US-Japan IEC Workshop
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D-T Burning in IECF

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INTRODUCTION

The D-T burning project has been funded by JSPS KAKENHI (Grant Number 25289340) for three years from April, 2013 to March 2016.

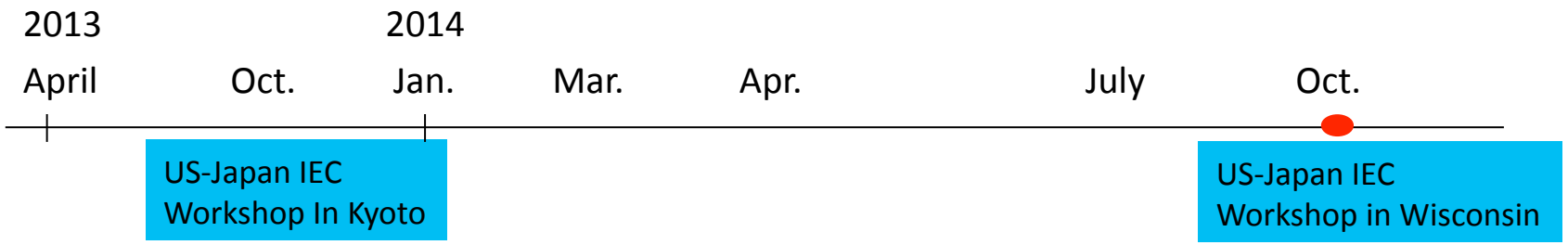
The present study and progress after the last workshop is reviewed.

The project is organized by seven universities.

Collaboration

Institution	Main Tasks	Collaborators
(1) Kansai Univ. Faculty of Engineering Science	Supervision IEC construction and experiment	M.Ohnishi Y. Yamamoto H. Osawa
(2) Kyoto Univ. IAE	Design and manufacture of the IEC device	K. Masuda
(3) Kyoto Univ. RRI	Measurement of 14 MeV neutrons	T. Misawa
(4) Osaka Univ. Subcritical Assembly Laboratory	Host of Exp. site and safety issue	I. Murata
(5) Toyama Univ. Hydrogen Isotope Research Center	Tritium handling and supply of Tritium	Y. Hatano
(6) Tokyo Institute of Technology	Control and operation of closed device	E. Hotta
(7) Kyushu Univ.	Adviser	M. Nishikawa

Time Schedule(delayed)



Funded by 'JSPS'

Moved to Osaka Univ.

Facility construction

D-D operation
low level NP

D-D operation
Remote control
Tritium recovery

Transfer tritium
from Toyama

D-T Campaign (1)
NP<10^{7-8}(1/s)

D-T Campaign (2)
NP=10^{9-10}(1/s)

D-T Campaign (3)
Studies of Neutron Radiography,
Selective measurement of 14MeV neutrons,
Fusion reactor blanket

Difference between D-D and D-T experiments

	D-D	D-T
Neutron Production (1/s)	$< 10^7$	$> 10^9$
Neutron Energy	2.45 MeV	14.1 MeV

⇒ **Thicker concrete wall for shielding**

Tritium Safety	Open to the air	Closed against the environment
Tritium recovery after shut down	-	Recovery of gaseous tritium (water bubbler)

⇒ **The facility must meat the strict regulation for the tritium safety.**
A gaseous tritium larger than 70 Bq/cc cannot be released to the air.
A monitoring system for the tritium should be equipped.

Drawing of the IEC device for D-T burning

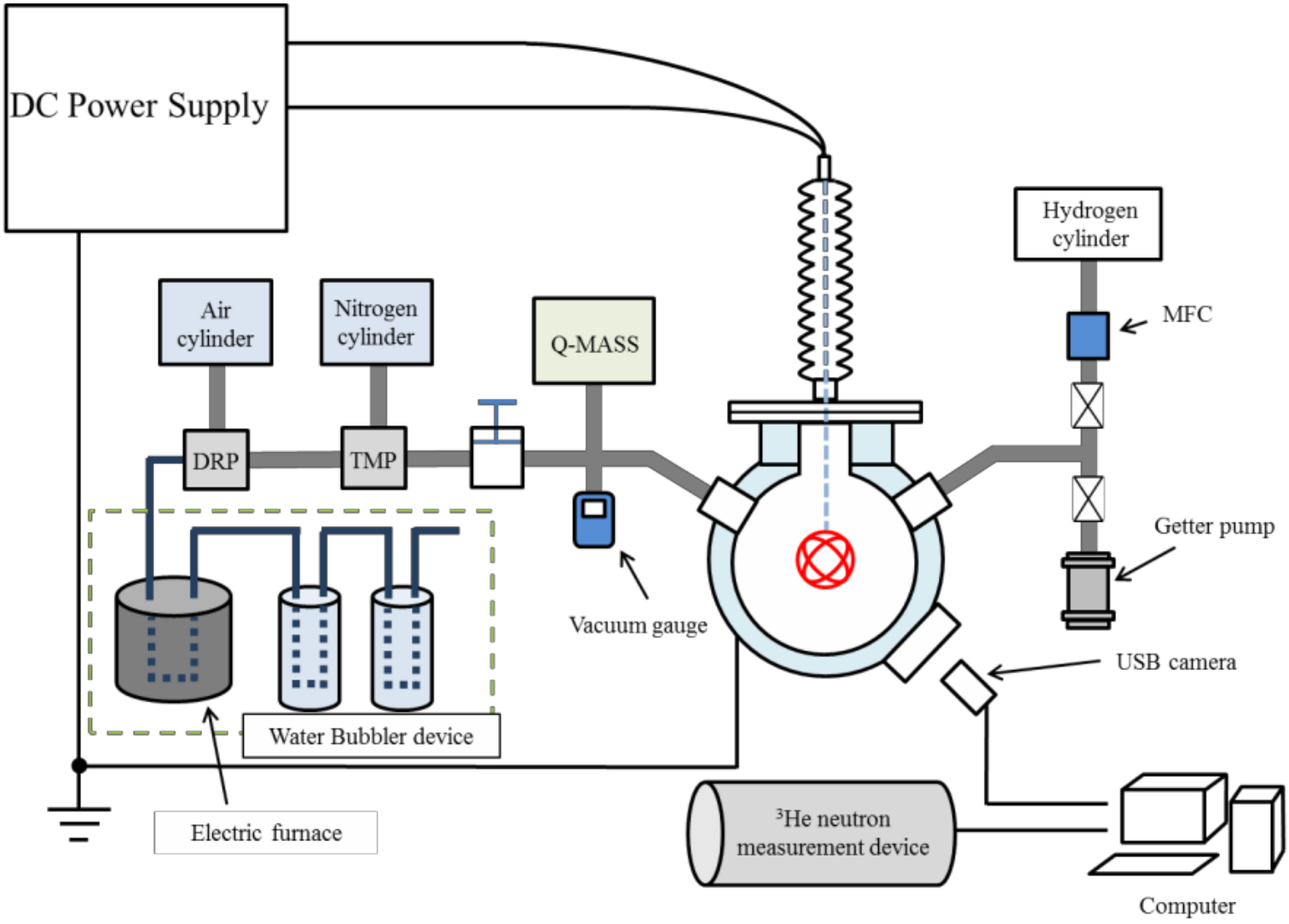


Photo of D-T IECF in the heavy irradiation laboratory

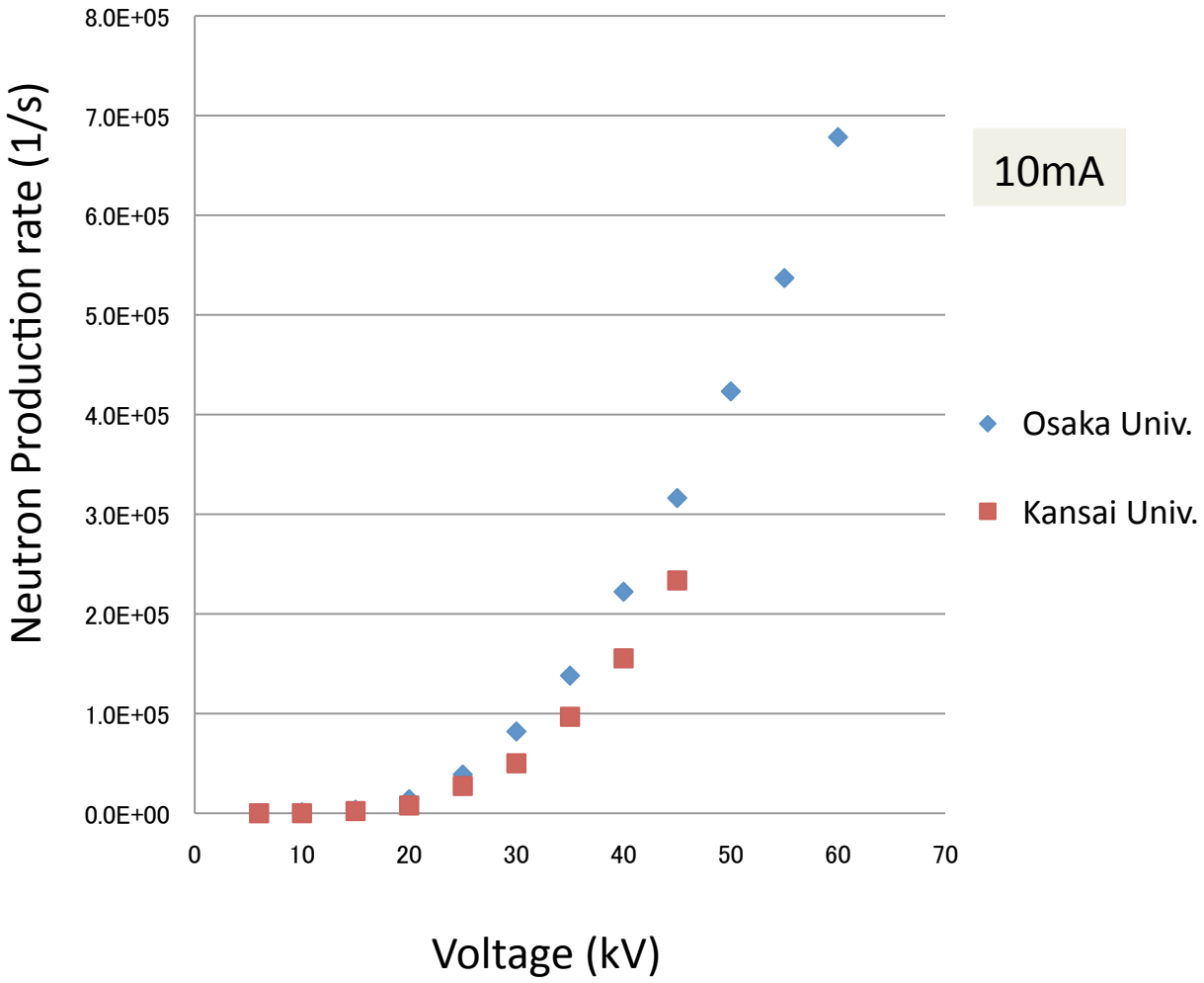
(1) *Y. Yamamoto, et al.,* **"Prepare for the D-T Burning in IECF "**

Relocation and modification of the device, remote operation system, and the tritium handling system using getter pump

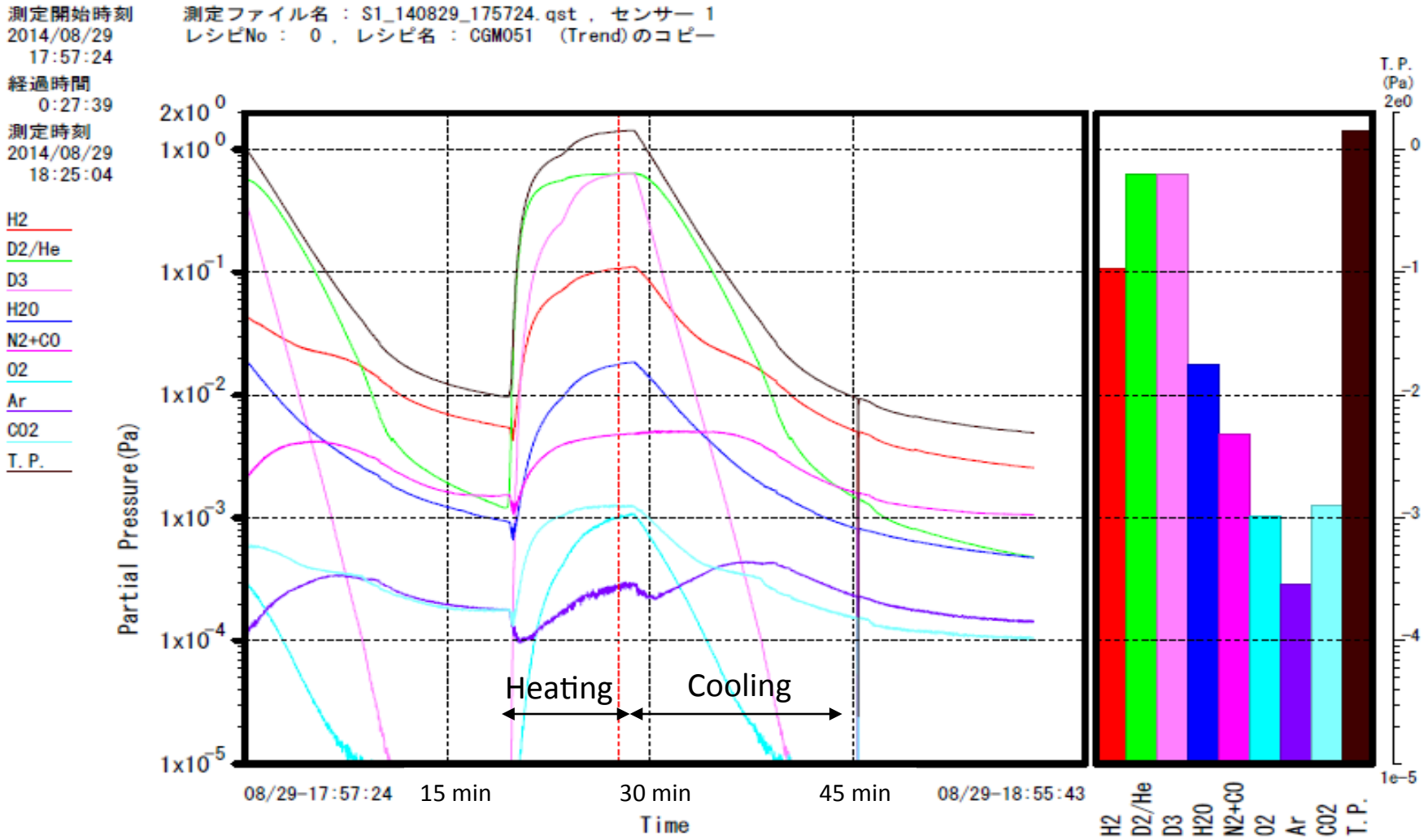
(2) *H. Konda, et al.,* "**Deuterium/Tritium and Exhaust System Using Non-evaporation Getter Material**"

Characteristics of feeding the hydrogen isotope into the vacuum chamber by getter pump. The getter pump absorbs 99% of the D-T gas in vacuum chamber.

Neutron Production by D-D Gas



Gas pressure control by getter pump



(3) *K. Miyamoto, et al.,* ” **Decontamination of Tritium from exhaust gas of IECF device** ”

The residual tritium gas in the vacuum chamber after the getter pumping is removed by the oxidization with CuO and the water bubbler.
The gaseous tritium can be much less than 70 Bq/cc in the exhaust gas.

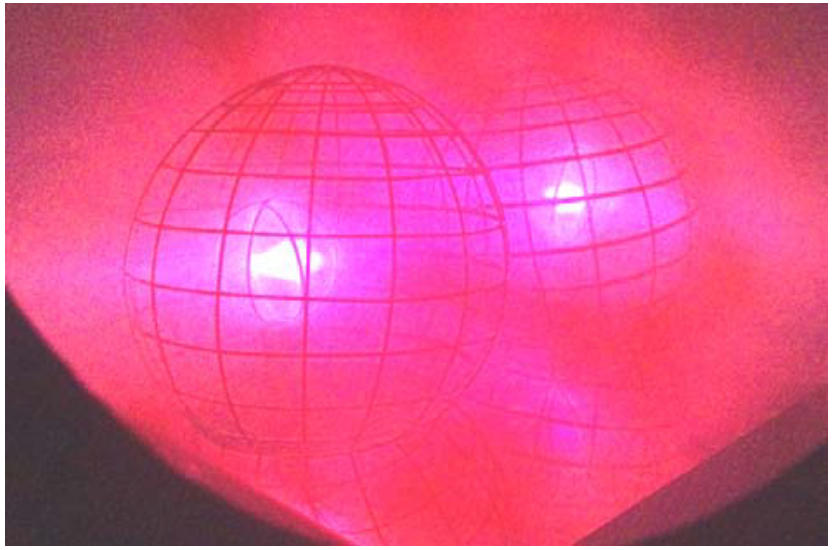
Issues for D-T burning

- Gas pressure setting by getter pump needs the precise control of the temperature of the getter material.
- The D-T mixture control should be required. But, the release of the gas from the getter material depends upon the each pressure of the hydrogen isotopes in the chamber.

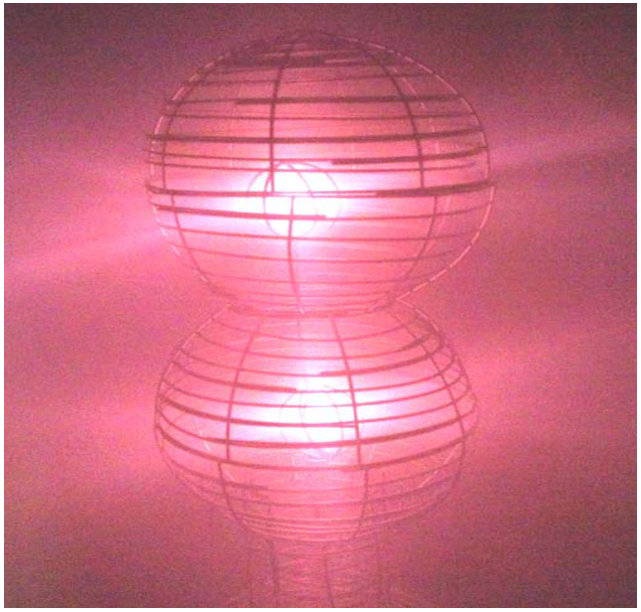
The other activities in the Kansai University:

(4) *H. Osawa, et al.,* " **The parallel running of multiple IECF devices** "

(5) *Y. Kawahira, et al.,* "**Discharge characteristics of multiple IEC device**"



Double IECF in parallel operation



Double IECF in series operation