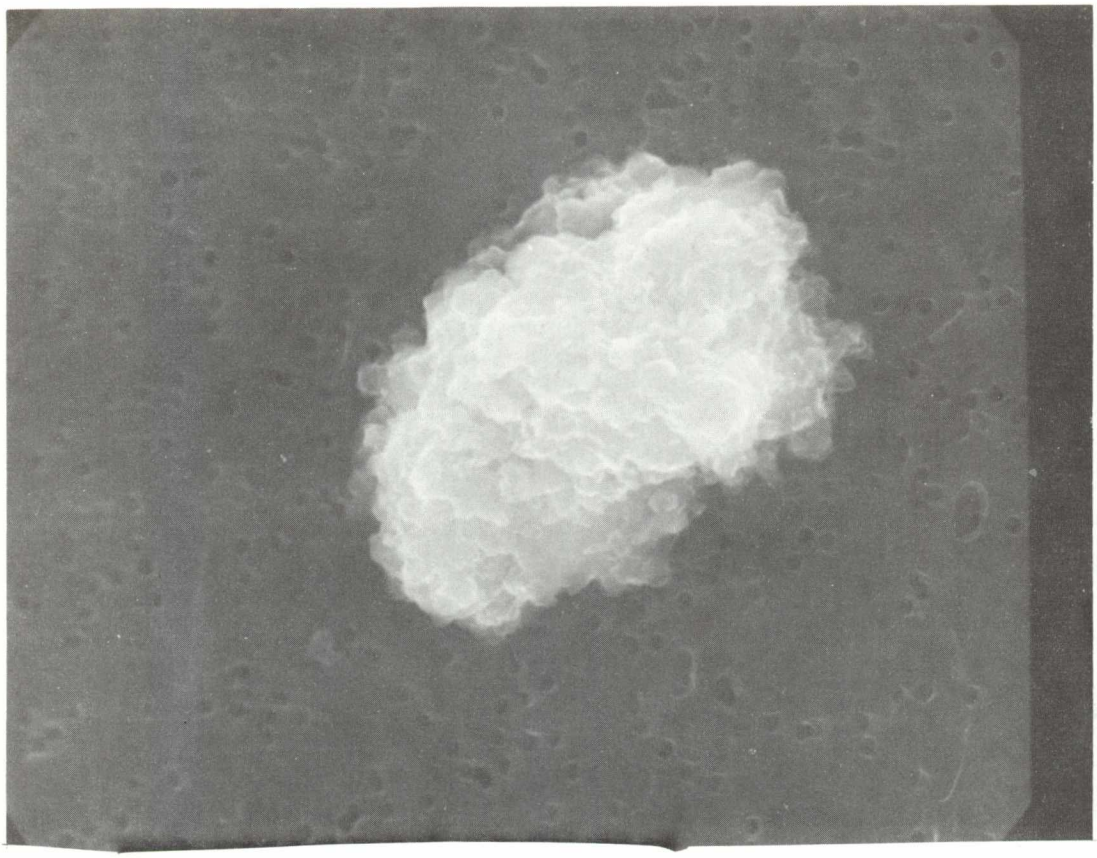


S-82-29595

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
3	E/I	TL	Pale Yellow	V	?	Related to AOS?

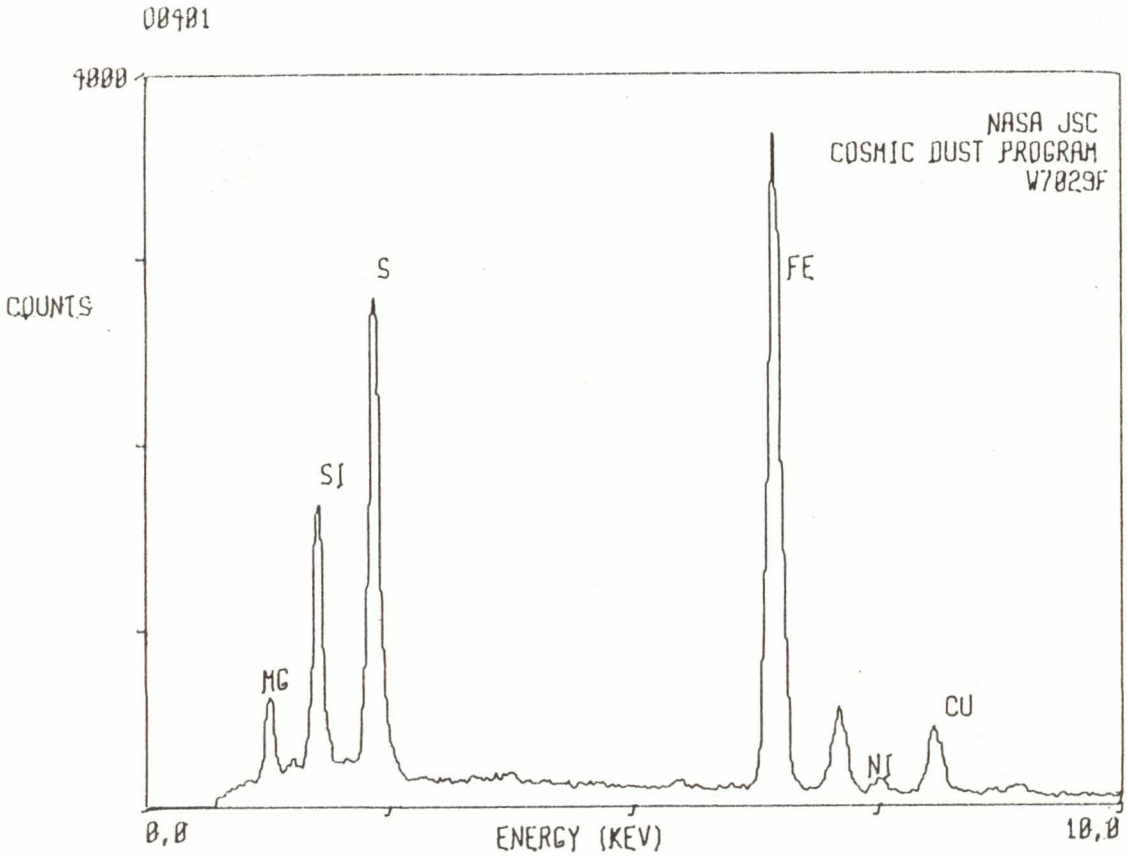


W7029F4

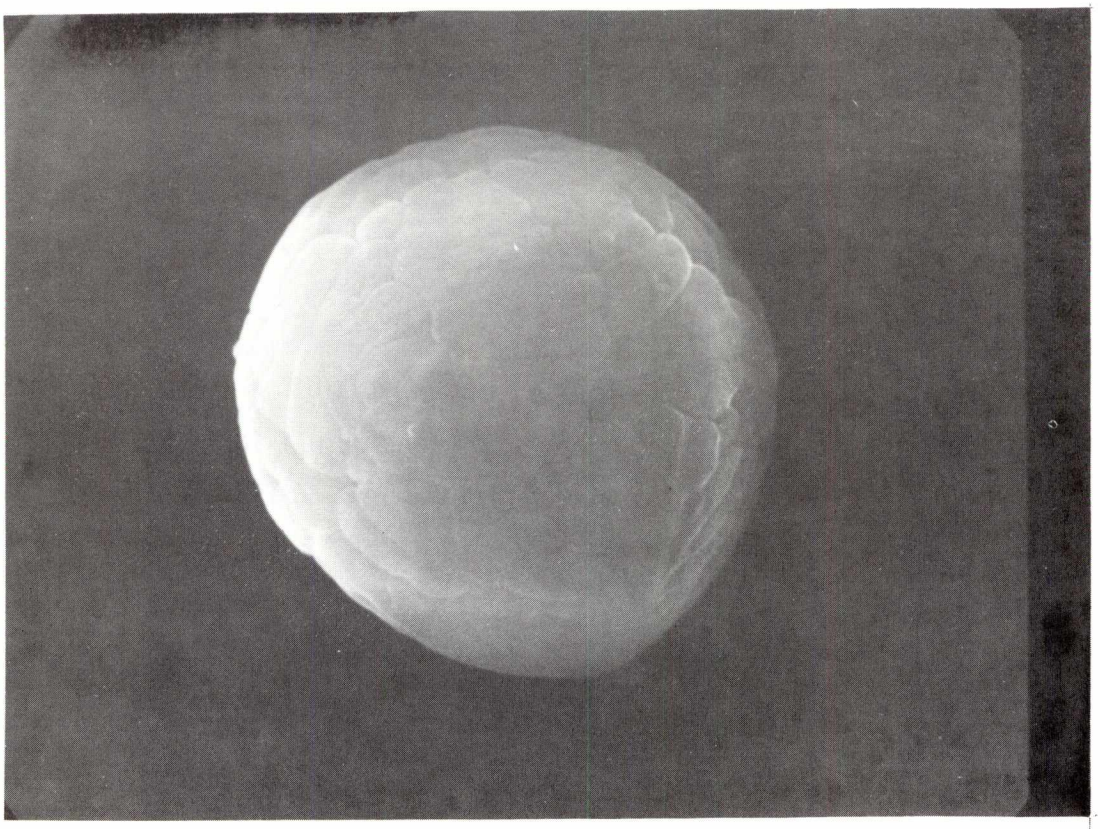


S-82-29596

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
6x10	I	O	Dk. Brown to Black with Reddish Tinge	SV/SM	C	

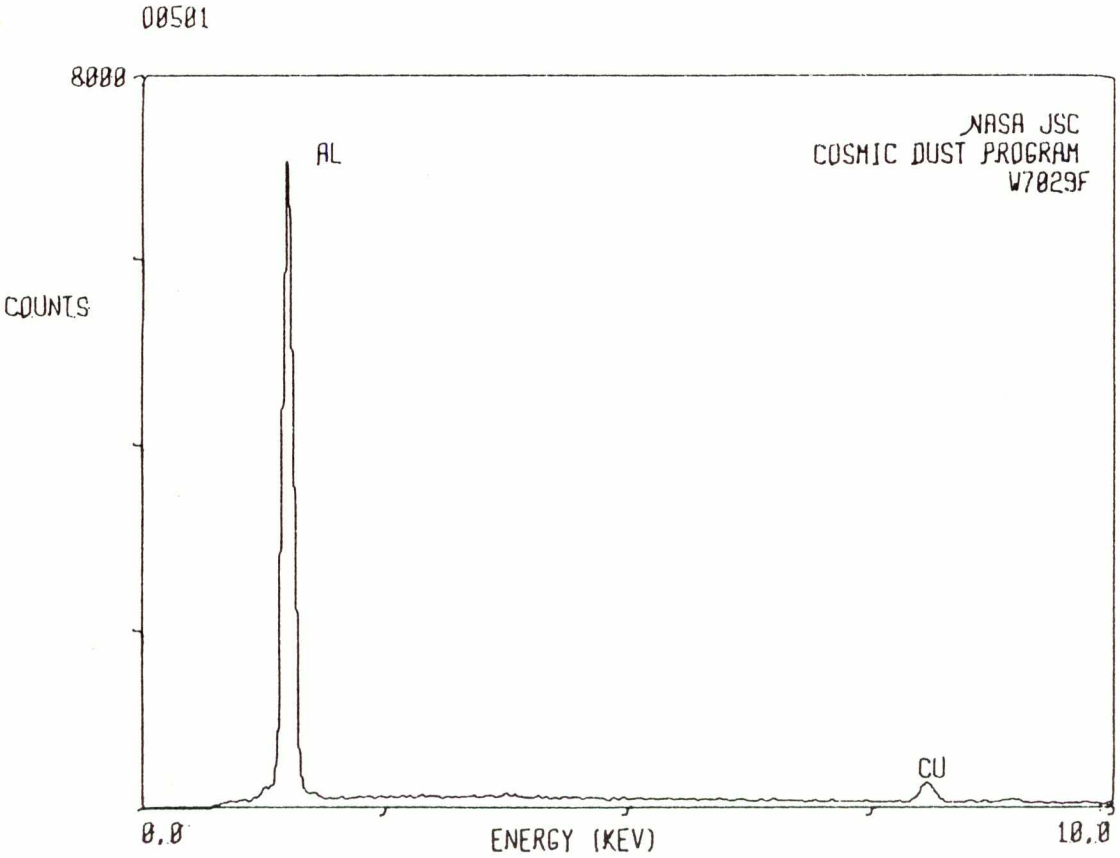


W7029F5

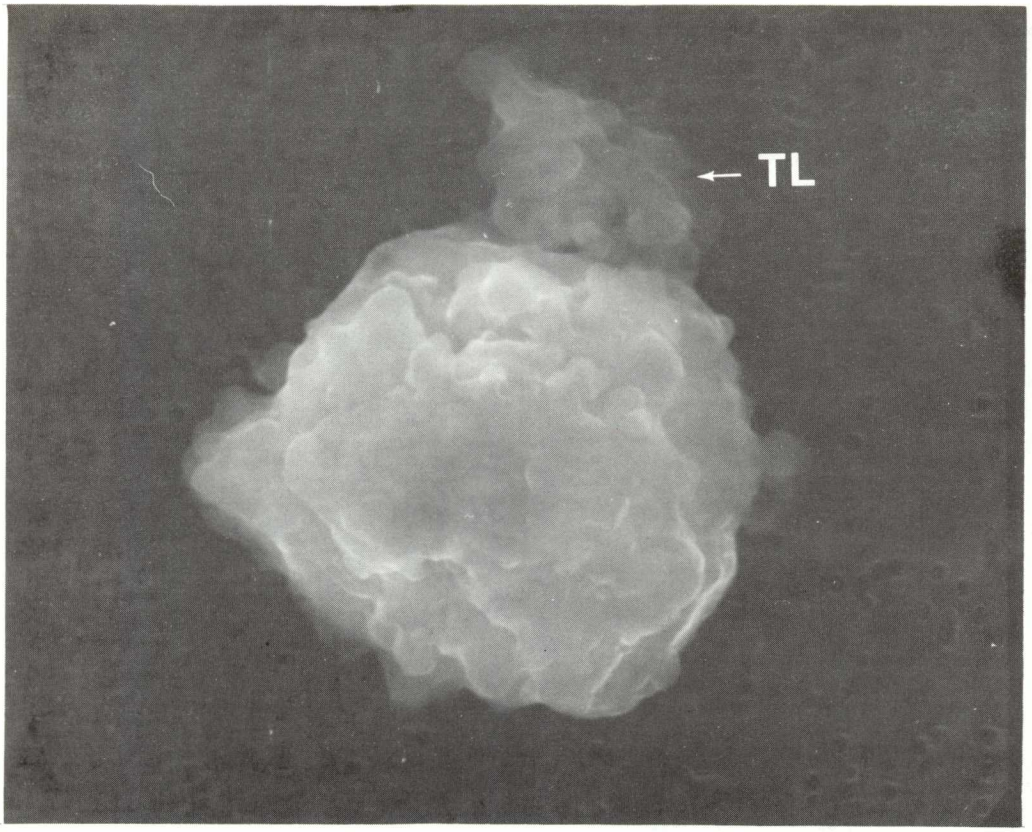


S-82-29597

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
13	S	TL	Pale Yellow-Gray	V	AOS	

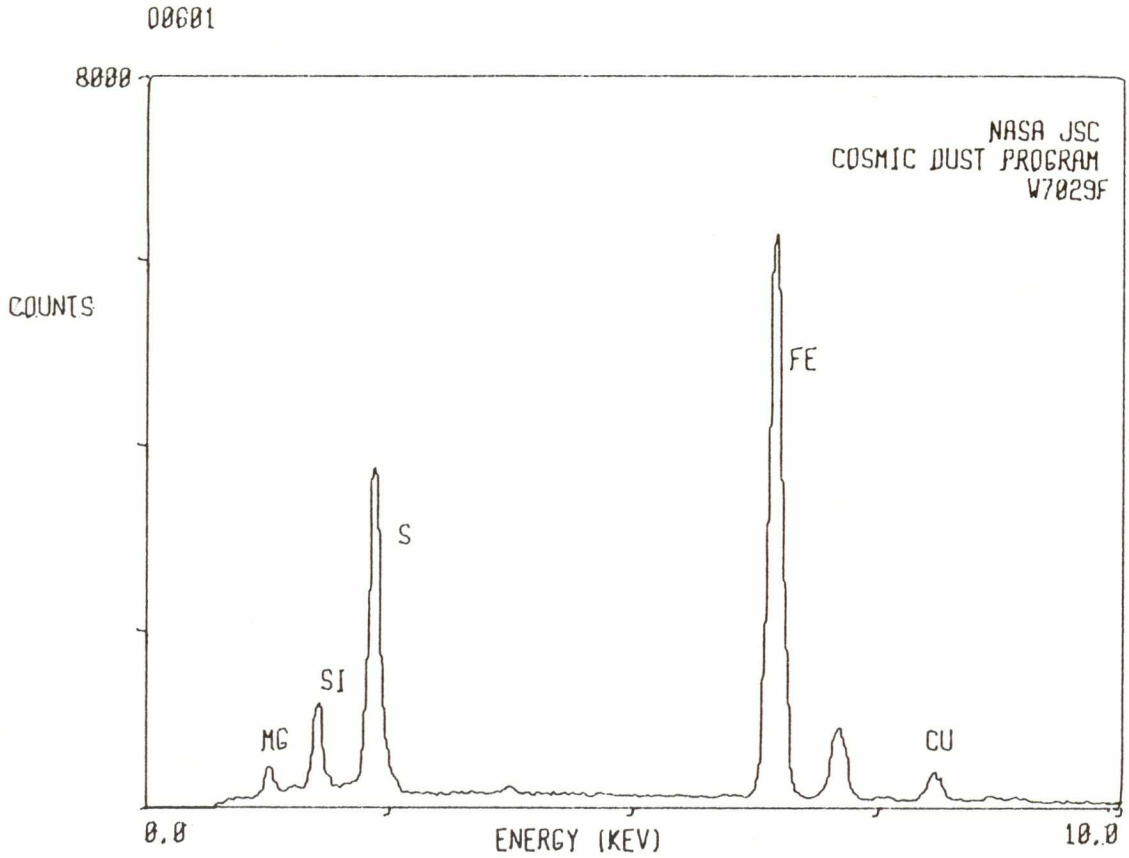


W7029F6

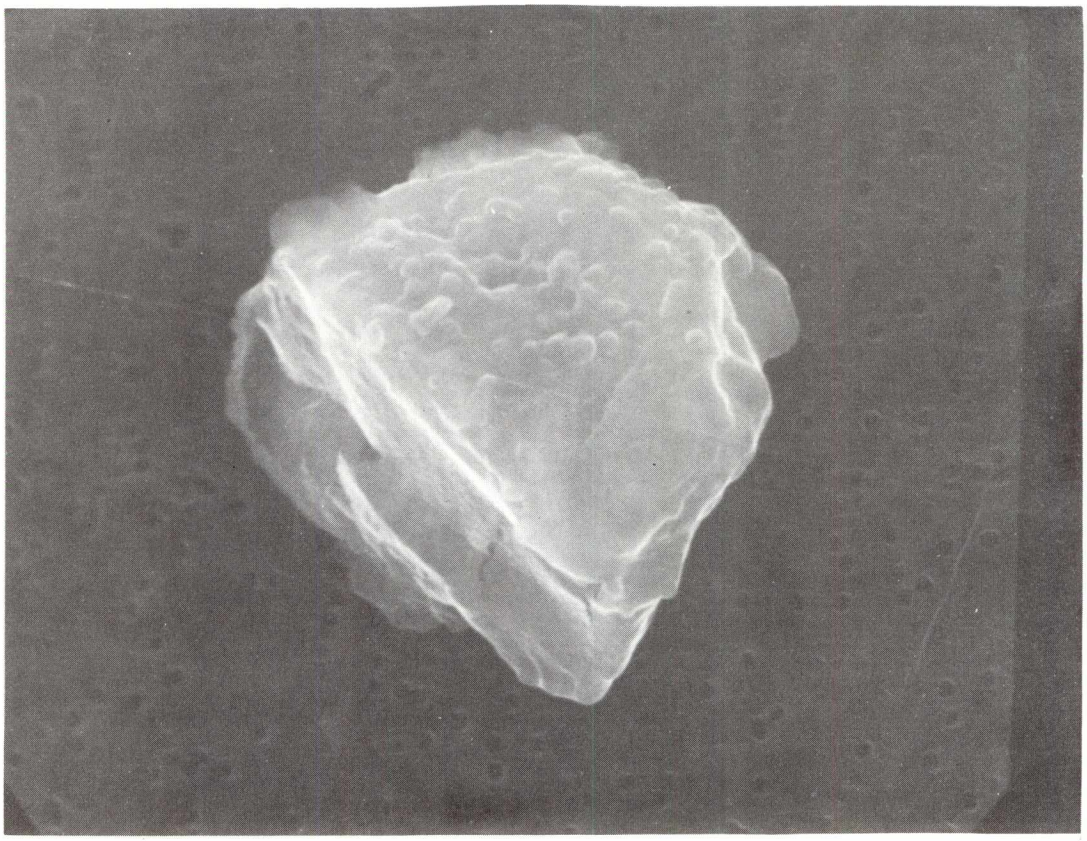


S-82-29598

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
10x11	I	O	Dk. Gray to Black	D/SM	C?	TL area marked by arrow

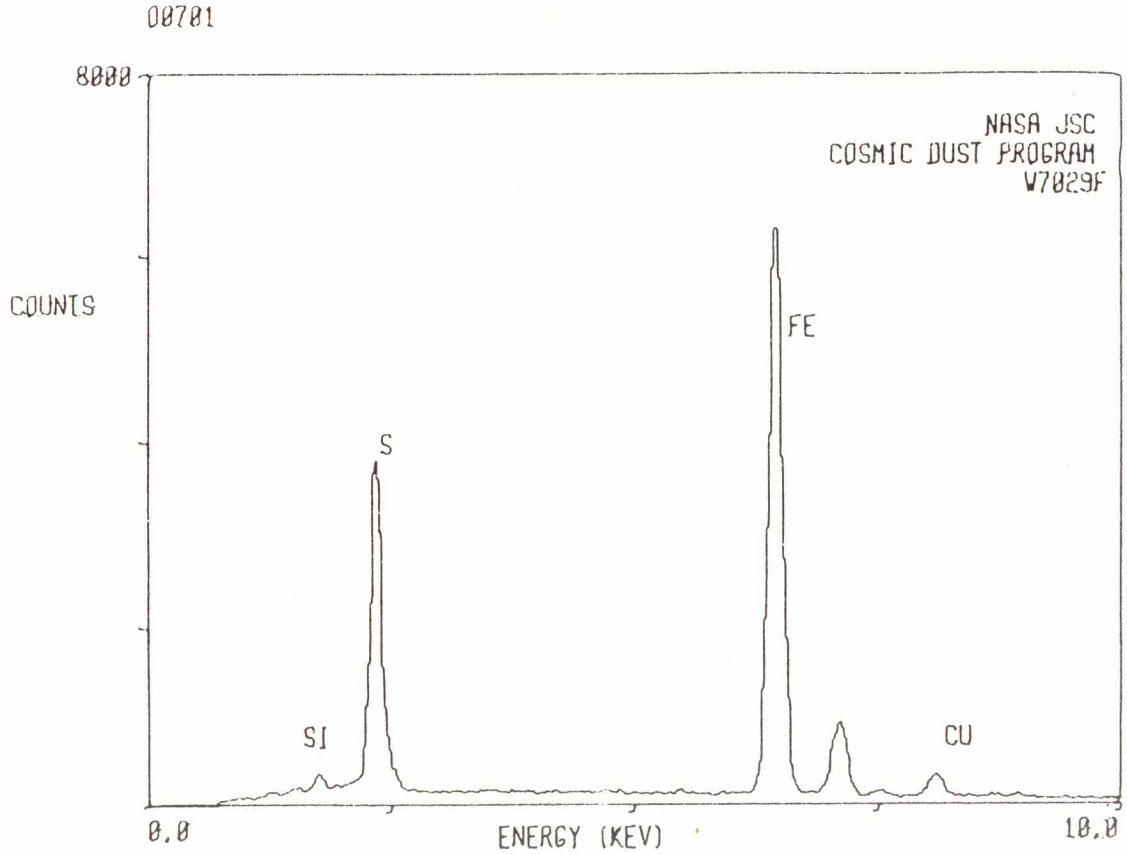


W7029F7

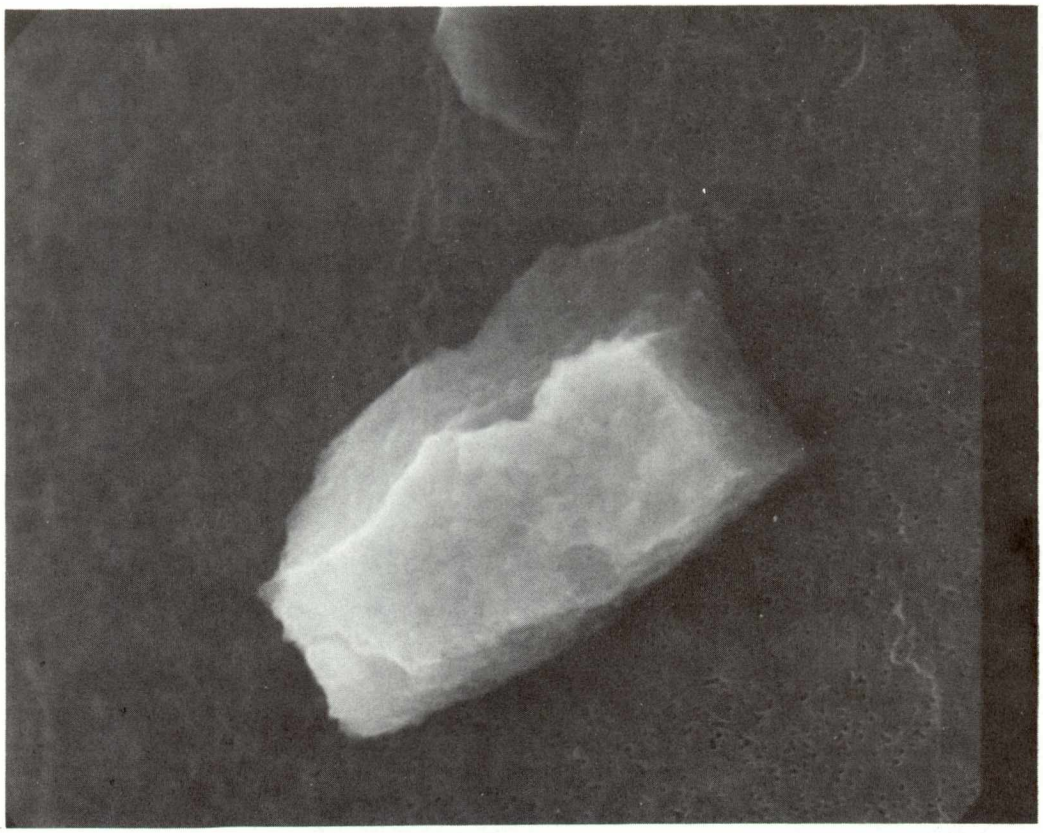


S-82-29599

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
10x11	I	O	Black	SM	C	

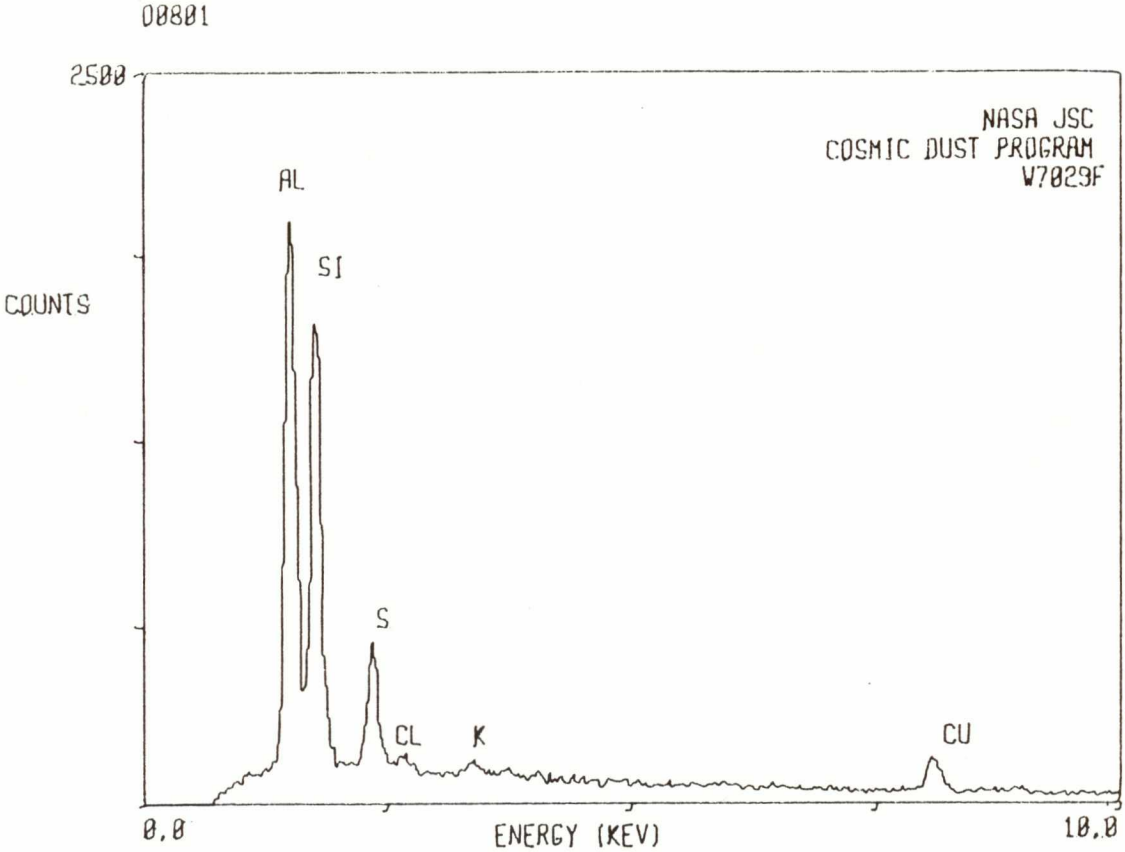


W7029F8

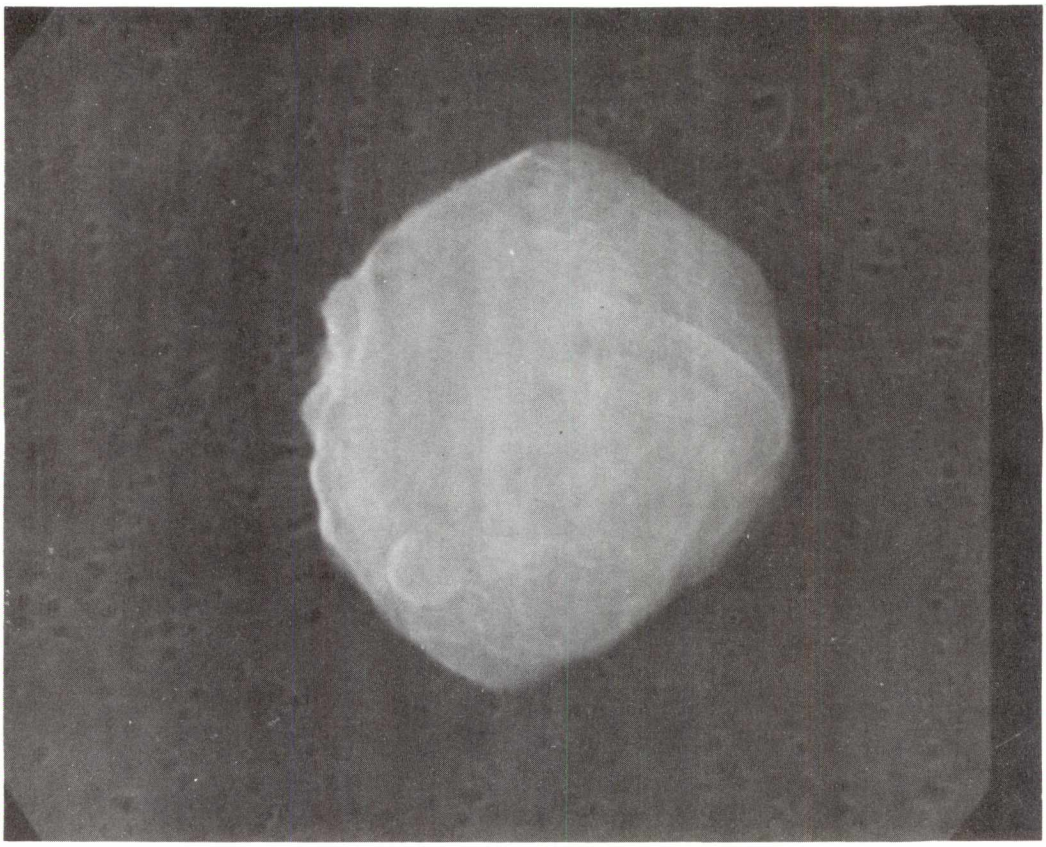


S-82-29600

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
16x27	I	TL	Pale Yellow-Gray	SV	?	

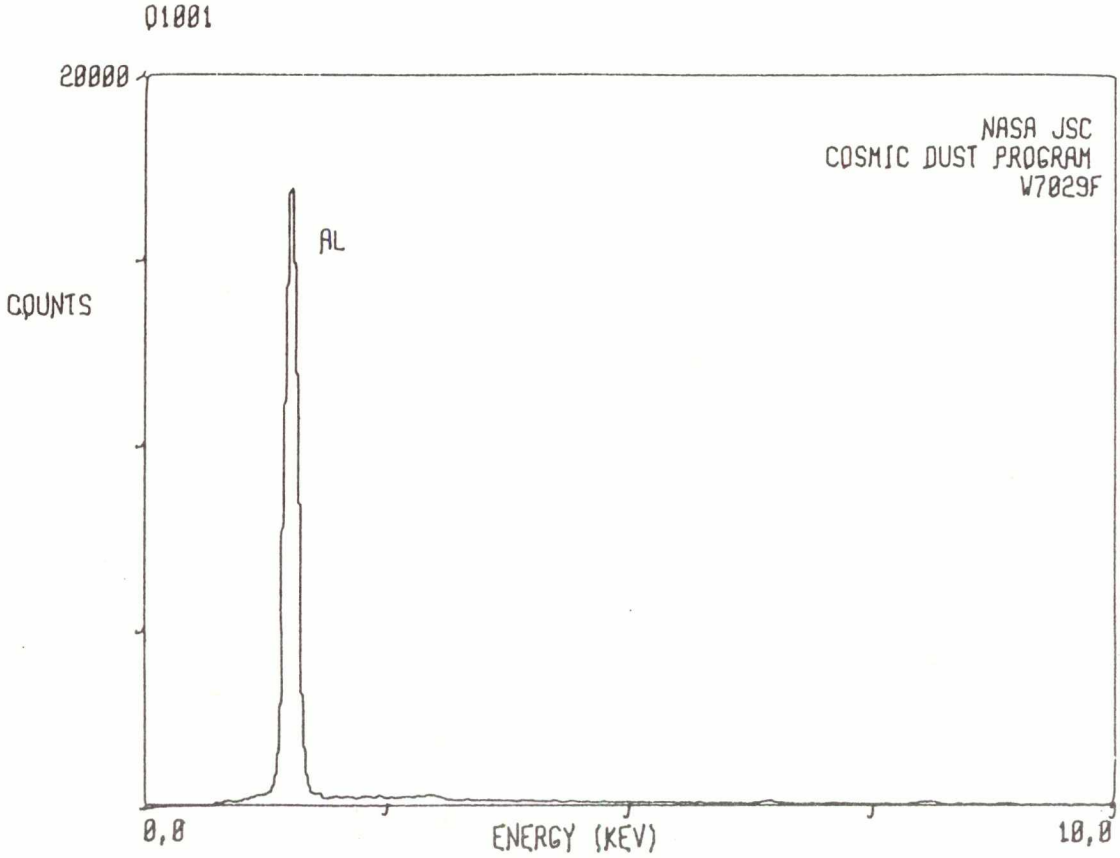


W7029F10

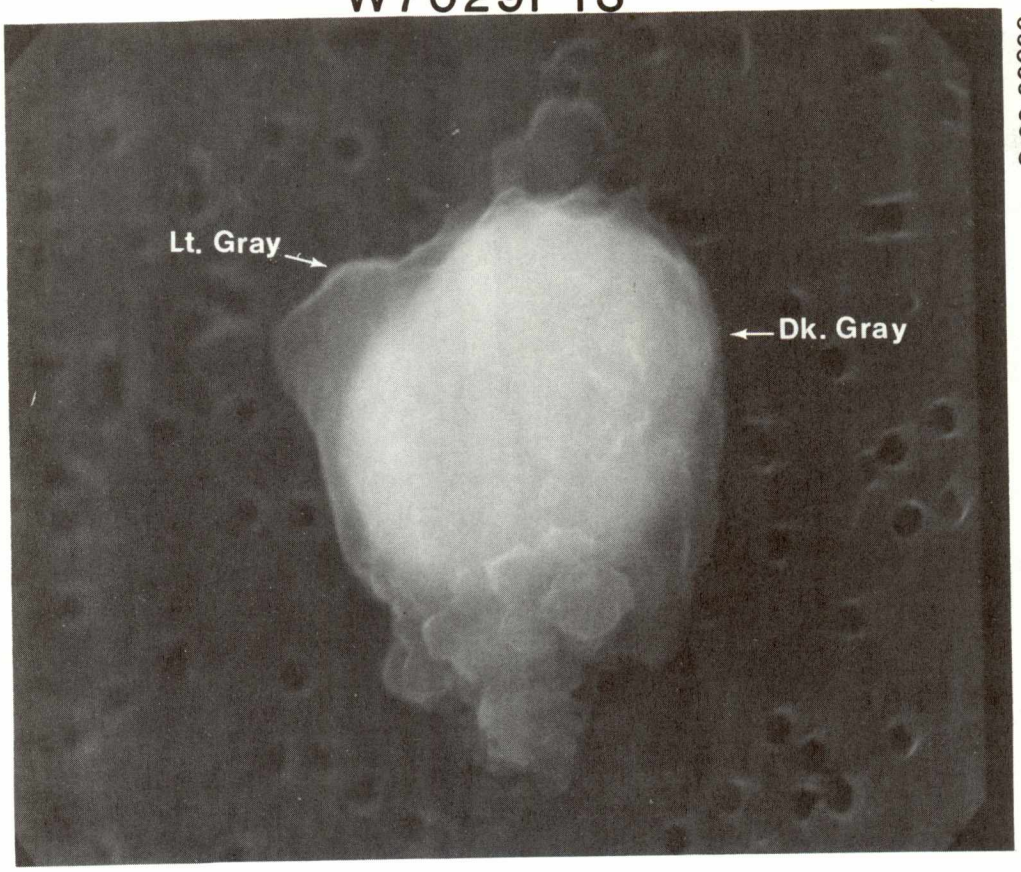


S-82-29601

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
9x10	E/S	O	Steel Gray to Black	M	TCA?	

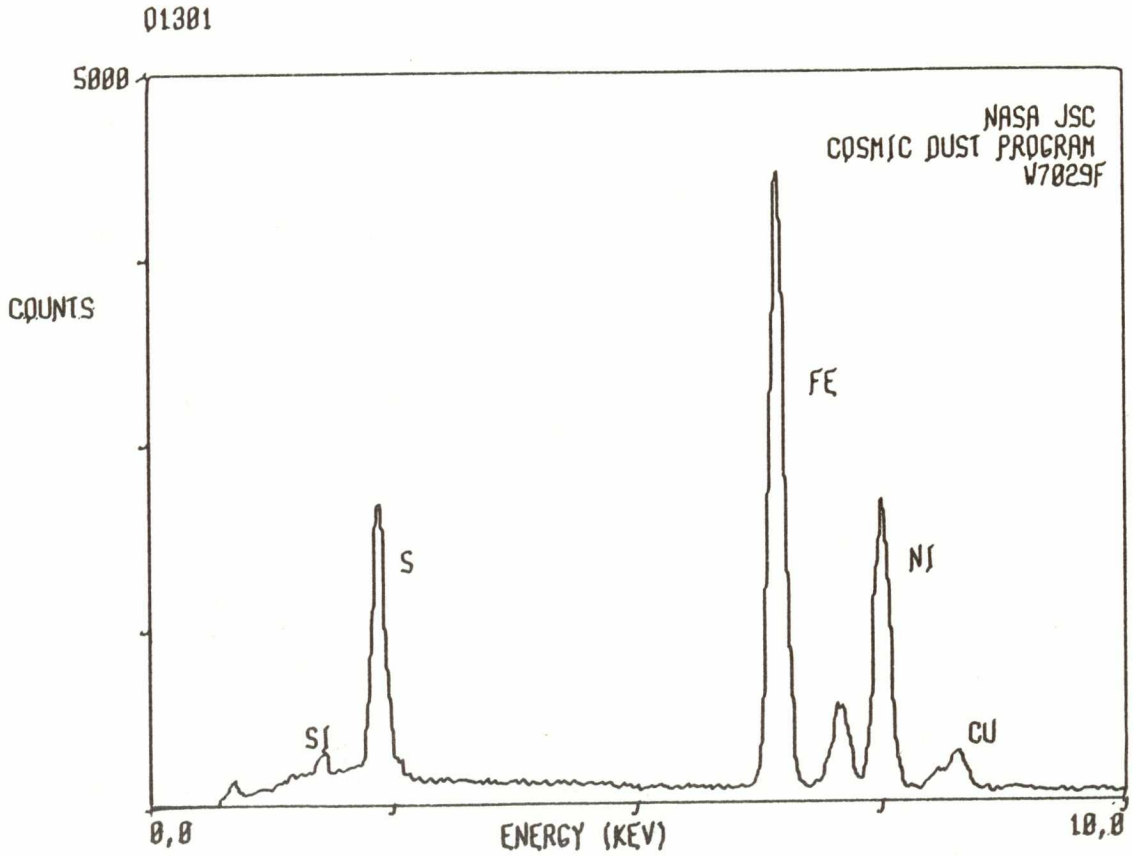


W7029F13

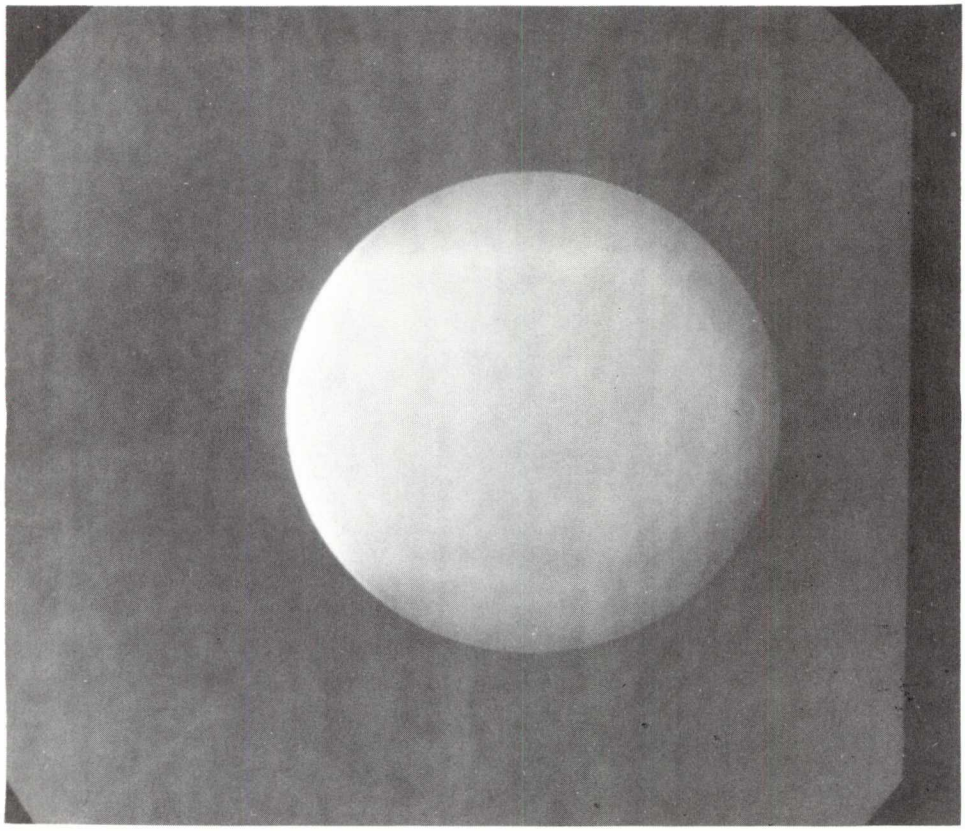


S-82-29602

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
5x6	E/S	TL	Gray	SV	C	

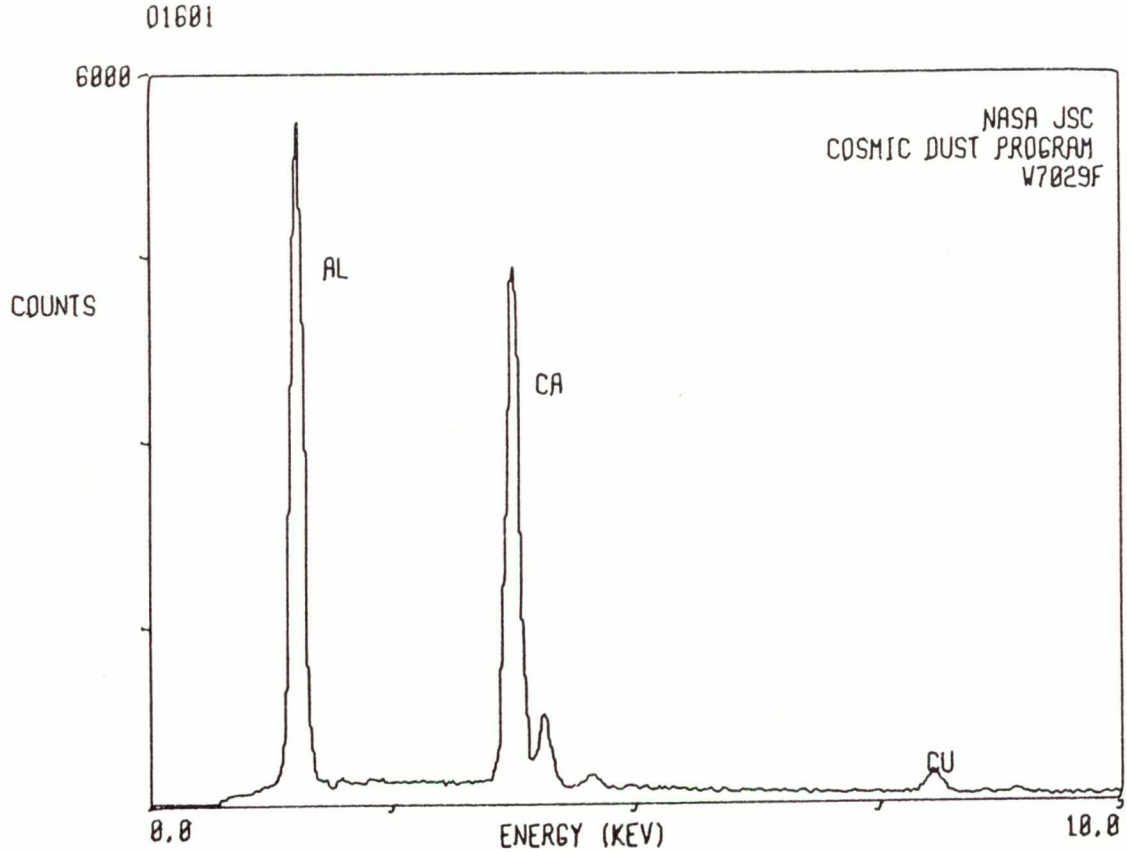


W7029F16

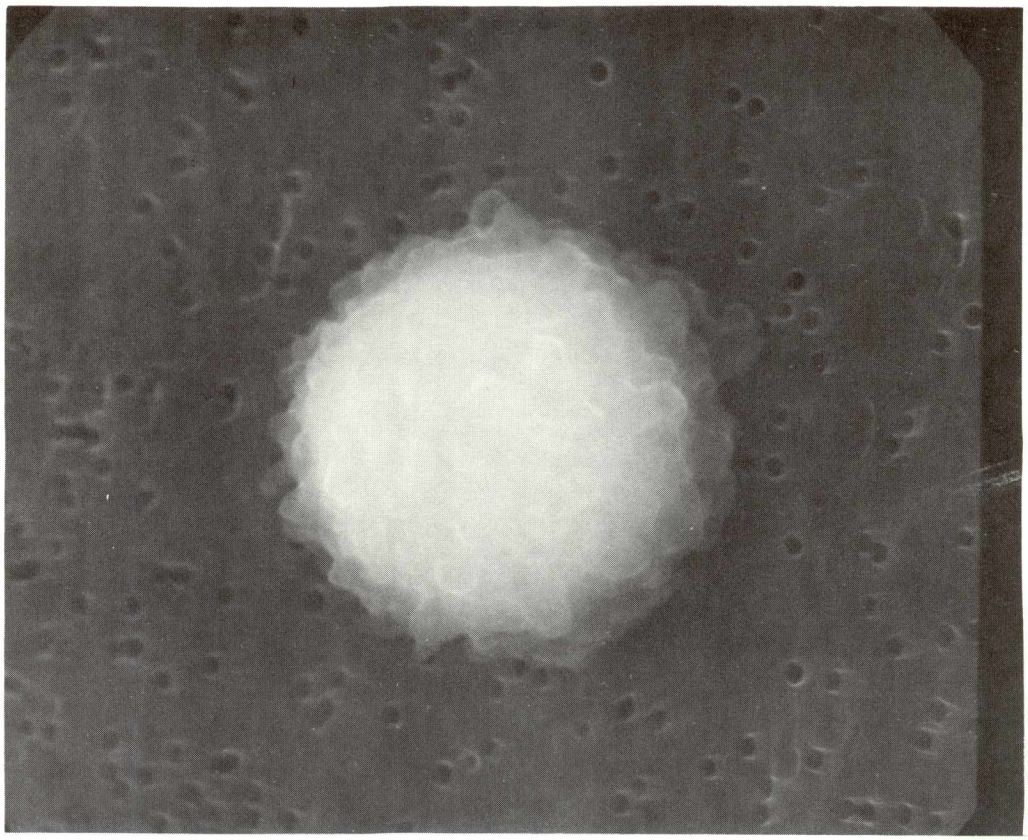


S-82-30461

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
12	S	T	CL/Pale Yellow		?	

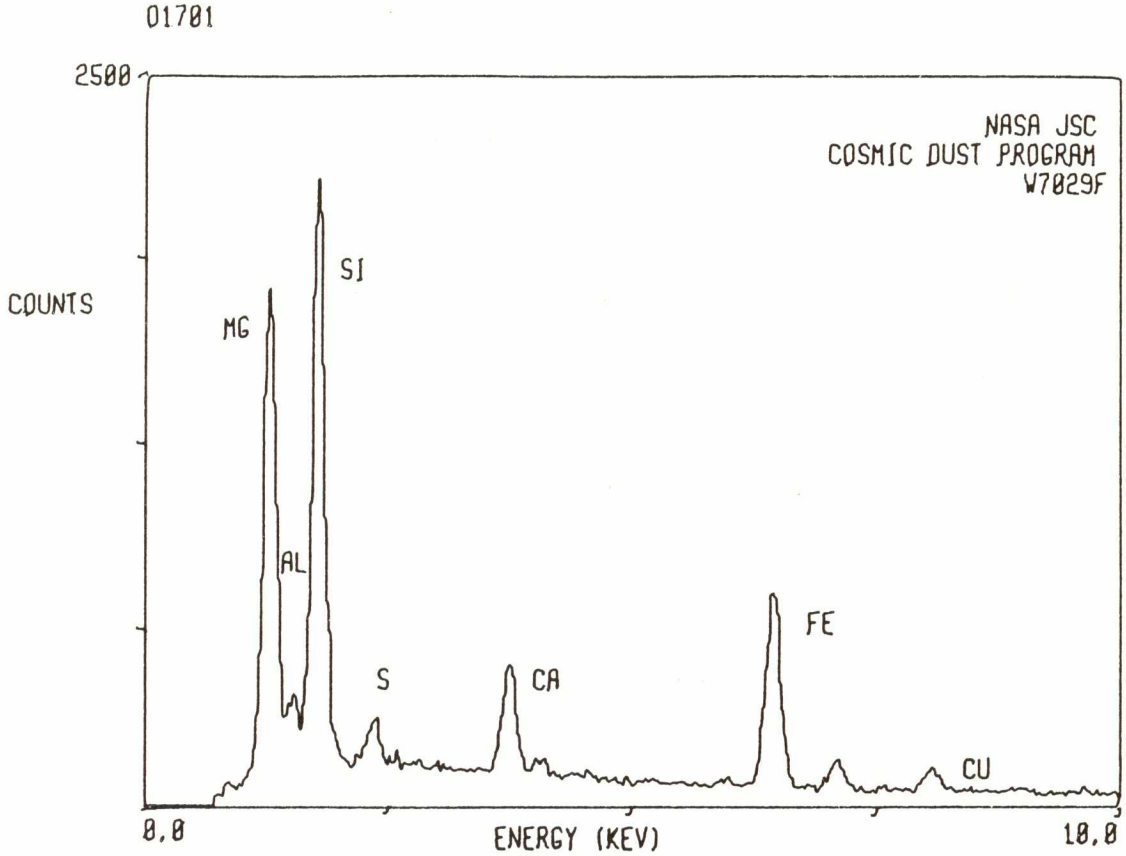


W7029F17



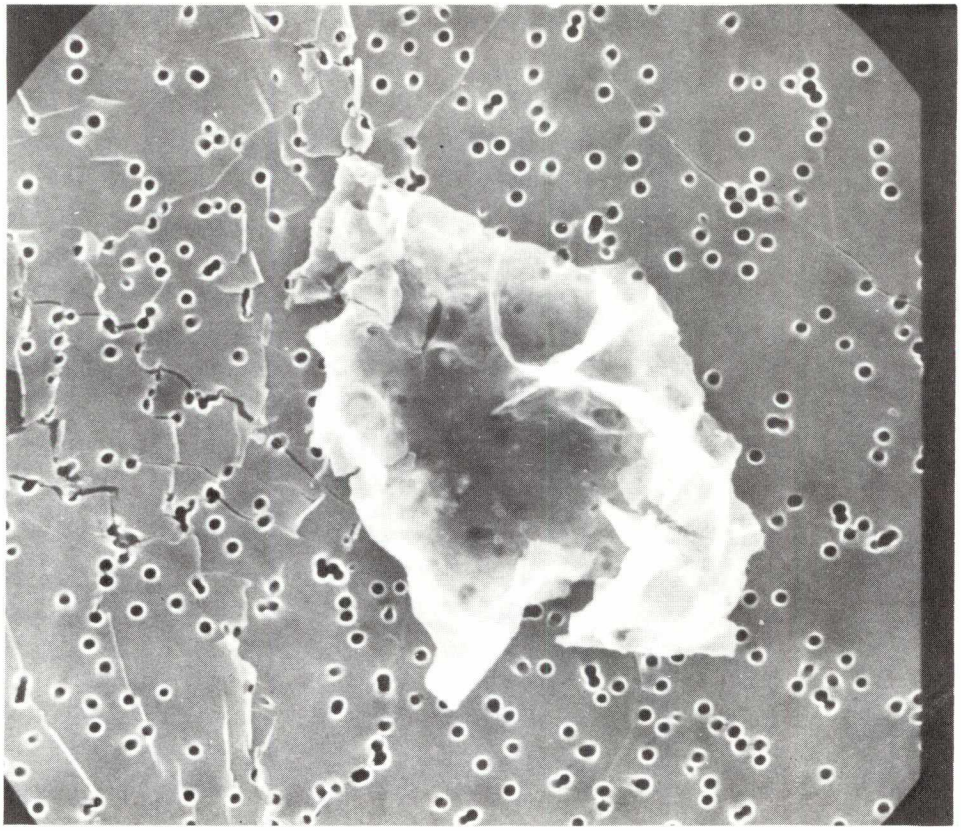
S-82-29603

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
7	S/E	T/TL	Colorless	V	C	



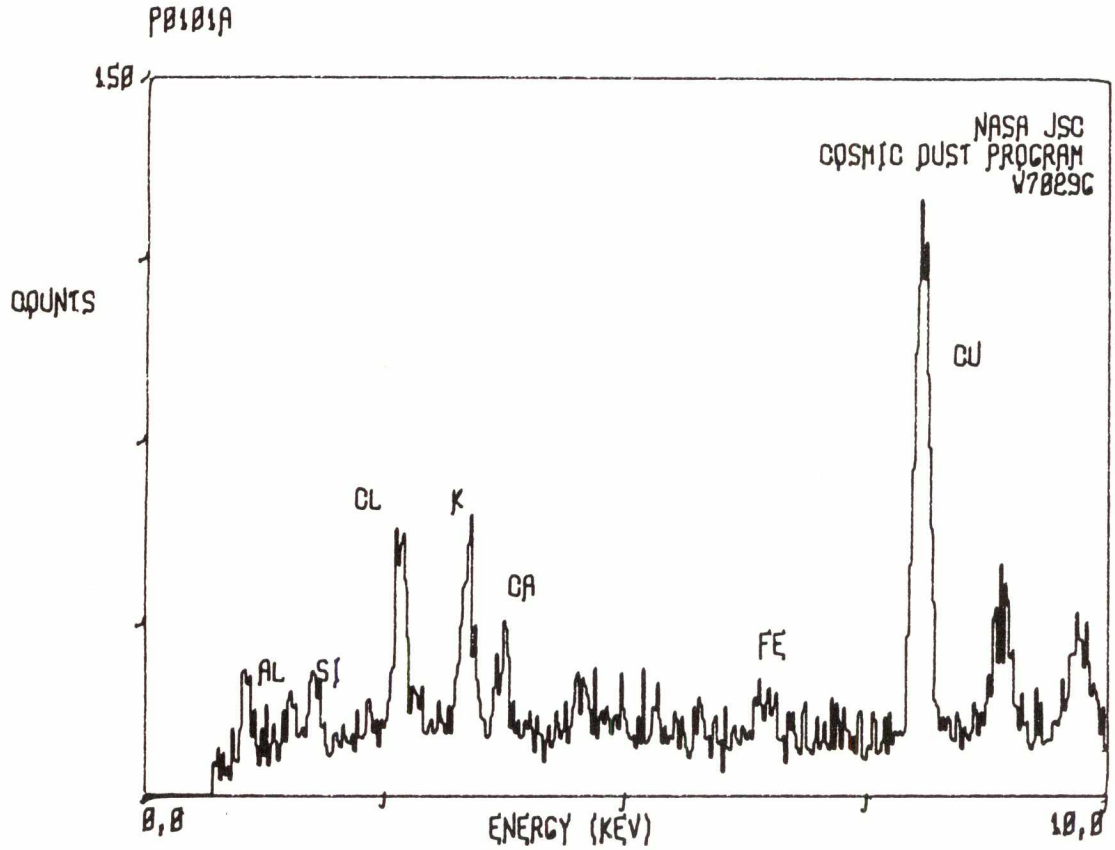
MOUNT W7029G

W7029G1

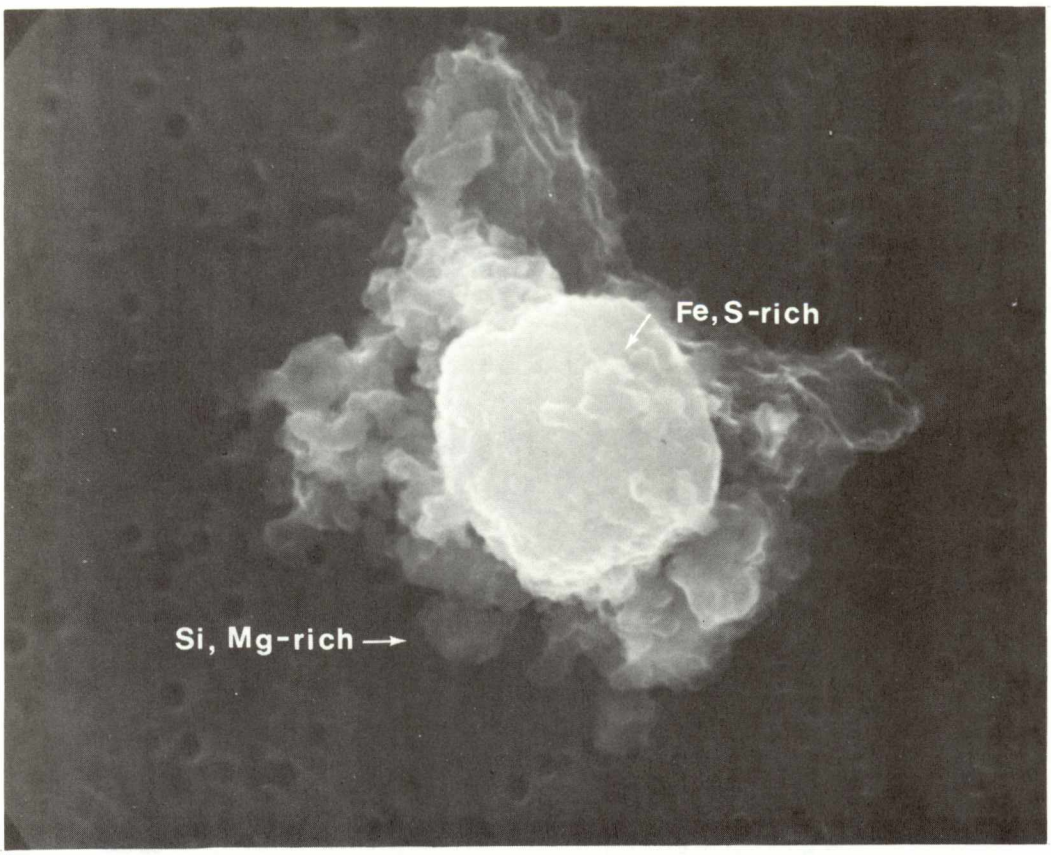


S-82-31865

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
12x16	I	O	Dk. Brown to Black	SM/M	?	Several fragments; Rich in low-atomic number elements?

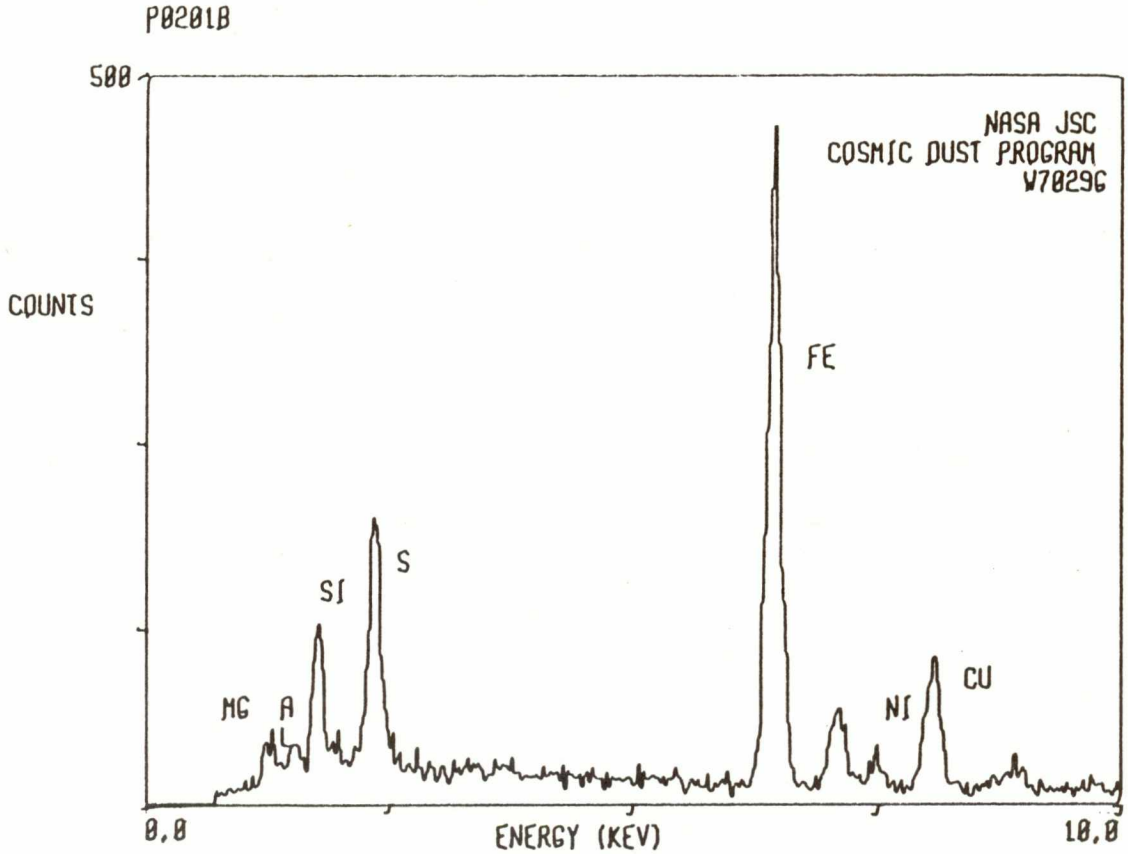


W7029G2

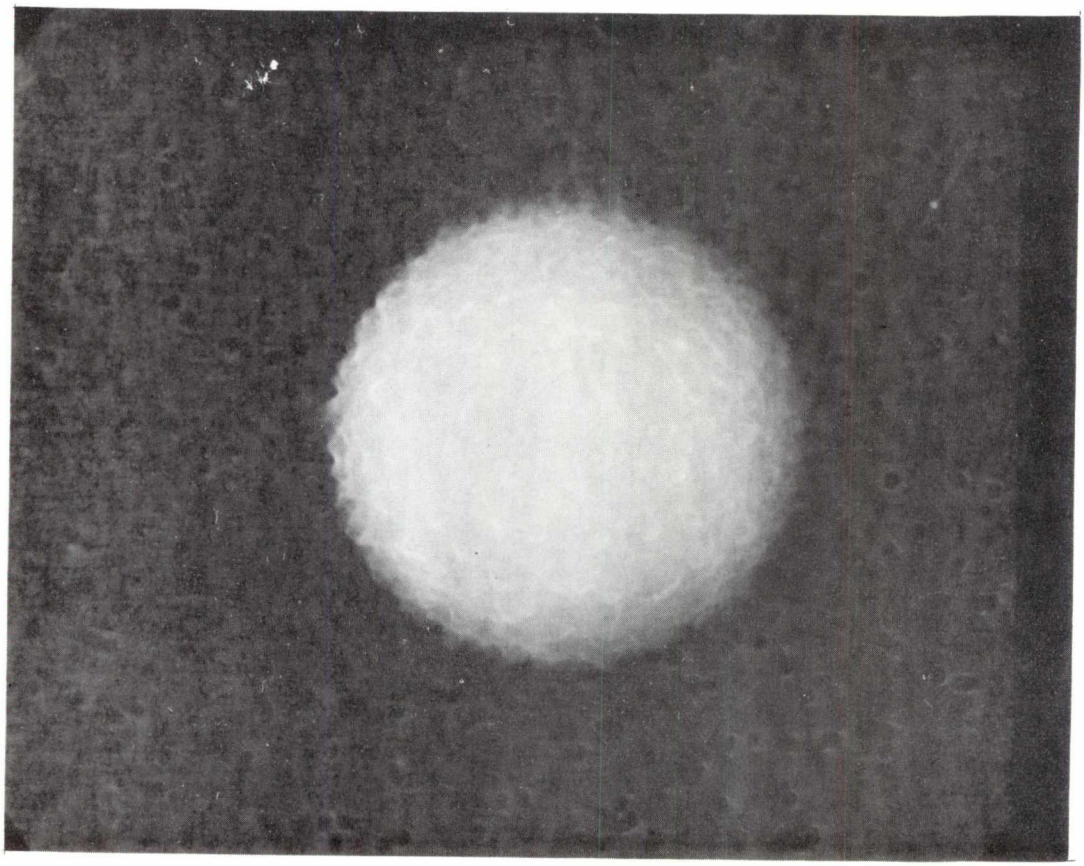


S-82-29605

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
6x7	I	O	Dk. Gray to Black	SM	C	Core rich in Fe, S; Rim rich in Si, Mg; Whole-particle composition shown below.

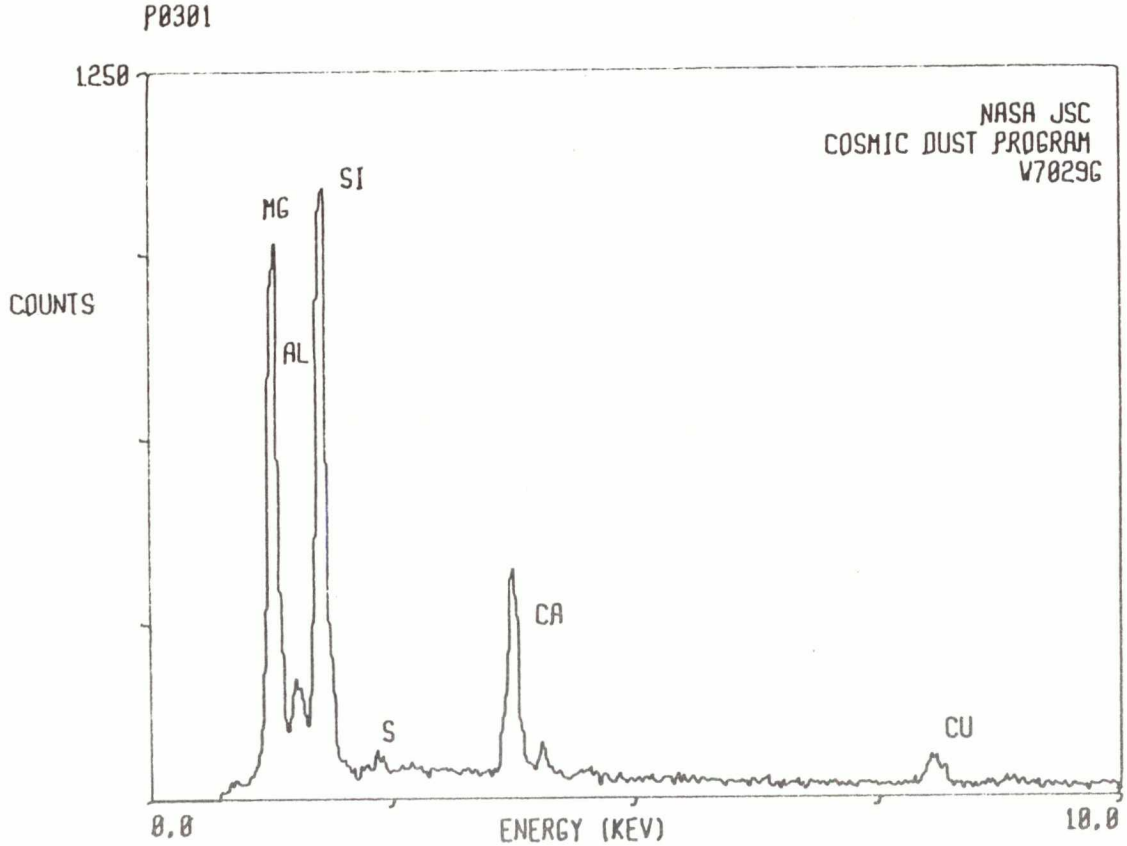


W7029G3

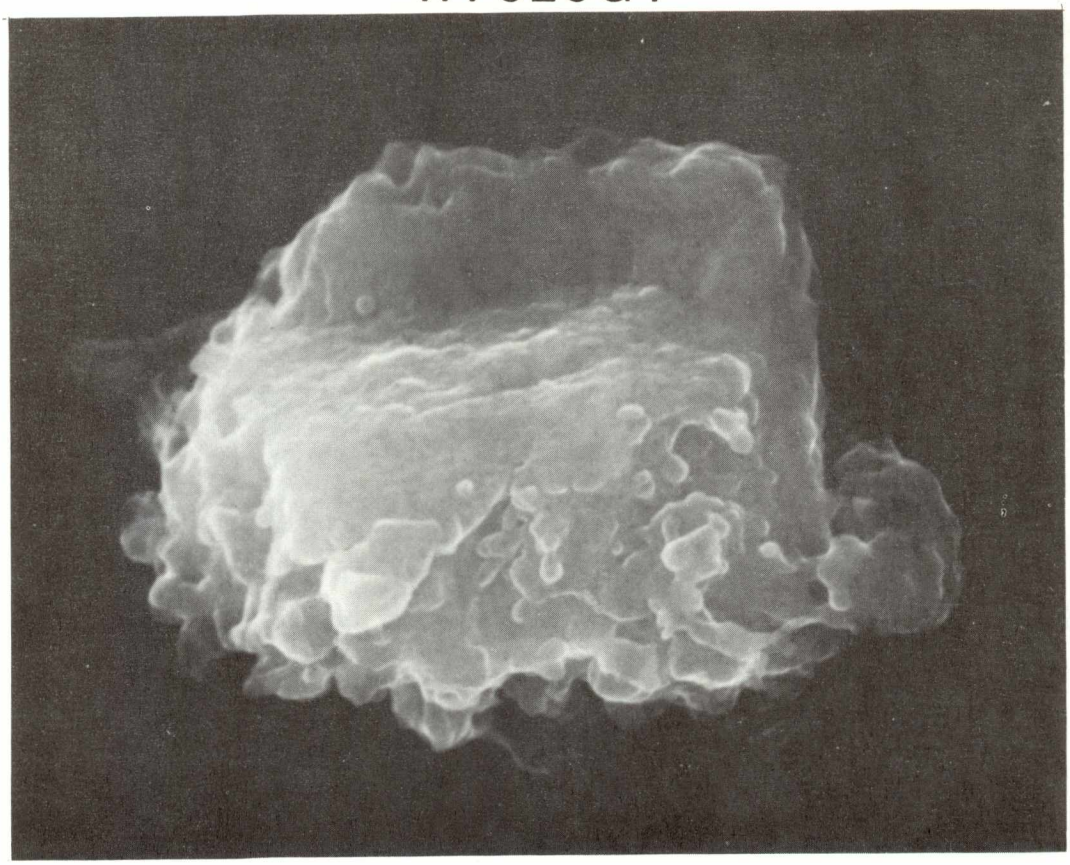


S-82-29606

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
9	S	TL	CL/Pale Yellow-Gray	V	C	

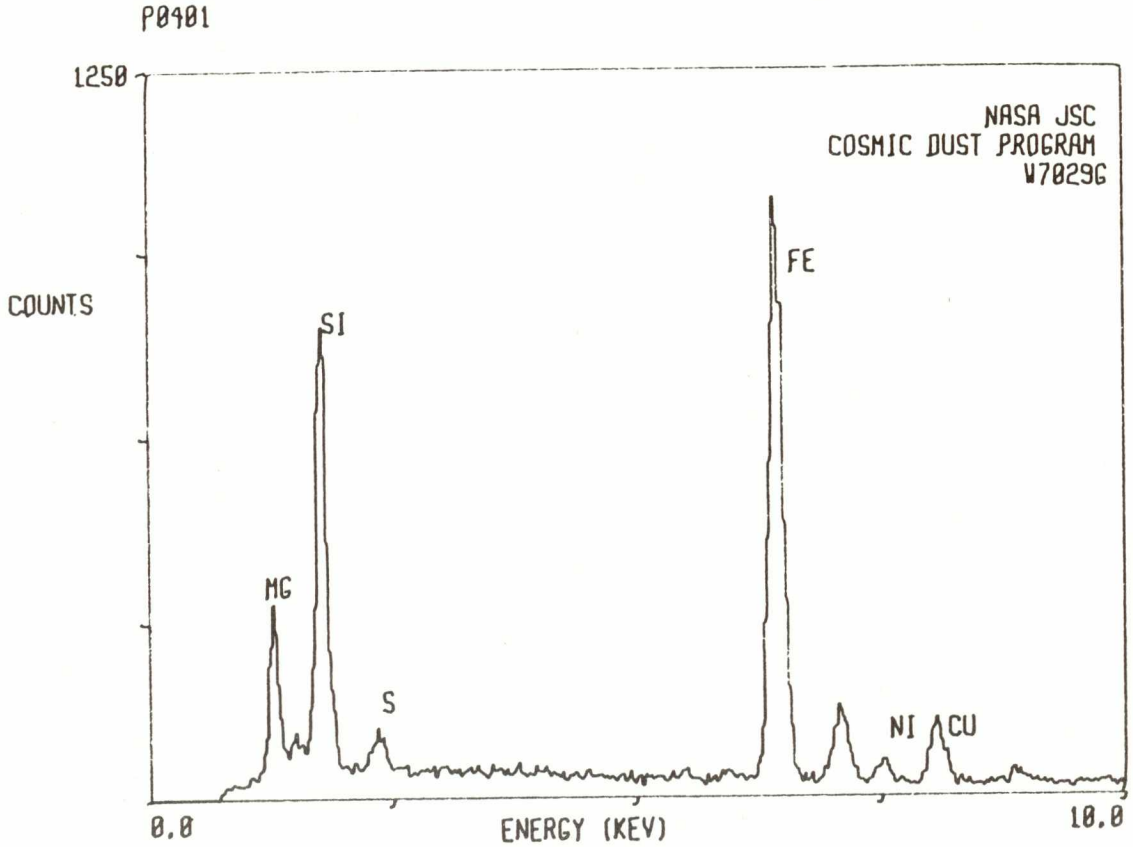


W7029G4

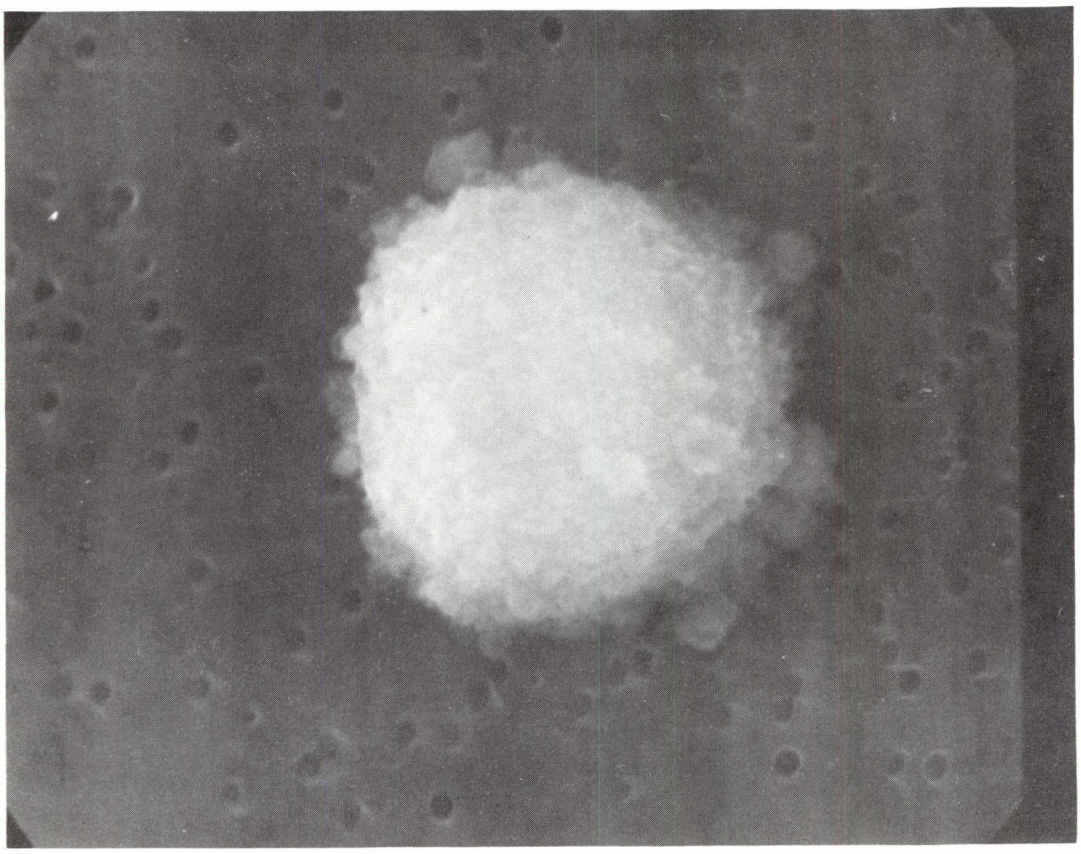


S-82-29607

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
9x12	I	TL/O	Dk. Red-Brown	V	C	

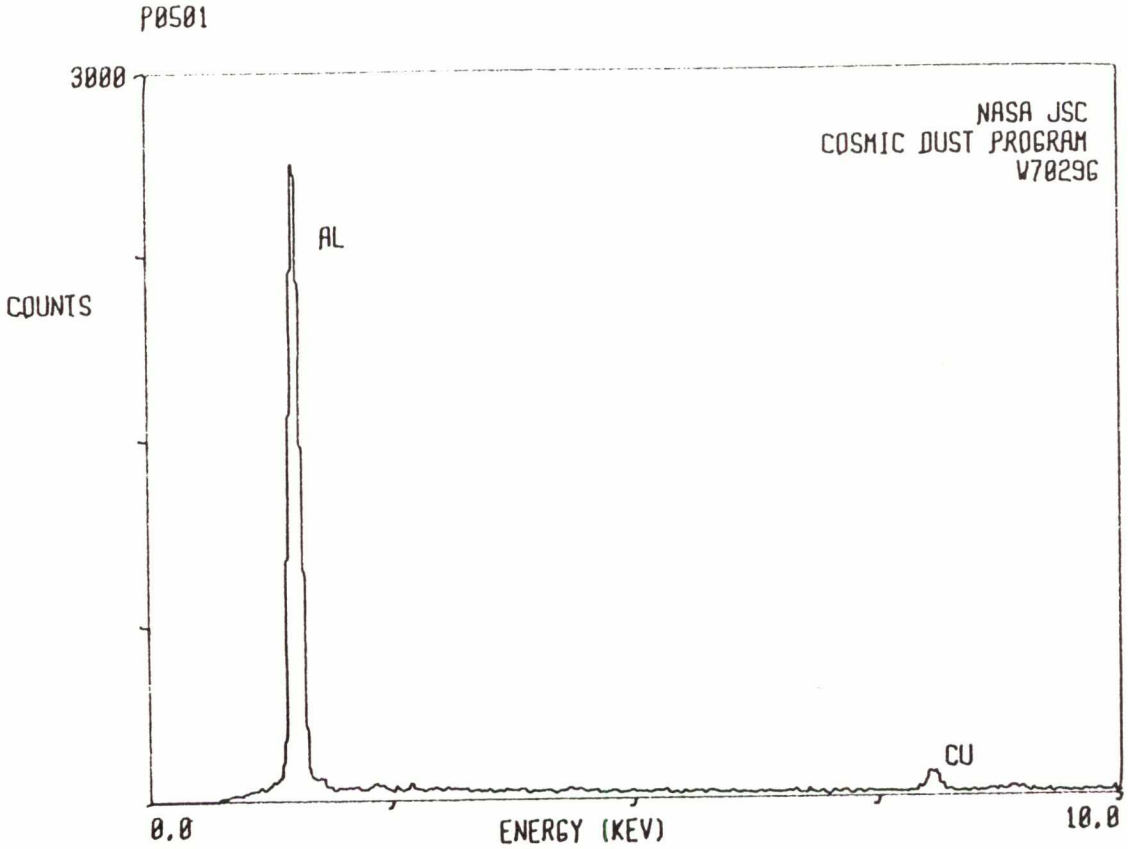


W7029G5

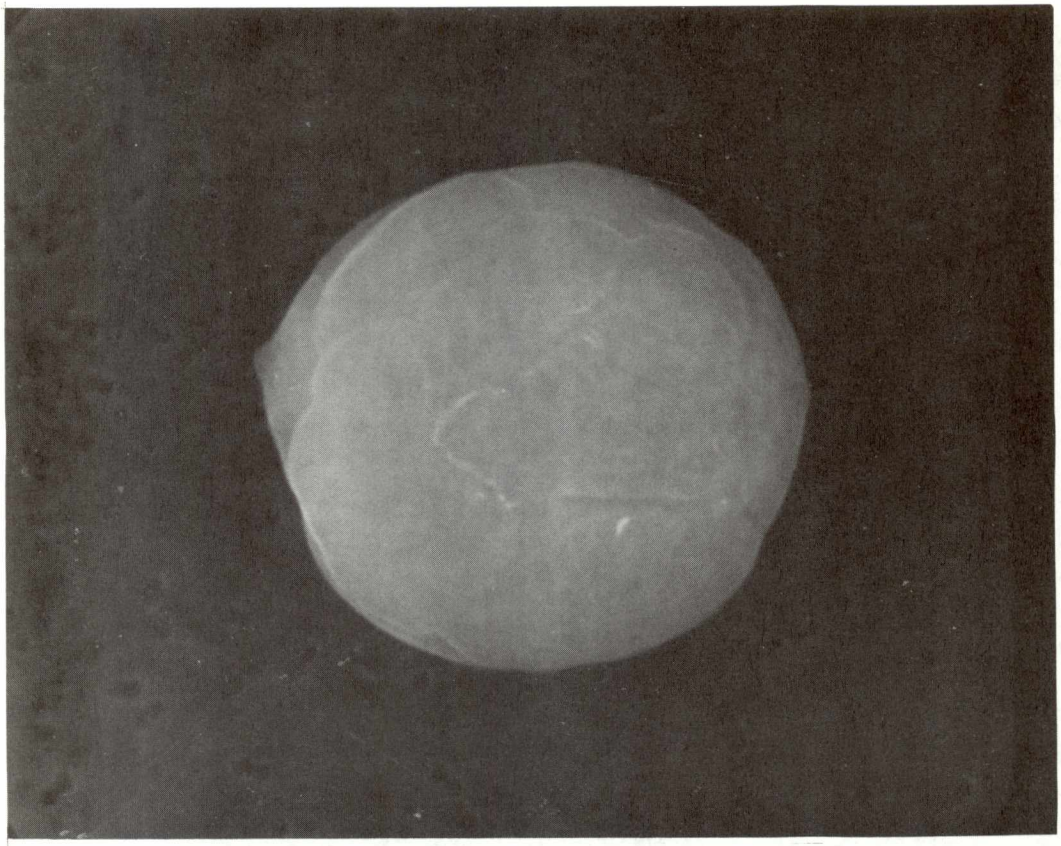


S-82-29608

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
6	S/E	0	Dk. Gray to Black	D	TCA?	Related to AOS?

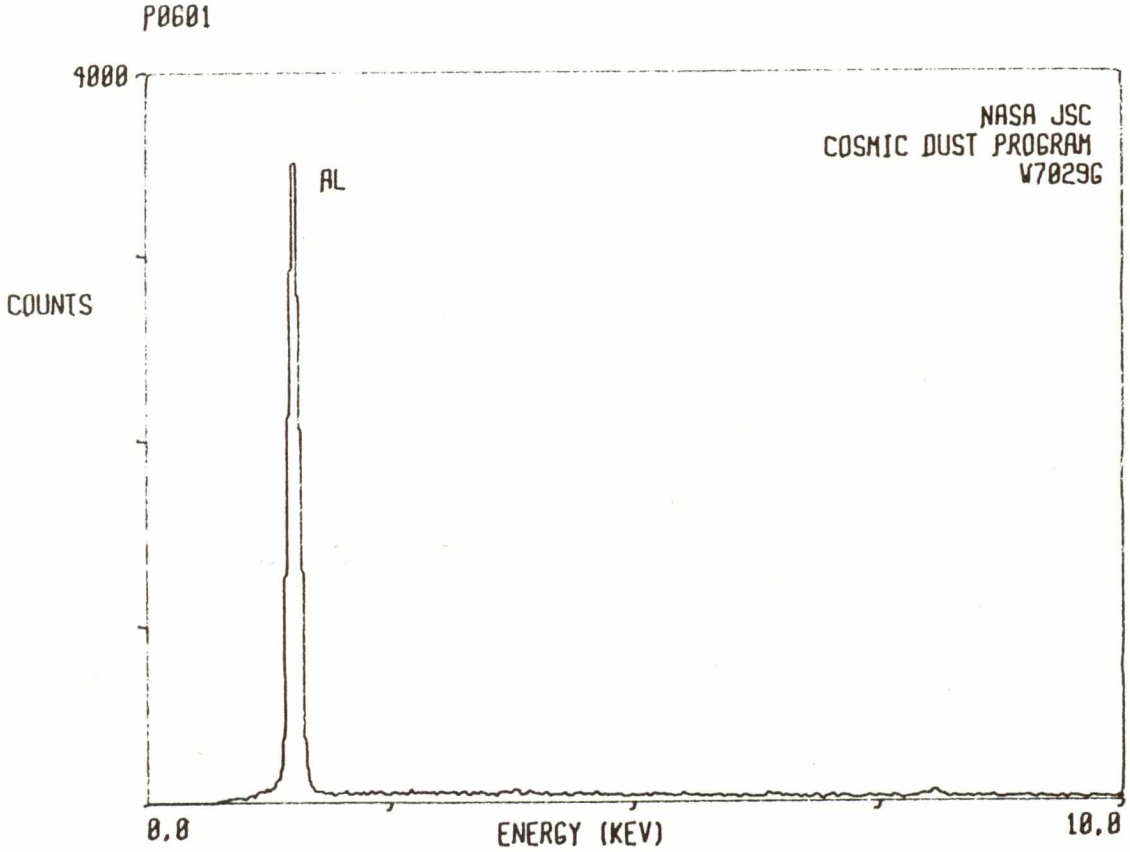


W7029G6

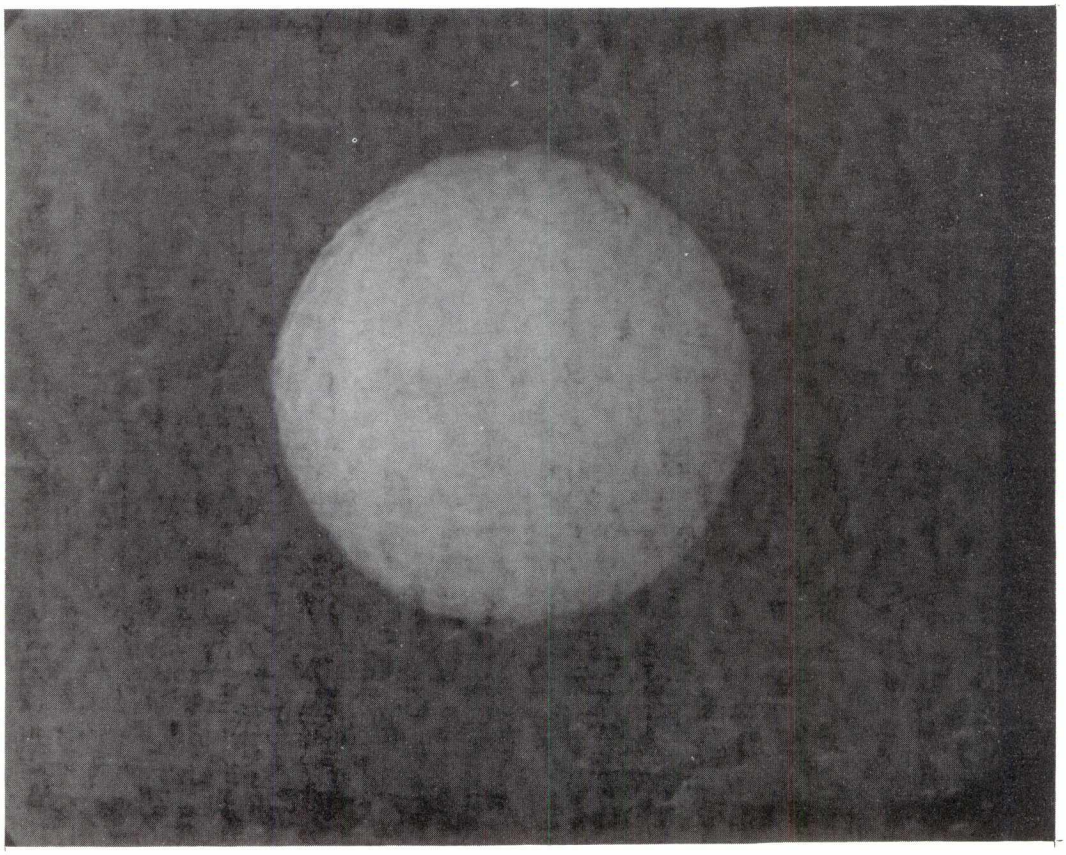


S-82-29609

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
8	S	TL	CL/Pale Yellow	V	AOS	

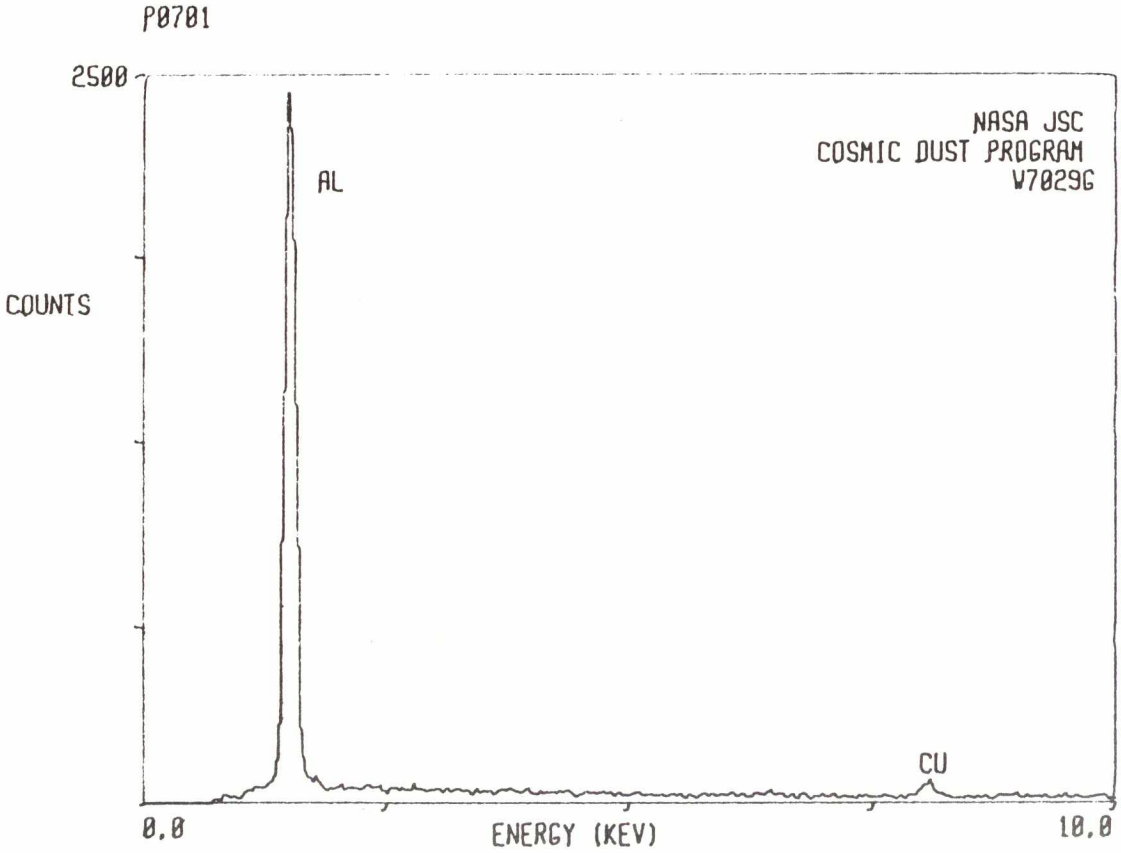


W7029G7

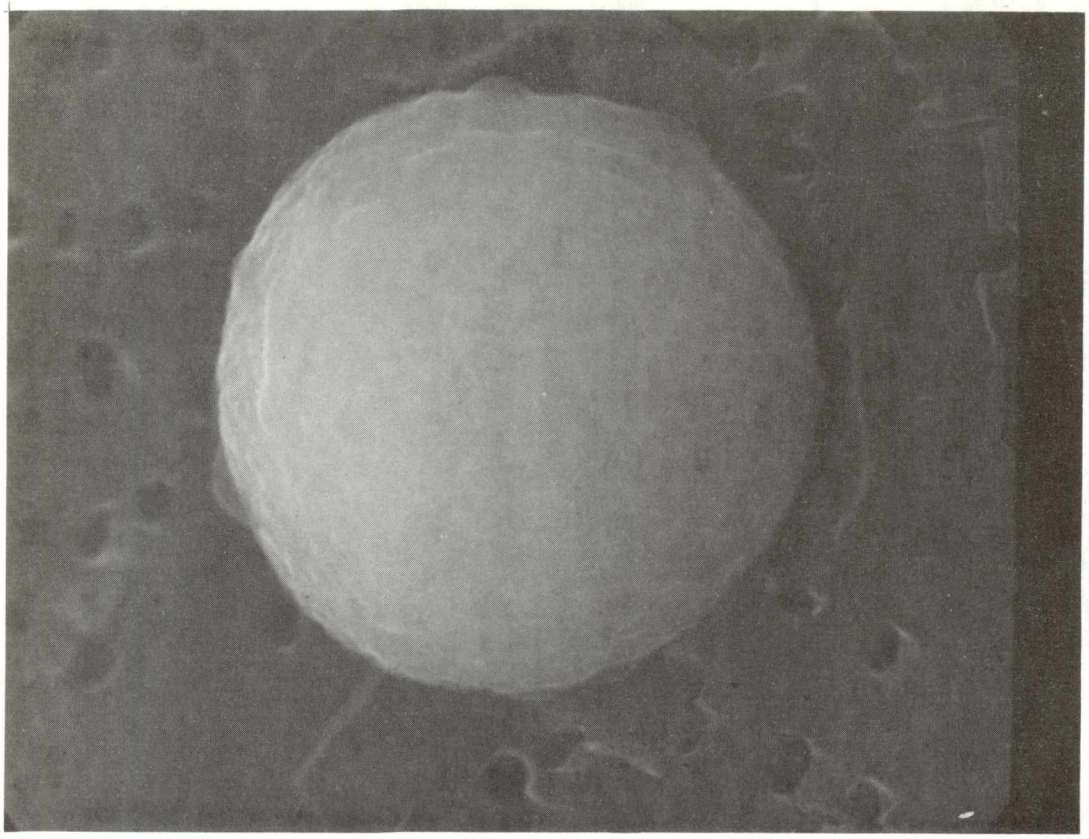


S-82-29610

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
5	S	T	CL/Pale Yellow	V	AOS	

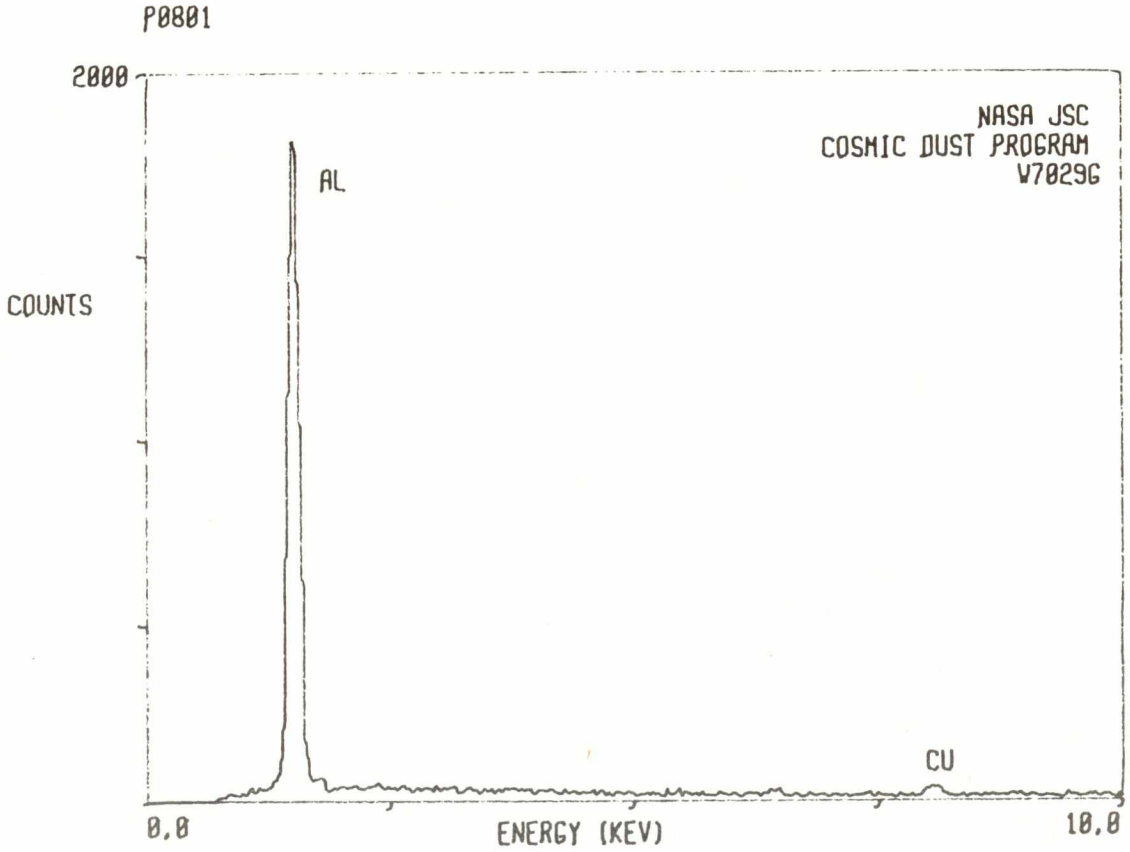


W7029G8

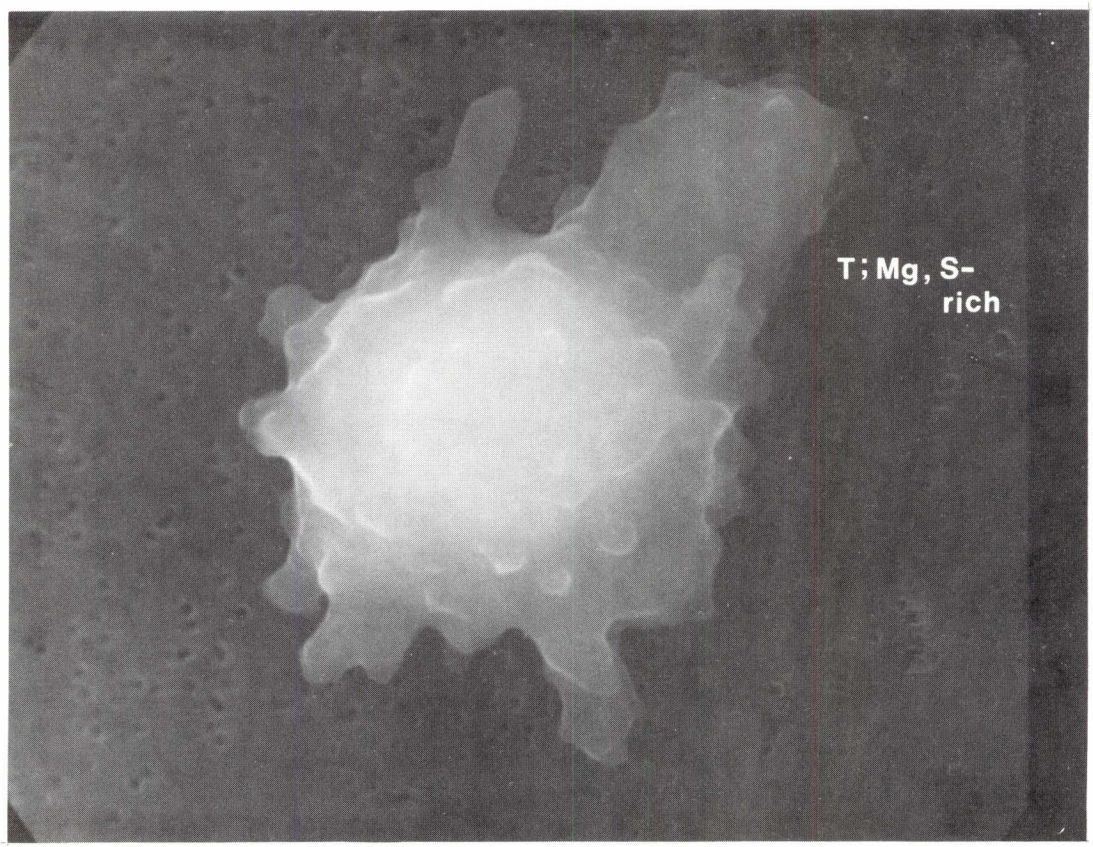


S-82-29611

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
4	S	T	CL/Pale Yellow	V	AOS	

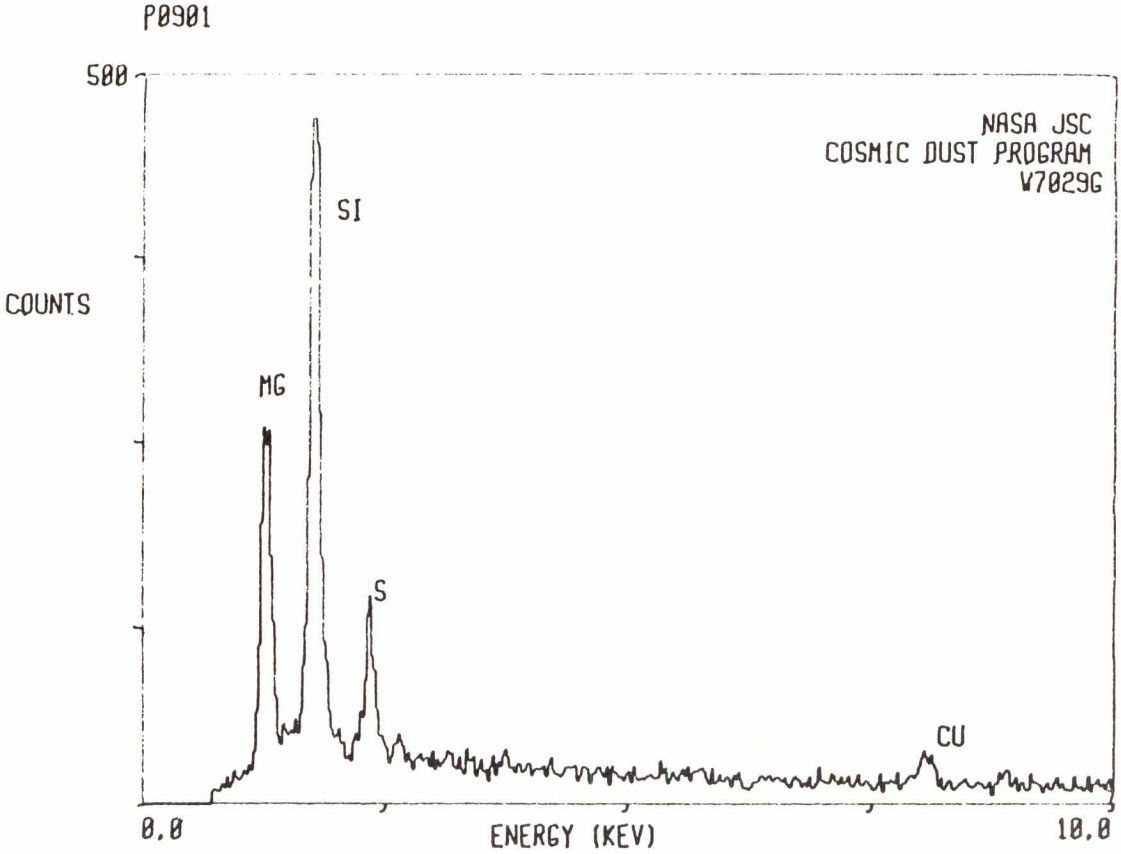


W7029G9

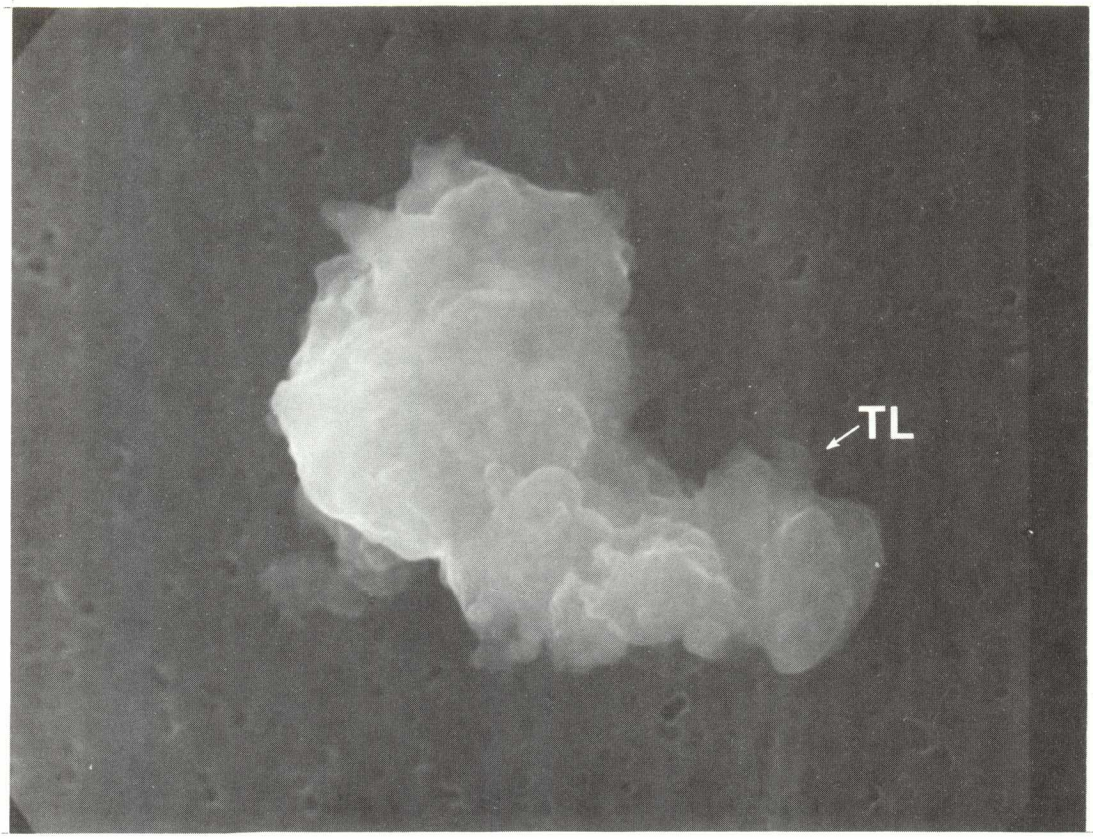


S-82-29612

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
13x18	I	TL/T	Pale Yellow-Brown	SV	?	TL edge rich in Mg, S; Whole-particle composition shown below.

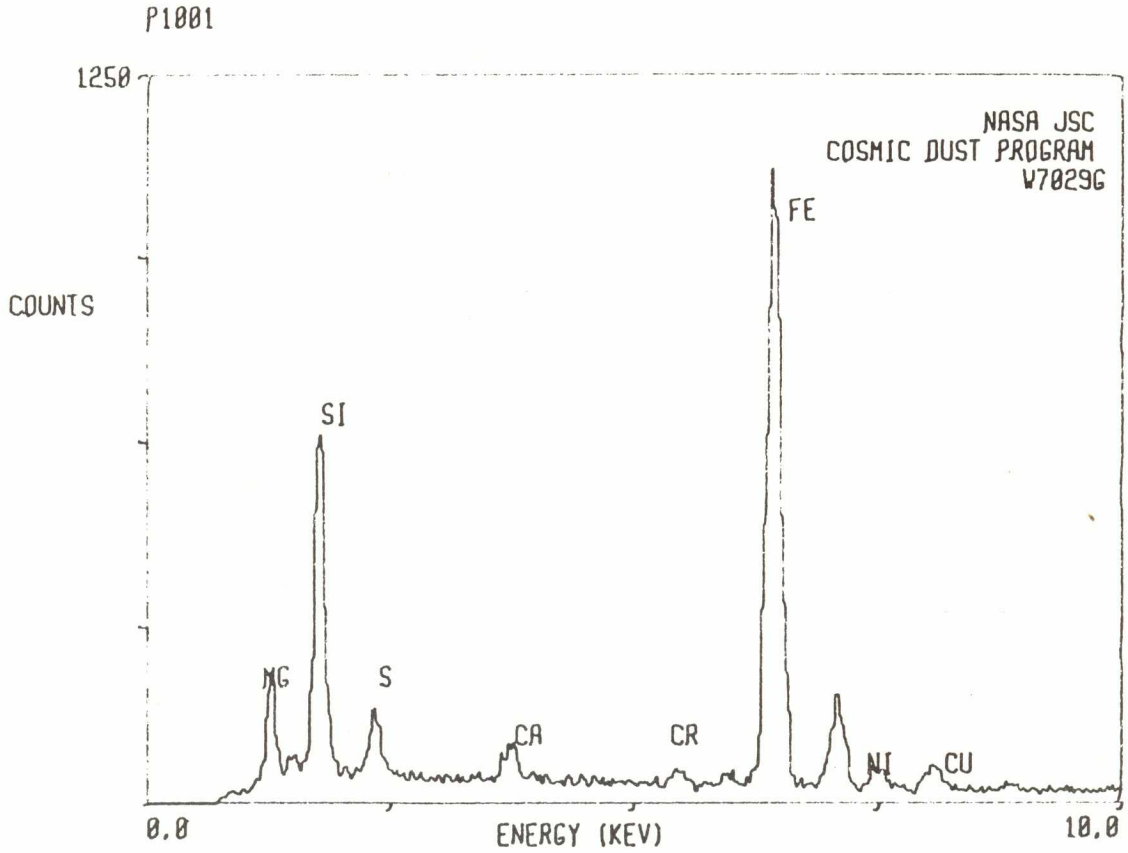


W7029G10

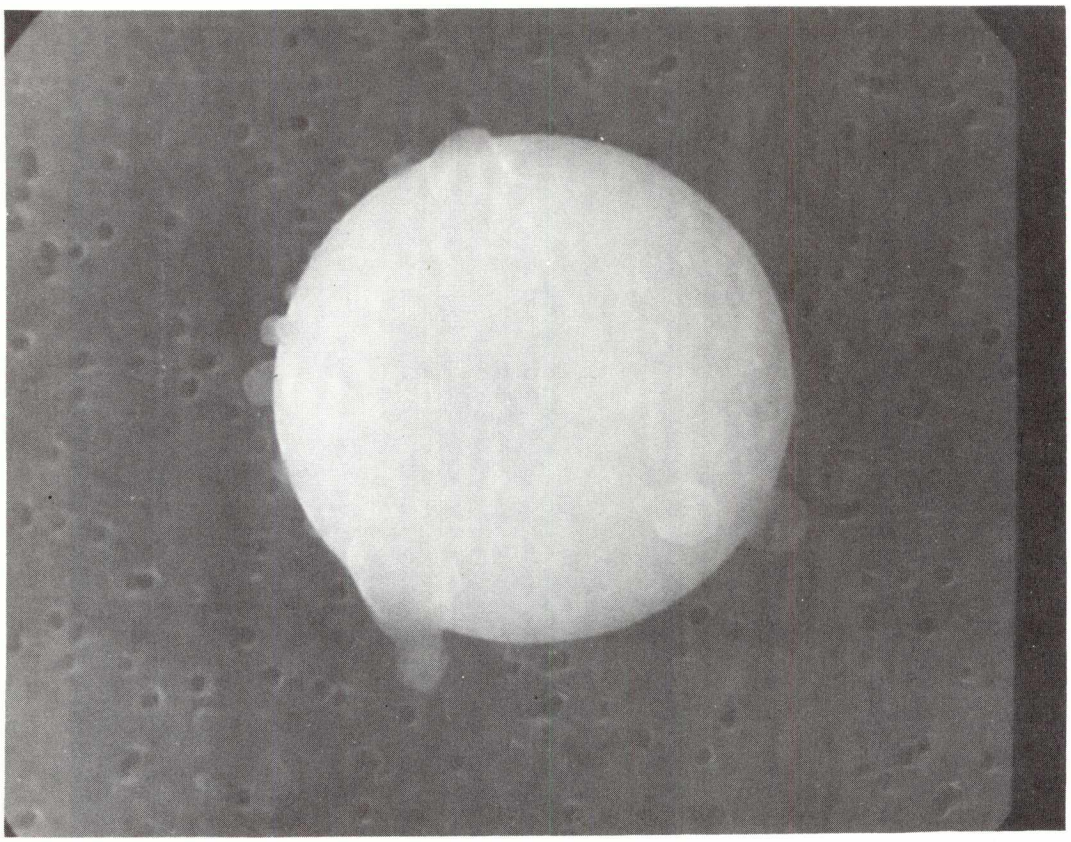


S-82-29613

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
9x12	I	TL/O	Gray to Black	SV	C	

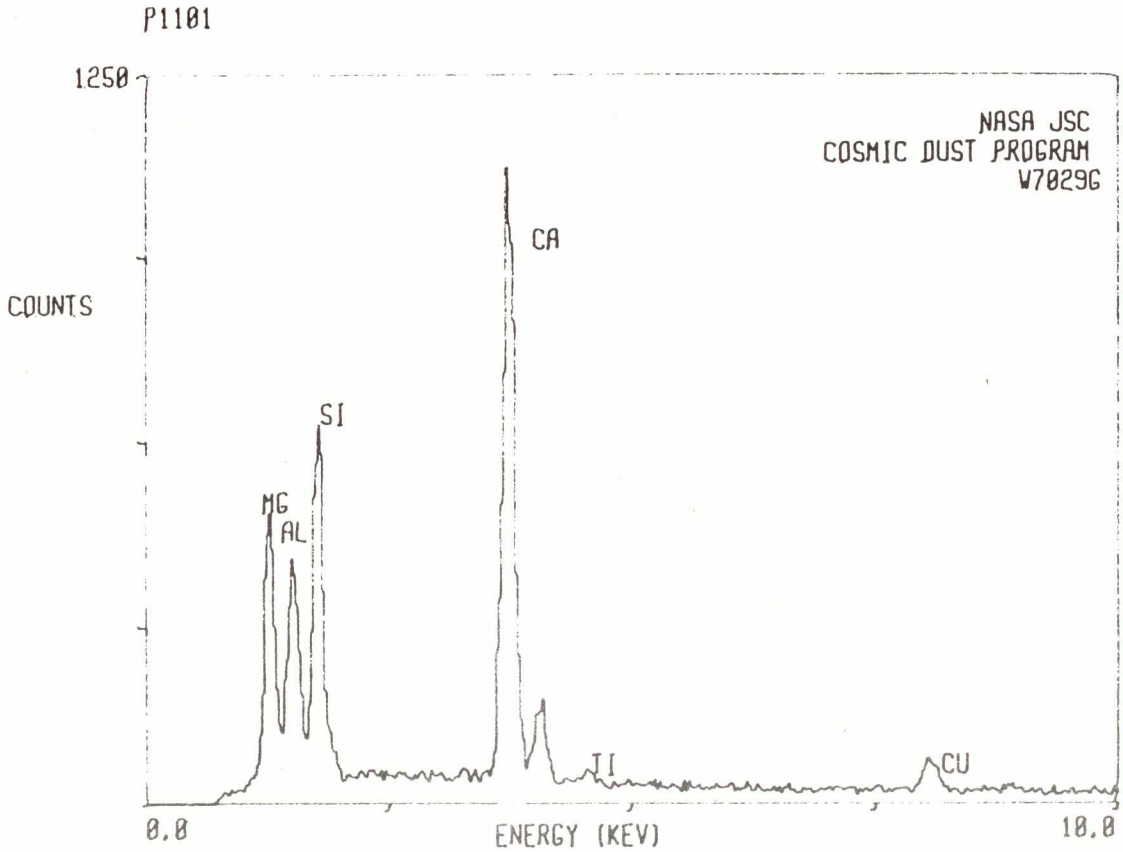


W7029G11

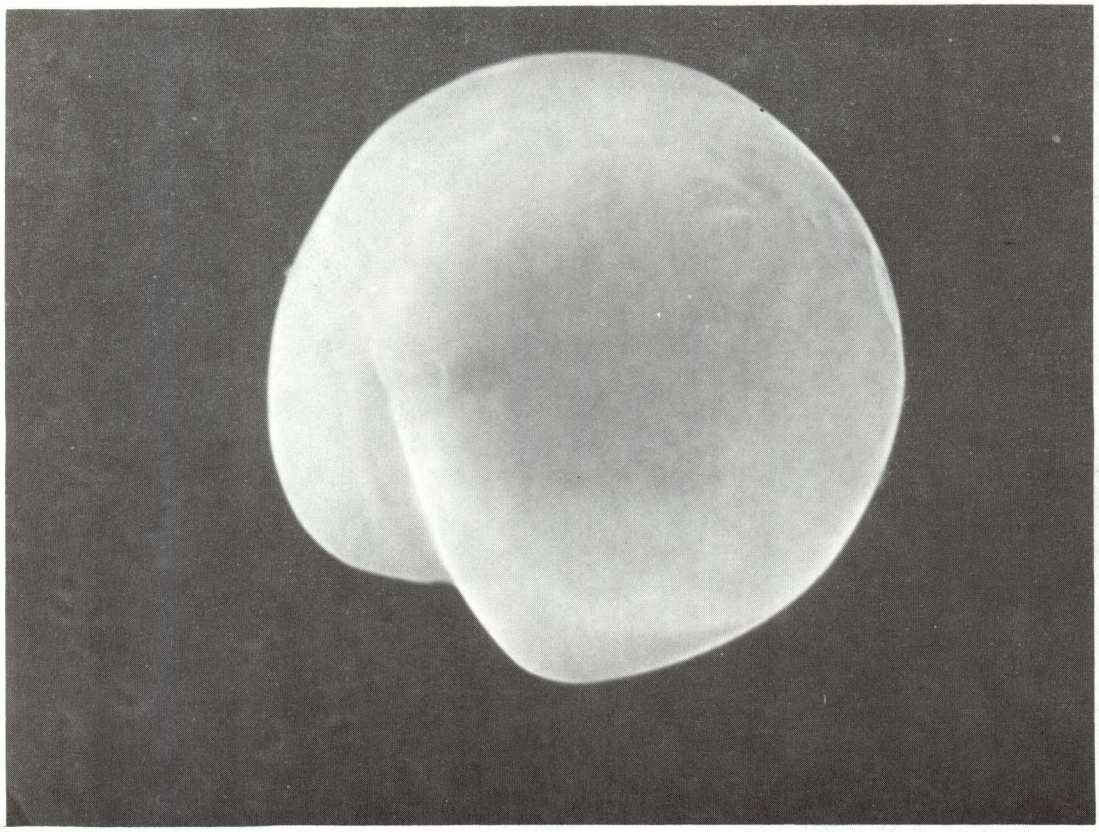


S-82-29614

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
8	S	T	CL/Pale Yellow	V	?	

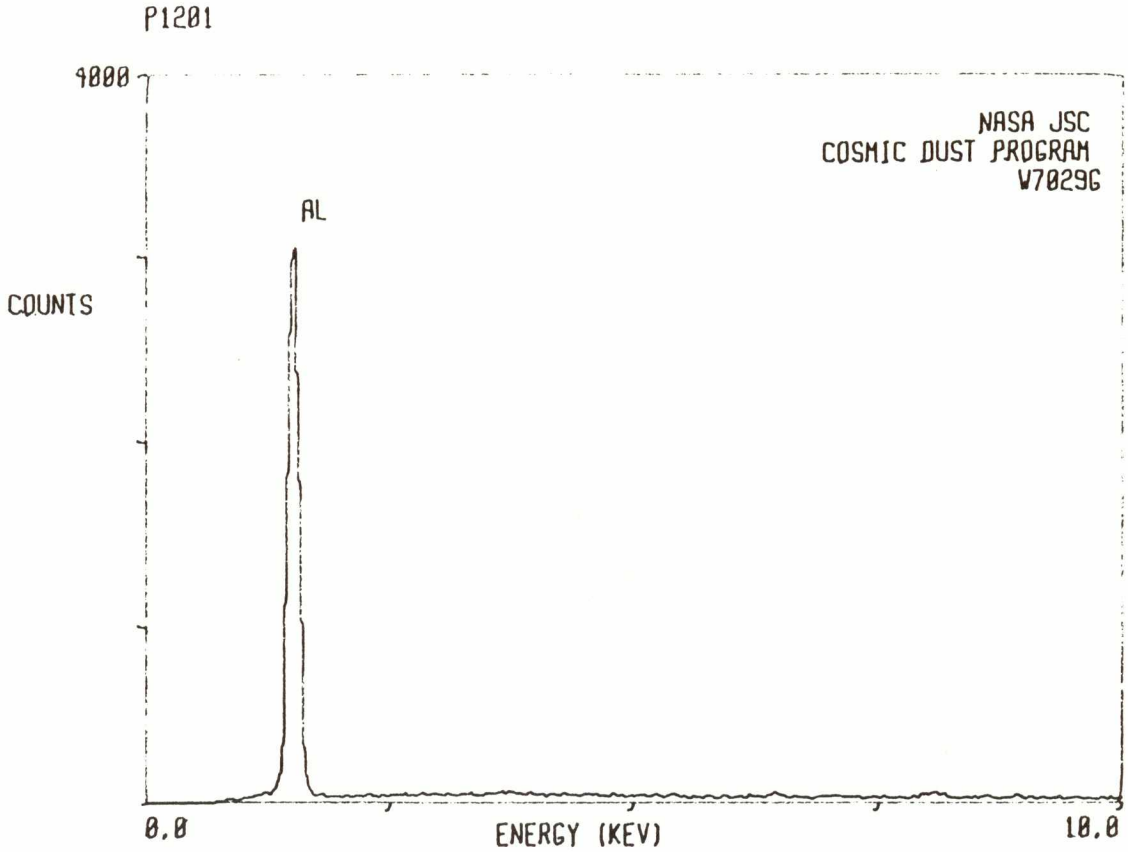


W7029G12

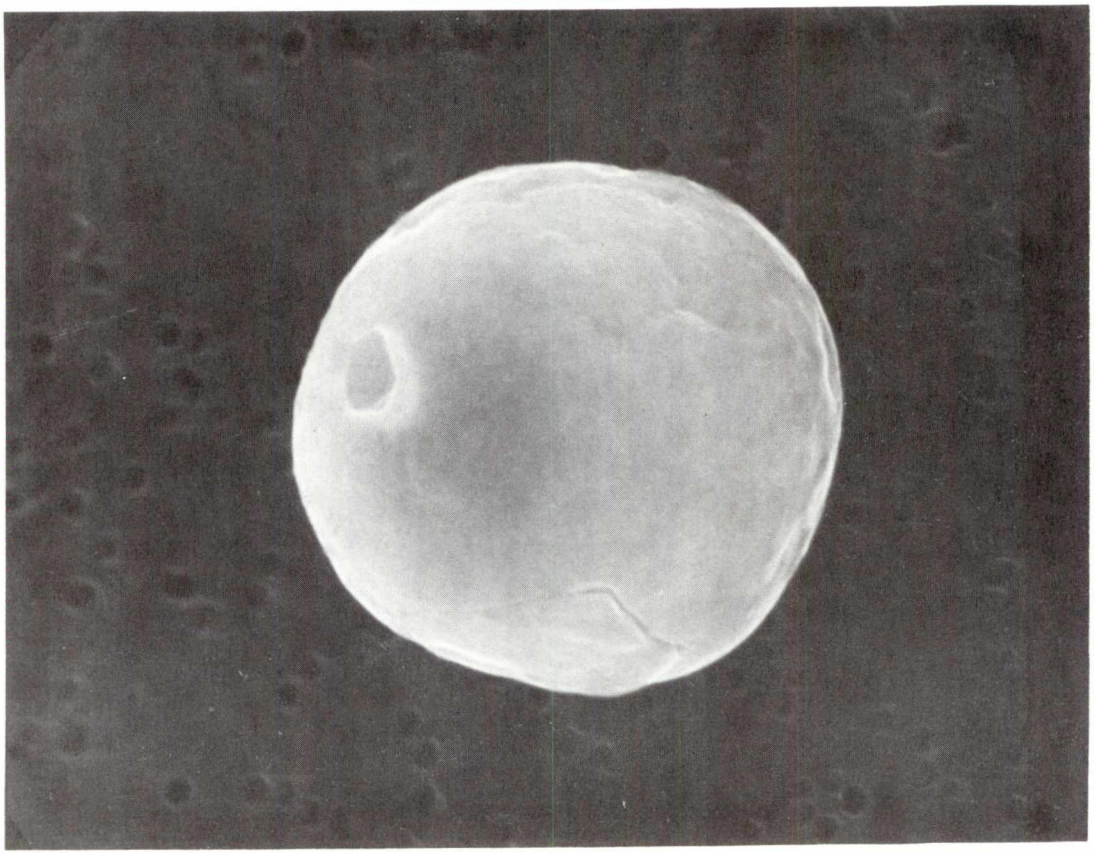


S-82-29615

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
13	S	T	CL/Pale Yellow	V	AOS	

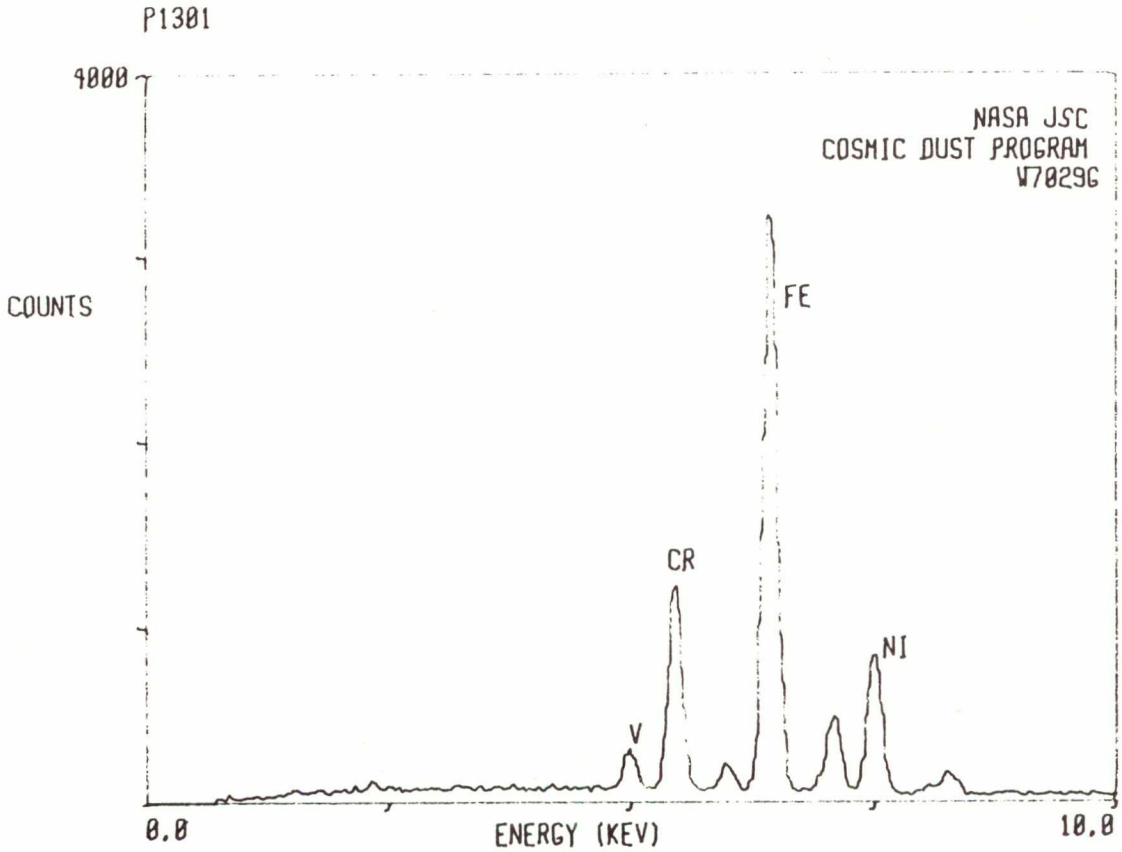


W7029G13

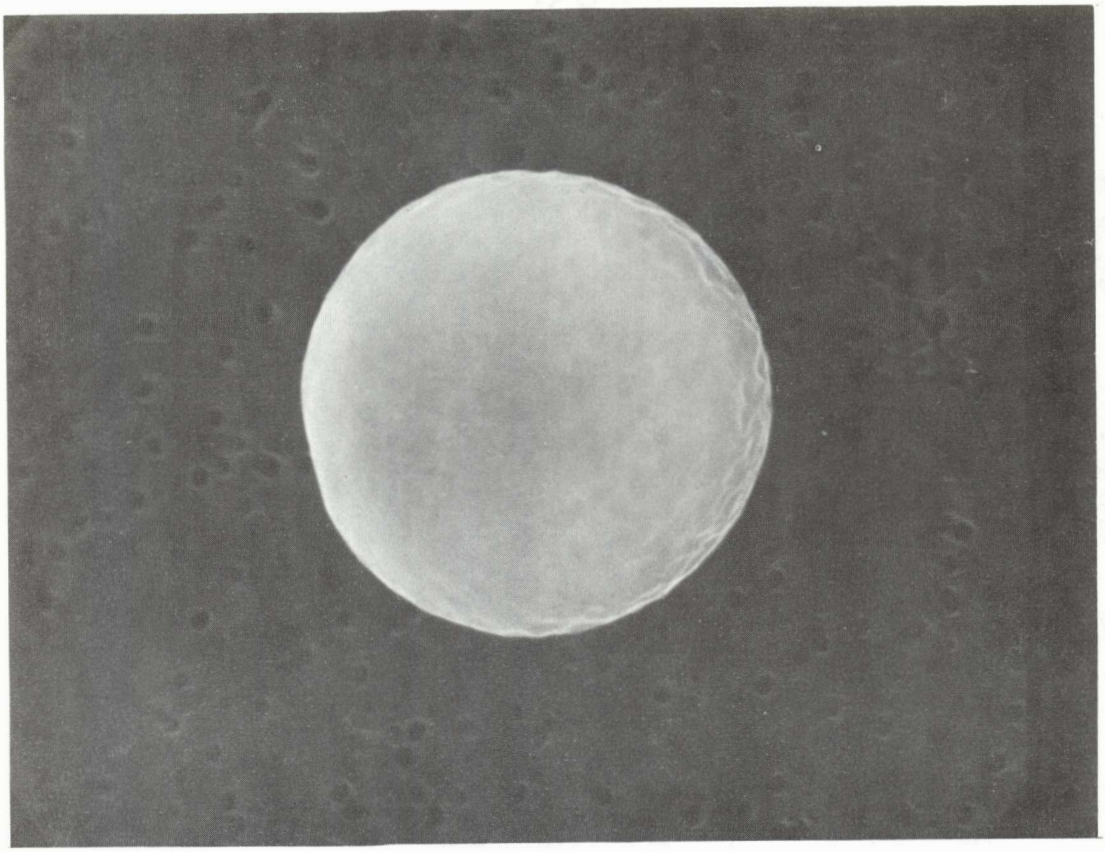


S-82-29616

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
6	S	O	Black	M	TCA?	

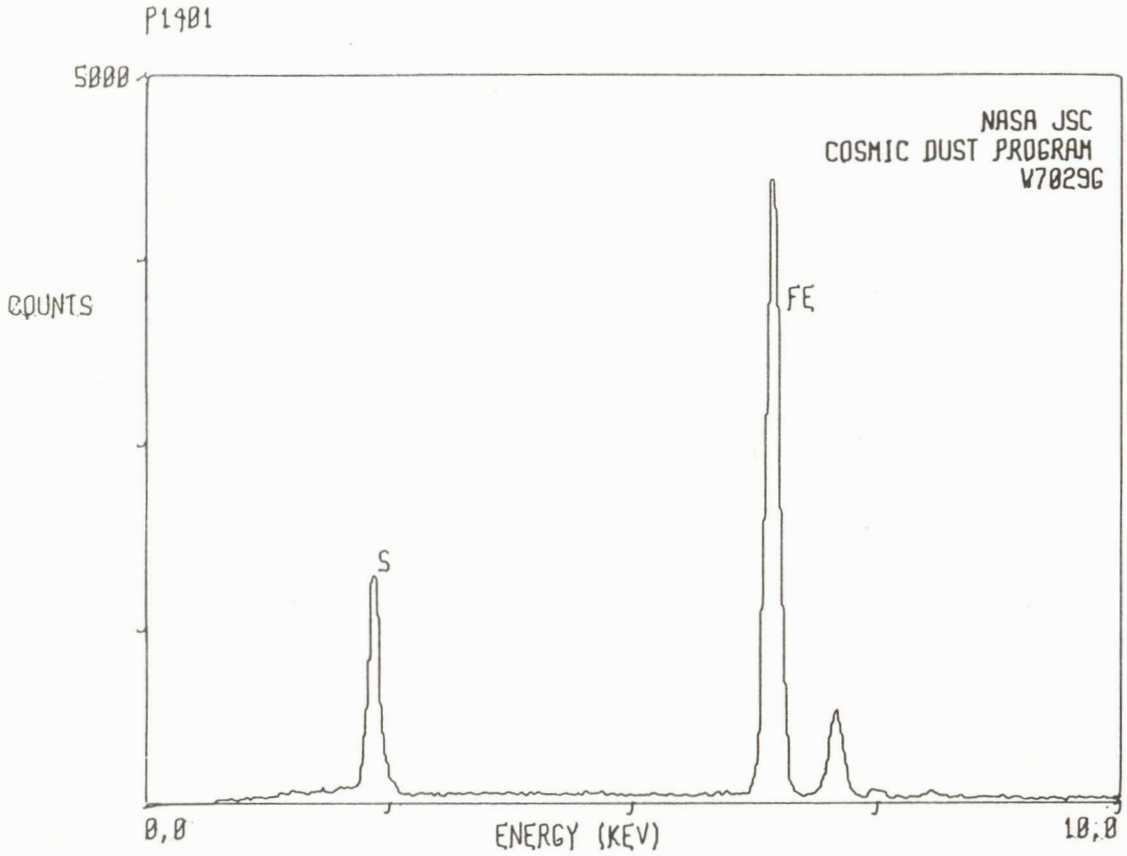


W7029G14

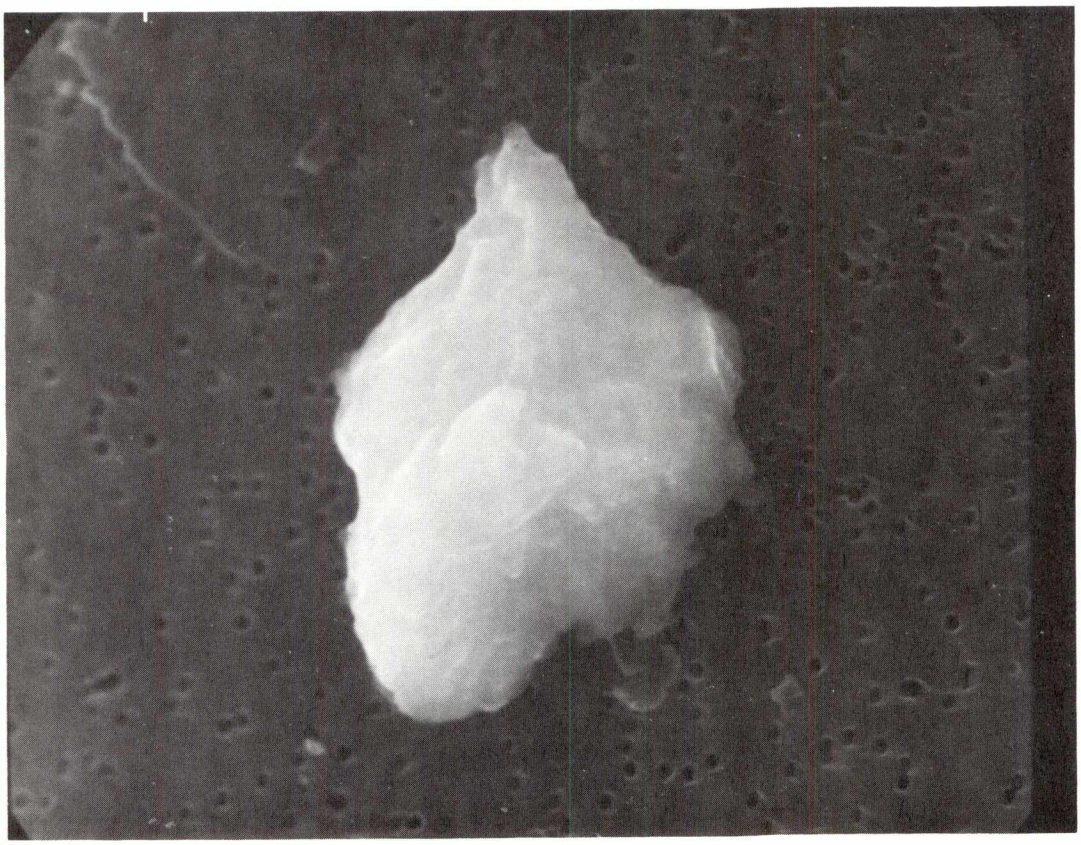


S-82-29617

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
7	S	0	Black	M	C?	

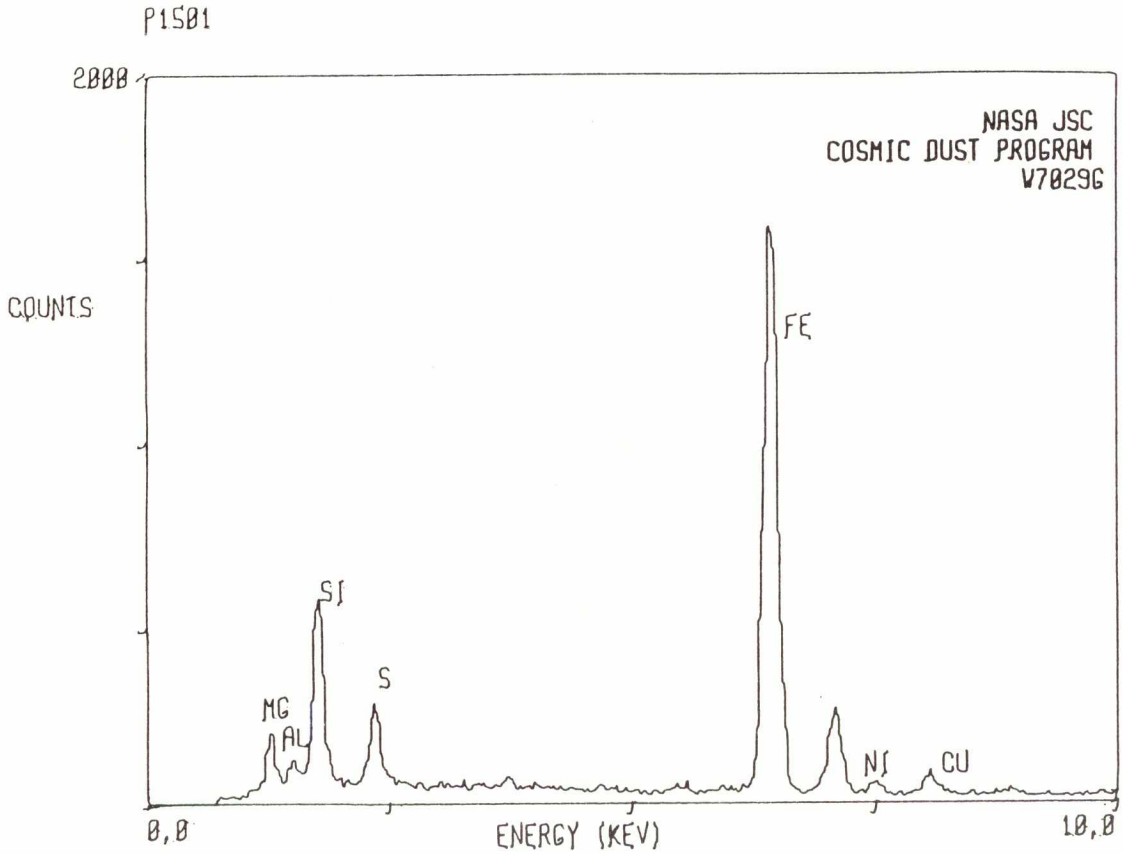


W7029G15

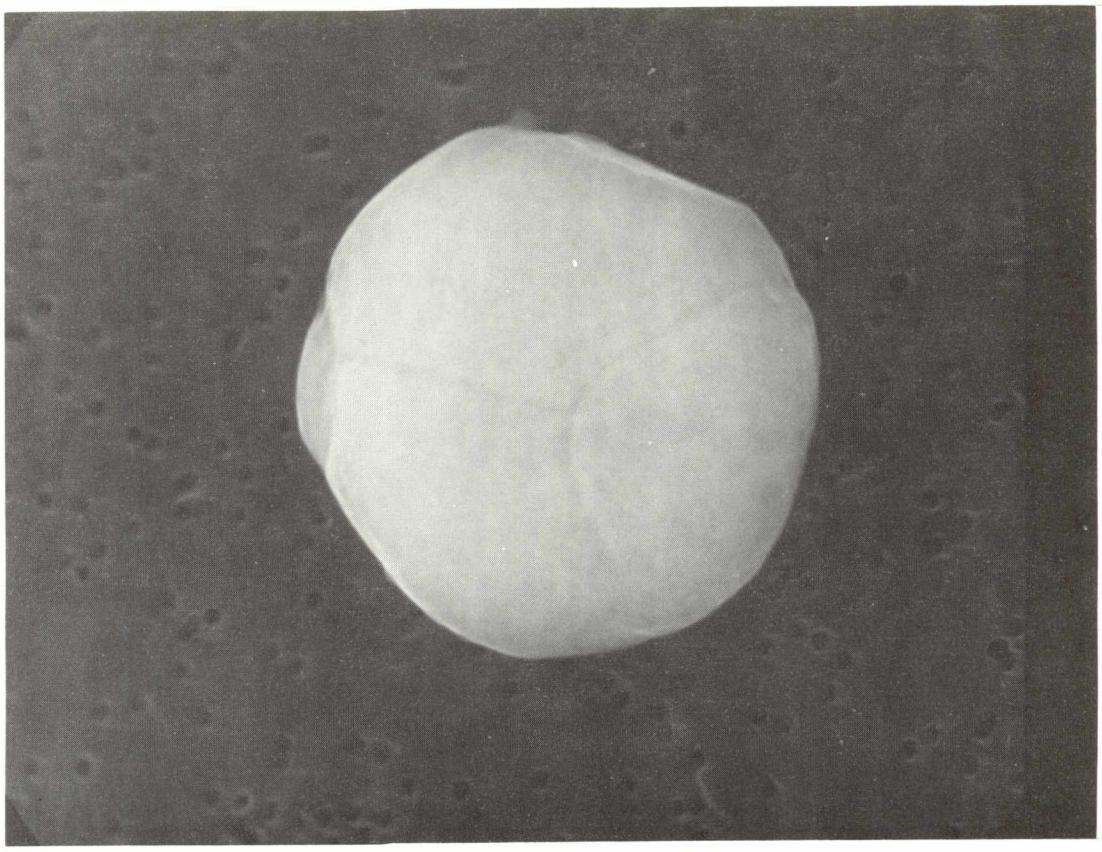


S-82-29618

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
8x11	I	O	Dk. Brown to Black	SM	C	

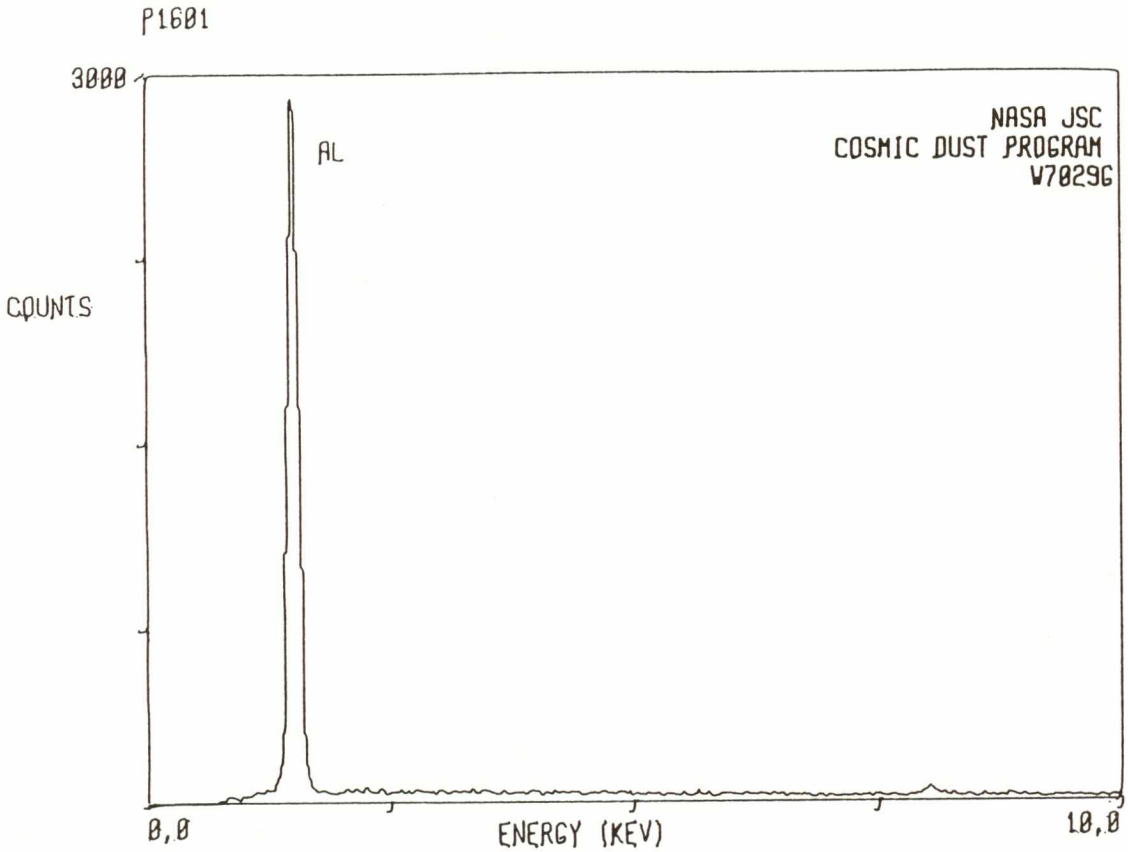


W7029G16



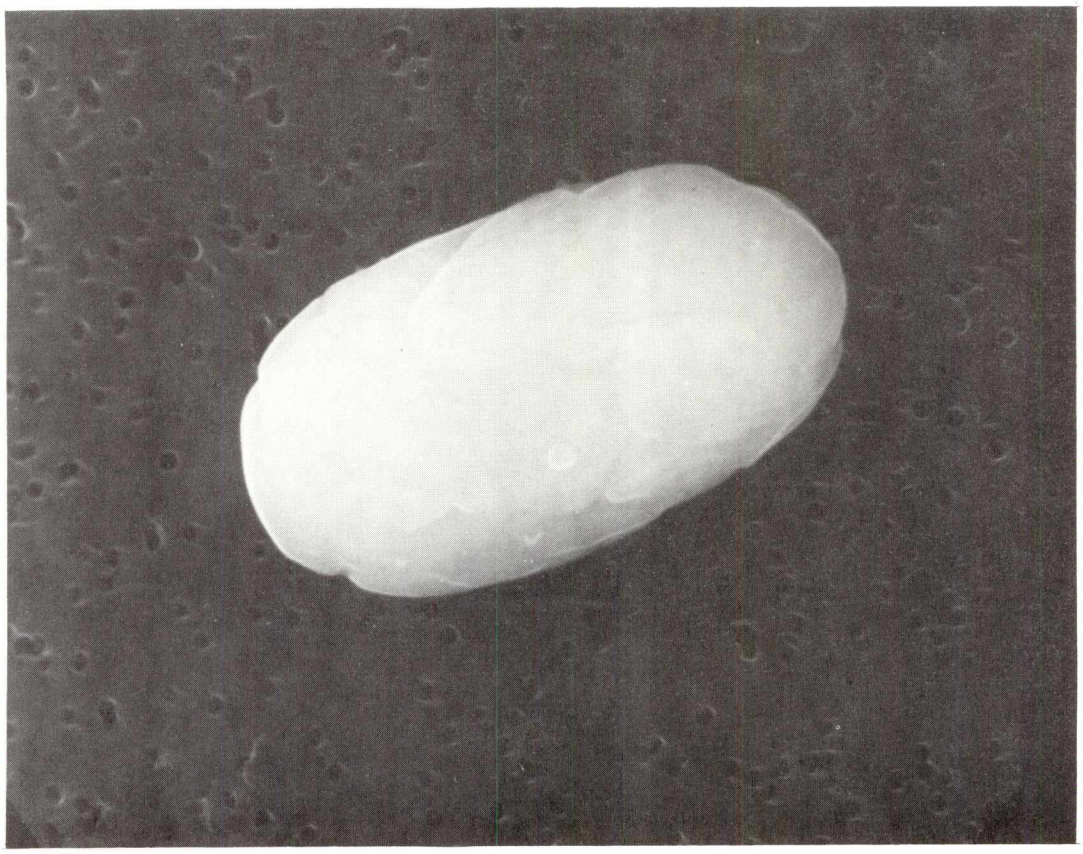
S-82-29619

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
9	S	T	CL/Pale Yellow	V	AOS	



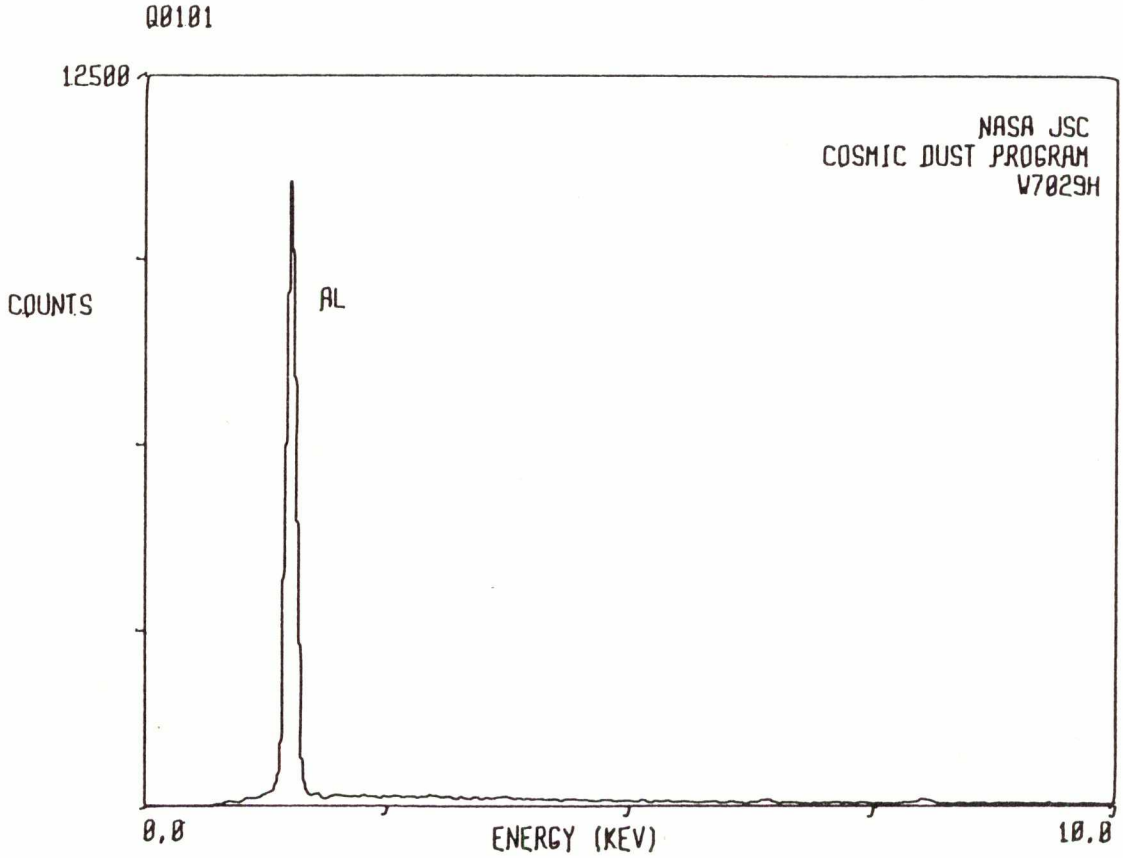
MOUNT W7029H

W7029H1

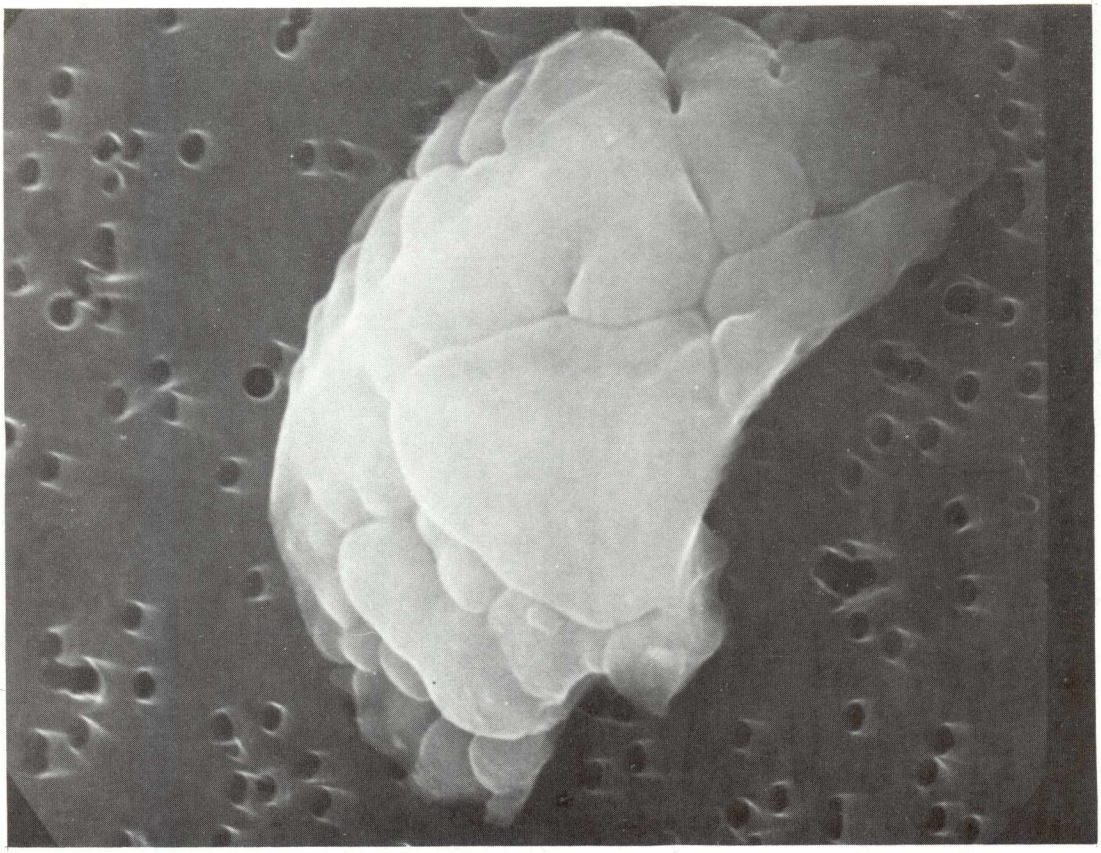


S-82-30197

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
8x13	I	T	CL/Pale Yellow	V	AOS	Unusually ellipsoidal for AOS.

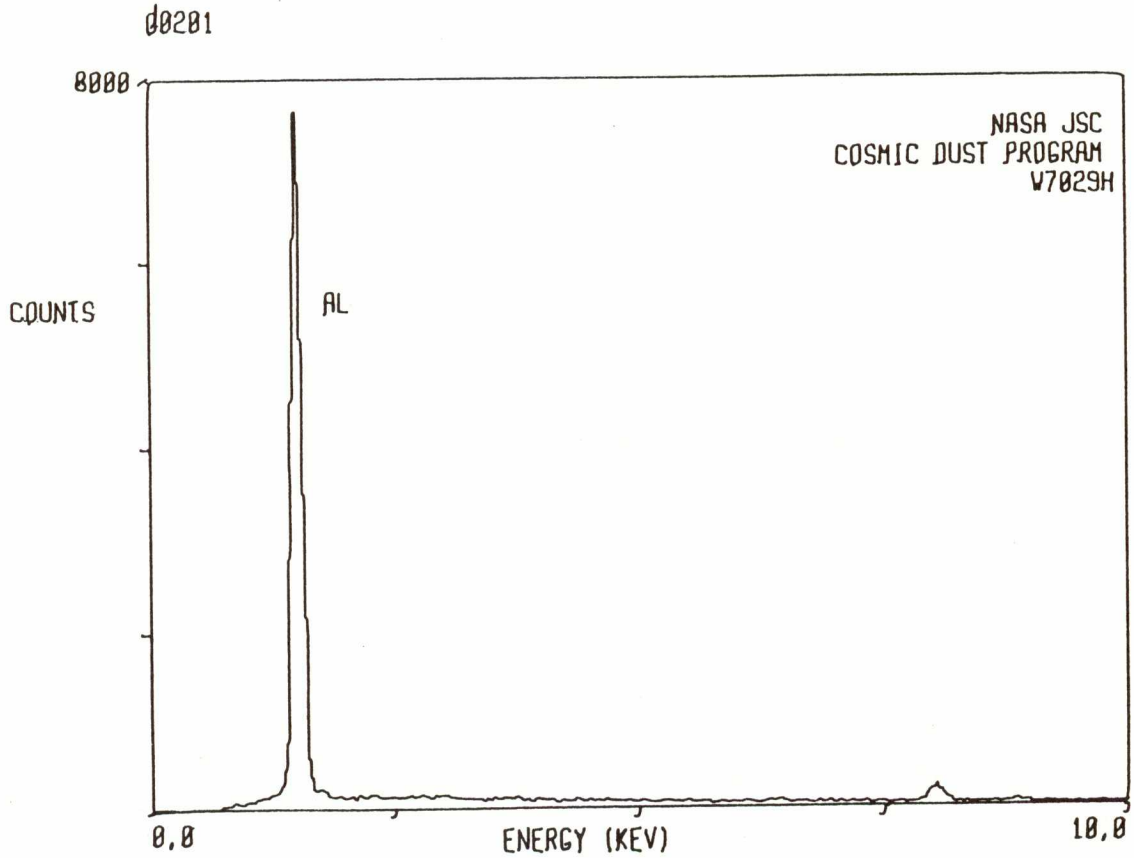


W7029H2

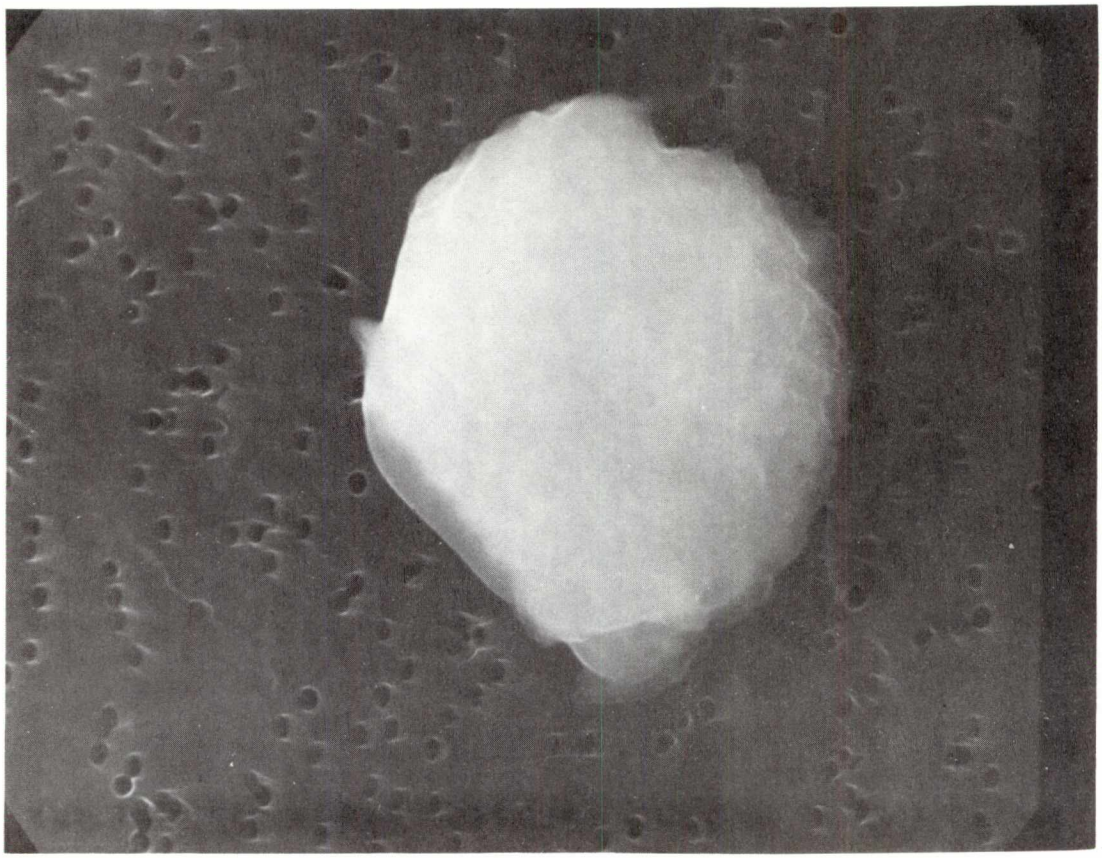


S-82-30198

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
9x11	I	TL	Pale Yellow	V	TCA?	Related to AOS?

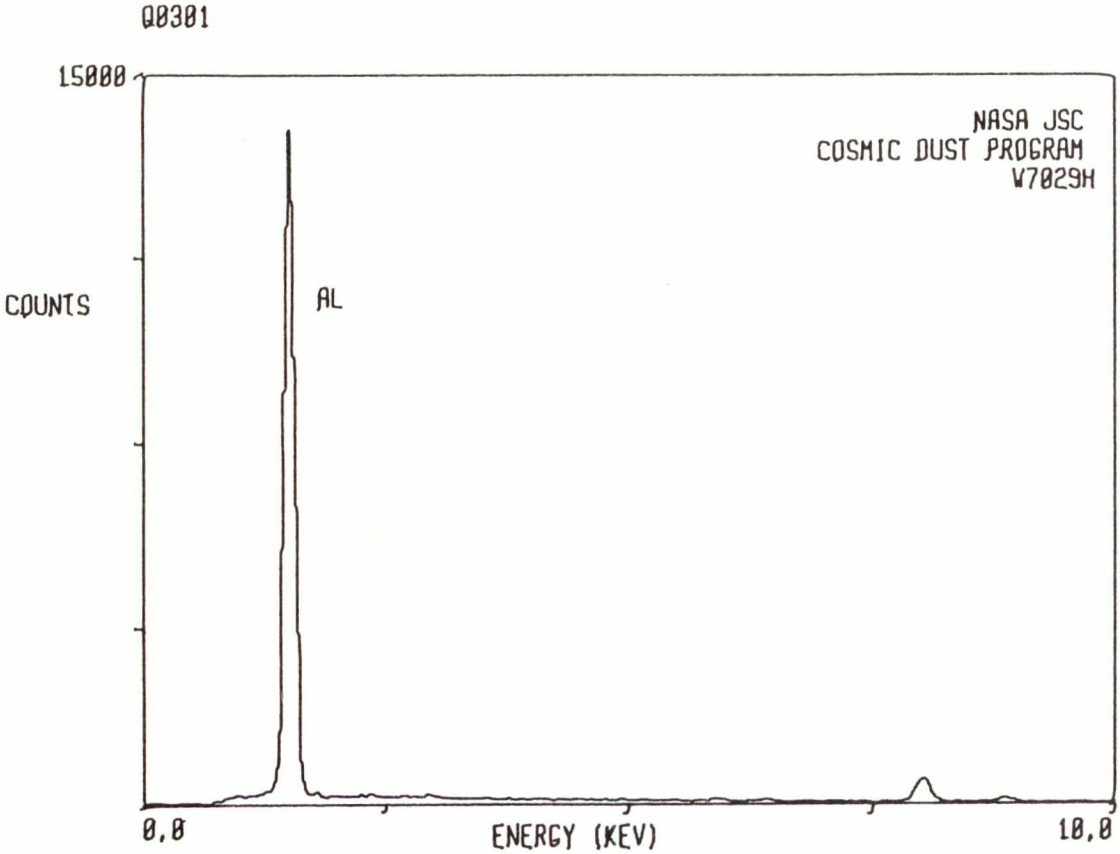


W7029H3

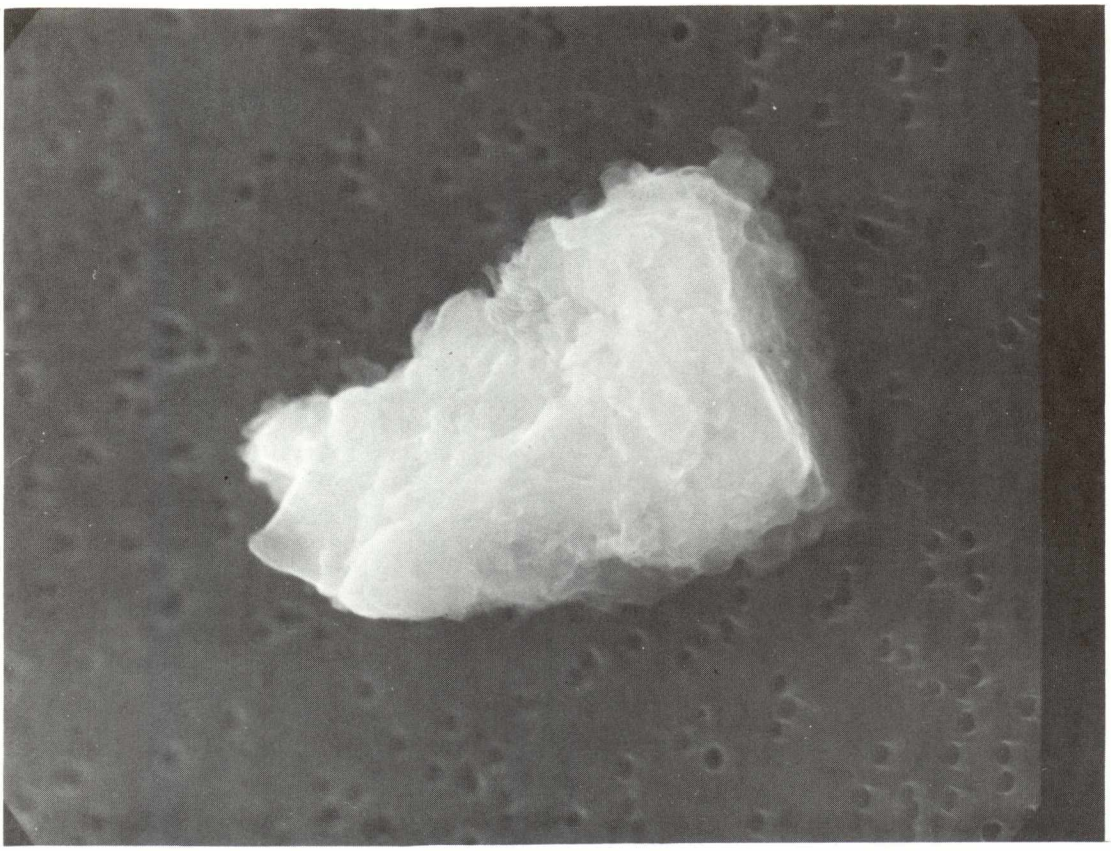


S-82-30199

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
7x9	E/I	O	Black	M	TCA?	

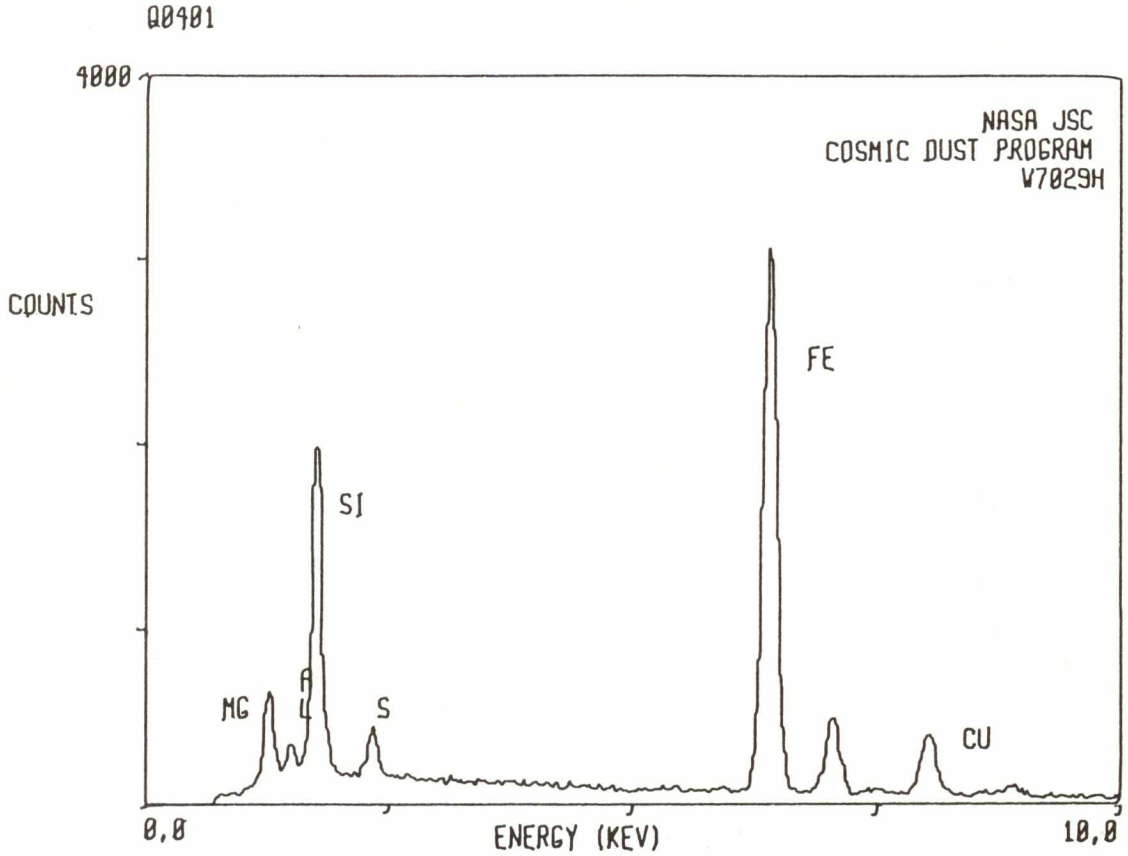


W7029H4

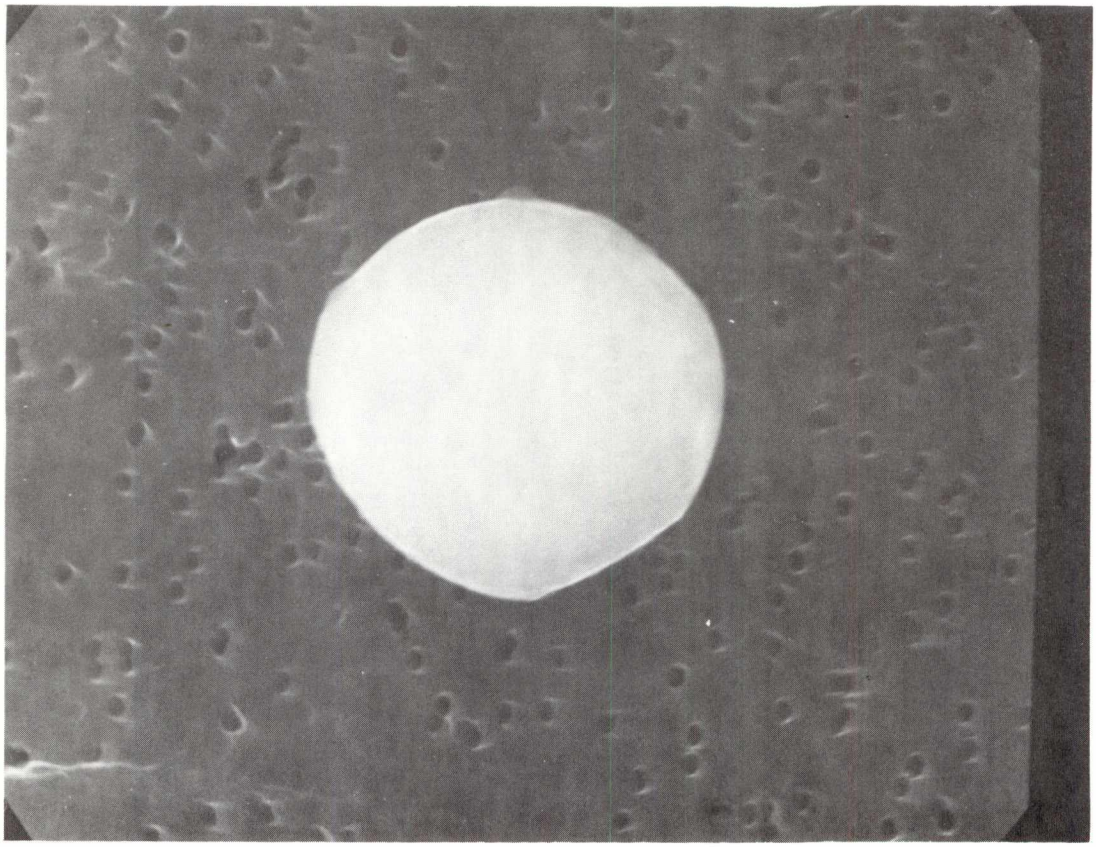


S-82-30200

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
6x9	I	O	Dk. Brown to Black	D/SV	C?	

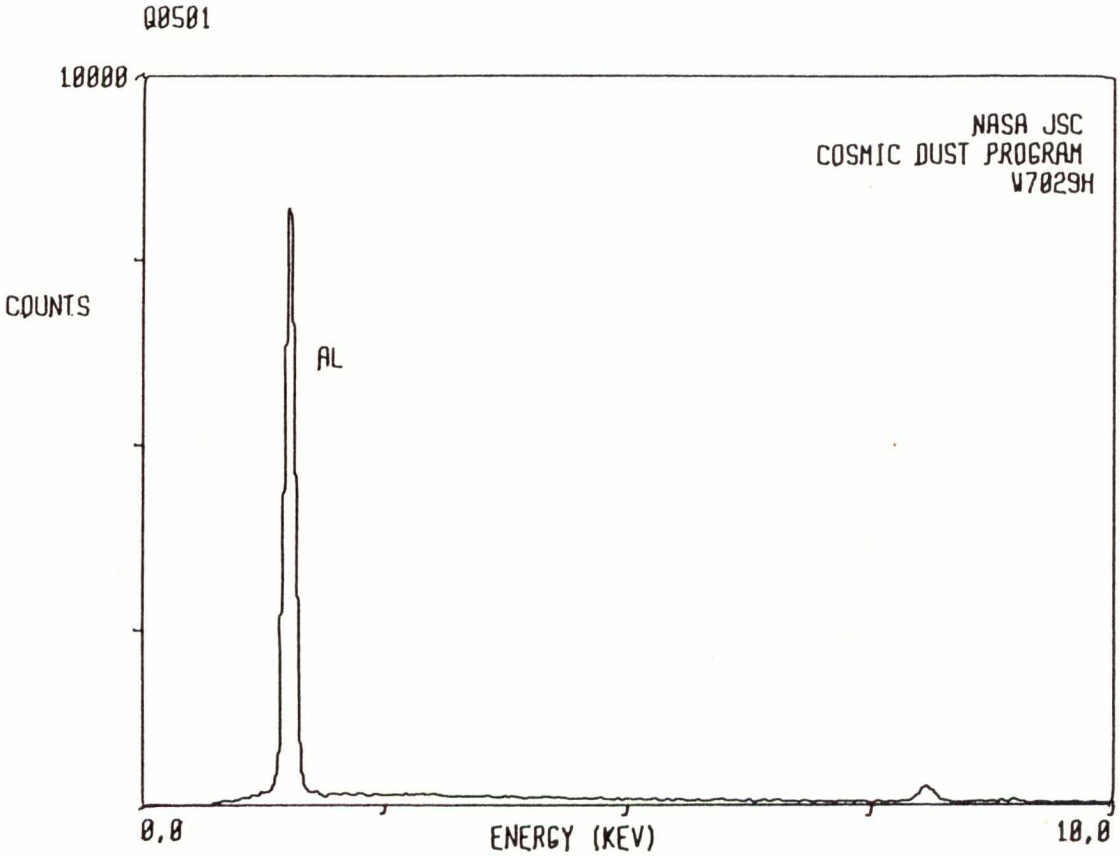


W7029H5

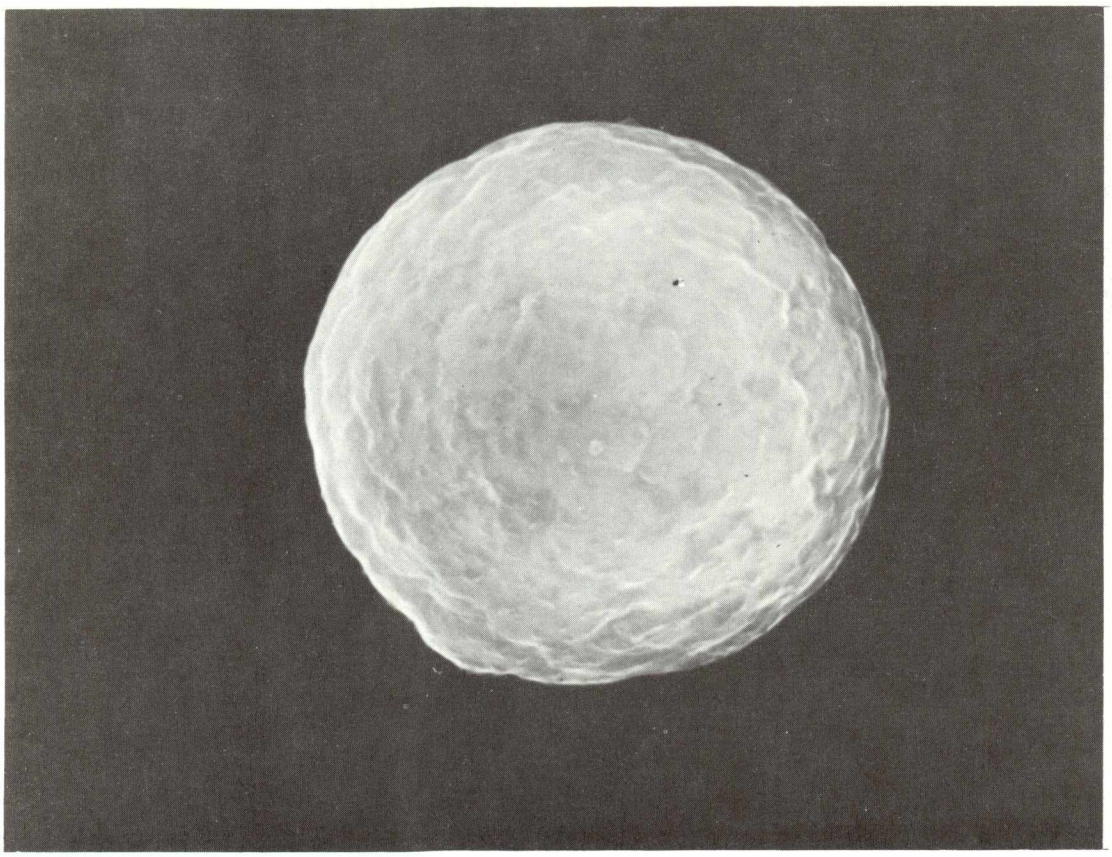


S-82-30201

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
6	S	T	CL/Pale Yellow	V	AOS	

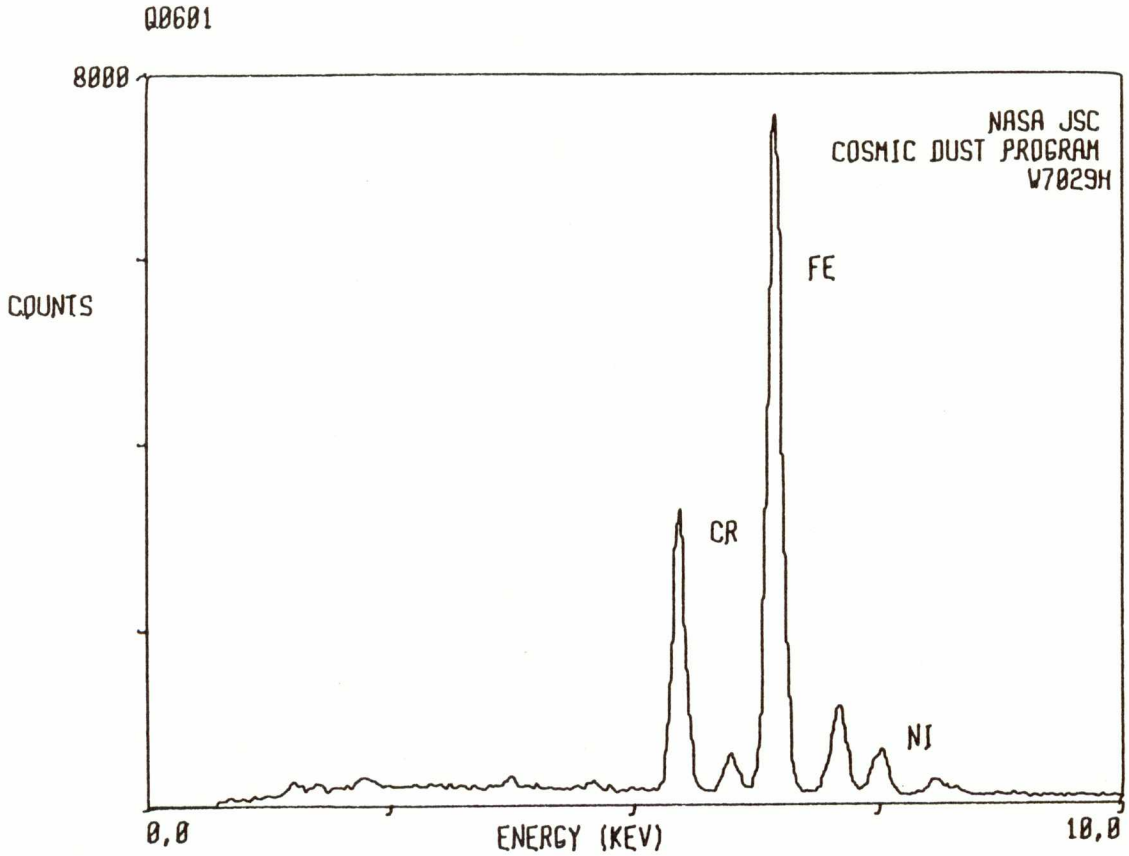


W7029H6

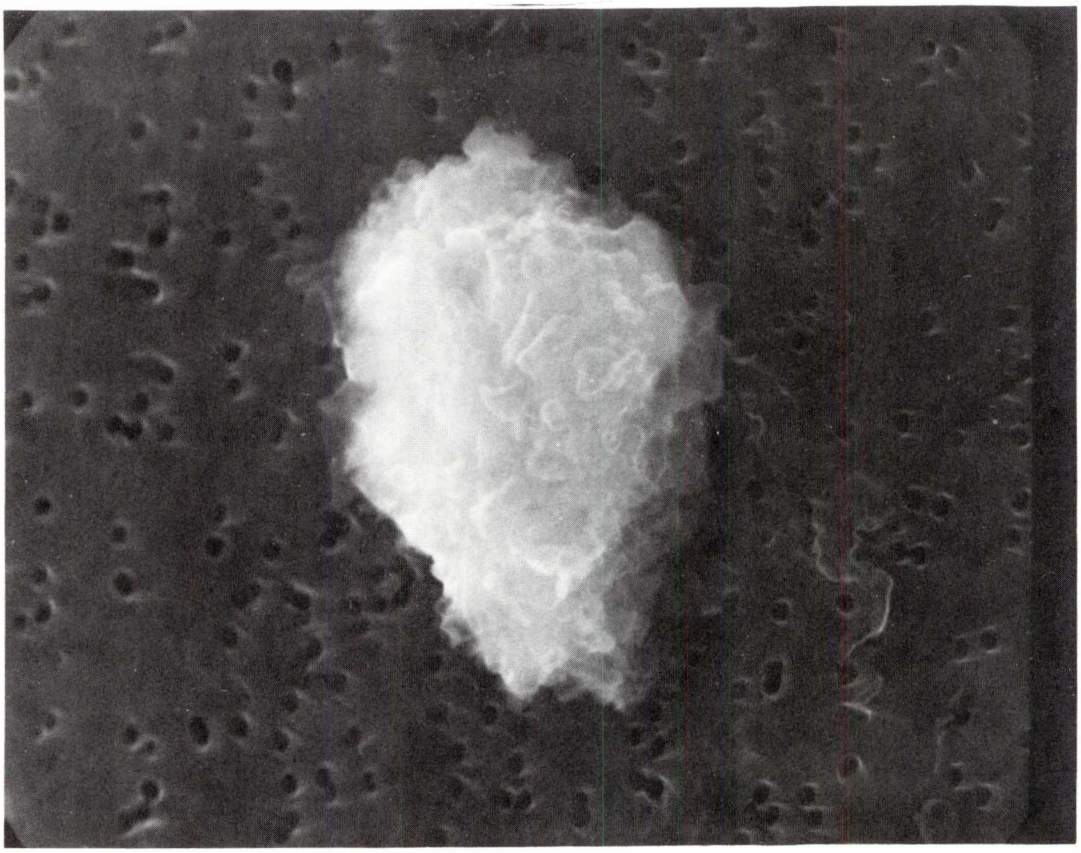


S-82-30202

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
7	S	0	Black	M	TCA?	

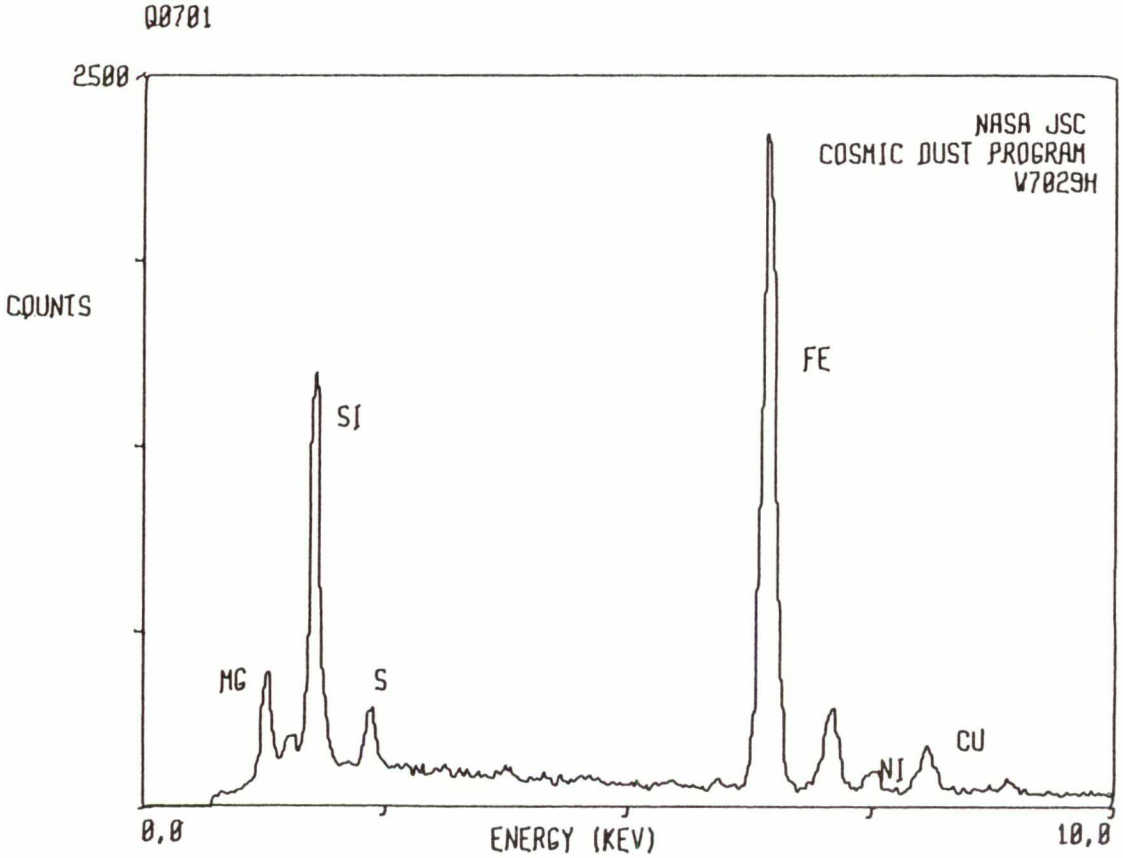


W7029H7



S-82-30203

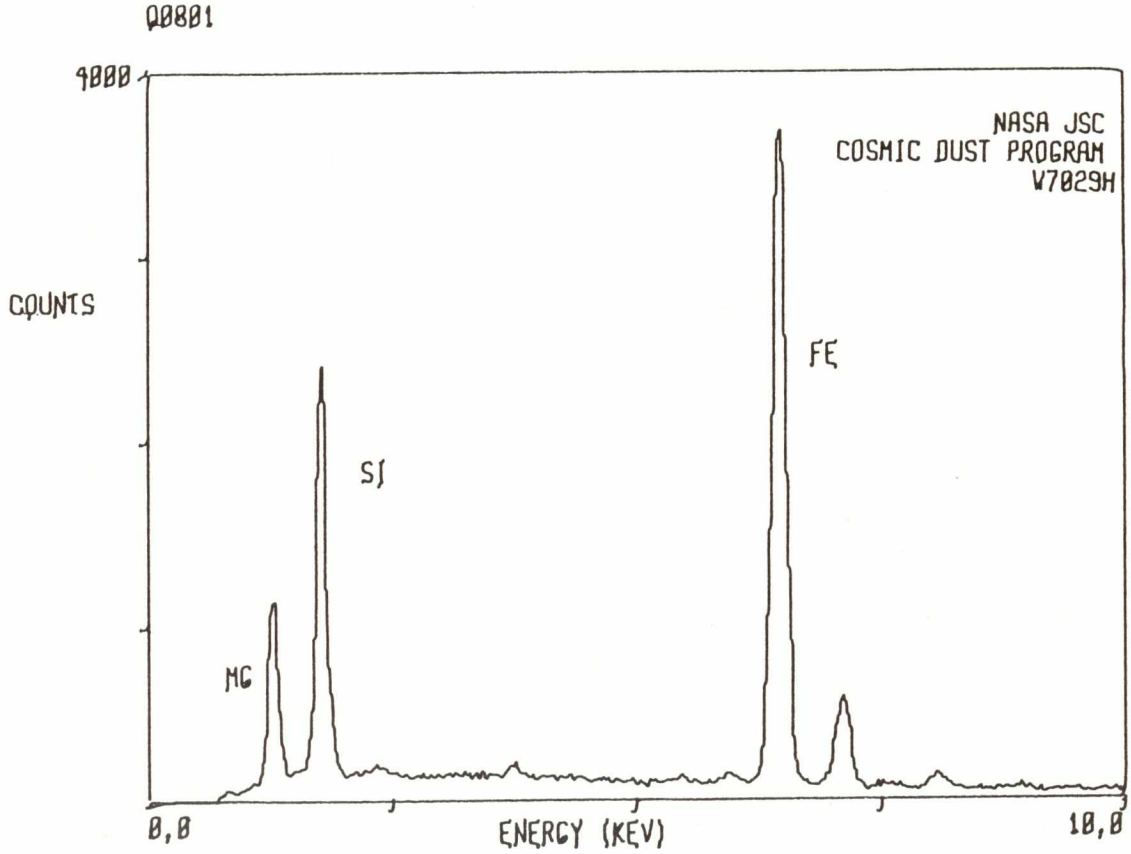
SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
6x9	I	O	Dk. Gray to Black	D/SM	C	



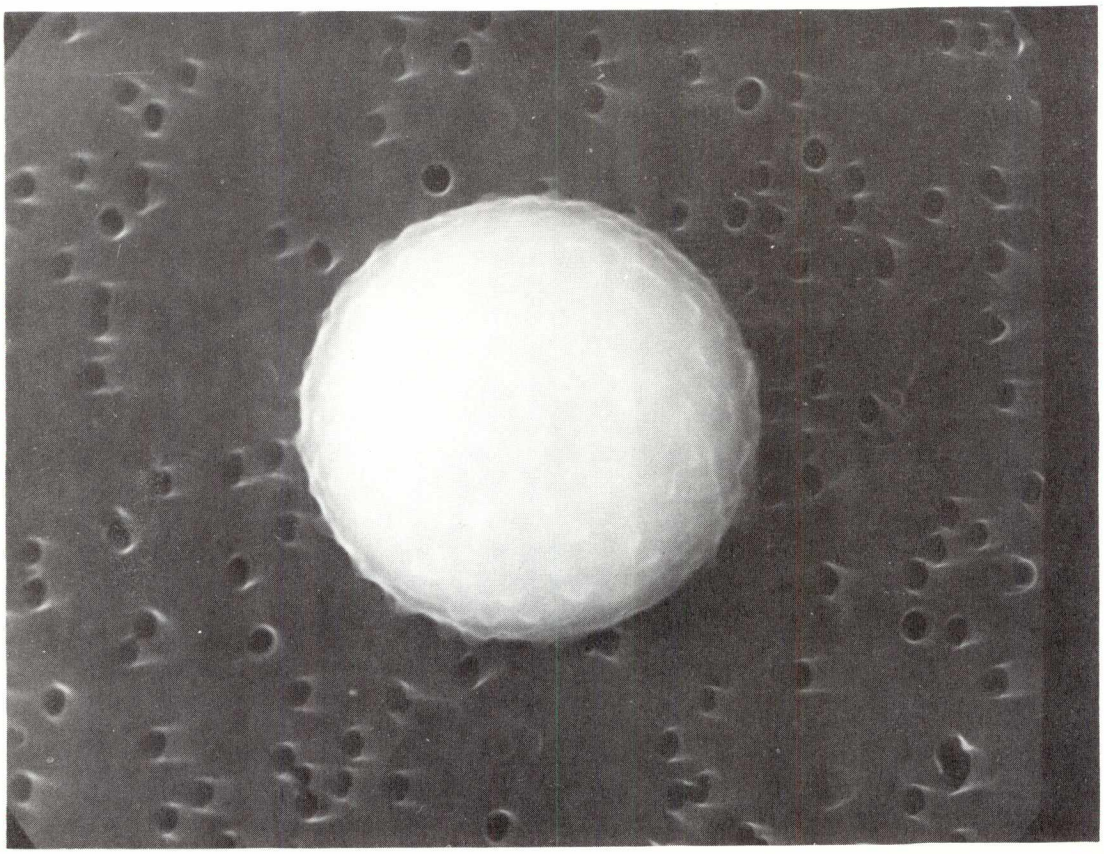
W7029H8

S-82-30204

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
14x15	I	TL	Yellow-Brown	SV	C	

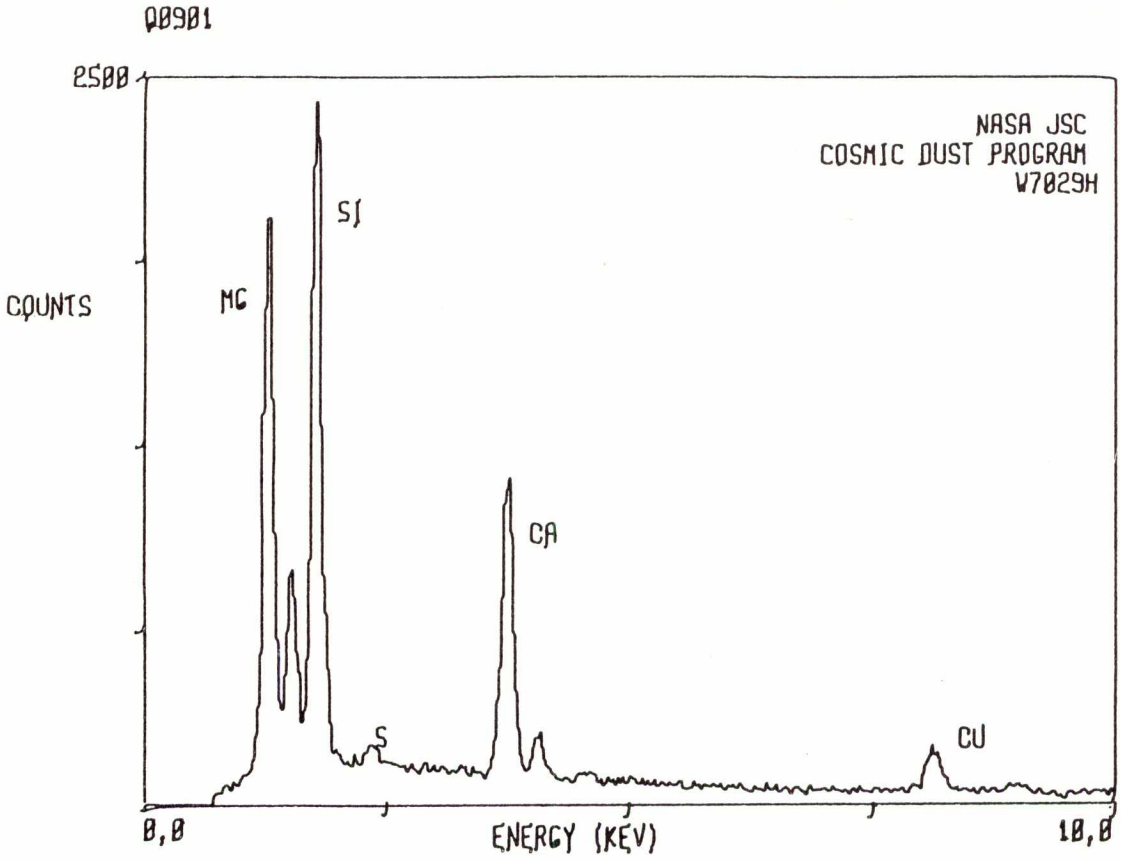


W7029H9

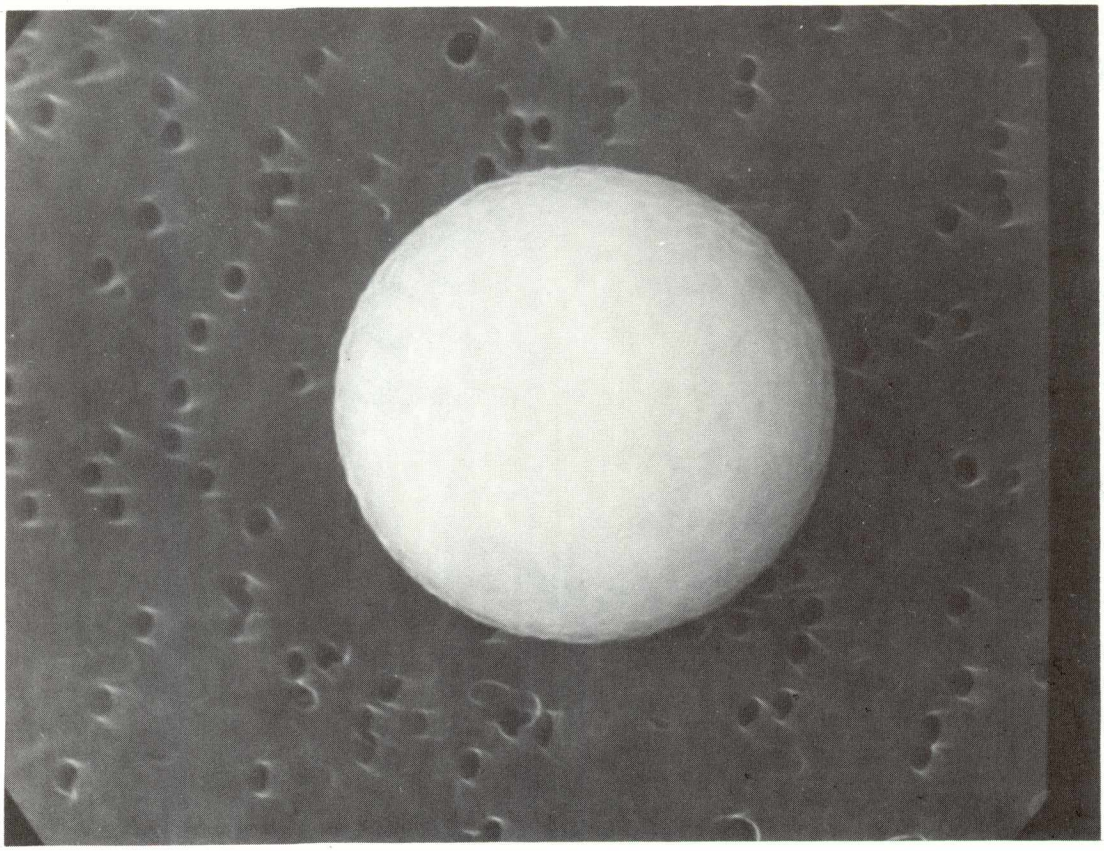


S-82-30205

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
5	S	T	CL/Pale Yellow	V	C	

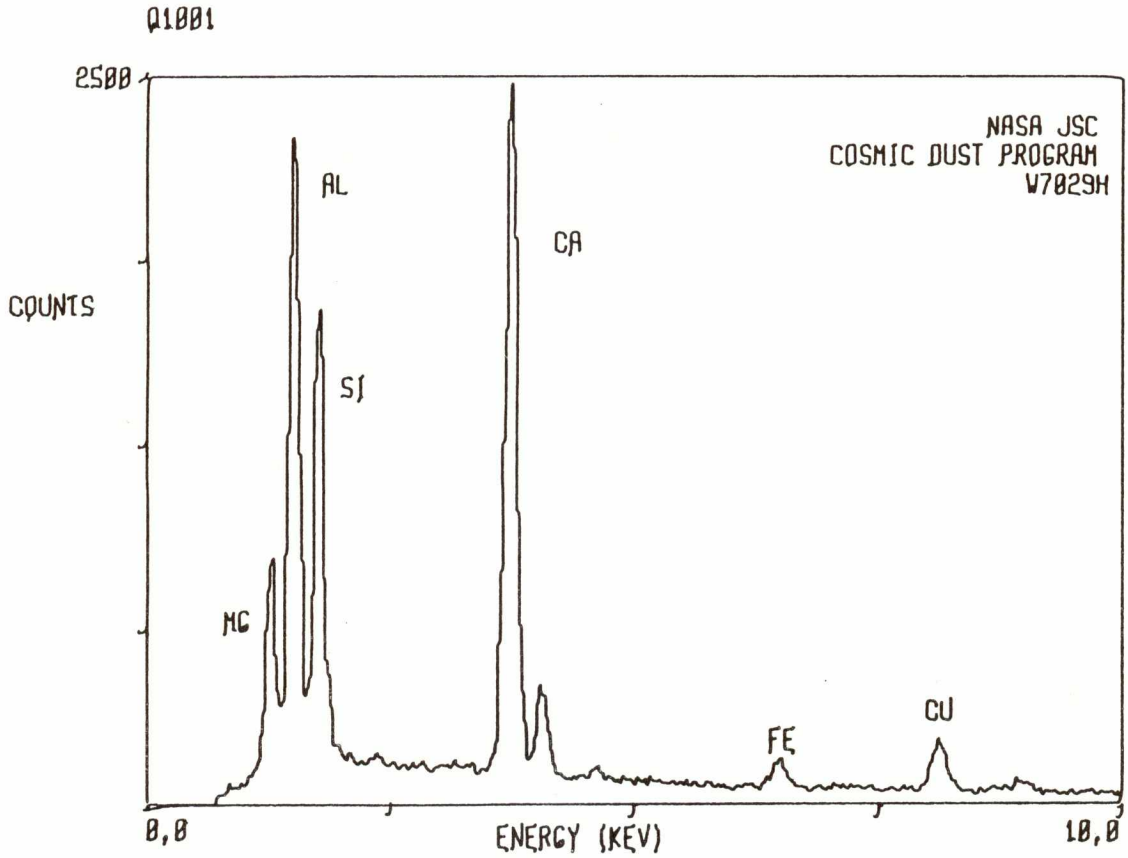


W7029H10

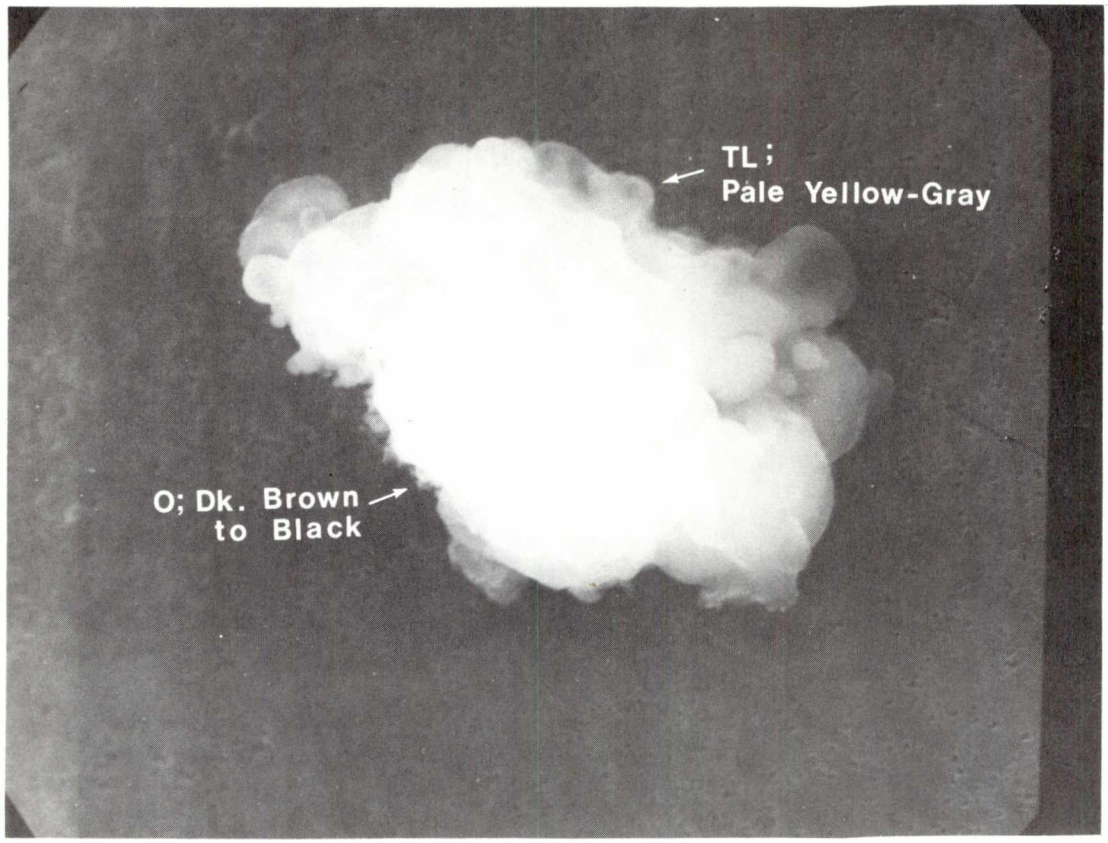


S-82-30206

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
6	S	T	CL/Pale Yellow	V	?	

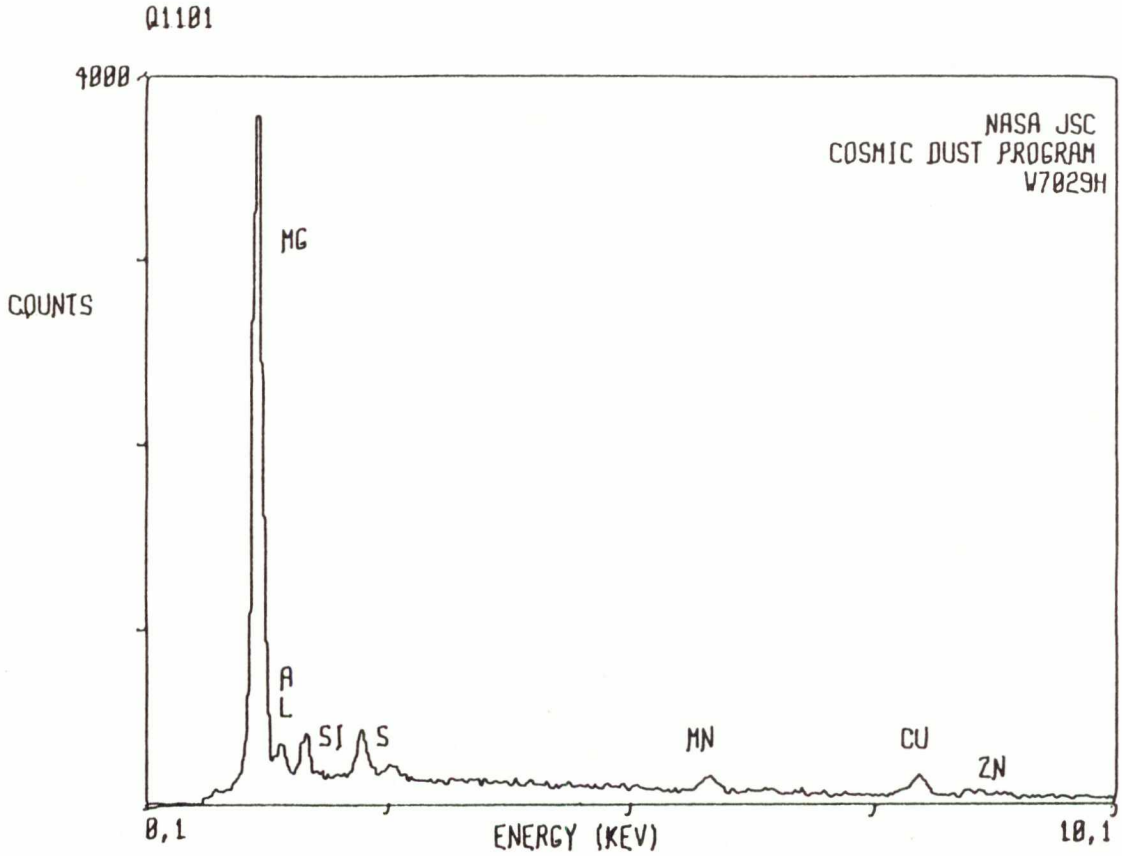


W7029H11

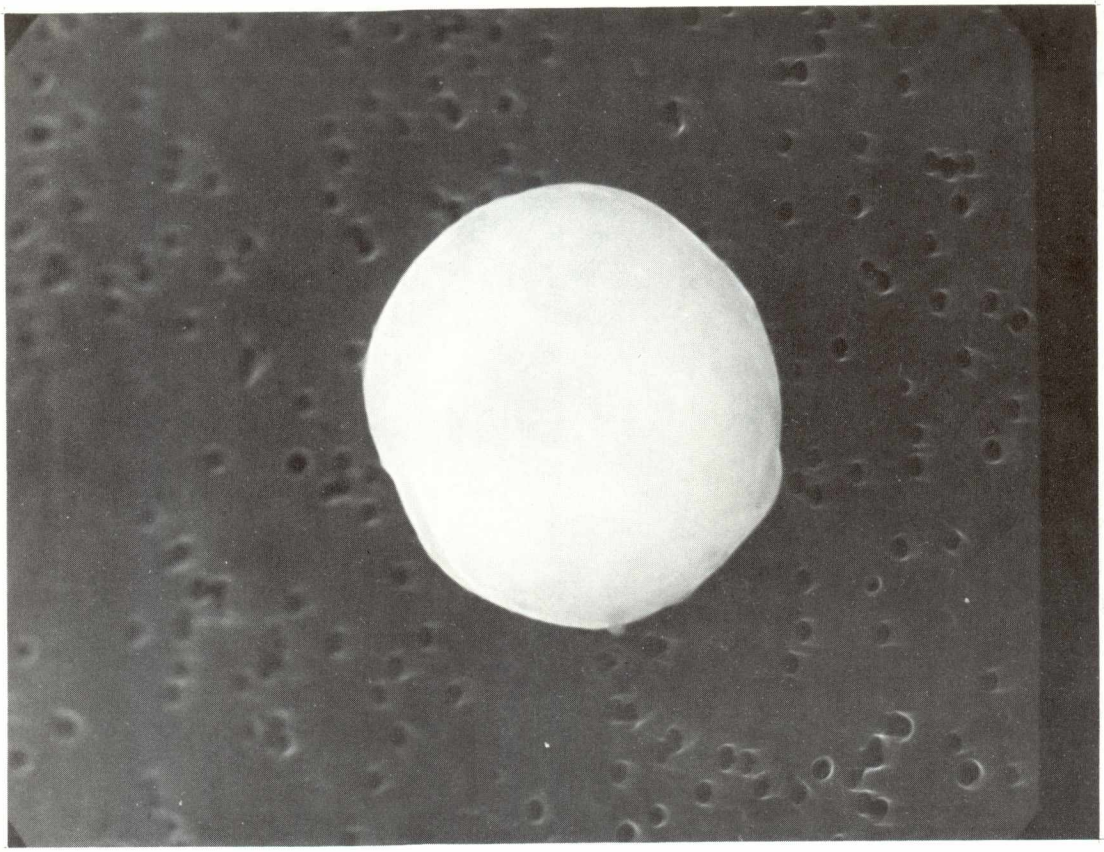


S-82-30207

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
20x30	I	TL/O	(See above)	V	TCA?	TL mantle on O core as shown above.

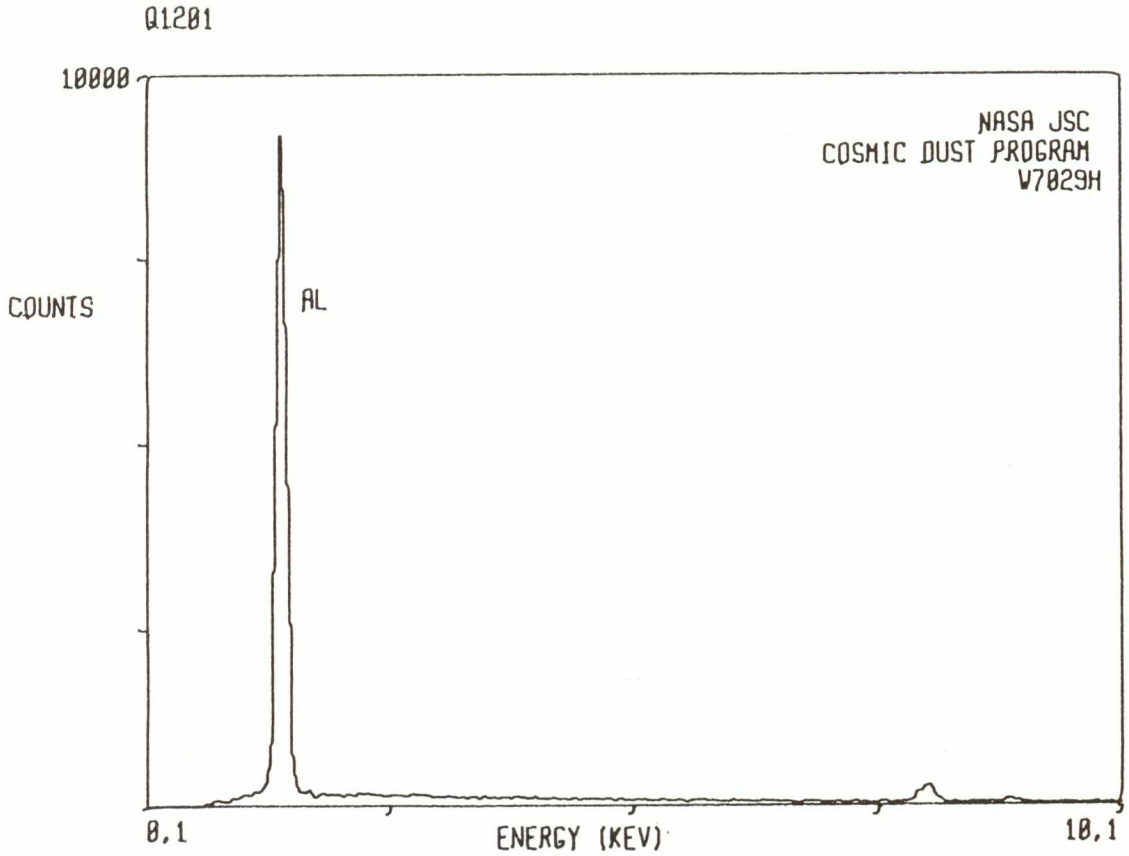


W7029H12

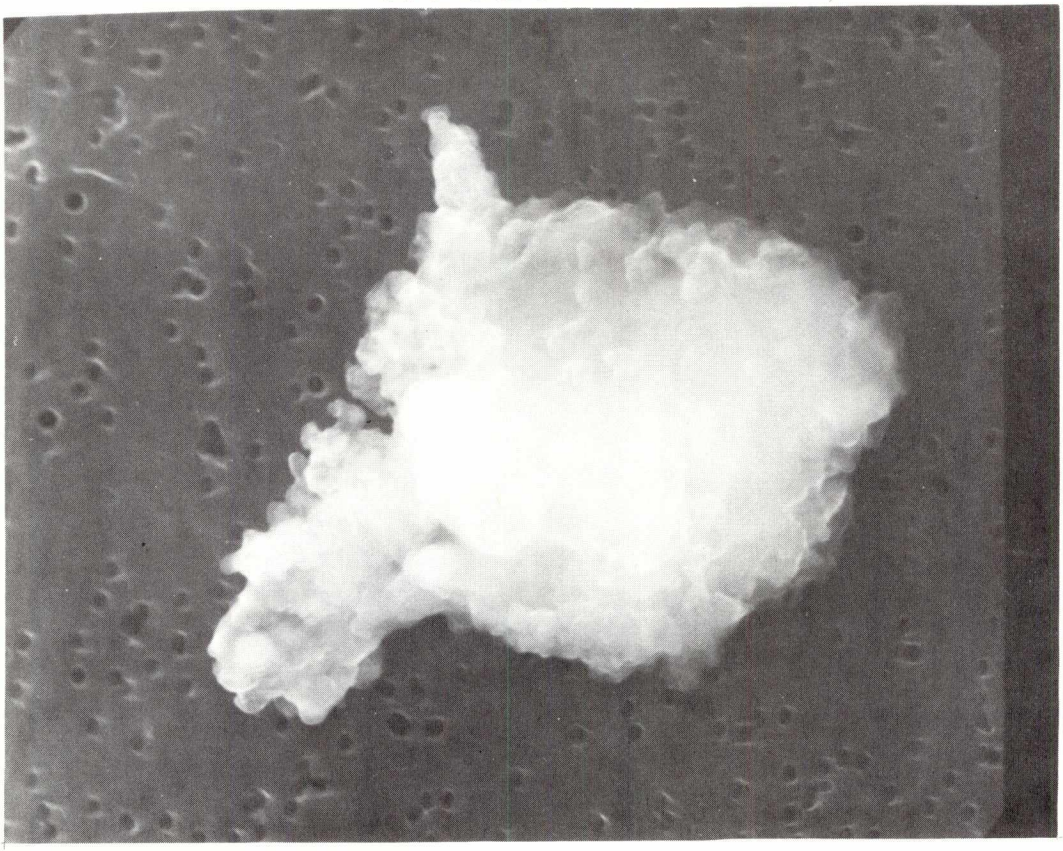


S-82-30208

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
7	S	T	CL/Pale Yellow	V	AOS	

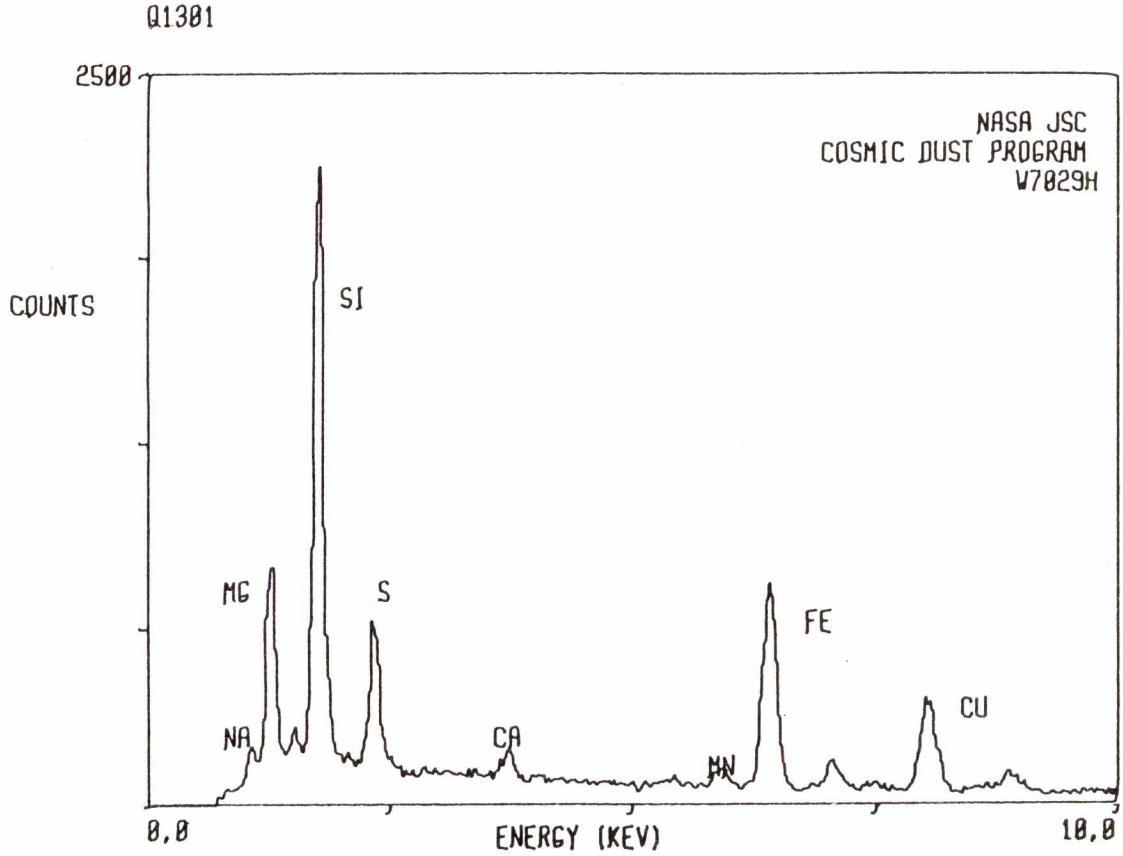


W7029H13

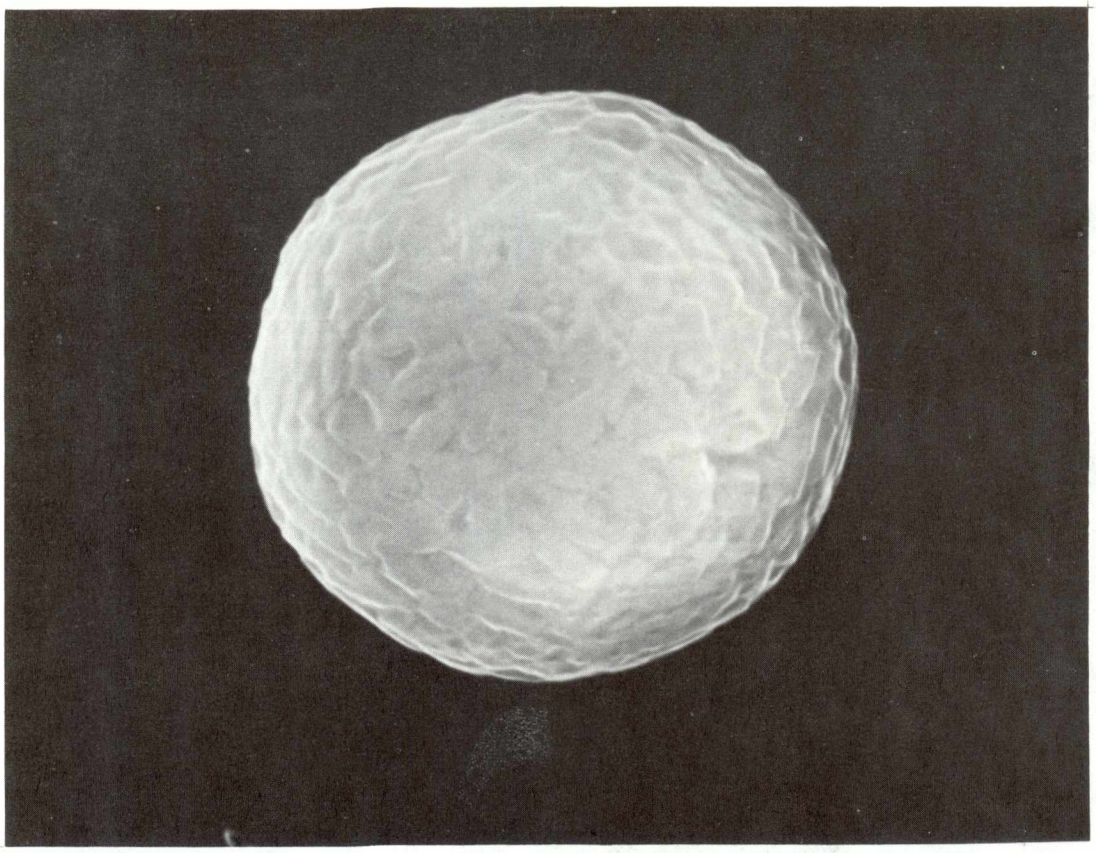


S-82-30209

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
11x14	I	O/TL	Pale Gray to Black	D/SV	C?	Two fragments (one shown above)



W7029H14

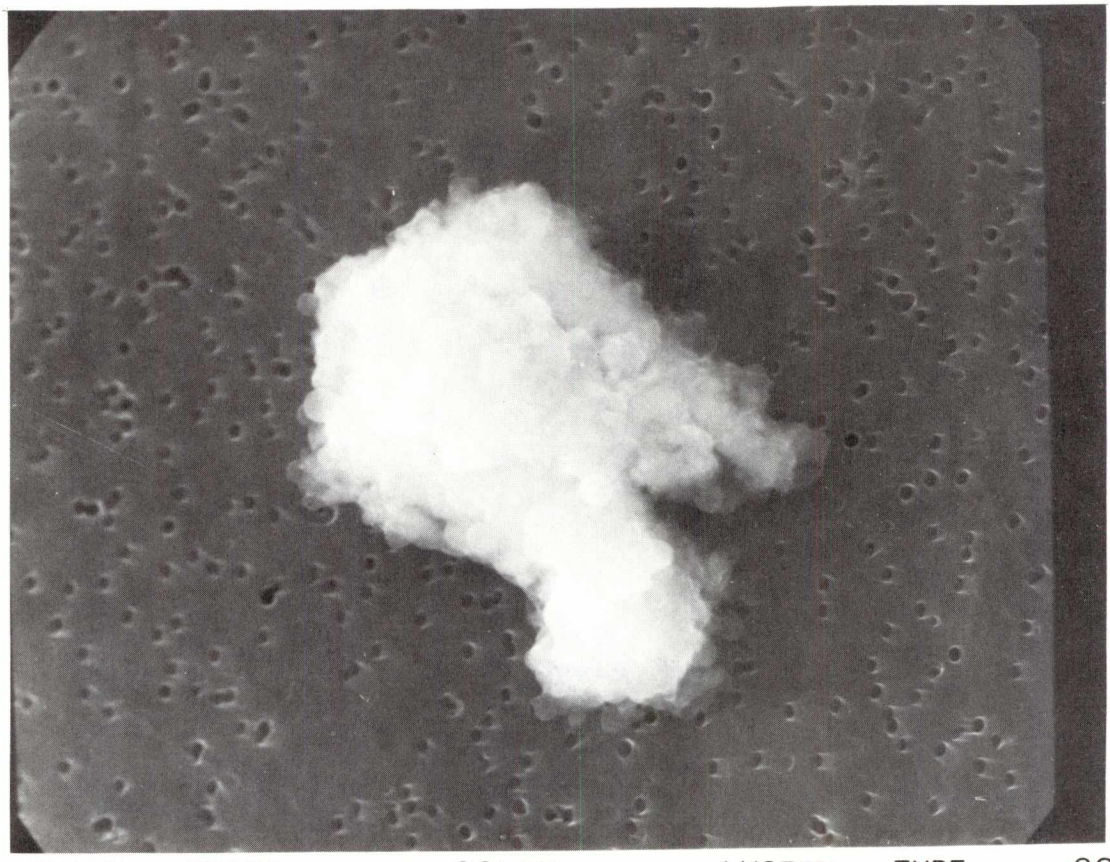


S-82-30210

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
7	S	0	Black	M	?	Lost prior to EDS analysis

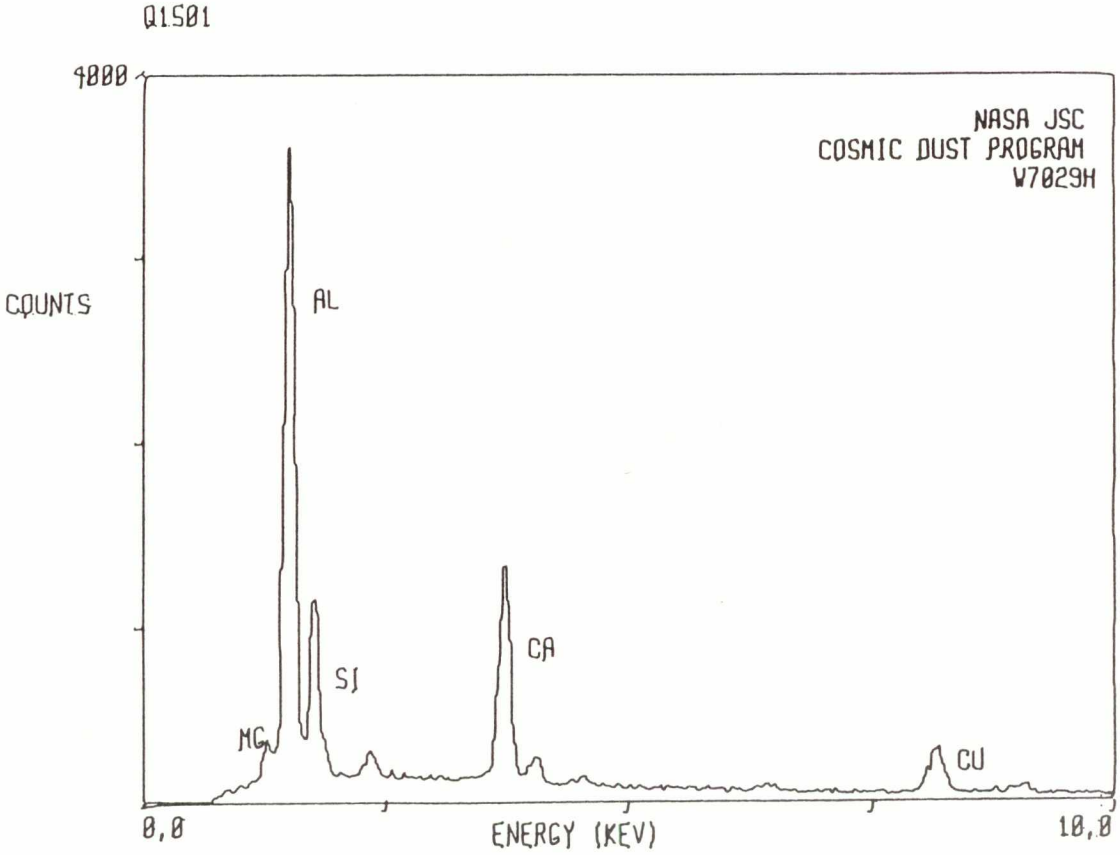
SAMPLE LOST PRIOR TO EDS

W7029H15

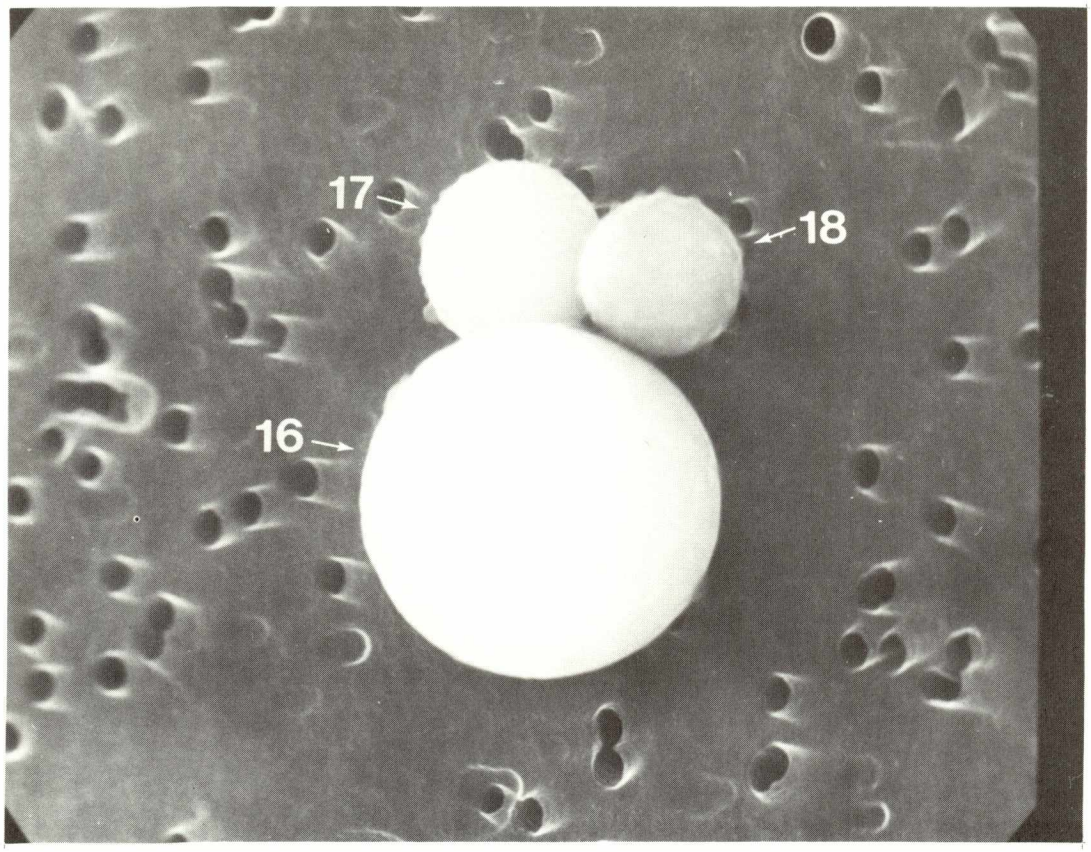


S-82-30211

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
9x13	I	O	Dk. Gray to Black	D/SV	?	

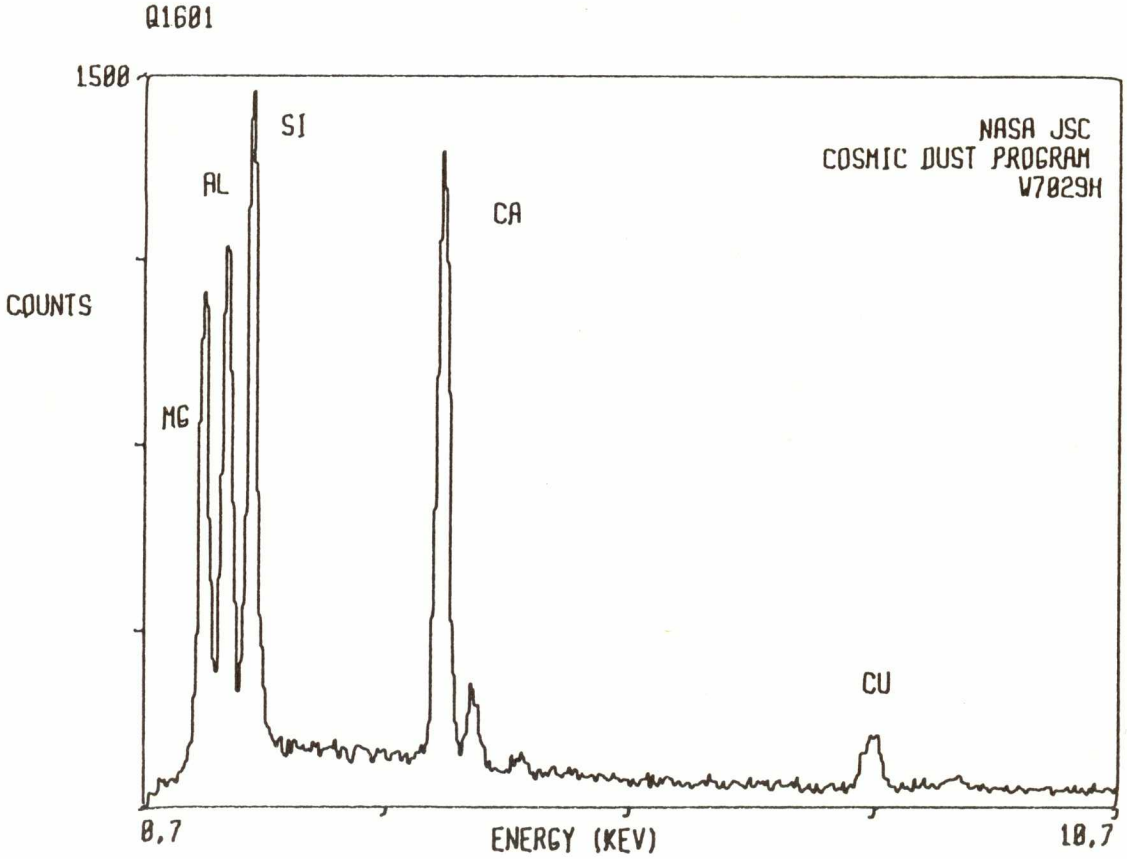


W7029H16



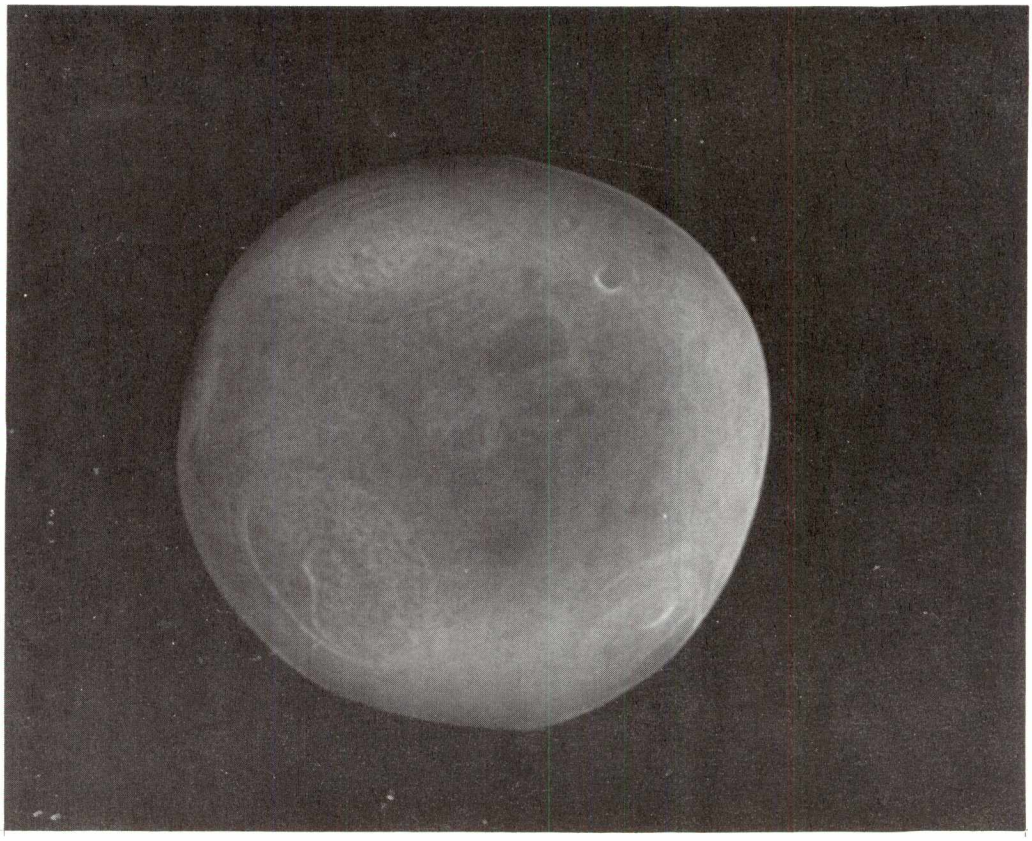
S-82-30212

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
3	S	T	CL/Pale Yellow	V	?	AOS particles W7029H17 and 18 are attached.



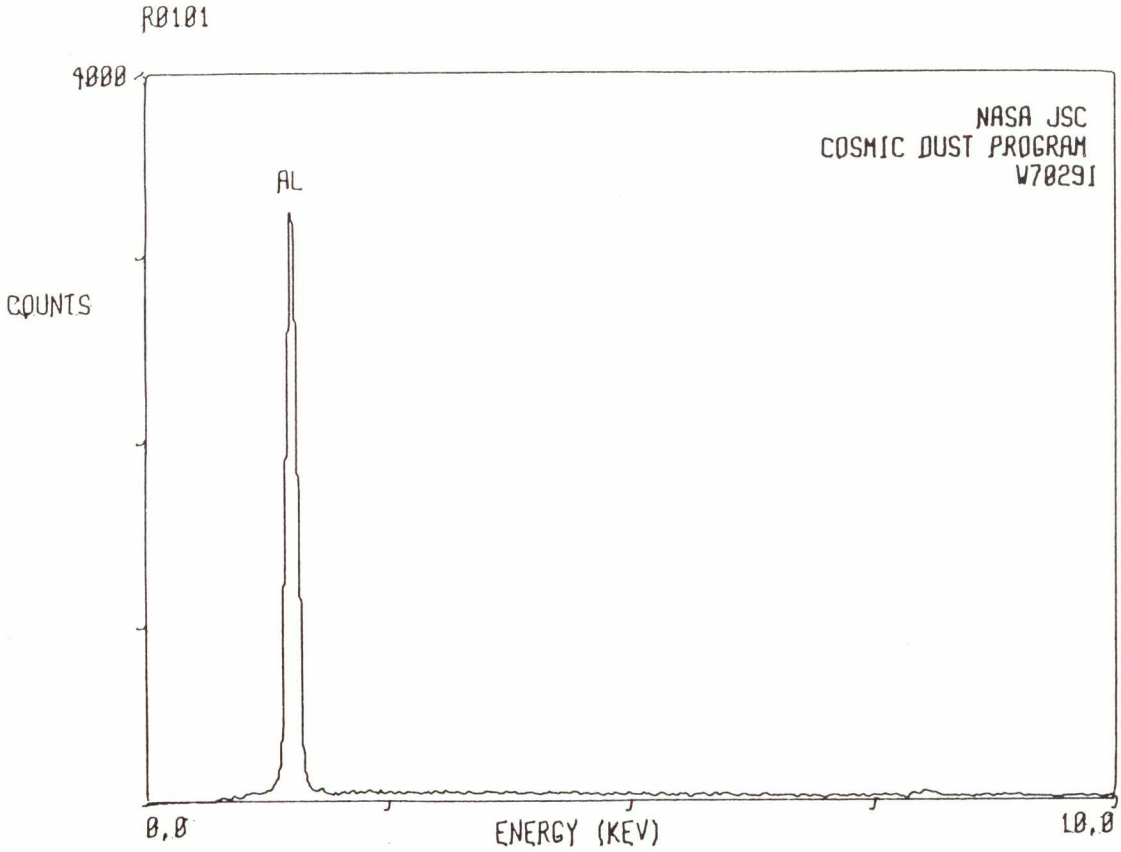
MOUNT W7029I

W702911

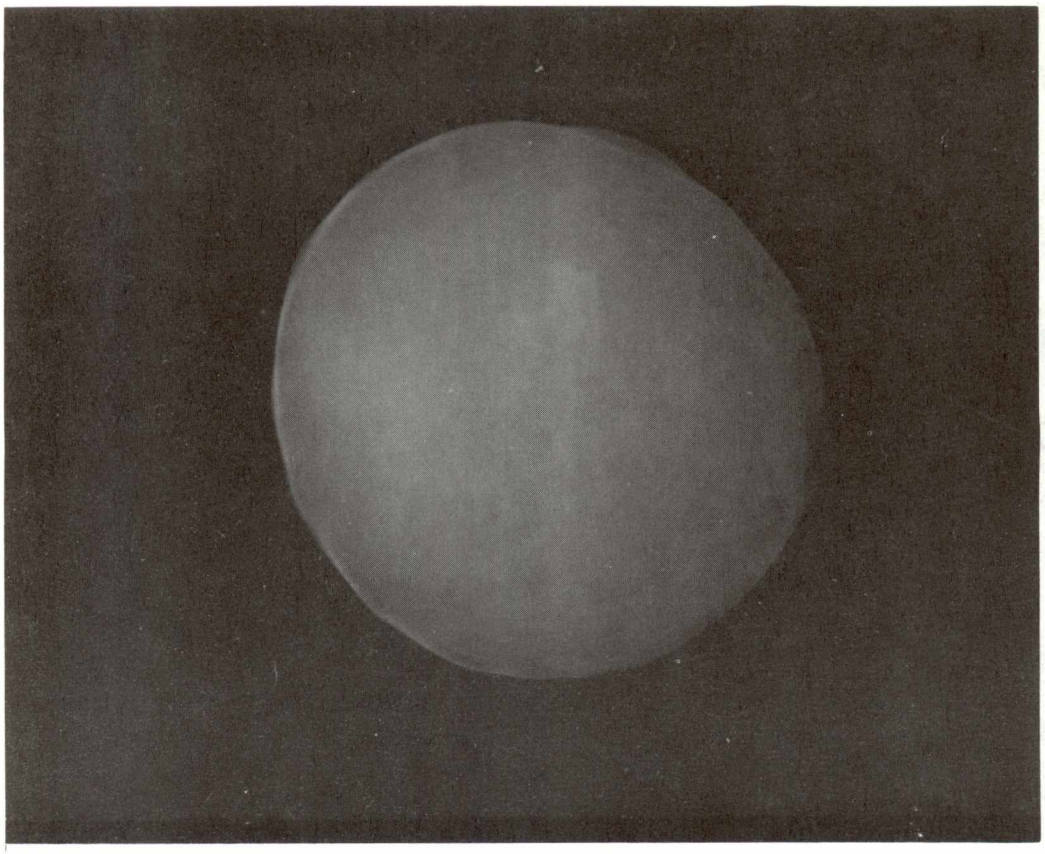


S-82-29592

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
12	S	T	CL/Pale Yellow	V	AOS	

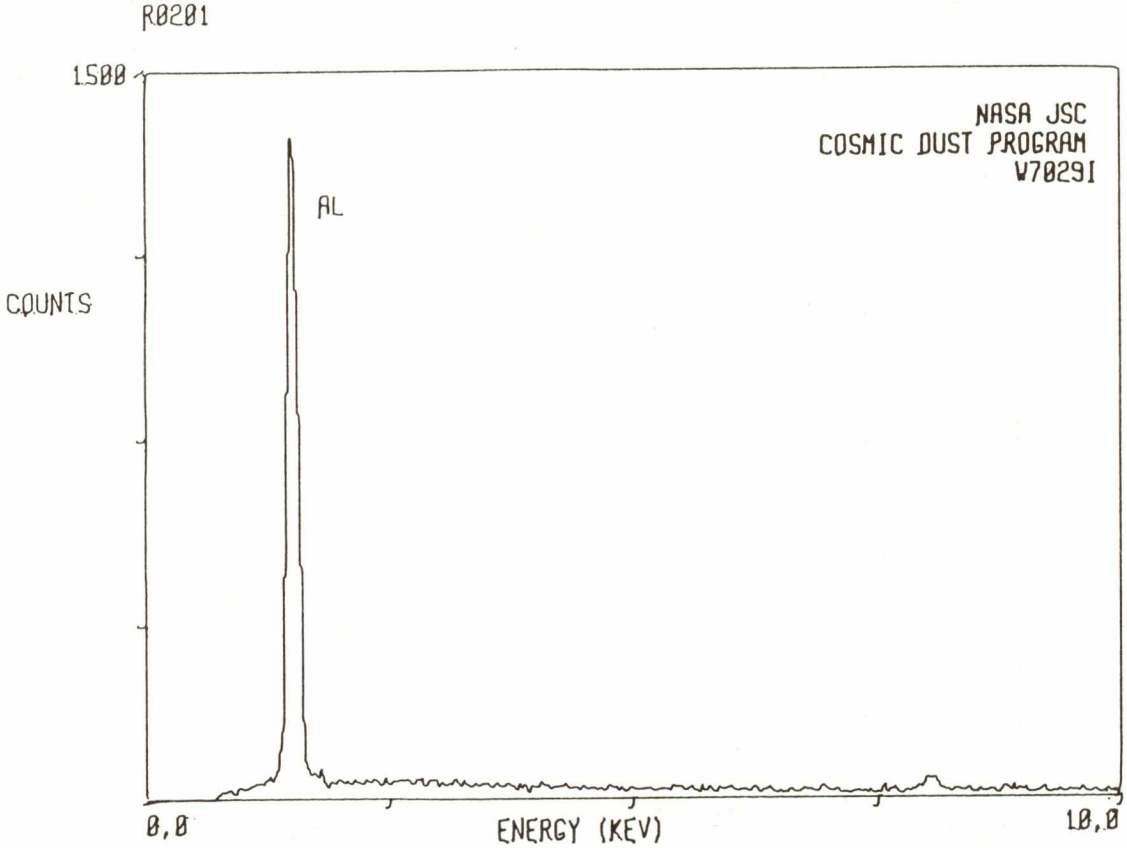


W702912

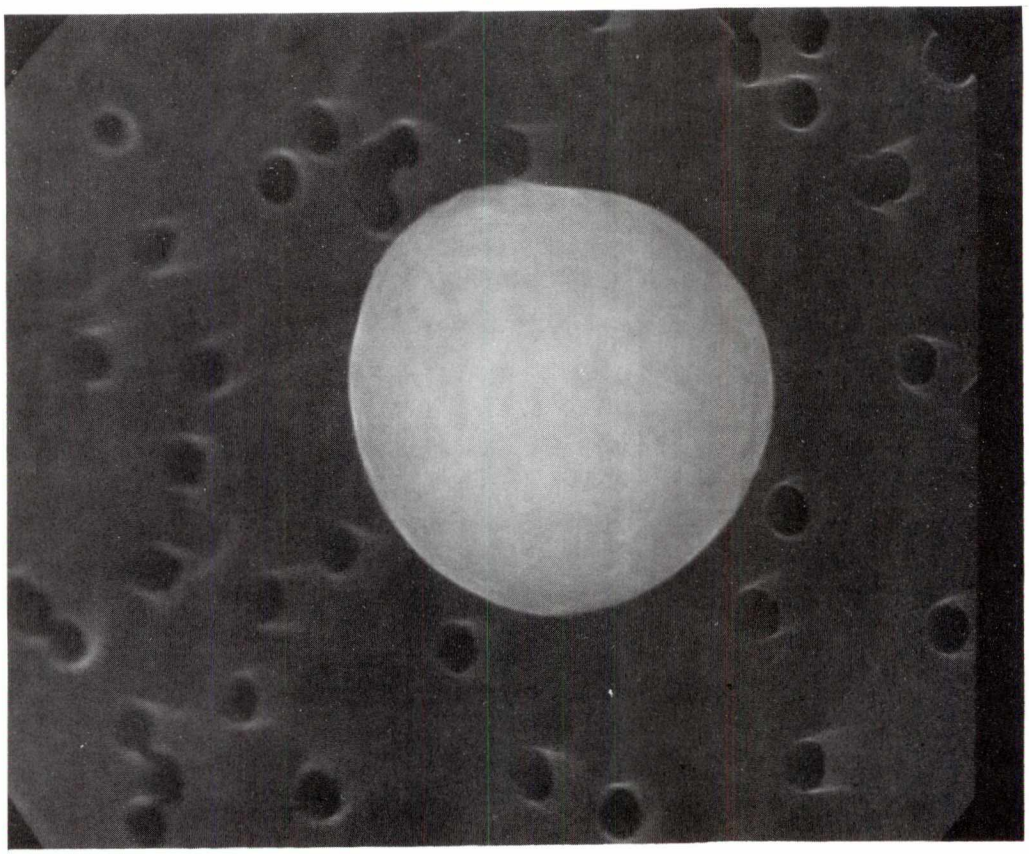


S-82-29591

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
4	S	T	CL/Pale Yellow	"	AOS	Associated with W702911.

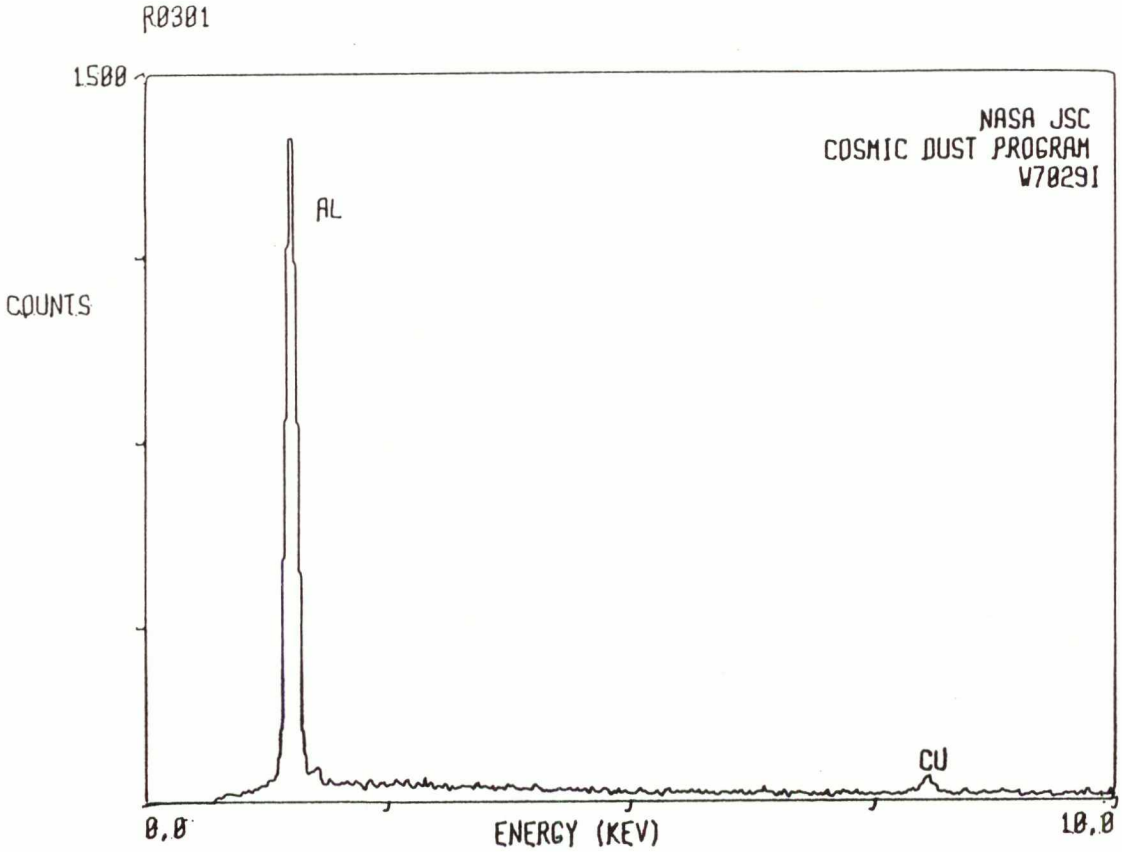


W702913

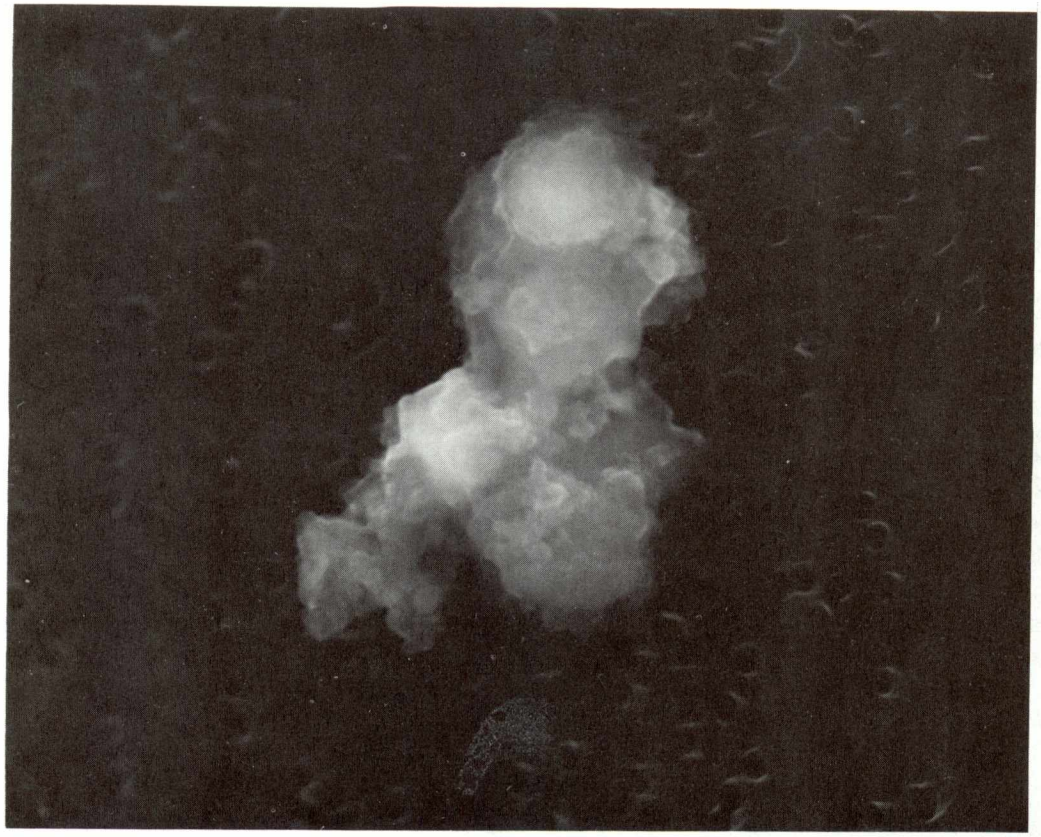


S-82-29590

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
3	S	T	CL/Pale Yellow	V	AOS	Associated with W702911.

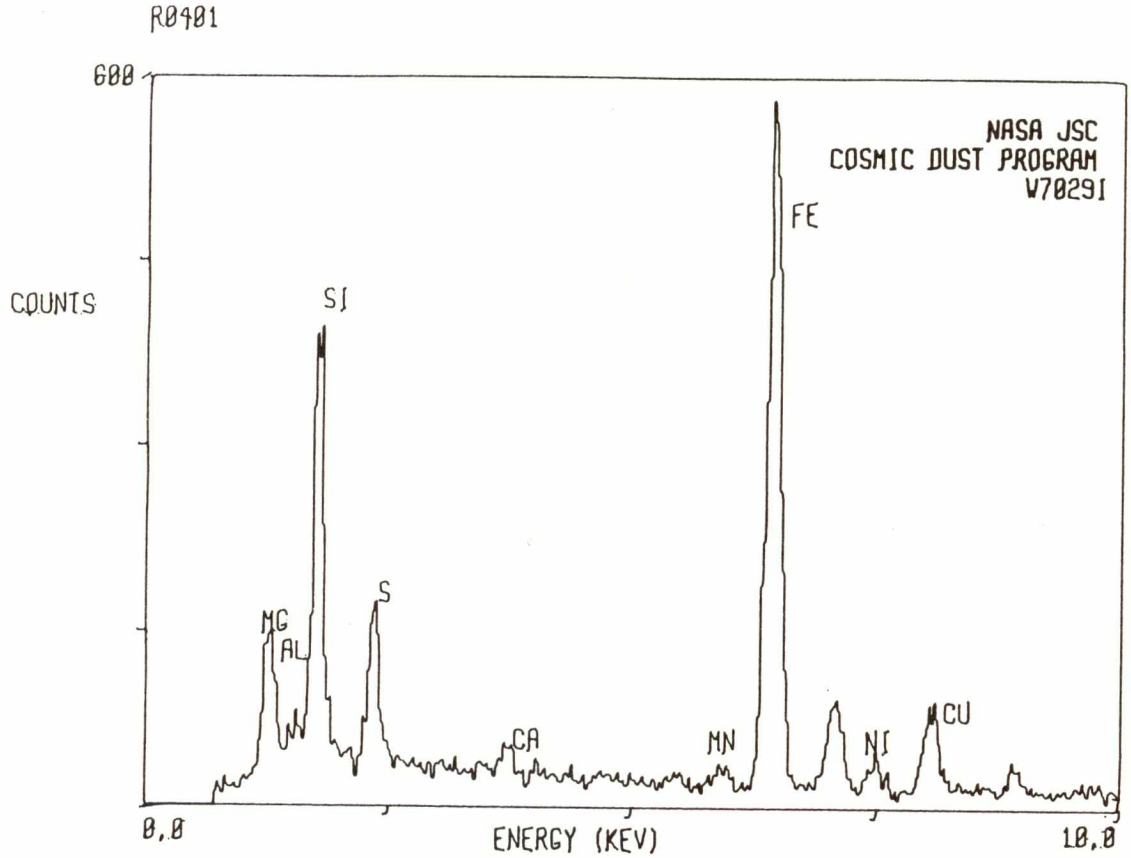


W702914

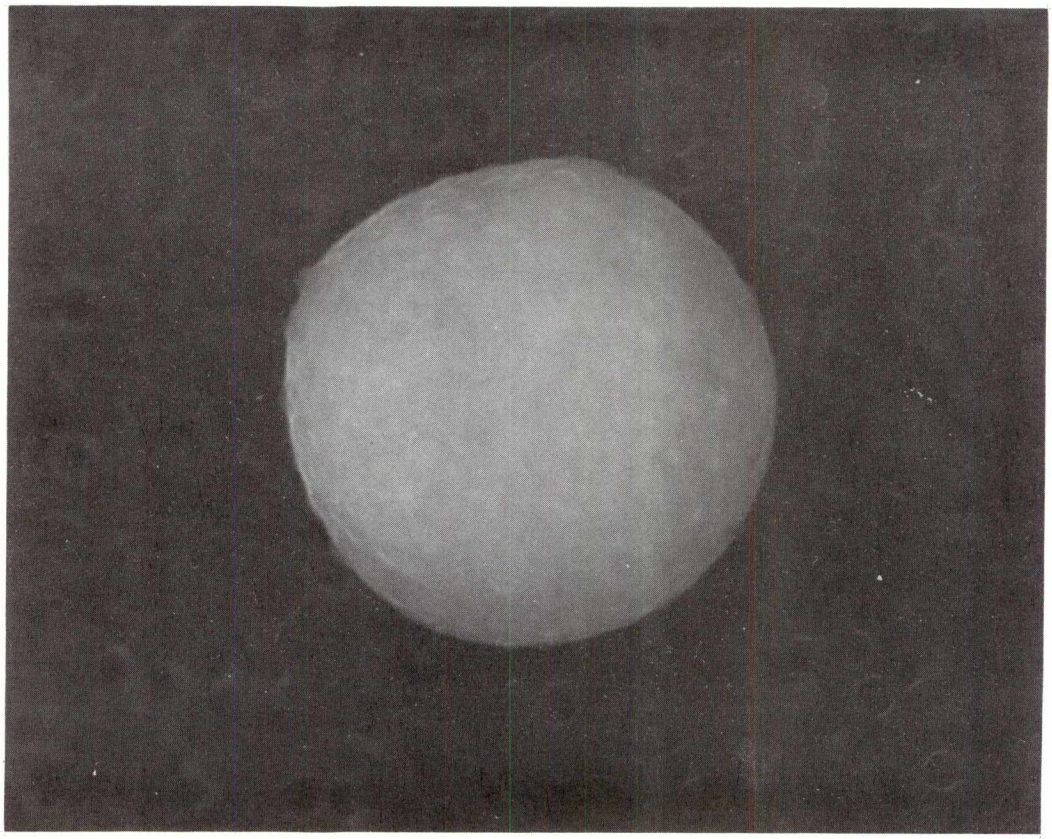


S-82-29589

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
4x7	I	O	Golden Brown to Black	D/SM	C?	

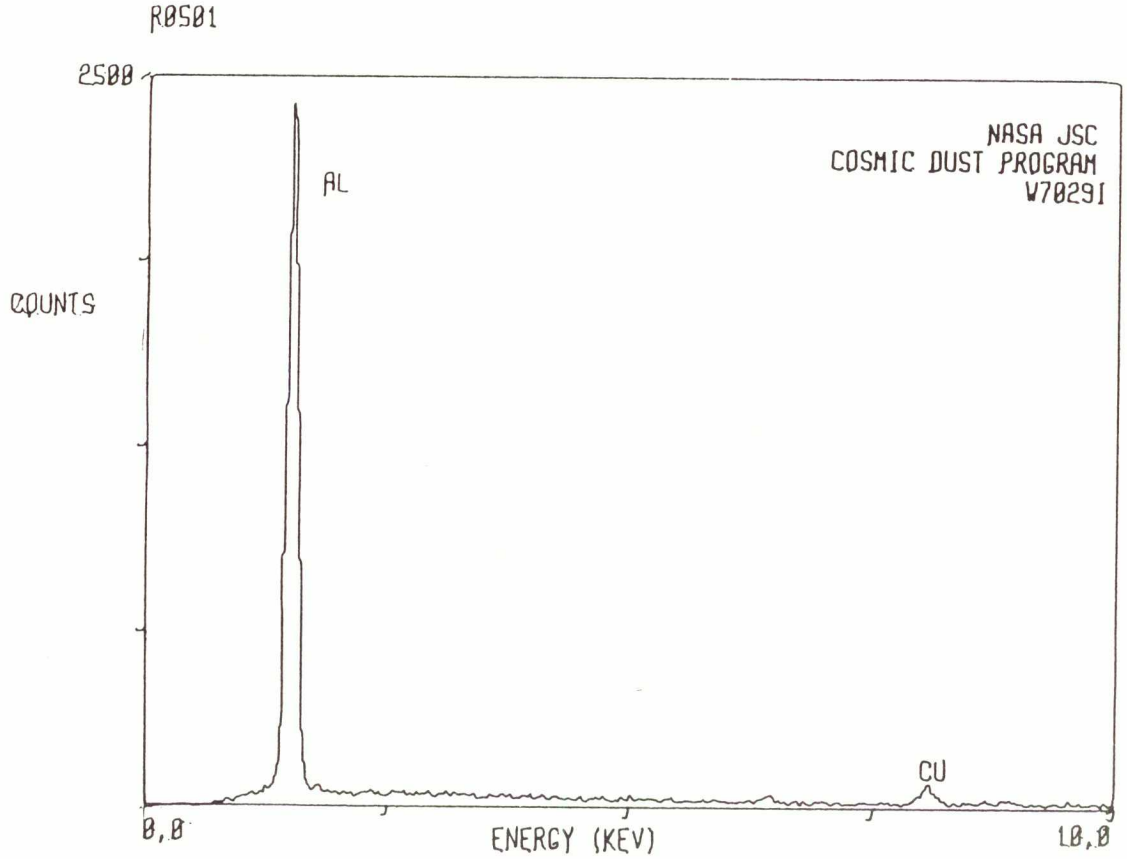


W702915

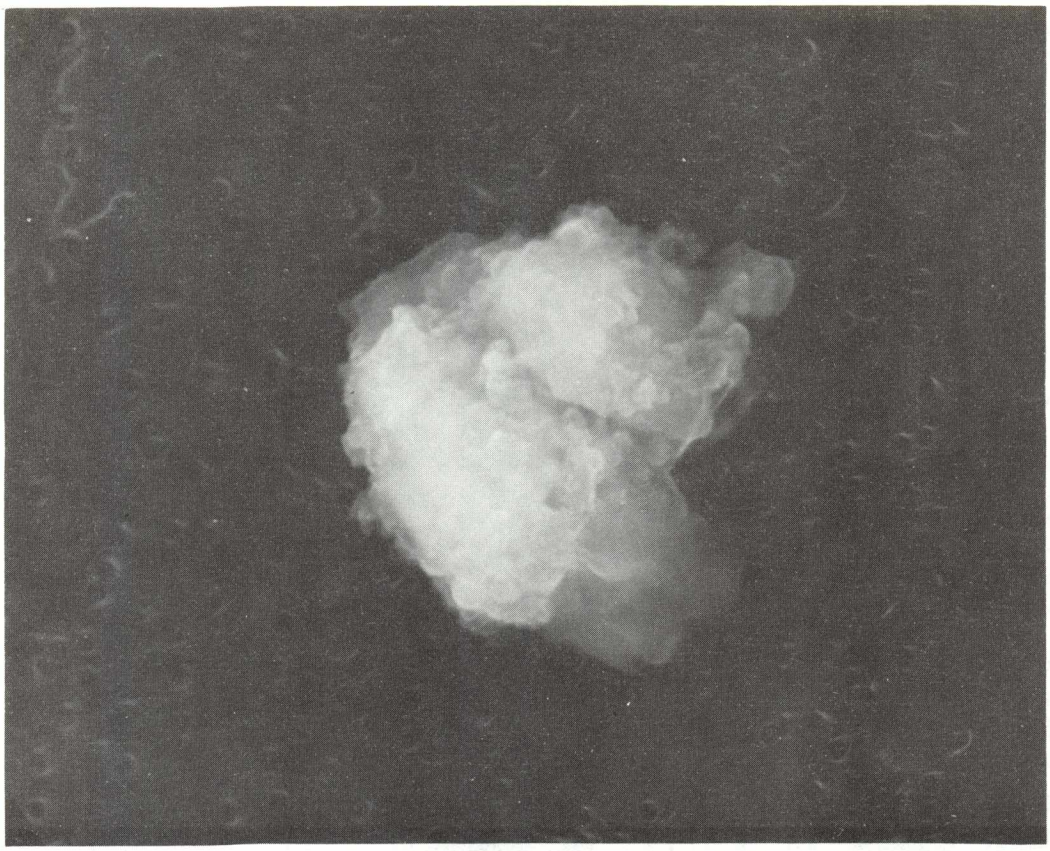


S-82-29588

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
5	S	T	CL/Pale Yellow	V	AOS	

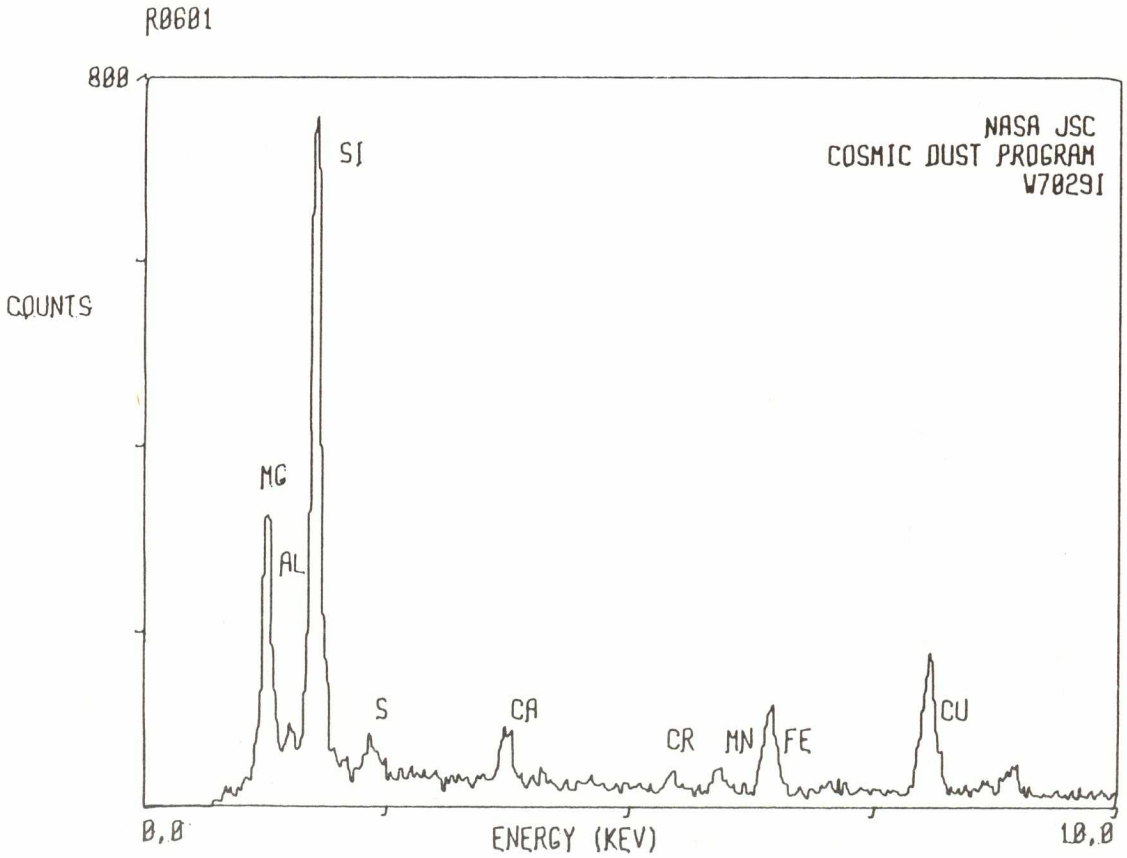


W702916

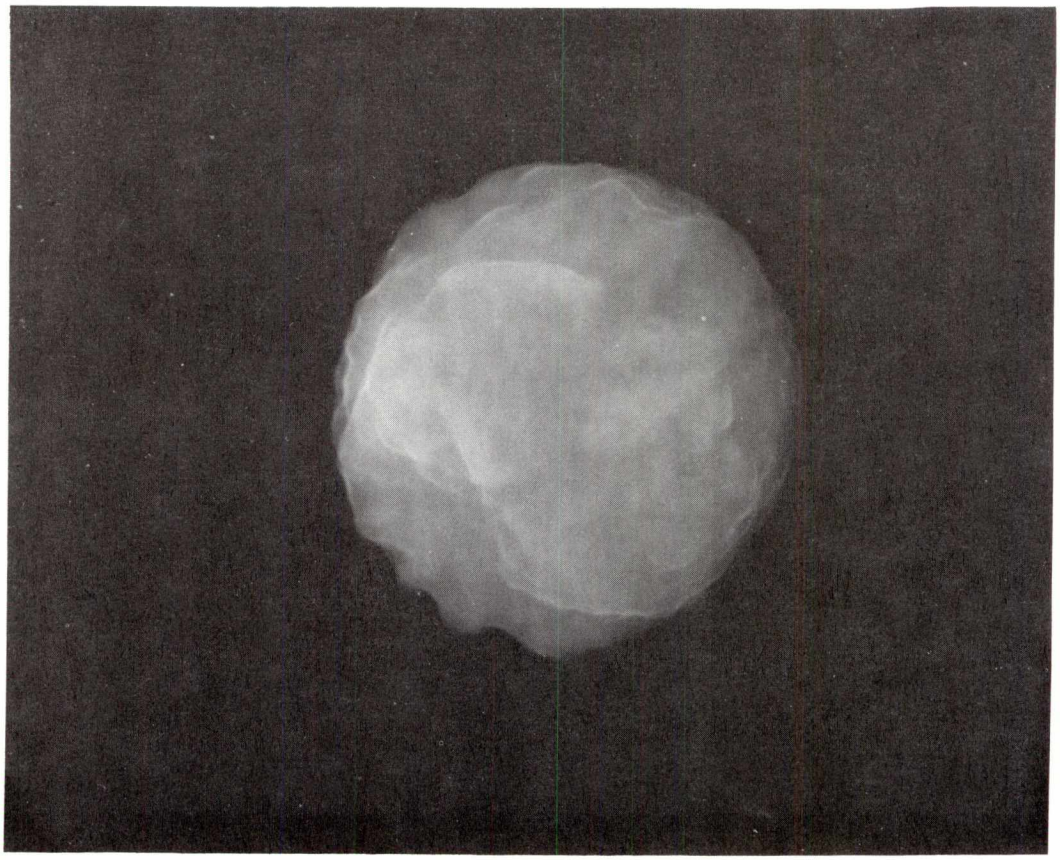


S-82-29587

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
8x9	I	TL	Gray to Black	D/SV	C?	

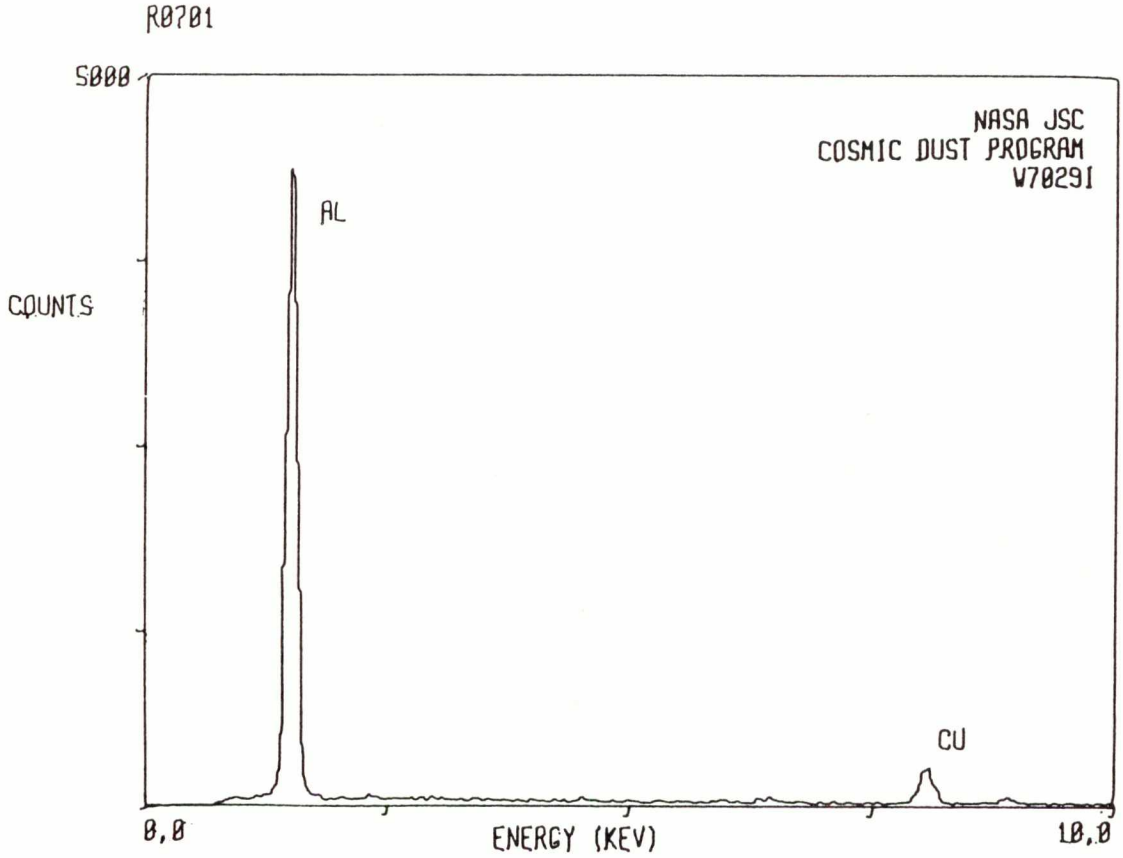


W702917

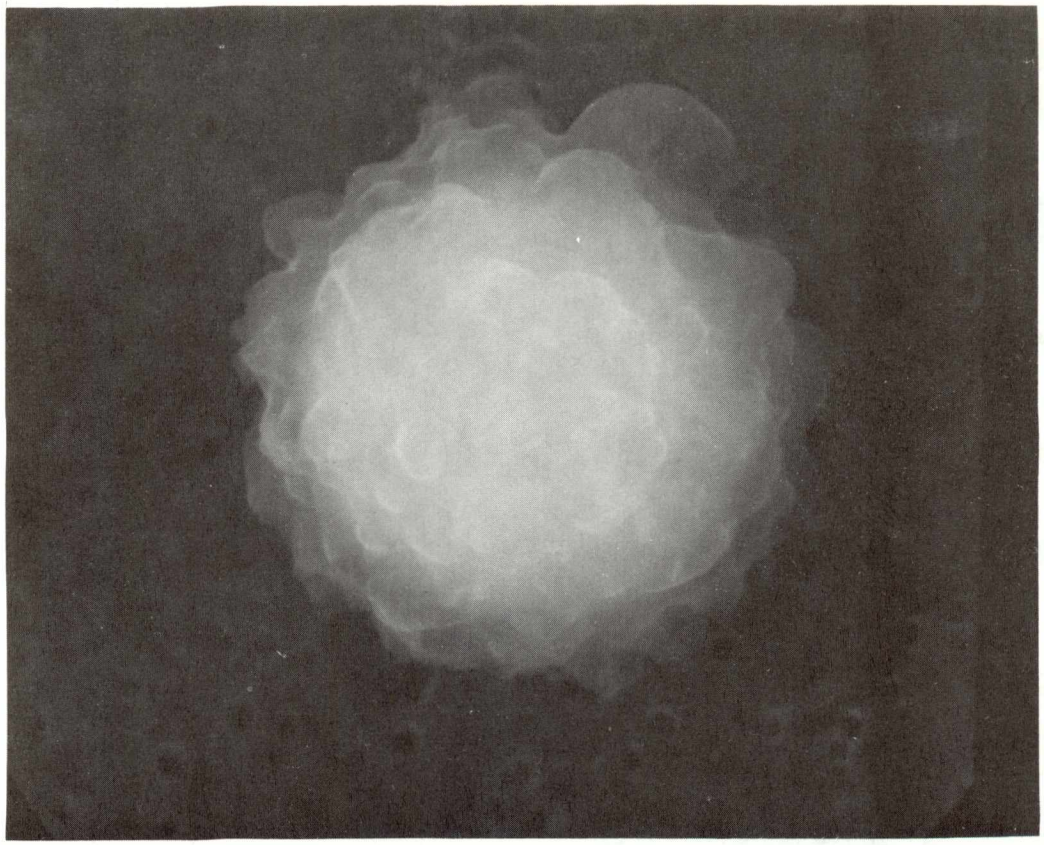


S-82-29586

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
8	S	O	Gray to Black	M	TCA?	

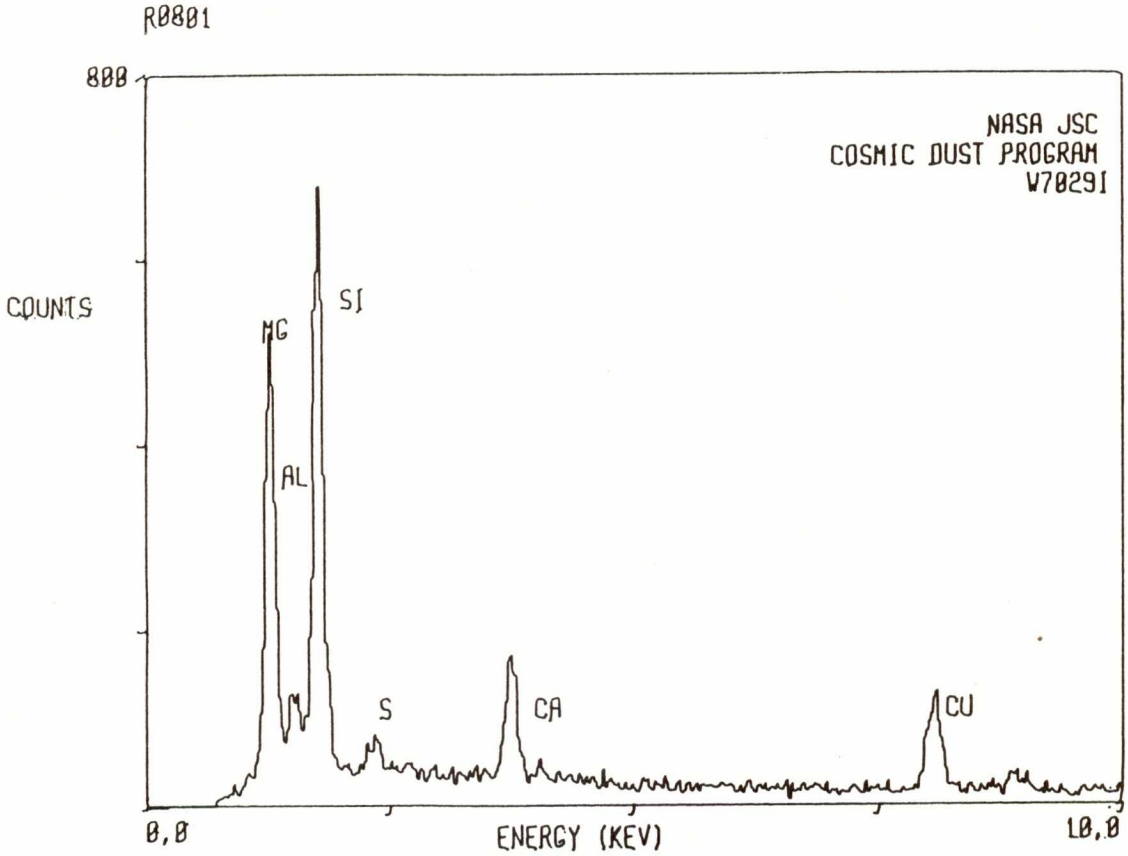


W702918

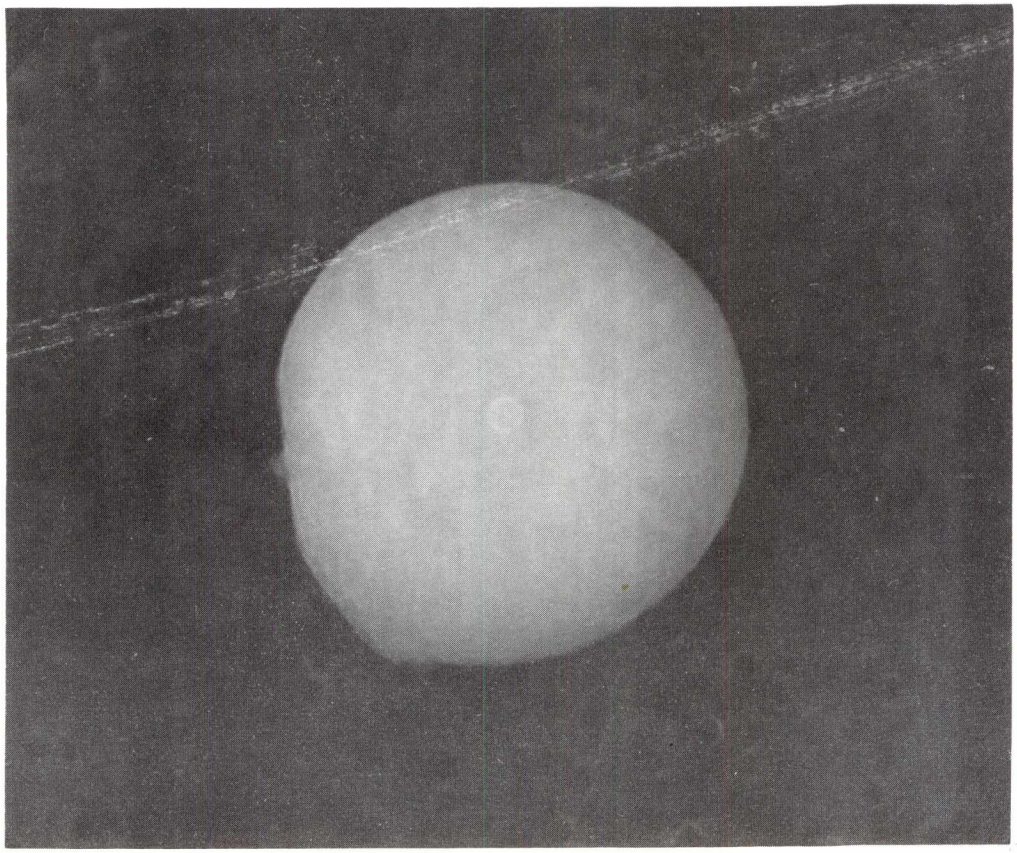


S-82-29585

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
8	E/S	TL	CL/Yellow-Gray	SV	C?	

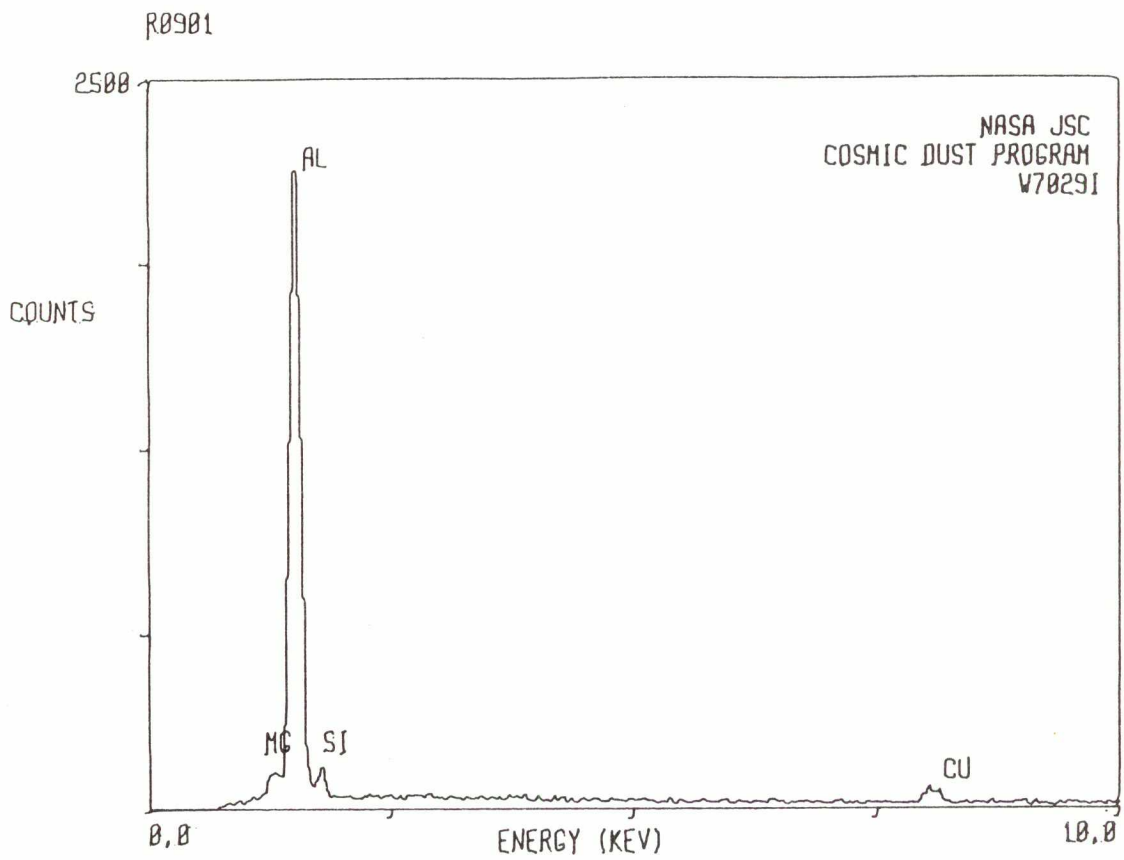


W702919

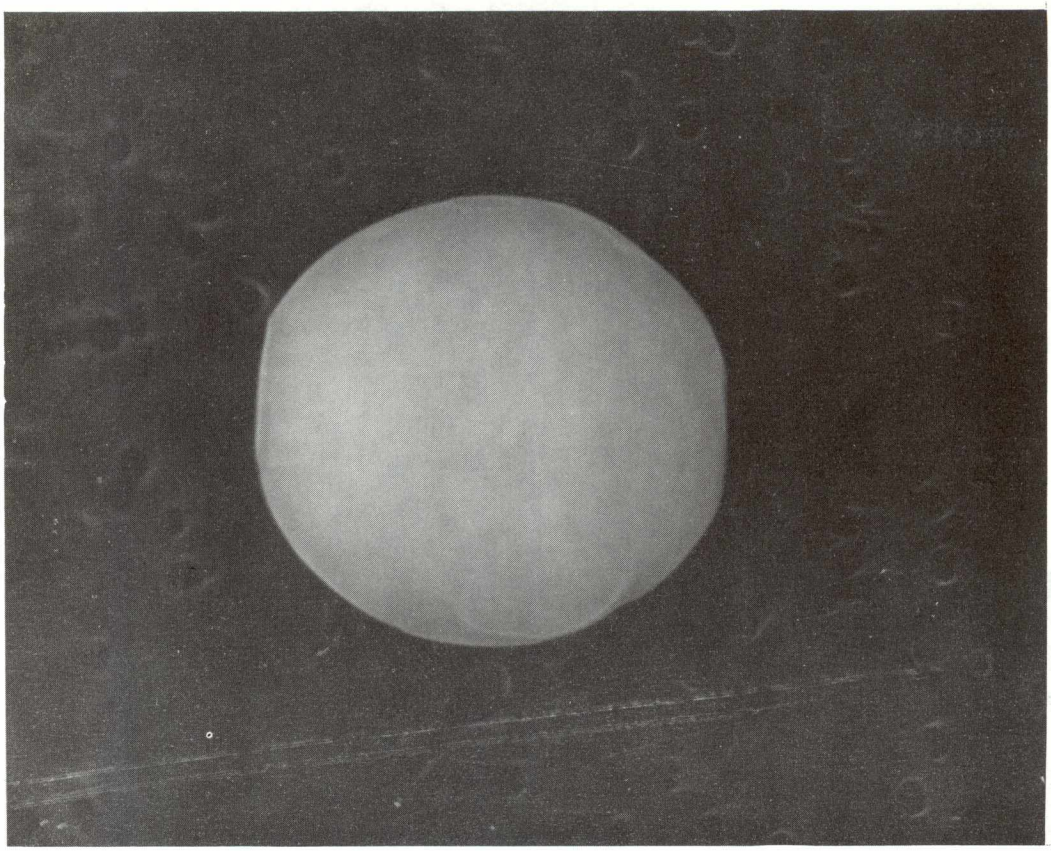


S-82-29584

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
6	S	T	CL/Pale Yellow	V	?	AOS with Mg, Si?

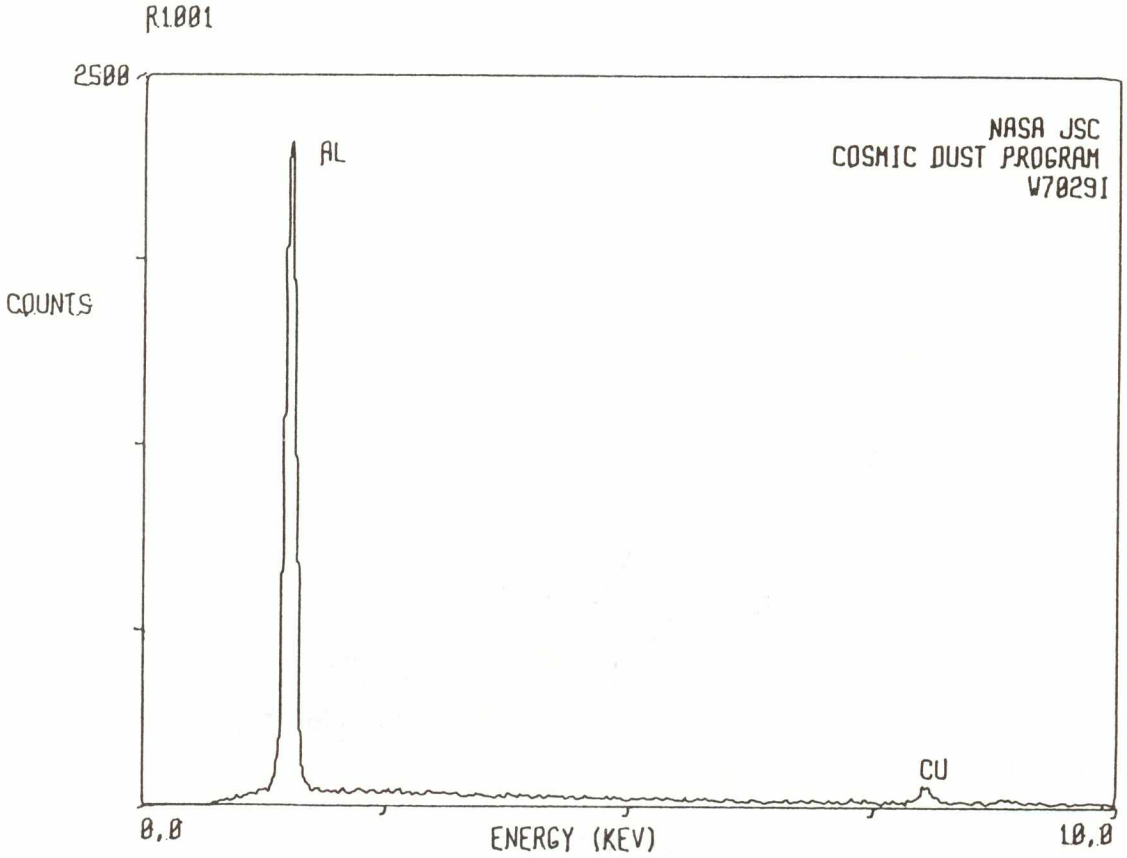


W7029I10

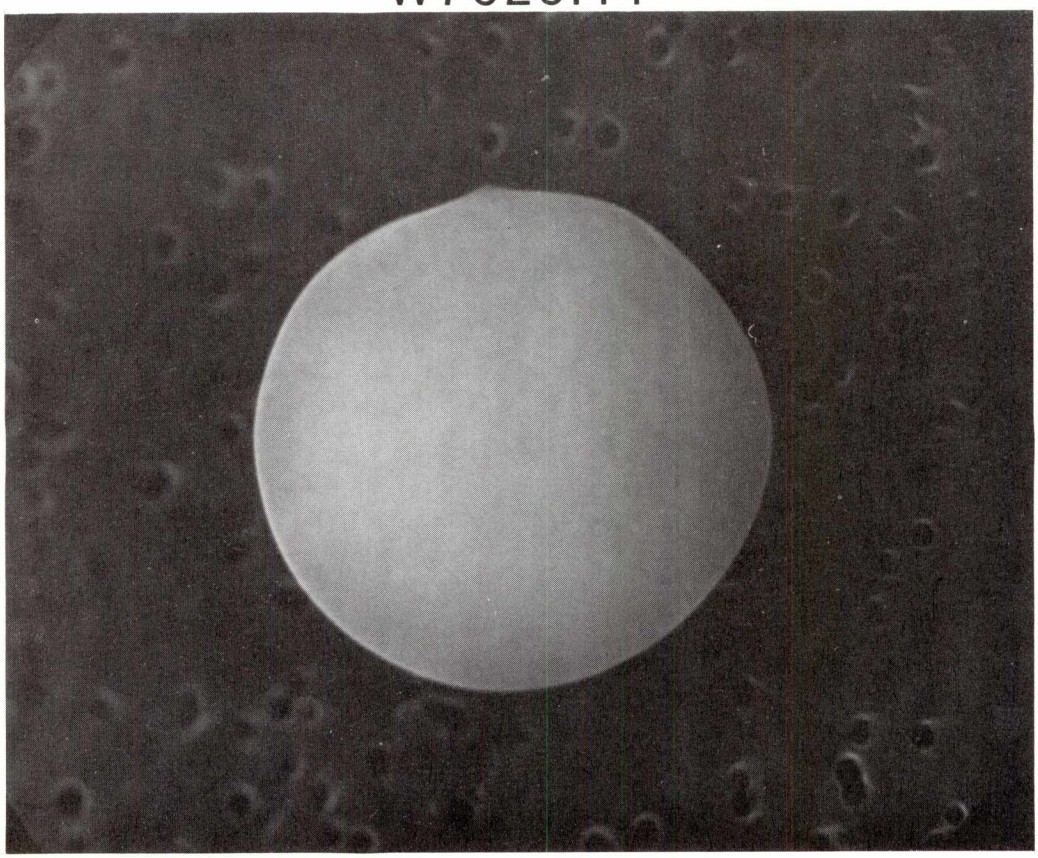


S-82-29583

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
5	S	T	CL/Pale Yellow	V	AOS	

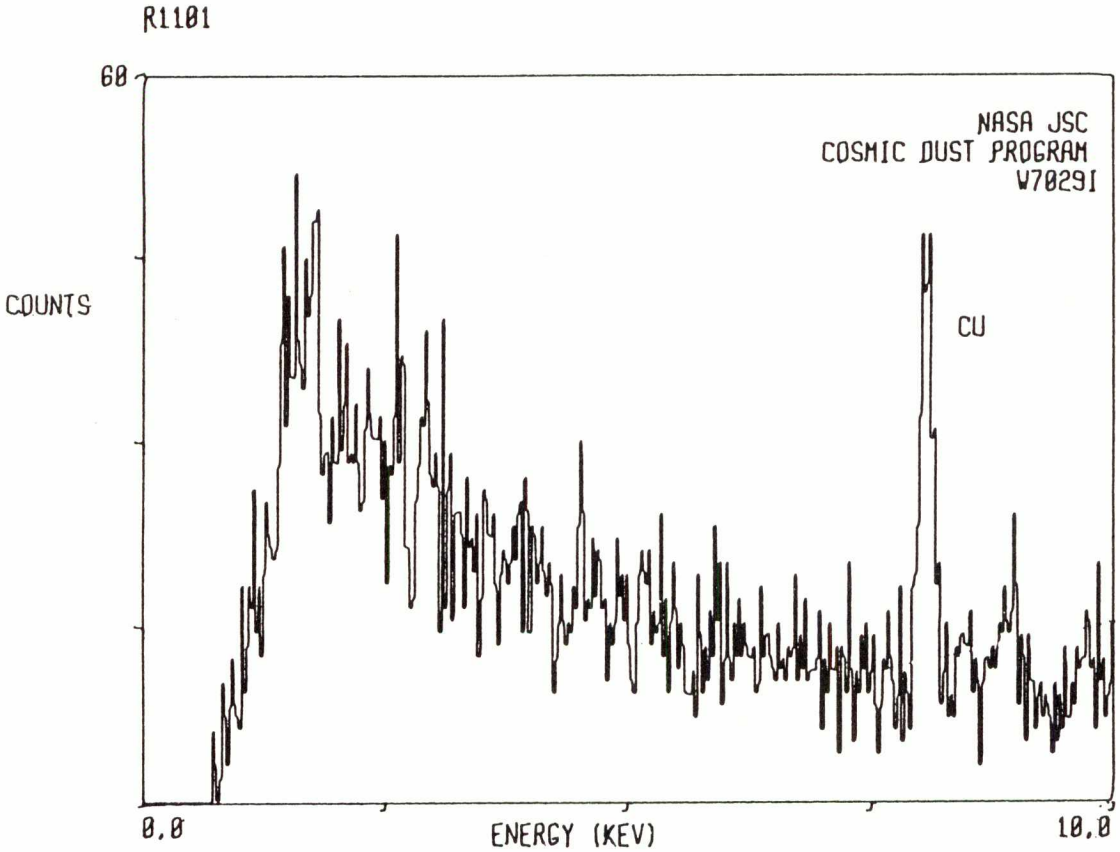


W7029I11

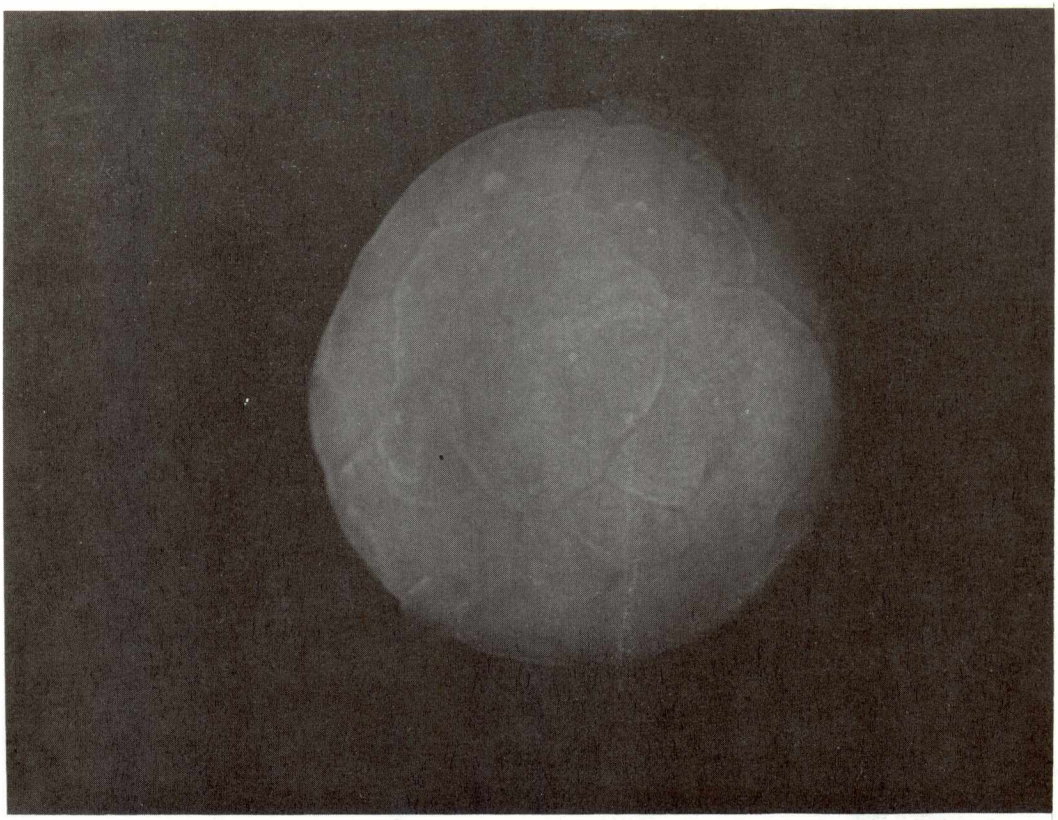


S-82-29582

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
6	S	TL	Dk. Red-Brown	V	TCA?	

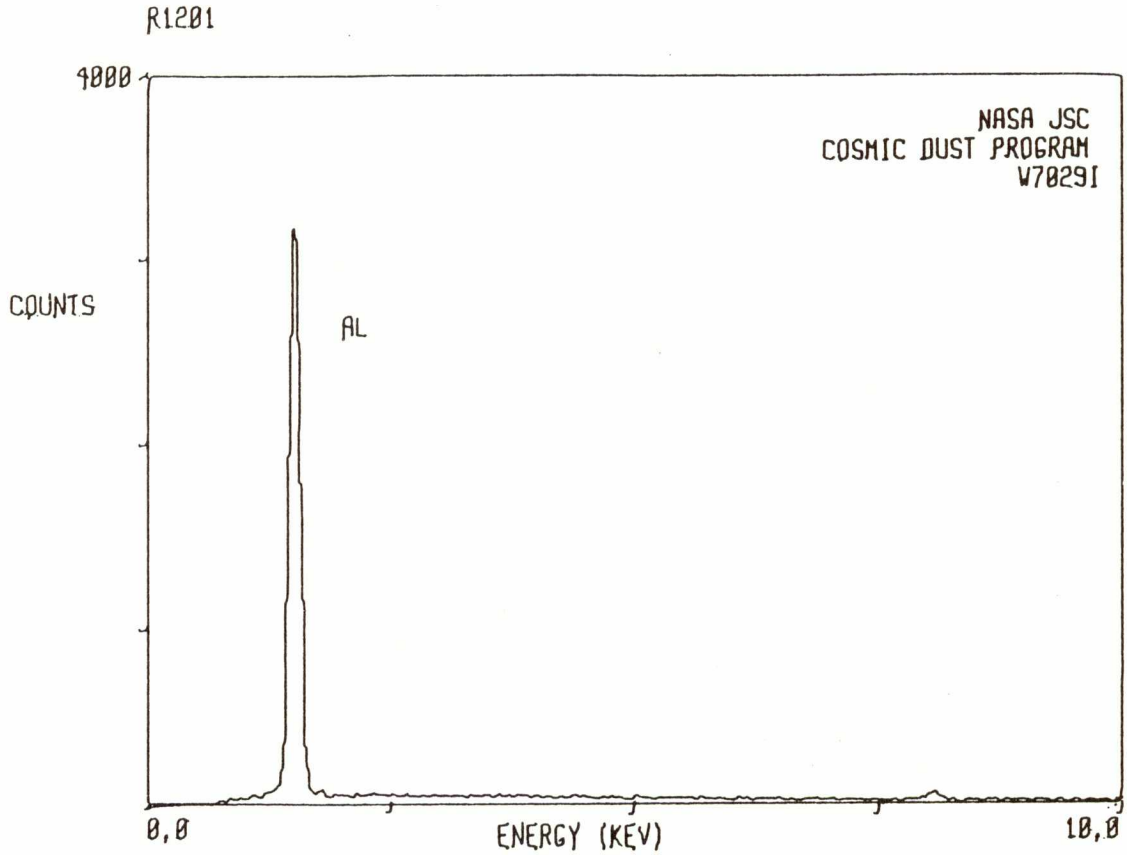


W7029I12

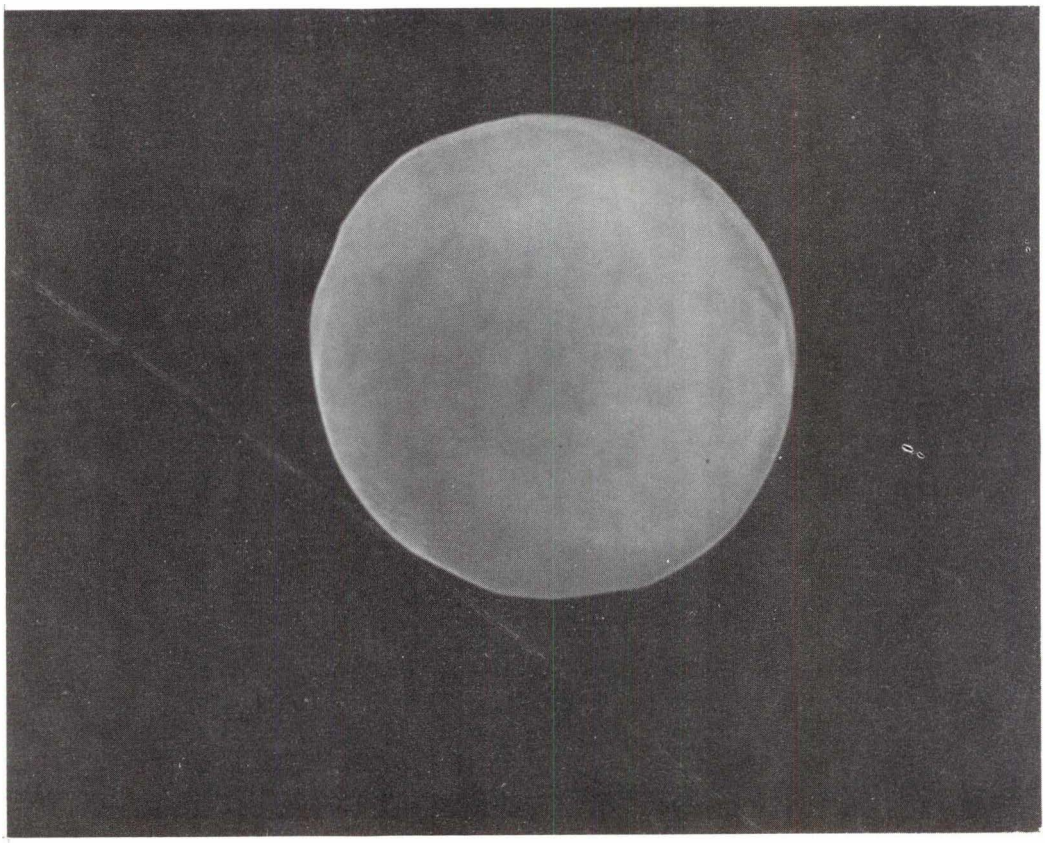


S-82-29581

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
9	S	TL	CL/Pale Yellow-Gray	V	AOS	

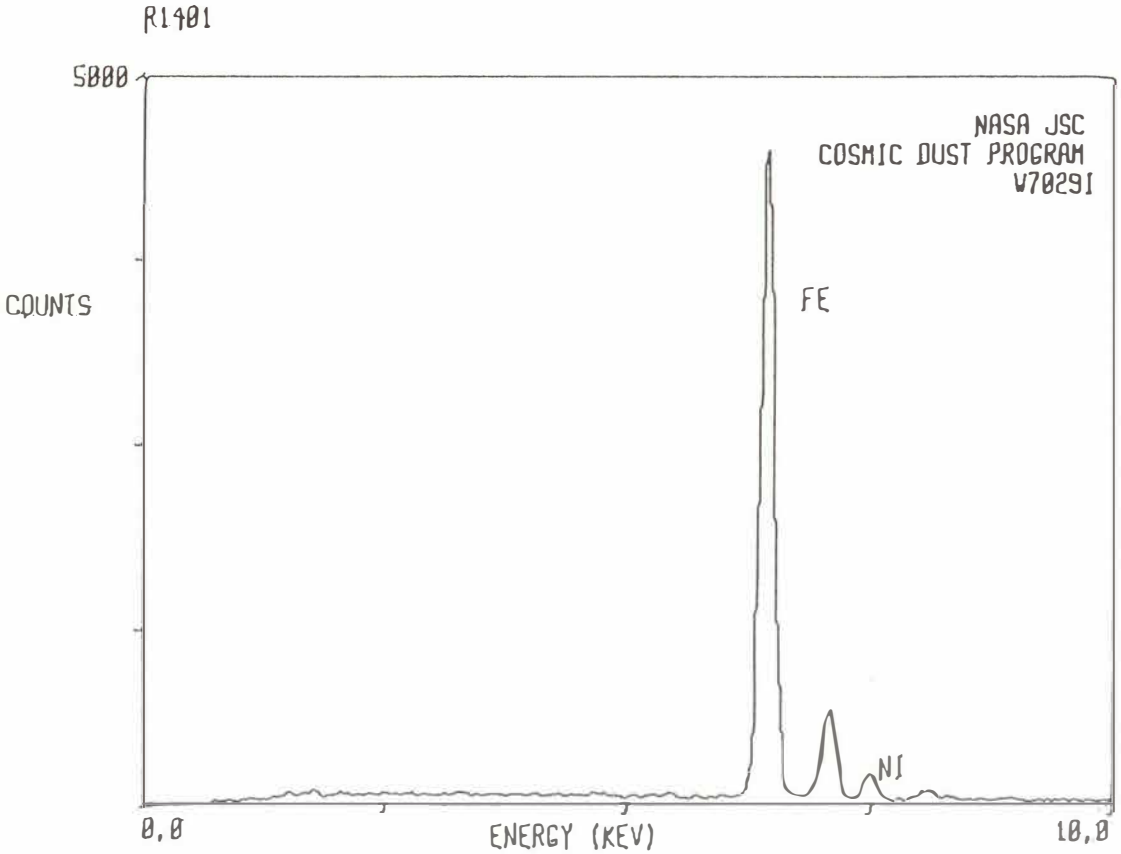


W7029I14

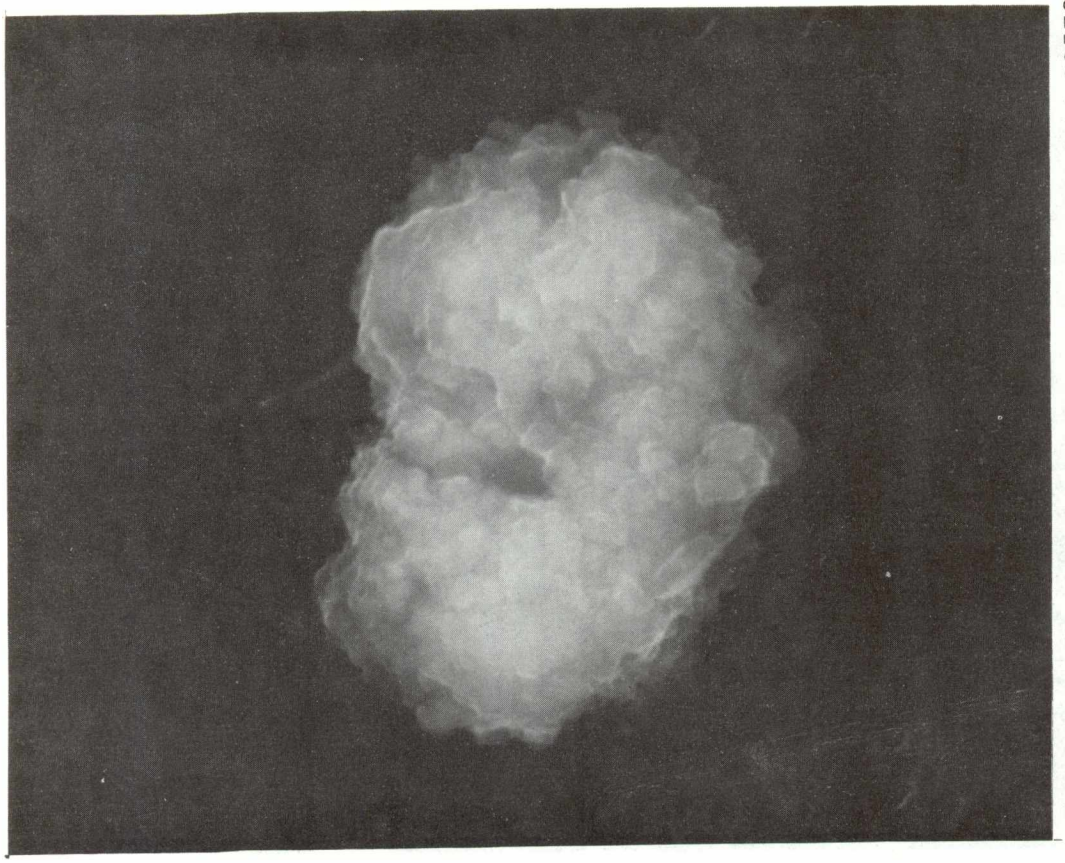


S-82-29580

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
6	S	O	Black	M	C?	

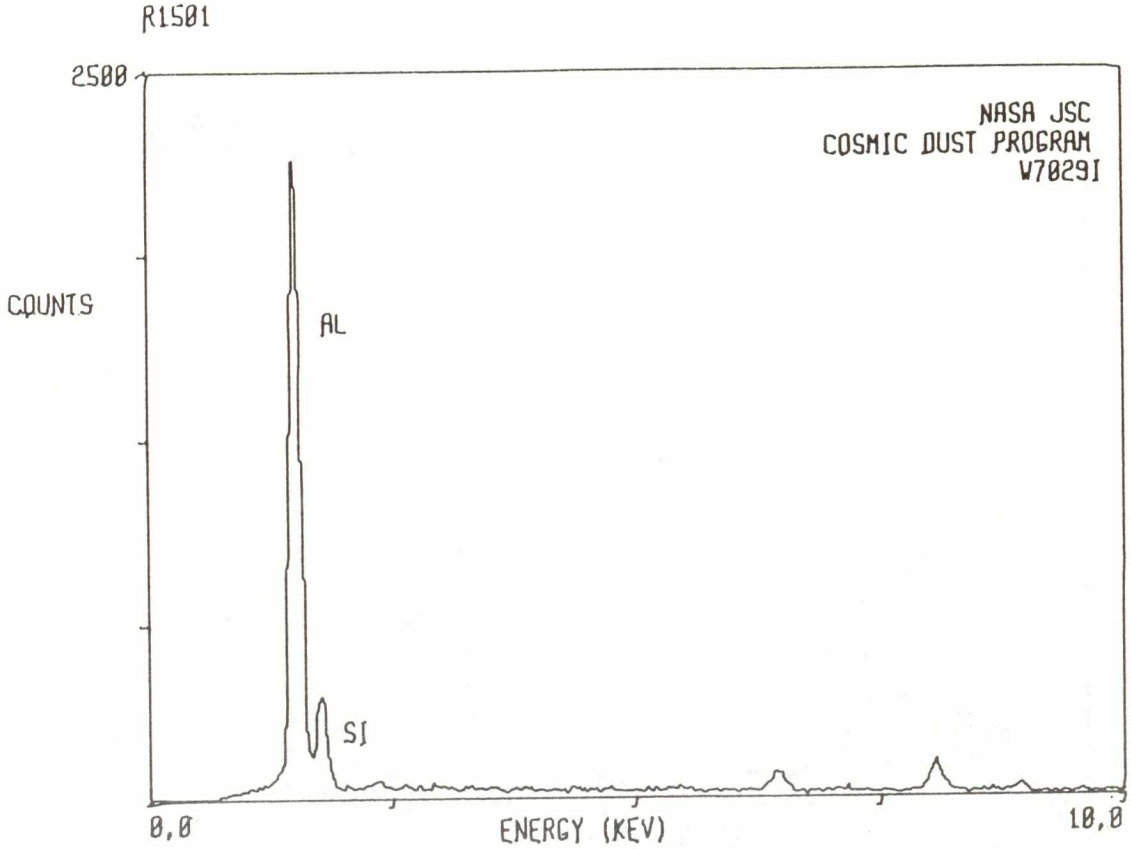


W7029I15

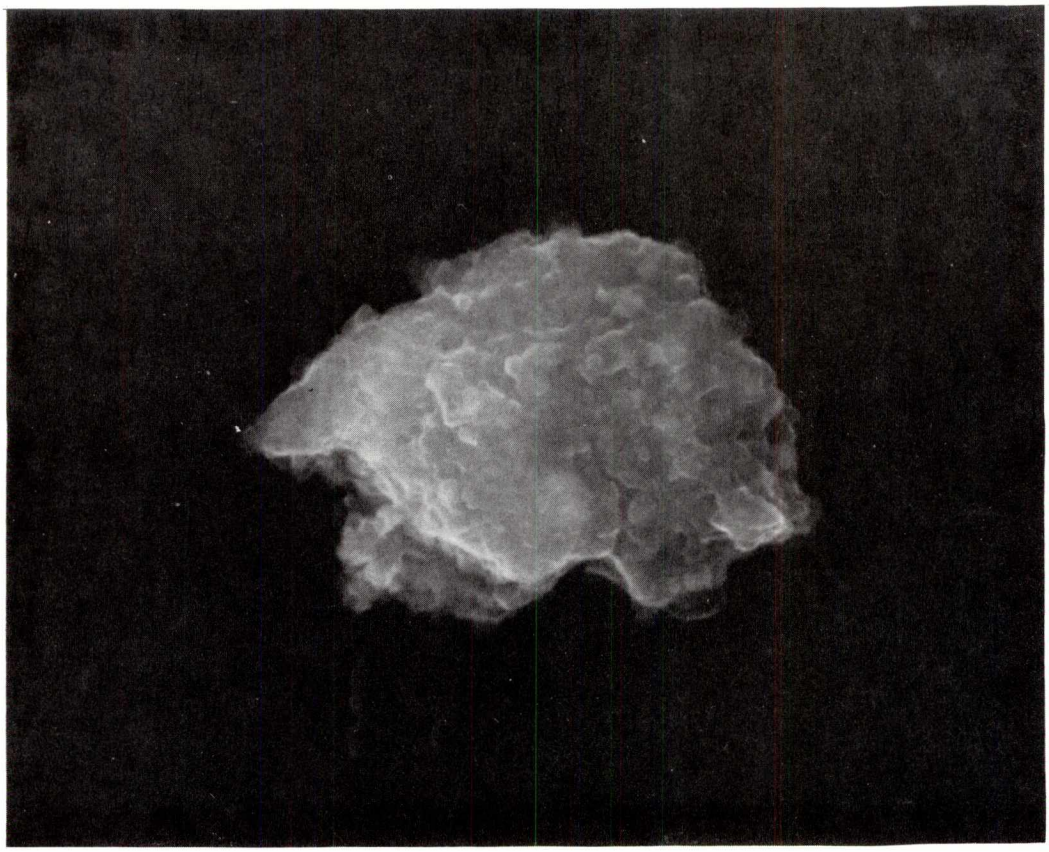


S-82-29579

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
7x10	I	O	Dk. Gray to Black	D/SV	?	

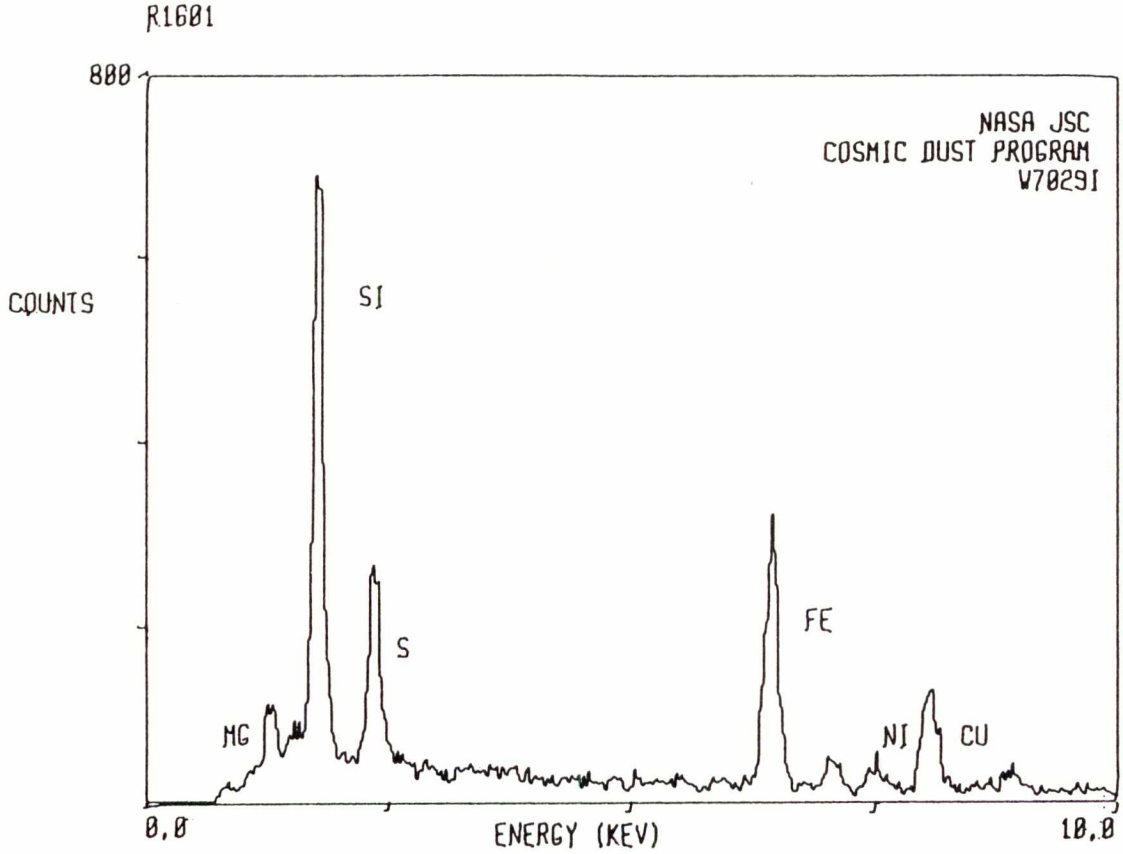


W7029I16

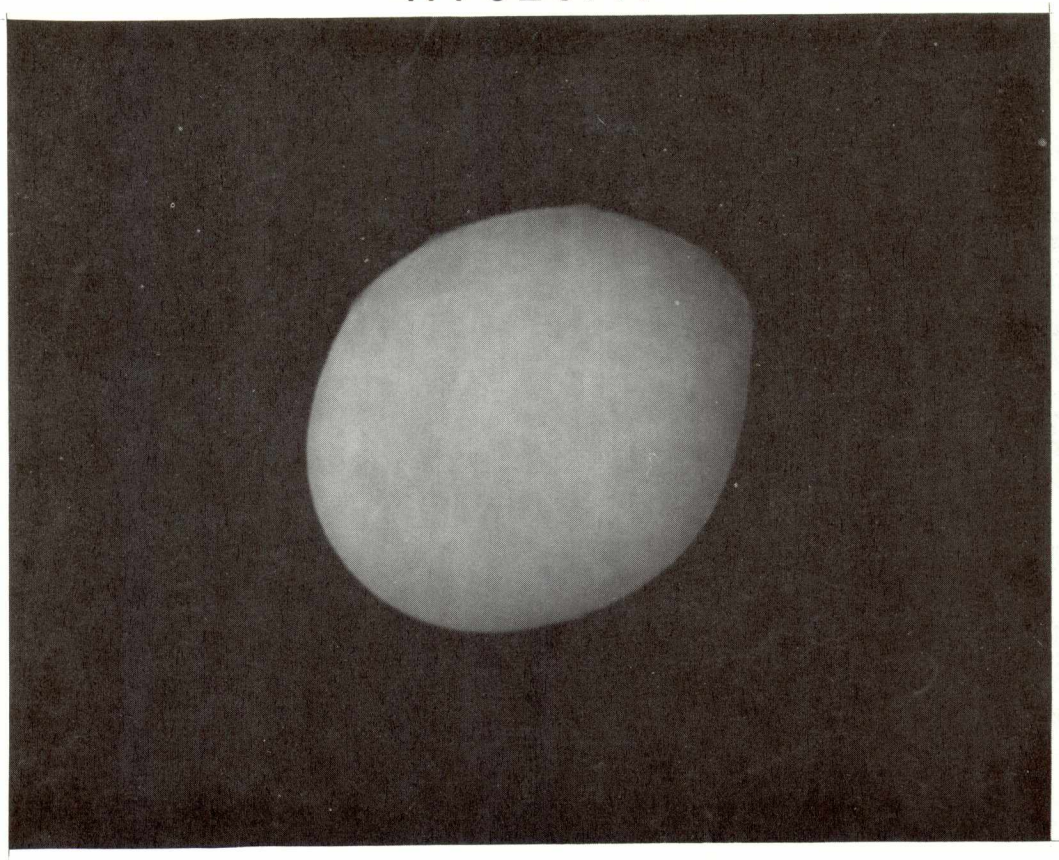


S-82-29578

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
10	E/I	O/TL?	Smoky Gray	D/SV	?	

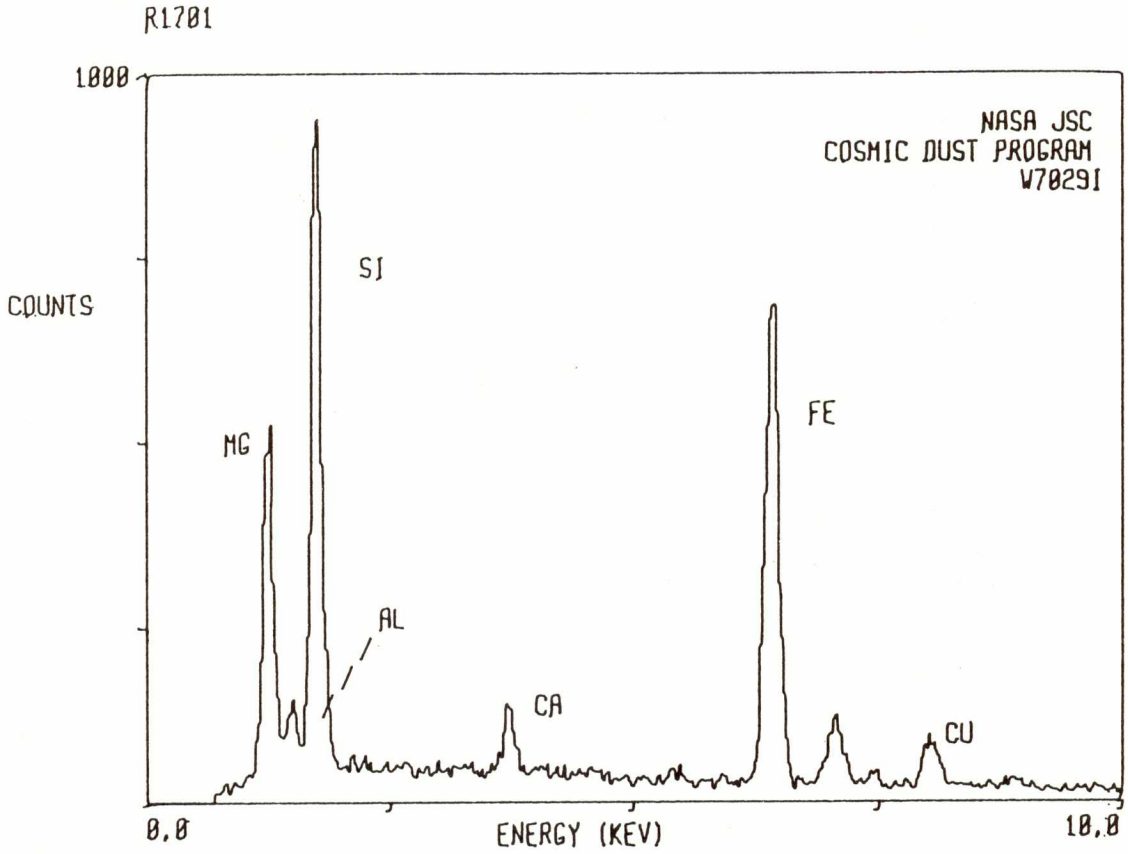


W7029I17

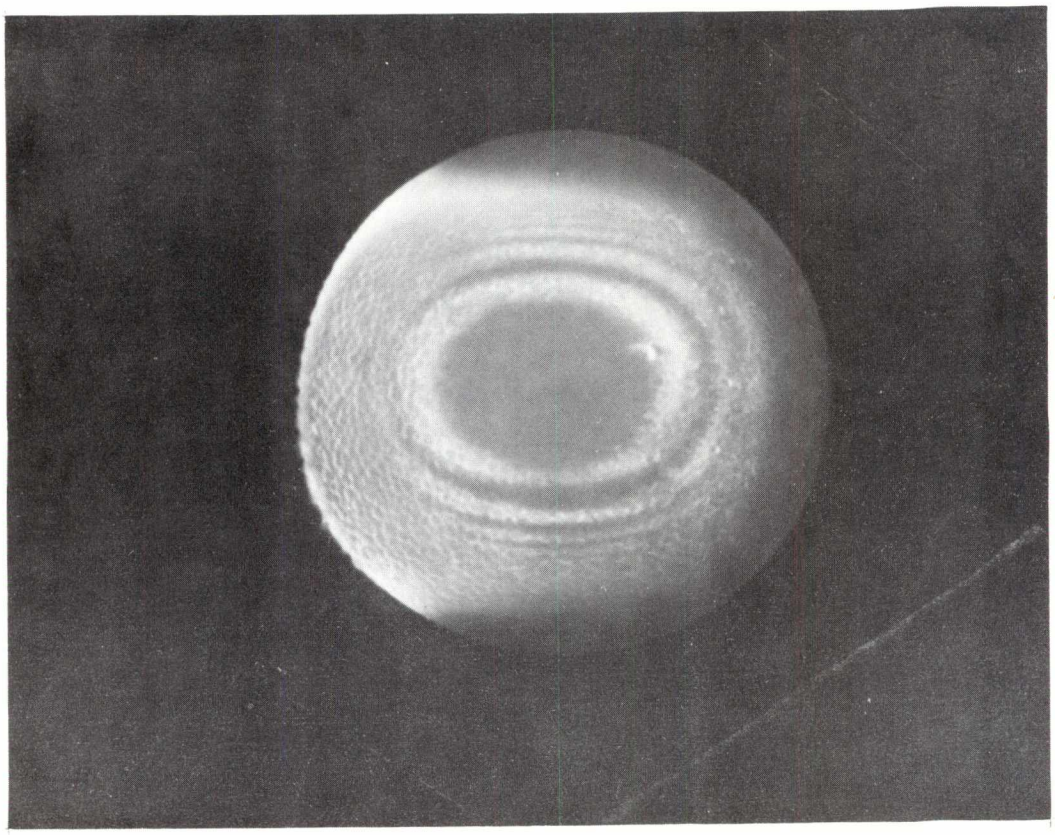


S-82-29577

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
7	S	O/TL?	Dk. Brown	V	C?	

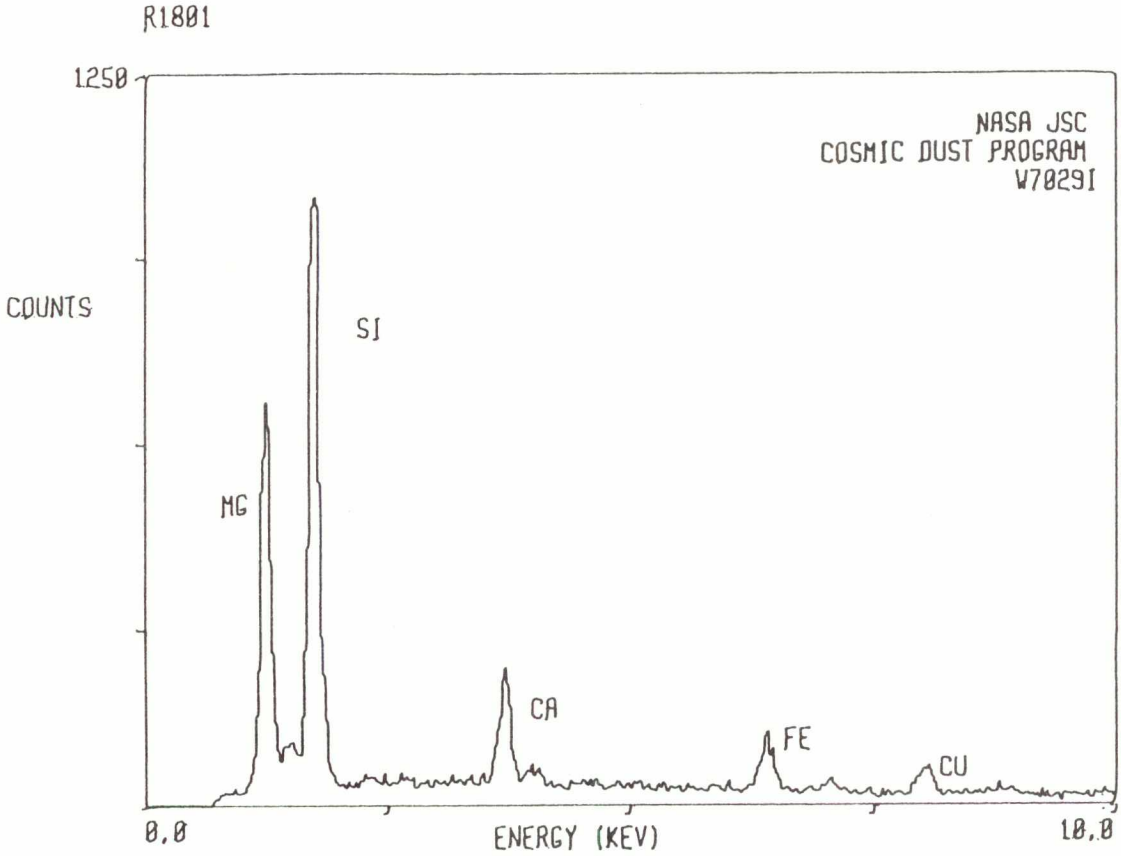


W7029I18

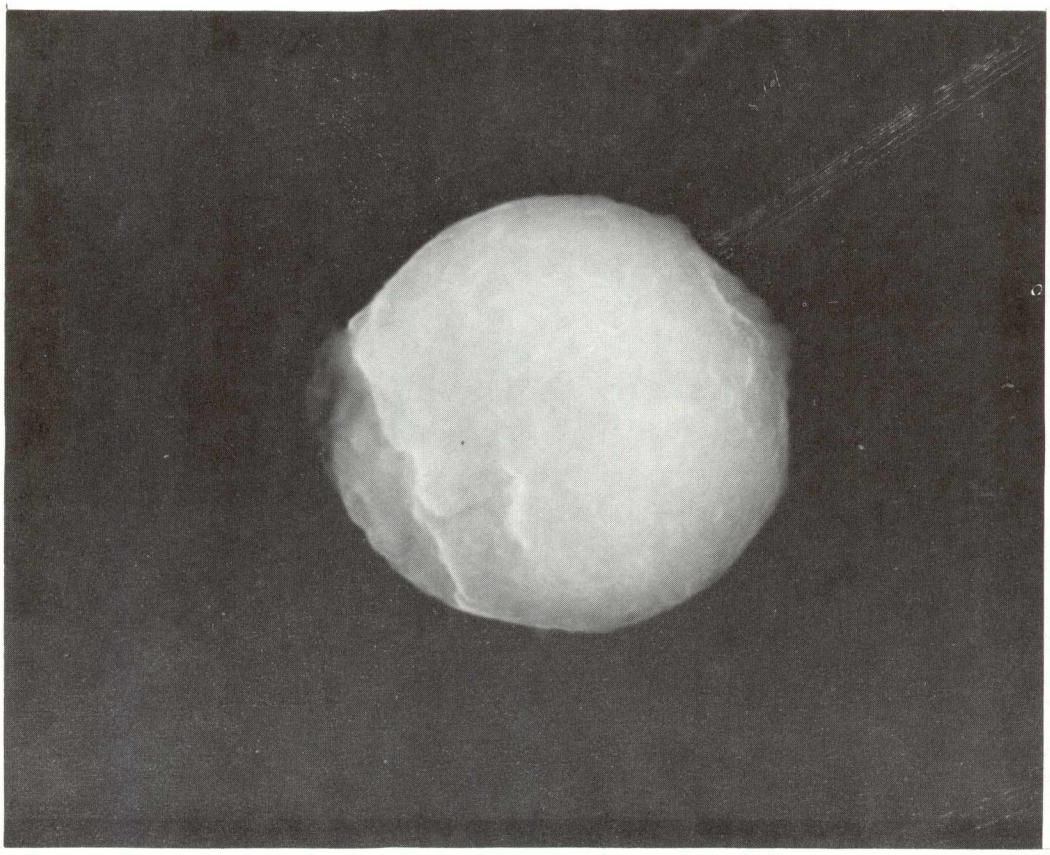


S-82-29575

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
17	S	T	CL/Pale Yellow	V	C?	

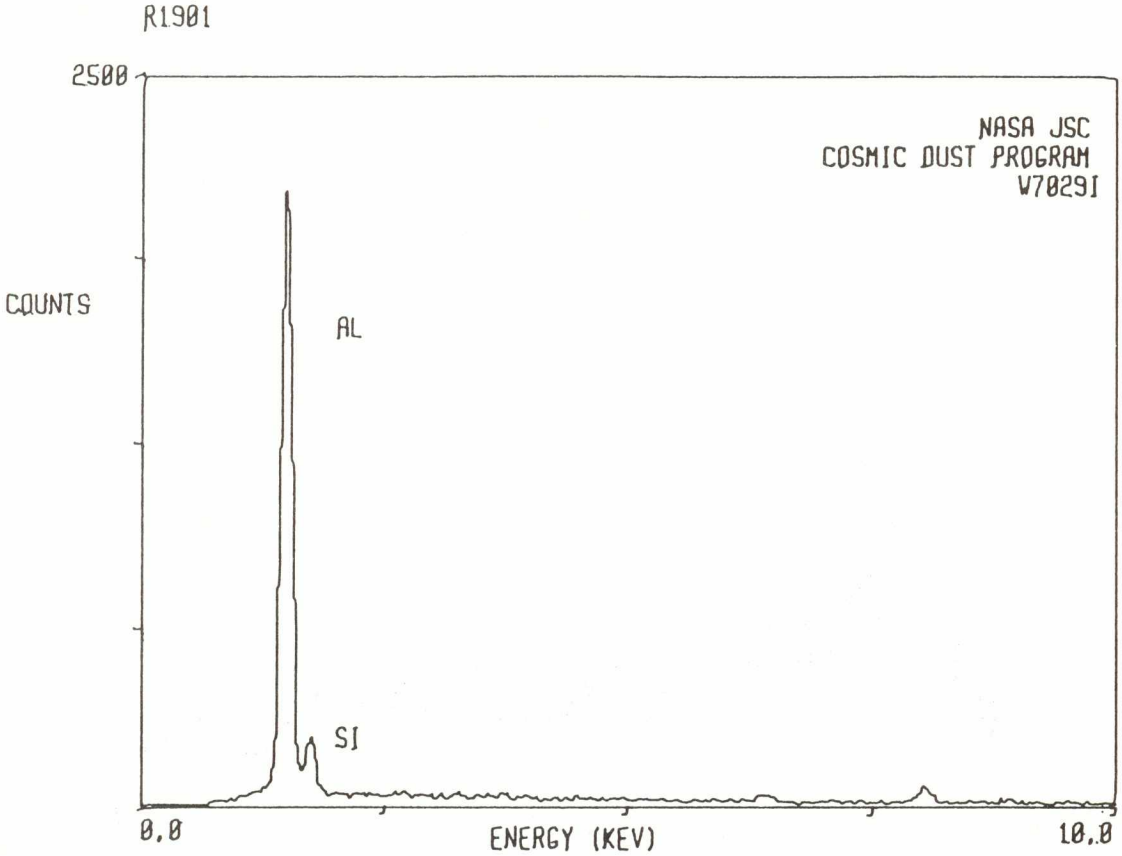


W7029I19

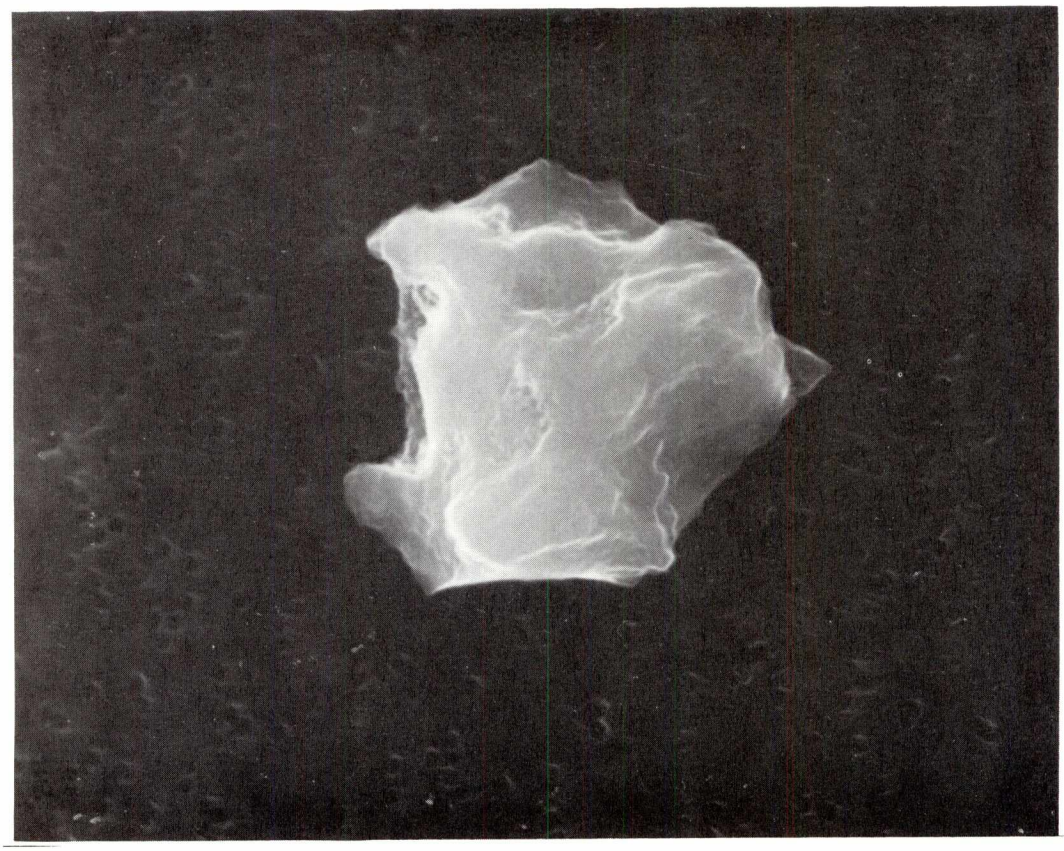


S-82-29576

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
8	S	O	Gray to Black	D/SM	?	

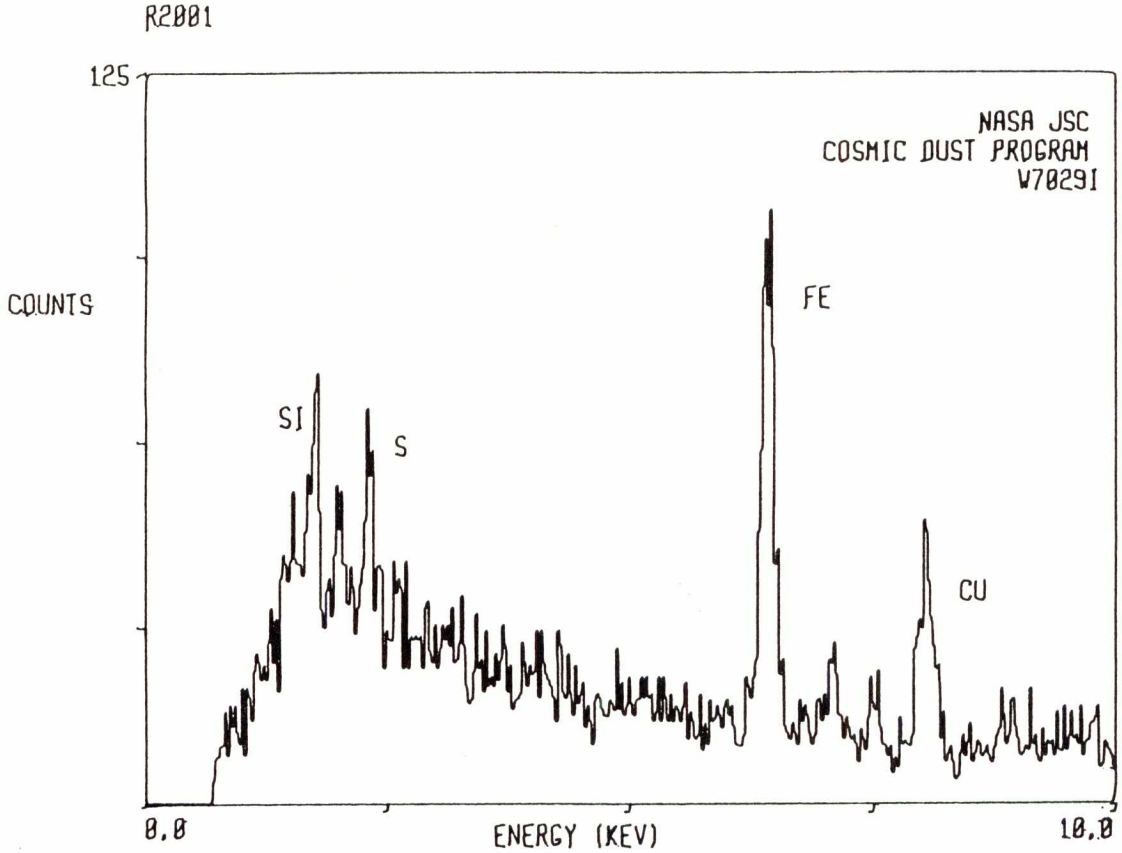


W7029I20



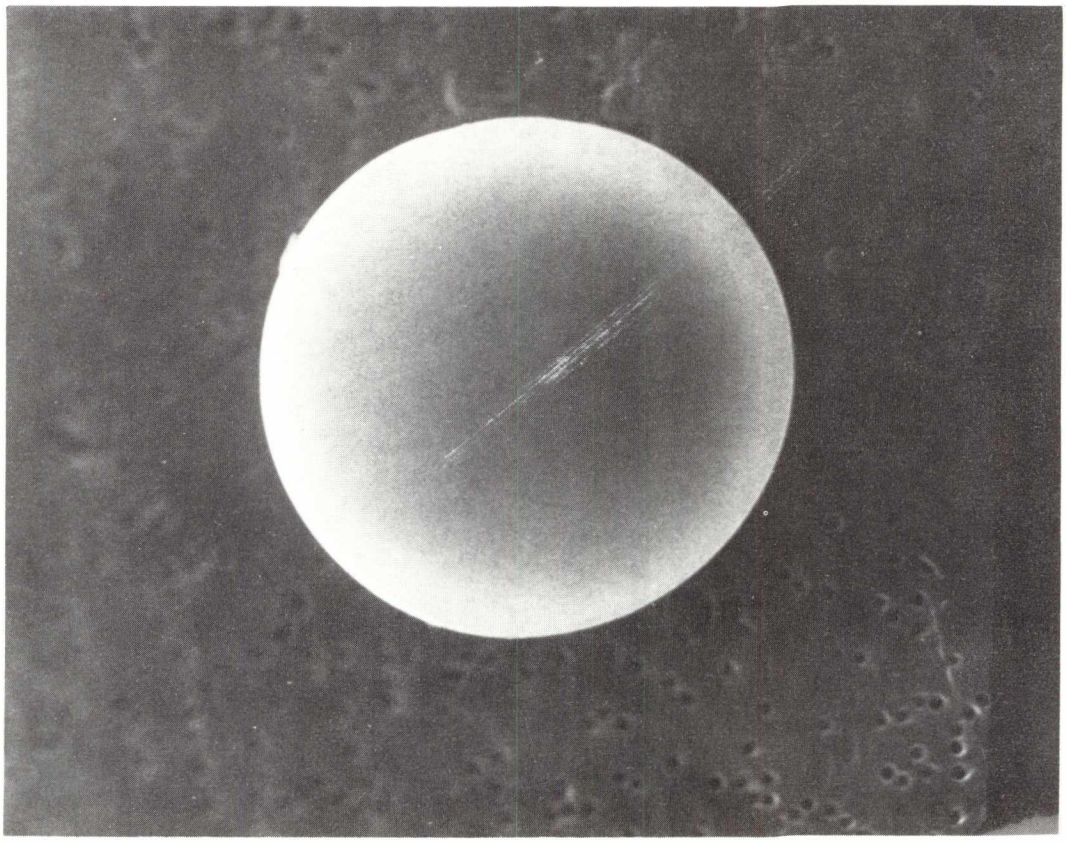
S-82-29574

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
8x9	I	O	Dk. Brown to Black	M	?	Rich in low-atomic number elements?



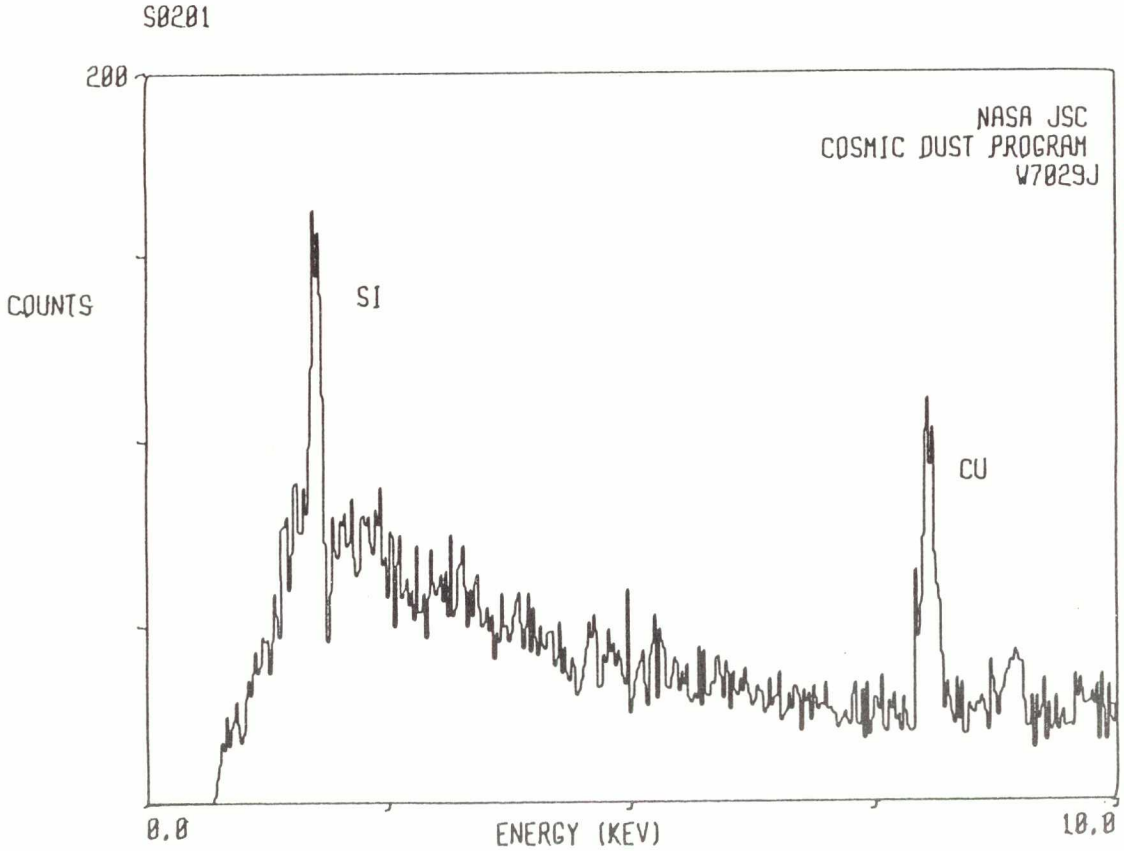
MOUNT W7029J

W7029J2

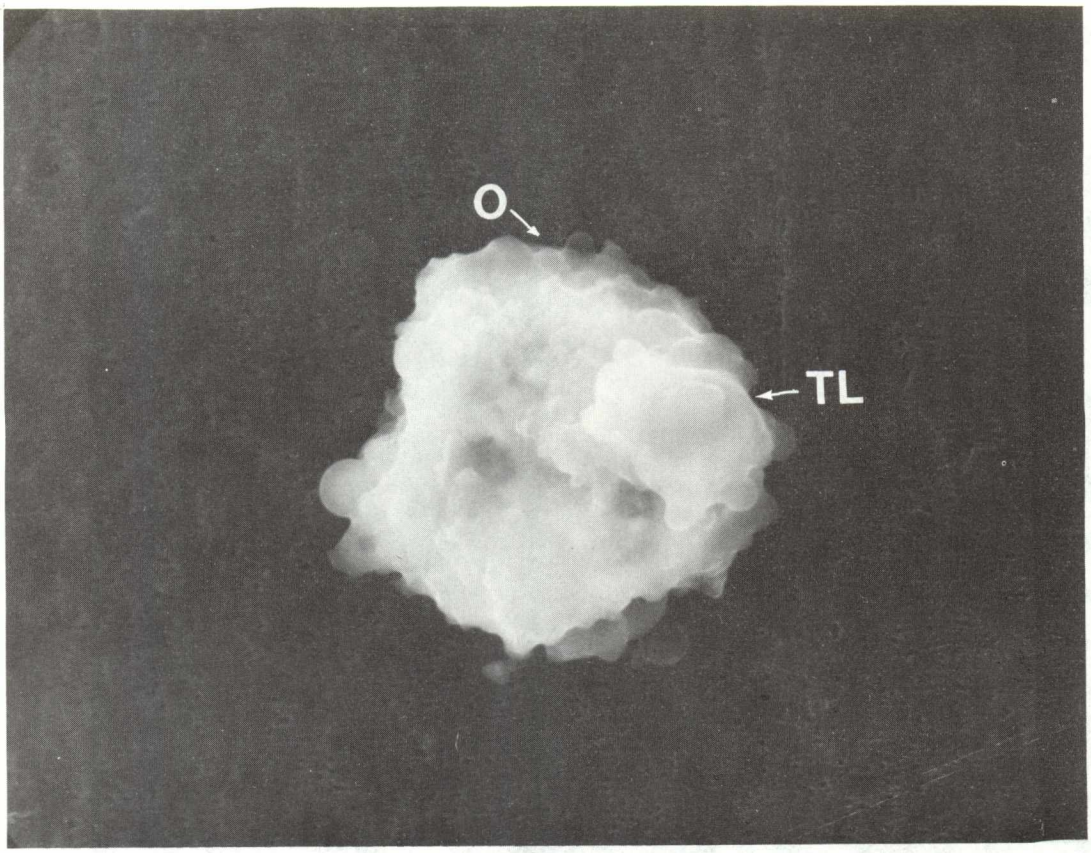


S-82-29224

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
13	S	T	Amber	V	?	Rich in low-atomic number elements?

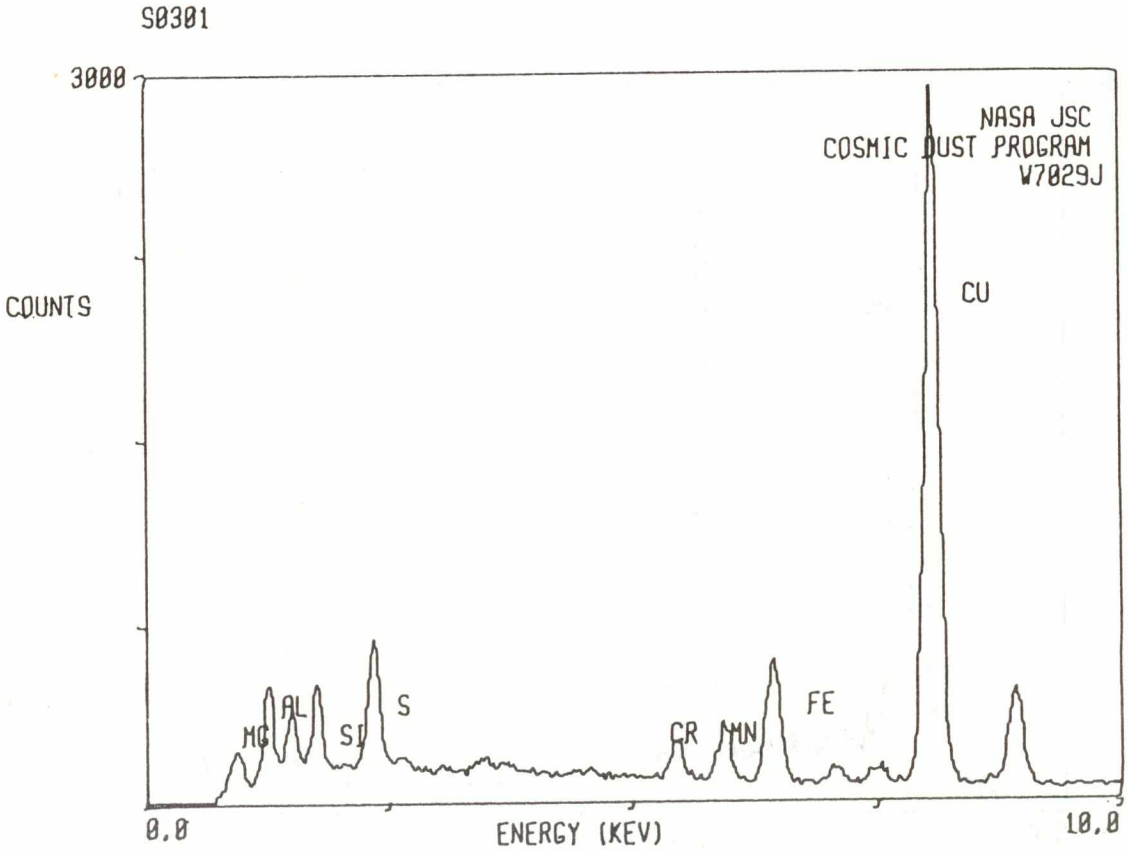


W7029J3

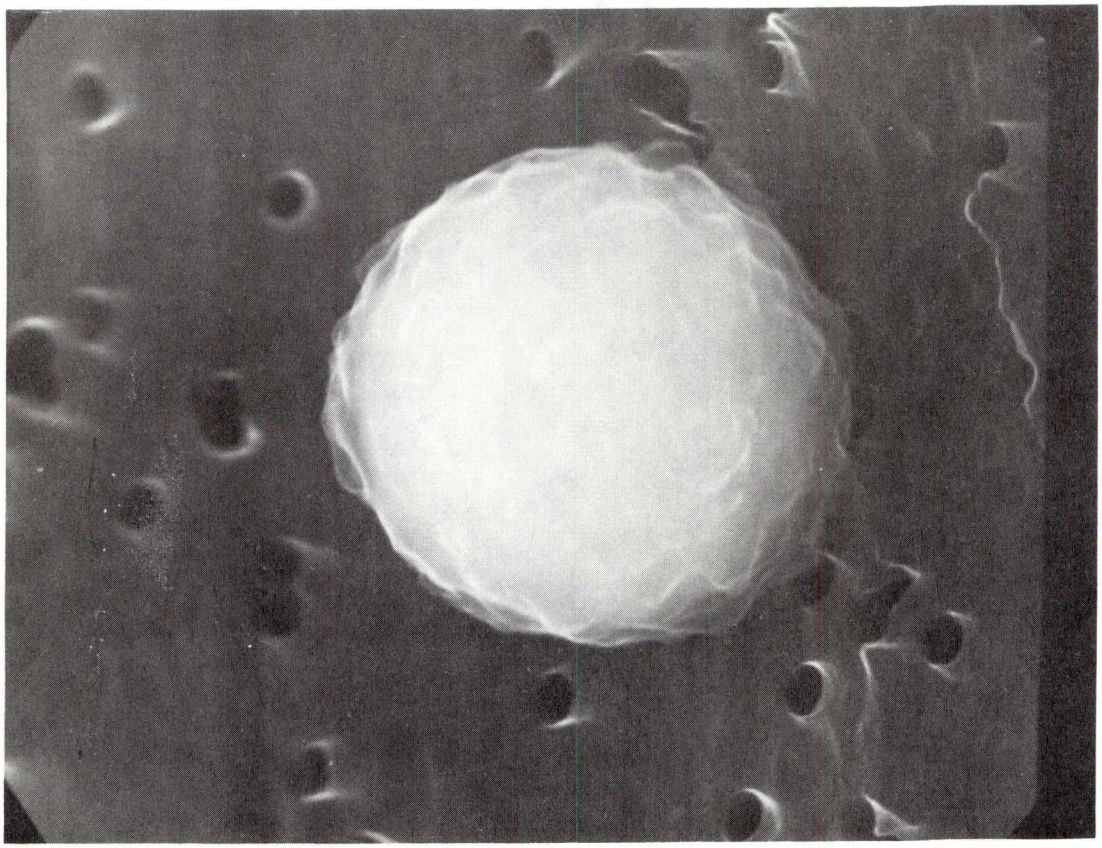


S-82-29225

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
20x21	E/I	O/TL	Dk. Red-Brown to Black	D/V	TCA?	

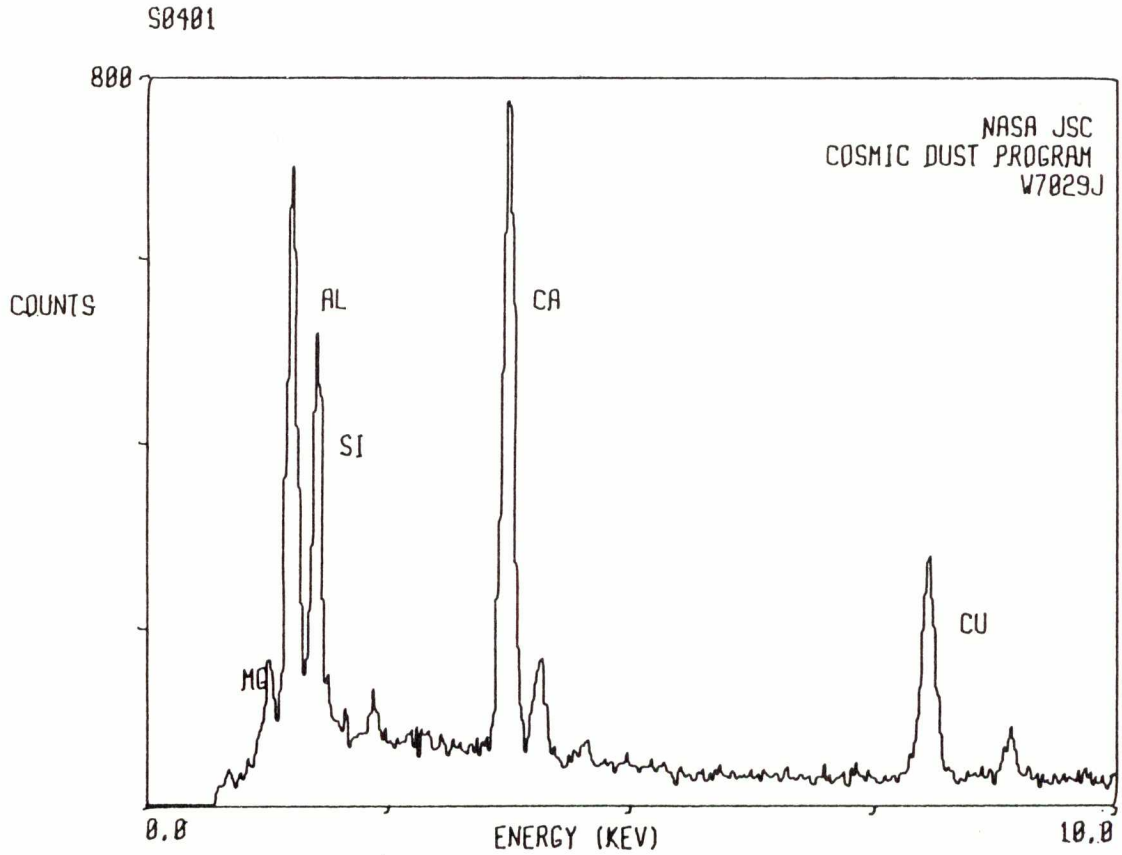


W7029J4

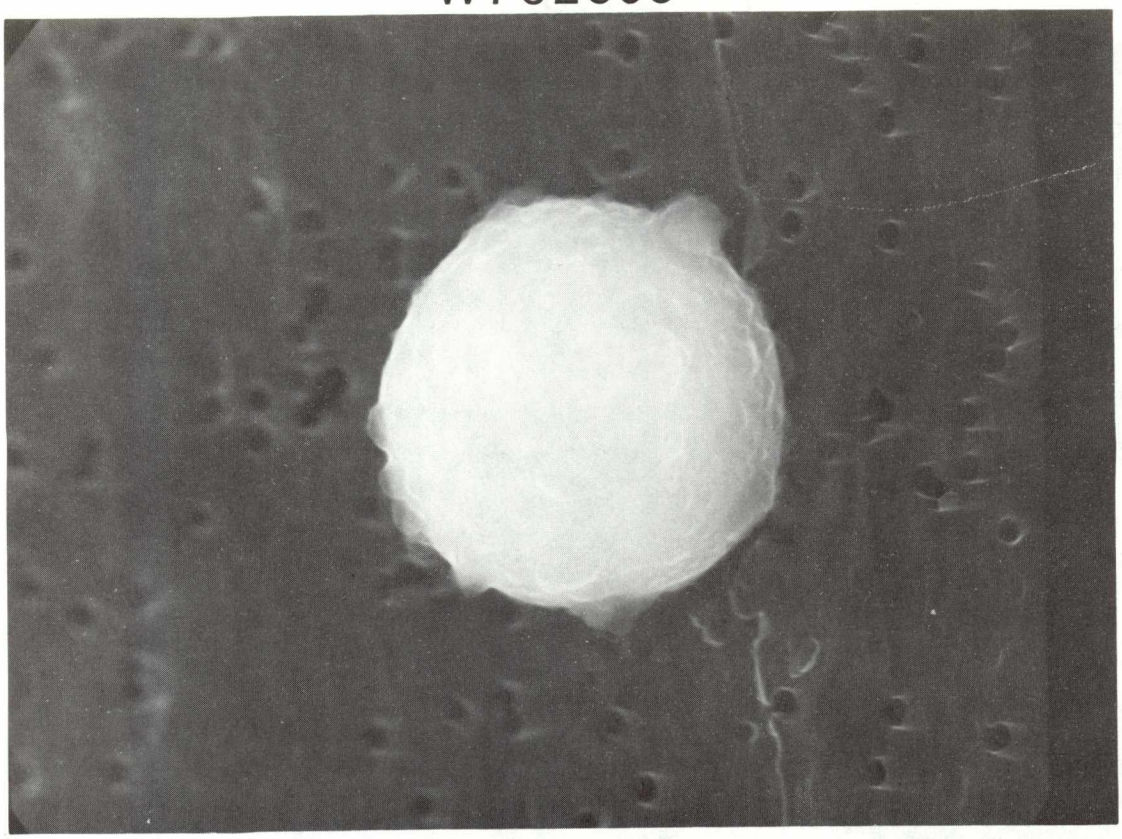


S-82-29226

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
3	S	TL/T	CL/Pale Gray	V	?	Associated with W7029J5.

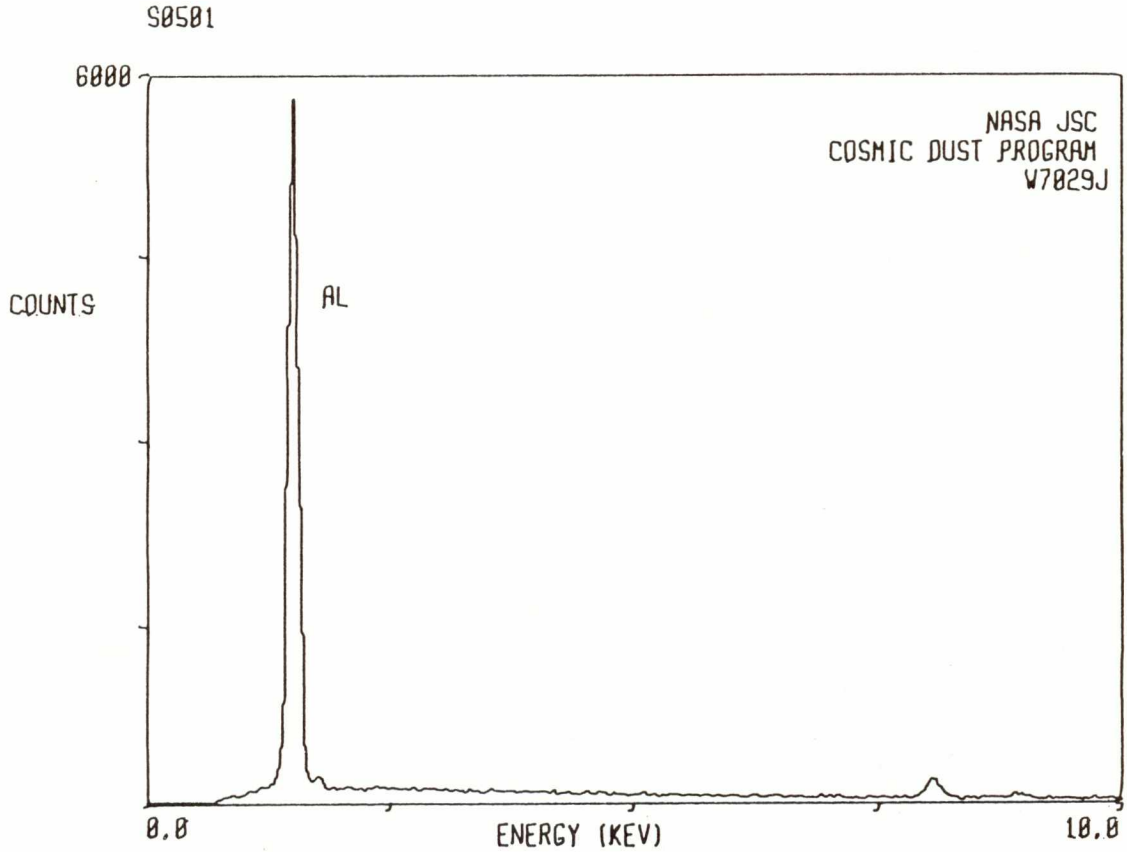


W7029J5

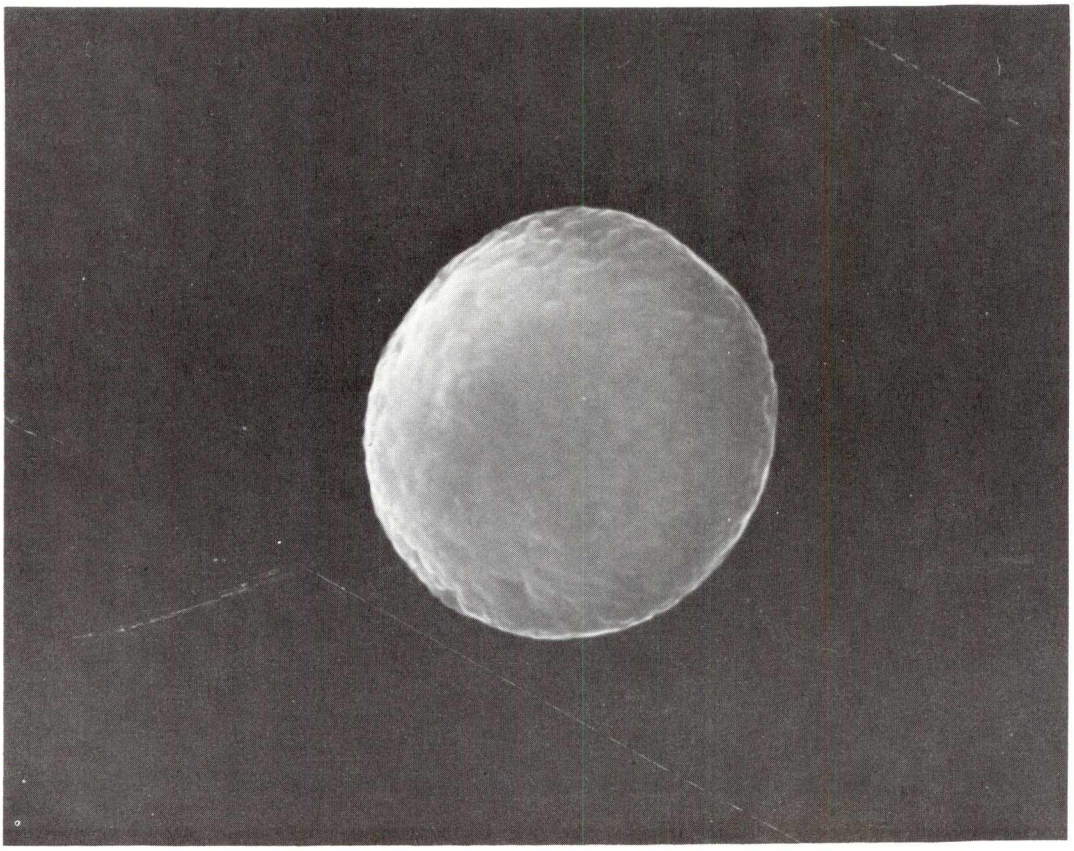


S-82-29227

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
5	S	TL/T	CL/Pale Yellow-Gray	V	AOS	Associated with W7029J4.

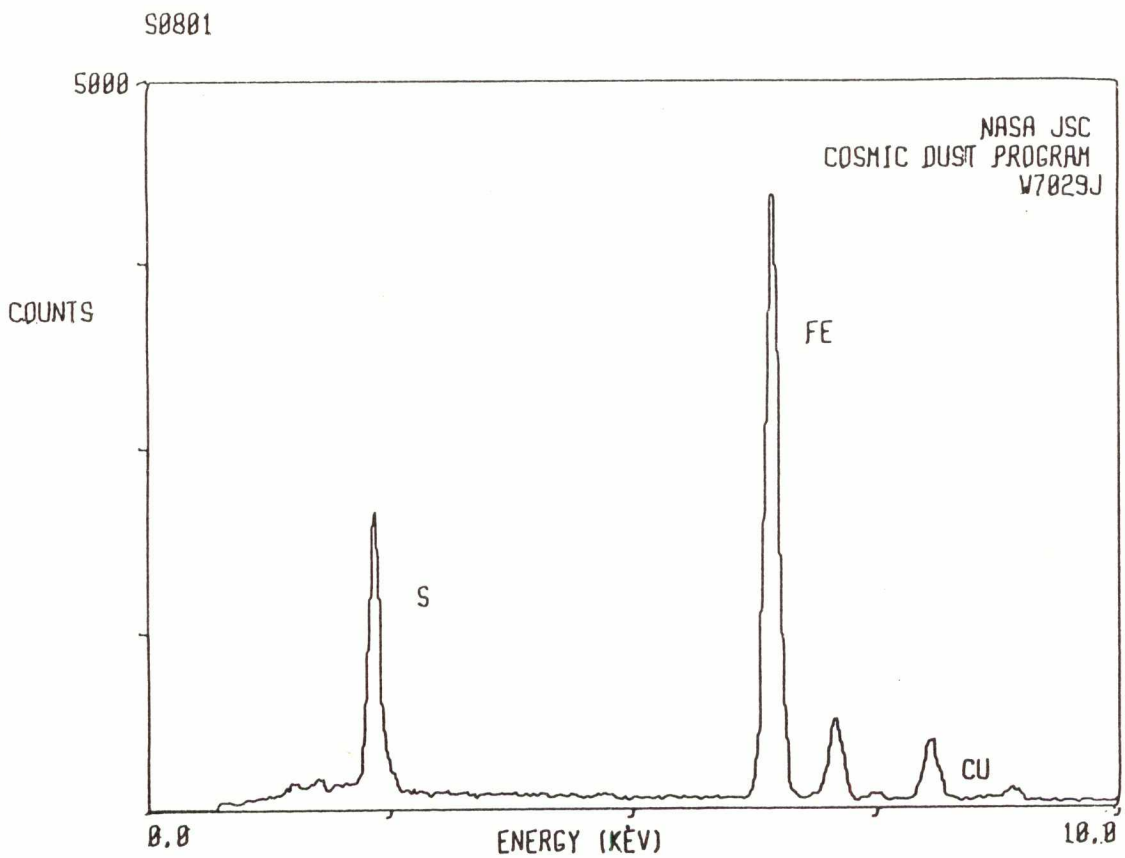


W7029J8

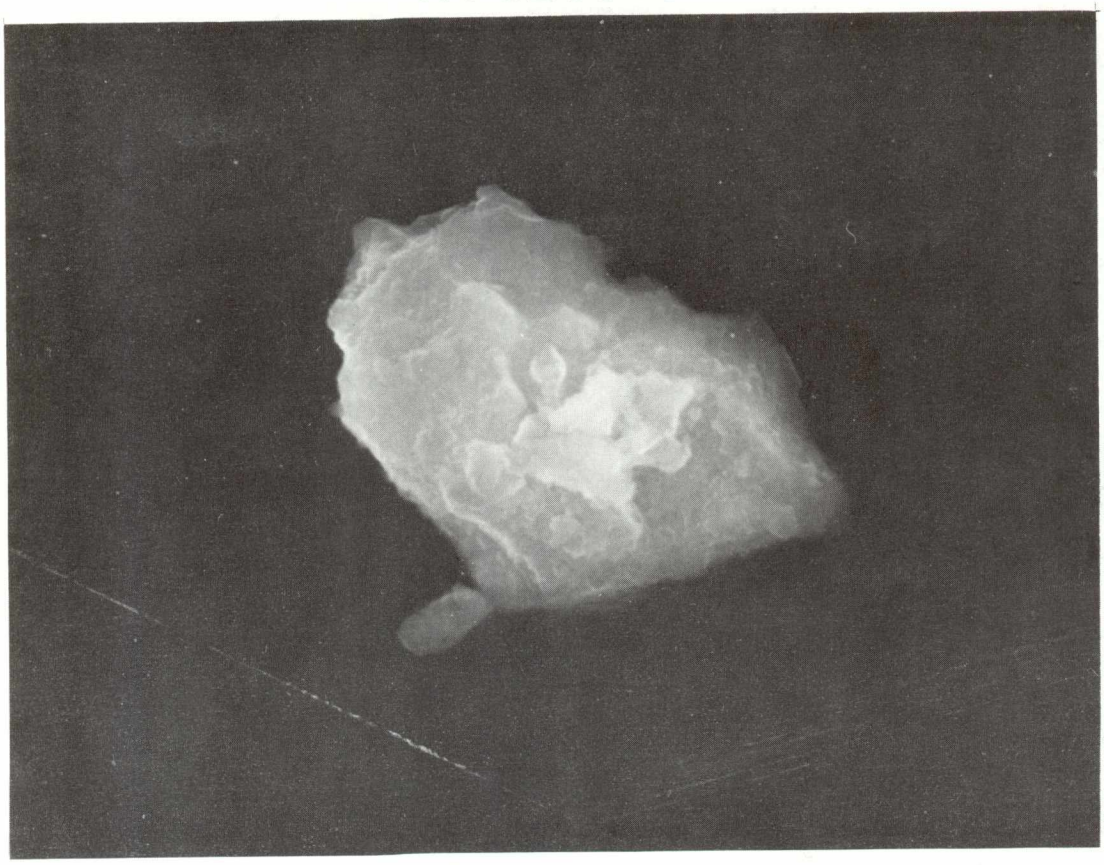


S-82-29228

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
5	S	0	Black	M	C?	

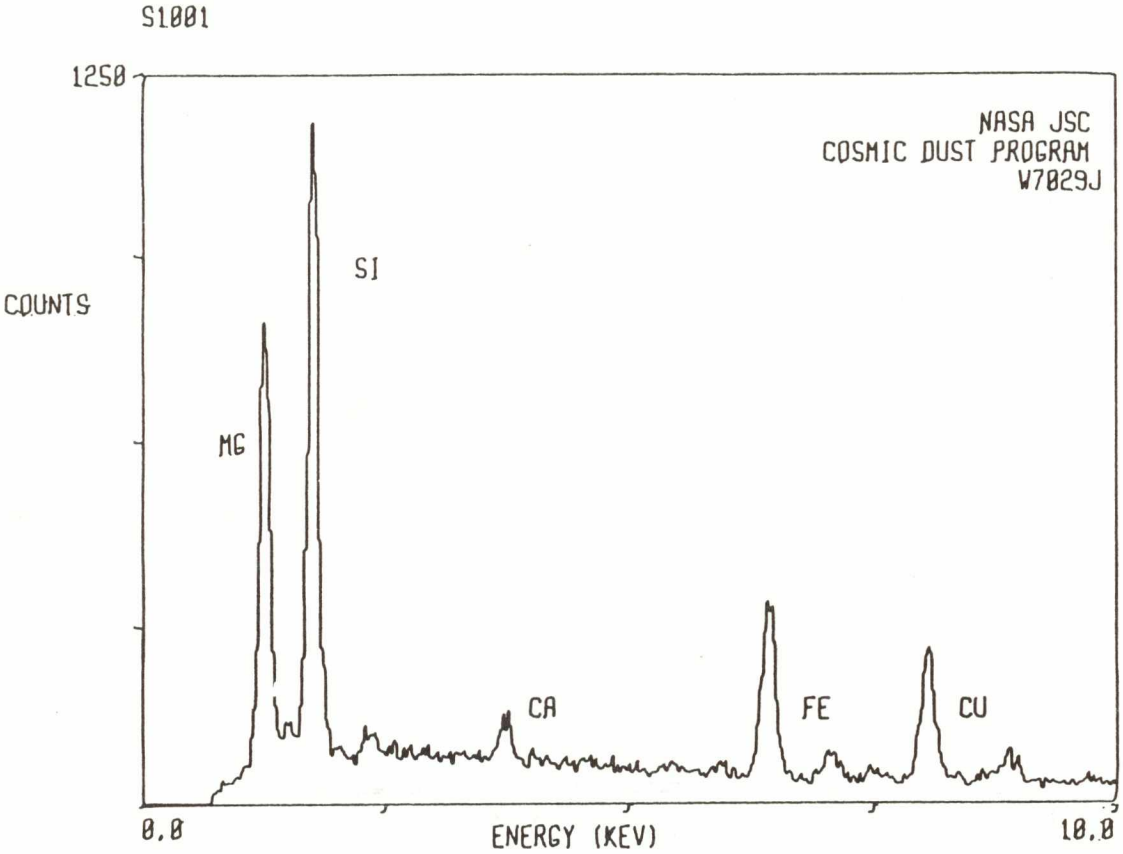


W7029J10

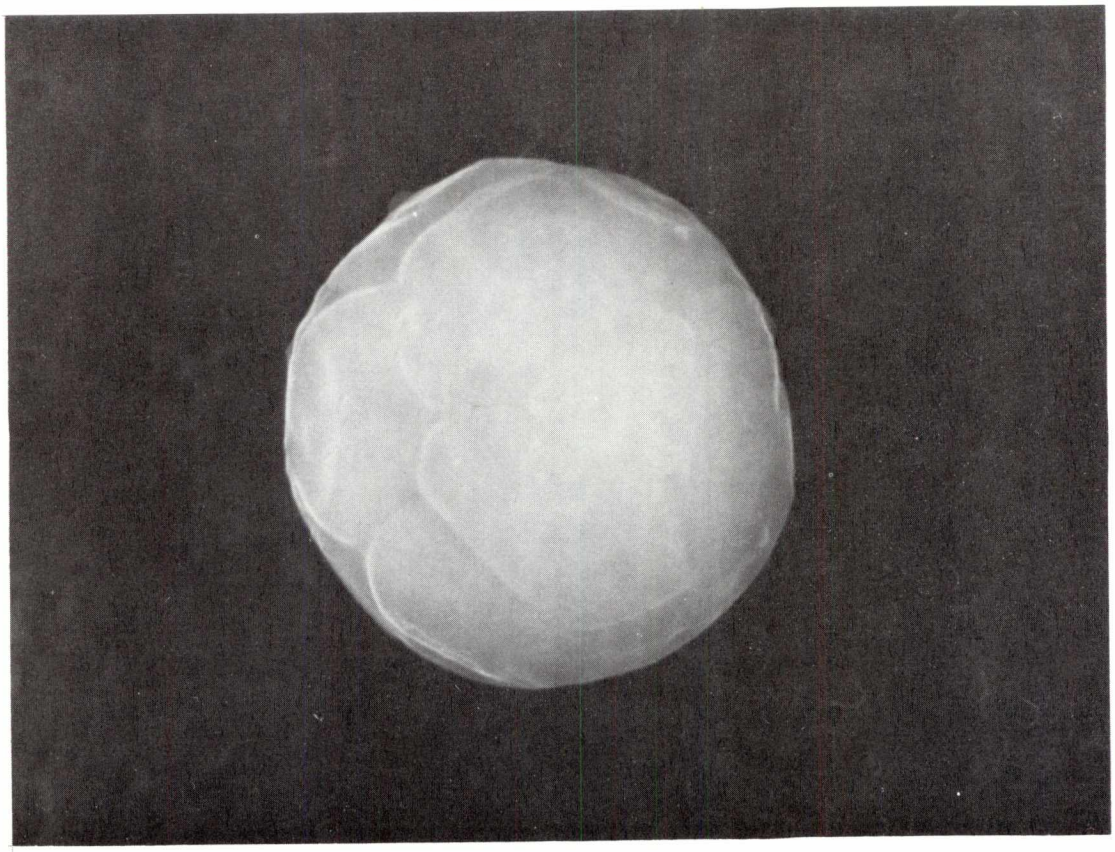


S-82-29229

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
12x17	I	TL	Pale Yellow-Gray	SV	C?	

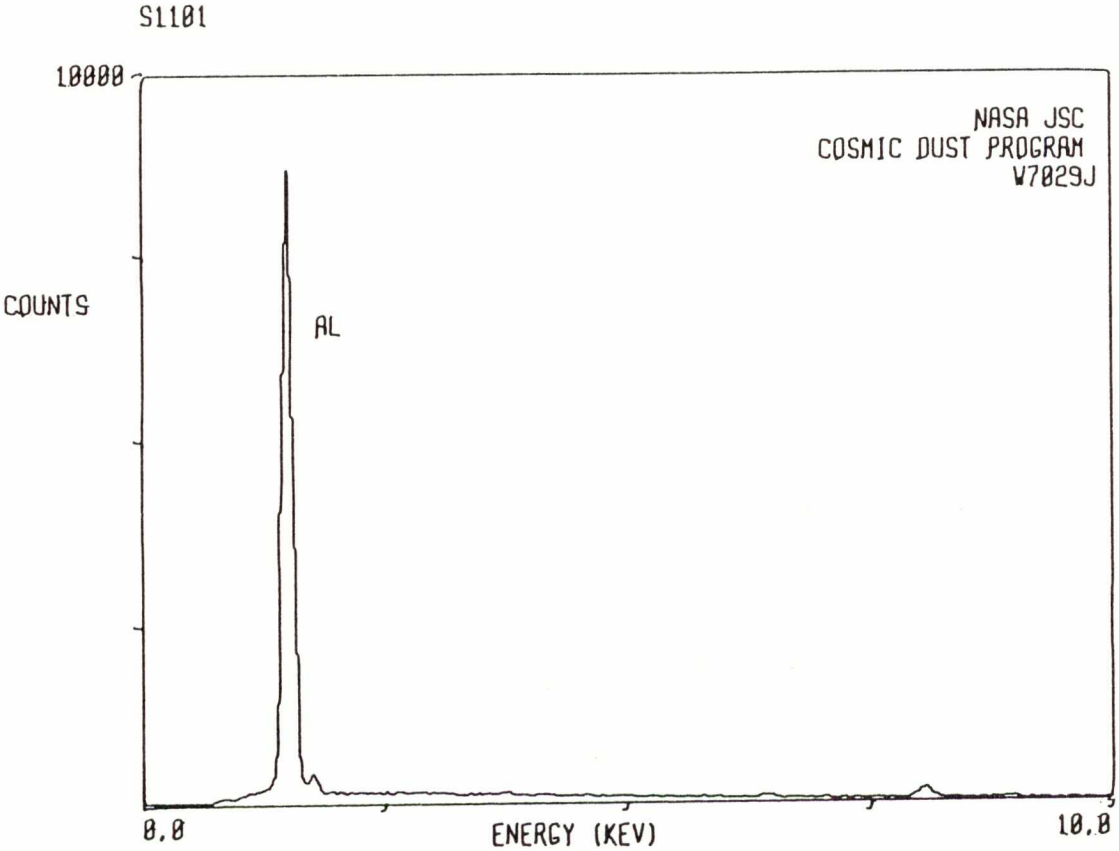


W7029J11

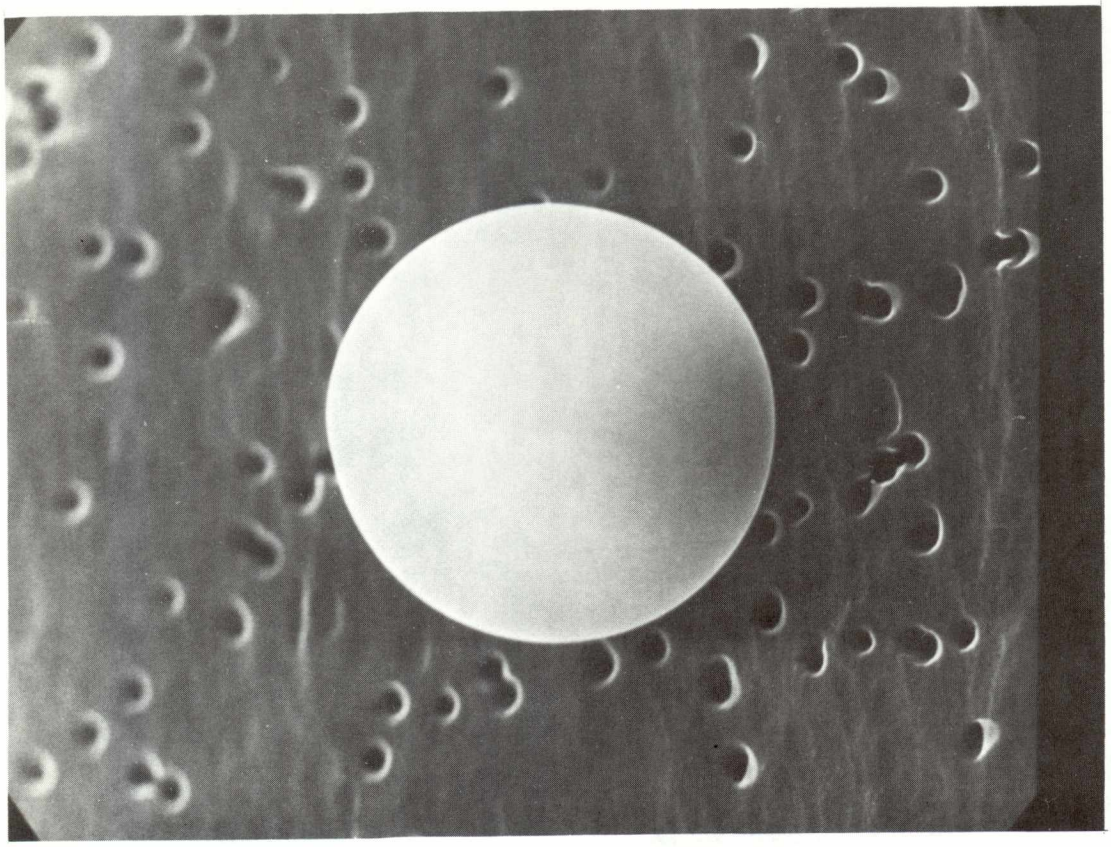


S-82-29230

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
8	S	T/TL	CL/Pale Yellow	V	AOS	Associated with W7029J12.

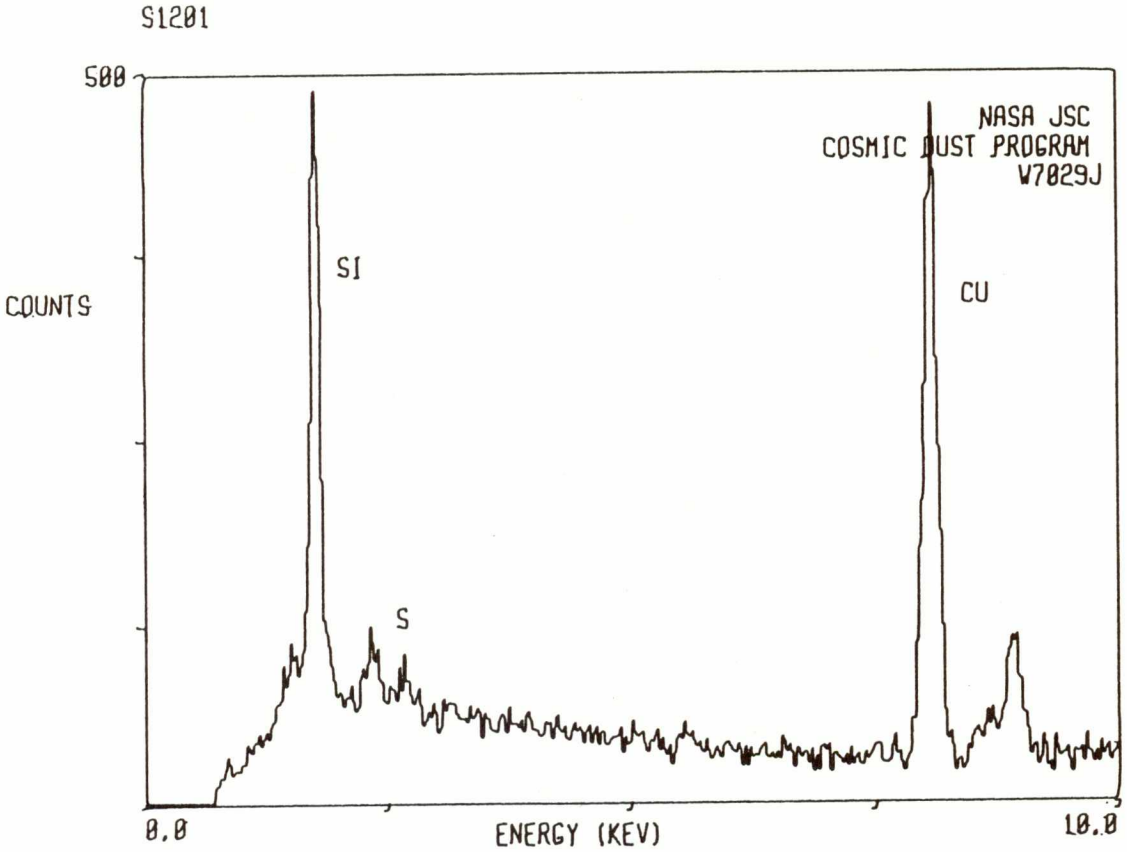


W7029J12

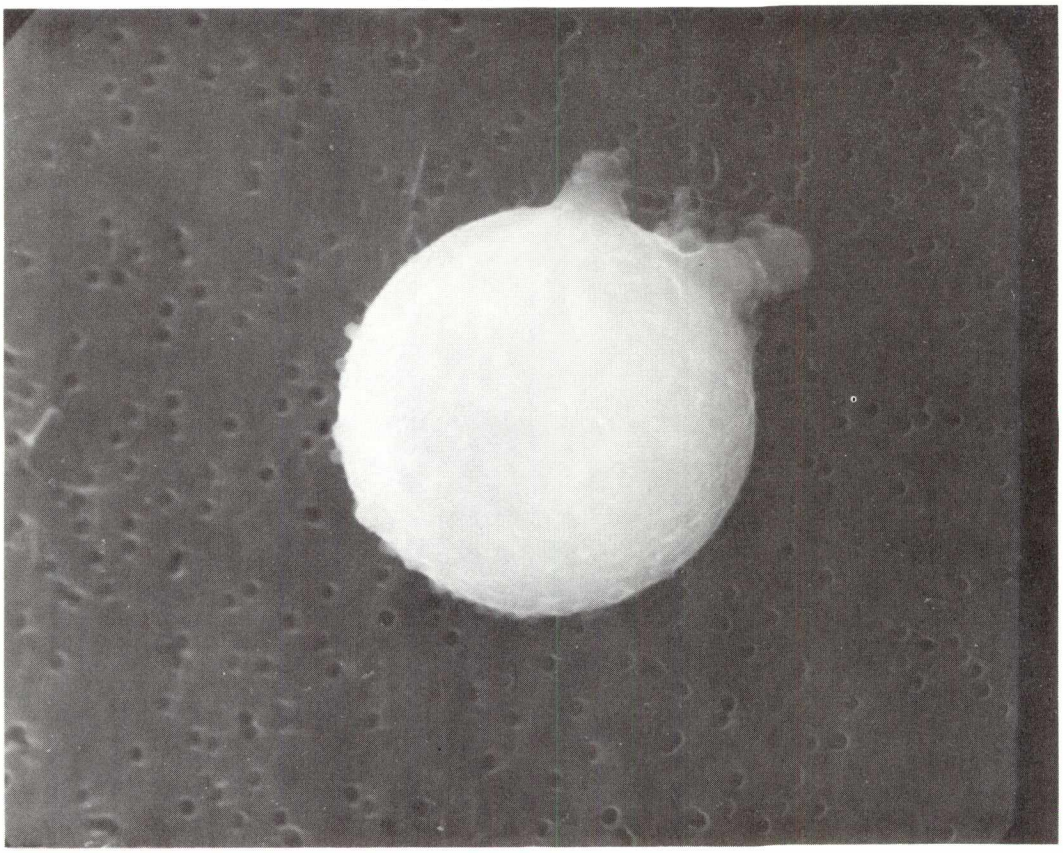


S-82-29231

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
4	S	T	Amber	V	?	Associated with W7029J11; Similar to W7029J2.

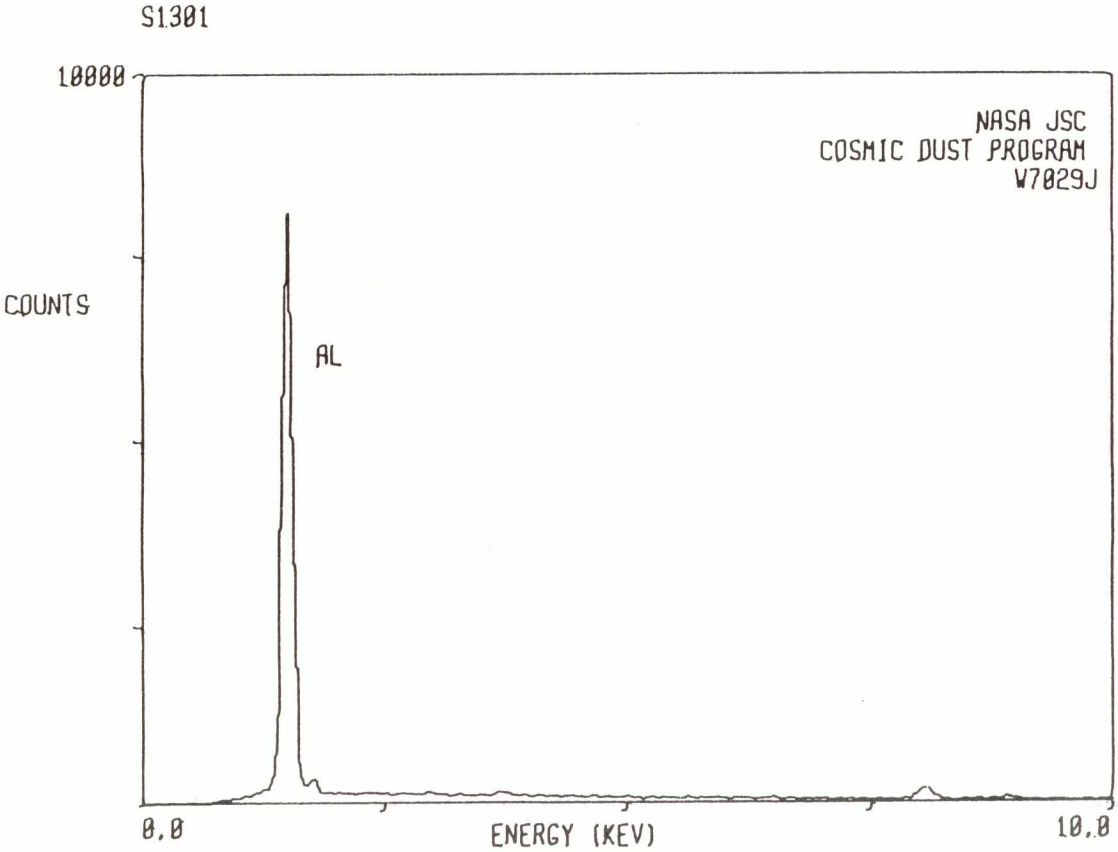


W7029J13

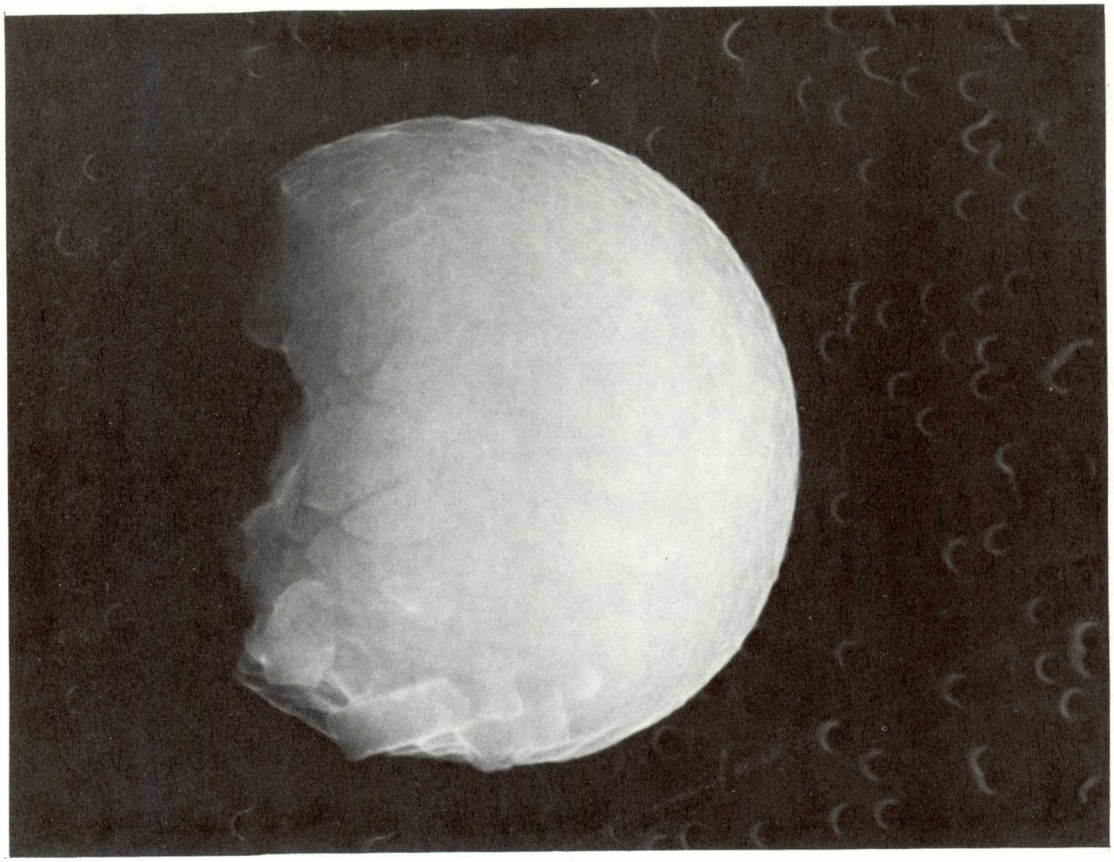


S-82-29232

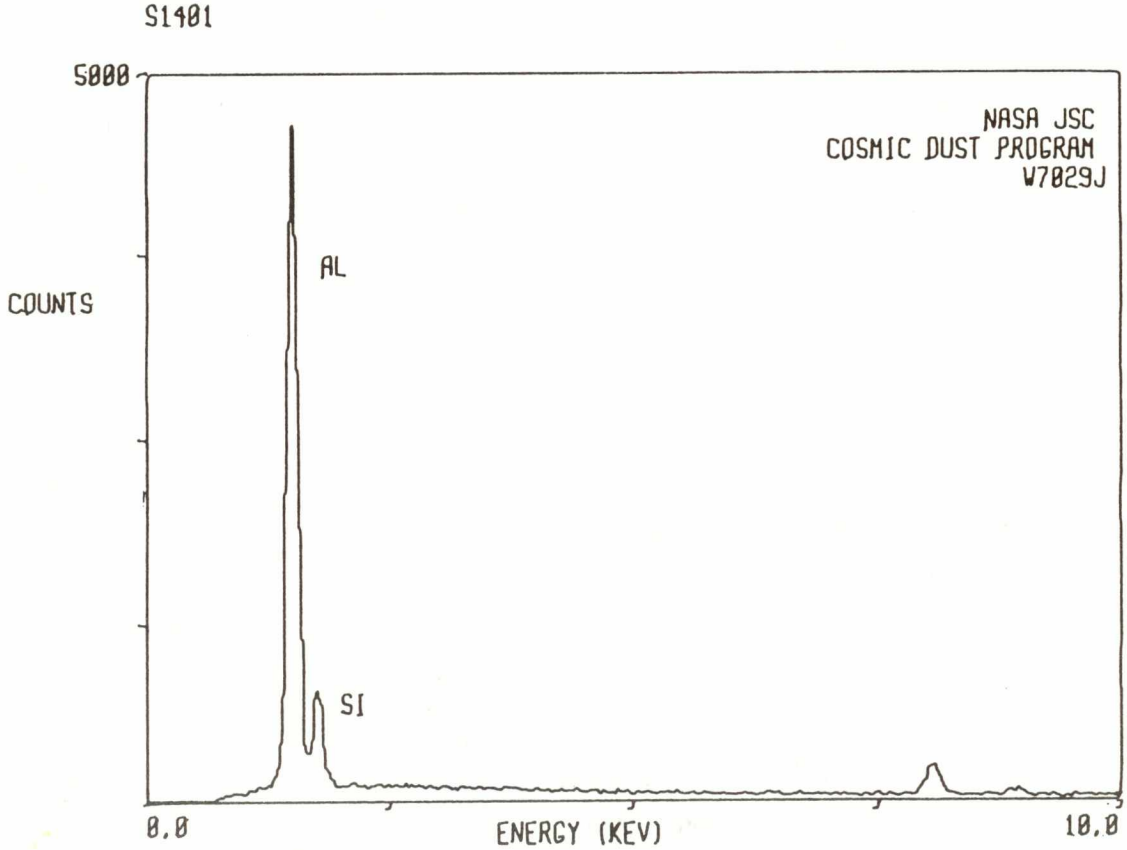
SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
8	S	T/TL	CL/Pale Yellow	V	AOS	



W7029J14



SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
8	E/S	T/TL	CL/Pale Yellow	V	AOS?	Broken AOS?

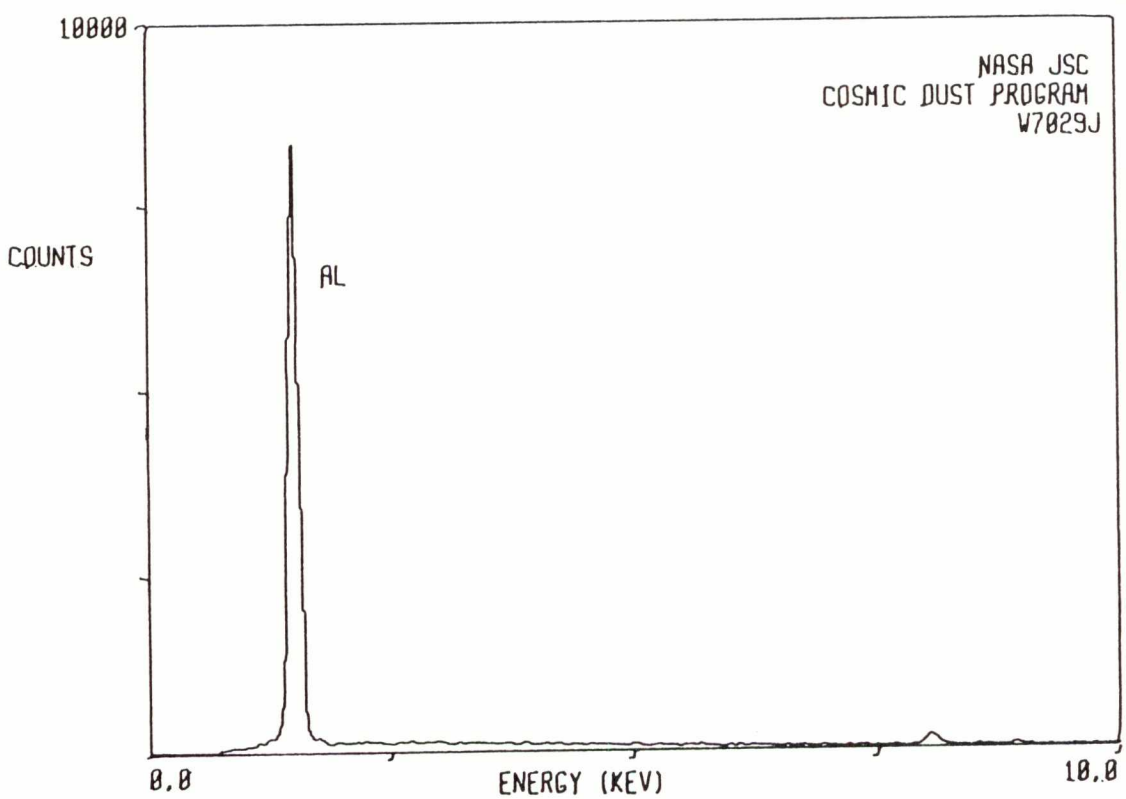


W7029J15

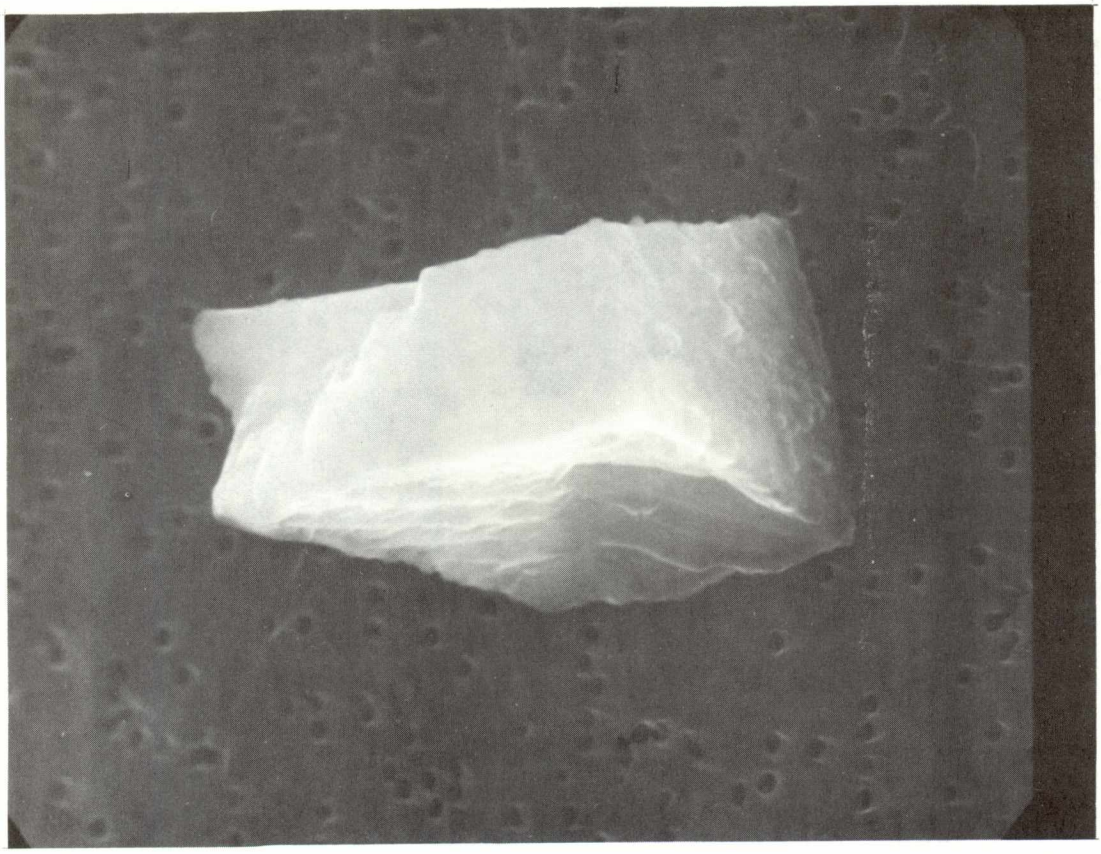
S-82-29234

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
10	S	T/TL	CL/Pale Yellow	V	AOS	

S1501

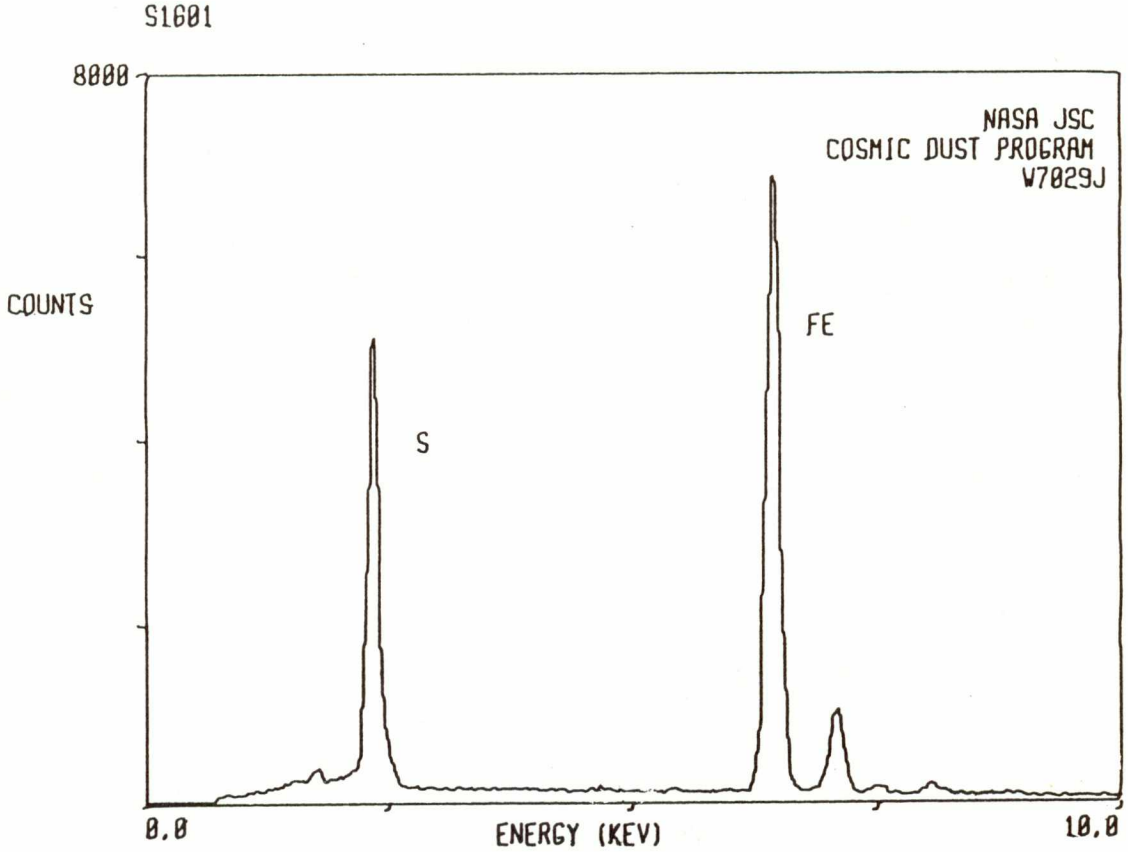


W7029J16

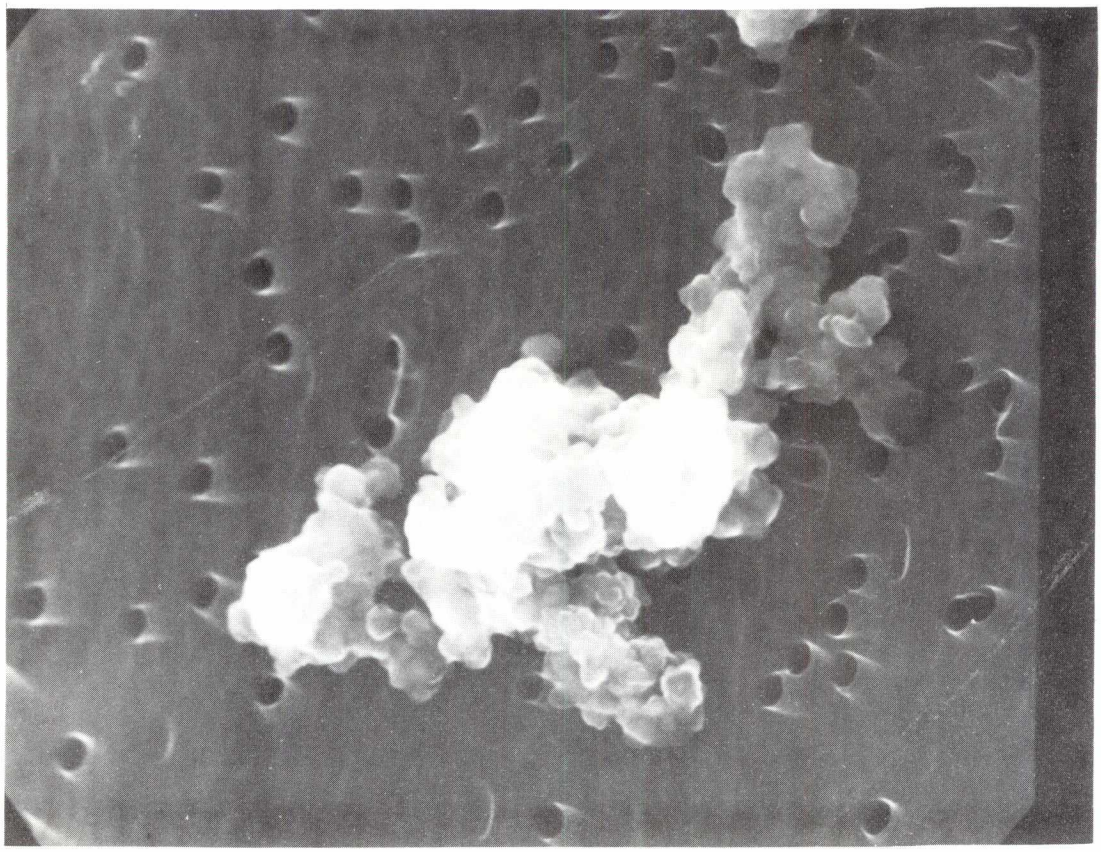


S-82-29235

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
5x9	I	O	Black	D/SM	C?	

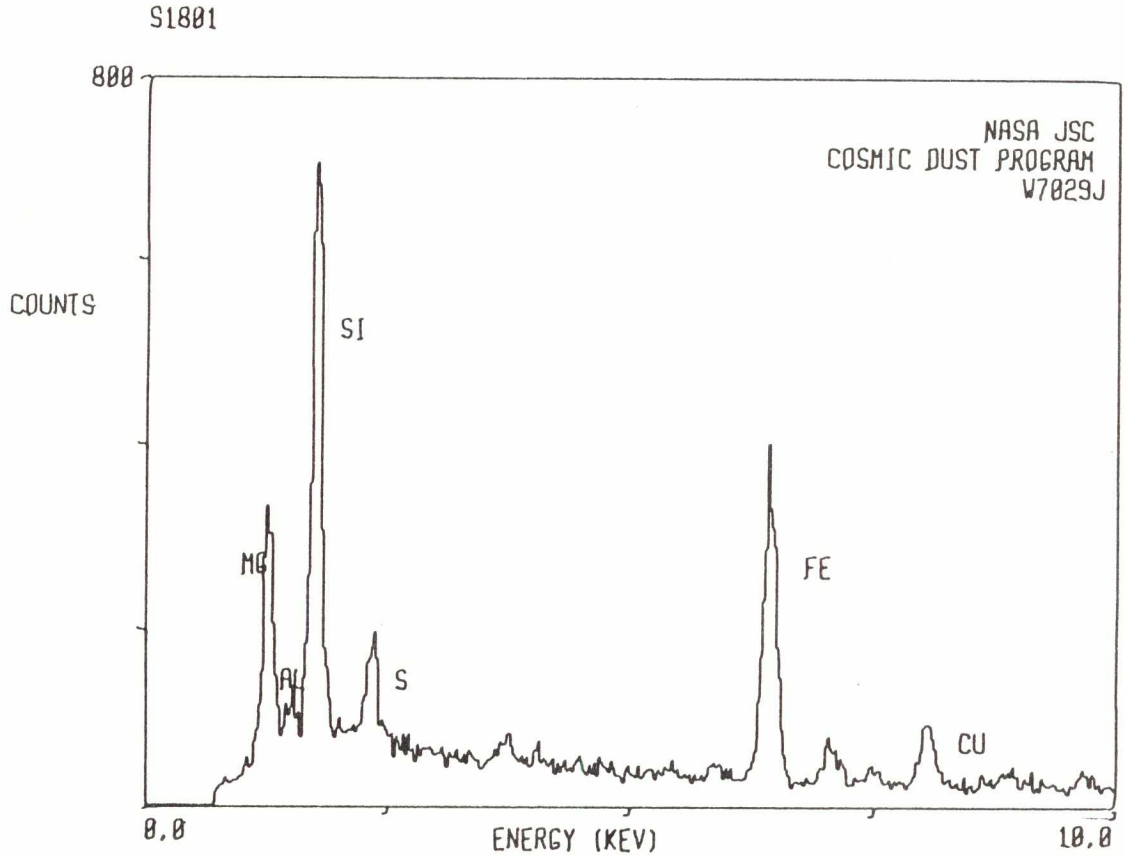


W7029J18

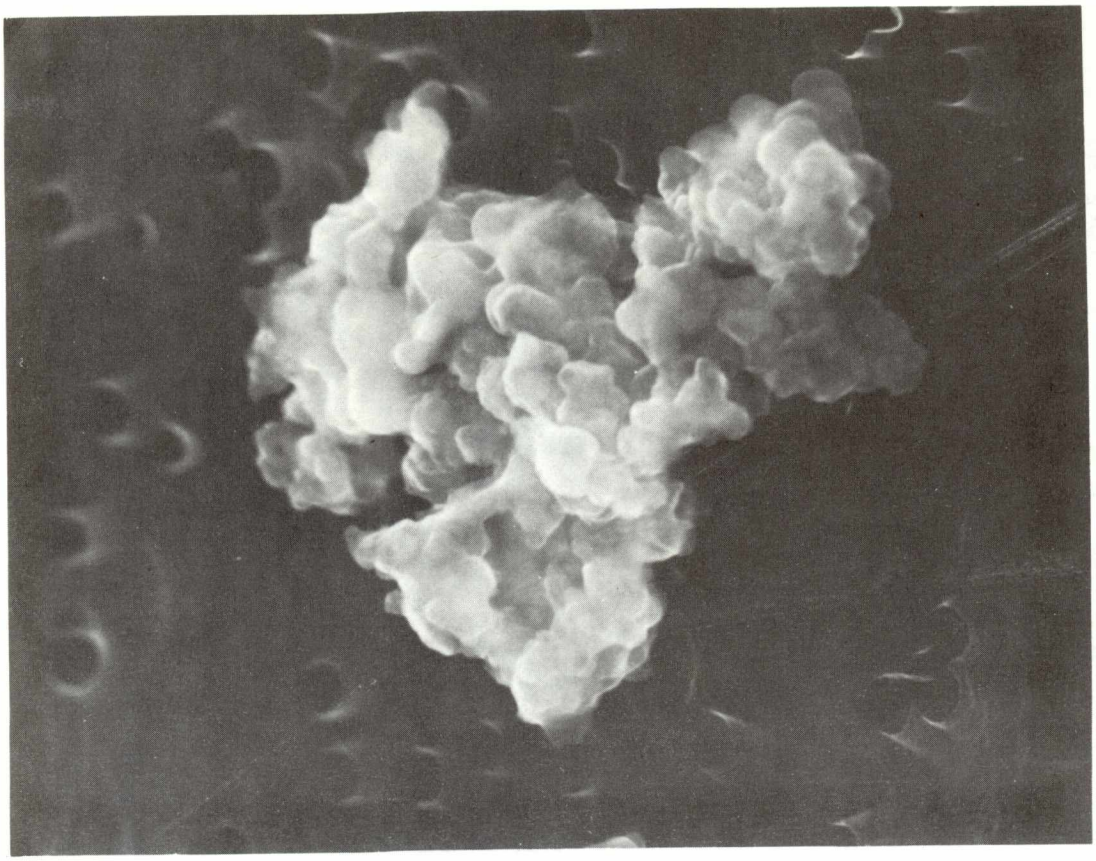


S-82-29238

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
4x7	I	O	Brown to Black	D/SV	C	Fragment related to W7029J19.

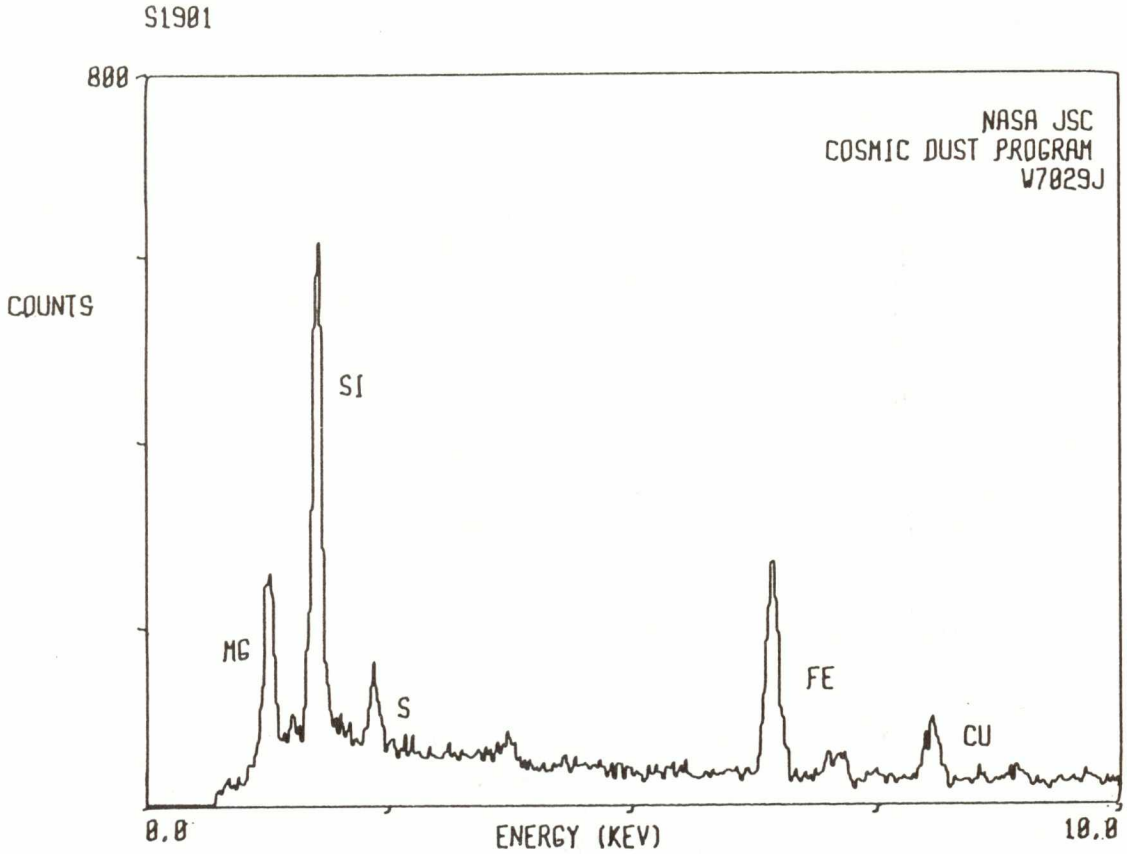


W7029J19

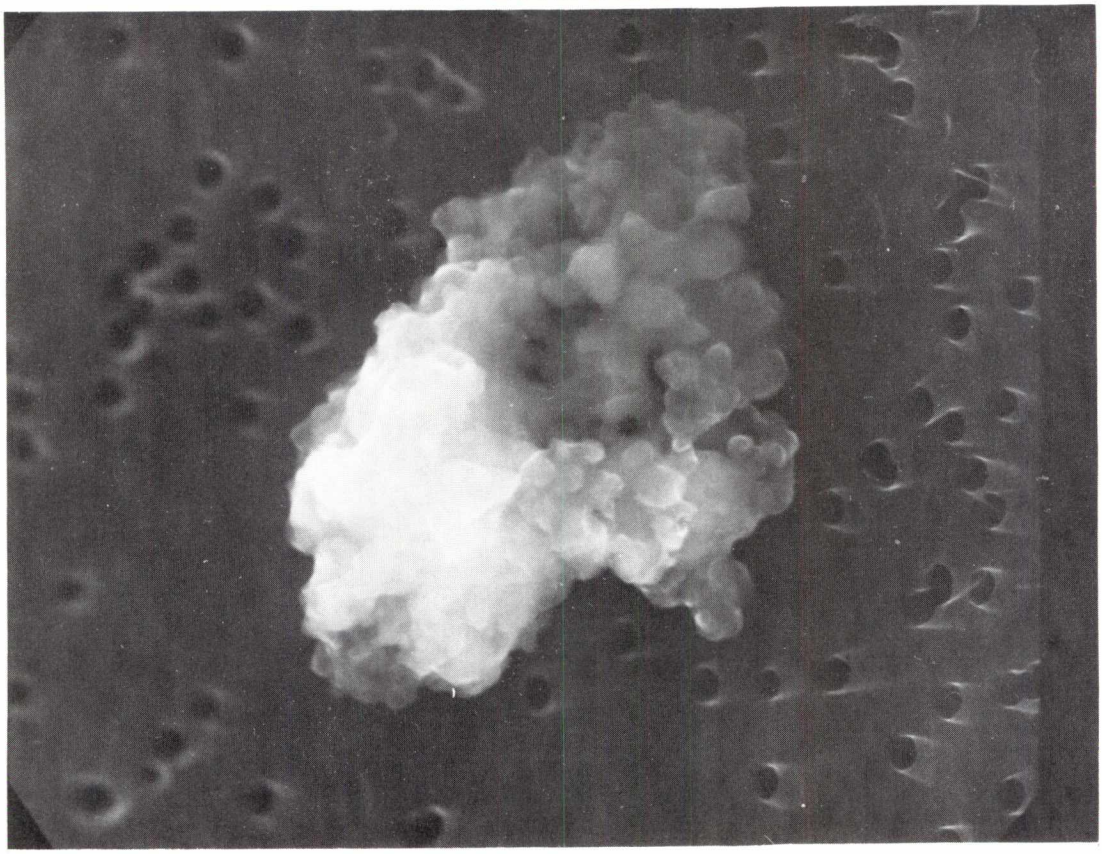


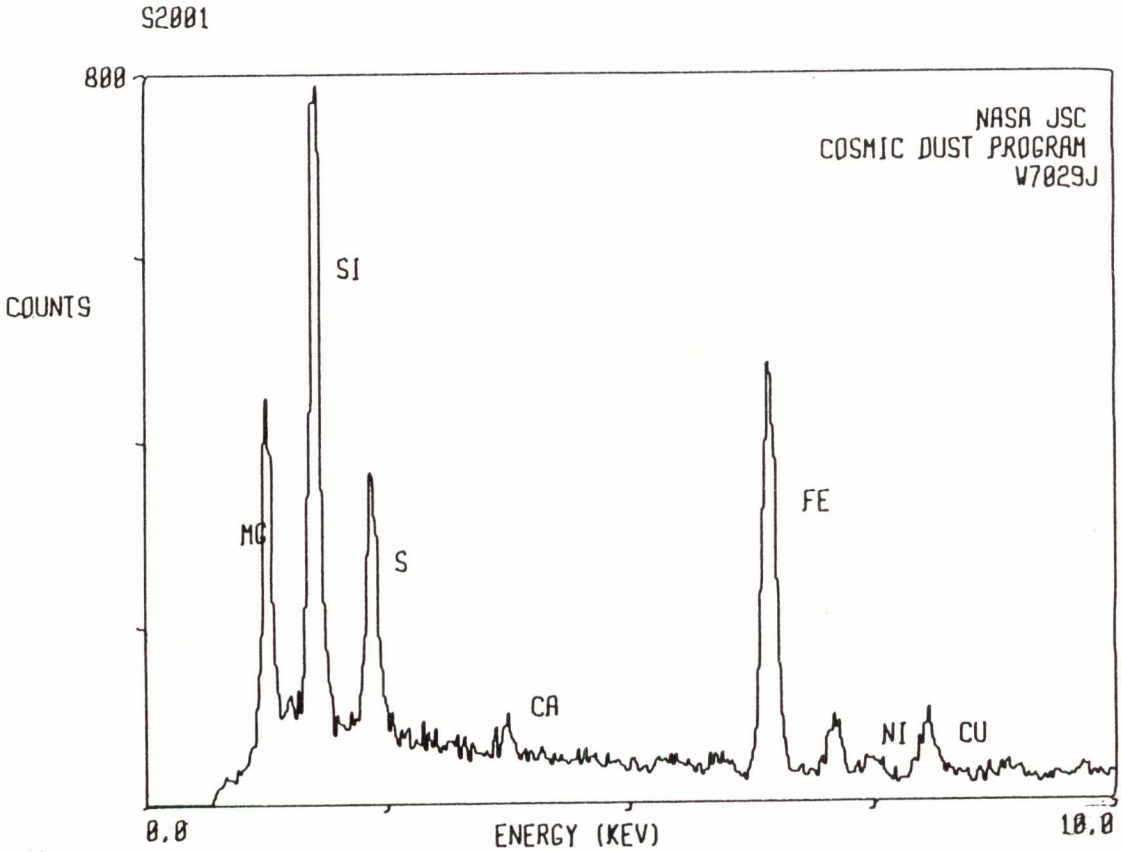
S-82-29237

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
4x4	I	O	Brown to Black	D/SV	C	Fragment related to W7029J18.



W7029J20



S-82-29236

SIZE	SHAPE	TRANS.	COLOR	LUSTER	TYPE	COMMENTS
4x6	I	O	Gray to Black	D	C	Fragment related to W7029J18, 19.