

Nuclear transmutation in deuterated palladium electrodes under electric discharges.

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Contents

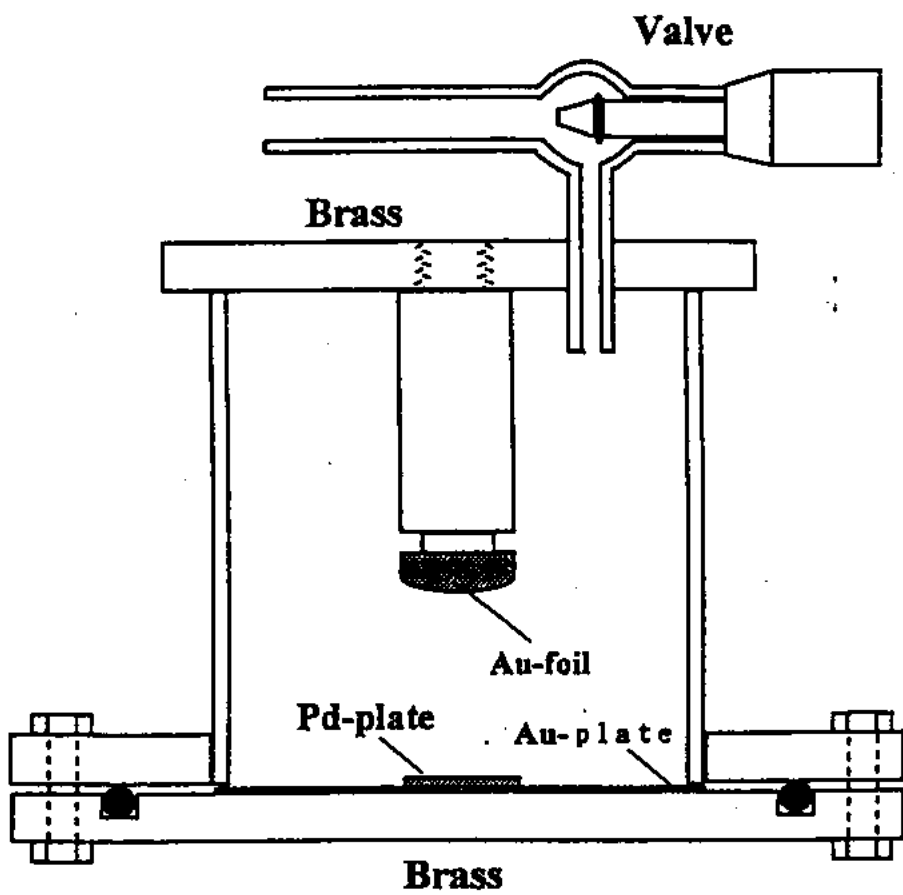
- Application of DC glow discharge with palladium metal as a cathode and deuterium gas.
- Observation of the amount radiation during experiment.
- Nuclear transmutation evidences in cathode surface.
- Concluding remarks.

Experiment

- Saturation of the palladium metal with deuterium gas. Gas loading method.
- Presenting the samples in a DC glow discharge with low discharge parameters.
- Any radiation observed by gamma-ray counter and autoradiography.
- Investigation of new elements and any isotopic changes in a cathode surface. ToF-SIMS's analysis method.

Nuclear transmutation evidences during experiments.

- Introducing the lithium and chromium as new elements in the cathode discharge.
- Increase of the impurities concentration such as Mg, ^{56}Fe , ^{63}Cu and Mn, comparing with blank samples.



Test cell with plate electrode discharge.

Display
C Det. #
G Buffer
Horz: 256
Vert
FS= 8192
Log Auto

Pulse Ht. Analysis
Started: 14:49:47
08-Jun-99
Real: 3643.18
Live: 3631.80
Dead: X

ROI
[<] [Del] [>]

Peak
[<] [Info] [>]
[Ins]

Library

EG&G ORTEC
15:12:59
Tue 22-Aug-00



Marker 0 = 0.00keV 0Cnts

Background gamma-ray emission.

Display Det.# Buffer
 Horiz: 256 ▶ ◀ ◀
 Vert FS: 3192 X ◀
 Log Auto

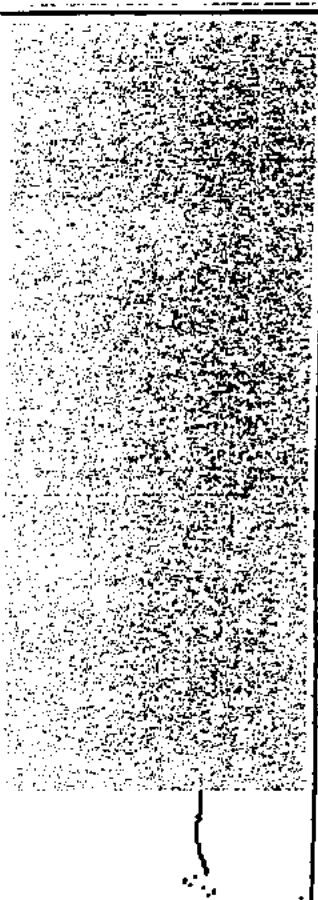
Pulse Ht. Analysis
 Started: 09:40:02
 27-Jan-00
 Real: 4251.62
 Live: 4156.58
 Dead: 2

ROI Del: >

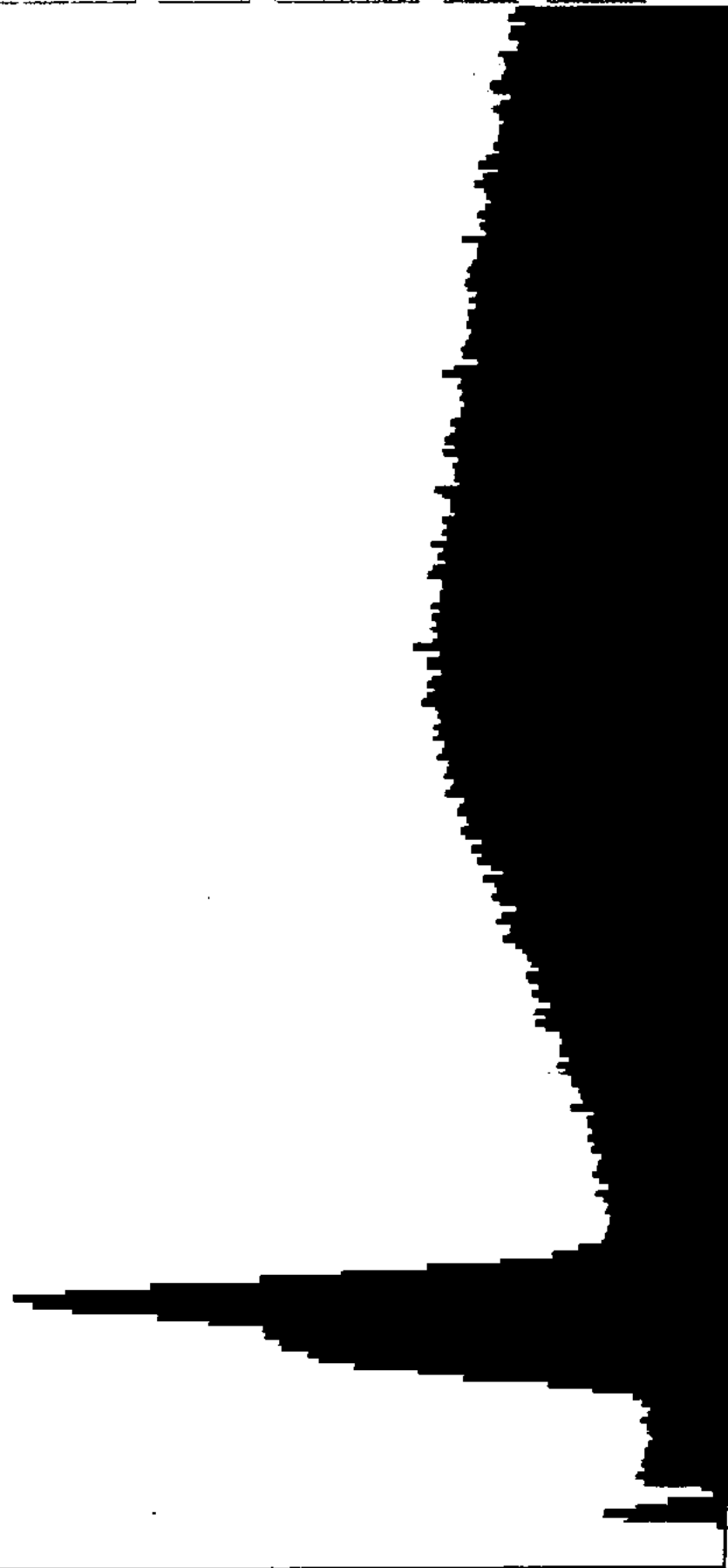
Peak Info Inc

Library

EG&G ORTEC
 15:02:11
 Tue 22-Aug-00

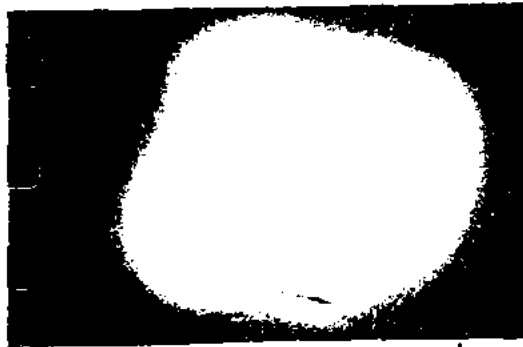


179.17keV
 5132Counts

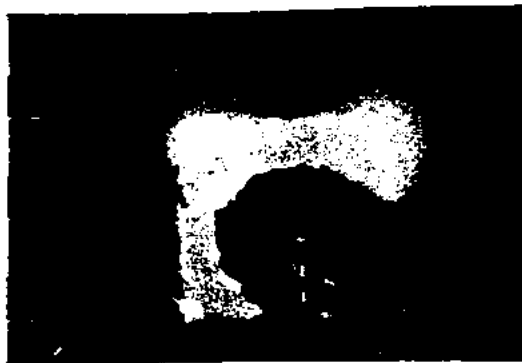


Marker 0 = 0.00keV 0Cnts

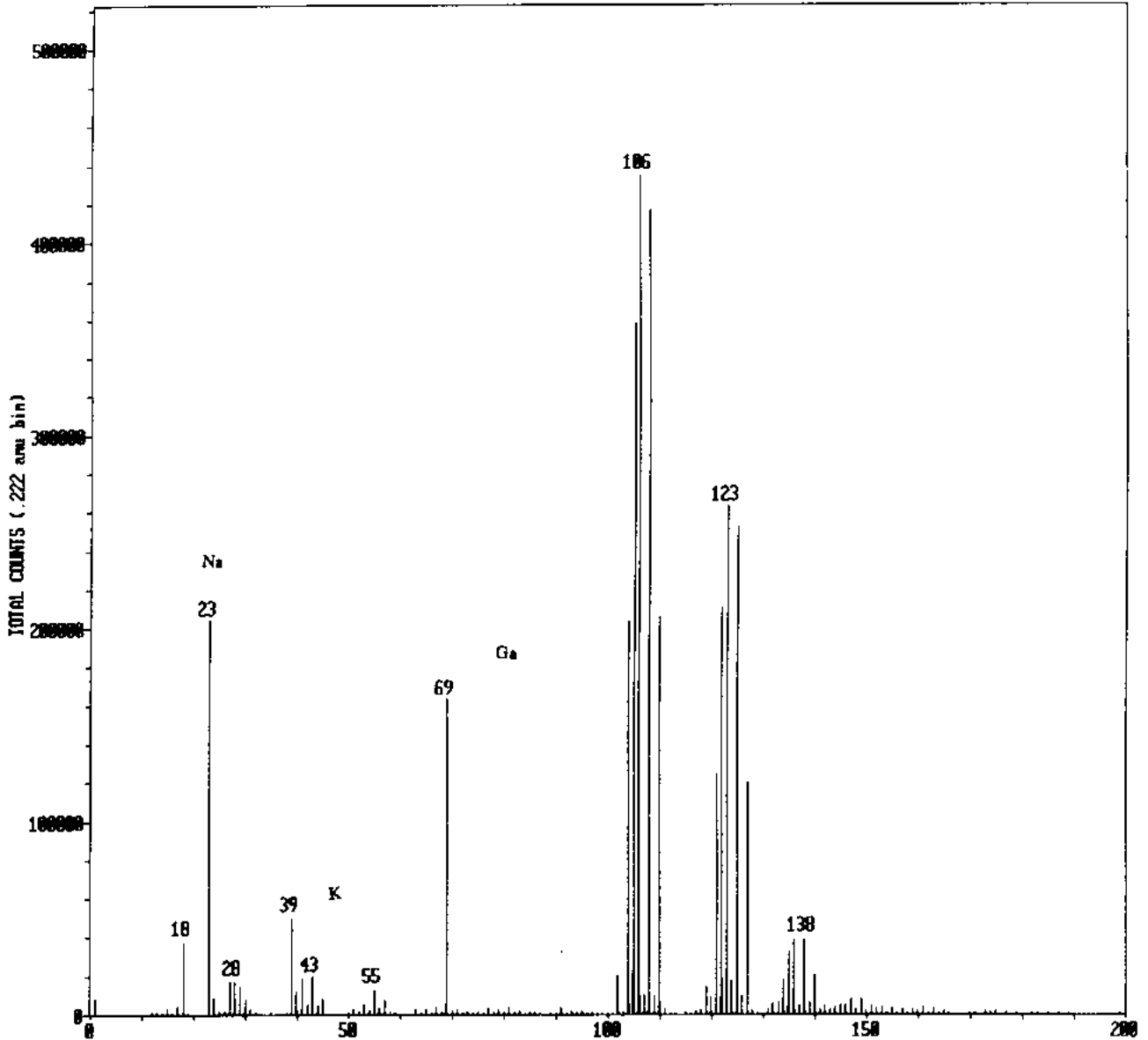
Gamma-ray emission after discharge.



Autoradiography before experiment.

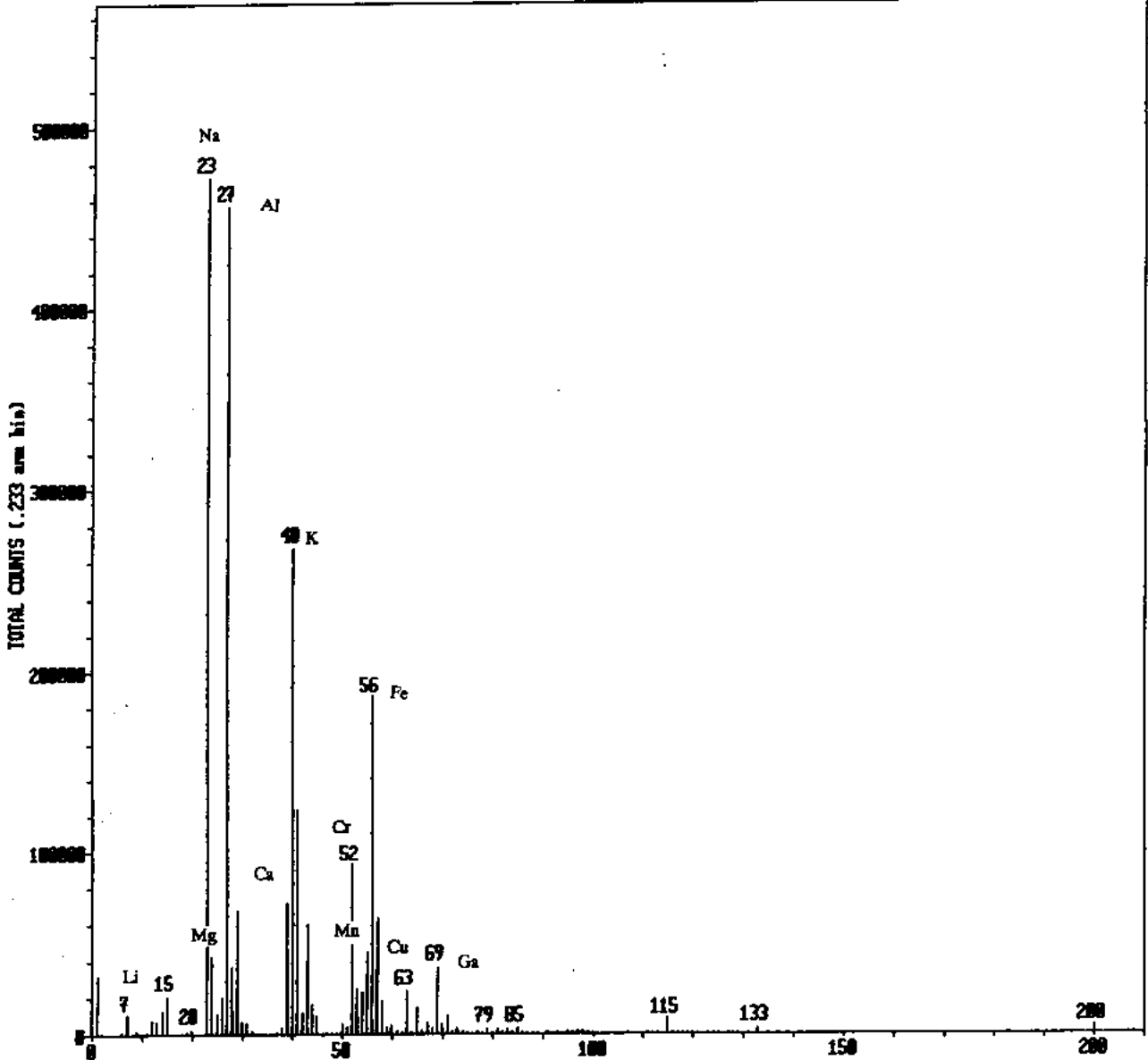


Autoradiography after experiment.



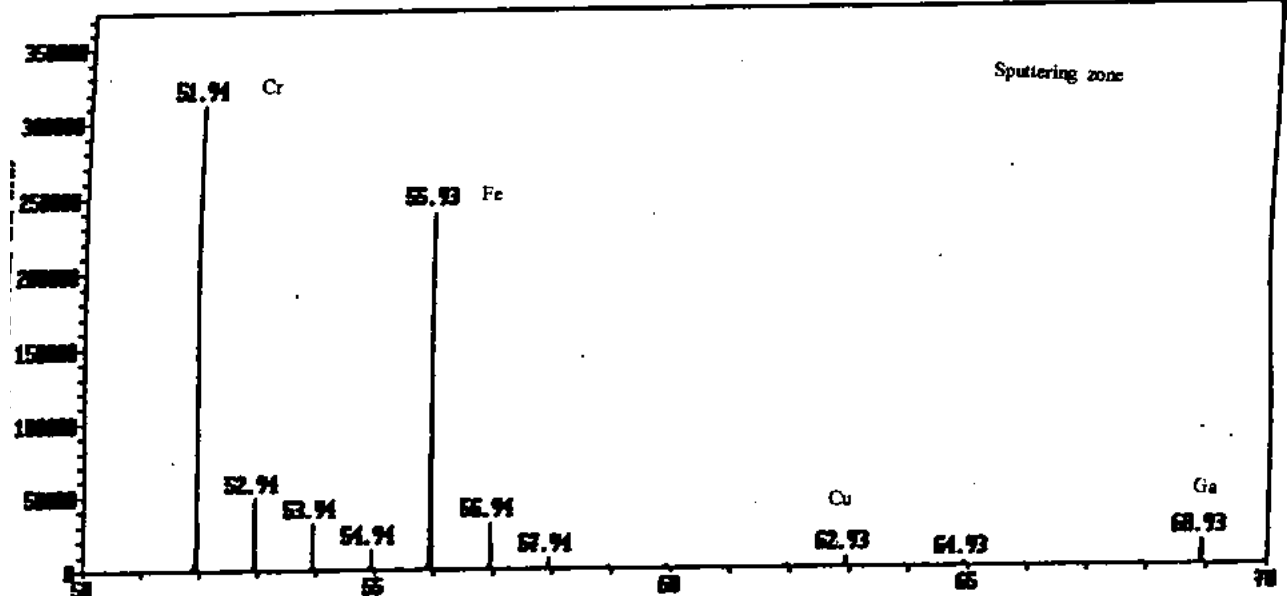
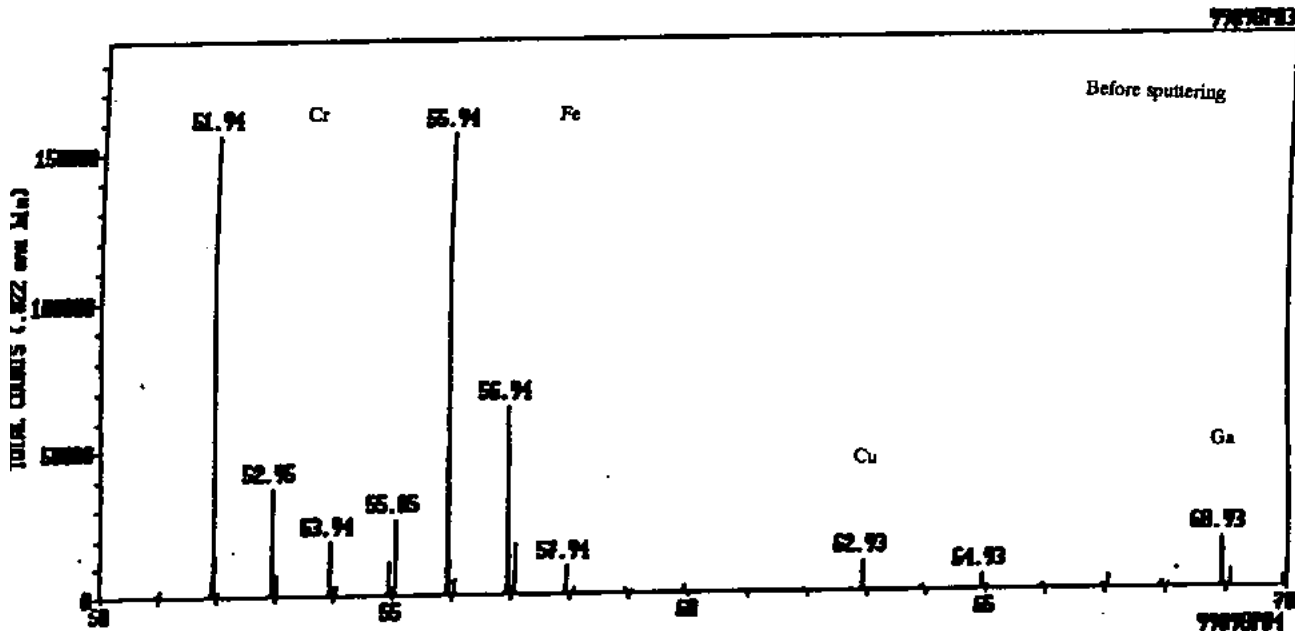
FILE NAME: PDB13-4 DATE : 26 Aug 99 17:42 ACQUISITION TIME: 3.0 MIN. SPECTRUM INTEGRAL : 4655536
aqua regia 100s, non-annealed, unloaded, discharge in 3Torr Air; suppter 10s PDB13-3
+ IONS PRIMARY GUN: LMIG TIME RECORDER: Multi-Stop TDC X-Y SOURCE: Raster TIME PER CHANNEL: 138 ps
DATA SET: 1 Spectra; 1 Image(s) RASTER SIZE: 81µm RASTER TYPE: 81

99098P01



FILE NAME: 99098P01 DATE: 24 Jan100 16:01 ACQUISITION TIME: 5.0 MIN. SPECTRUM INTEGRAL: 2662530
Aq100s,An800c3h,5atmD2,GDTorrD2,DC600V2mA,1h;
+ IONS PRIMARY GUN: LMIG TIME RECORDER: Multi-Stop TDC X-Y SOURCE: Raster TIME PER CHANNEL: 138 ps
DATA SET: 1 Spectra; 0 Image(s) RASTER SIZE: 81µm RASTER TYPE: #1

FIGURE _____



FILE NAME: 9908043 DATE: 24 Jan100 16:33 ACQUISITION TIME: 8.8 MIN. SPECTRUM INTEGRAL: 383857
 Ag1000,Am80002h,SchUB,EDS70002H,DCS00720A.1h;
 + IONS PRIMARY GUN: LENS TIME RECORDER: Multi-Step TDC X-Y SOURCE: Raster TIME PER CHANNEL: 138 ps
 DATA SET: 1 Spectra; 0 Image(s) RASTER SIZE: 81um RASTER TYPE: 01

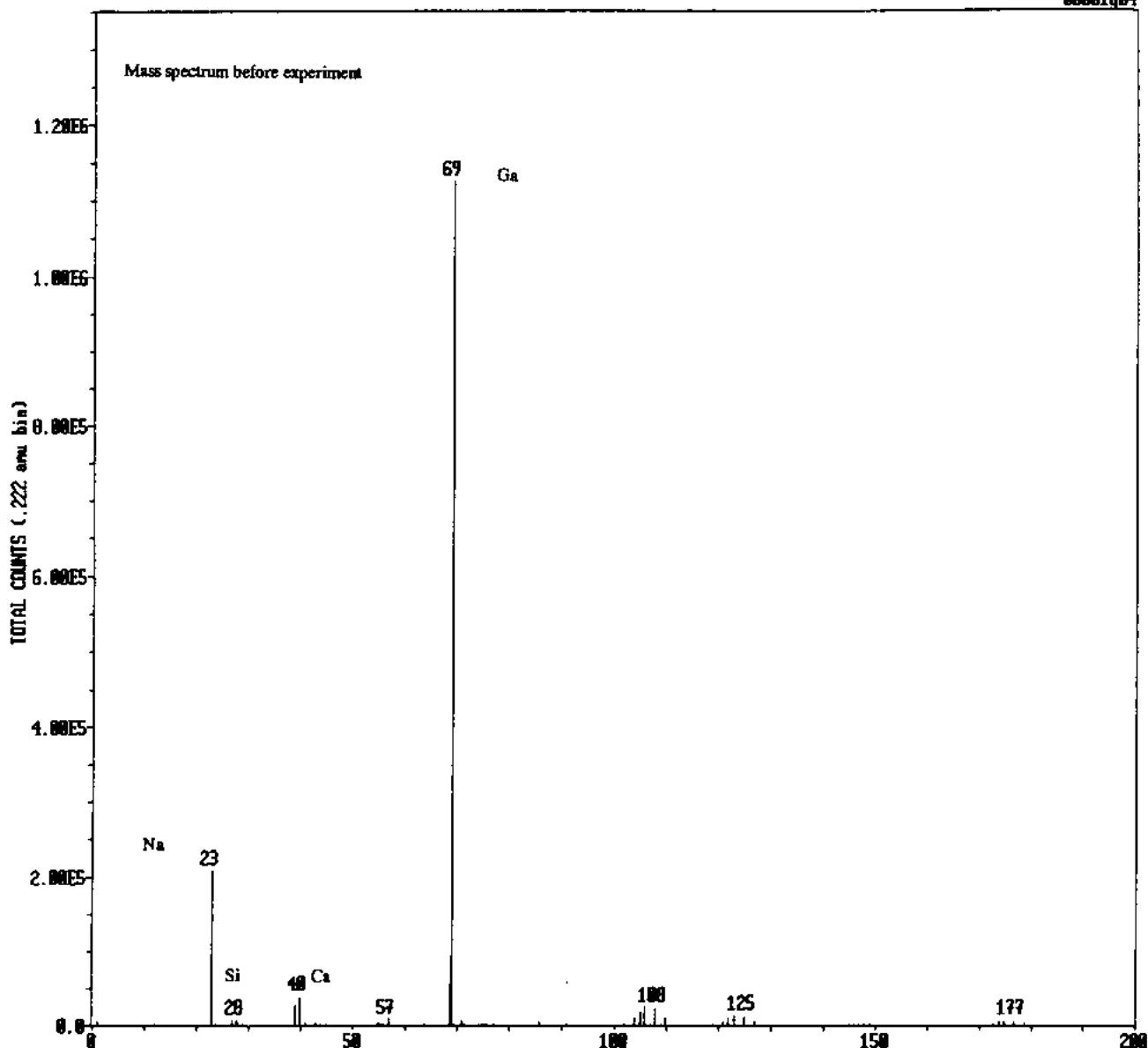
FILE NAME: 9908044 DATE: 24 Jan100 16:29 ACQUISITION TIME: 8.8 MIN. SPECTRUM INTEGRAL: 5781668
 Ag1000,Am80002h,SchUB,EDS70002H,DCS00720A.1h; Supter 16e 9908043
 + IONS PRIMARY GUN: LENS TIME RECORDER: Multi-Step TDC X-Y SOURCE: Raster TIME PER CHANNEL: 138 ps
 DATA SET: 1 Spectra; 0 Image(s) RASTER SIZE: 81um RASTER TYPE: 01



The Sims data analogy for both brass and glass cells.

- Advantage in using glass cell.
- The Sims data analogy for both brass and glass cells.
- Complexity in introducing the boron (B) as new element, produced during experiment.
- The following elements Na, Si, Al, K can be presented as impurities, contaminated by glass cell or quartz cylinder.

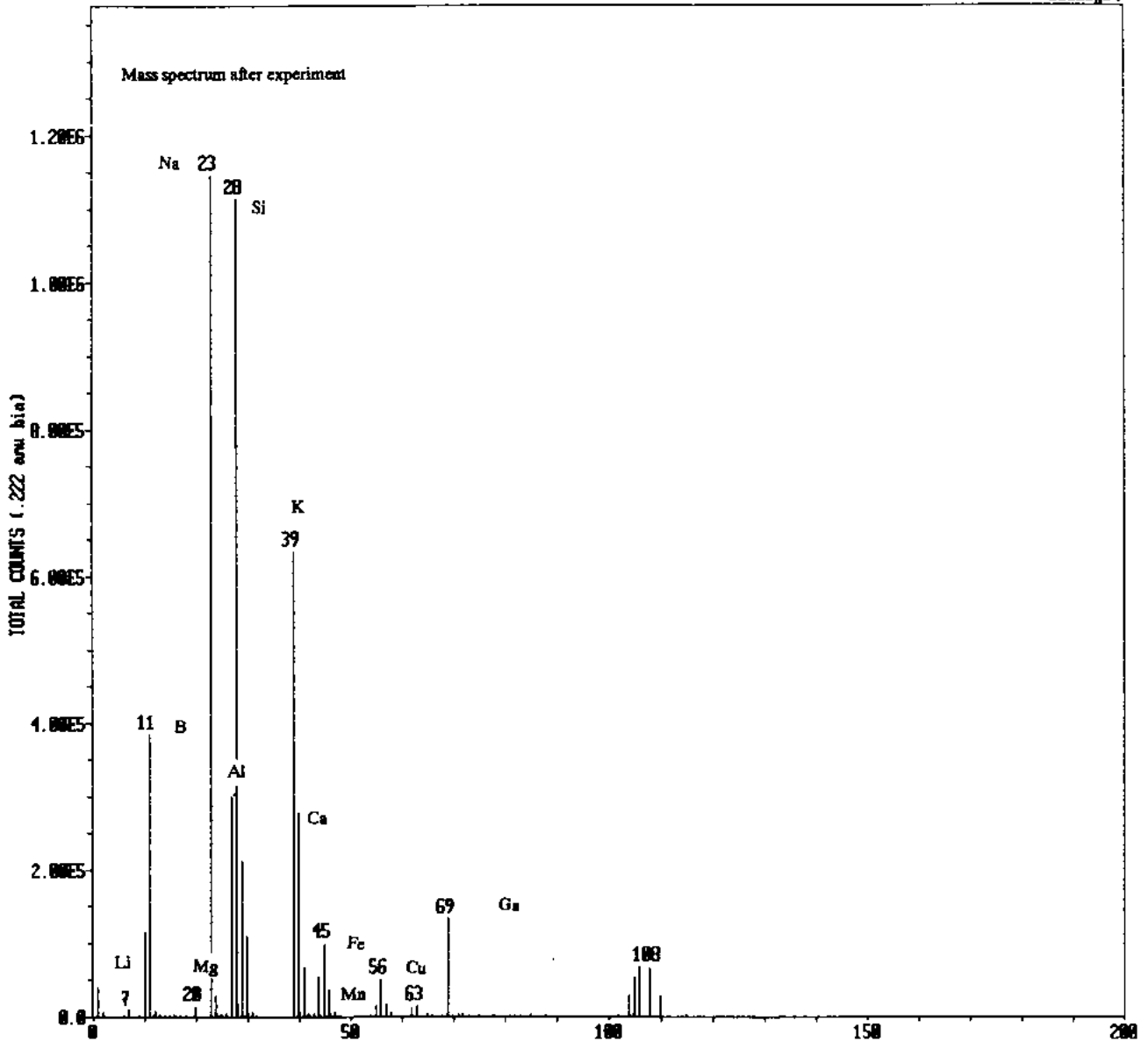
00001g04



FILE NAME: 00001g04 DATE: 4 Jul100 14:11 ACQUISITION TIME: 10.1 MIN. SPECTRUM INTEGRAL: 1914758
Sample:00Pd01, BEFORE exp., position-4; Sputter 10sec
+ IONS PRIMARY GUN: LMIG TIME RECORDER: Multi-Stop TDC X-Y SOURCE: Raster TIME PER CHANNEL: 138 ps
DATA SET: 1 Spectra; 0 Image(s) RASTER SIZE: 40µm RASTER TYPE: 40

FIGURE

00001g14



FILE NAME: 00001g14 DATE: 27 Jul100 14:45 ACQUISITION TIME: 3.3 MIN. SPECTRUM INTEGRAL: 5452004
00Pd01. AFTER exp. position-4; sputter 10sec, calibrated with CH3+Al+Ga
+ IONS PRIMARY GUN: LMIG TIME RECORDER: Multi-Stop TDC X-Y SOURCE: Raster TIME PER CHANNEL: 138 ps
DATA SET: 1 Spectra; 0 Image(s) RASTER SIZE: 40µm RASTER TYPE: 40

FIGURE _____

Concluding remarks

- Even the scintillation counter registered sometimes peaks over background, the peak's intensity was low. The irreproducibility of the gamma-ray emission.
- Improving loading ratio D:Pd still remains an important direction in our research.
- Investigation of the materials which can be subject for contamination.
- The appearance of new elements in Pd surface showed that maybe some anomalous reactions took place in and inside cathode surface.
- More transmutation data are needed.