Production of Helium and Energy in the “Solid Fusion”

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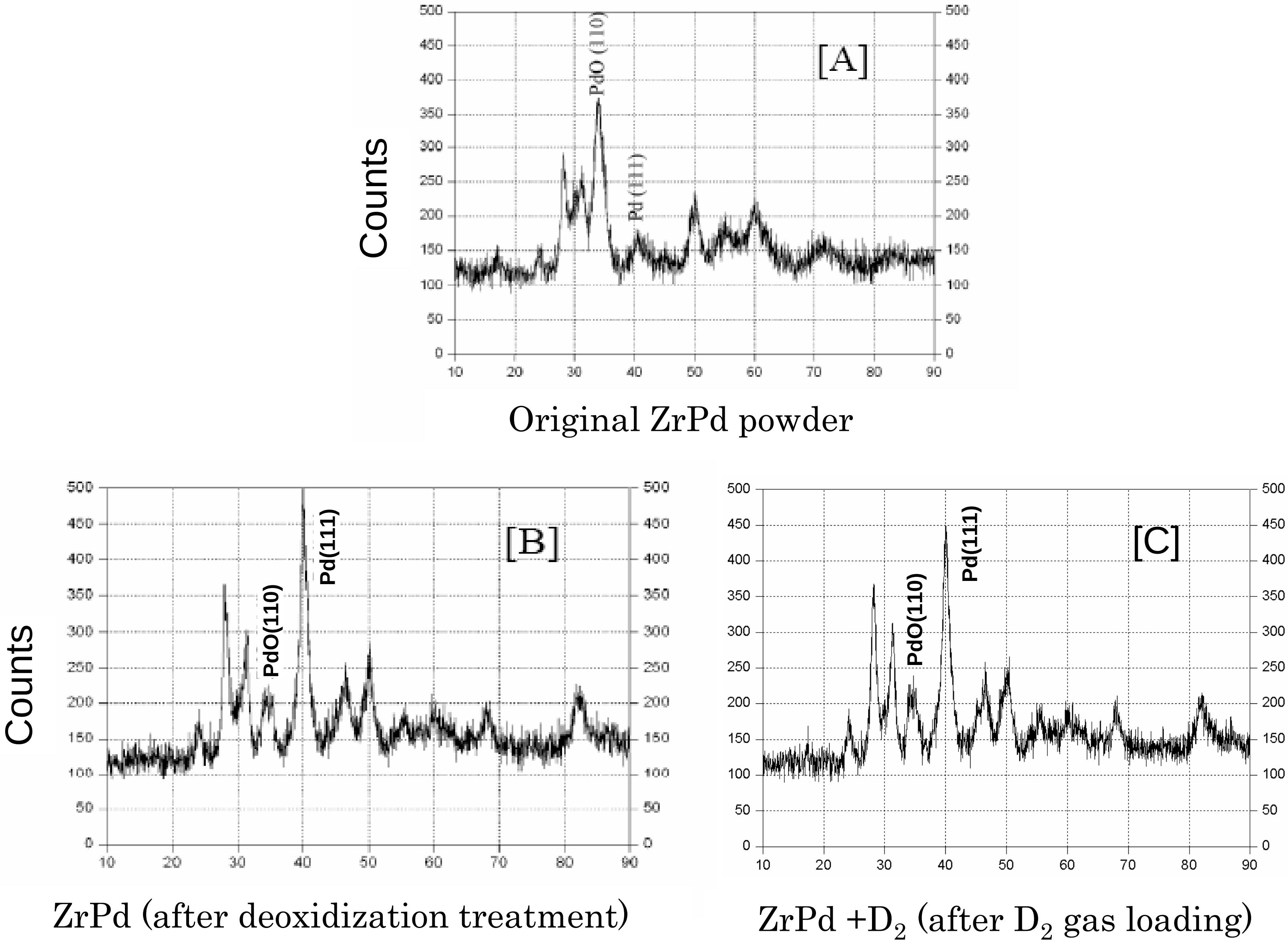


Fig.1 X-ray diffraction analysis

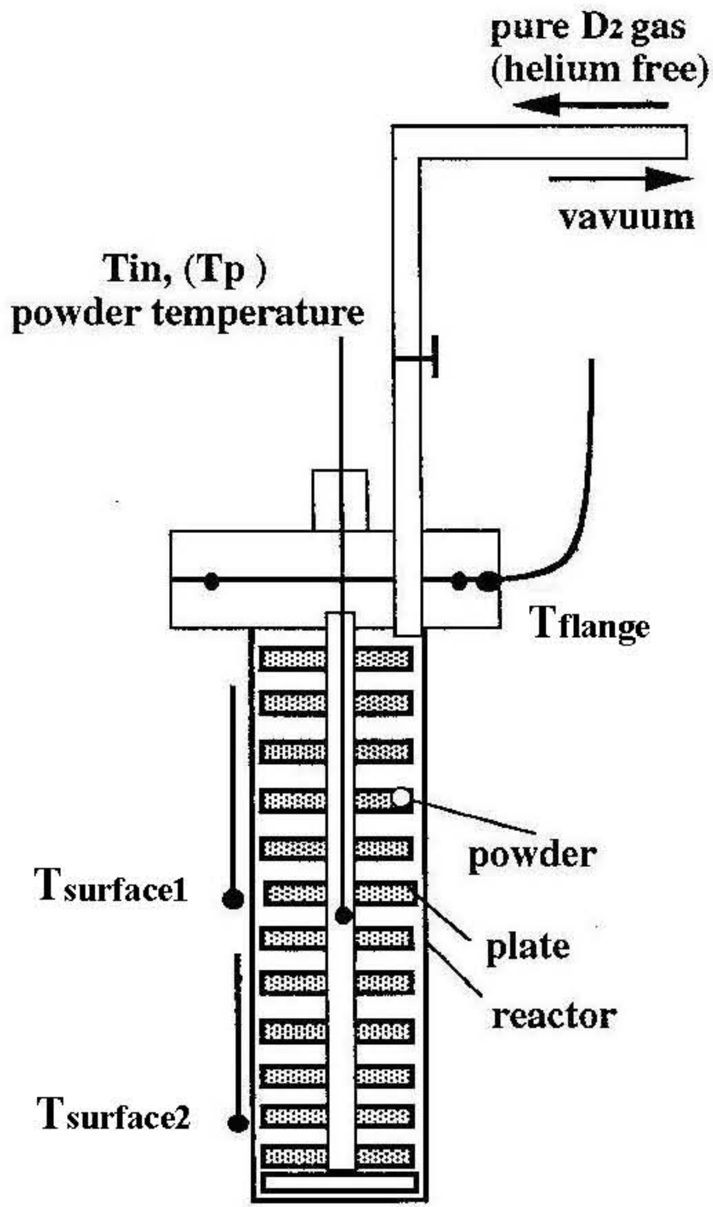


Fig.2 Fusion reactor

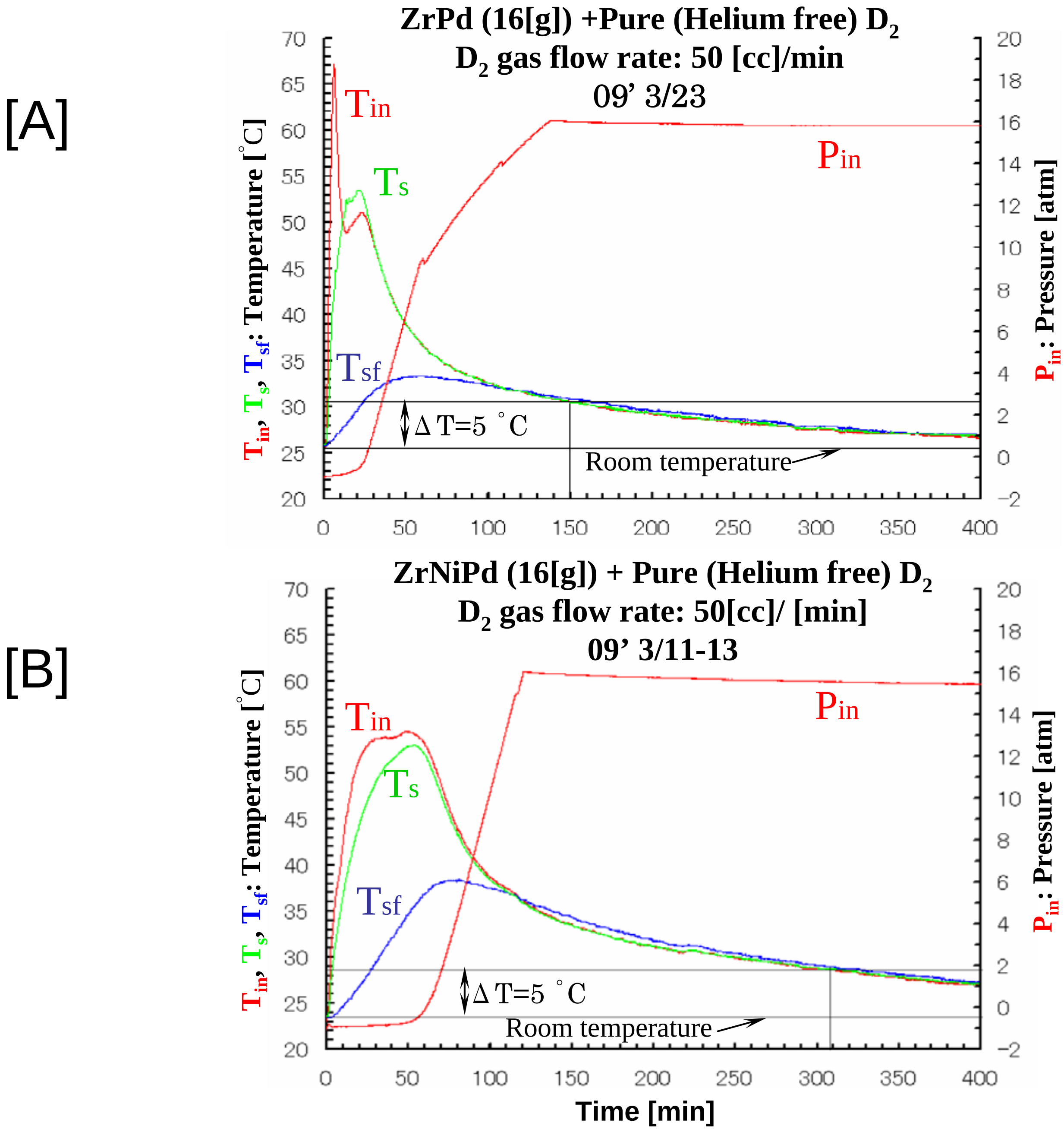


Fig.3 Distribution of temperature and pressure

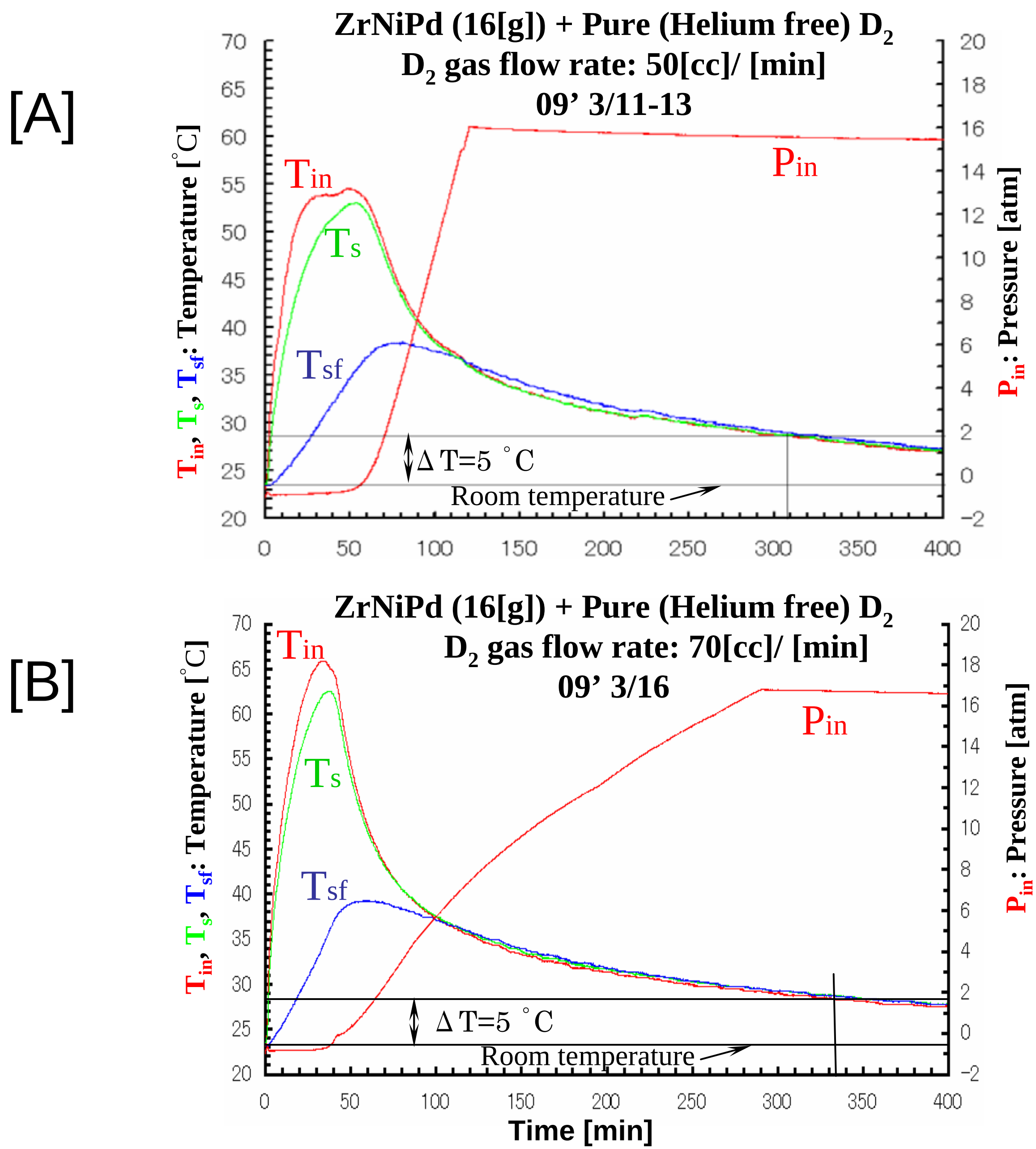
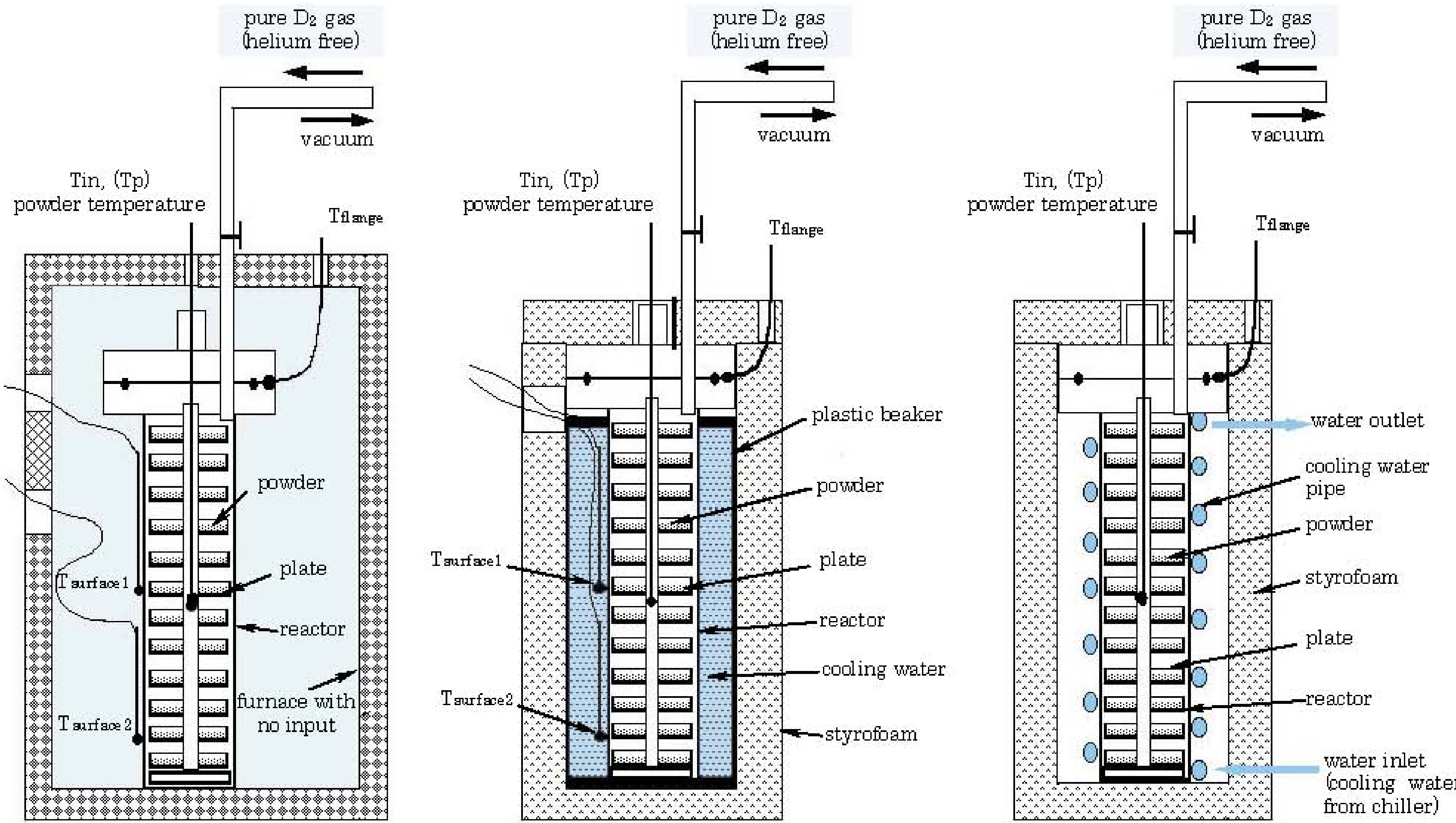


Fig.4 Distribution of temperature and pressure

Fig.5 Three kinds of cooling type during D_2 gas loading



Cooling type-1
cooling in air with shelter

Cooling type-2
cooling in water bath

Cooling type-3
cooling water using a chiller

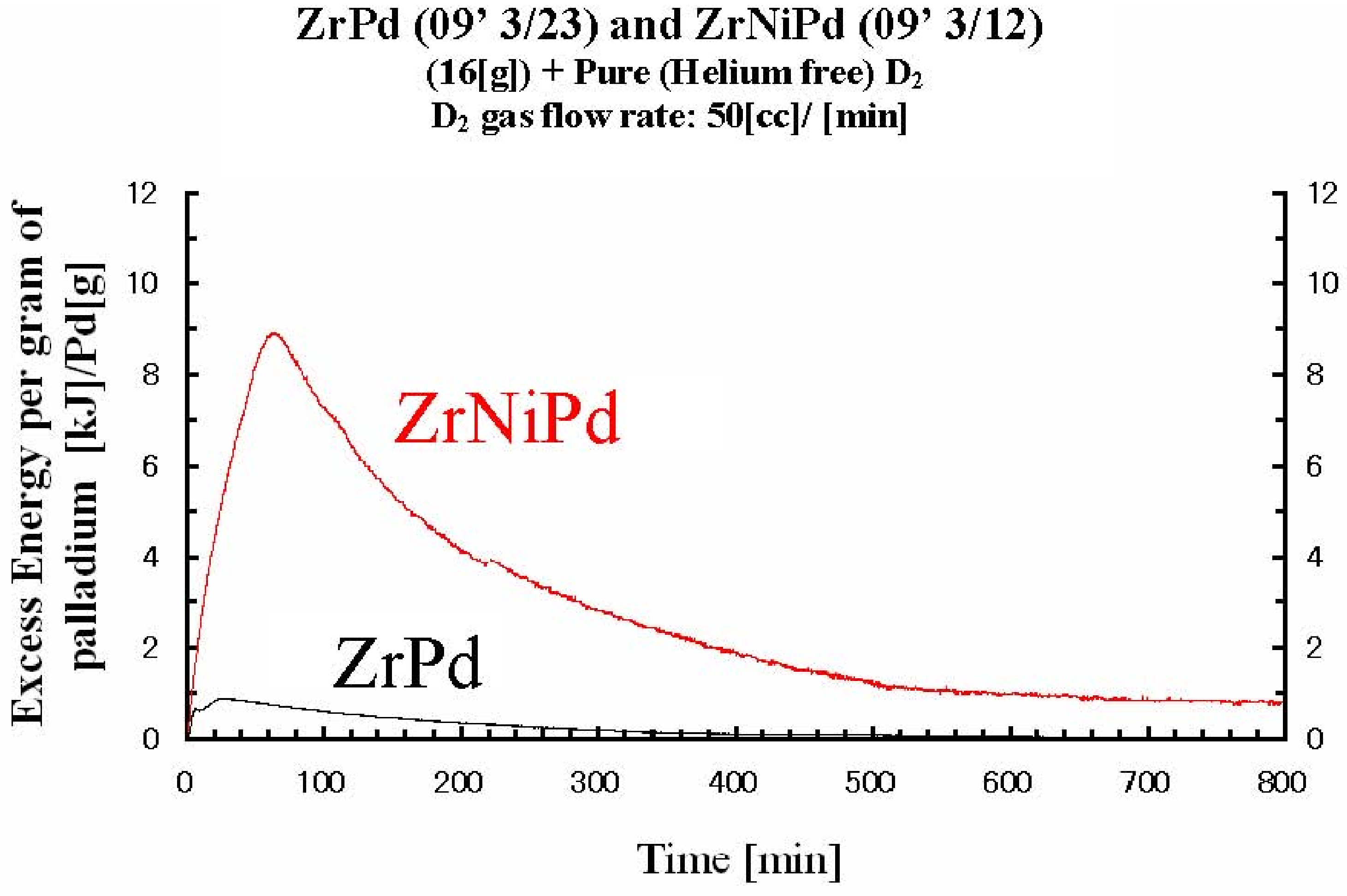

ZrPd (09' 3/23) and ZrNiPd (09' 3/12)
(16[g]) + Pure (Helium free) D2
D2 gas flow rate: 50[cc]/ [min]
Excess Energy per gram of palladium [kJ]/Pd[g]
Time [min]
ZrNiPd
ZrPd
0
2
4
6
8
10
12
0
100
200
300
400
500
600
700
800

Fig.6

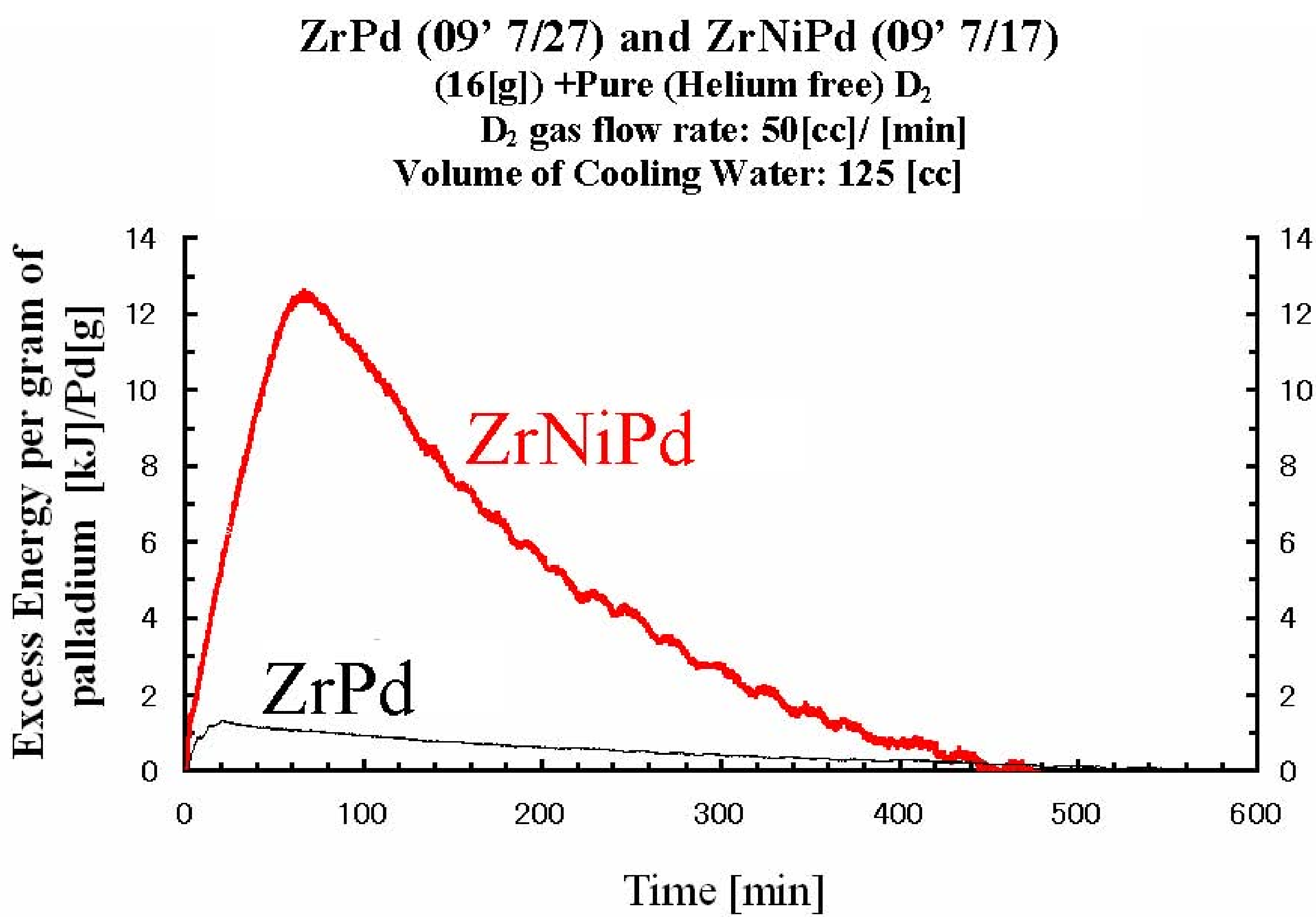

ZrPd (09' 7/27) and ZrNiPd (09' 7/17)
(16[g]) +Pure (Helium free) D2
D2 gas flow rate: 50[cc]/ [min]
Volume of Cooling Water: 125 [cc]
Excess Energy per gram of palladium [kJ]/Pd[g]
ZrNiPd
ZrPd
Time [min]
0
100
200
300
400
500
600
0
2
4
6
8
10
12
14

Fig.7

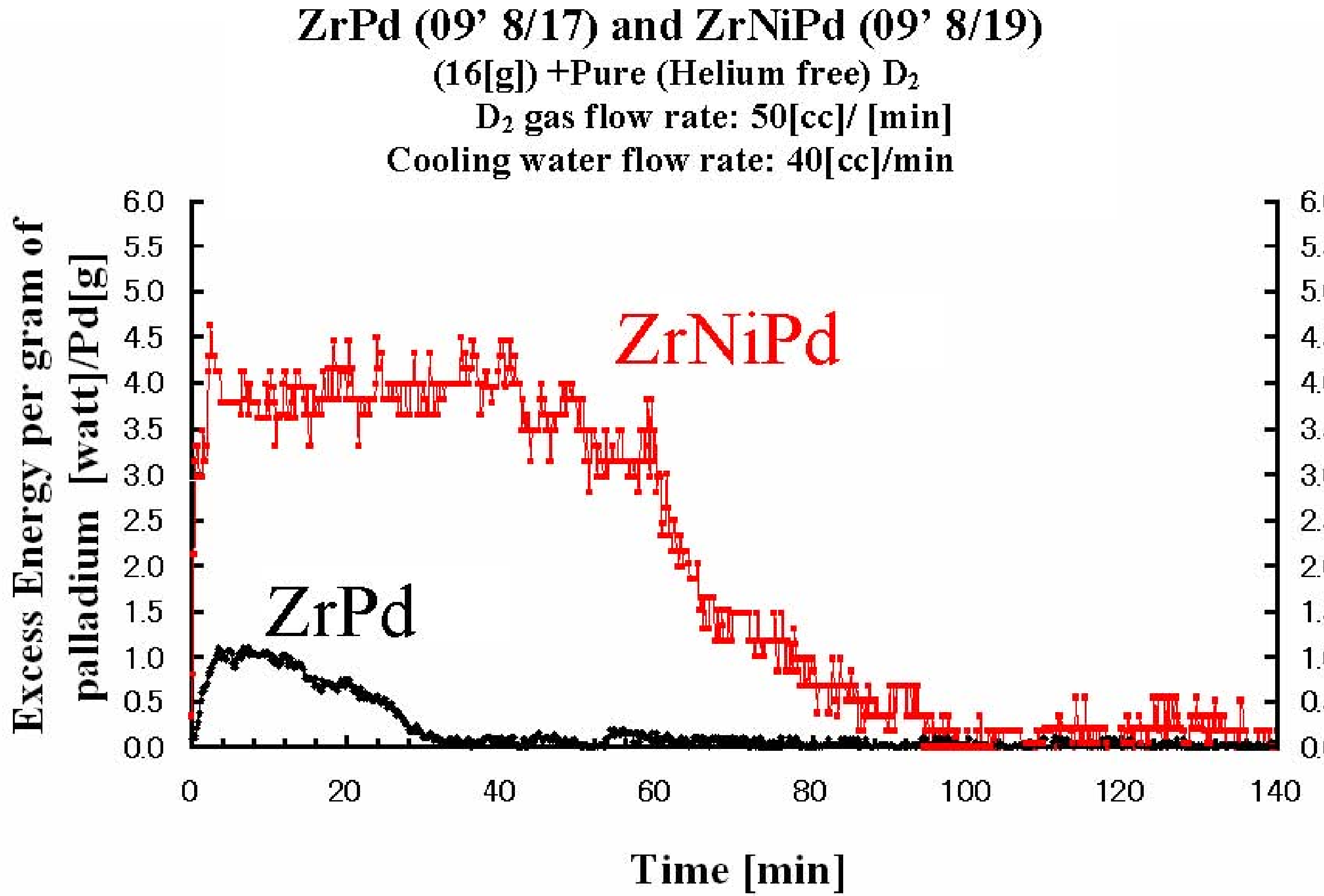
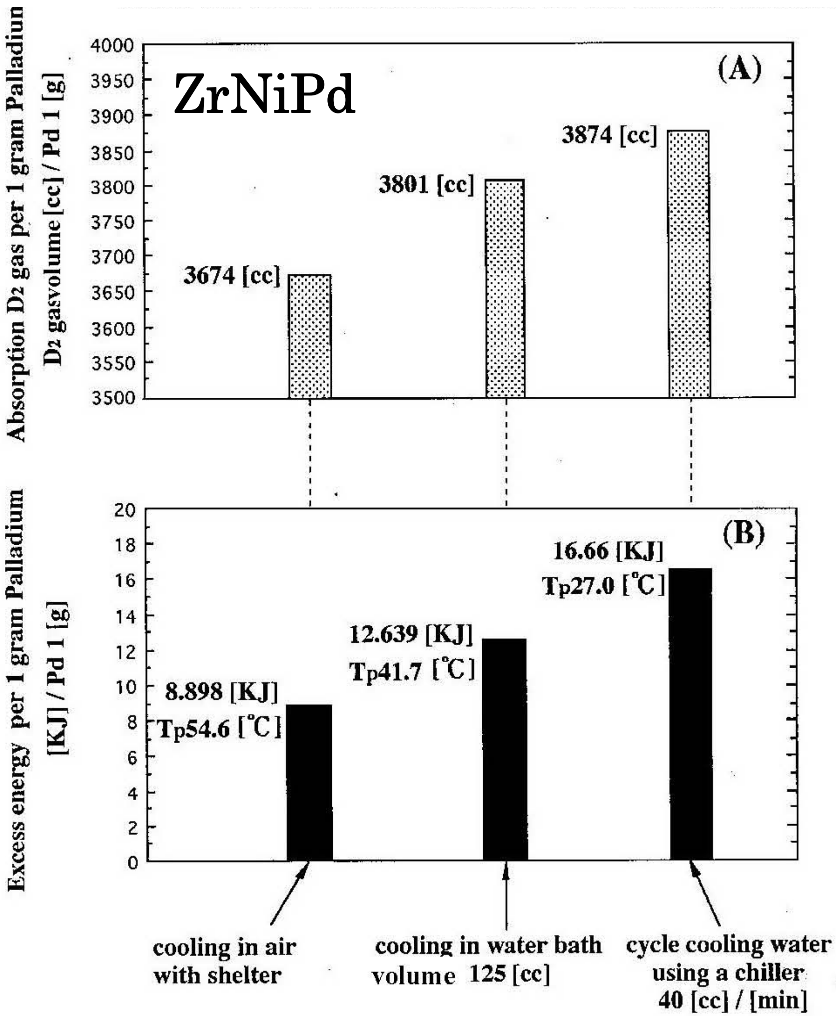
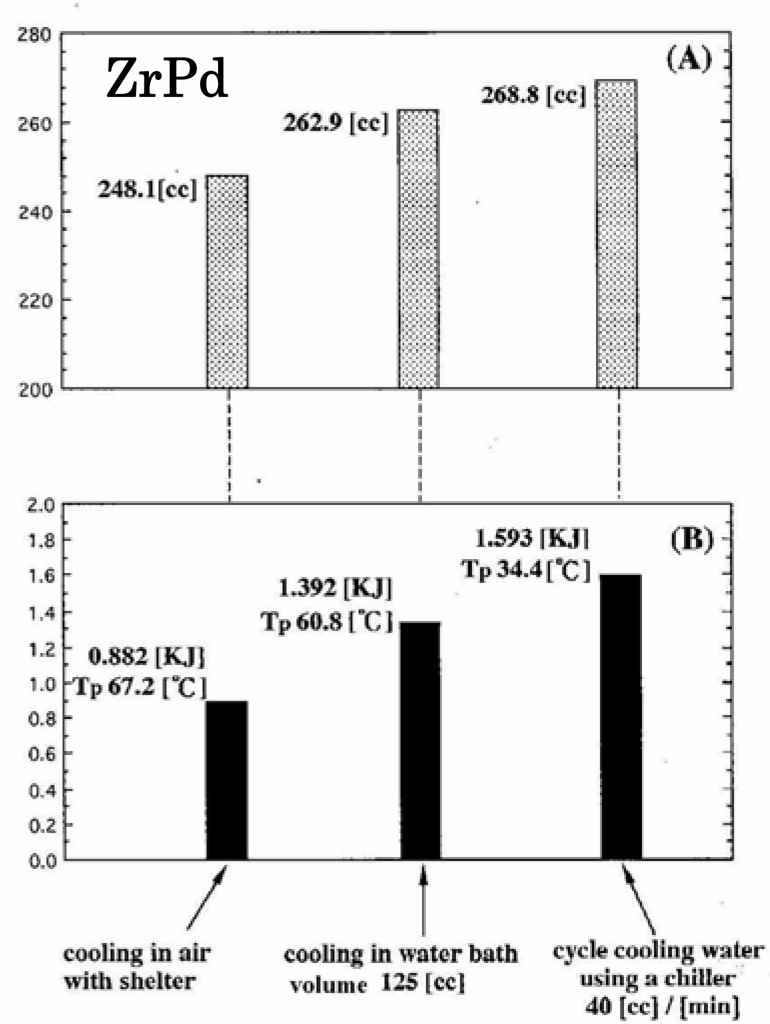

ZrPd (09' 8/17) and ZrNiPd (09' 8/19)
(16[g]) +Pure (Helium free) D2
D2 gas flow rate: 50[cc]/ [min]
Cooling water flow rate: 40[cc]/min
Excess Energy per gram of palladium [watt]/Pd[g]
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
ZrNiPd
ZrPd
0
20
40
60
80
100
120
140
Time [min]

Fig.8

Absorption volume of D_2 gas and excess energy of the powder (16[g]) during the pure D_2 gas loading under the same conditions except for the cooling condition.





T_p: powder temperature at the highest point during D_2 gas loading

Fig.9 ZrNiPd powder

Fig.10 ZrPd powder

Comparison of the absorbed D_2 gas volume and excess energy between ZrNiPd powder and ZrPd powder under different gas flow rate.

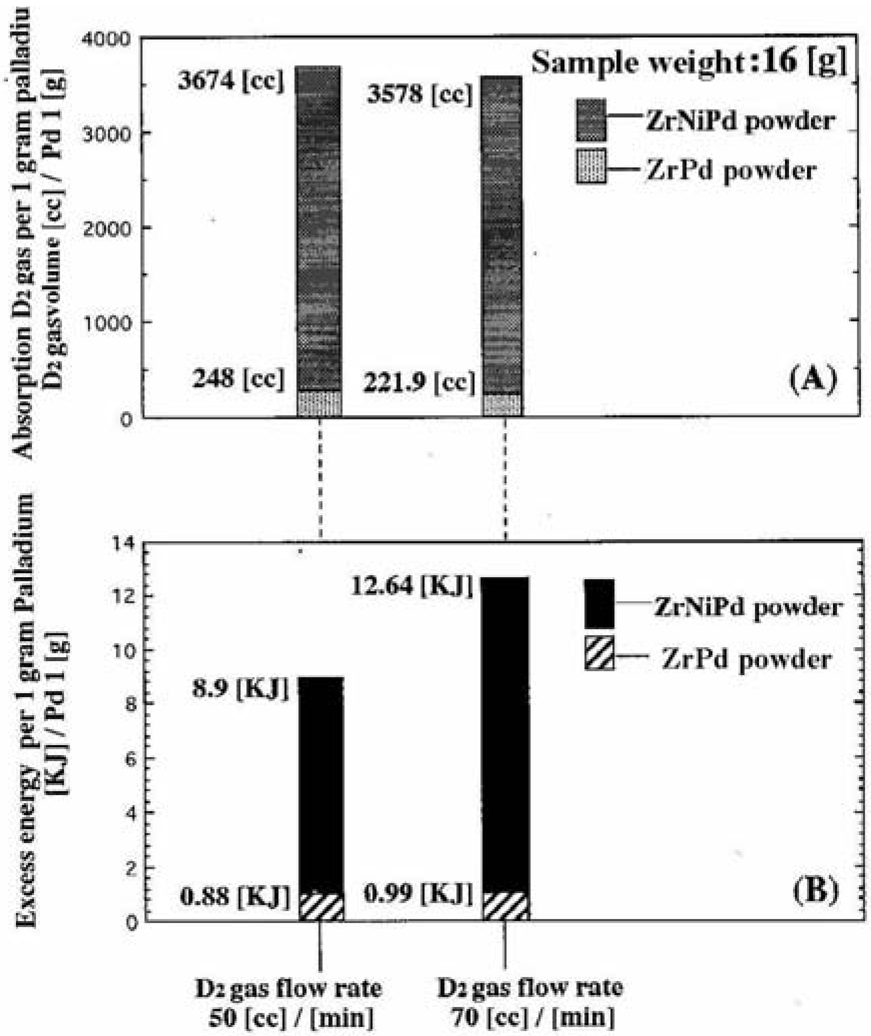
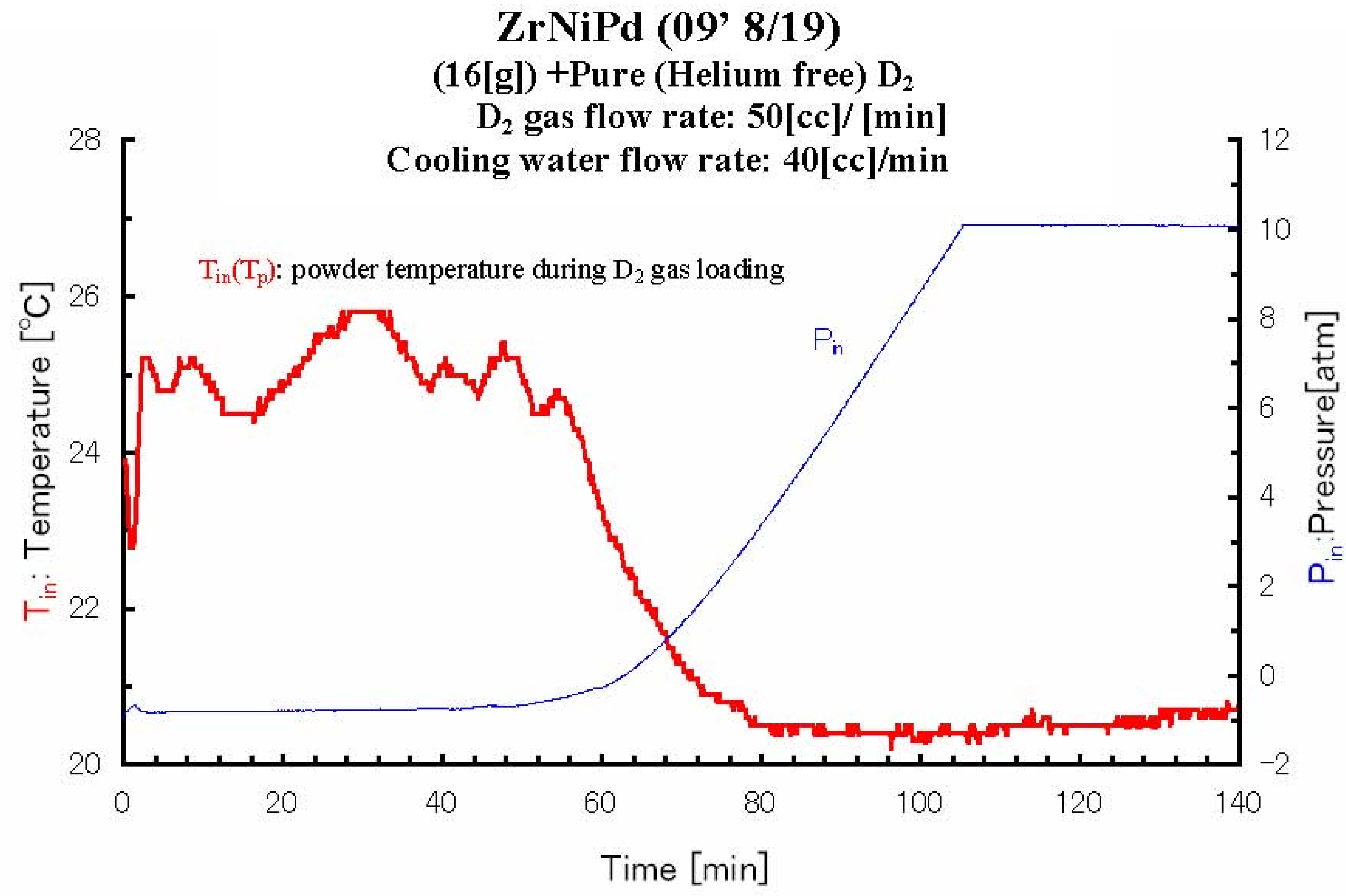
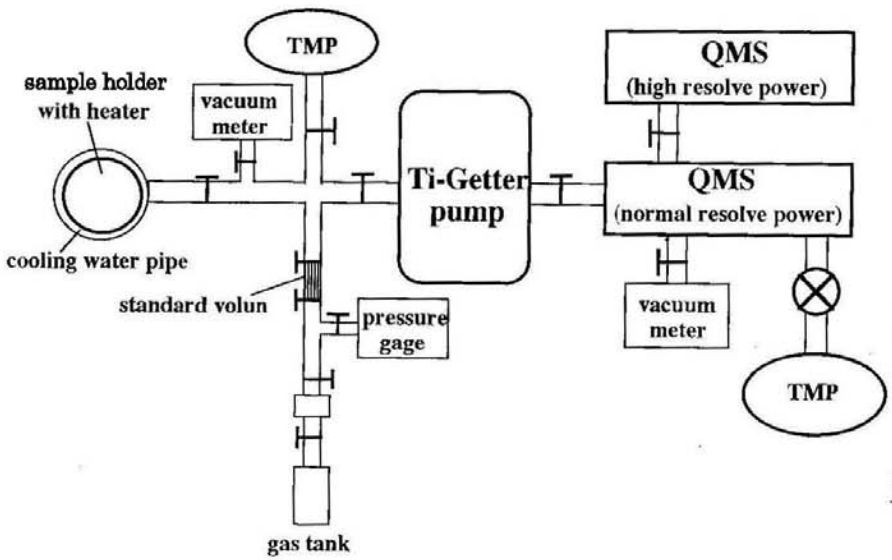


Fig.11



ZrNiPd (09' 8/19)
(16[g]) +Pure (Helium free) D2
D2 gas flow rate: 50[cc]/ [min]
Cooling water flow rate: 40[cc]/min
Tin(Tp): powder temperature during D2 gas loading
Pin
Tin: Temperature [°C]
Pin:Pressure[atm]
Time [min]
28
26
24
22
20
12
10
8
6
4
2
0
−2
0
20
40
60
80
100
120
140

Fig.12



Mass analysis apparatus - "QMS".

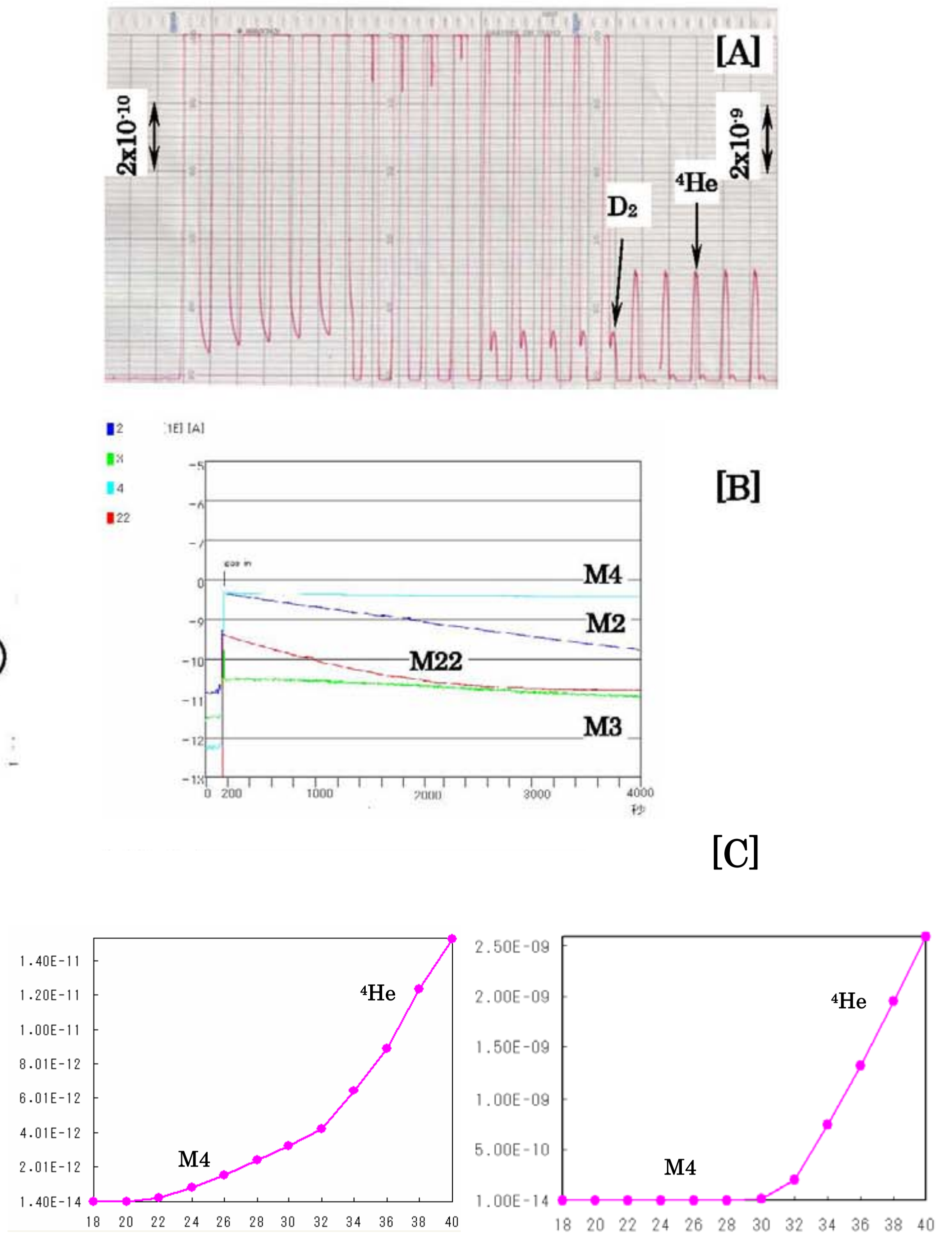


Fig.13

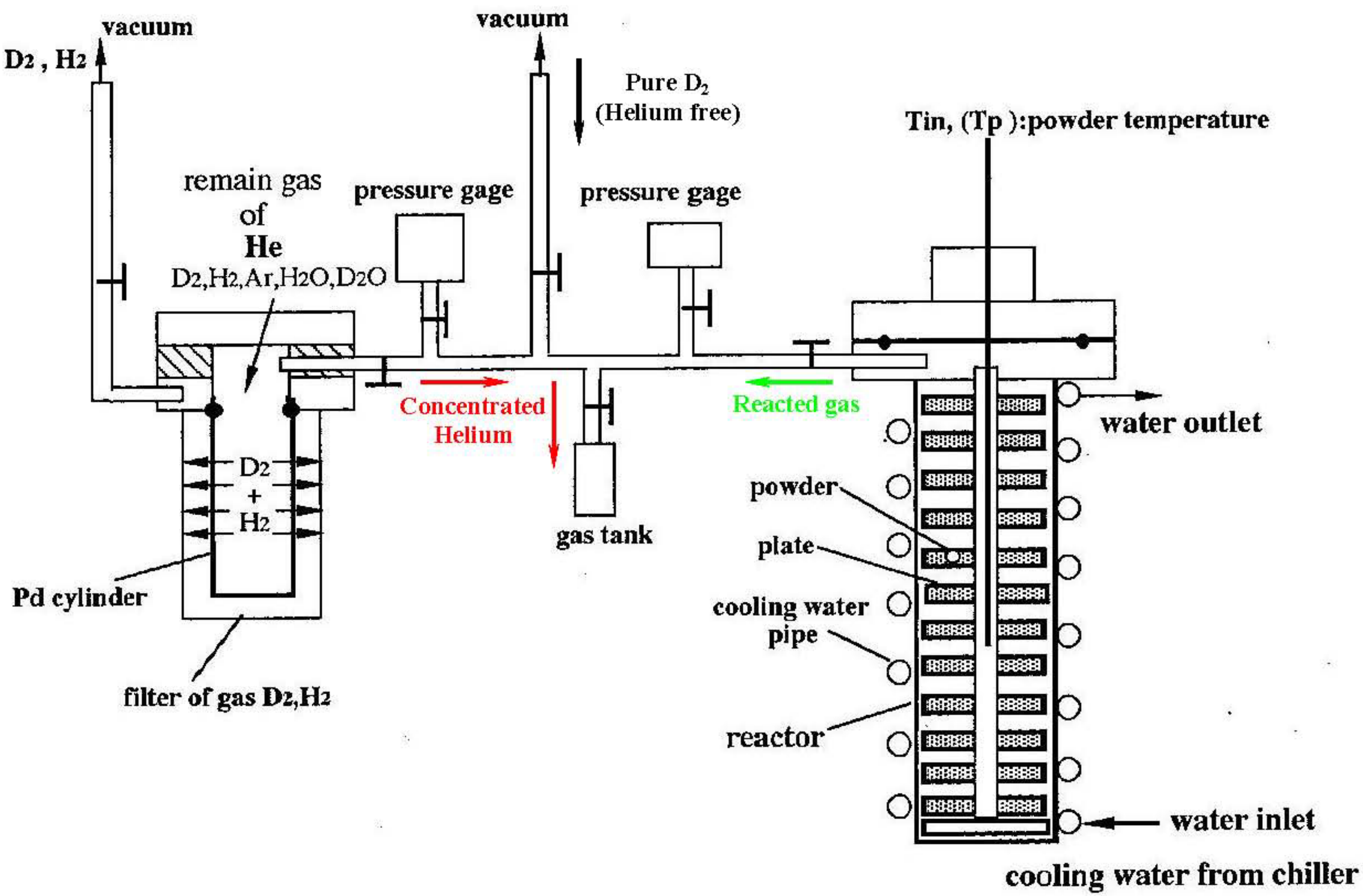


Fig.14 Concentration apparatus of Helium from reacted powders

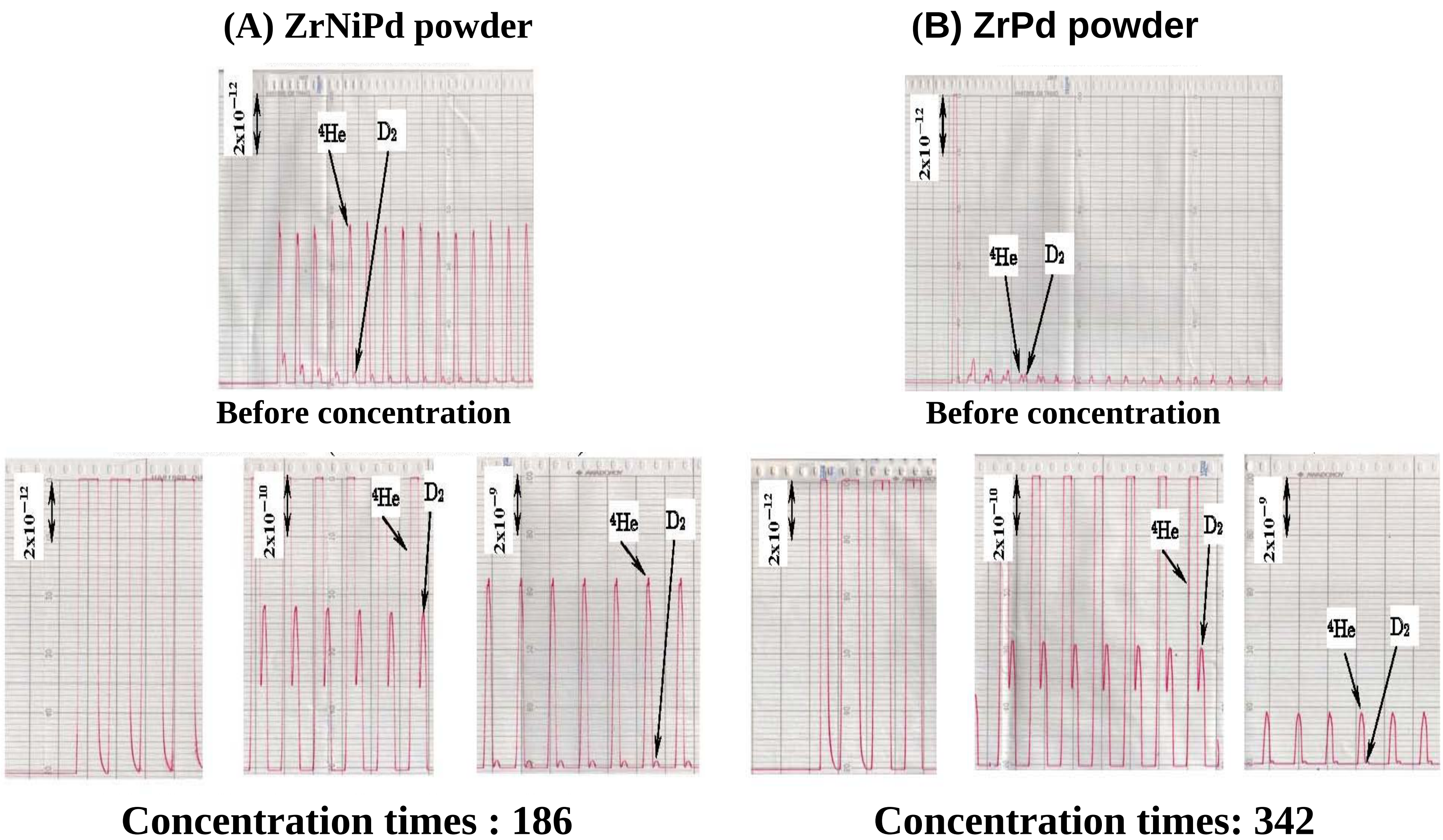


Fig.15 Spectrum of reaction products

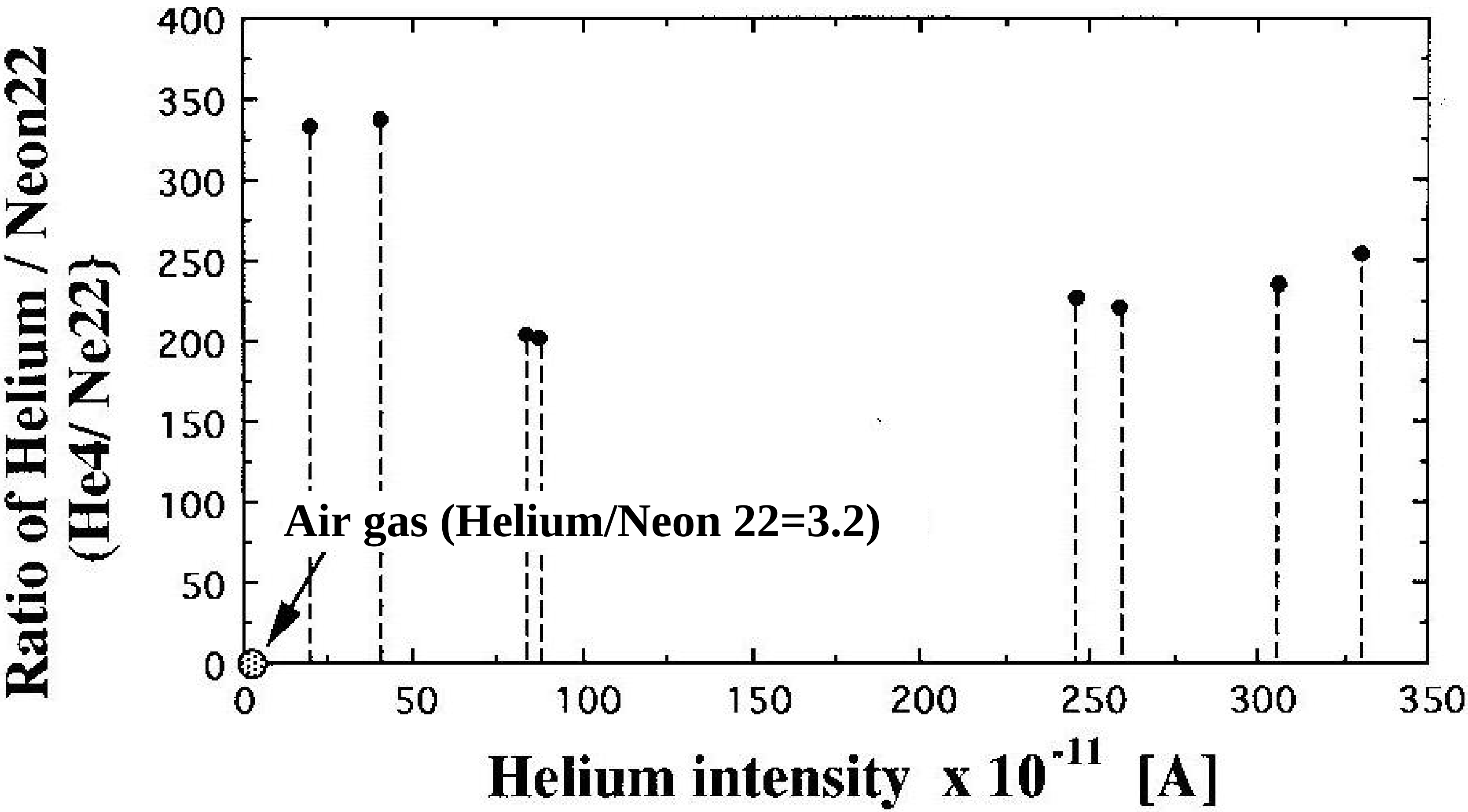


Fig.15C Helium intensity and the intensity ratio of Helium per Neon22 detected from reacted gas of ZrNiPd powder using "QMS"

Helium intensity relation to concentration Times with loading using cooling type-3

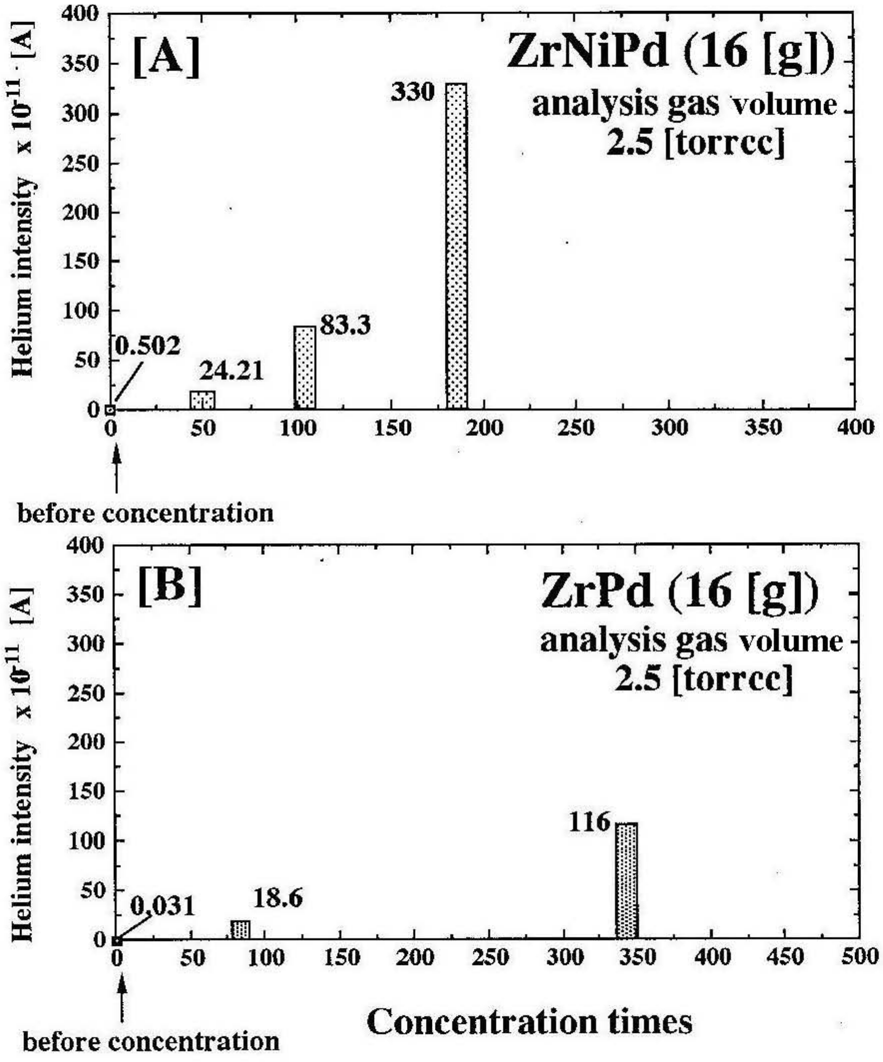
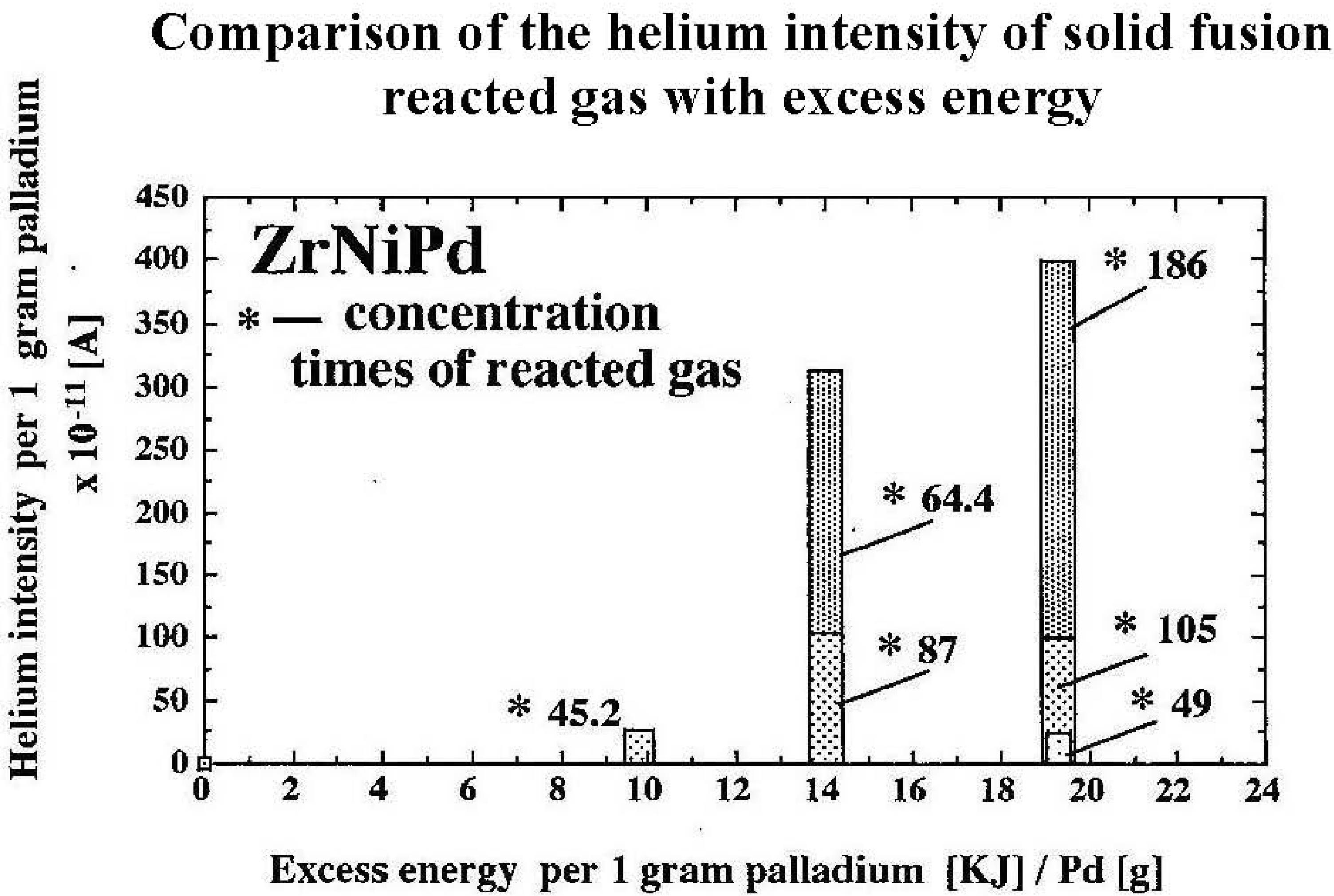


Fig.16



Comparison of the helium intensity of solid fusion reacted gas with excess energy
Helium intensity per 1 gram palladium x 10-11 [A]
ZrNiPd
* — concentration times of reacted gas
* 186
* 64.4
* 87
* 105
* 49
* 45.2
450
400
350
300
250
200
150
100
50
0
0
2
4
6
8
10
12
14
16
18
20
22
24
Excess energy per 1 gram palladium [KJ] / Pd [g]

Fig.17

- **Conclusion:**
- (1)Either excess energy or helium of the ZrNiPd powder is always about ten times higher than that of the ZrPd powder.
- (2)By using the weight 16 [g] of the ZrNiPd powder, the excess power 4 [watt] lasted stably for one hour, only less than one gram palladium was consumed. Its cost is lower than the ZrPd powder. We choose the ZrNiPd powder as a good material for the solid fusion.
- (3)The concentration of helium was very successful. These results indicate that the reacted gas of “solid nuclear fusion" can serve as a source of helium production.
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