

Real Time Measurements of the Energetic Charged Particles and the Loading Ratio (D/Pd)*

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ABSTRACT

A loading D₂ gas system was built, which can measure the gas pressure, the temperature, the loading ratio, the charged particles and burst, in real time. the charged particles and burst was searched and the reproduce condition was found preliminary.

1. Introduction

Since ICCC II, we have continued on measuring the energetic charged particles emitted from the deuterized palladium wire in a high pressure vessel. Measurement of charged particles possess distinctive advantages.⁽¹⁾The experimental arrangement has been developed into a real time measurement system, which can measure the temperature of vessel, the pressure of D₂ gas in vessel, the loading ratio (D/Pd), charged particles number and energy, and charged particles burst, continuously. (Fig.1). This development allows us to identify the charged products and the condition under which they are emitted.

2. Loading Ratio (D/Pd)

There are three methods to check the loading ratio, i.e. the electric resistance method, the volume-pressure method, and weight method in real-time measurement resistance method is the most convenient one.

Fig2⁽²⁾ shows the relationship between H₂ and D₂ content-loading ratio and relative resistance.

Fig 3⁽²⁾ shows the isothermal curves of Pd-H system, table 1 lists our experiment results.

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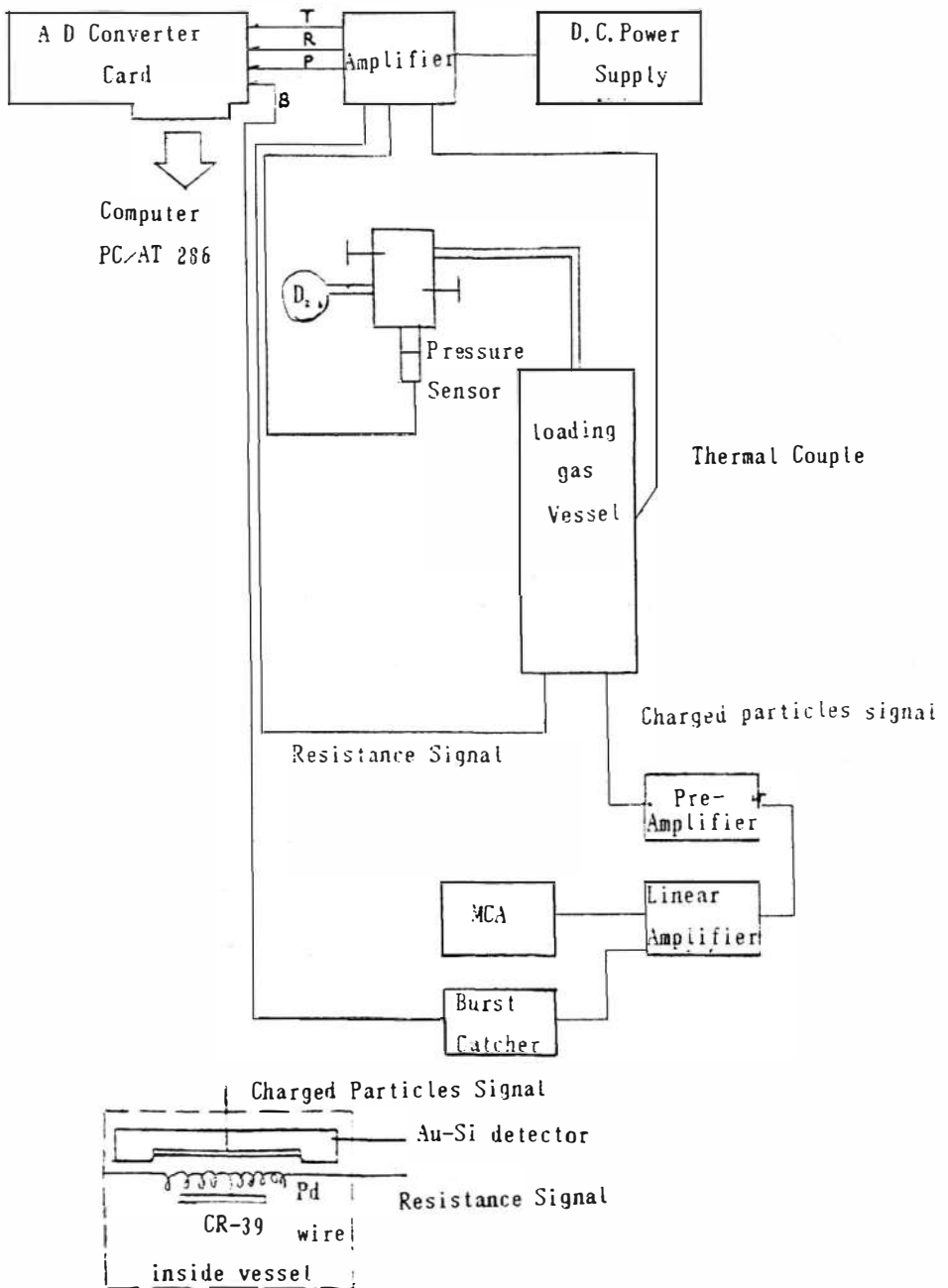


Fig 1. Experimental arrangement

Table 1. Loading Ratio Experiment Results

No.	Surface Treatment	Storing Time	$R_0(\Omega)$	Gas	Pressure (atm)	H/Pd	Loading Time hr.
1	Y	half year	8.15	H	9	0.74	16
2	N		21.47	H	6	0.85	75
3	Y	two days	20.96	H	20	0.89	<4.5
4	Y	five days	16.0	H	16	0.88	6
5	Y	fifteen days	9.2	D	19	0.74	7.5

Sample No.3 was weighted and compared with electric resistance. The results are listed in table 2.

Fig 2. Relationship between relative resistance and H_2 , D_2 loading ratio

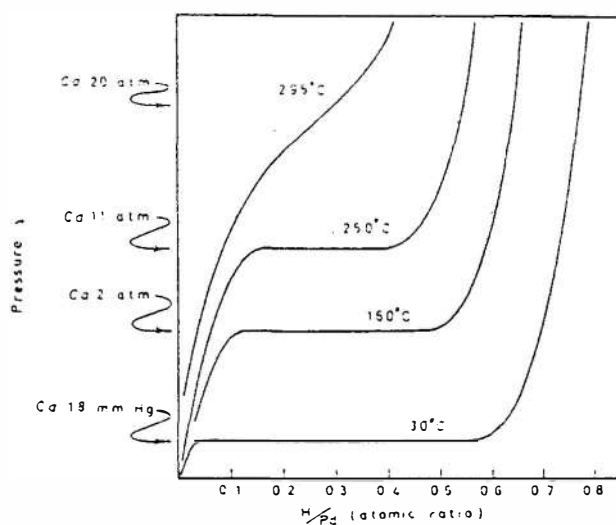
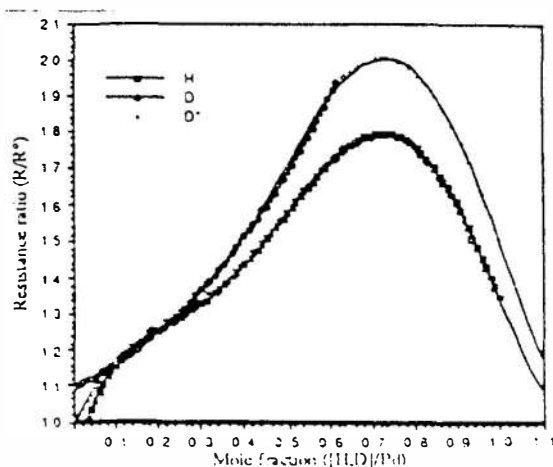


Fig 3.
 D_2 -Pd system isothermal curves

Table 2 The Loading Ratio Results of Weight Method

Before loading		After loading		Ratios	
Mass (mg)	Electric Resistanc Ro (Ω)	Mass (mg)	Electric Resistance R (Ω)	H/Pd	R/Ro
139.01	20.96	140.17	33.6	0.39	1.6

This result means that the loading ratio has acrosseed the peak of Fig2 curve and the result is coincident with electric resistance method. So it can be used to measure the loading ratio in real time.

The No.5 result tells us that the loading ratio 0.74 is obtained.

All of the experiment results is achievable the peak of the loading ratio curve.

3. Experimental results

In gas loading experiment, the emission of charged particles or neutron is connected to thermodynamic transformation taking place (in particular phase transformations), while the temperature of sample, the pressure of gas and related parameter are changing. ¹⁰

Temperature is an important parameter at our previous work ¹¹, temperature was changed from 77° K to 300° K. The results are positive. At this work temperature is changed only from 0° to 25°C based on Takahashi's experiments (~20°C) and the transform point of Pd-D system (~19°C). The charged particles bursts are observed at about 20°C, when vessel was vacuumed.

Table 3 Shows the results

Table 3 The experimental Results

No	T° K	P	R/Ro	Count of Bursts	Time duration min
1	237.1	tore	1.86	400	10
2	235.7	Vacuum	1.39	400	36
3	239.1		1.38	4200	120

4. Acknowledgements

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