



H-D mixed gas supply experiments using the non-evaporable getter alloy St172 and analysis of D-T burning experiment 2015



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Background of the research

Trying to Use D-T fusion reaction in IECF

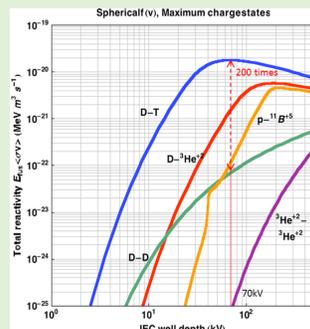
The reasons

- Increase of the neutron production rate in IECF
- the reaction cross-section of D-T is **200 times** as large as that of D-D(at about 70kV)

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Use of Getter Pump

Purpose of research

Characteristics of the Zr-V-Fe non-evaporable getter alloy St172 with regards to hydrogen isotope



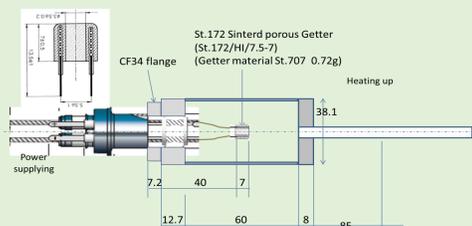
Getter Pump

Operation

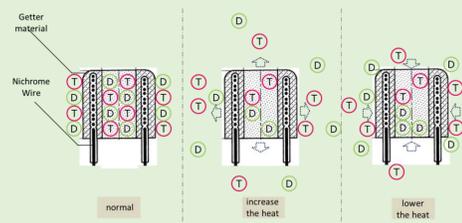
Controlling the **temperature** (200°C~900°C) of the Getter by heating current.

Temperature operation of Getter

- Increase the heat(400°C~700°C)
Getter releases only hydrogen isotope.
- Lower the heat(~400°C)
Getter absorbs most activated gas.
- Activation(800~900°C)



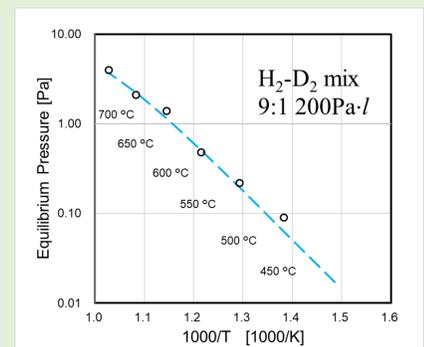
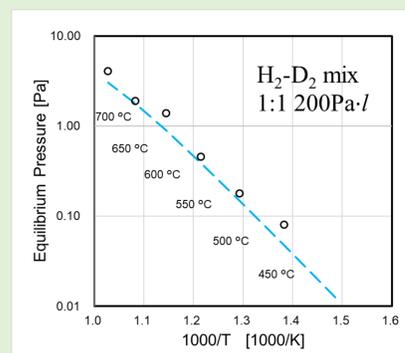
Getter pump schematic



Getter pump operation

Experimental results

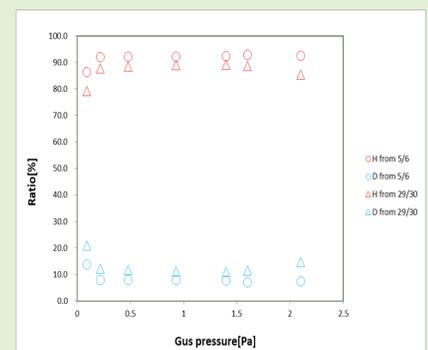
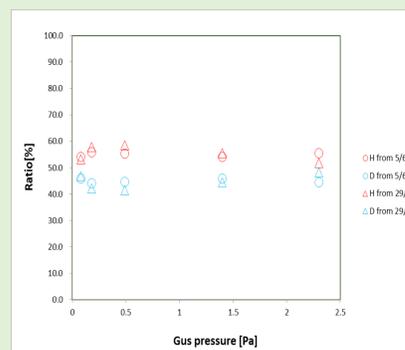
Supply experiment with H-D mixed gas (1:1)and(9:1)



These graphs are experimental results of hydrogen isotope gas supply at each ratio.

In these graphs

- Dotted lines are graphs of the empirical formula, and points are experimental results(CP).
- Decide the amount of gas by back calculation from the kinetic isotope effect.
- We can see that the hydrogen isotope is not independent within the getter.



These graphs are experimental results of hydrogen isotope gas supply at abundance ratio.

In these graphs

- When obtaining the hydrogen isotopic abundance ratio using the analog scan data of QMS, the ratio of H-D could be obtained from the ion current value corresponding to $m/z = 5, 6$ and $m/z = 29, 30$.
- It is possible to freely control the gas abundance ratio from the kinetic isotope effect.

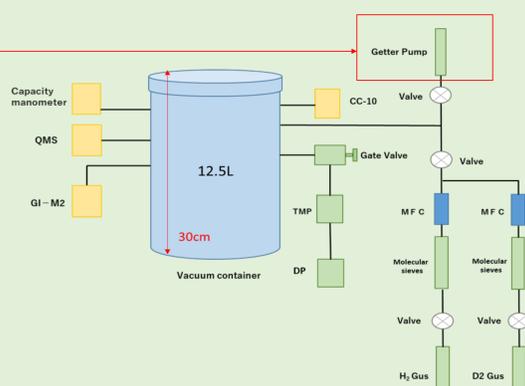
Experimental equipment



Getter Alloy St172



Getter pump



Equipment for gas analysis

- This device is used to research the characteristics of Getter with regards to hydrogen isotope.
- The pressure in the vacuum chamber is measured by four measurement hardware (QMS,IG,CC-10,CP).

Future plans

Based on the results of previous experiments, we will analyze the D-T burning experiment in 2015.

If the result of the analysis is good, a new D-T burning experiment is started.

And continue H-D mixed gas experiment.