7N-25-CR
77704
P.29

SURFACE SCIENCE LABORATORIES

The University of Alabama in Huntsville

Dr. J. C. Gregory

Dr. J. J. Weimer

XPS Analysis

Friday, May 17, 1991

For: Roger Linton

EH12 - NASA Marshall Space Flight Center

Samples: SI-5658
S13GA
S13GB

(NASA-CR-190078) XPS ANALYSIS (Alabama Univ.) 29 p N92-70522

Unclas
Z9/25 0077704

See Note on back of this page

The following materials were received from Marshall on May 10 for analysis:

Si-5658	(silicon rubber disk)
S13G	(white disk)
H23	(halar)
RTV511	(white polymer)

The first two were for Dr. R. Linton and the second two were for Dr. A. Whittaker.

Marshall was required to prepare the third and forth materials by cutting them into three pieces each to facilitate sample mounting. Samples were mounted on May 13 and analysis was performed shortly thereafter.

A total of nine (9) samples were analyzed.

1 Si-5658	analysis on central region of the material
2. S13GA	analysis on a central region of the disk that appeared brown in color
3. S13GB	analysis on an edge region of the disk that appeared white in color
4. H23A	analysis on the center of the bottom side of the halar material
5. H23B	analysis on the center of the top side of the halar material
6. H23C	analysis on the center of the edge side of the halar material
7. RTV511A	analysis on the center of the bottom (white colored) side of the polymer
8. RTV511B	analysis on the center of the top (brown colored) side of the polymer
9. RTV511C	analysis on the center of the edge (brown colored) side of the polymer

This report contains the results with the samples labelled as described above. Each analysis is divided by a blue colored separation sheet. For similar sets of samples (2-3, 4-6, and 7-9), the first page contains a summary table of elemental concentrations (atomic percent) on each sample from the quantitative analysis. For each sample, the next (or otherwise first) page presents the quantitative chemical analysis in atomic percent for each particular sample. The remaining pages for each sample show the XPS scans in the order of survey and high resolution on each of the major components. The high resolution scans also show the area used for quantitative determination of atomic concentrations.

The samples have been returned to Marshall Space Flight Center with this report.

Note:

All Mg peaks are probably ghost peaks of C1s and should be ignored.

JM 17.May.91

Ion Gun:OFF X-ray:OFF Mg Technique:ESCA

0.6mPa 5/19/91 12:39

Atomic Concentration (%) Summary Table Screen 1 of 1

Page 1 of 1

1 File Name	Angle/ Cycle	O1s	C1s Si2p	Sn3d5 Mg2p	N1s Mo3d	Cl2p
S13GA_3		30.42	47.79 20.45	- -	- -	0.56 0.77
S13GB_3		30.48	49.71 19.28	- -	- -	- 0.53

Print Summary | Delete Entry | Clear AC Summary | Exit

Analysis added afterward to report

Mg peaks removed from quantitative analysis

HW

Ion Gun:OFF X-ray:OFF Mg Technique:ESCA

0.6mPa 5/19/91 12:33

Atomic Concentration

1 Peak Measurement Use Height Area Element Name

2 Included Regions 1 2 3 4 5

3 Omitted Regions 6

Atomic Concentration Table

File: S13GA_3

Comment: white disk sample: yellowed area of sample

Input Lens: Large Area Omni Focus

Element	Concentration(%)	Sens. Factor
O1s	30.42	0.711
C1s	47.79	0.296
Si2p	20.45	0.339
Mo3d	0.56	3.321
Cl2p	0.77	0.891

AC Table Omit All Include All Exit

Ion Gun:OFF X-ray:OFF Mg Technique:ESCA

0.6mPa 5/19/91 12:37

Atomic Concentration

1 Peak Measurement Use Height Area Element Name

2 Included Regions 1 2 3 4

3 Omitted Regions 5

Atomic Concentration Table

File: S13GB_3

Comment: white disk sample: white edge area of sample

Input Lens: Large Area Omni Focus

Element	Concentration(%)	Sens. Factor
O1s	30.48	0.711
C1s	49.71	0.296
Si2p	19.28	0.339
Cl2p	0.53	0.891

AC Table | AC to AC Summary | Omit All | Include All | Exit

Ion Gun:OFF X-ray:OFF Mg Acq complete Technique:ESCA

0.6mPa 5/13/91 11:53

Atomic Concentration

1 Peak Measurement Use	Height	Area	Element Name

2 Included Regions 1 2 3

Atomic Concentration Table

File: Si_5658_3

Comment: silicon rubber disk sample

Input Lens: Large Area Omni Focus

Element	Concentration(%)	Sens. Factor
O1s	52.81	0.711
C1s	22.56	0.296
Si2p	24.63	0.339

AC Table | AC to AC Summary | Omit All | Exit

ESCA SURVEY 5/13/91 ANGLE= 20 deg ACQ TIME=8.34 min
FILE: Si_5658_1 silicon rubber disk sample
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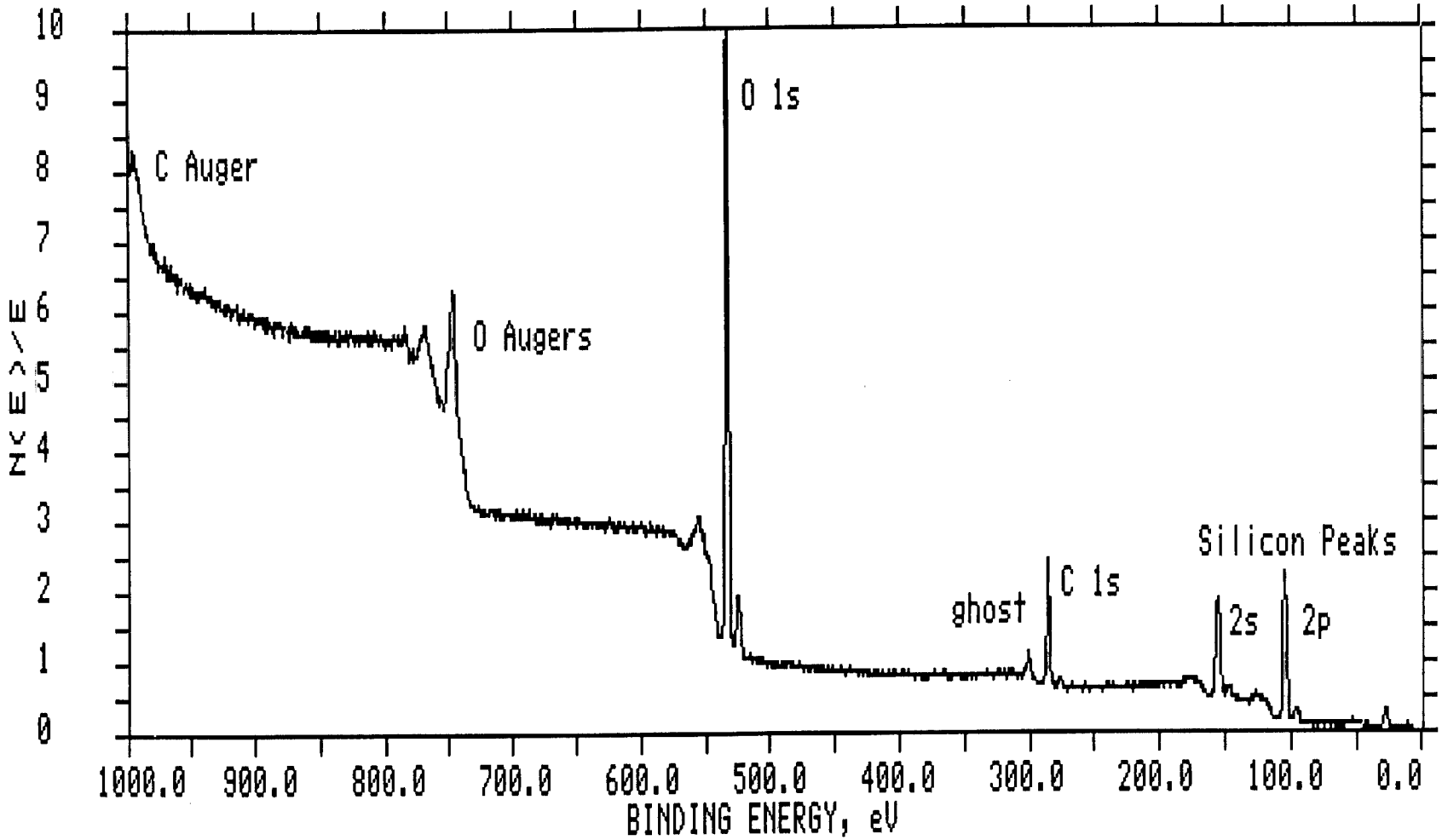

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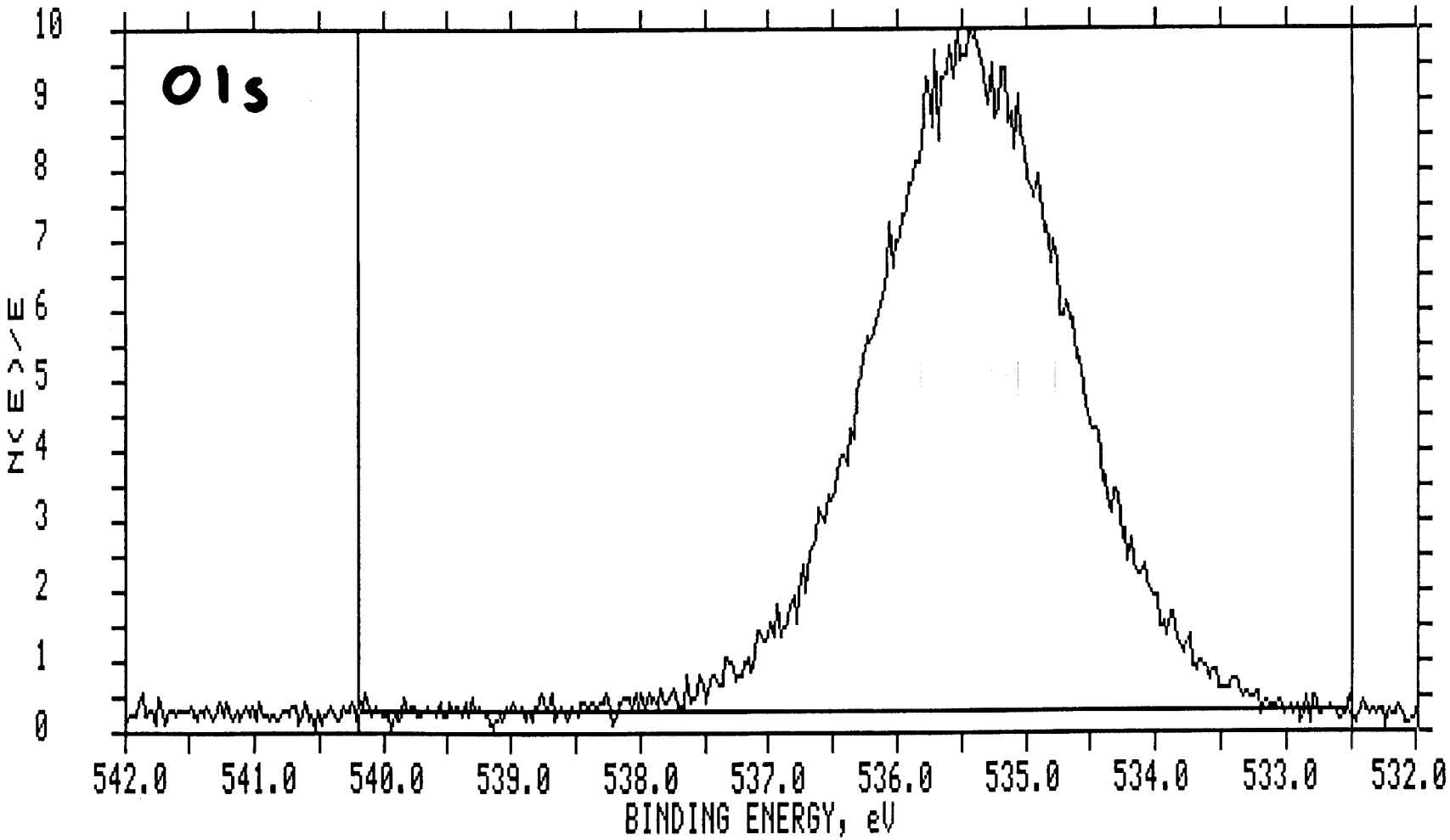
FILE: Si_5658_3 silicon rubber disk sample
SCALE FACTOR, OFFSET=0.511, 1.456 k c/s PASS ENERGY=8.950 eV Mg 300 W



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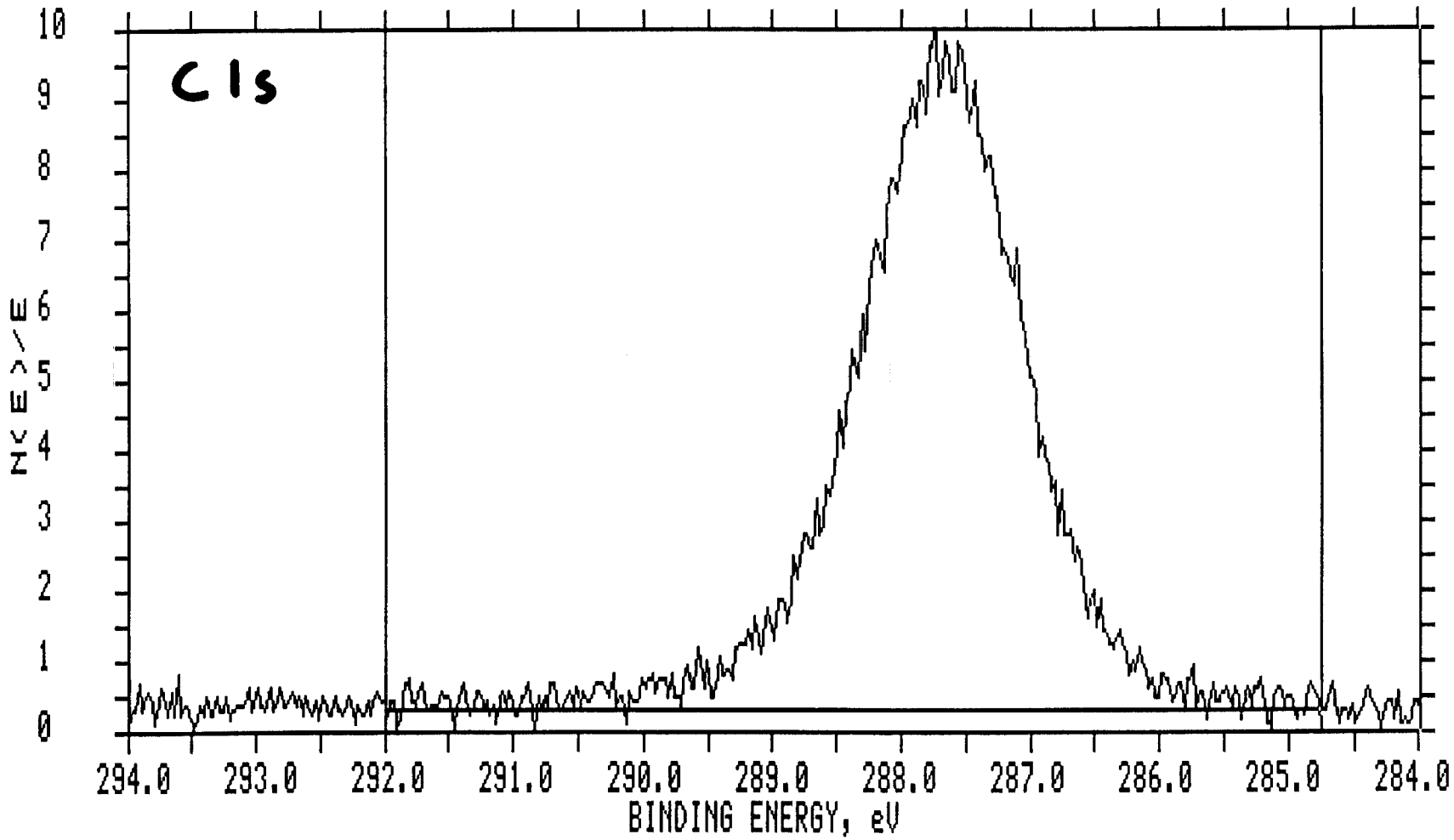

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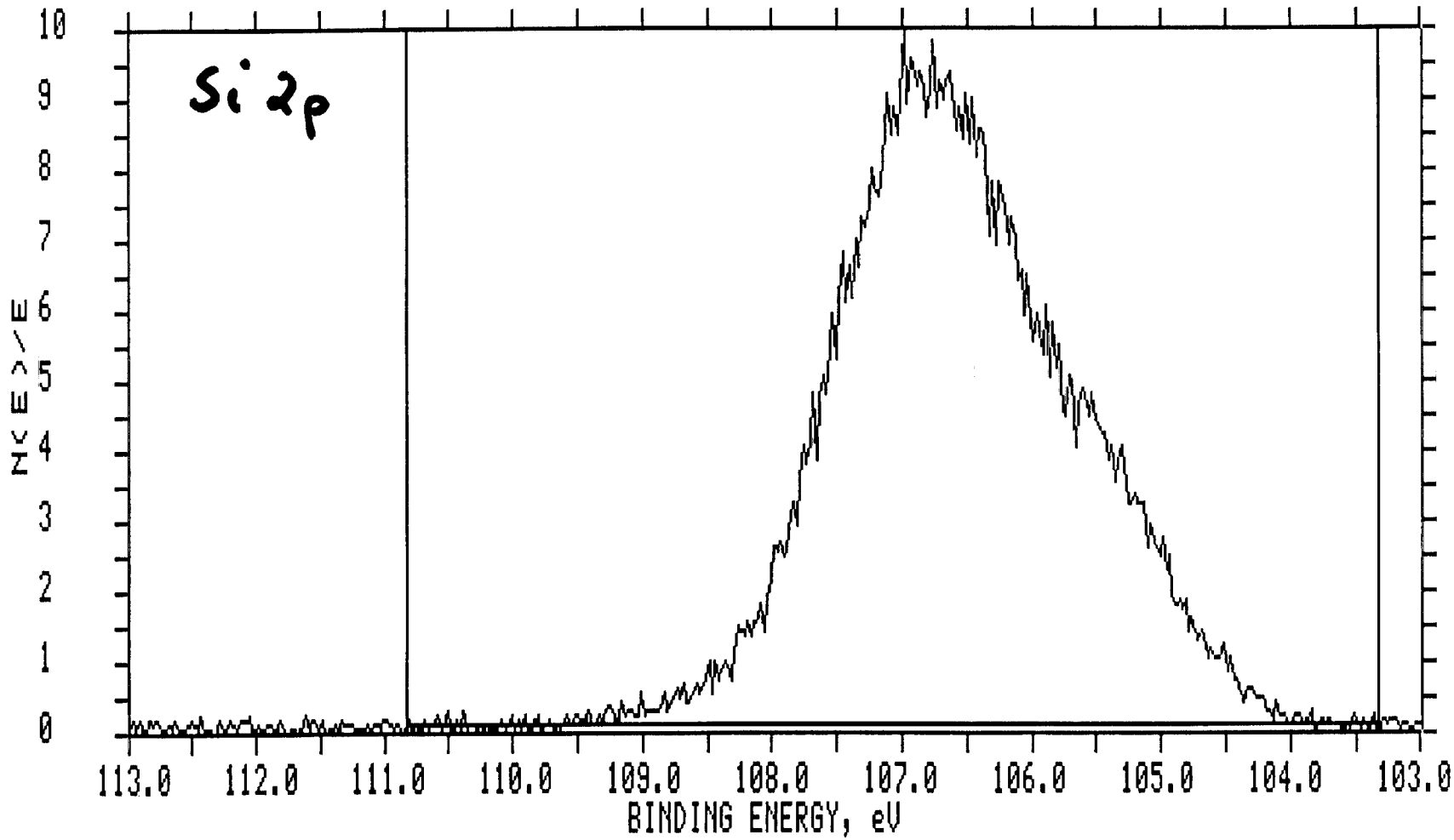


Ion Gun:OFF X-ray: ON Mg Acquiring Technique:ESCA

0.6mPa 5/13/91 16:15

Atomic Concentration (%) Summary Table

1 File Name	Angle/ Cycle	O1s	C1s Si2p	Mo3d	Cl2p	Mg2p	
S13GA_3		31.21	45.77 20.01	0.64	0.80	1.57	yellow area (center)
S13GB_3		30.78	47.44 19.25	-	0.59	1.93	white area (edge)

S13G Sample

Print Summary | Delete Entry | Clear AC Summary | Exit

Ion Gun:OFF X-ray: ON Mg Acquiring Technique:ESCA

0.6mPa 5/13/91 14:58

Atomic Concentration

1 Peak Measurement Use Height Area Element Name

2 Included Regions 1 2 3 4 5 6

Atomic Concentration Table

File: S13GA_3

Comment: white disk sample: yellowed area of sample

Input Lens: Large Area Omni Focus

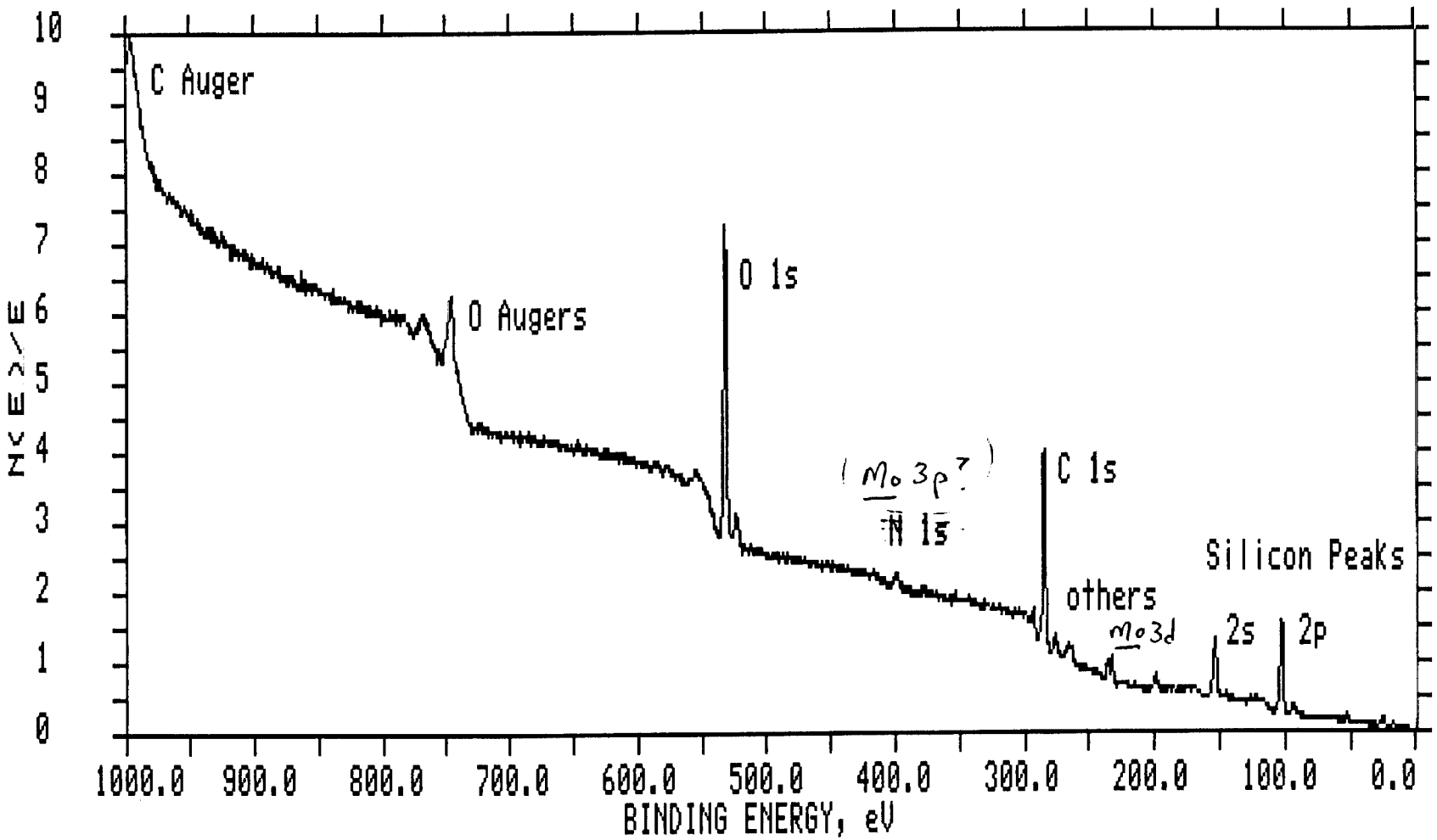
Element	Concentration(%)	Sens. Factor
O1s	31.21	0.711
C1s	45.77	0.296
Si2p	20.01	0.339
Mo3d	0.64	3.321
Cl2p	0.80	0.891
Mg2p	1.57	0.153

AC Table

Omit All

Exit

ESCA SURVEY 5/13/91 ANGLE= 20 deg ACQ TIME=8.34 min
FILE: S13GA_1 white disk sample: yellowed area of sample
SCALE FACTOR, OFFSET=12.975, 2.304 k c/s PASS ENERGY=89.450 eV Mg 300 W



ESCA SURVEY 5/13/91 ANGLE= 20 deg ACQ TIME=8.76 min
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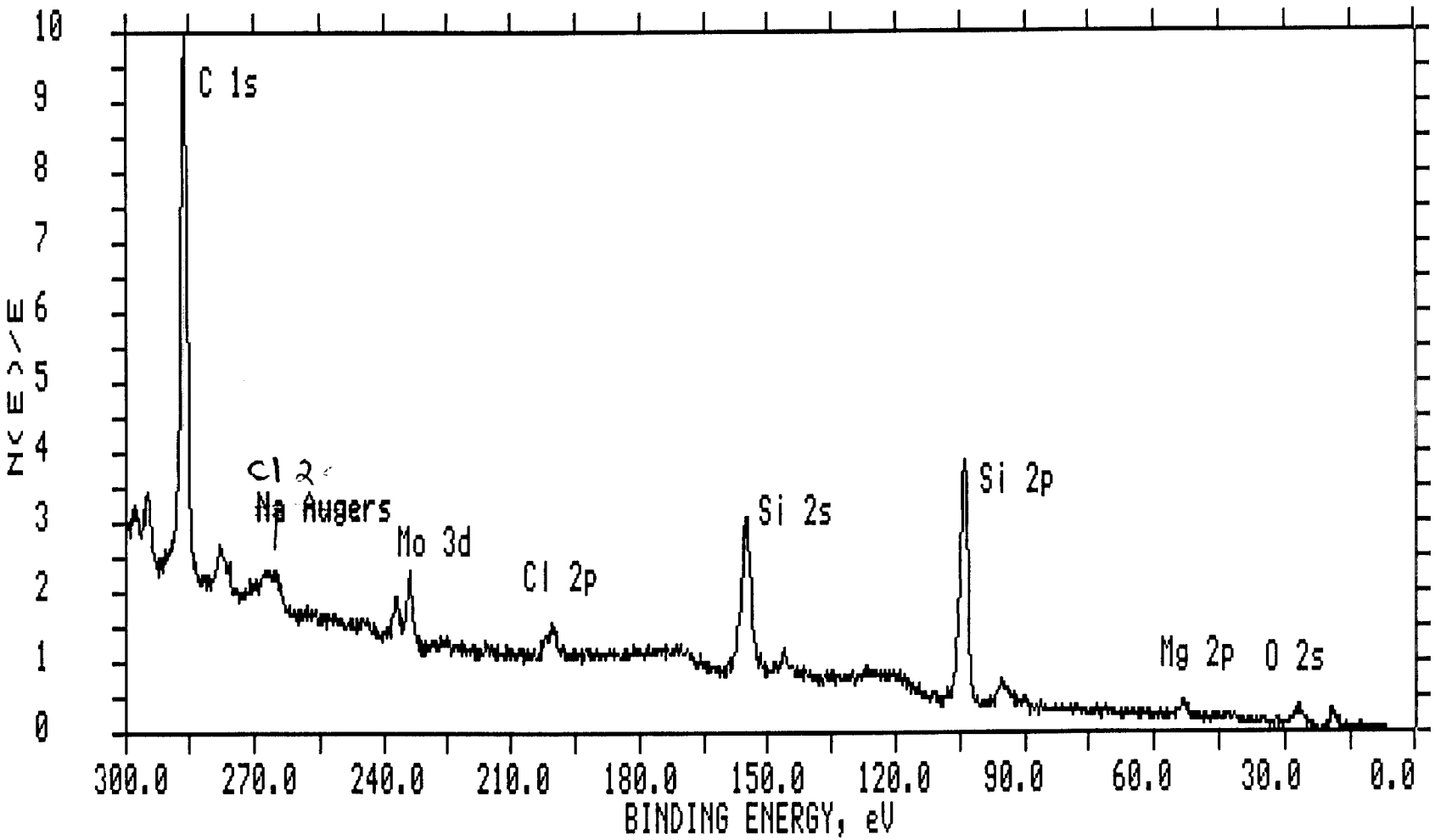
SCALE FACTOR, OFFSET=1.862, 1.400 k c/s PASS ENERGY=35.750 eV Mg 300 W



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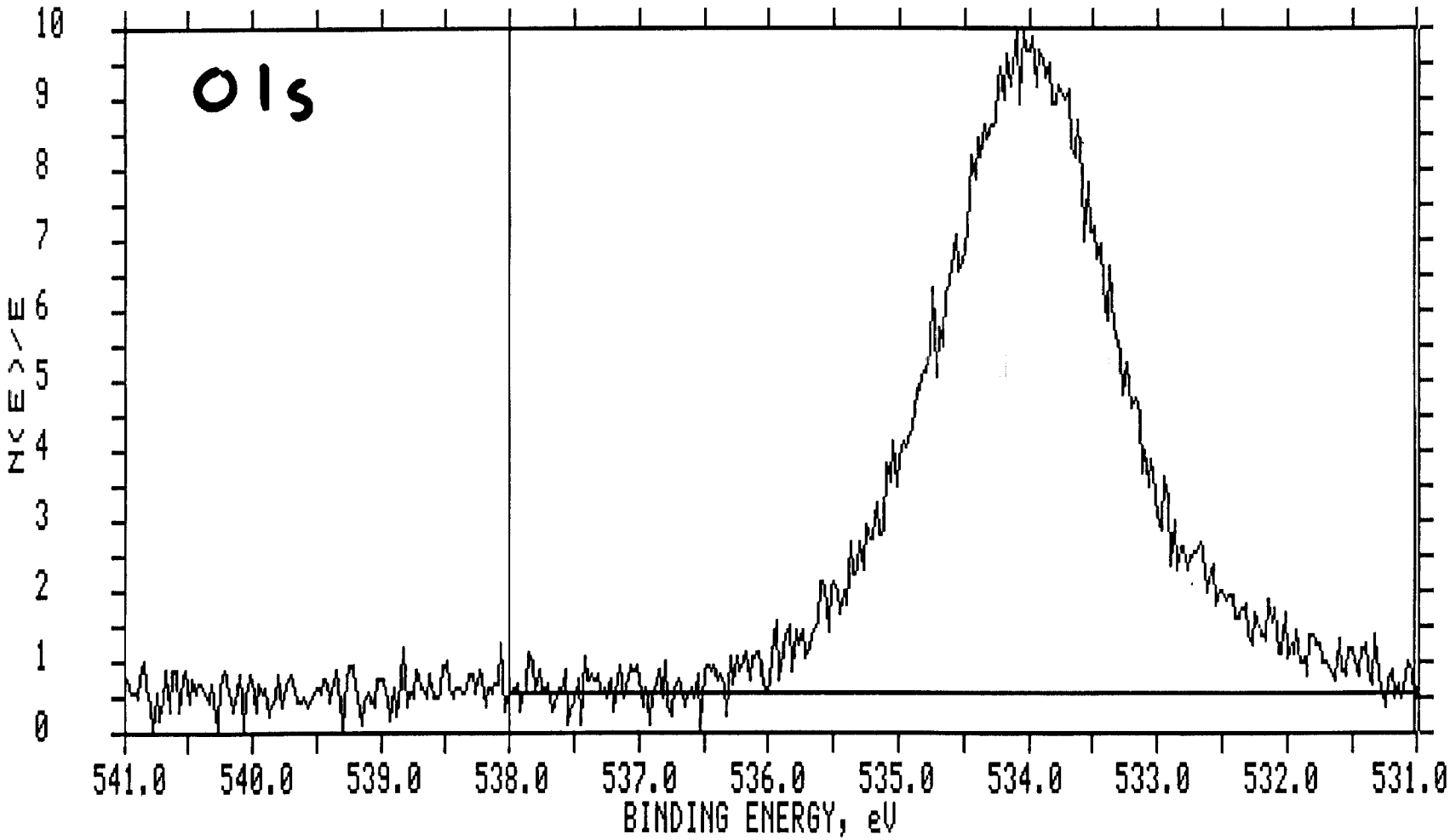

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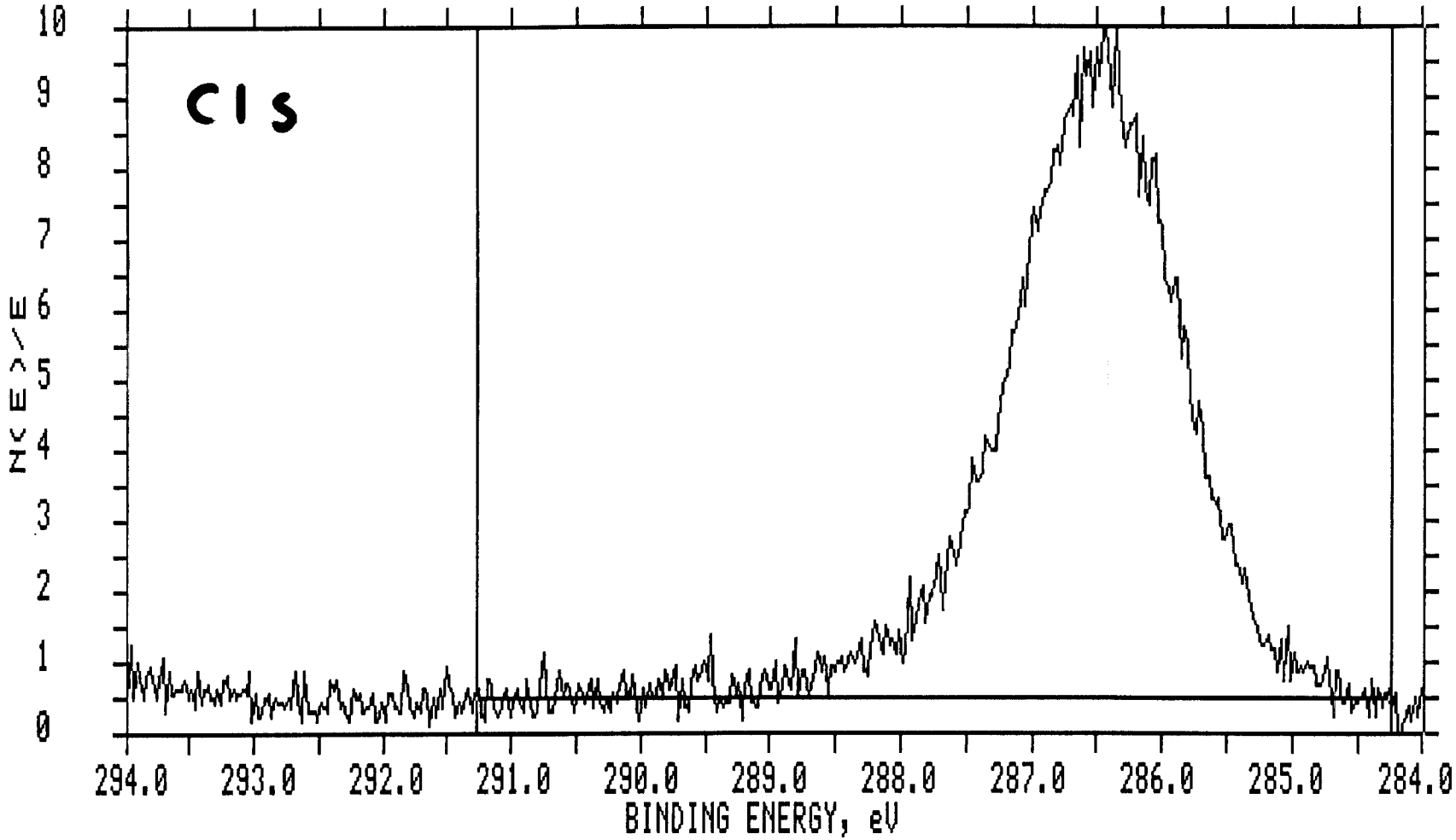
SCALE FACTOR, OFFSET=0.315, 1.768 k c/s PASS ENERGY=8.950 eV Mg 300 W



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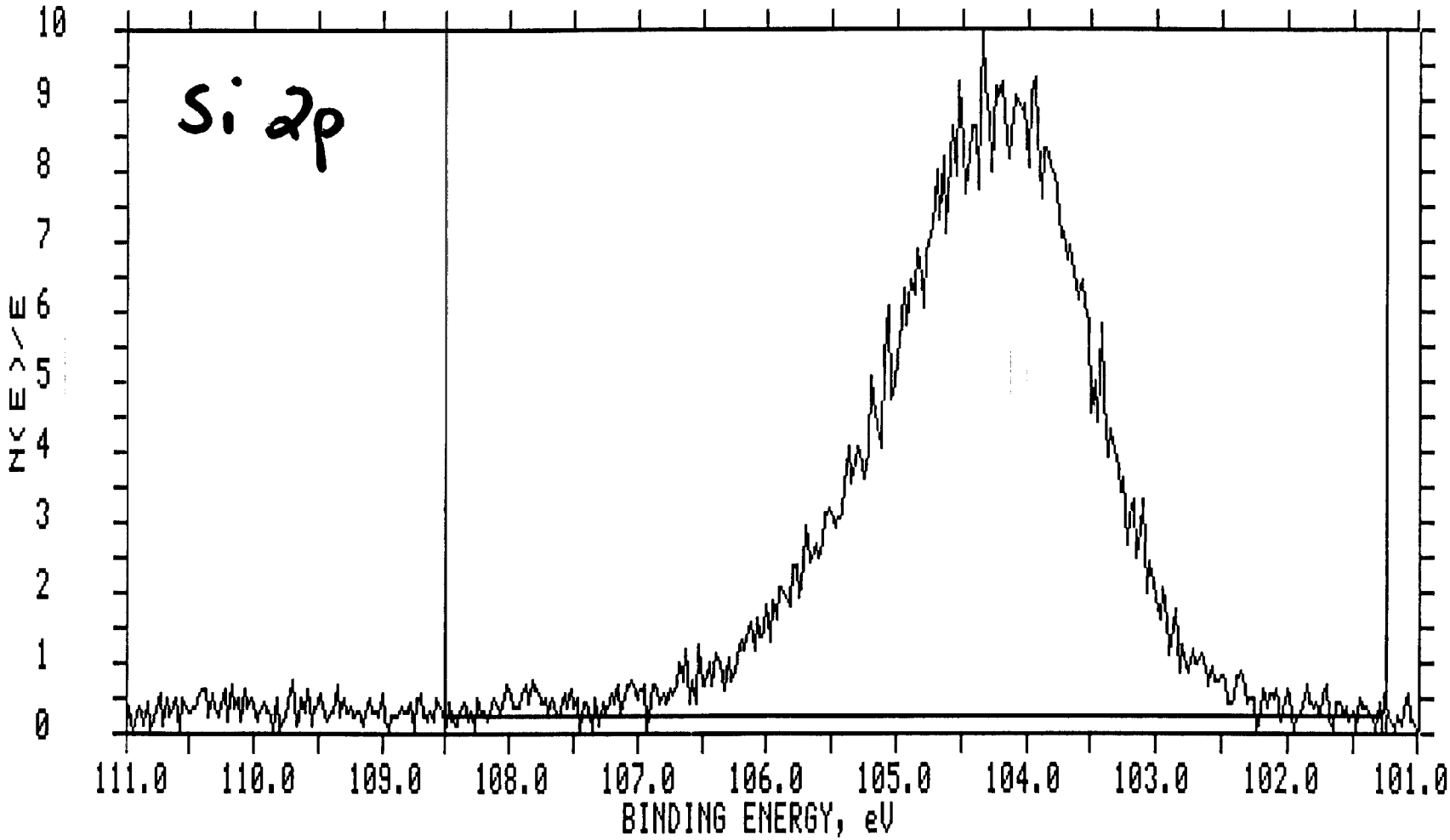
SCALE FACTOR, OFFSET=0.132, 1.316 k c/s PASS ENERGY=8.950 eV Mg 300 W



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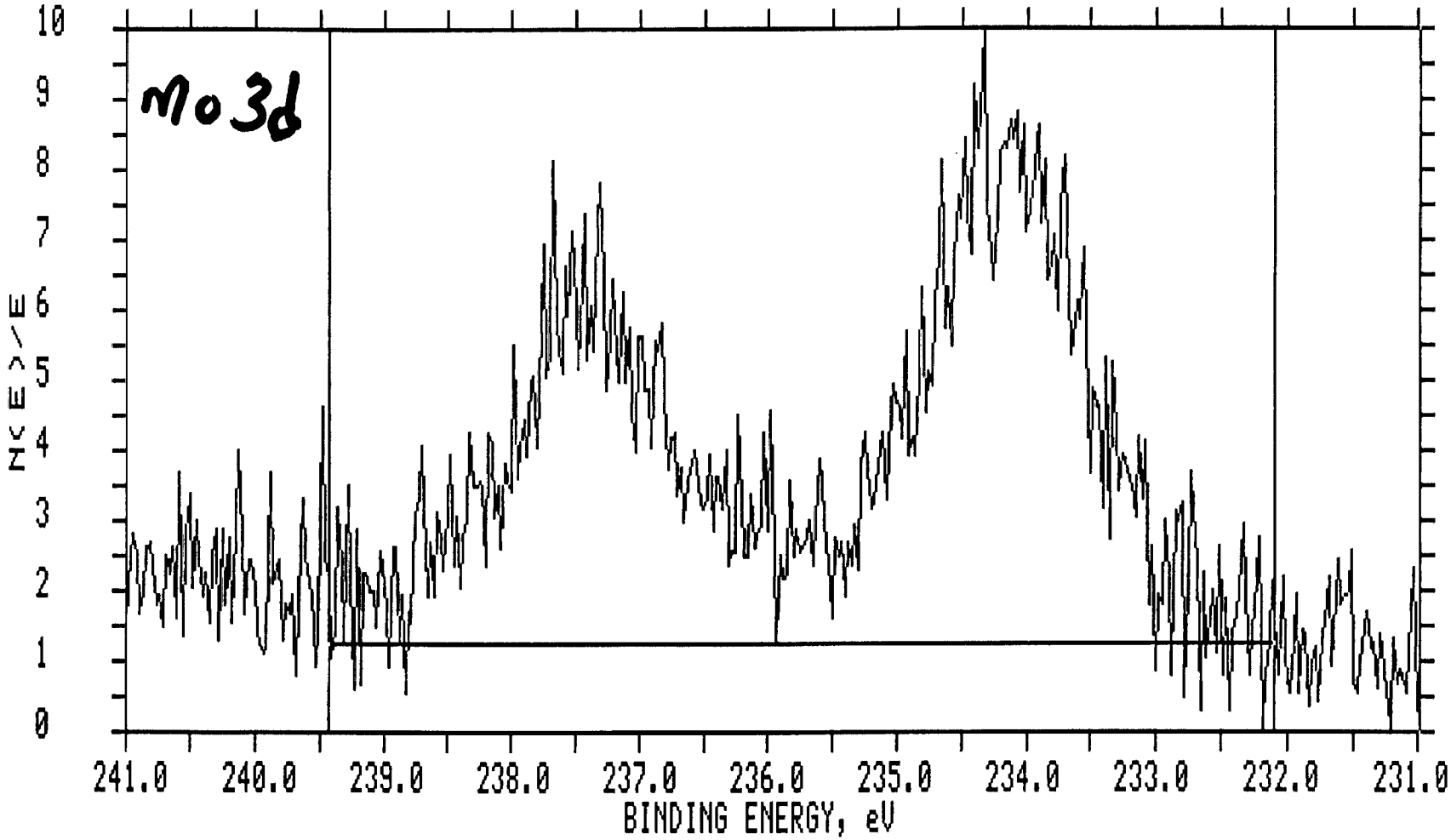
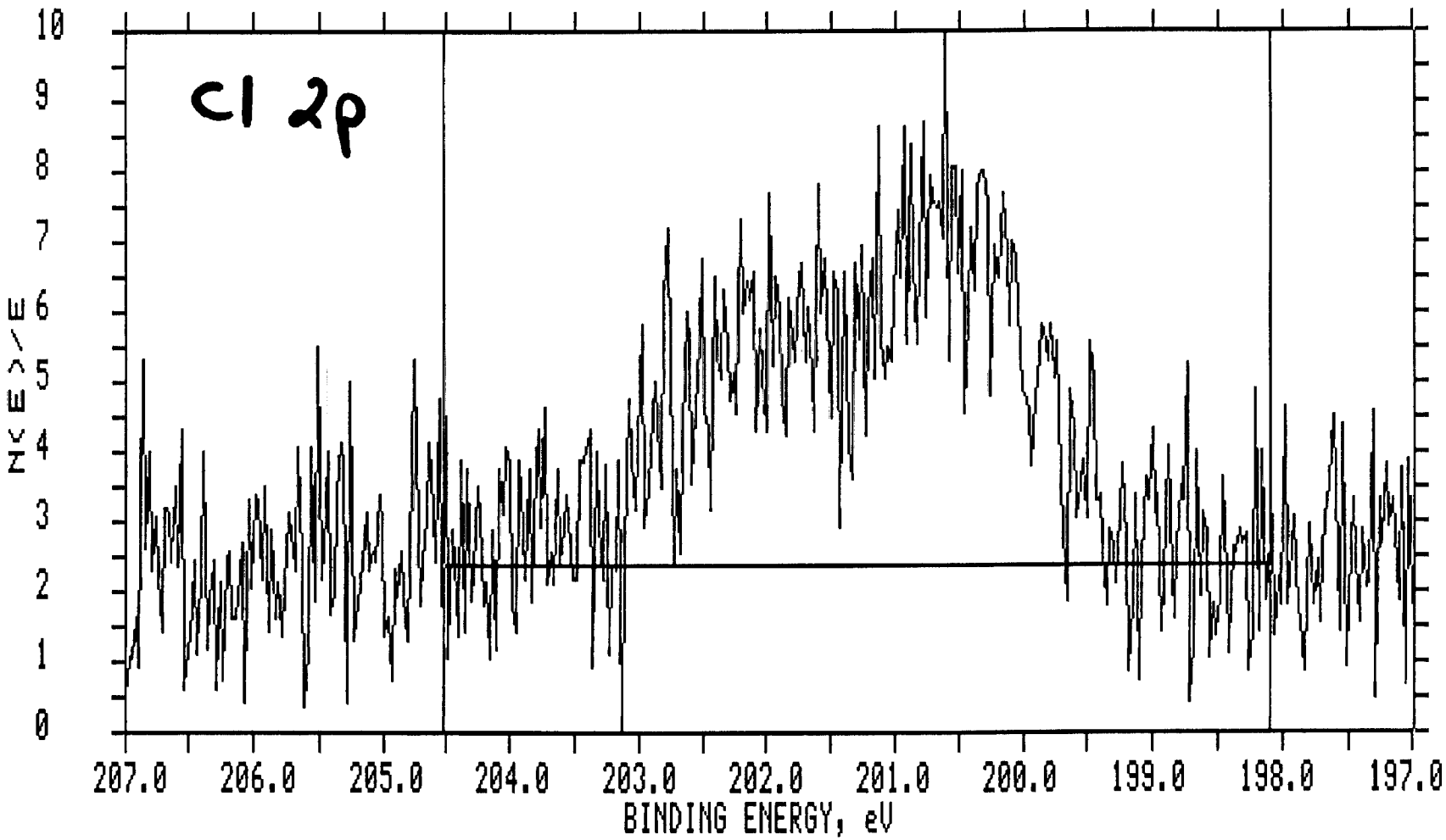
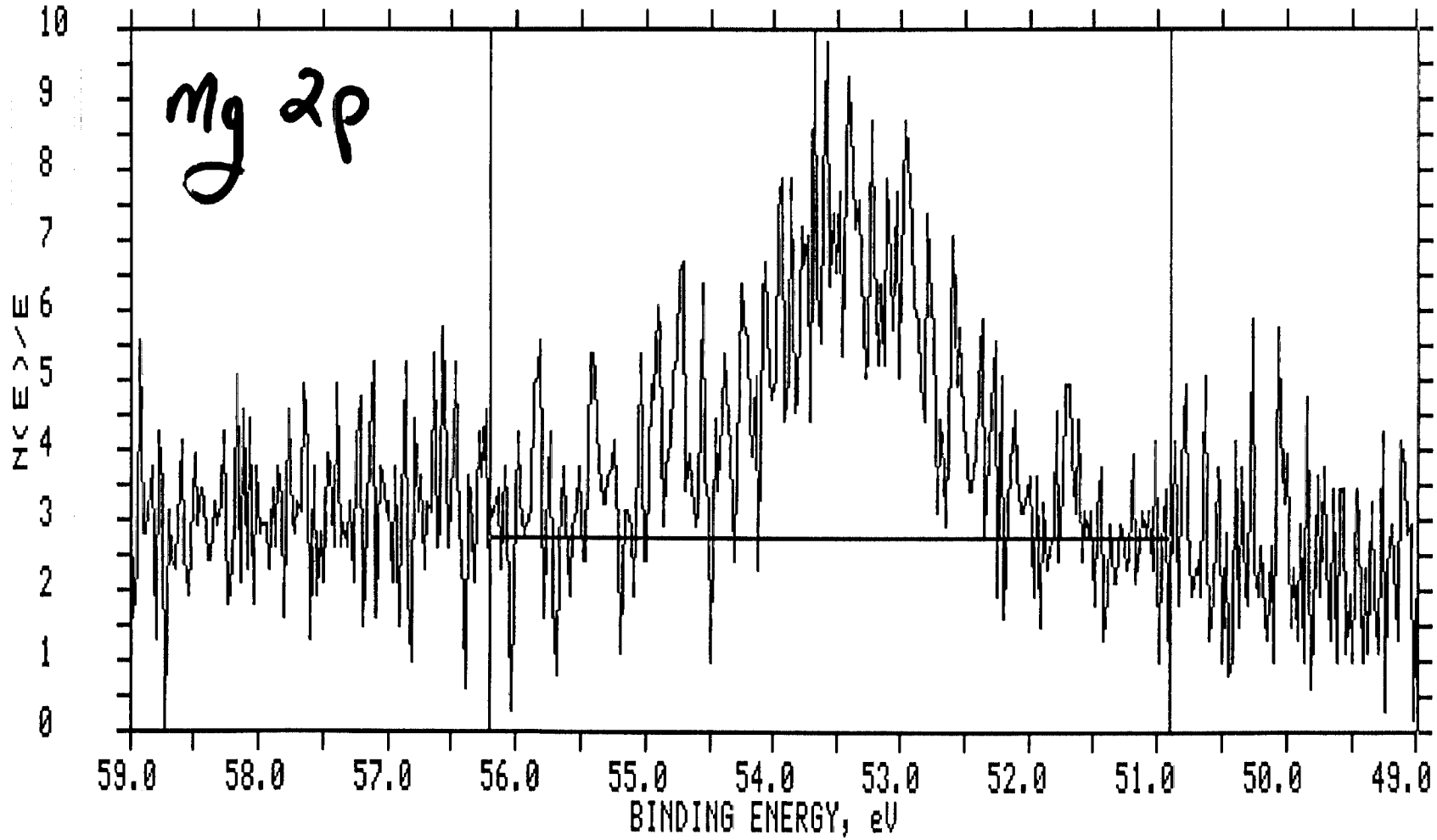
SCALE FACTOR, OFFSET=0.035, 1.528 k c/s PASS ENERGY=8.950 eV Mg 300 W



ESCA MULTIPLEX 5/13/91 EL=Cl1 REG 5 ANGLE= 20 deg ACQ TIME=8.35 min
FILE: S13GA_3 white disk sample: yellowed area of sample
SCALE FACTOR, OFFSET=0.019, 1.480 K c/s PASS ENERGY=8.950 eV Mg 300 W



ESCA MULTIPLEX 5/13/91 EL=Mg2 REG 6 ANGLE= 20 deg ACQ TIME=8.35 min
FILE: S13GA_3 white disk sample: yellowed area of sample
SCALE FACTOR, OFFSET=0.010, 1.280 k c/s PASS ENERGY=8.950 eV Mg 300 W



Ion Gun:OFF X-ray: ON Mg Acquiring Technique:ESCA

0.6mPa 5/13/91 16:13

Atomic Concentration

1 Peak Measurement Use Height Area Element Name

2 Included Regions 1 2 3 4 5

Atomic Concentration Table

File: S13GB_3

Comment: white disk sample: white edge area of sample

Input Lens: Large Area Omni Focus

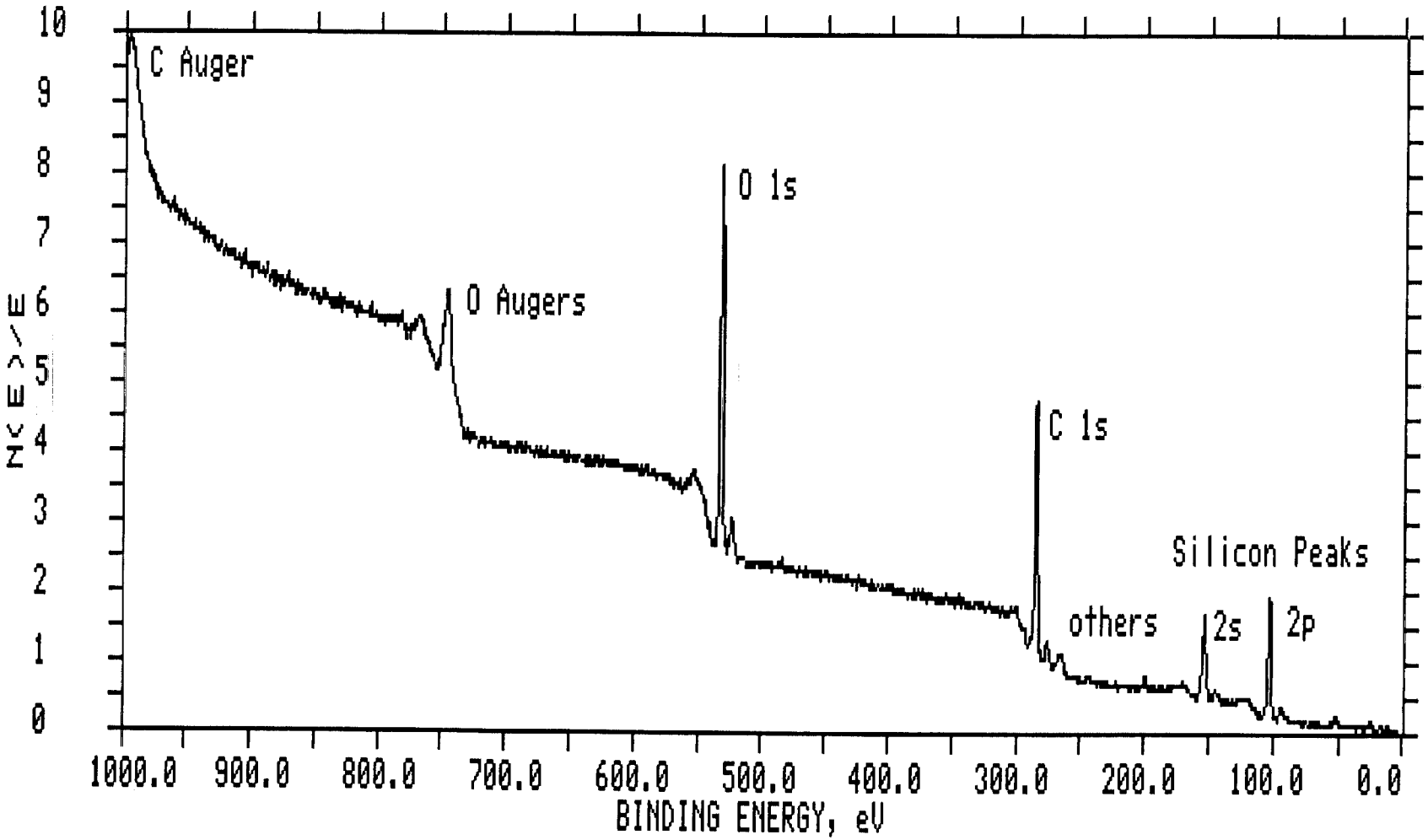
Element	Concentration(%)	Sens. Factor
O1s	30.78	0.711
C1s	47.44	0.296
Si2p	19.25	0.339
Cl2p	0.59	0.891
Mg2p	1.93	0.153

AC Table

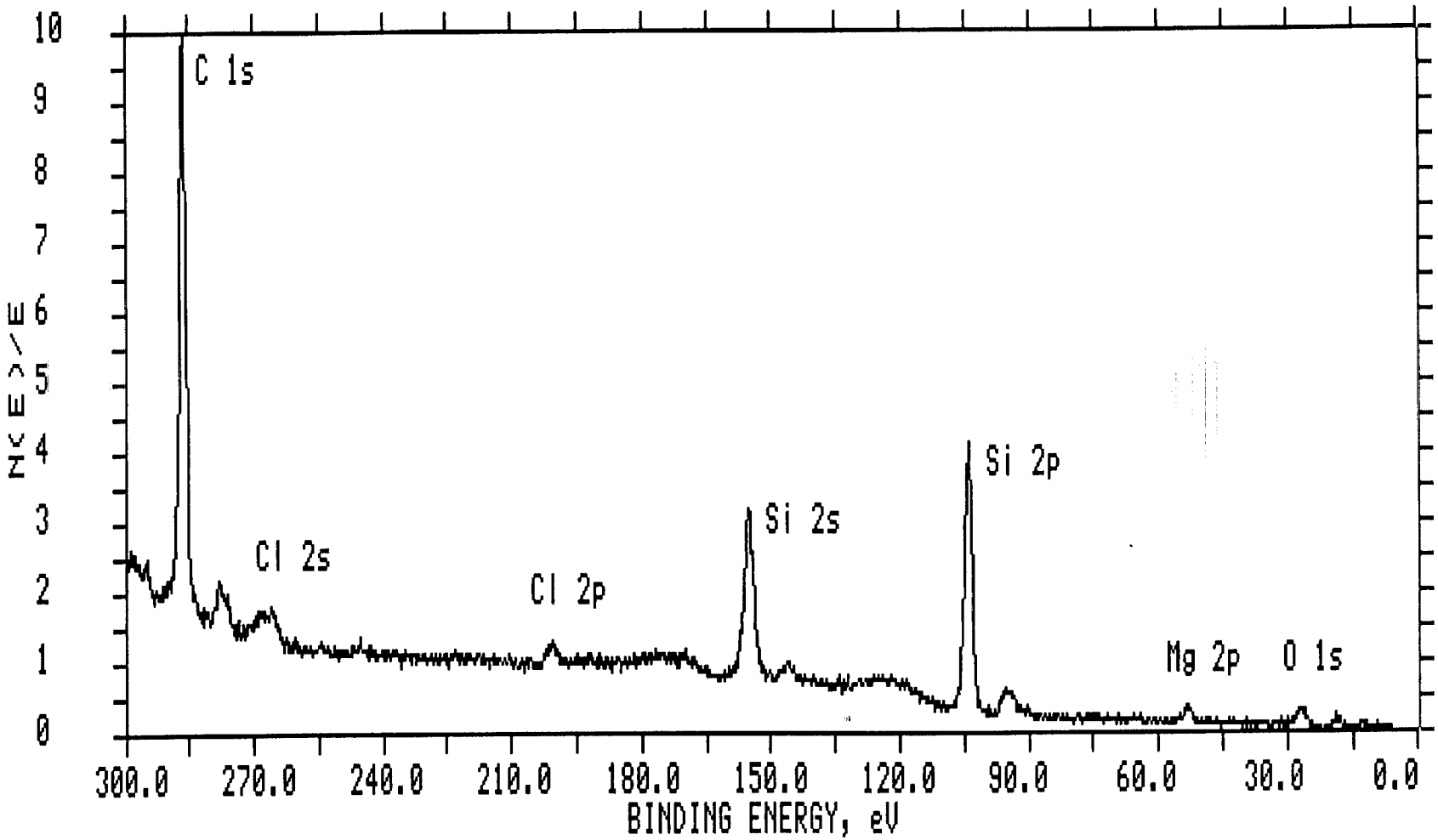
Omit All

Exit

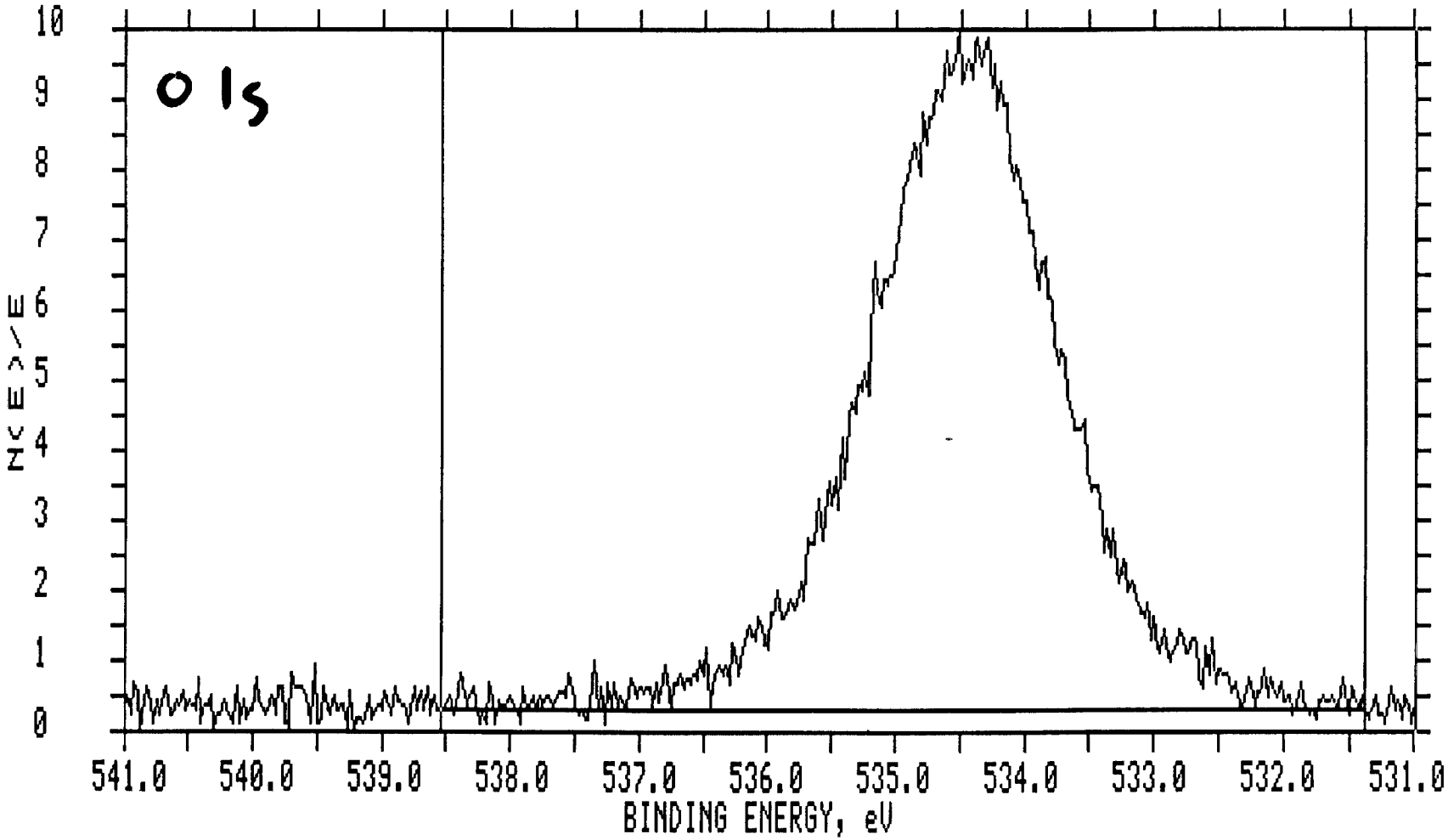
ESCA SURVEY 5/13/91 ANGLE= 20 deg ACQ TIME=8.34 min
FILE: S13GB_1 white disk sample: white edge area of sample
SCALE FACTOR, OFFSET=12.848, 2.376 k c/s PASS ENERGY=89.450 eV Mg 300 W



ESCA SURVEY 5/13/91 ANGLE= 20 deg ACQ TIME=8.76 min
FILE: S13GB_2 white disk sample: white edge area of sample
SCALE FACTOR, OFFSET=2.196, 1.389 K c/s PASS ENERGY=35.750 eV Mg 300 W



ESCA MULTIPLEX 5/13/91 EL=01 REG 1 ANGLE= 20 deg ACQ TIME=1.67 min
FILE: S13GB_3 white disk sample: white edge area of sample
SCALE FACTOR, OFFSET=0.509, 2.432 k c/s PASS ENERGY=8.950 eV Mg 300 W



ESCA MULTIPLEX 5/13/91 EL=C1 REG 2 ANGLE= 20 deg ACQ TIME=1.67 min
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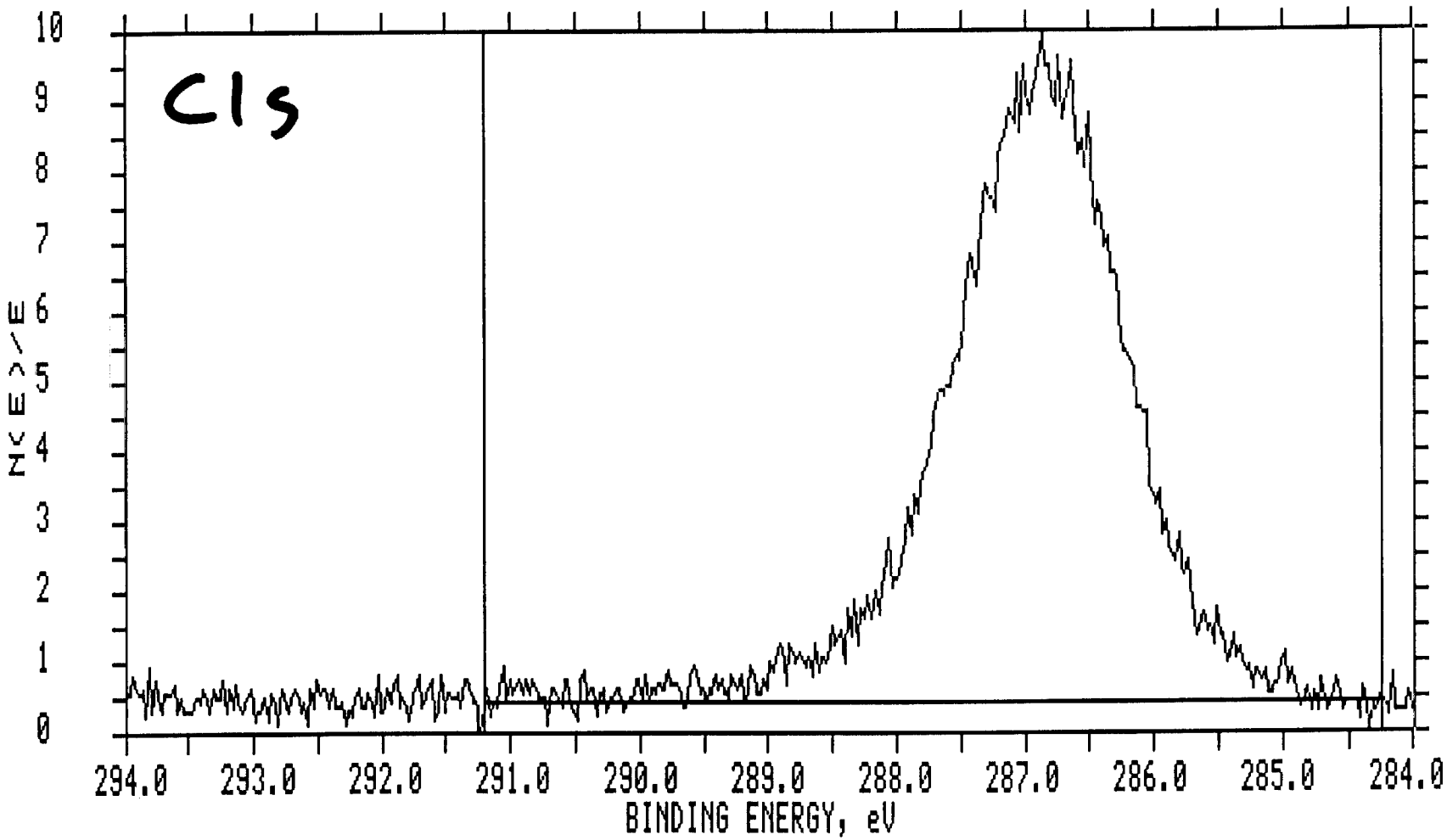
SCALE FACTOR, OFFSET=0.373, 1.608 k c/s PASS ENERGY=8.950 eV Mg 300 W



ESCA MULTIPLEX 5/13/91 EL=Si1 REG 3 ANGLE= 20 deg ACQ TIME=3.34 min
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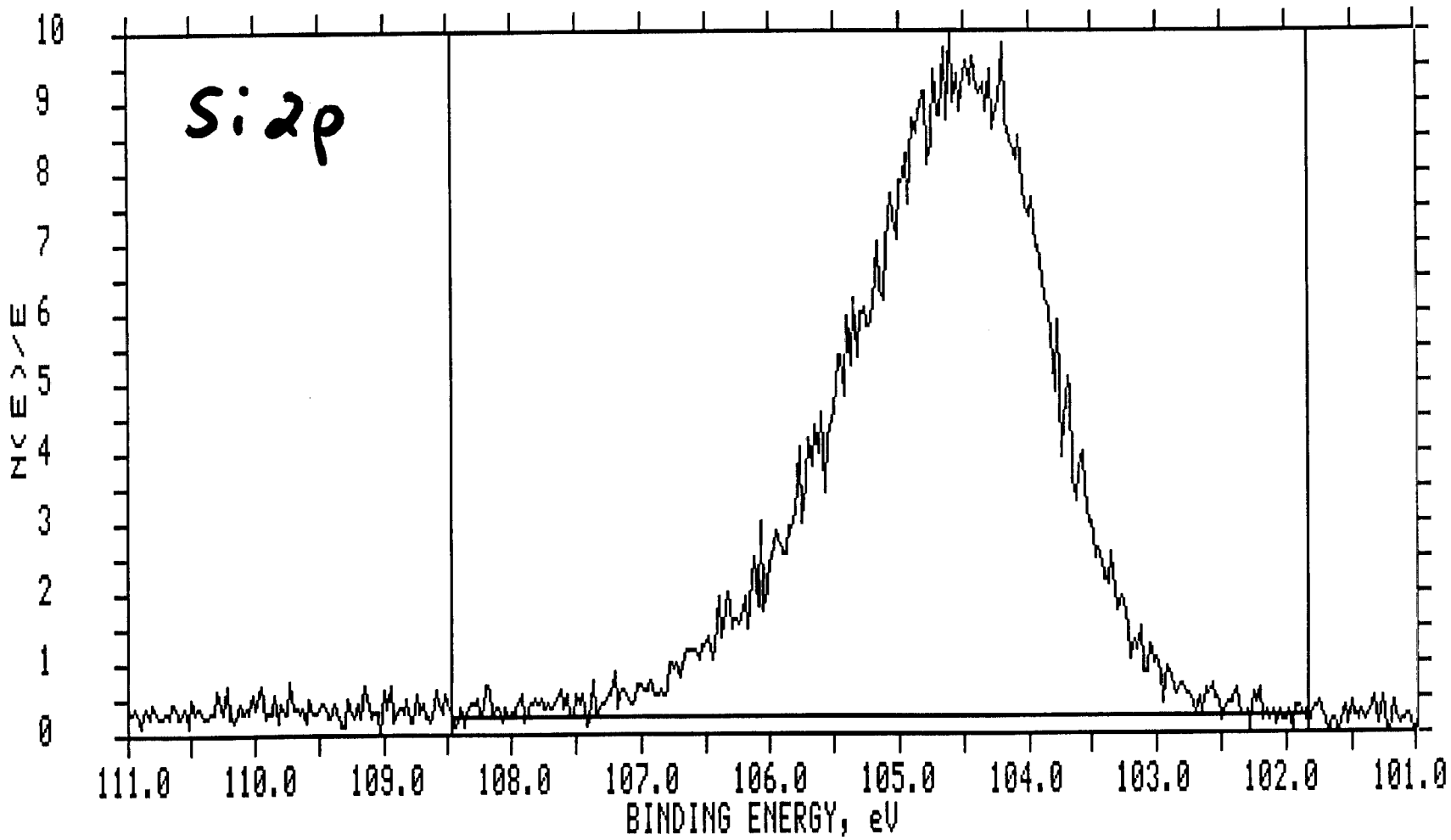
SCALE FACTOR, OFFSET=0.142, 1.284 k c/s PASS ENERGY=8.950 eV Mg 300 W



ESCA MULTIPLEX 5/13/91 EL=Cl1 REG 4 ANGLE= 20 deg ACQ TIME=8.35 min
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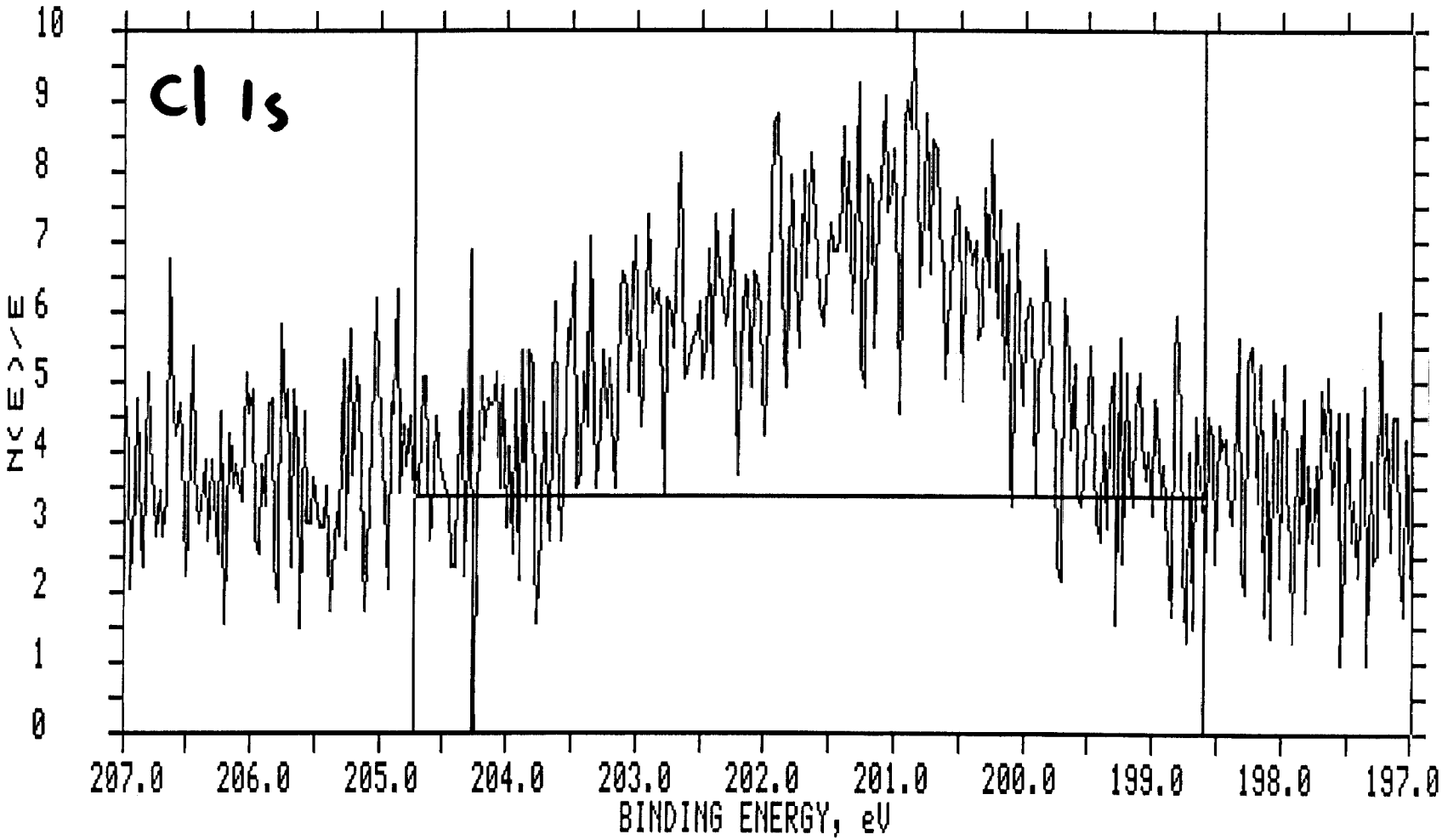
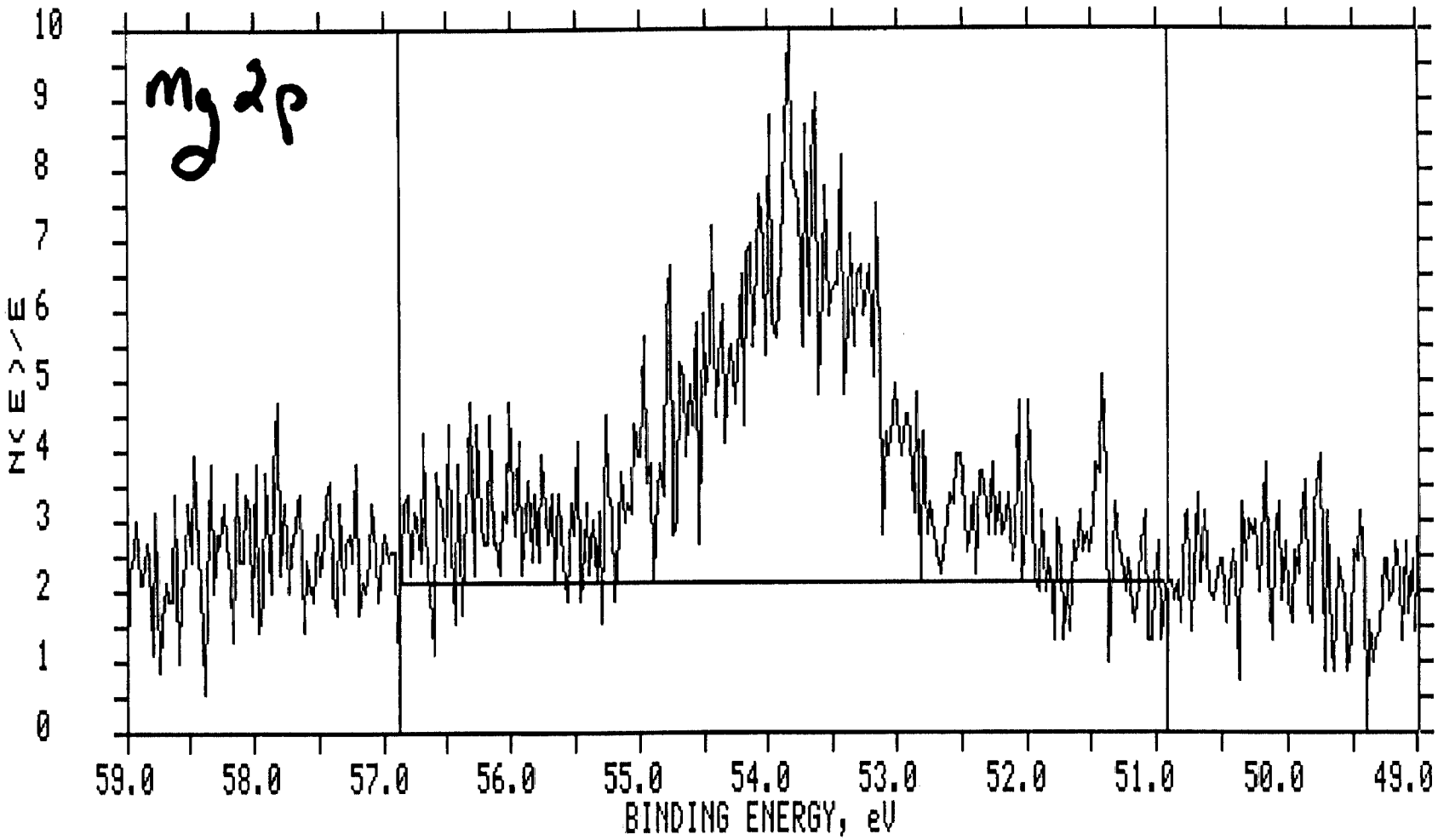
ESCA MULTIPLEX 5/13/91 EL=Mg2 REG 5 ANGLE= 20 deg ACQ TIME=8.35 min
FILE: S13GB_3 white disk sample: white edge area of sample
SCALE FACTOR, OFFSET=0.011, 1.266 k c/s PASS ENERGY=8.950 eV Mg 300 W