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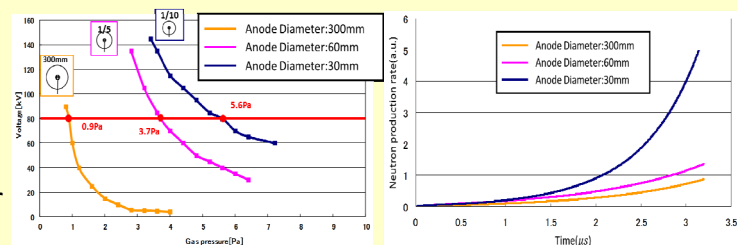
Discharge characteristics of multiple IEC device

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Motivation

IECF has possibility to use non-destructive testing and etc. However, it is not enough quantity of neutron to use. The Kansai U. s' PIC simulation results showed that electric discharge properties and neutron is improved by using the smaller anode and cathode. To increase the neutron, smaller IECF device is made and try multiple smaller IECF.

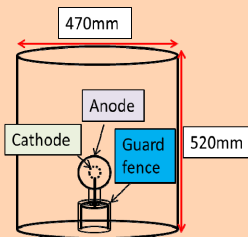


PIC simulation

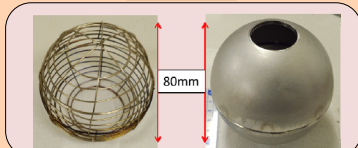
IECF Device

Single

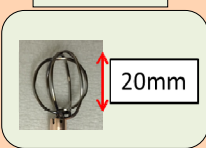
Anode and guard fence are made stainless wire. Cathode is made by molybdenum. Guard fence is made to defend electric discharge between the feed through and the inner wall of vacuum chamber.



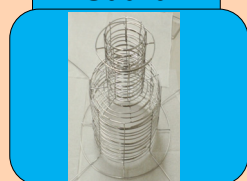
Anode



Cathode

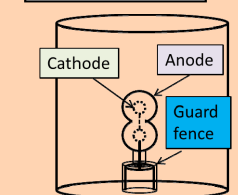


Guard

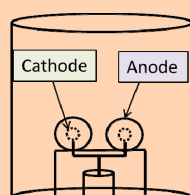
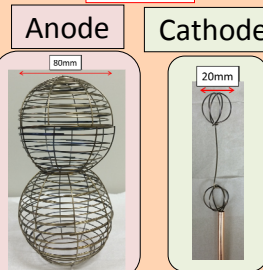


Inside of the vacuum chamber

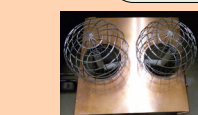
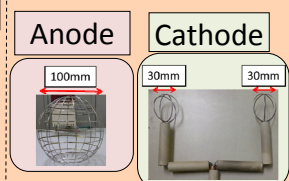
Double



Vertical



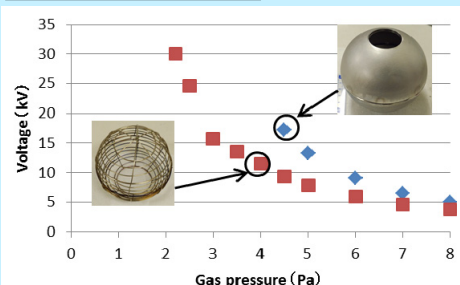
Horizontal



Inside of the vacuum chamber(Horizontal)

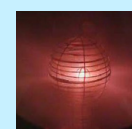
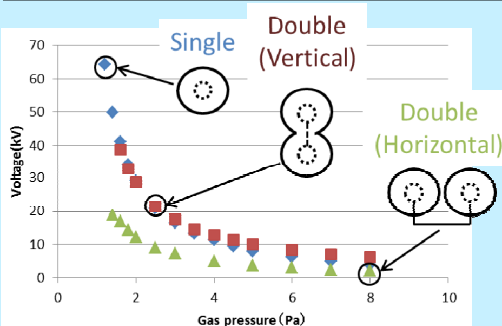
Results

Hydrogen gas 5mA



Changing the mesh density, the electric discharge can be controlled. Best neutron production rate can be found by testing many different anode mesh density of discharge characteristic.

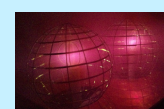
Hydrogen gas Single:5mA Double:10mA



Single 8Pa 4.4kV



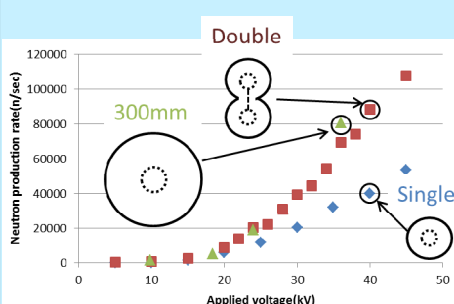
Double (Vertical) 8Pa 5.6kV



Double (Horizontal) 5Pa 3.4kV

Multiple IEC device is harder to stable discharge in high voltage

Deuterium Gas Single,300mm:5mA Double:10mA



	Gas pressure (Pa)	Voltage (kV)	Neutron production rate (n/sec)
Single 300mm IECF	0.8	36	1.0×10^5
Single small IECF	2.4	35	3.2×10^4
Double IECF	2.4	36	6.9×10^4

Double (vertical) IEC device can get twice quantity of neutron than Single small IECF.

Future Plan

Using the more IECF devices

Optimization of mesh density of Anode