5720
Ser 00C/036
July 27, 2020

Mr. John Greenewald
[redacted]
john@greenewald.com

Subj: YOUR FOIA REQUEST (DON-NAVY 2020-010012 and LOCAL NUMBER NPS-2020-025)

Dear Mr. Greenewald:

This letter is in response to your request under the Freedom of Information Act (FOIA), assigned tracking number DON-Navy-2020-010012 and Local Number NPS-2020-025, dated July 16, 2020, for information pertaining to Professor Michael Melich's PowerPoint presentation dated 12 December 2006 titled "Is Transmutation Nuclear (Molecular) Physics?"

The following document is provided, with redactions, pursuant to exemption (b)(6) of the Freedom of Information Act, 5 USC § 552, which protects the release of an individual's personal private information.

In accordance with U.S. Navy policy, there are no fees associated with this request.

I am the official responsible for the partial denial of your request. If you have any questions, please contact me at stephen.murray@nps.edu, 831-756-7612.

You have the right to an appeal. It must be received within 90 calendar days from the date of this letter. Please provide the appellate authority (see below) the following information in an envelope marked "FOIA appeal":

- a letter requesting an appeal that explains what you are appealing with any supporting arguments or reasons you think may be worthy of consideration;
- a copy of your initial request; and
- a copy of the letter of denial.

Also, please provide me with a copy of your appeal letter at the Office of the Staff Judge Advocate, Naval Postgraduate School, Herrmann Hall, Room 127D, Monterey, CA 93943.

There are two ways to file an appeal: through FOIAonline or by mail.

1. Through FOIAonline. This will work only if you set up an account on FOIAonline before you make the request that you would like to appeal. To set up an account, go to FOIAonline (this is a website that will appear as the top hitif you search the internet for

"FOIAonline"), click "Create Account" (a link located within the blue banner at the top in the upper right corner), enter your data into the field that subsequently appears, and click "Save" (at the bottom left of the screen). With your account thereby created, you will have the power to file an appeal on FOIAonline to any request you file on FOIAonline thereafter. To do so, locate your request (enter a keyword or the request tracking number in the "Search for" field on the "Search" tab), click on it, then the "Create Appeal" tab in the left-hand column. Complete the subsequent field, click "Save," and FOIAonline will submit your appeal.

2. By mail. Address your appeal to:

The Judge Advocate General (Code 14)
1322 Patterson Avenue SE, Suite 3000
Washington Navy Yard, DC 20374-5066

Alternatively, it may be sent to the Department of the Navy General Counsel if appropriate (the Office of the General Counsel generally handles issues outside of those of the uniformed service). That address is as follows:

Department of the Navy,
Office of the General Counsel
1000 Navy Pentagon, Room 5A532
Washington, DC 20350-1000

If you have any questions, please contact the FOIA coordinator at elaine.macdonald@nps.edu, 831-756-7612. You may also contact the DON FOIA Public Liaison, Christopher Julka, at christopher.a.julka@navy.mil, (703)697-0031. In addition, the Office of Government Information Services (OGIS) provides a voluntary mediation process for resolving disputes between persons making FOIA requests and the Department of the Navy (DON). For more information, go to https://www.archives.gov/ogis/about-ogis/contact-information.

Sincerely,

Stephen A Murray

S. A. MURRAY
By Direction

Is Transmutation Nuclear "Molecular" Physics?

DTRA High Energy Workshop

12 December 2006

Professor [redacted]

W.E. Meyer Institute for Systems Engineering

Naval Postgraduate School

Monterey, CA 93943-5000

[redacted]

Transmutation
(Dictionary Definition)

- **transmutation** noun
- the action of changing or the state of being changed into another form : *the transmutation of the political economy of the postwar years was complete.*
  - Physics the changing of one element into another by radioactive decay, nuclear bombardment, or similar processes.
  - Biology, chiefly historical the conversion or transformation of one species into another.
  - the supposed alchemical process of changing base metals into gold.

Transubstantiation (Dictionary Definition)

- **transubstantiation** noun
- Christian Theology(esp. in the Roman Catholic Church) the conversion of the substance of the Eucharistic elements into the body and blood of Christ at consecration, only the appearances of bread and wine still remaining.
- formal a change in the form or substance of something.

Some Transmutations (Ignoring Selection Rules, i.e., breaking symmetries?)

- Protium(99.9885%) + neutron >> Deuteron
- Deuteron(0.0115%) + neutron >> Tritium
- Tritium + Proton >> Helium Nucleus (alpha)((99.999863%)
- Alpha + Alpha >> Beryllium 8
- Lithium 6(7.59%) + Deuteron >> Beryllium 8
- Palladium 102(1.02%) + Deuteron >> Silver 104

Palladium Isotopes (Stable & Selected Radioactive)

- Palladium 100 + neutron >> Silver 101
- Palladium 103 + Deuteron >> Silver 105
- Palladium 104(11.14%) + Deuteron >> Silver 106
- Palladium 105(22.33%) + Deuteron >> Silver 107
- Palladium 106(27.33%) + Deuteron >> Silver 108
- Palladium 108(26.46%) + Deuteron >> Silver 110
- Palladium 110(11.72%) + Deuteron >> Silver 112
- Palladium 110(11.72%) + neutron >> Silver 111

Foundation of Conservation Laws

Emmy Noether's Theorem

Noether's theorem is a central result in theoretical physics that expresses the one-to-one correspondence between continuous symmetries and conservation laws.

Nuclear Structure Physics is Stuck

- Nuclear structure physicists now consider 200 MeV to be low energy and the good ones are looking for the Higgs boson.
- The selection rules of two body collision nuclear physics use, e.g., conservation of energy and angular momentum. Nuclear spectroscopy is an intellectually barren soil.
- To what extent do the underlying symmetries remain unbroken within condensed matter? Or, are there new ways to probe nuclear structure? Consider Prof Juergen Kluge and colleagues storage ring and trapping experiments.

Familiar Conservation Laws and Symmetries

- the invariance of physical systems with respect to spatial translation (in other words, that the laws of physics do not vary with locations in space) gives the law of conservation of linear momentum;
- invariance with respect to rotation gives law of conservation of angular momentum;
- invariance with respect to time translation gives the well known law of conservation of energy

Branching Ratio Failure

- Much has been made about the failure in "cold fusion" experiments to obey certain branching ratios.
- Much has been made about the absence of "nuclear ash".
- Let us consider three experiments that challenge the completeness of our understanding of nuclear molecular physics.

Are the experimental results credible products of careful experimentation?

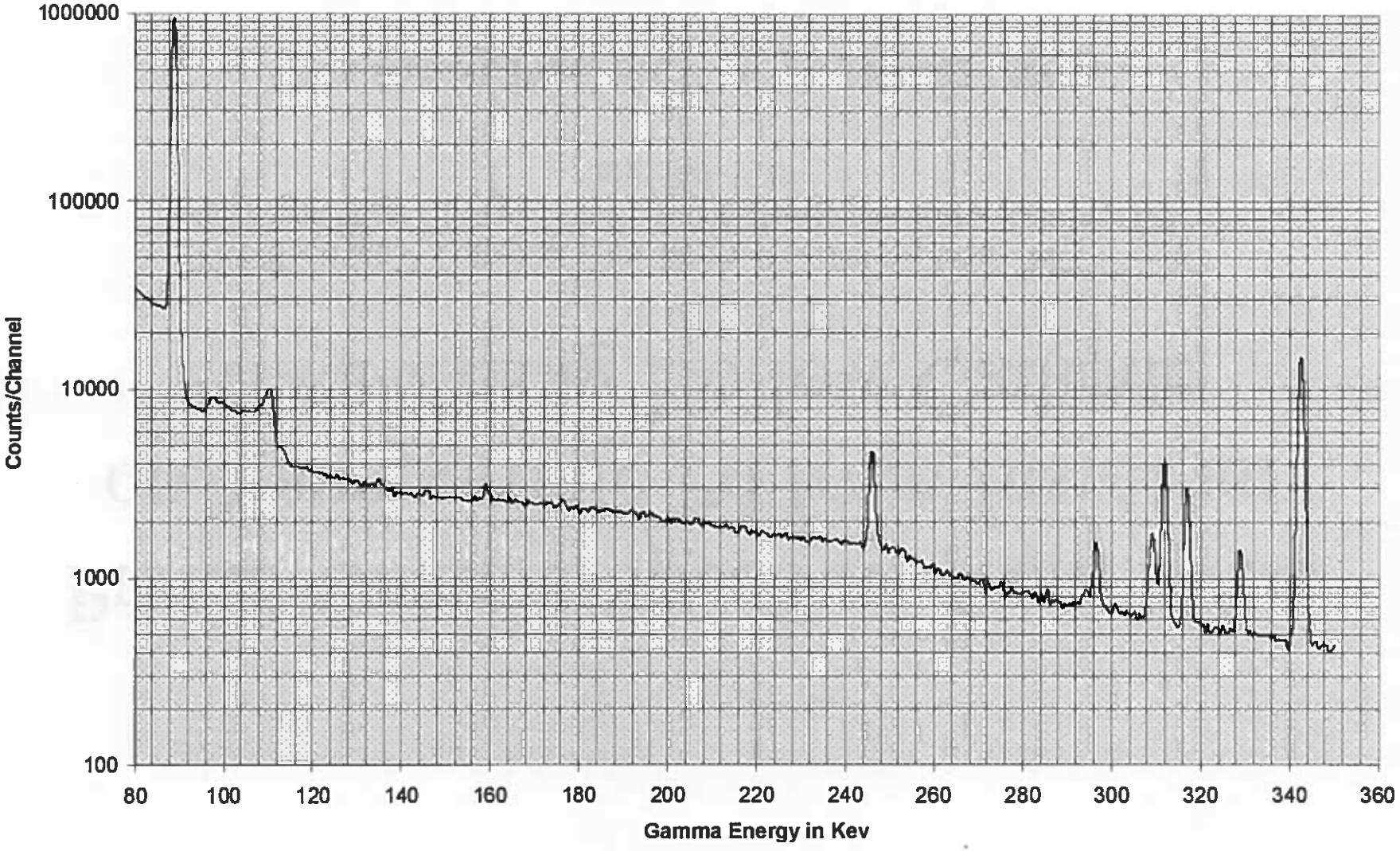
- Passell's examination of the isotopic history of Pd nanocrystals from the Arata experiment.
- Miley & Patterson's exploration of the thin films of Ni in a light water electrolysis.
- Iwamura's transubstantiation of Cs into Pr.

Partial Gamma Spectrum from NAA on Nanoparticle Pd from Inside an Arata-Zhang Hollow Cathode

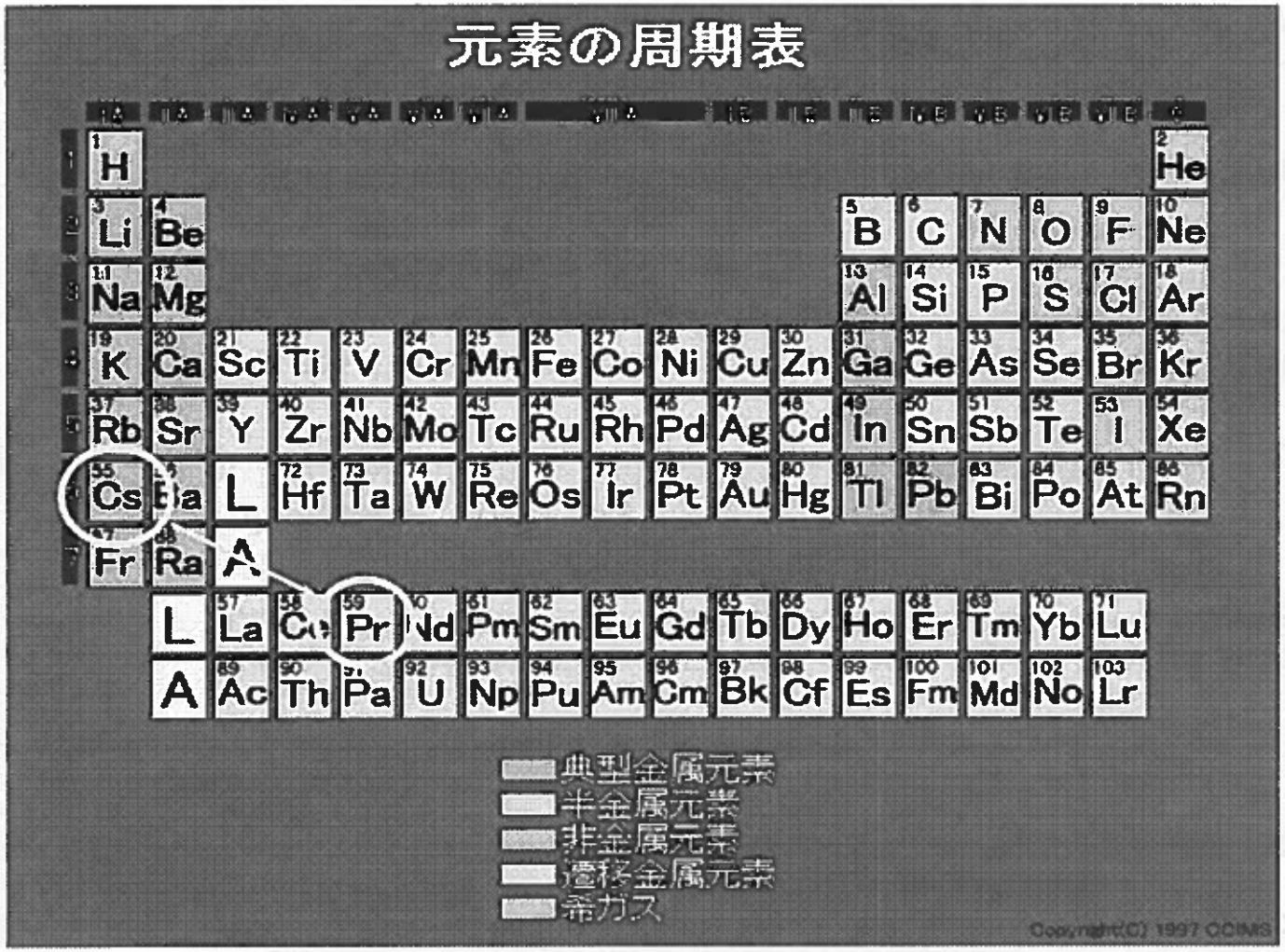
The 88.0 keV Gamma Ray from Pd-109 and the 342.1 keV Gamma Ray of Ag-111 Provide the Ratio between Pd-108 and Pd-110

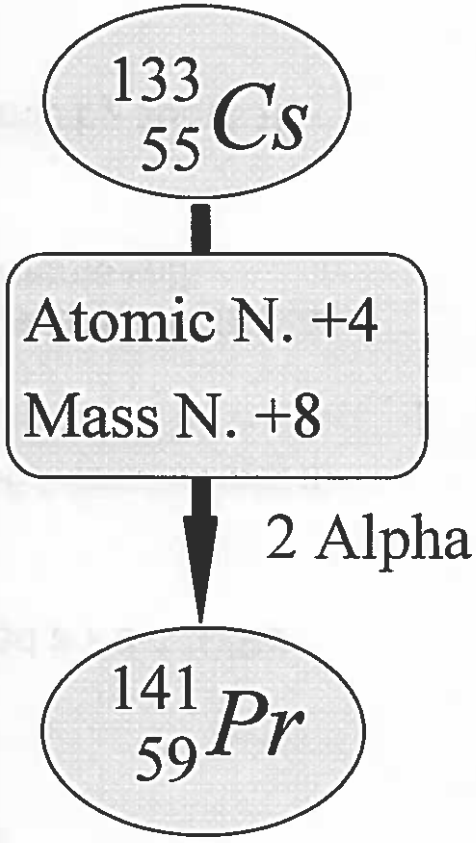
T.O. Passell, Proc. ICCF-10, pp 399-403 (2003)

Gamma Spectrum of Pd Powder from Arata Hollow Cathode-File 2019n



Transmutation of Pd into ?





Significance of an 8% Depletion in Pd-108 relative to Pd-110 in an Arata-Zhang Powdered Pd Sample from inside their Double Structured Cathode that had Produced some 10's of Megajoules of Excess Heat

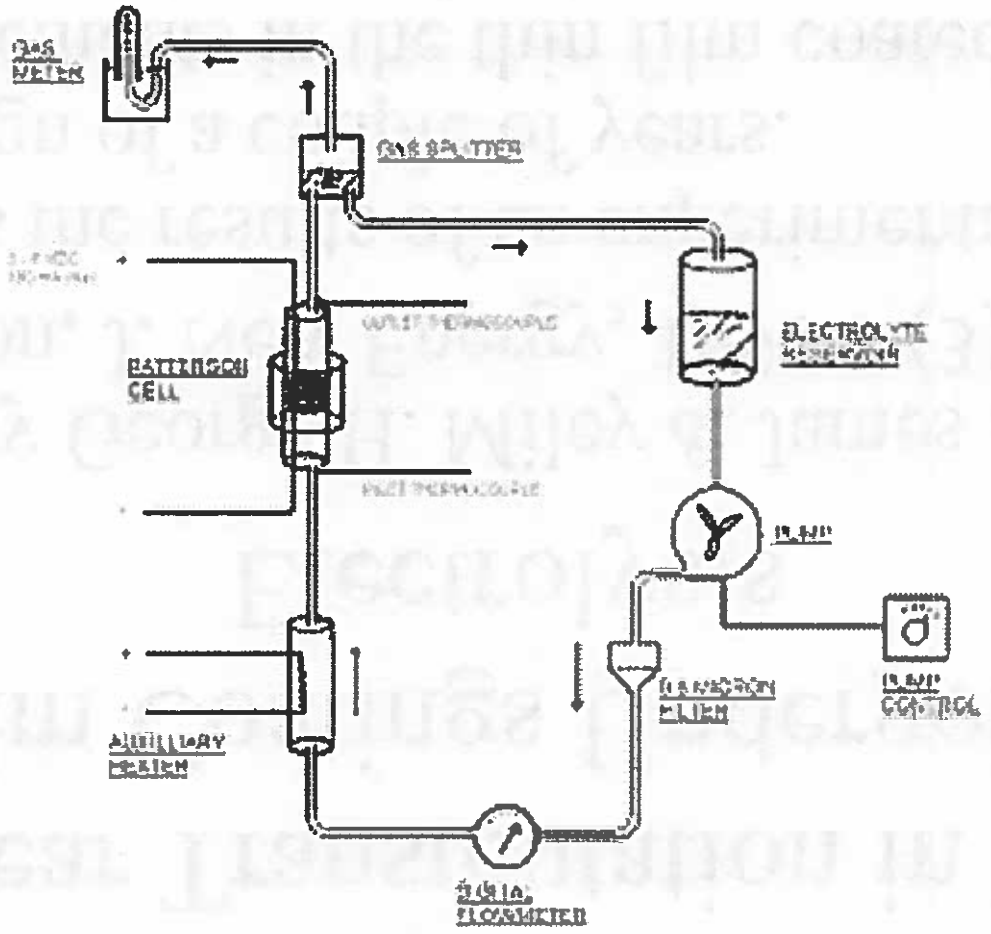
T.O. Passell, 12-10-06 (ICCF-10 pp 399-403)

- One of 3 active samples from heat-producing Pd powder showed a Pd-110/Pd-108 Ratio 1.089 + or - 0.008 Higher than the Virgin Pd Powder
- This Sample (Pd-B) was notable for showing an increase in Zn-64 concentration of 15 times above that of the Virgin Pd sample (Pd-D)
- One Hypothesis for the relative depletion of Pd-108 to Pd-110 is that it is due to its greater rate of fission to Zn-64 plus other Isotopes of the elements with atomic number 18-32
- Most of the above Hypothesized Fission Reactions are exothermic by about 10-30 Mev
- (*NAA is blind to other ratios of the Six Pd Isotopes except for Pd-102 for which the errors were too large in this particular neutron irradiation)

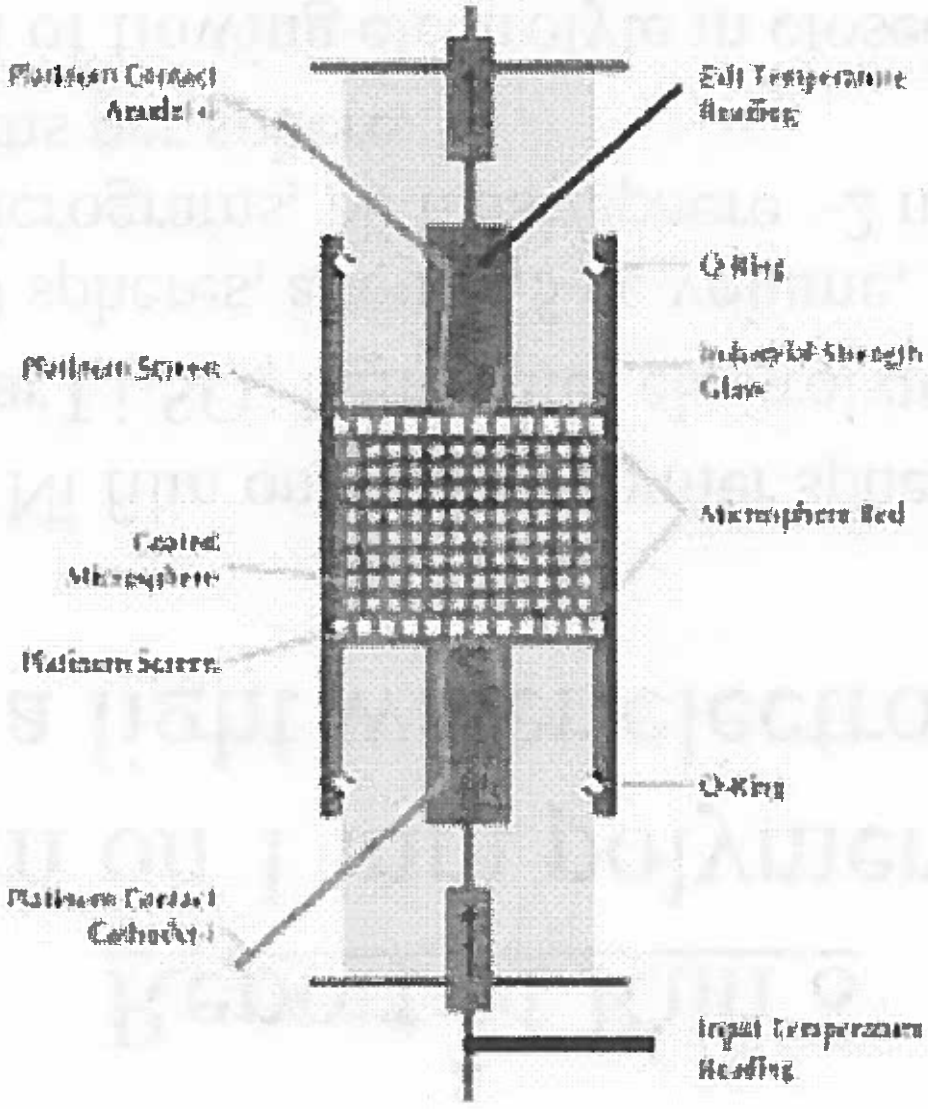
Nuclear Transmutation in Thin-Film Coatings Undergoing Electrolysis

- Paper by [redacted] & [redacted], J. New Energy, 1996 **1** (3): p.5
- Reports the results of an experimental campaign of a couple of years. Improvements in the thin film coated plastic bead technology, reduction over time in potential sources of contamination, multiple metal films of varying thicknesses.

Flow Electrolysis System Schematic (Figure 1b.)



Patterson Cell (Figure 1a.)



Report of Run 8

Ni film on 1 mm polymer sphere in a light water electrolyte

- 65 nm Ni film on 1 mm polymer sphere
- 1 molar Li_2SO_4 light water electrolyte
- ~1,000 spheres, about 0.5 cc volume, mass/sphere 611 micrograms, Ni mass/sphere ~2 micrograms, Ni atoms per sphere
- 100 ml of flowing electrolyte in closed plastic system with gas release allowed

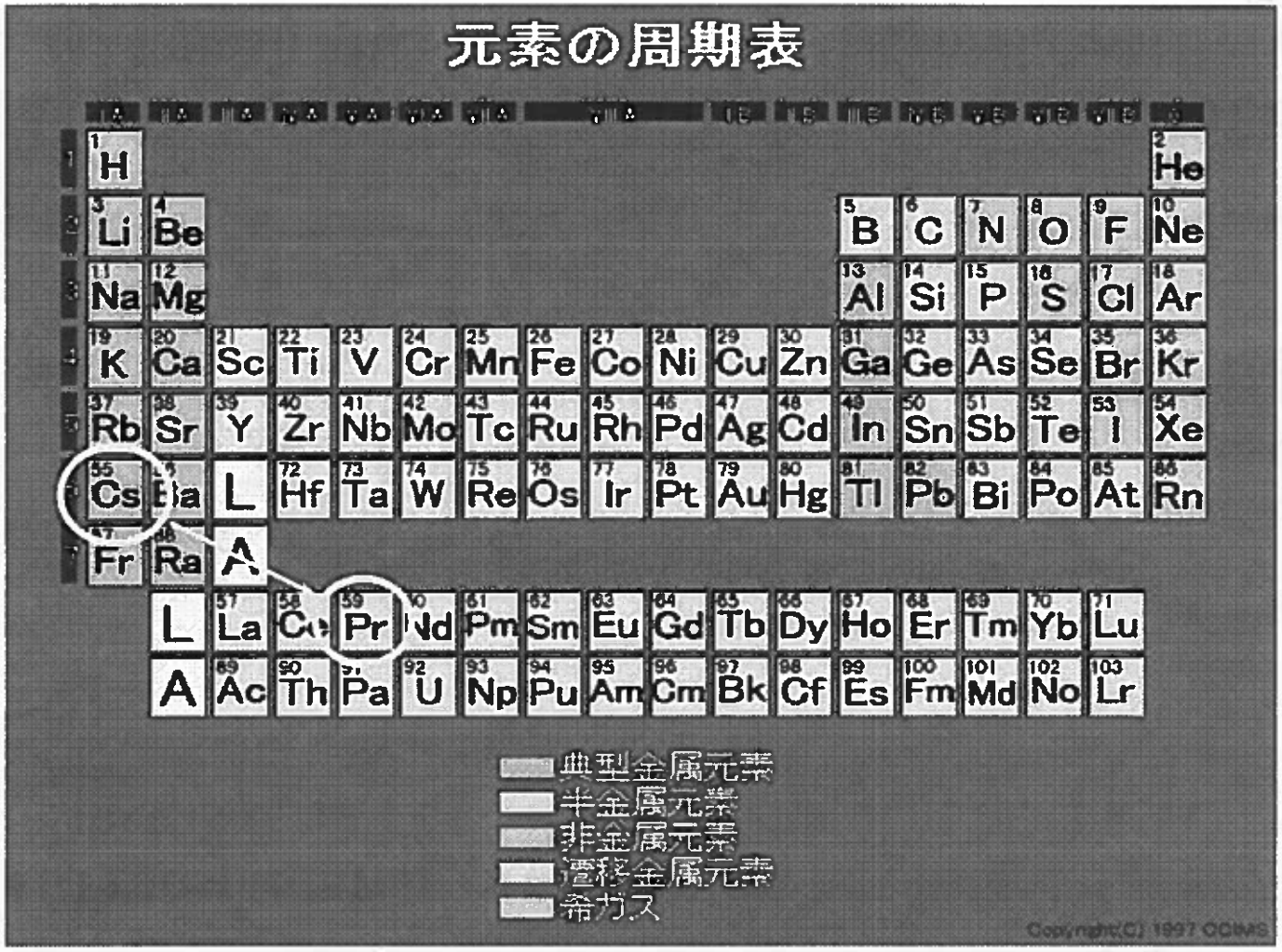
Patterson Ni Spheres Run 8
Ag & Cu weights: before & after Electrolysis-NAA Results

	Increased mass/ mg per 1,000 bead	**Mass of Impurities/ mg in total electrolyte (100ml)**	**Mass Ratio, increase Ag, Cu in film to electrolyte impurity**
Ag	**1.5**	**3×10^{-3}**	**500**
Cu	**1.1**	**80×10^{-3}**	**10**(~14*)

Patterson Ni Spheres Run 8
Deviation of Ag & Cu Isotope Natural Abundance
before & after Electrolysis-NAA

Ag-107	**+3.9%**	**Cu-63**	
Ag-10x		**Cu-65**	

Transmutation of Ni into Ag?



$^{133}_{55}Cs$

Atomic N. +4

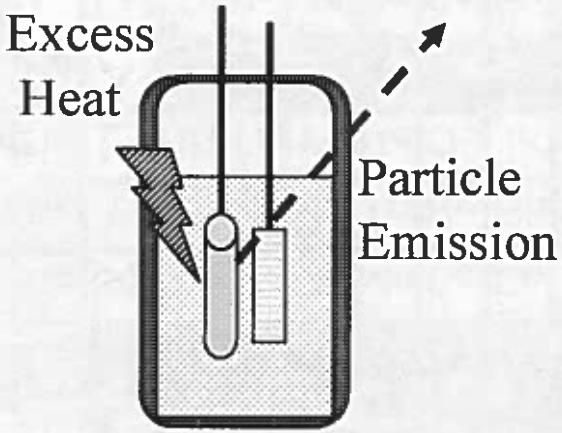
Mass N. +8

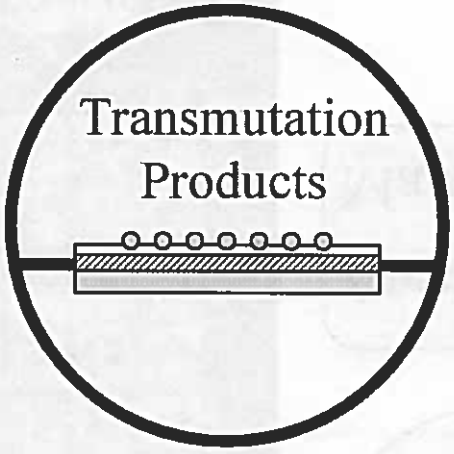
2 Alpha

$^{141}_{59}Pr$

Merits of Transmutation Approach(1)

1. Transmutation products can be observed many times by various methods and by other independent institutes.





On line measurement
Vanish after events

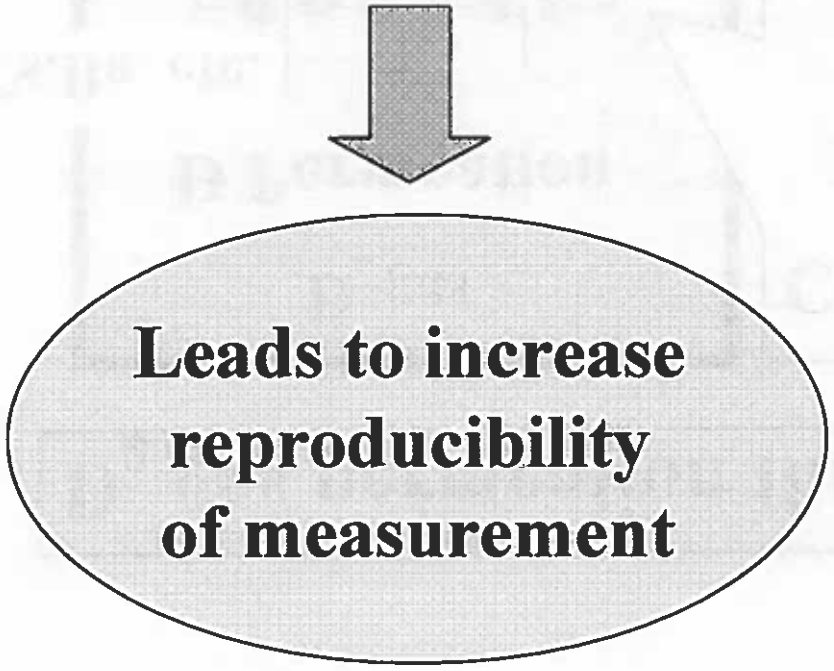
On line and off line measurement
Remain after events

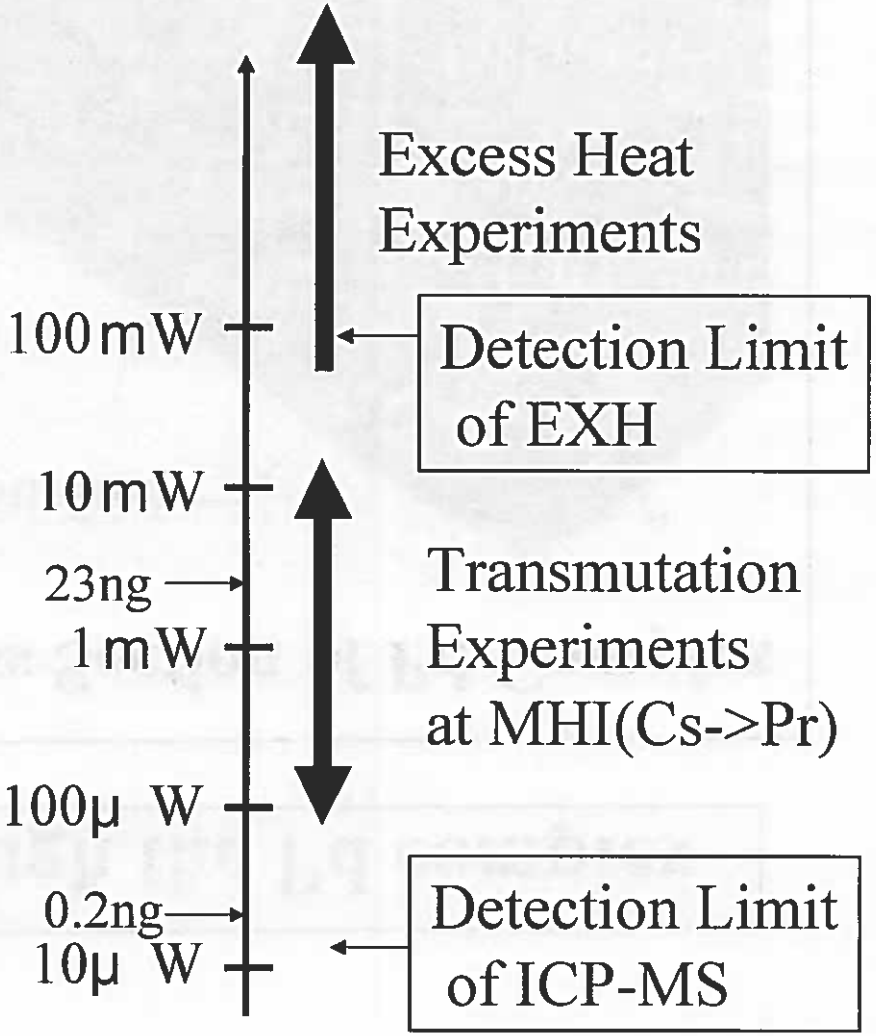
⇩

Possible to increase reliability after experiments

Merits of Transmutation Approach(2)

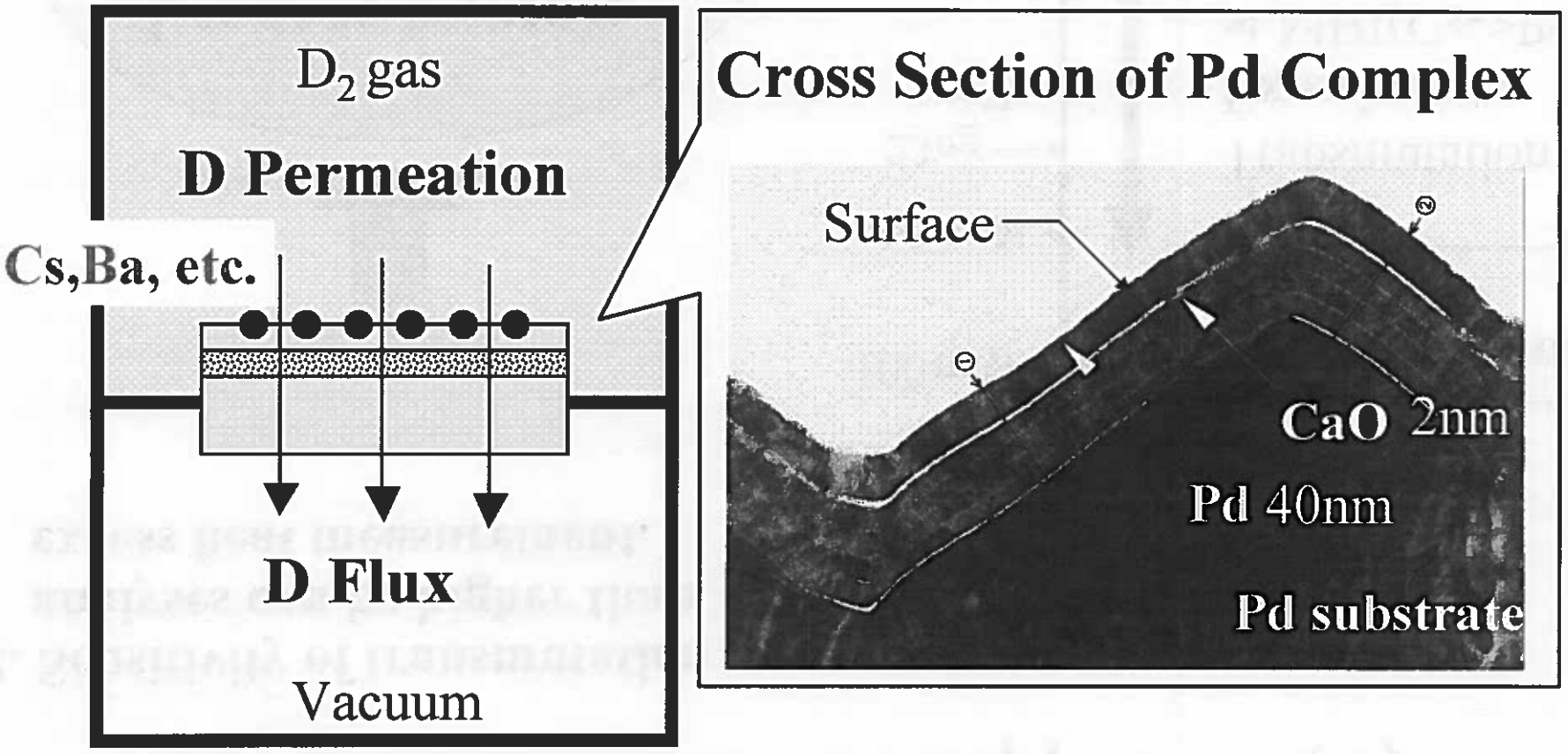
2. Sensitivity of transmutation analyses can be higher than excess heat measurement.



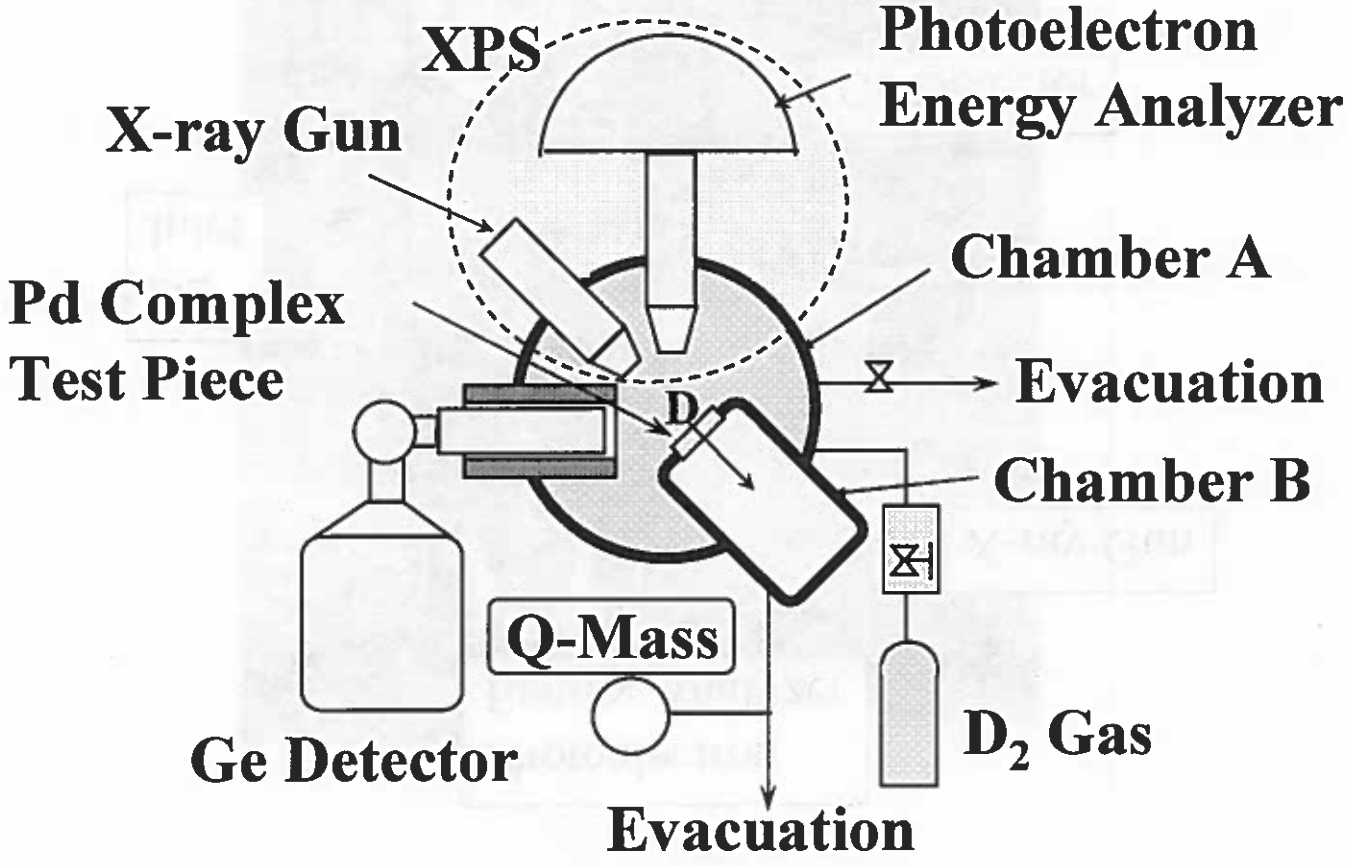


Features of the Present Method

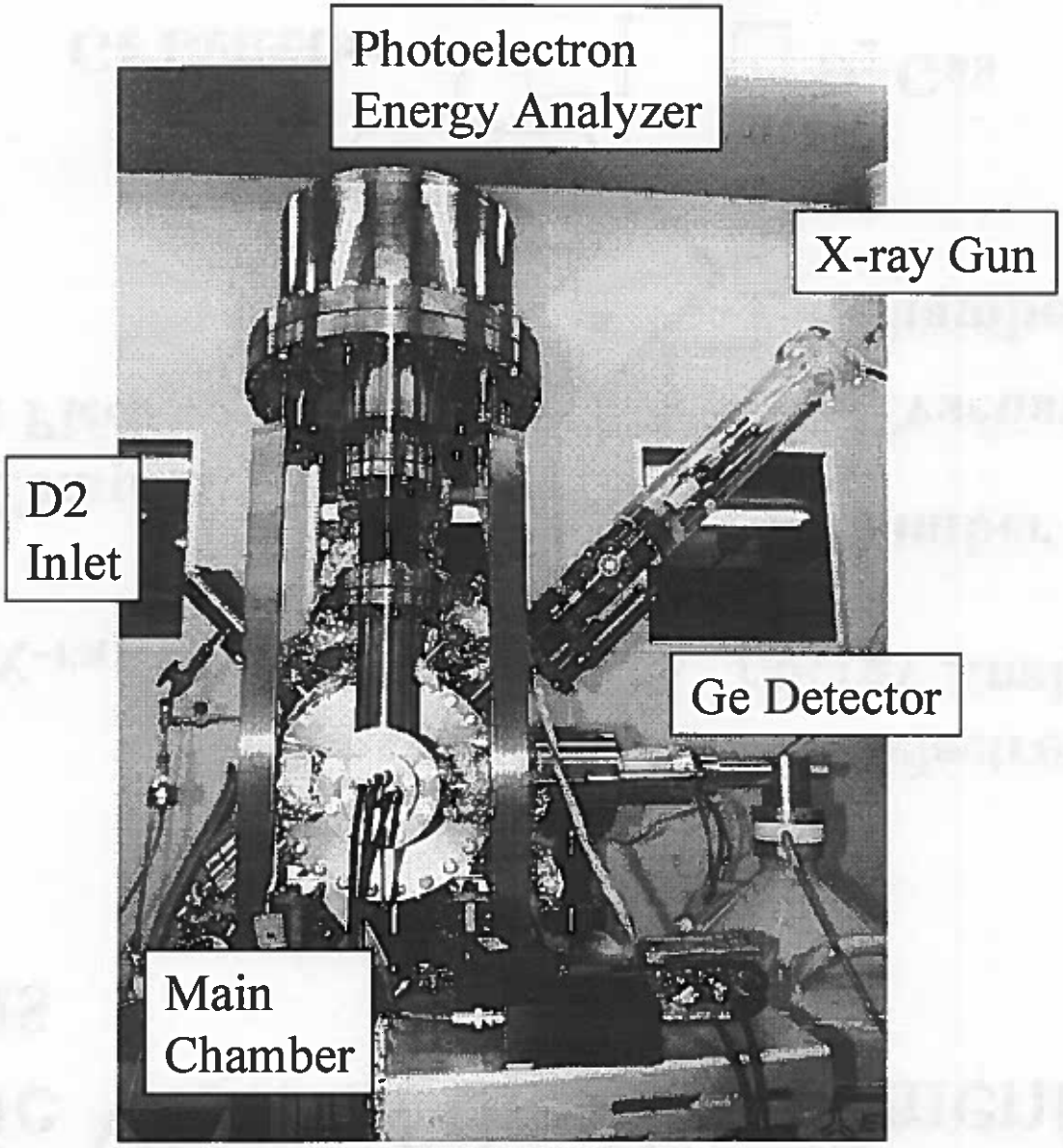
D_2 gas permeation through the Pd complex



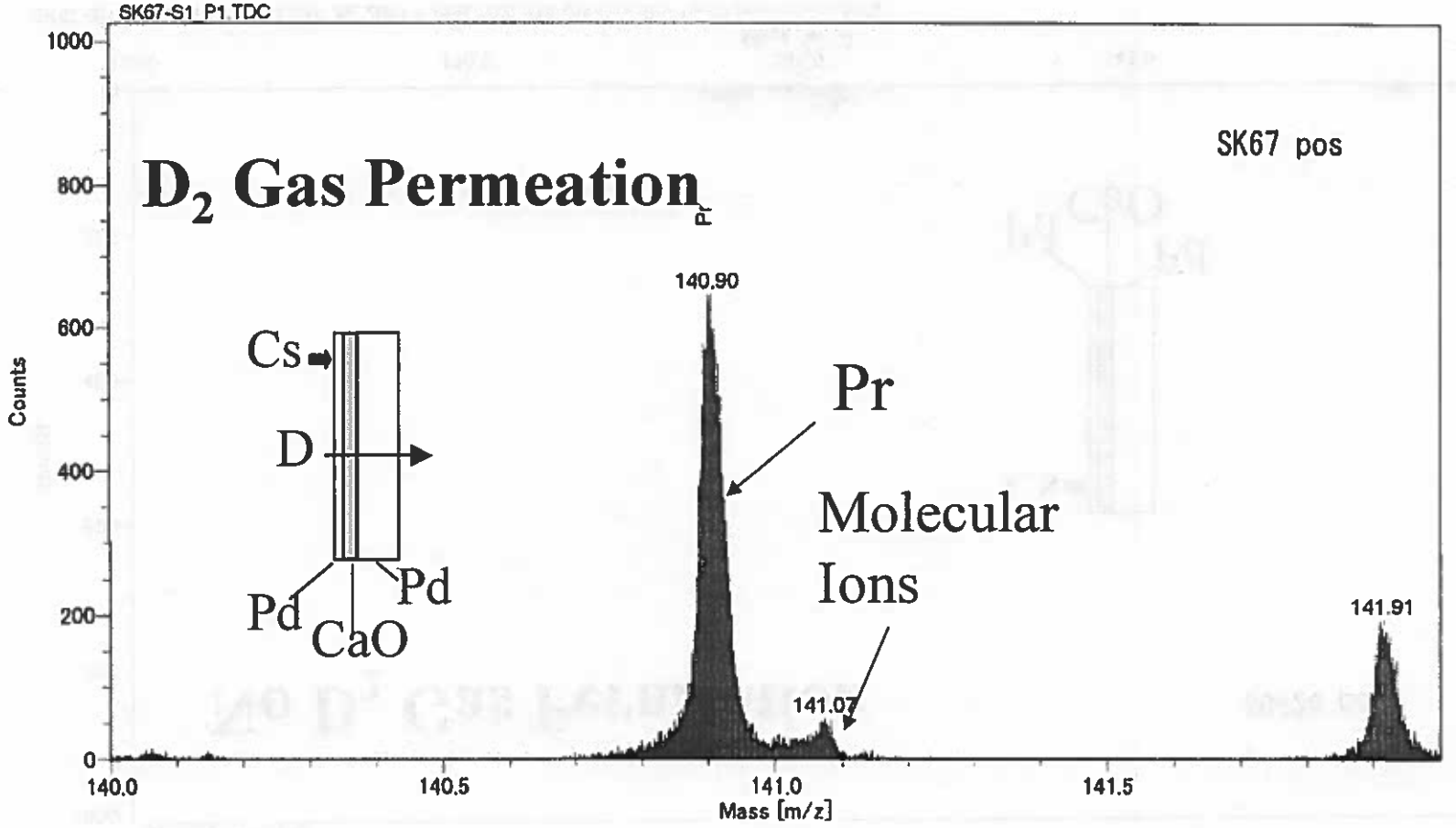
Schematic View of the Experimental Apparatus



Photograph of the Experimental Setup

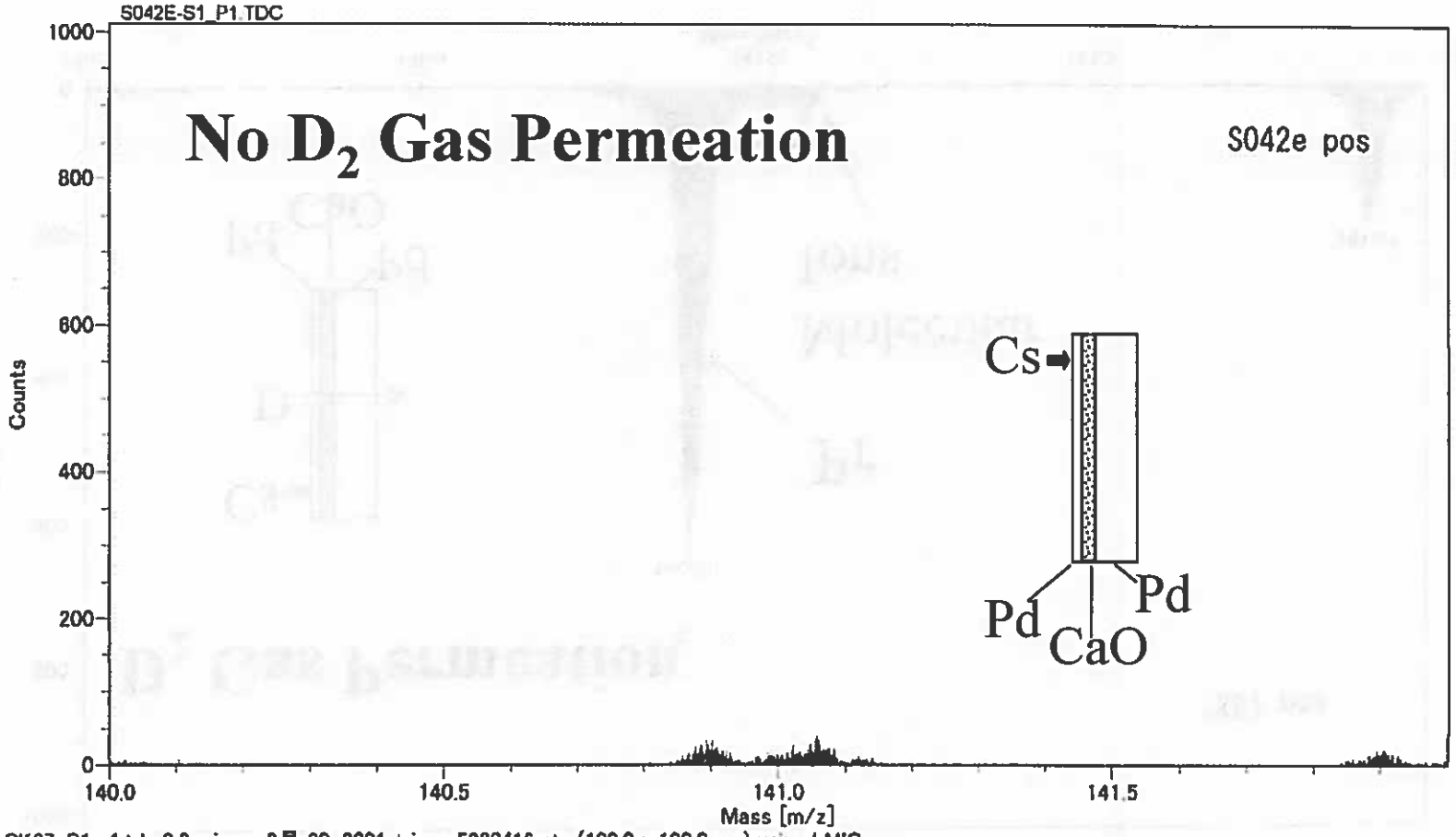


Identification of Pr by TOF-SIMS



TOF-SIMS device (TRIFT™II;ULVAC-PHI)

Identification of Pr by TOF-SIMS

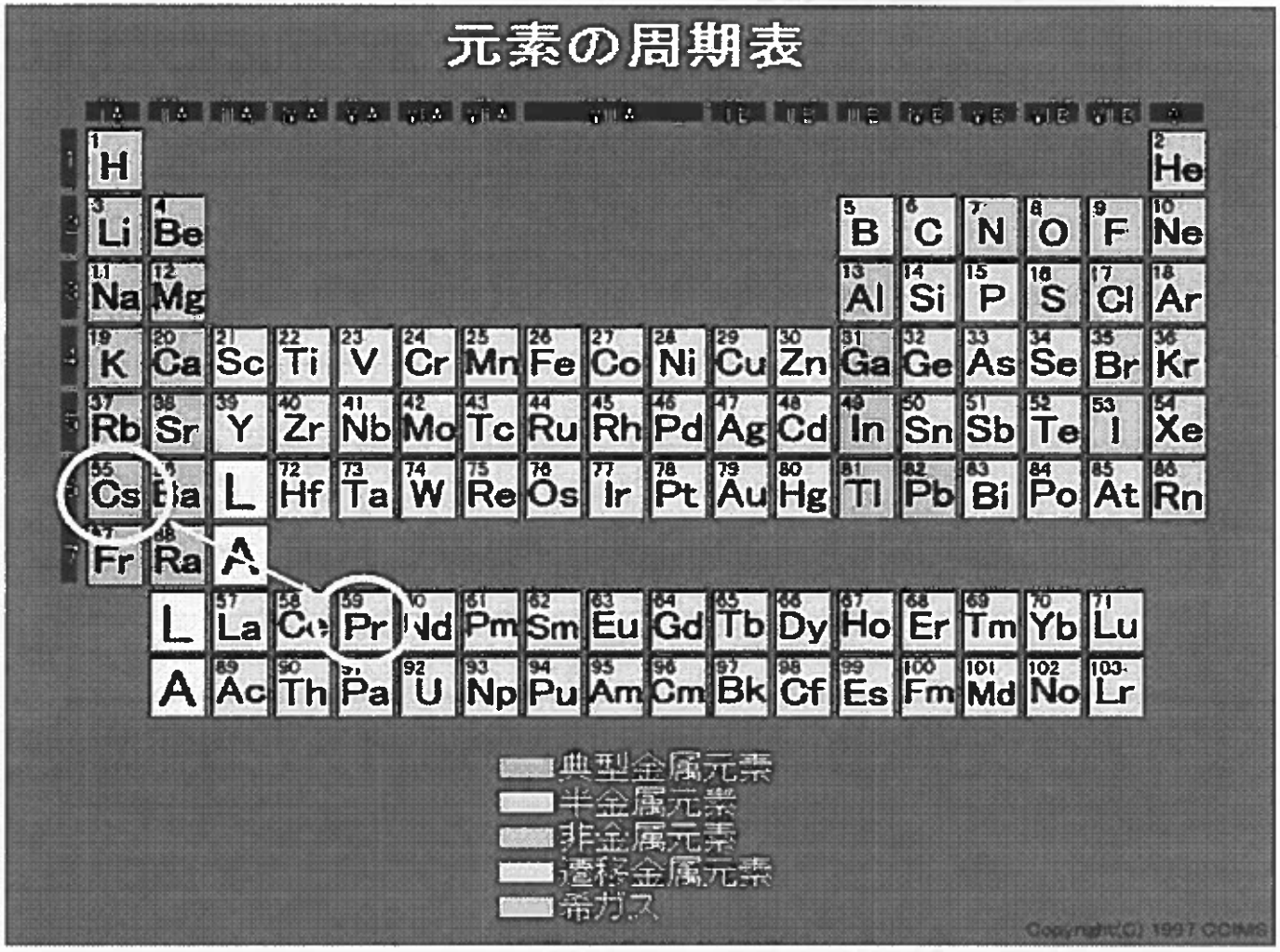


SK67-S1_p1.tdc 3.8 min on 8月 30, 2001 + ions 5320416 cts (100.0 x 100.0 um) using LMIG

S042e-S1_p1.tdc 3.9 min on 8月 30, 2001 + ions 5343585 cts (100.0 x 100.0 um) using LMIG

TOF-SIMS device (TRIFT^{TM}II;ULVAC-PHI)

Transmutation of Cs into Pr



$^{133}_{55}Cs$

Atomic N. +4

Mass N. +8

2 Alpha

$^{141}_{59}Pr$

Fabrication of Pd Complex

Washing a Palladium Sample with Acetone

↓

900° C 10H Annealing under Vacuum Condition (< 10^{-7} Torr)

↓

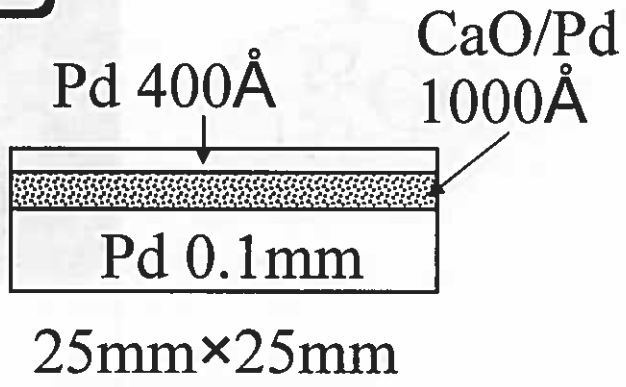
Washing the Sample with Aqua Regia (100sec)

↓

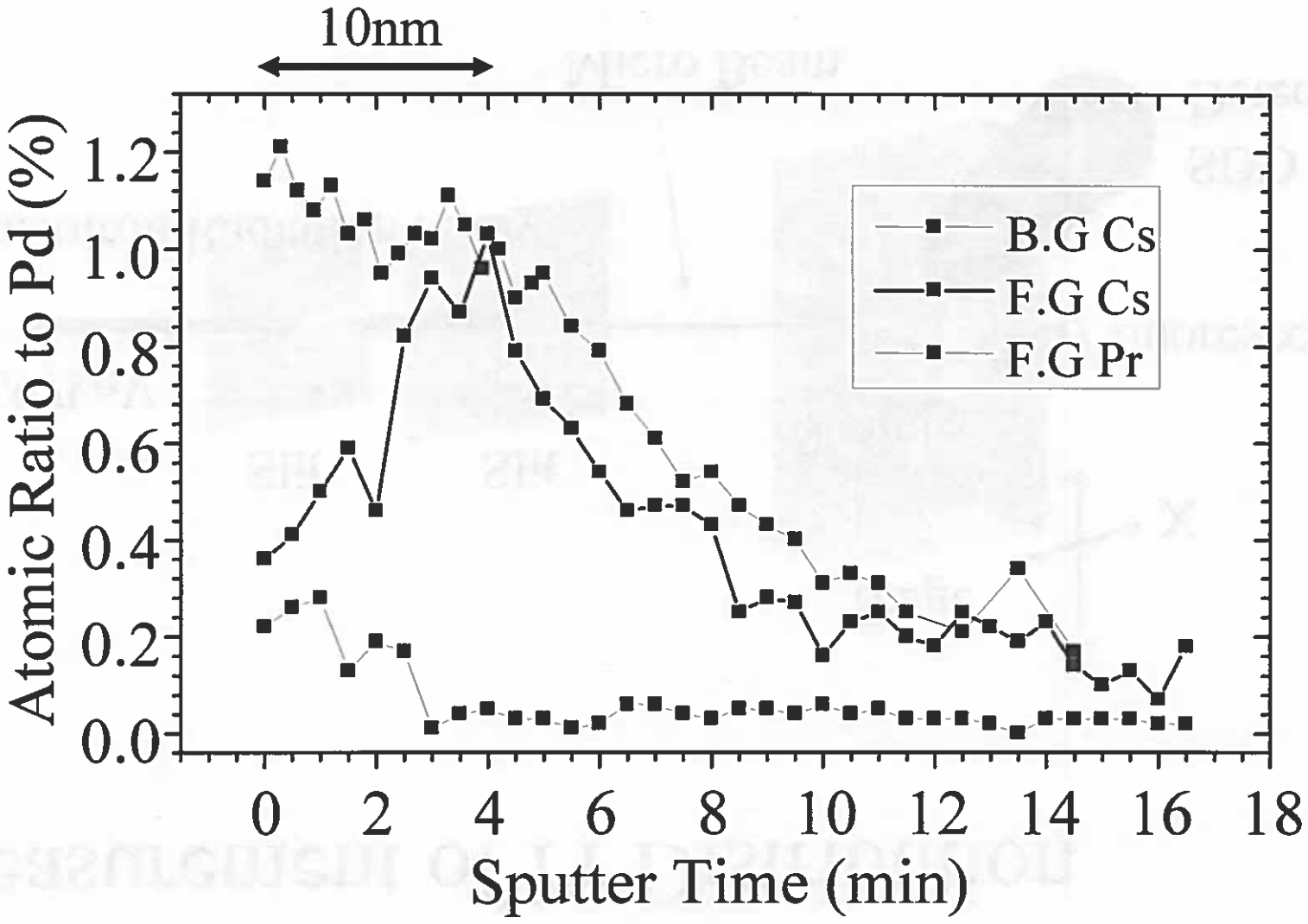
5 times Alternatingly Sputtering of CaO(20Å) and Pd(180Å)

↓

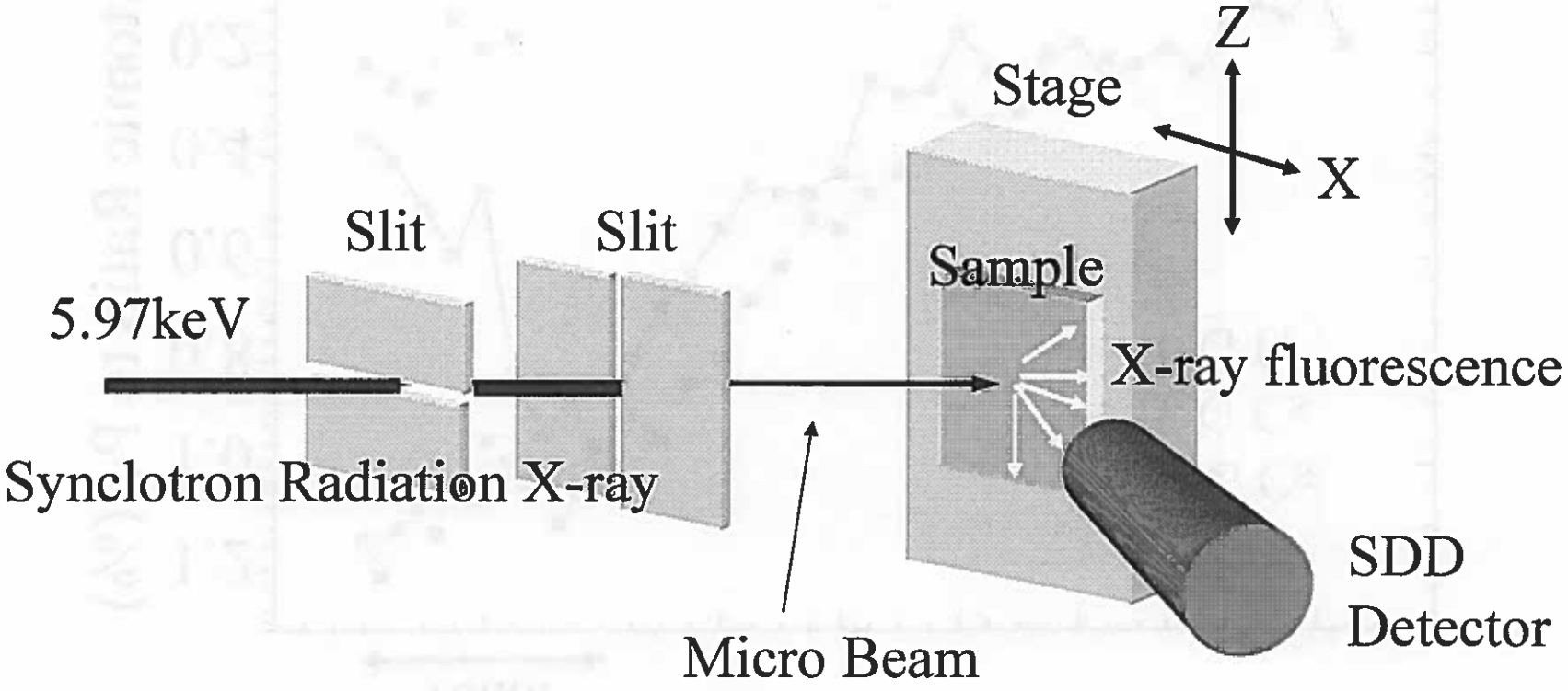
Ion Beam Sputtering of Pd only (400Å)



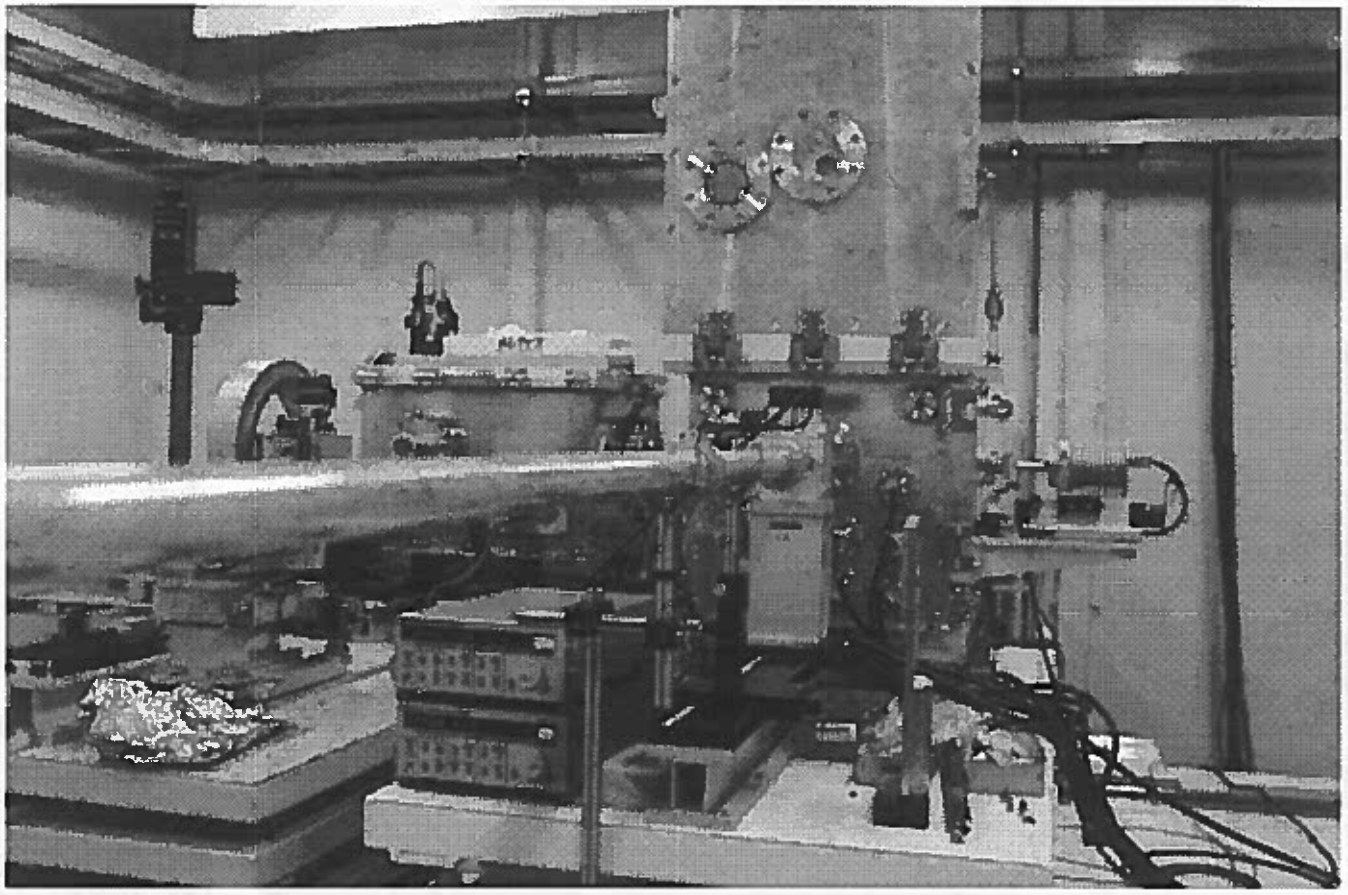
Depth Profile of Cs and Pr by XPS



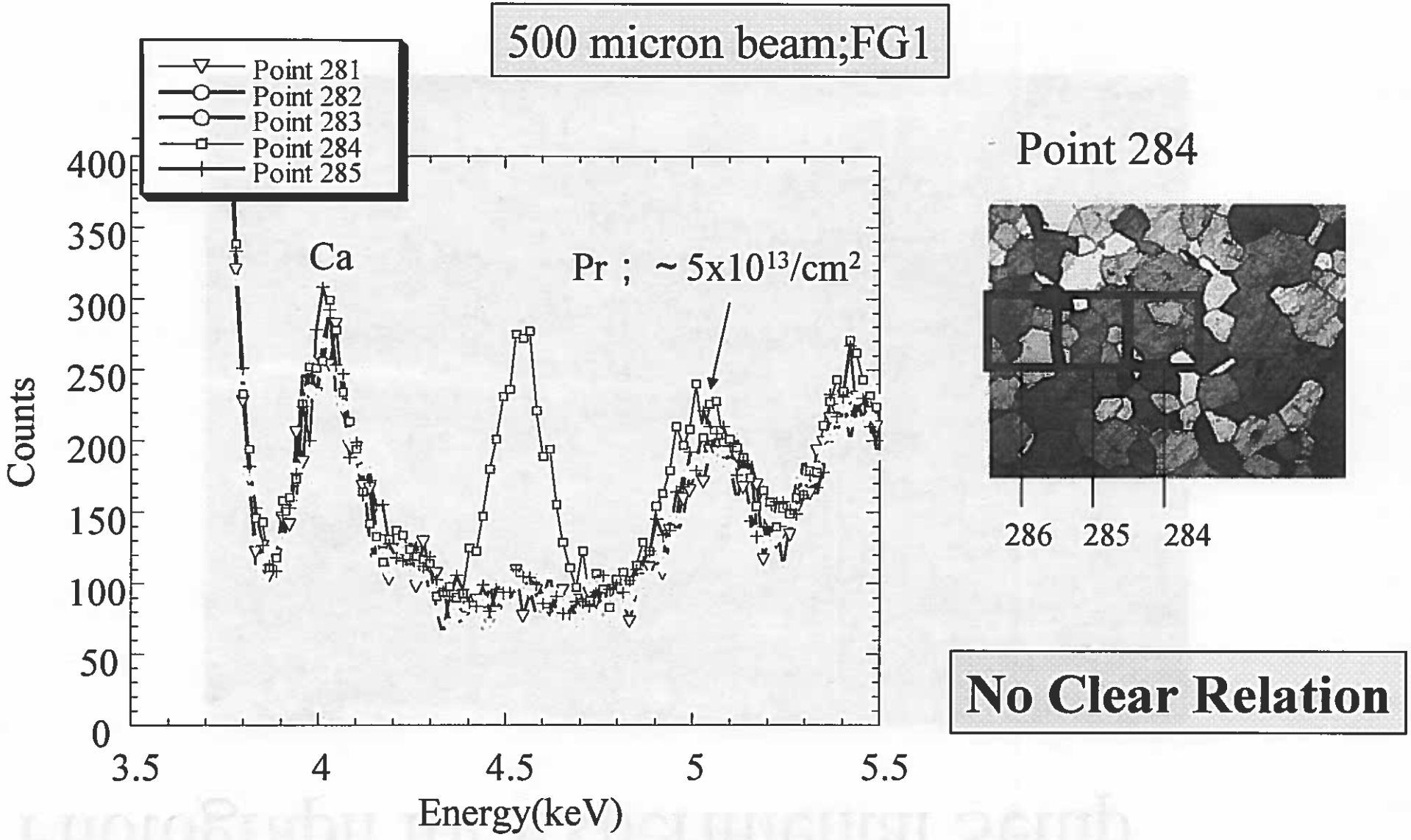
Experimental Setup for Measurement of Pr Distribution



Photograph for Experimental Setup



XRF Spectrum and Surface Structure

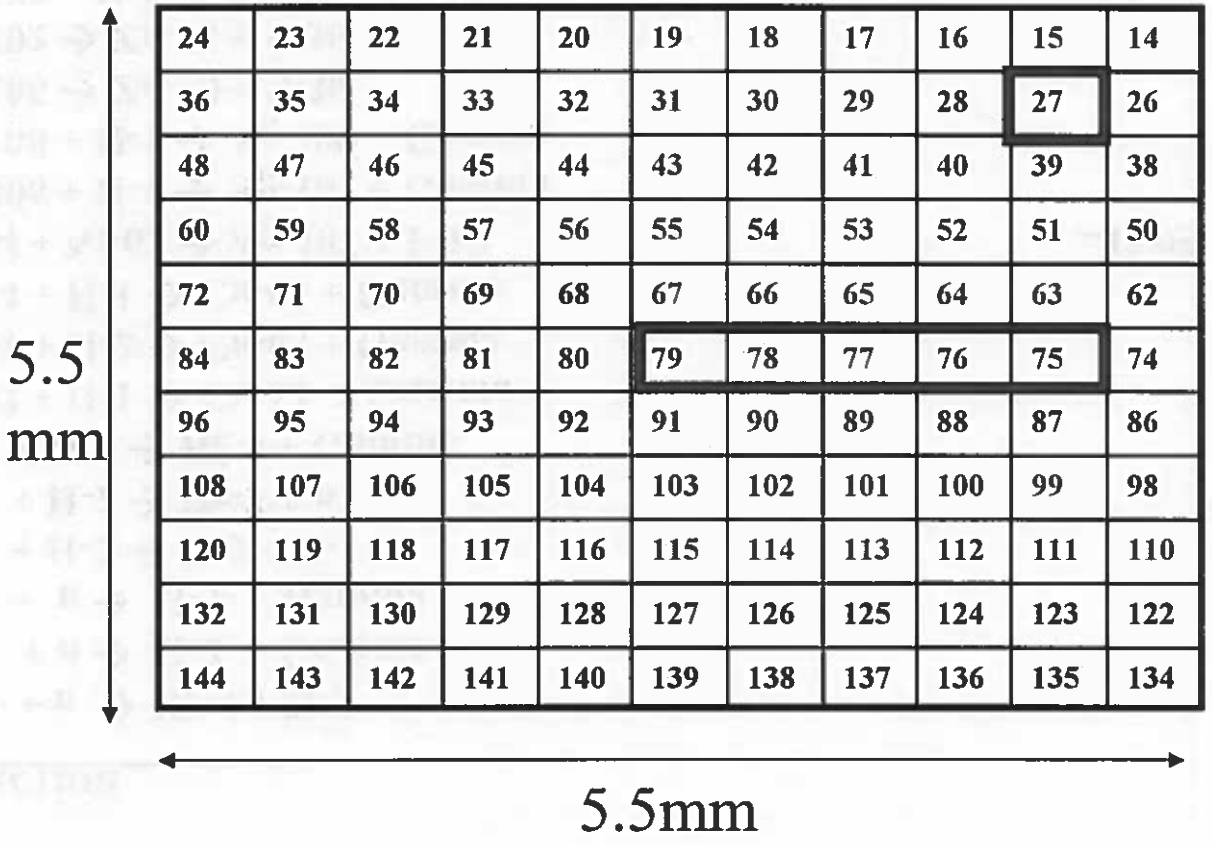


Point 284

286 285 284

No Clear Relation

Mapping of Products by 500 micron X-ray Beam;FG2



Red : Detection of Pr only; 74points (61%)

Black : No Detection;47points (39%)

Nuclear Reaction Q Values Using Mass Differences Times 931.5 Mev/AMU

Reaction	Q(Mev)
Li-6 + n → He-4 + H-3	+4.79
H-1 + n → H-2 + Gamma	+2.45
H-2 + n → H-3 + Gamma	+6.26
H-2 + H-2 → H-3 + H-1	+4.03
H-2 + H-2 → He-3 + n	+3.27
H-2 + H-2 → He-4 + Gamma	+23.84
Ni-62 + H-1 → Cu-63 + Gamma	+ 6.12
Ni-61 + H-2 → Cu-63 + Gamma	+14.5
Ni-64 + H-1 → Cu-65 + Gamma	+ 7.45
Ni-64 + Ni-62 → Ag-107 + F-19	--43.95
Pd-106 + H-1 → Ag-107 + Gamma	+5.62
Pd-108 + H-1 → Ag-109 + Gamma	+6.43
Pd-106 → Zn-70 + S-36	+10.3
Pd-102 → Zn-66 + S-36	+11.66
Pd-105 + H-2 → Zn-70 + Cl-37	+25.94

D2 permeation through Pd film

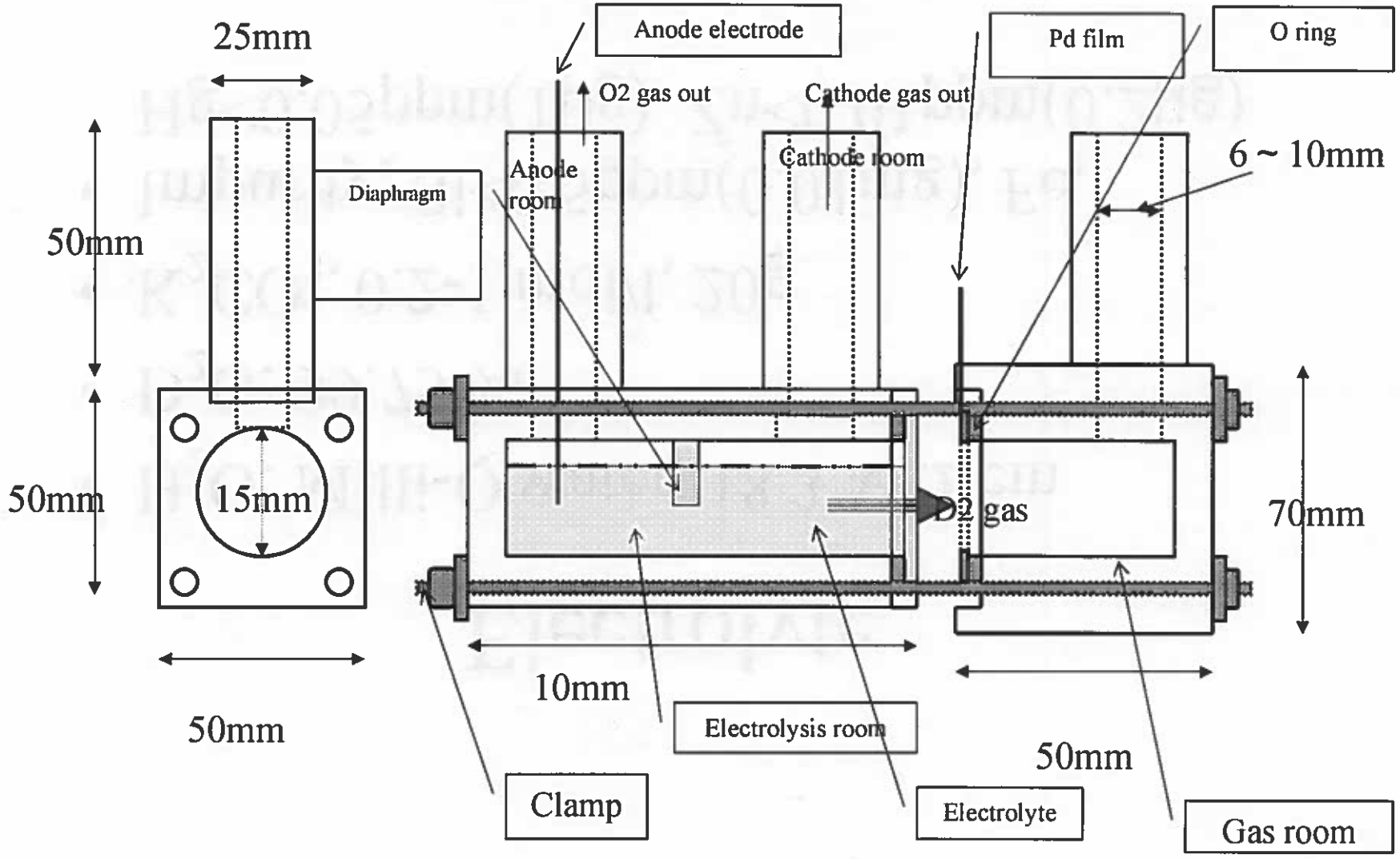
[redacted]

- Laboratory of Nuclear and Environmental Materials
- Graduate School of Engineering, Hokkaido University,
- [redacted]
- Tel:[redacted], Fax:[redacted]
- E-mail:[redacted]

Sample

- Pd Cathode: 0.3mm thickness ×2.5 cm diameter, 99.97 % purity,Weight:0.73g
- impurities: B 110(0.08mg), Ag 44(0.03mg), Au 23(0.016mg), Pt 20(0.015mg), Cr 10(0.007mg), Si 10(0.007mg), Ca 9(0.007mg), Cu 6(0.004mg), Ti 5(0.004mg), Mg 1ppm(0.7μg)
- Pt anode: 2.5×2.5×0.03 cm rectangular shape, 99.99 %, 4g
- impurities: Rh 18(0.072mg), Pd 2(0.008mg), Si 2(0.008mg), Cr 2 (0.008mg) ppm

D2 permeation cell



Electrolyte

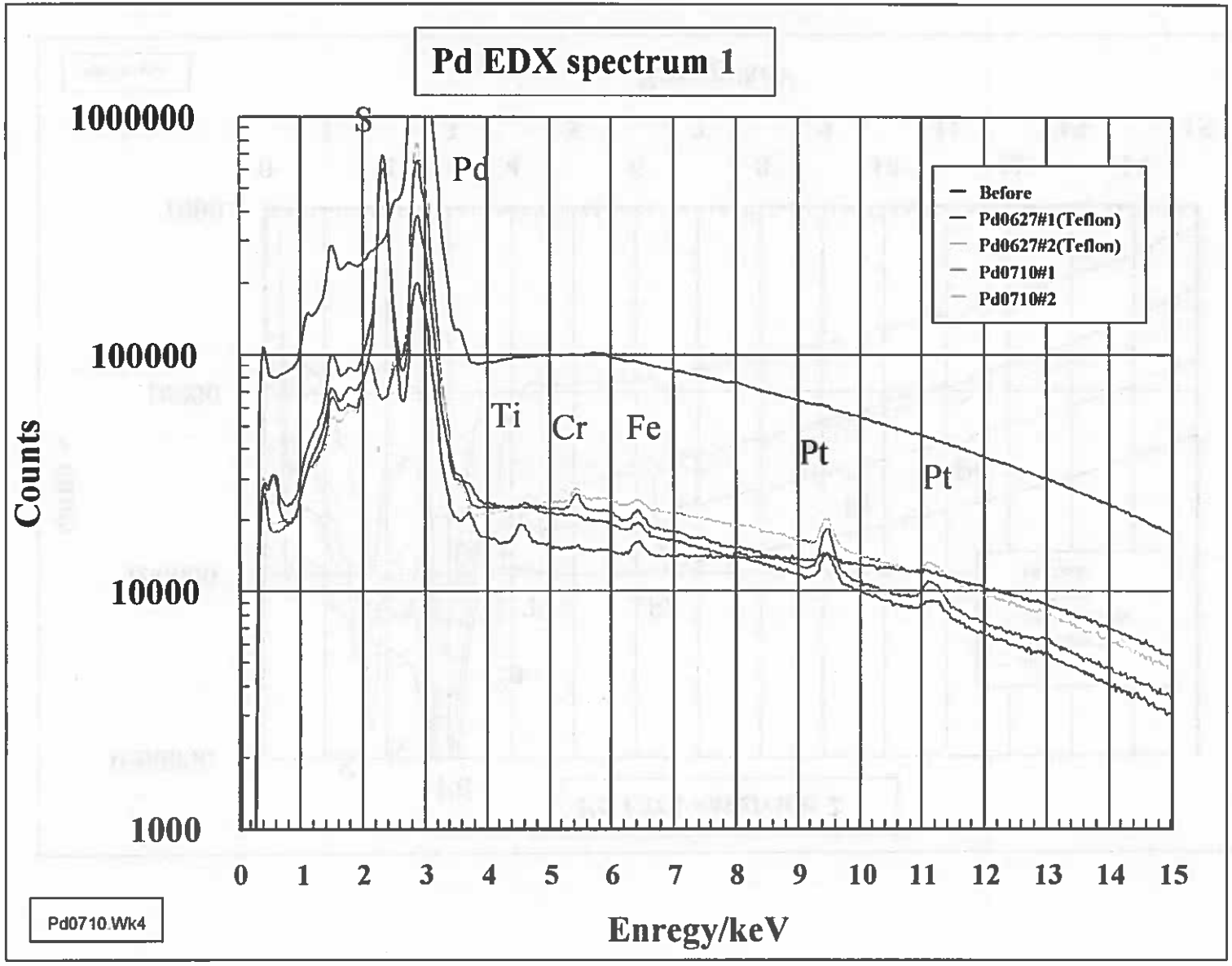
- H_2O: Milli-Q water, 18.3 MΩ-cm
- D_2O: 99.75 %,
- K_2CO_3, 0.2-1 mol/l, 20g
- Impurity; Si<0.5ppm(0.01mg), Fe, Hg<0.05ppm(1μg), Zn<0.01ppm(0.2μg)

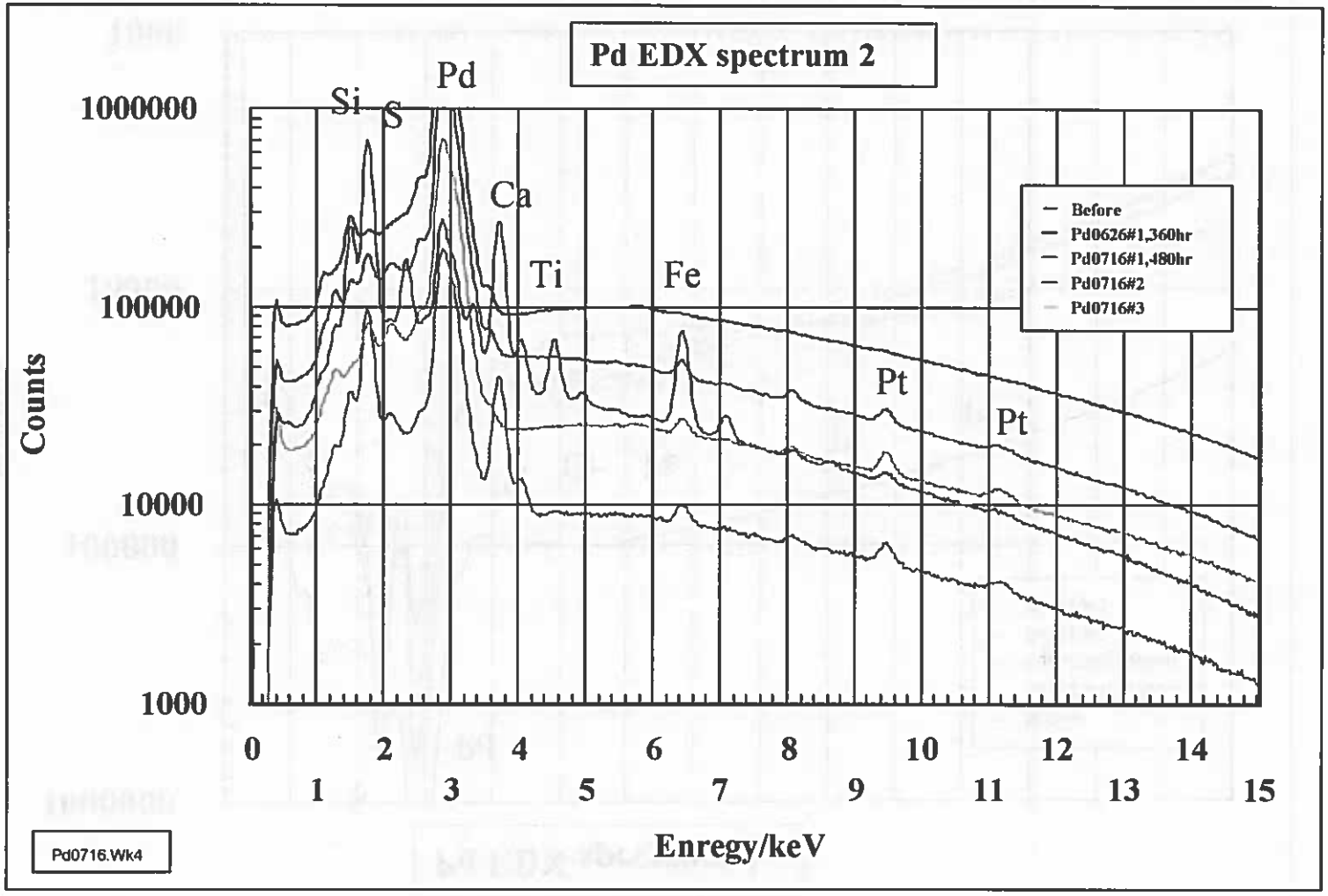
Electro permeation experiment

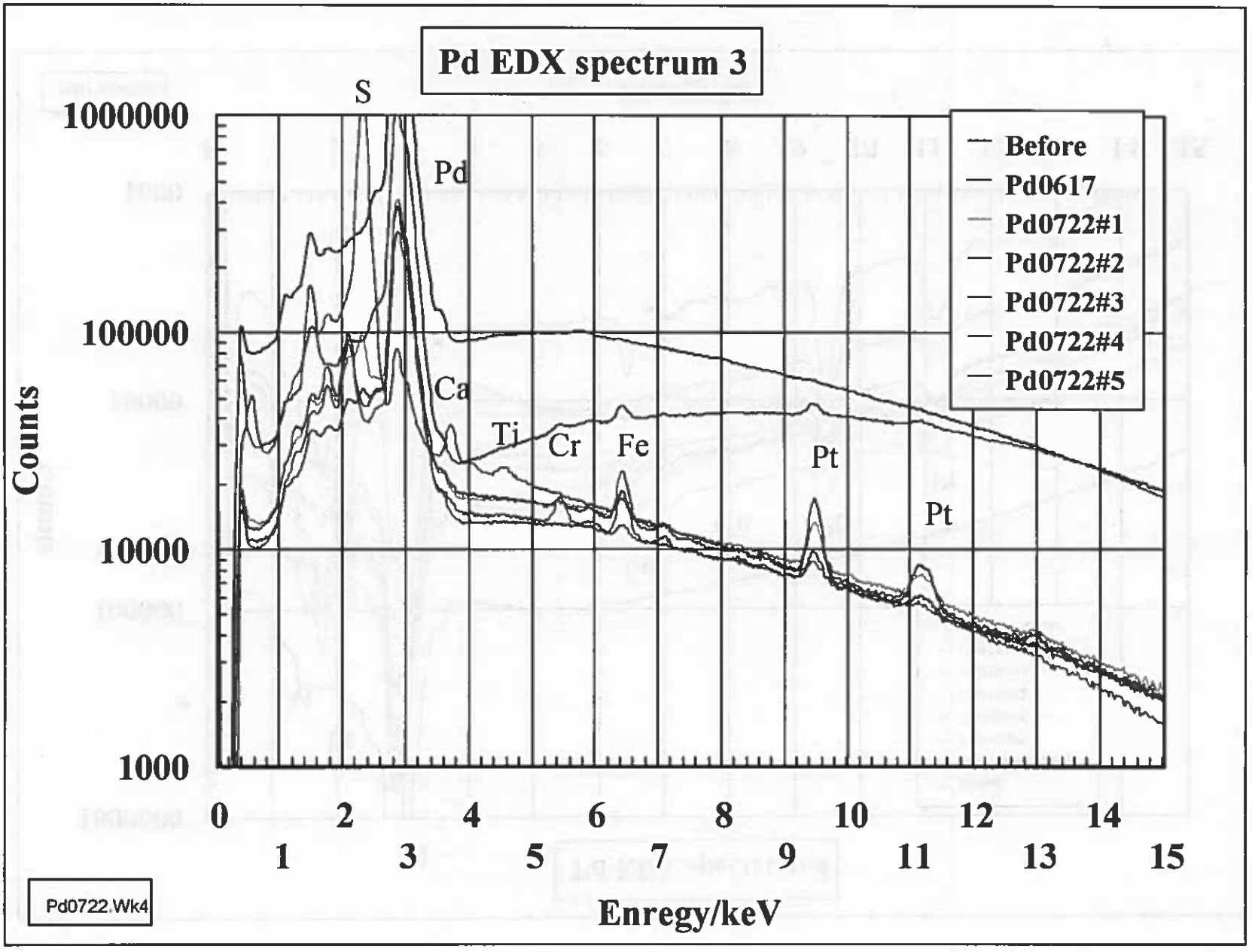
- Electrolysis: 10-50mA/cm^2
- Temperature: 20-60℃
- Electrolysis time:100 ~ 600h

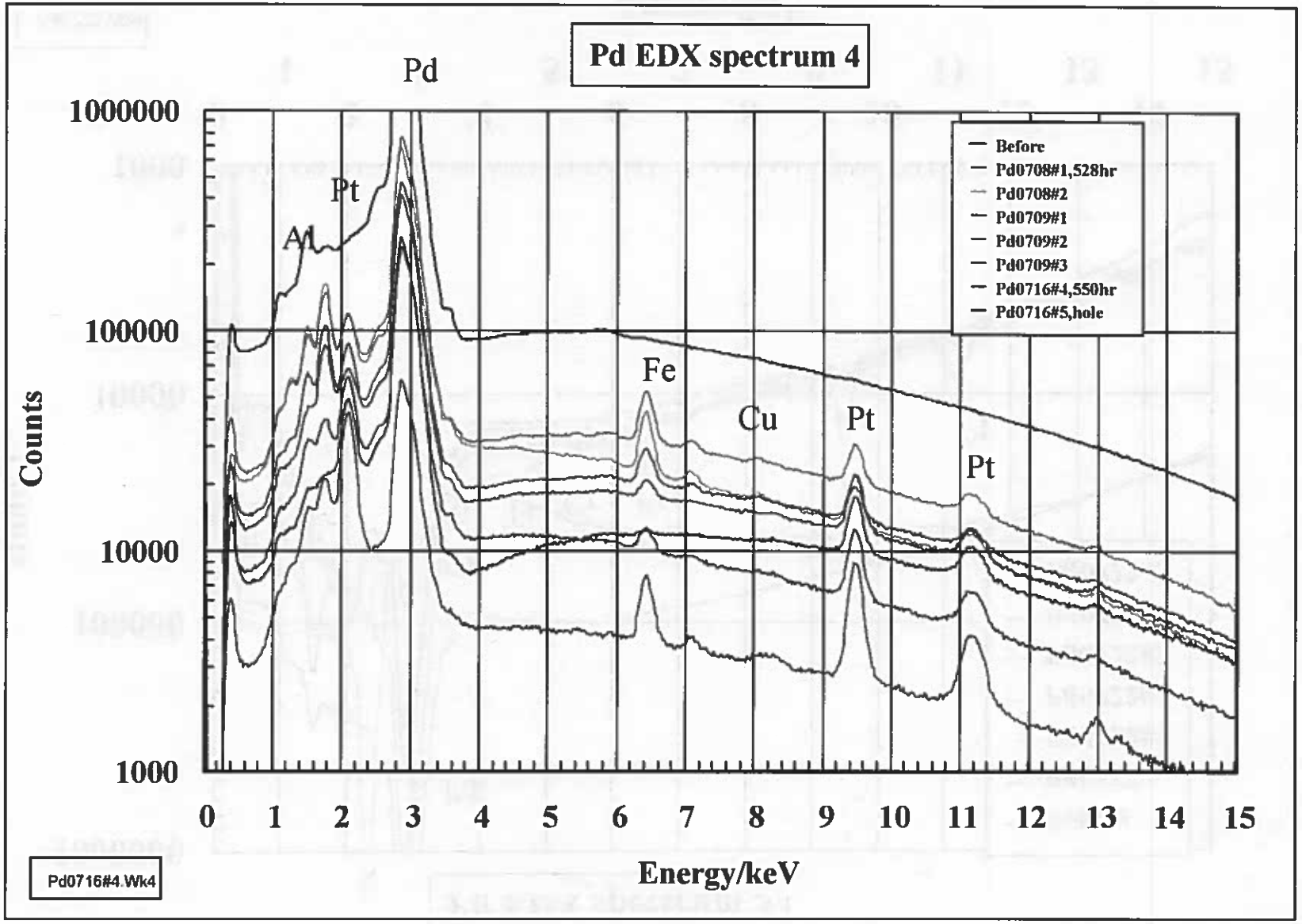
Experiment

- D atom path through the Pd film by electrolysis.
- Pd surface was analyzed by EDX.
- Electrolyte was analyzed by ICP method.

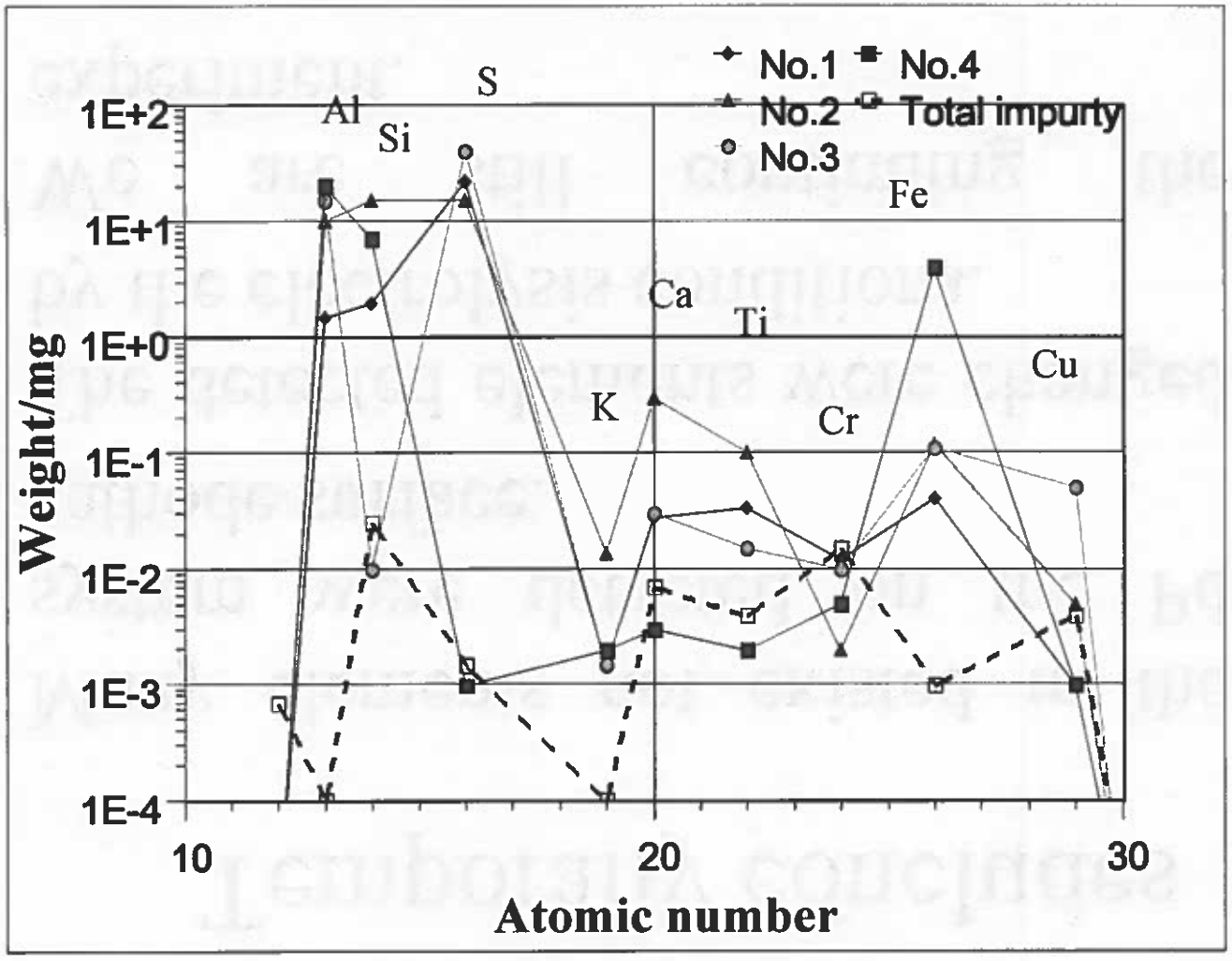

Pd EDX spectrum 1
1000000
100000
10000
1000
Counts
S
Pd
Ti
Cr
Fe
Pt
Pt
Before
Pd0627#1(Teflon)
Pd0627#2(Teflon)
Pd0710#1
Pd0710#2
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
Enregy/keV
Pd0710.Wk4


Pd EDX spectrum 2
Si
S
Pd
Ca
Ti
Fe
Pt
Pt
Before
Pd0626#1,360hr
Pd0716#1,480hr
Pd0716#2
Pd0716#3
1000000
100000
10000
1000
Counts
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
Enregy/keV
Pd0716.Wk4


Pd EDX spectrum 3
S
Pd
Ca
Ti
Cr
Fe
Pt
Pt
Before
Pd0617
Pd0722#1
Pd0722#2
Pd0722#3
Pd0722#4
Pd0722#5
Counts
1000000
100000
10000
1000
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
Enregy/keV
Pd0722.Wk4


Pd EDX spectrum 4
Pd
Pt
Al
Fe
Cu
Pt
Pt
Before
Pd0708#1,528hr
Pd0708#2
Pd0709#1
Pd0709#2
Pd0709#3
Pd0716#4,550hr
Pd0716#5,hole
Counts
1000000
100000
10000
1000
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
Energy/keV
Pd0716#4.Wk4

Amount of detected major elements



Temporally concludes

- Many elements not existed in the system were detected on the Pd cathode surface.
- The detected elements were changed by the electrolysis conditions.
- We are still continuing the experiment.

Cell for D2 gas permeation

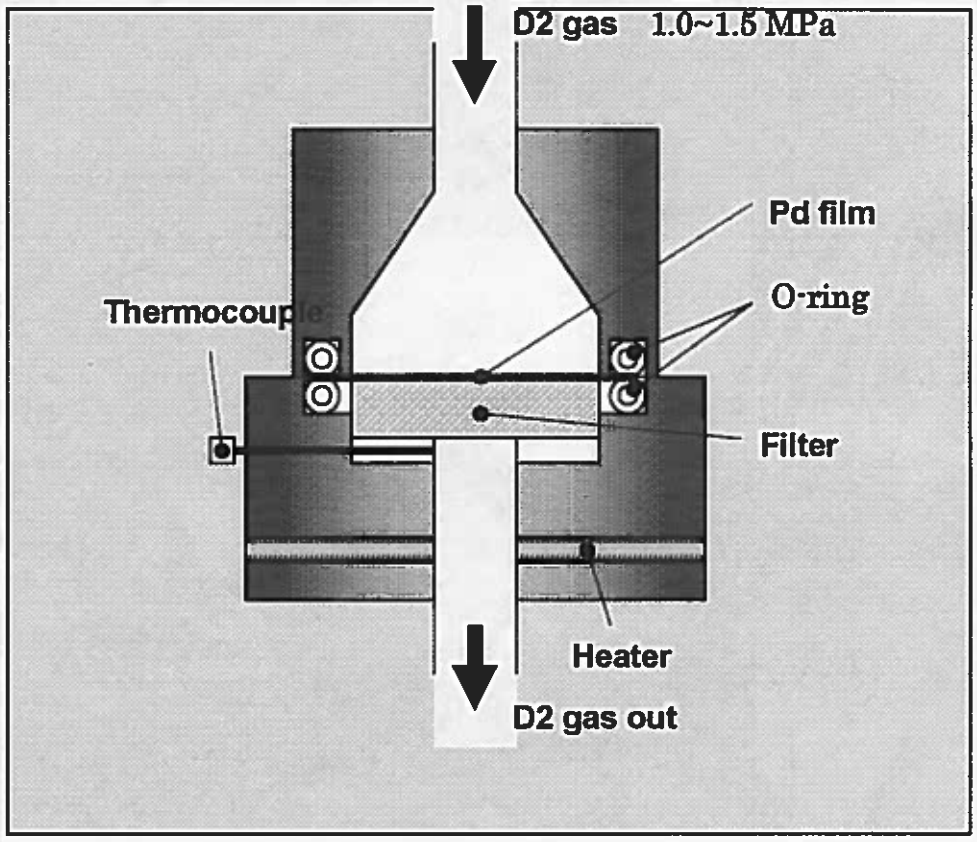


Photo for D2 permeation cell