VIBA (Versatile Ion Beam Accelerator)

The Current Status and Future Plans of Versatile Ion Beam Accelerator Facility

KBSI-Busan Center

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I–1. VIBA history & layout

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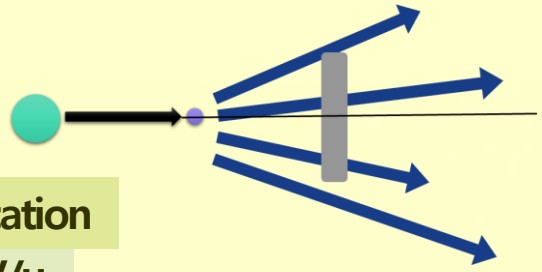
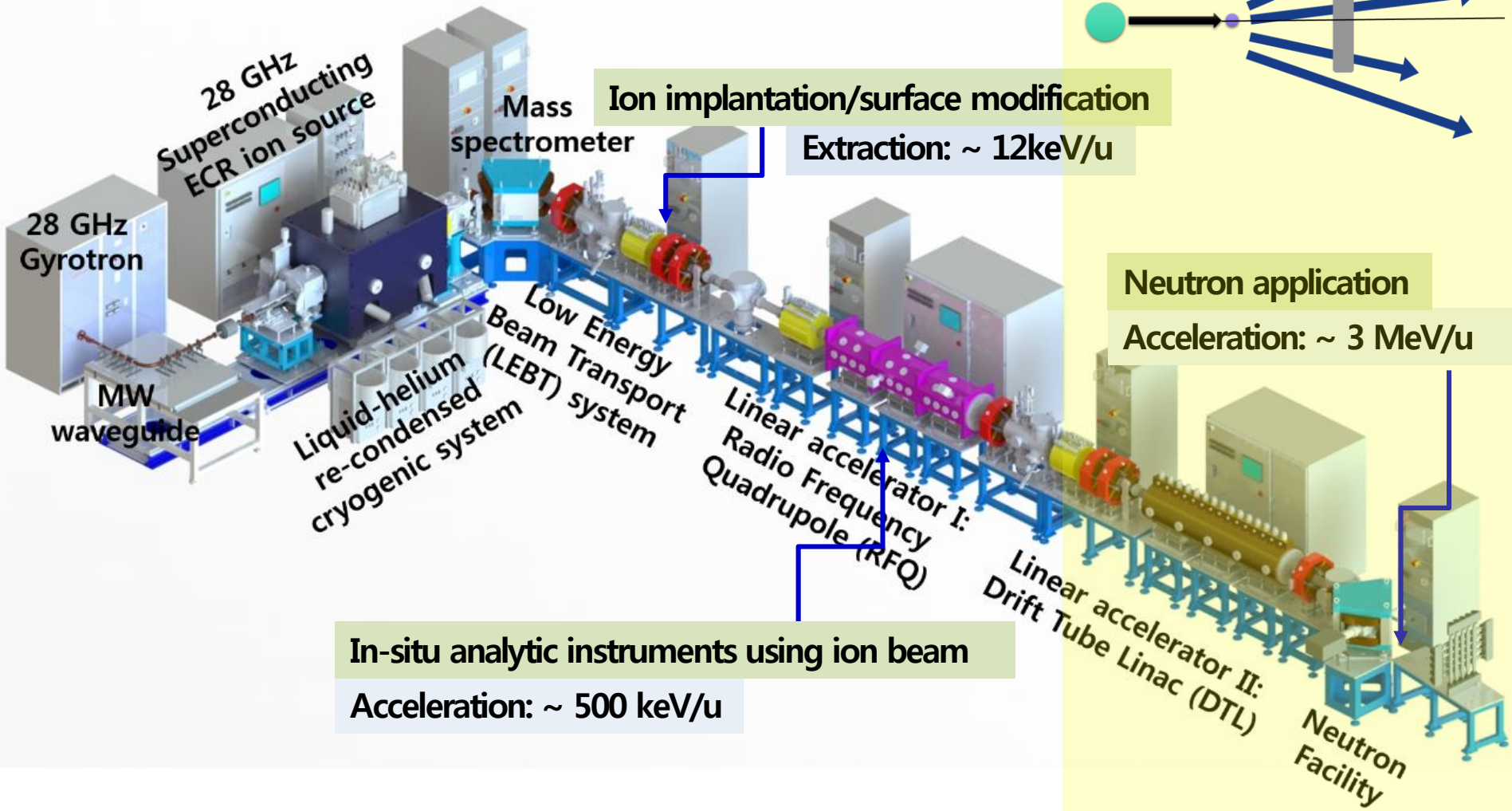
VIBA (Versatile Ion Beam Accelerator)

- **VIBA had been developed since 2009**

Inverse kinematics for neutron generation





Ion implantation/surface modification

Extraction: ~ 12keV/u

Neutron application

Acceleration: ~ 3 MeV/u

In-situ analytic instruments using ion beam

Acceleration: ~ 500 keV/u

I–2. VIBA history & installation

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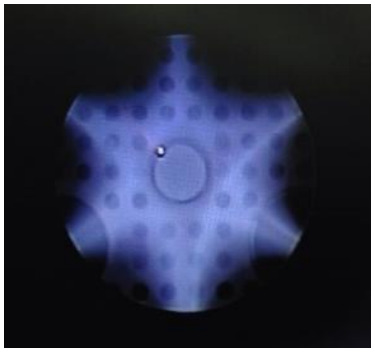
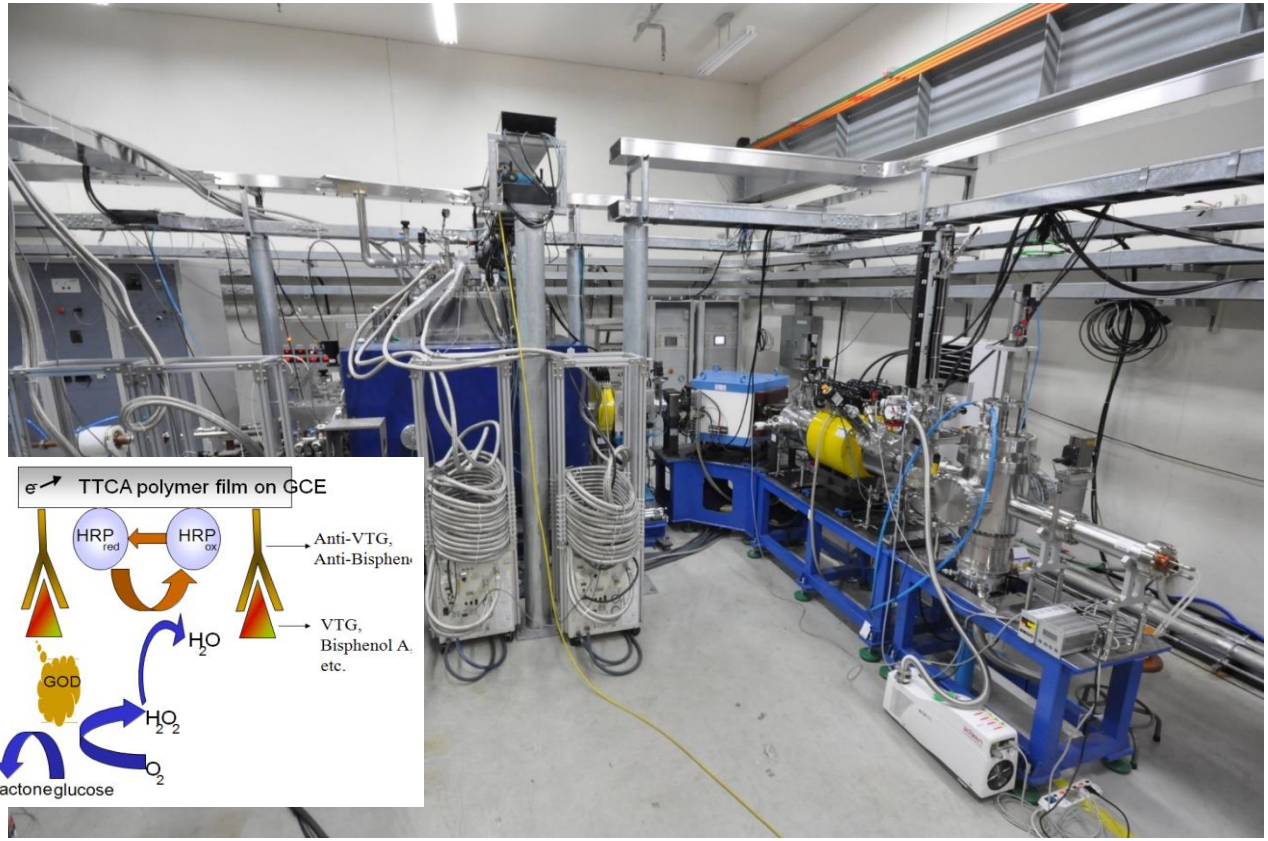
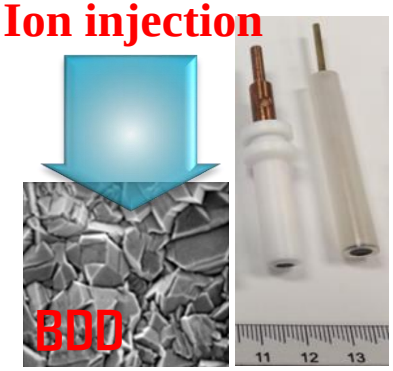
VIBA (Versatile Ion Beam Accelerator)

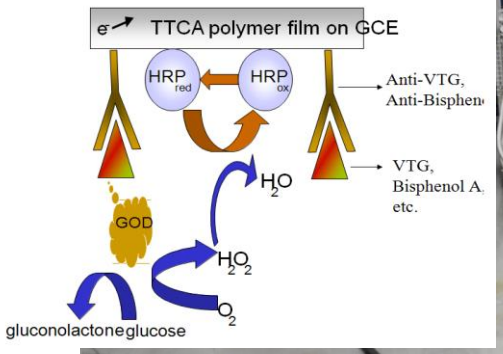
- The first plasma of 28GHz ECR ion source had been ignited in 2014
- In 2015, we had opened for feasibility study and service to several users.
- We had started overhaul for maintenance of Cryocooler, upgrade control system, changed focusing magnet and so on.





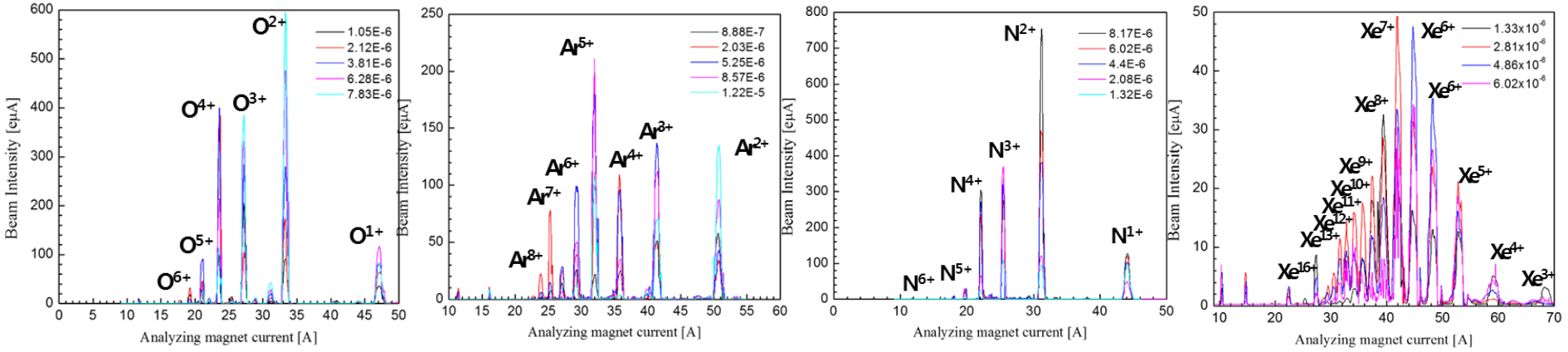
Ion injection





I–3. VIBA beam current in 2015

Microwave Power =1 kW Binj= 2.3 T , Br= 1.1 T , Bext= 2 T, 13 kV



Injection Ions	Energy(keV)	Current(euA)	Dose(#/CM^2)
N	20~52	100~380	2.77E+16~1.05E+17
O	30~60	70~360	1.55E+16~8.24E+16
He	20	160~185	6.64E+16~7.67E+16
Ar	40~78	90~180	2.49E+16~3.46E+16

I–4. Purpose of VIBA

ECR IS + RFQ : Wide ragne of Ion beam irradiation

SIMS: Surface analysis after ion beam process

Aim: One-stop Ion beam facilities and analysis platform for supporting Industry, Academia, Institution

XPS: Surface analysis after ion beam process

TEM: Structural analysis after ion beam process

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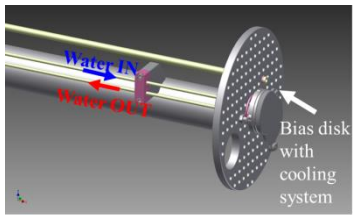
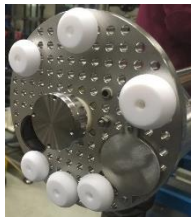
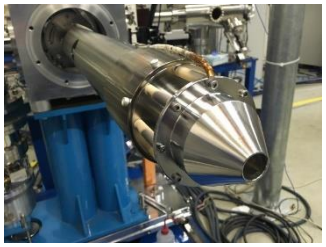
II-1. Overhaul Status of VIBA



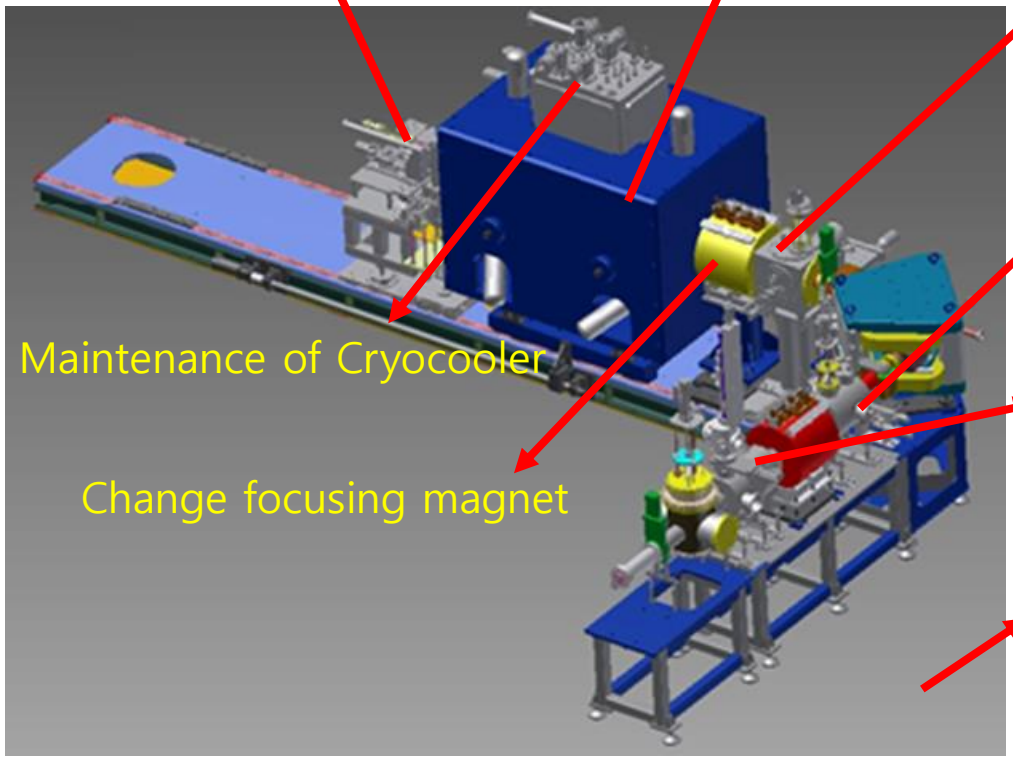


Upgrade of Launcher Disk

Insert Yoke in SC coil



Upgrade of electrode



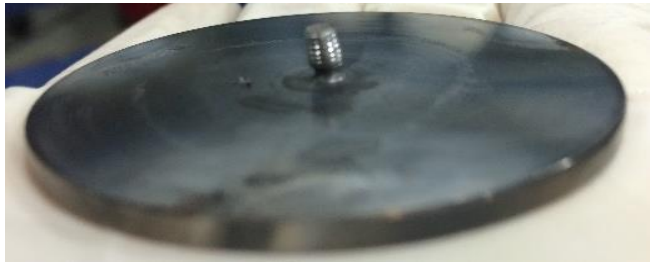
Upgrade of beam diagnostics

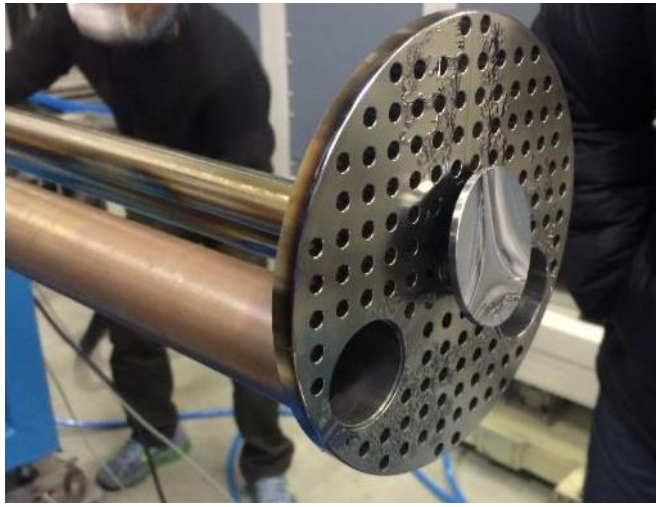
Install a chamber for ion implantation

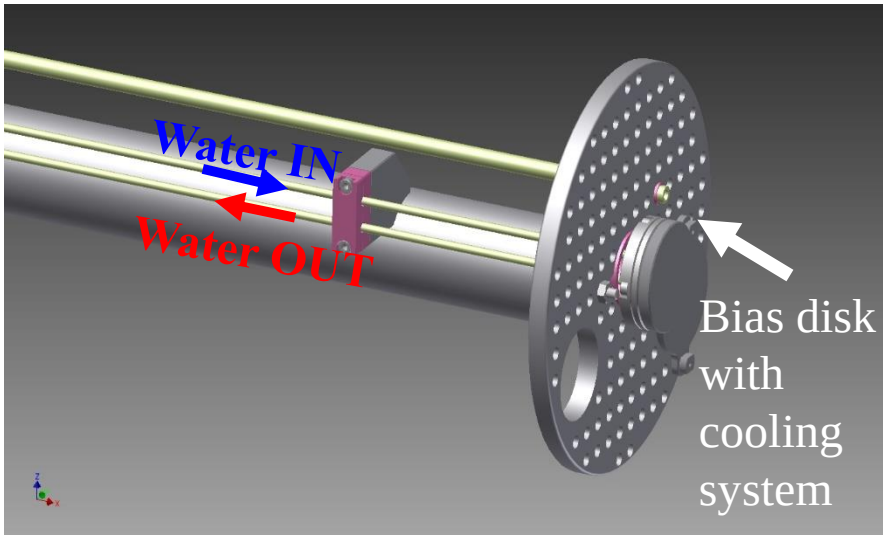
Upgrade of control system with EPICs

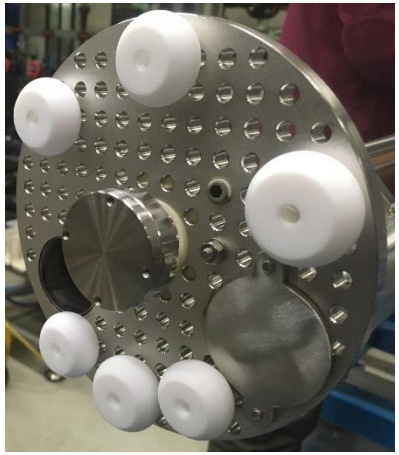
II-1a. Upgrade of Launcher Disk

◆ Bias disc has been improved with cooling system

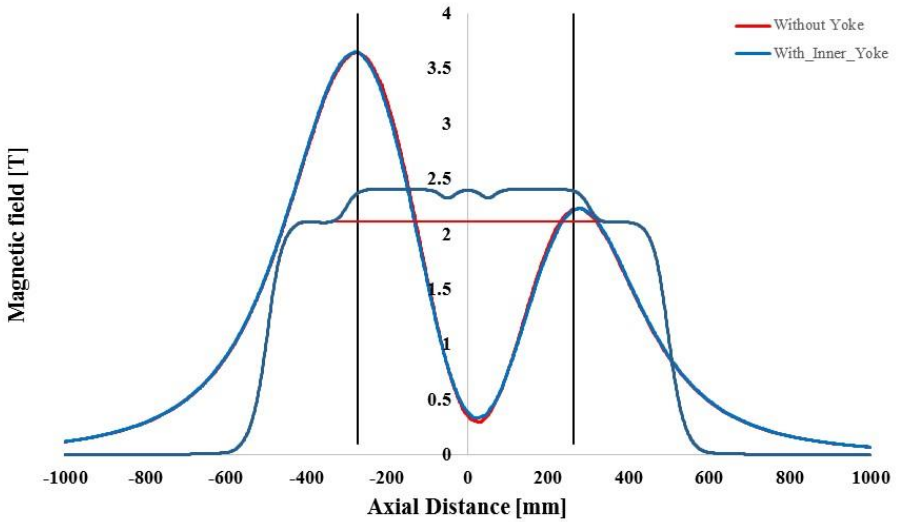


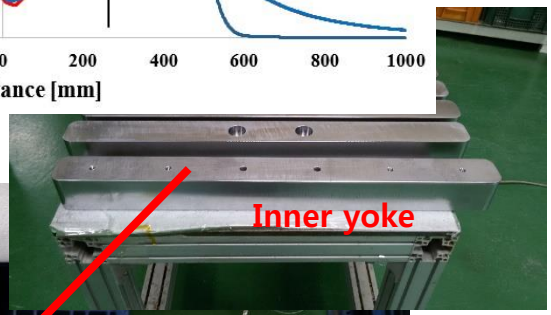


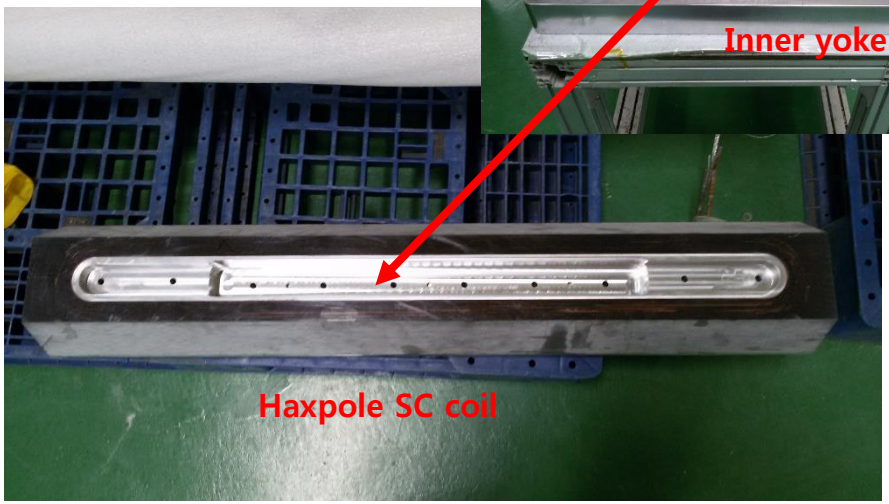




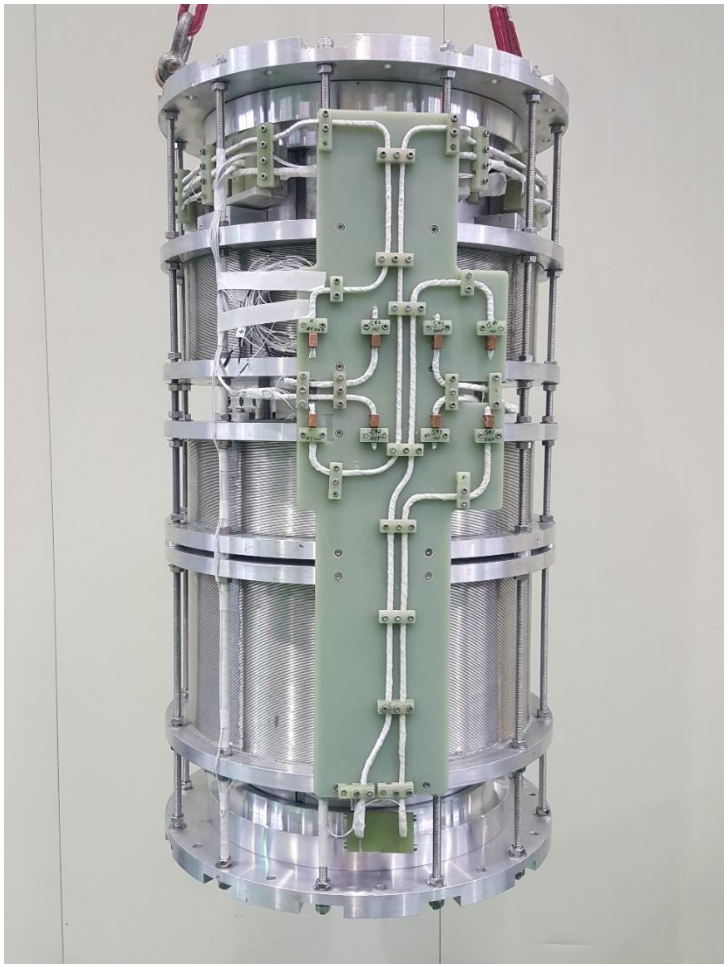
II-1b. Insert York in SC Coils





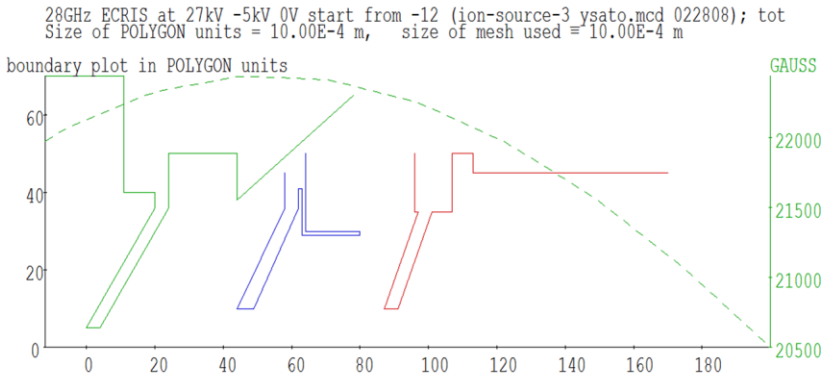


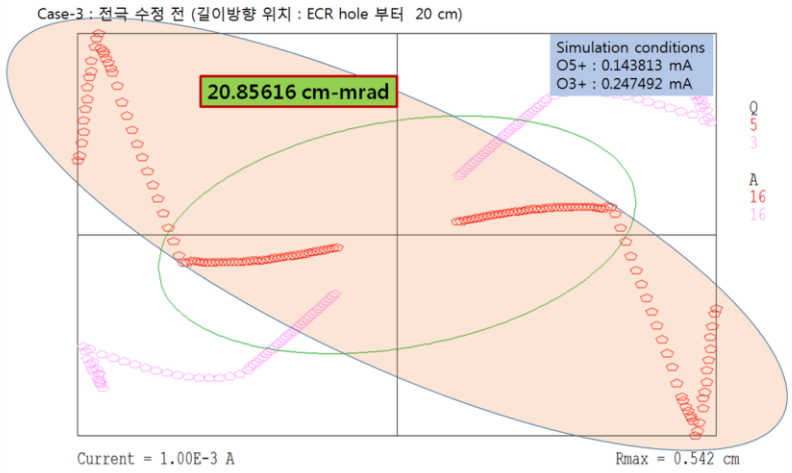
The Br will go up 2.4 Tesla from 2.1 Tesla



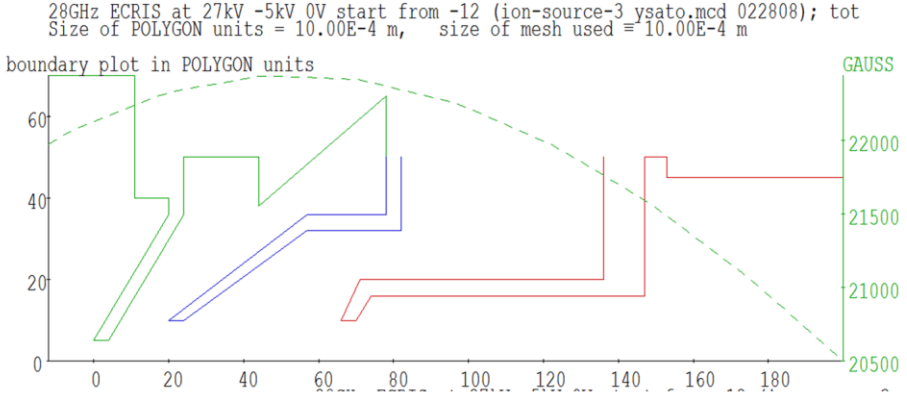
II-1c. Upgrade of Extraction Electrode

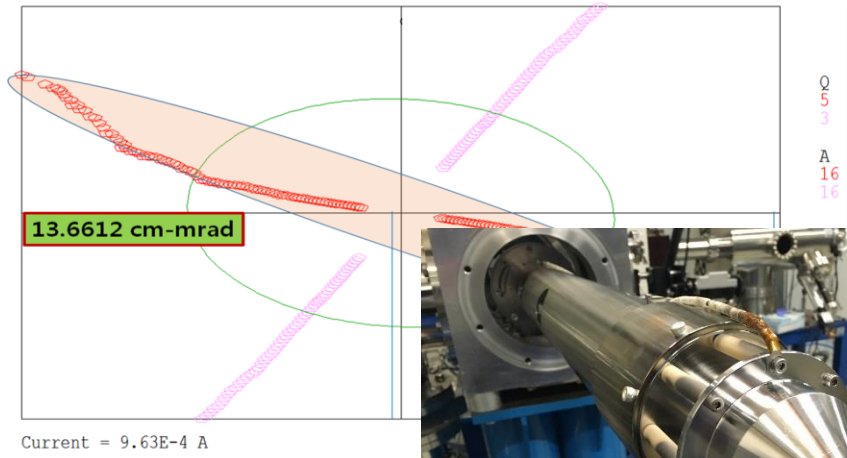
before

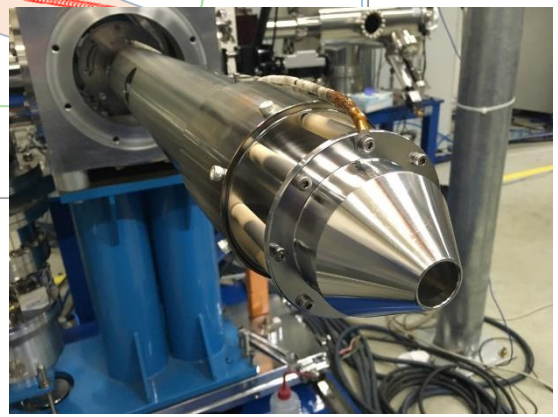




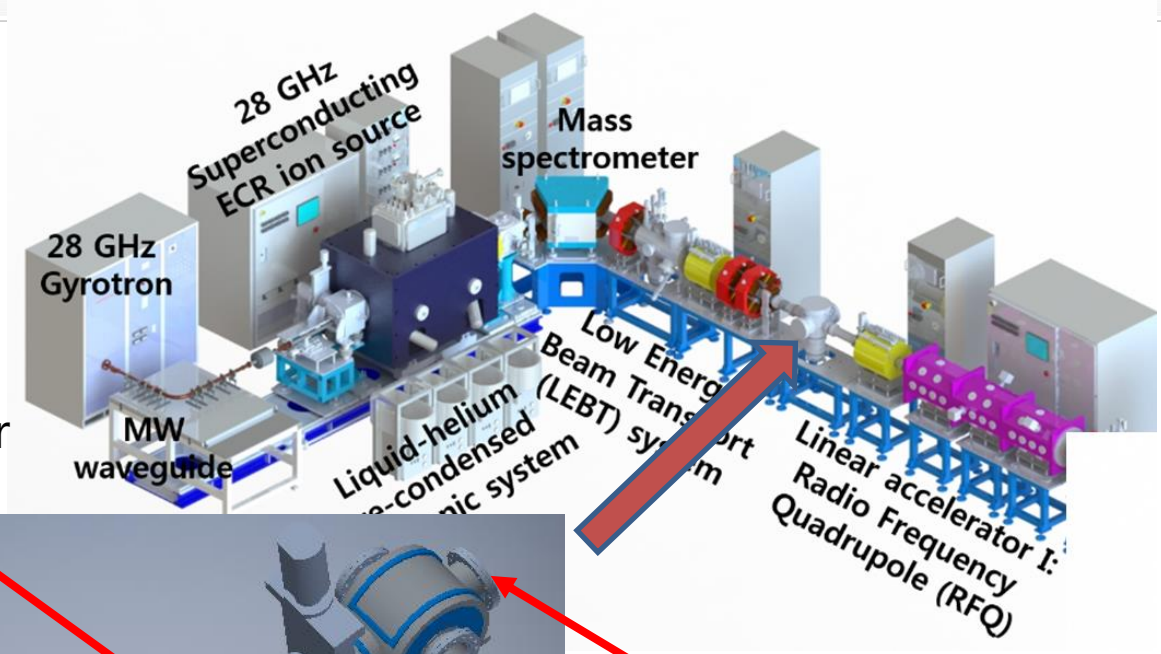
After



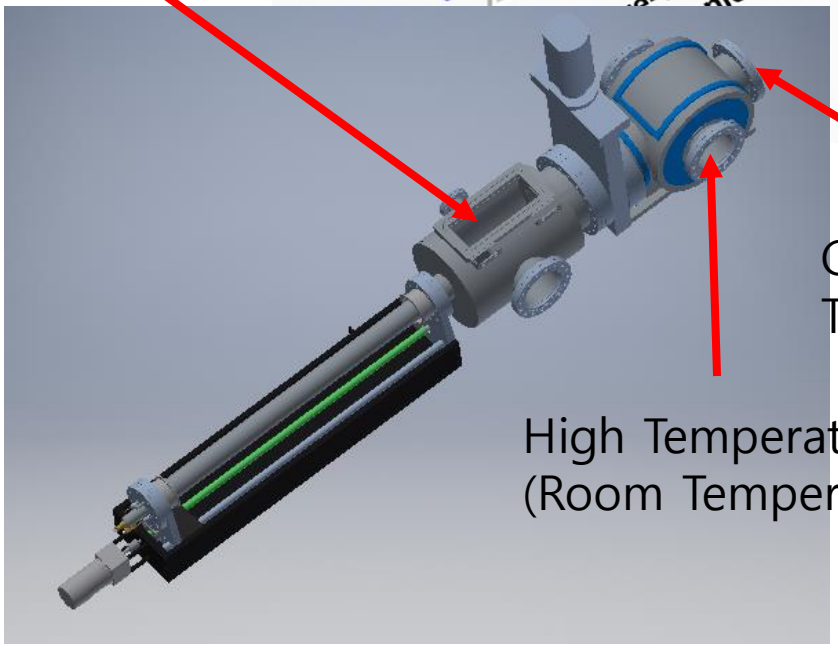




II–1d. End Station of Ion Implantation



Post Heat Treatment Chamber



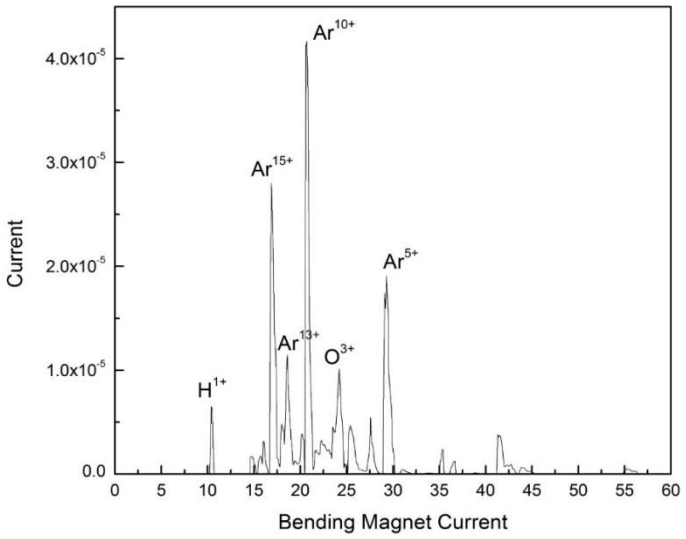
Connection port
To Analytic Instrument Room

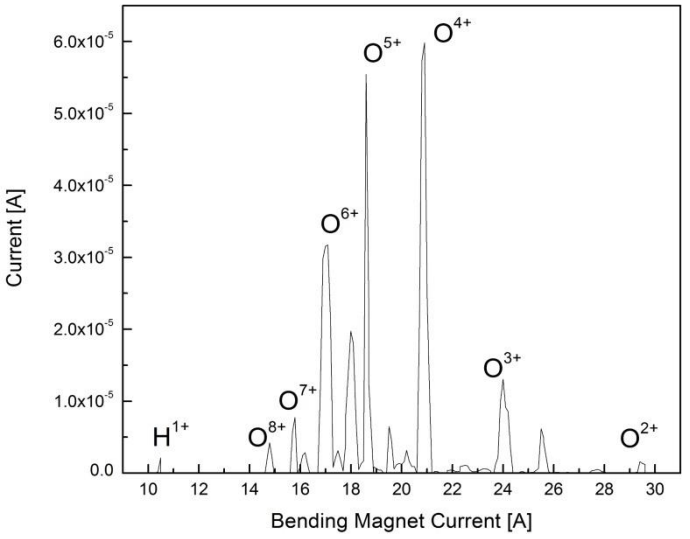
High Temperature Sample Chamber
(Room Temperature ~ 1000℃)

II-1e. Beam Results after Overhaul

Beam extracted resutls

Max. extracted ions	Argon	Oxygen
Results in 2015	Ar^{8+}	O^{6+}
Results in 2017	**Ar^{15+}**	**O^{8+}**



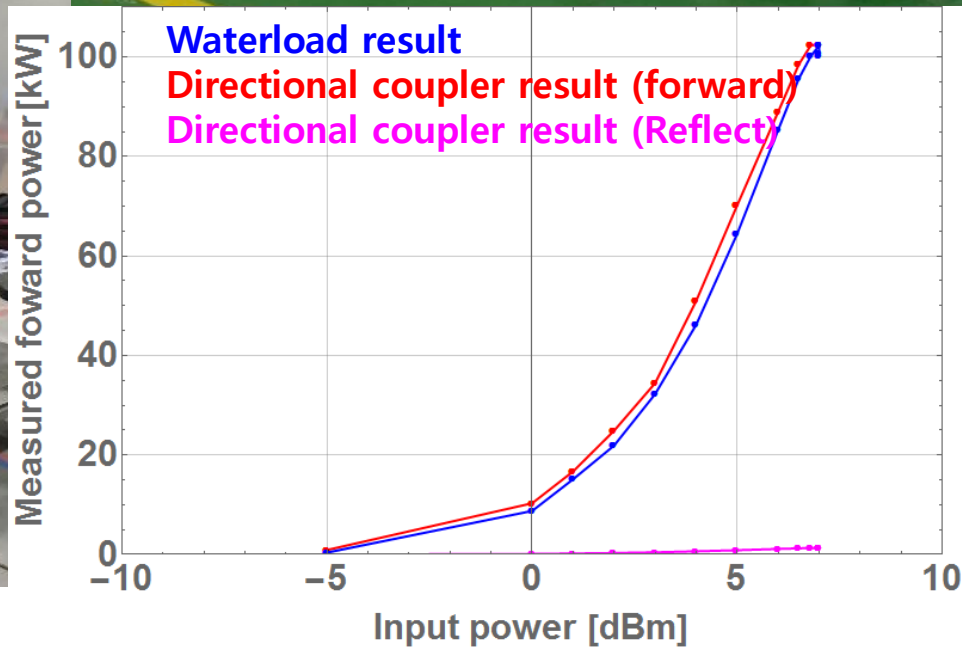


Microwave Power =1 kW Binj= 2.37 T , Br= 1.5 T , Bext= 2 T , High Voltage= 10 kV

II-2a. R&D Status of VIBA

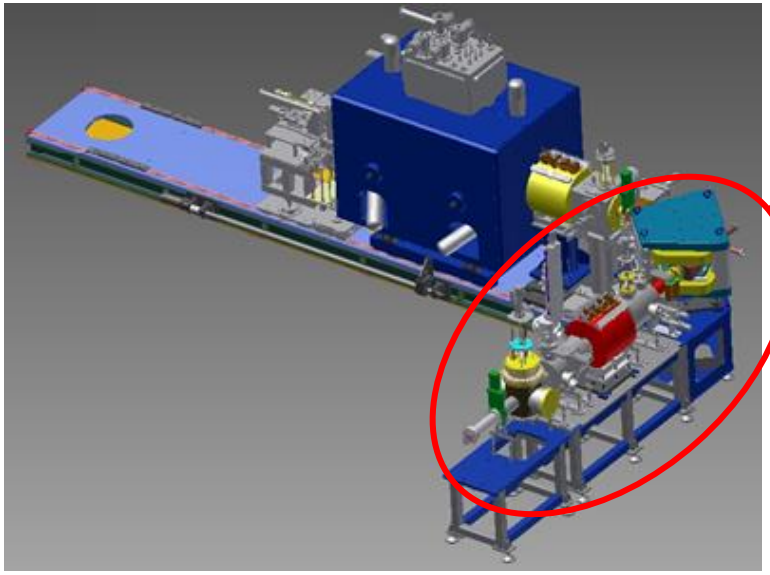
RFQ cavity is under bead full test.
RFQ cavity will be connected at new site in 2018

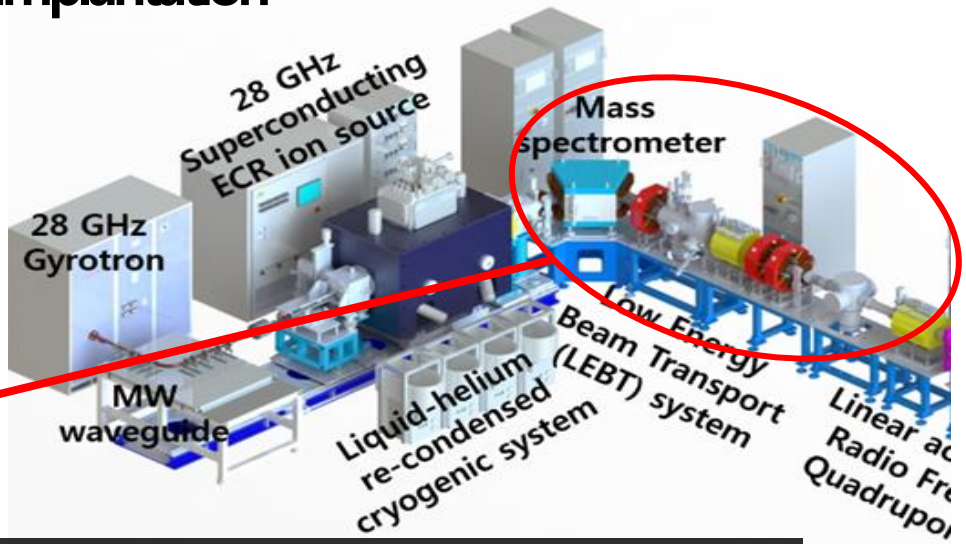
RF Amplifier had been finished and reached 100kW

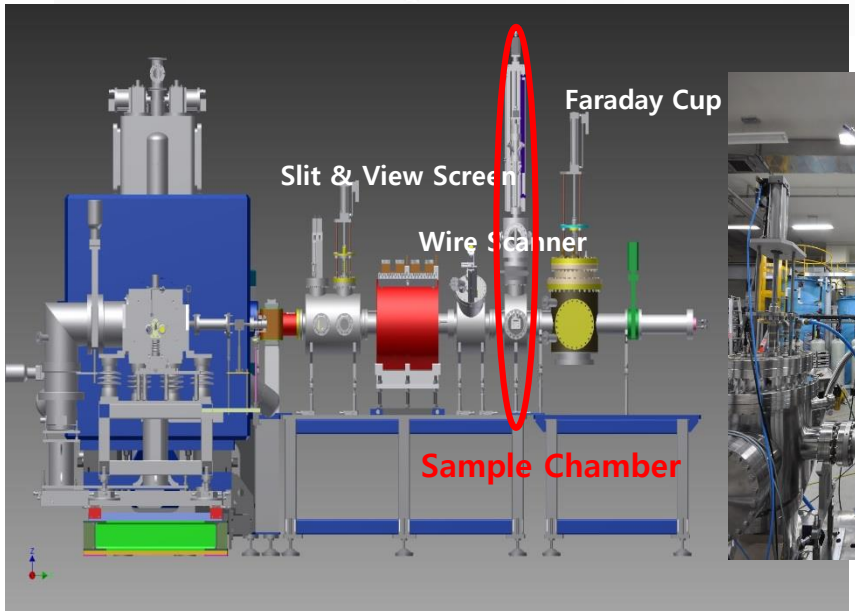


II-2b. R&D Status of VIBA

Installation of sample chamber for implantation





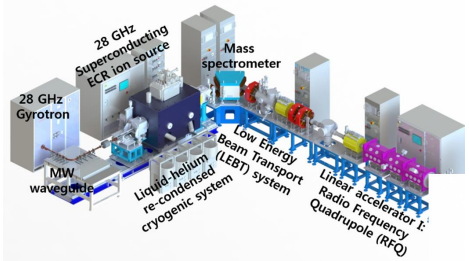


II–3. Status of Building Construction

VIBA building construction project (2015~2018.08)

Fund : ~14 M$

Floors	3rd floor
Site Area	18,700㎡
Building Area	2,335.88㎡
Space	3,911.73㎡



2017 year

1~3

› Preparation of construction

4~6

› Public works and Piling

7~8

› Substructure and placing concrete of basement

9~12

2018 year current

› Finishied framework

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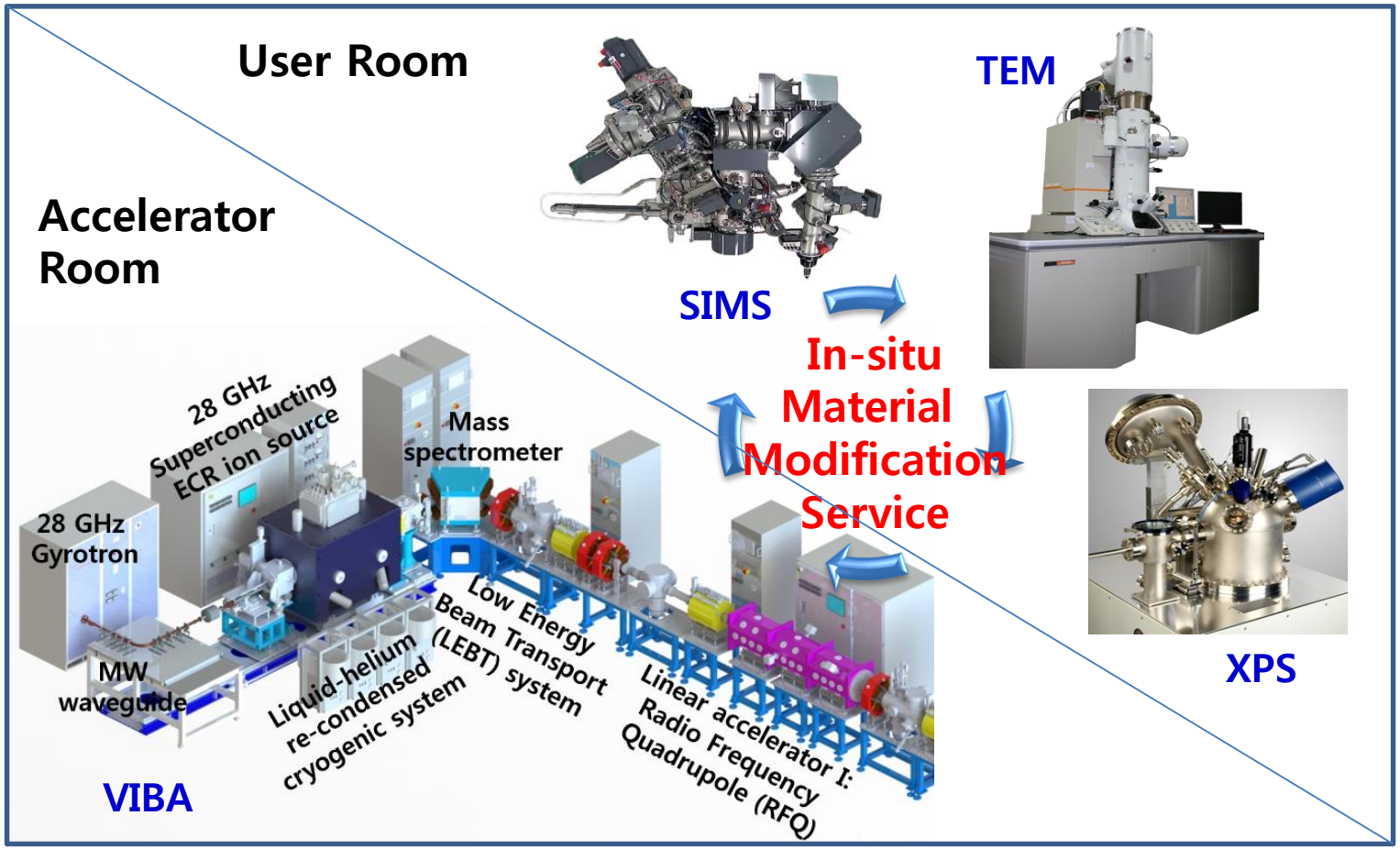
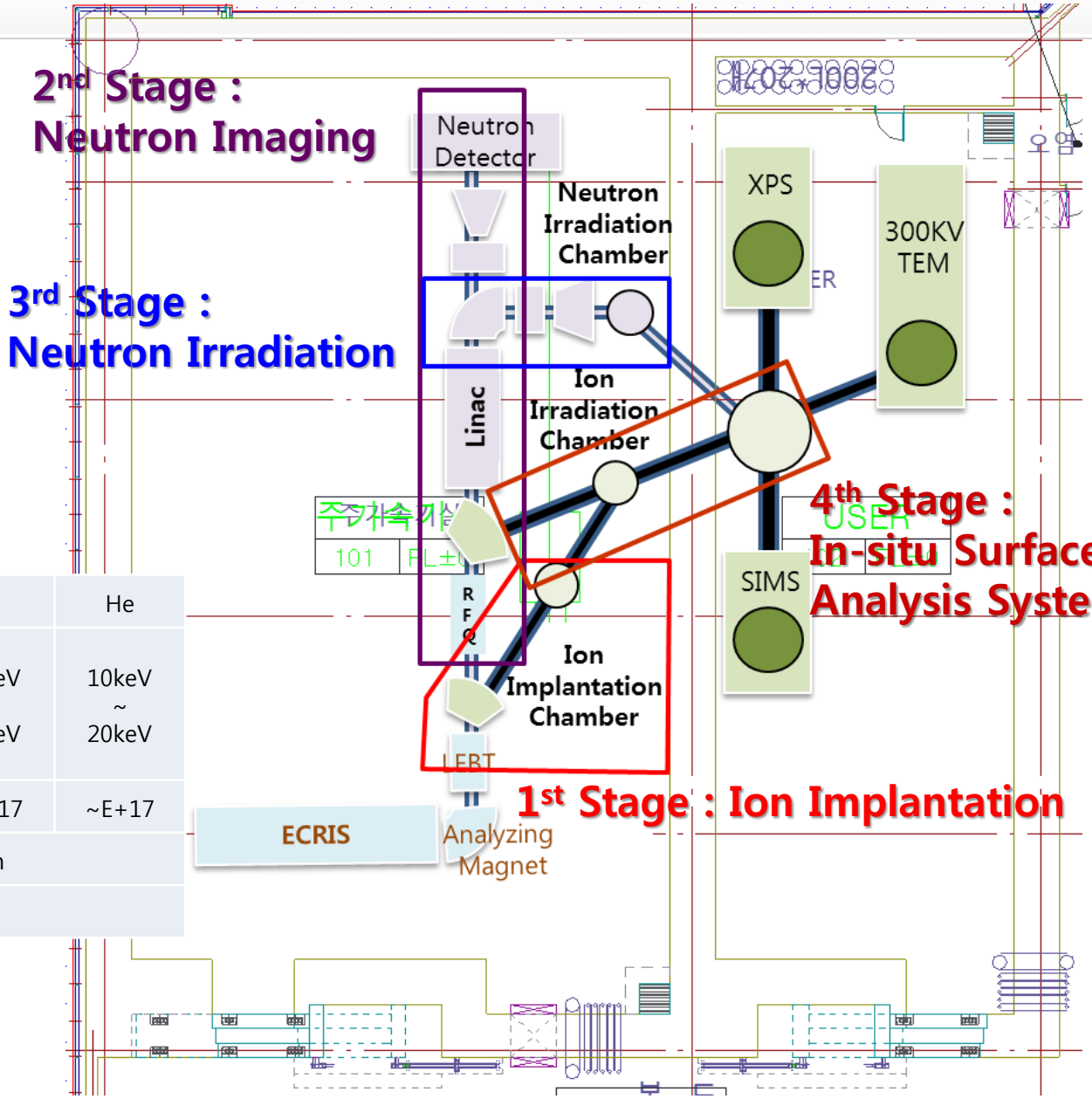
III. Future Plan of VIBA

- New purpose of VIBA is One-stop ion beam facilities and analysis platform for supporting industry, academia, institution.
- Until 2018, we hope to finish establishment of VIBA with building



III. Future Plan of VIBA

Ions	N	O	Ar	He
Injection Energy	10keV ~ 50keV	10keV ~ 60keV	10keV ~ 80keV	10keV ~ 20keV
Dose	~E+17	~E+17	~E+17	~E+17
Sample	10 mm X 10 mm			
Temp.	20~1000℃			



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