

# The first test of the ion implantation beamline at VIBA

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## Introduction

- VIBA(Versatile Ion Beam Accelerator) is a compact linear accelerator facility using 28GHz ECR ion source at KBSI(Korea Basic Science Institute). The goal of VIBA is to support various researchers using low-energy ion beams.
- The purpose of VIBA is one-stop ion beam facilities and analysis platform for supporting industry, academia, institution. VIBA gives the researchers a chance to collaborate in high dose ion implantation.

ECR IS + RFQ : Wide range 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

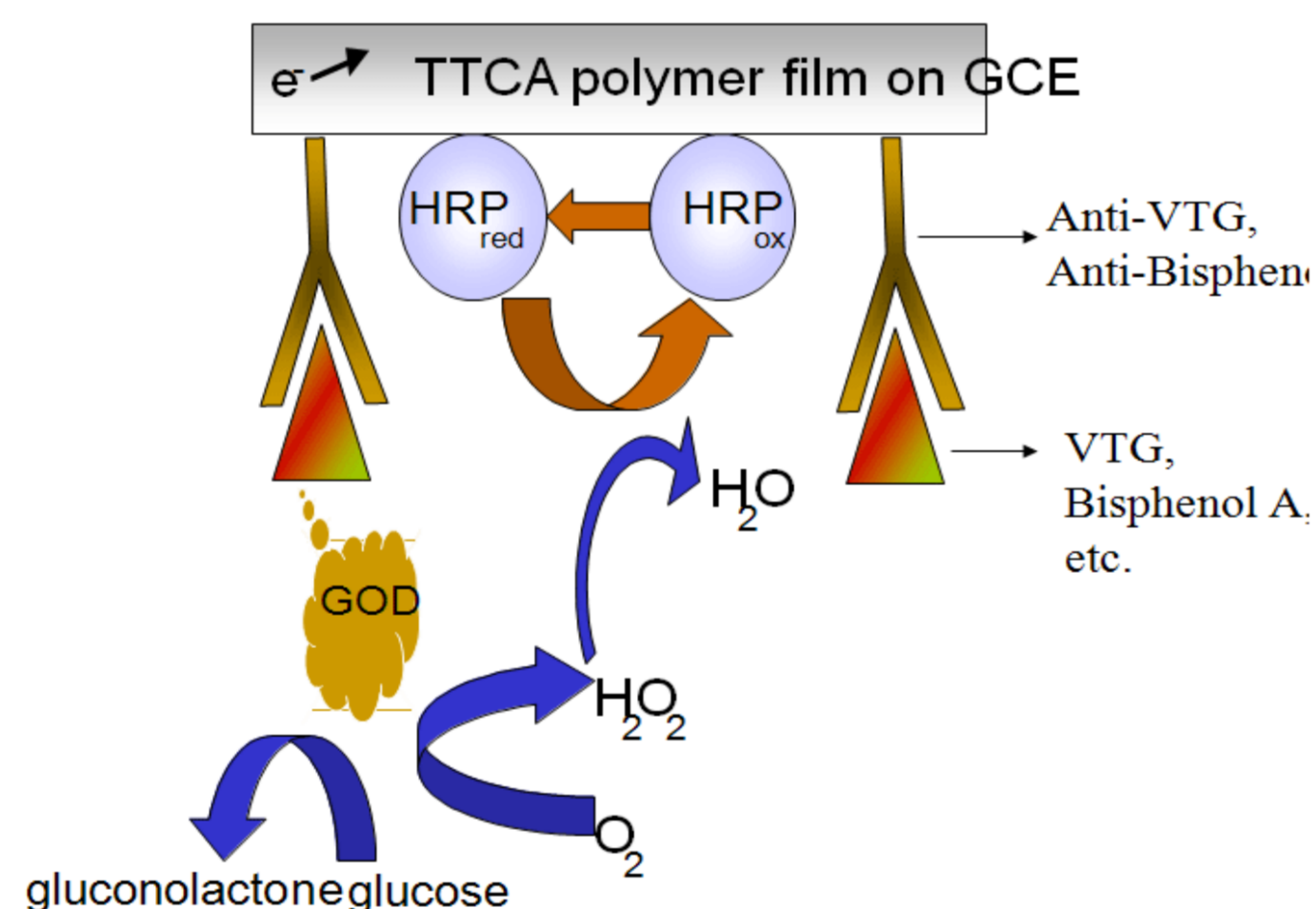
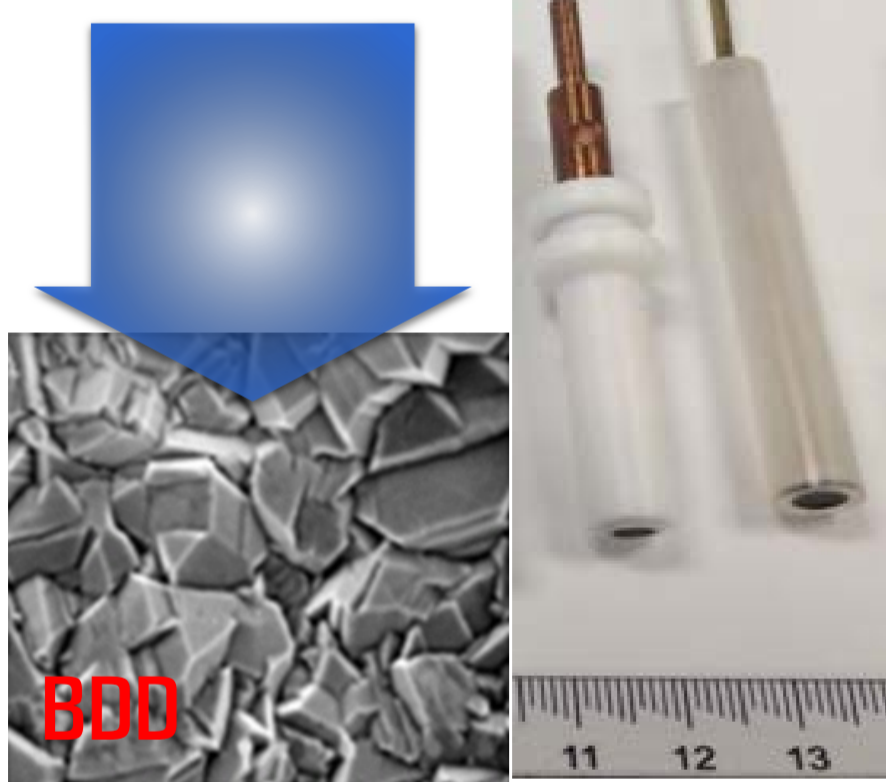
TEM: Structural analysis after ion beam process

## First test results of ion implantation

- From 2015, VIBA(Versatile Ion Beam Accelerator) had serviced ion implantation. Beam service had given for 15 users (27 cases), specially we had found a possibility of ion implantation at electrochemical sensors.

### Representative instance

Ion injection

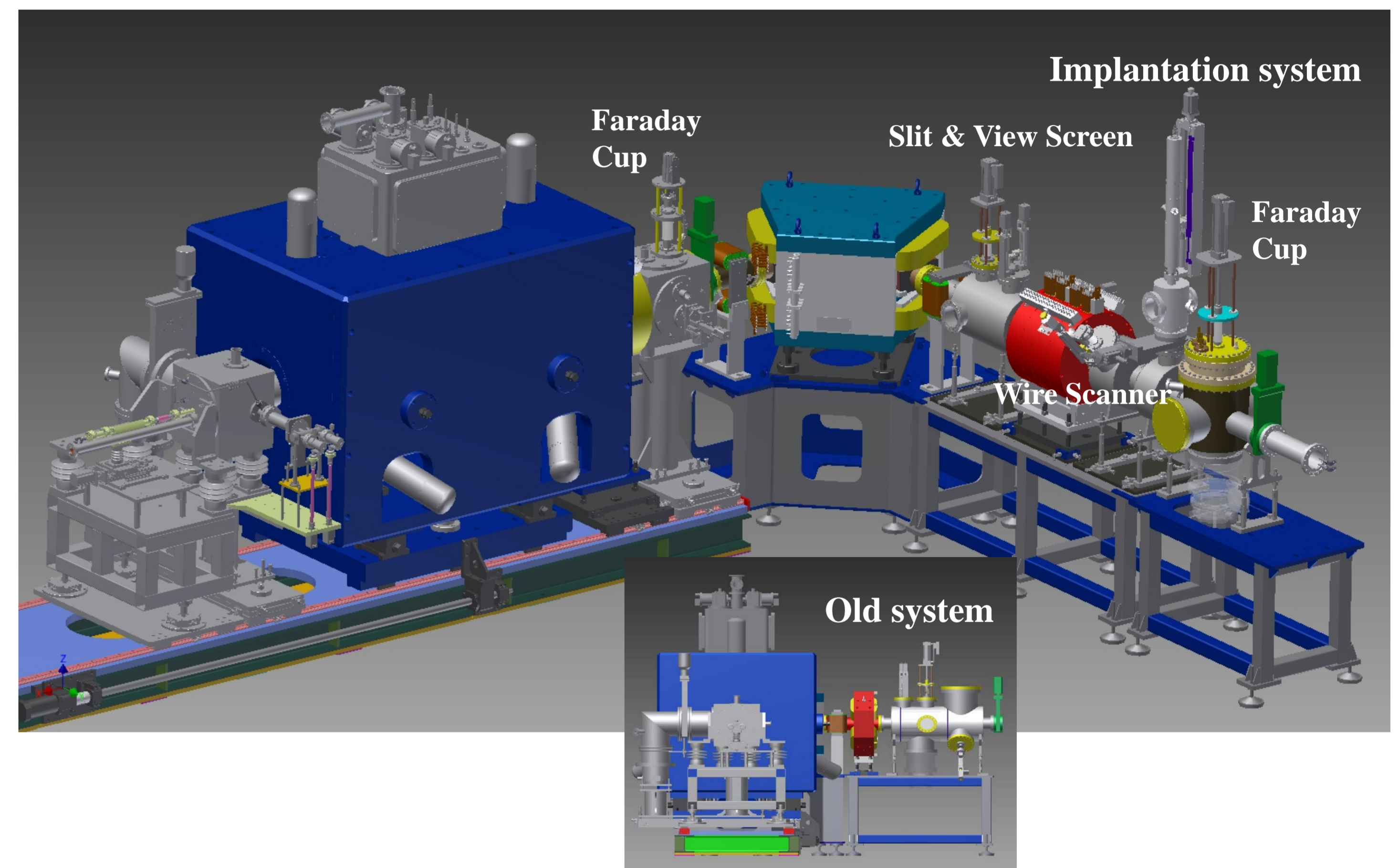


### Serviced conditions for ion implantation

Ion	Energy (keV)	Current (eA)	Dose (#/Cm <sup>2</sup> )
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

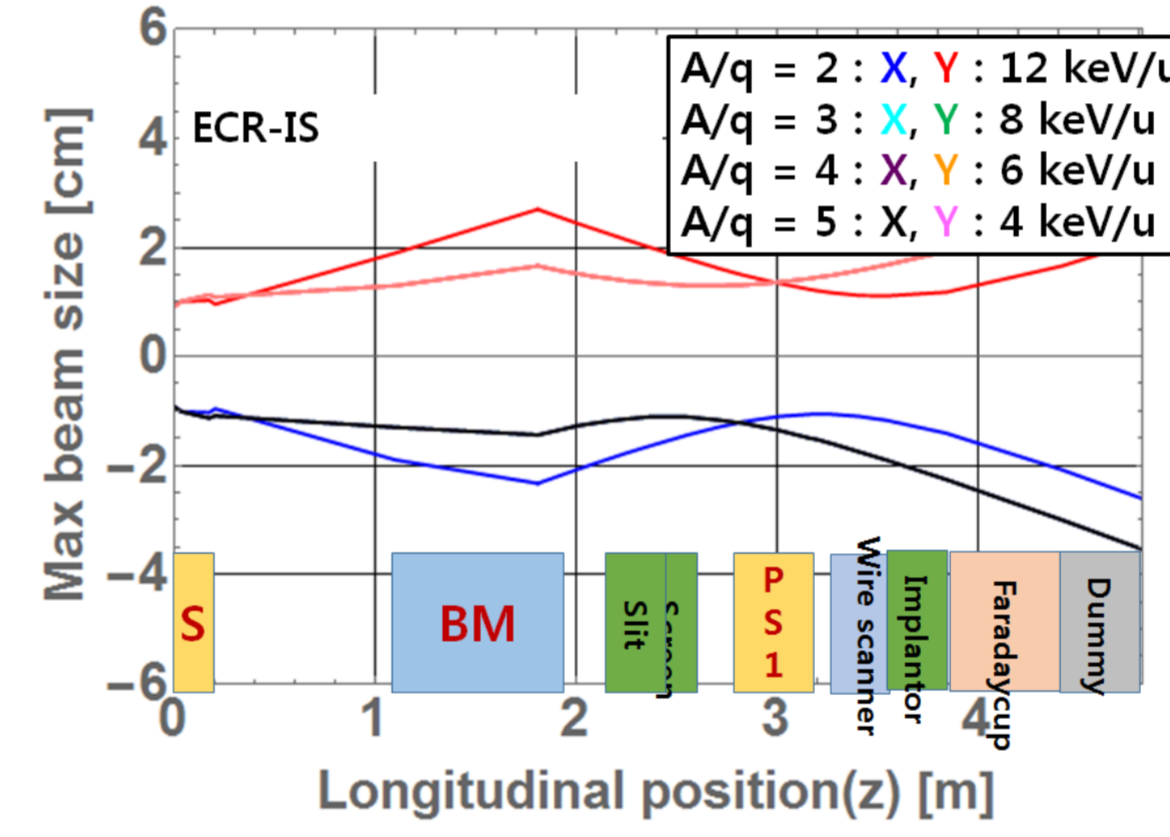
## Design of beamline for ion implantation

- In this year, Diagnosis system of VIBA was changed for ion implantation. Chambers were separated from conventional the diagnostic chamber for improve ion implantation.

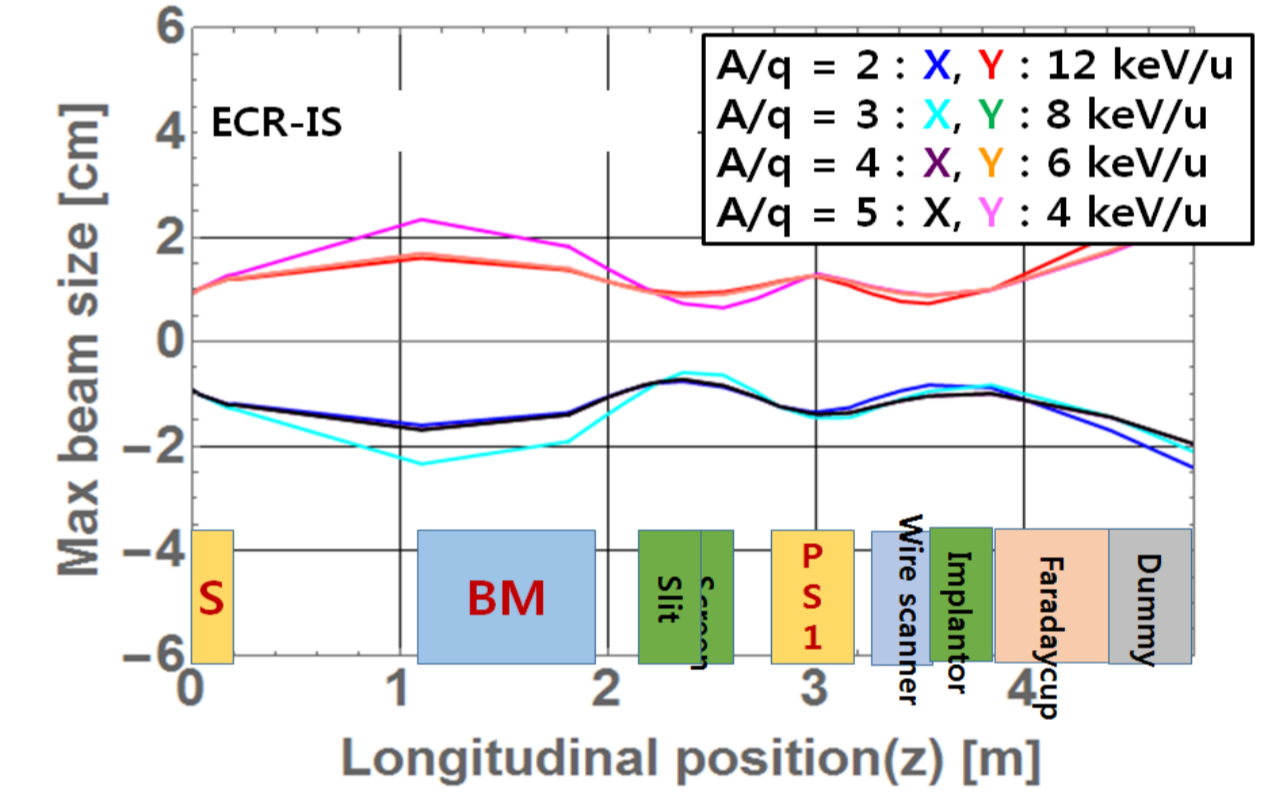


## Result of transport simulation

### Emittance measurement beamline



### Implantation beamline

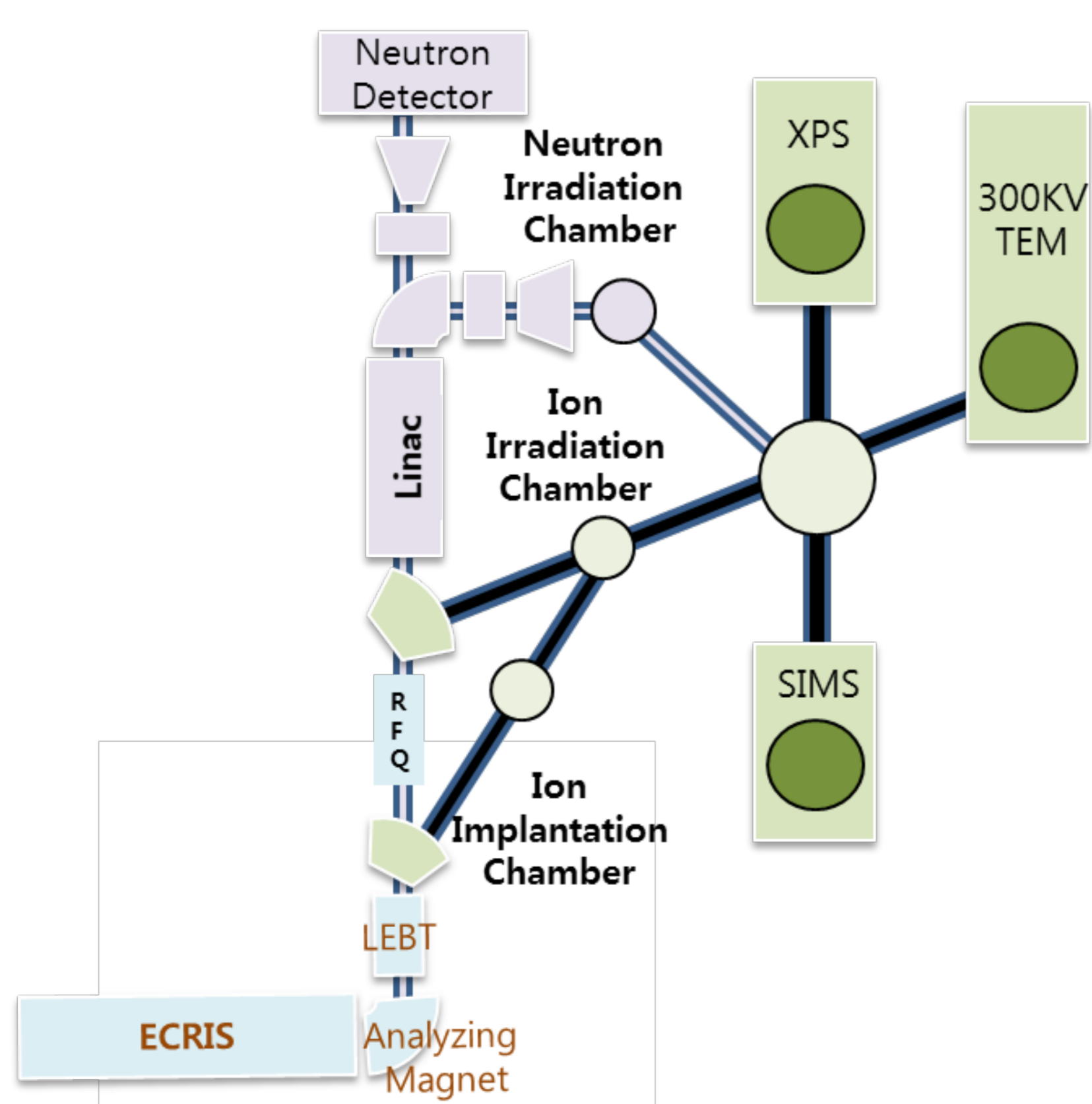


Elements	Z-position [m]	X-size [cm]	Y-size [cm]	Magnet [kG]
Ion source	0	0.93	0.93	
S1-flange	0.03	1.01	1.01	
S1	0.17	1.13	1.13	3.80734
S1-flange	0.2	1.09	1.09	
BM-flange	1.1	1.3	1.3	
BM90	1.807	1.43	1.65	
BM-flange	1.937	1.32	1.56	
bellows	2.007	1.27	1.51	
spool	2.079	1.22	1.47	
ST2	2.169	1.17	1.42	
spool	2.242	1.14	1.39	
H.sl	2.358	1.11	1.34	
screen	2.553	1.11	1.3	
DG-1	2.715	1.16	1.3	
flange	2.793	1.21	1.31	
PS1-flange	2.823	1.22	1.31	
PS1a	2.973	1.33	1.35	0.0
PS1-yoke	3.013	1.36	1.37	
PS1b	3.163	1.5	1.44	0.0
PS1-flange	3.193	1.53	1.45	
flange	3.272	1.61	1.5	
WS	3.407	1.75	1.59	
WS	3.542	1.91	1.69	
Implantor	3.842	2.27	1.94	
FaradayCup	4.417	3.01	2.5	
Dummy	4.819	3.55	2.93	

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PS1b	3.163	1.65	1.51	-2.47642
PS1-flange	3.193	1.69	1.53	
flange	3.272	1.8	1.61	
WS	3.407	2	1.75	
WS	3.542	2.2	1.89	
Implantor	3.842	2.66	2.24	
FaradayCup	4.417	3.57	2.96	
Dummy	4.819	4.22	3.48	

## Changed new plan for VIBA facility

- We changed plan for VIBA application from feasibility study about implantation. R&D schedule for implantation service started in this year.



## Install of beamline for ion implantation

- From design results, we manufactured and installed new beamline. we will finish modification of operation program until this year.



Current status of beamline