

Unlock New Possibilities in Si&SiC with Proton&Helium Implantation

From lifetime control to isolation layers – tailored solutions for your devices

APPLICATIONS



SF-KHII®

Suppress stacking fault expansion



Lifetime Control

Optimize carrier lifetime for power devices



Isolation Layers

Create precise buried insulating regions



WHY CHOOSE OUR SERVICE?

Optimize Material Performance:

Elevating Si & SiC Performance through Ion Implantation

R&D Testing Made Easy:

Easily Start Testing with Our Equipment & Systems

Flexible Scalability:

From Prototype to Mass Production – We Provide the Solution



Ion Implantation into Semiconductor

Get To Know Us

1

Contract processing service!

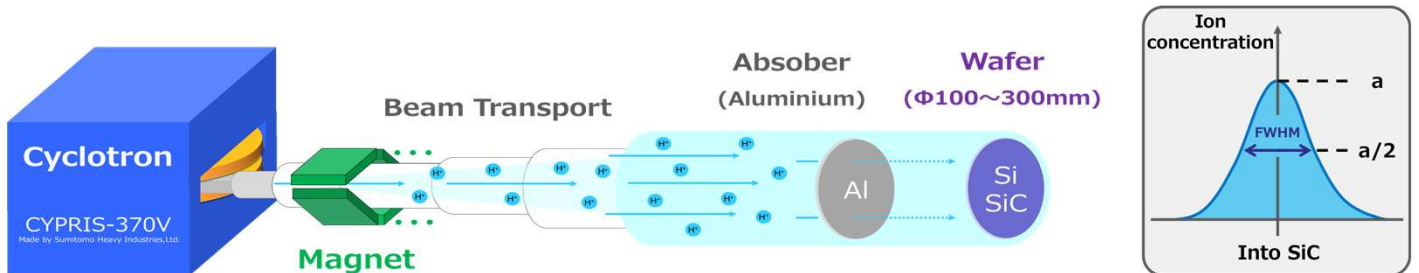
2

Implanting proton and helium ions!

3

High-energy light ion implantation!

Implanter Spec.



	Gas	Ion	Energy	Into SiC (μm)	FWHM (μm)
Cyclotron Spec.	Hydrogen	H ⁺	2MeV	0~29	1
		H ⁺	4MeV	0~113	4
		H ⁺	8MeV	0~320	11
	Helium-3	³ He ²⁺	23MeV	0~229	4
	Helium-4	⁴ He ²⁺	17MeV	0~114	2
Tandem Spec.	Hydrogen	H ⁺	0.26~2.40MeV	1.6~43.0	~1.7



Business Introduction

*「Ion and Electron Irradiation on Semiconductors
for device characteristic improvement」*

SHI-ATEX Co., Ltd.

We would like to inform that “S.H.I. Examination & Inspection, Co.,Ltd. (SHIEI) ” will merger with “Japan Electron Beam Irradiation Service Co., Ltd. (EBIS)” and be named to “***SHI-ATEX Co., Ltd.***” from April 1, 2017.

In the same way as SHIEI and EBIS, we will continue the **Ion and Electron beam irradiation service business** in NEW COMPANY.

Location of SHI-ATEX



Ion Head office Factory (Ehime)



Ion Okayama Center (Okayama)



EB Tsukuba Center (Ibaraki)



EB Kansai Center (Osaka)



Main accelerators

Ion

- Manufactured by Sumitomo Heavy Industry
Cyclotron 4Unit (Ehime)
Cyclotron 2Unit (Okayama)



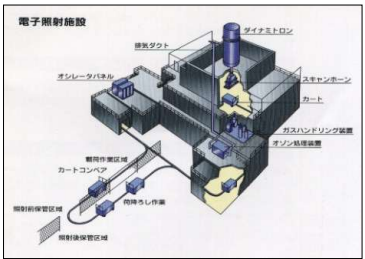
Ion

- Manufactured by High Voltage Engineering
Van de Graaff 1Unit (Ehime)
Tandem 1Unit (Okayama)



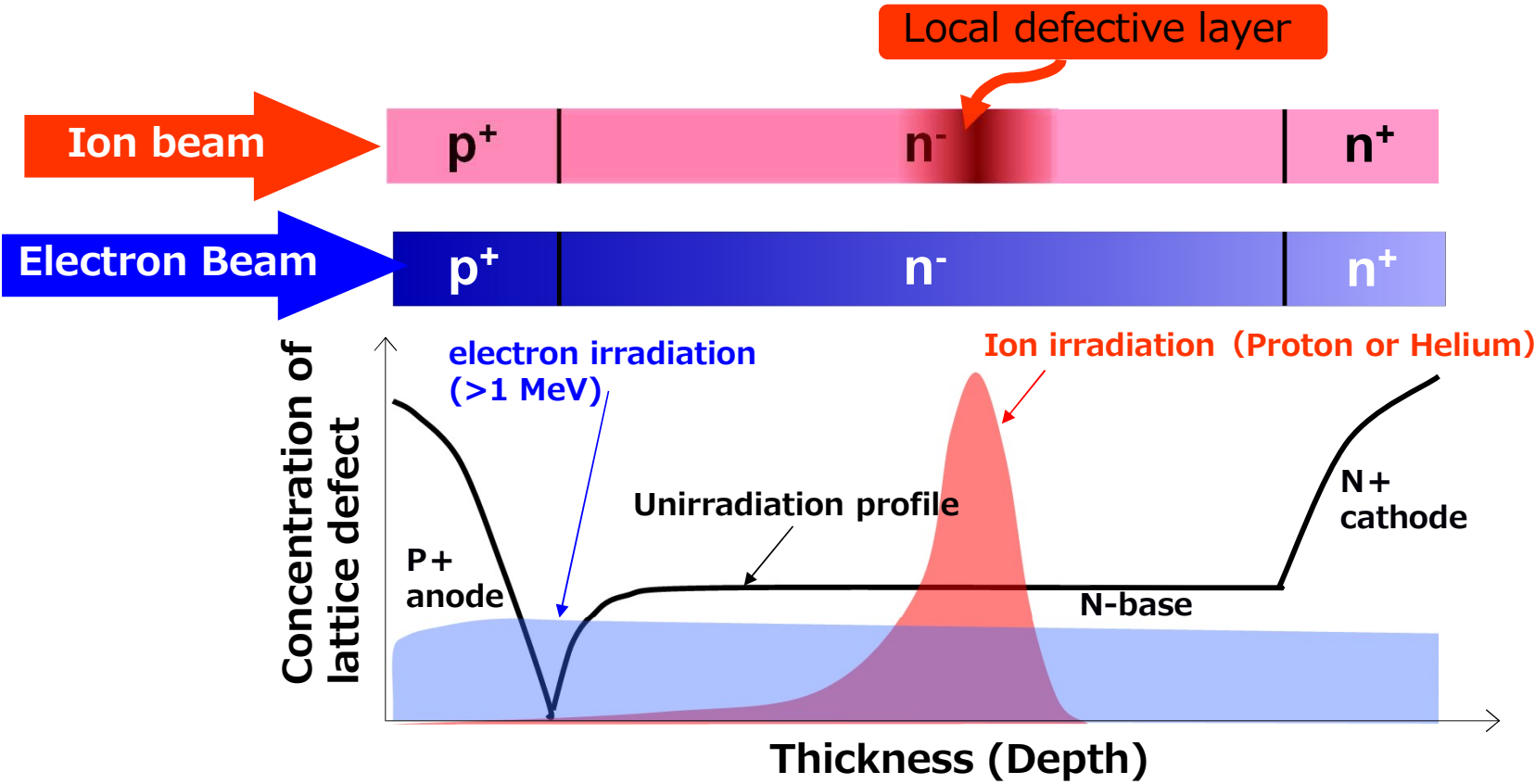
EB

- Manufactured by RDI
Dynamitron 1 Unit (Osaka)
Dynamitron 1 Unit (Ibaraki)



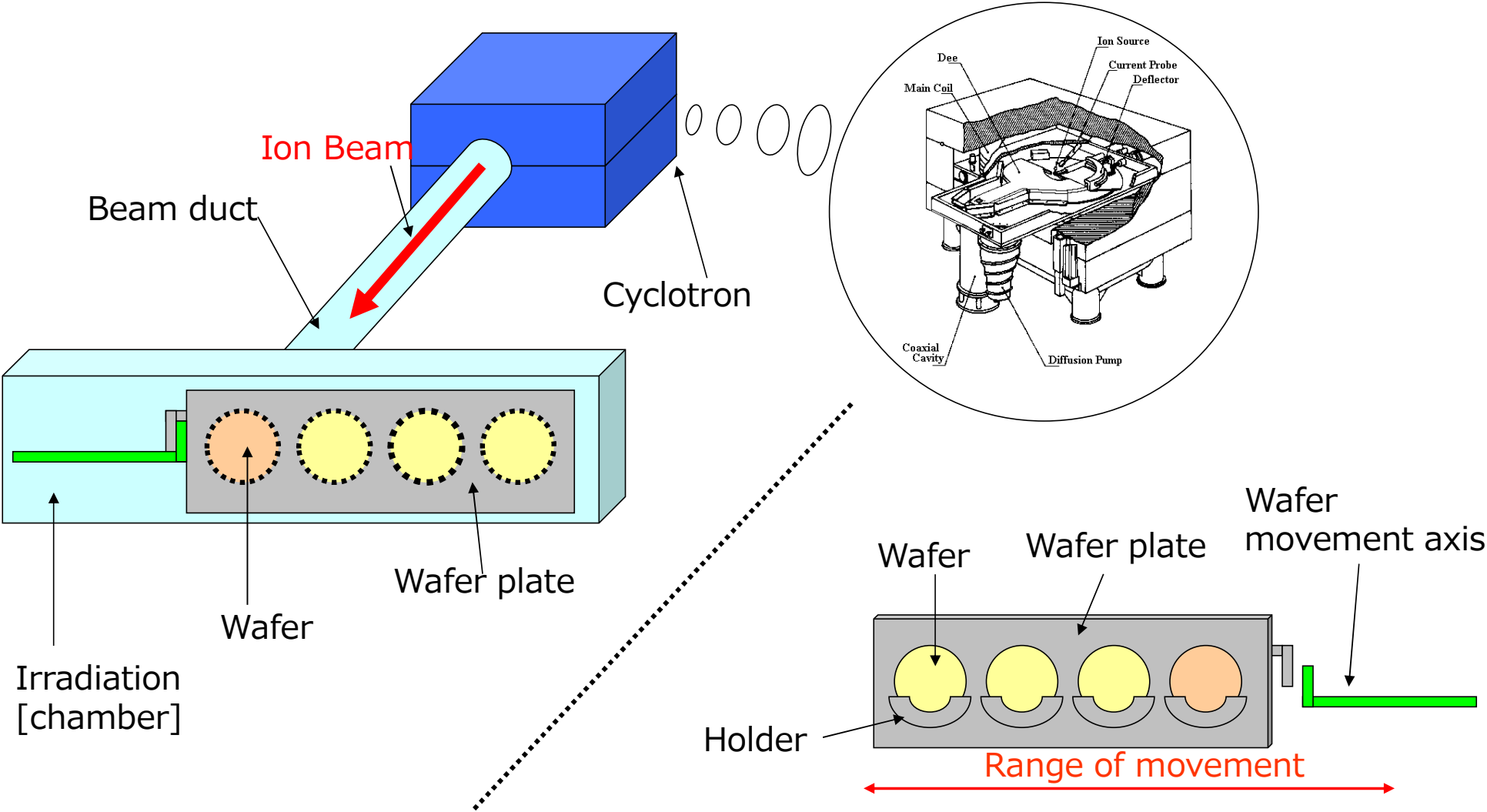
Comparison of defect distribution (Thickness direction)

Ion or electron irradiation service produce lattice defects in silicon wafer as carrier of lifetime control. Particularly, ion beam irradiation form a local defective layer.



Ion Beam Irradiation by Cyclotrons

Wafer handling device (Ion beam irradiation)

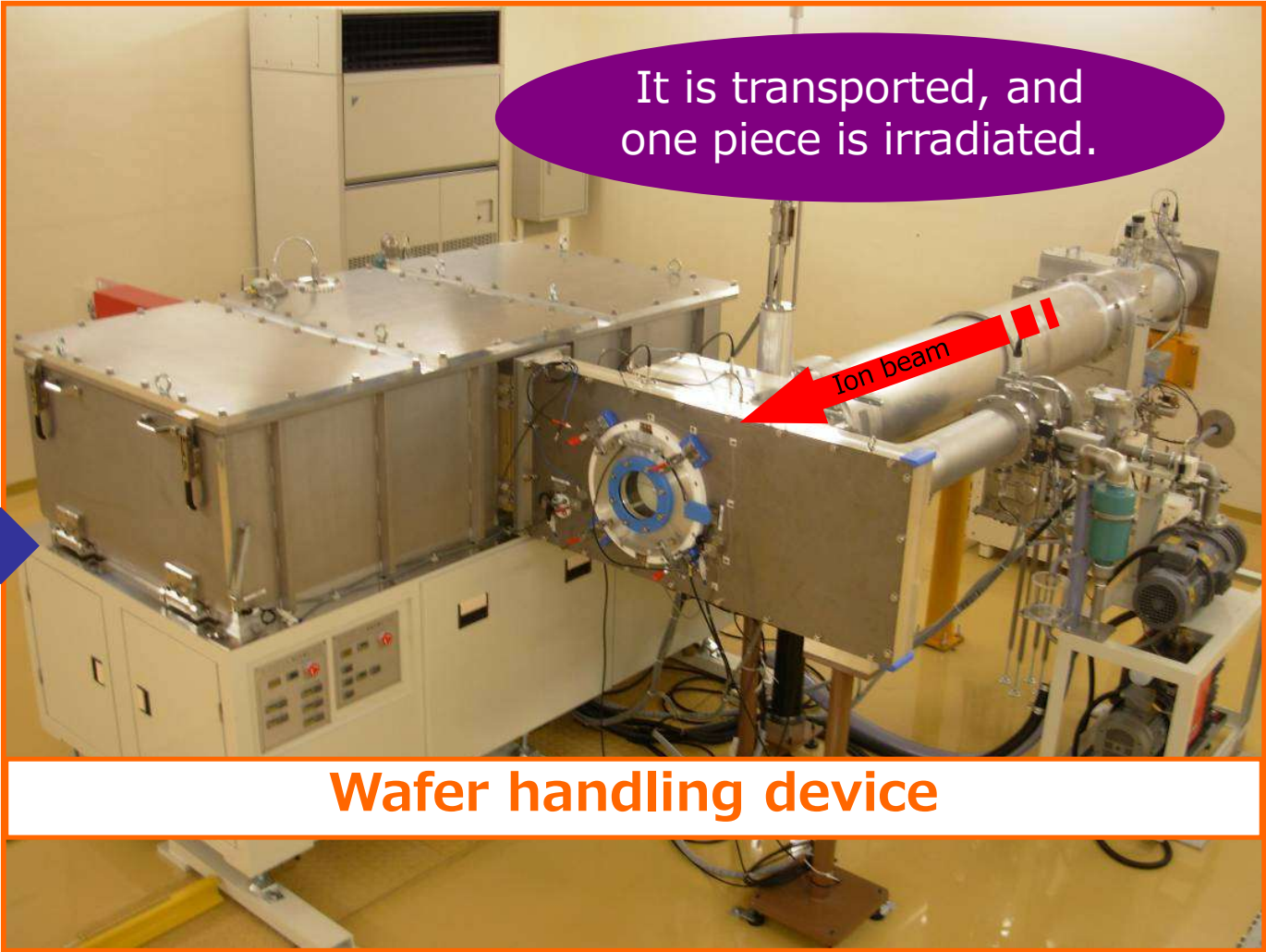


Wafer handling device (Ion beam irradiation)



into the chamber

The wafer is an automatic operation.



It is transported, and one piece is irradiated.

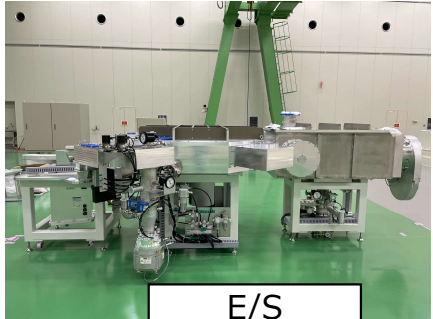
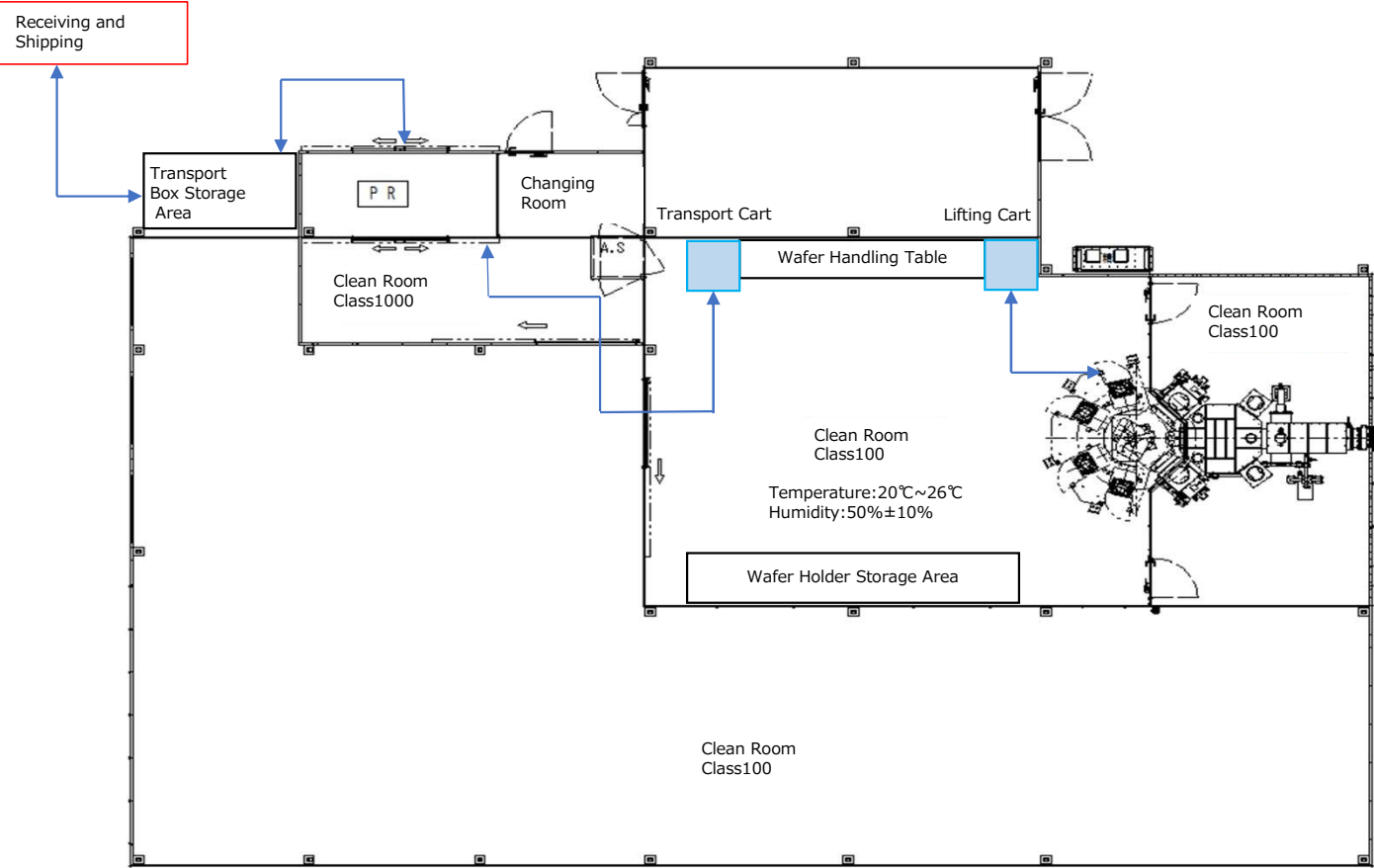
Wafer handling device

Ion Beam Irradiation by Tandem

Tandem : Clean Equipment Overview

Equipment Specifications

- Work Area Cleanliness : Class100
- Target Wafer : 6,8,12inch



E/S



Cassette Stand



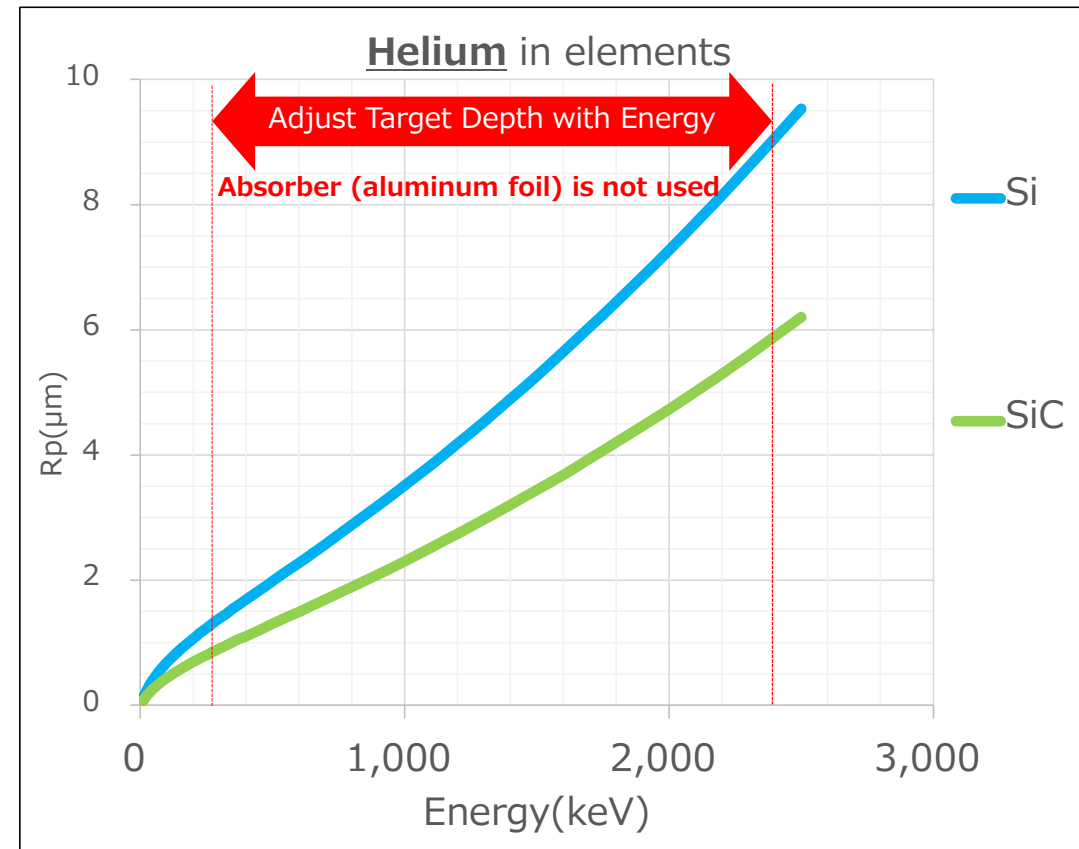
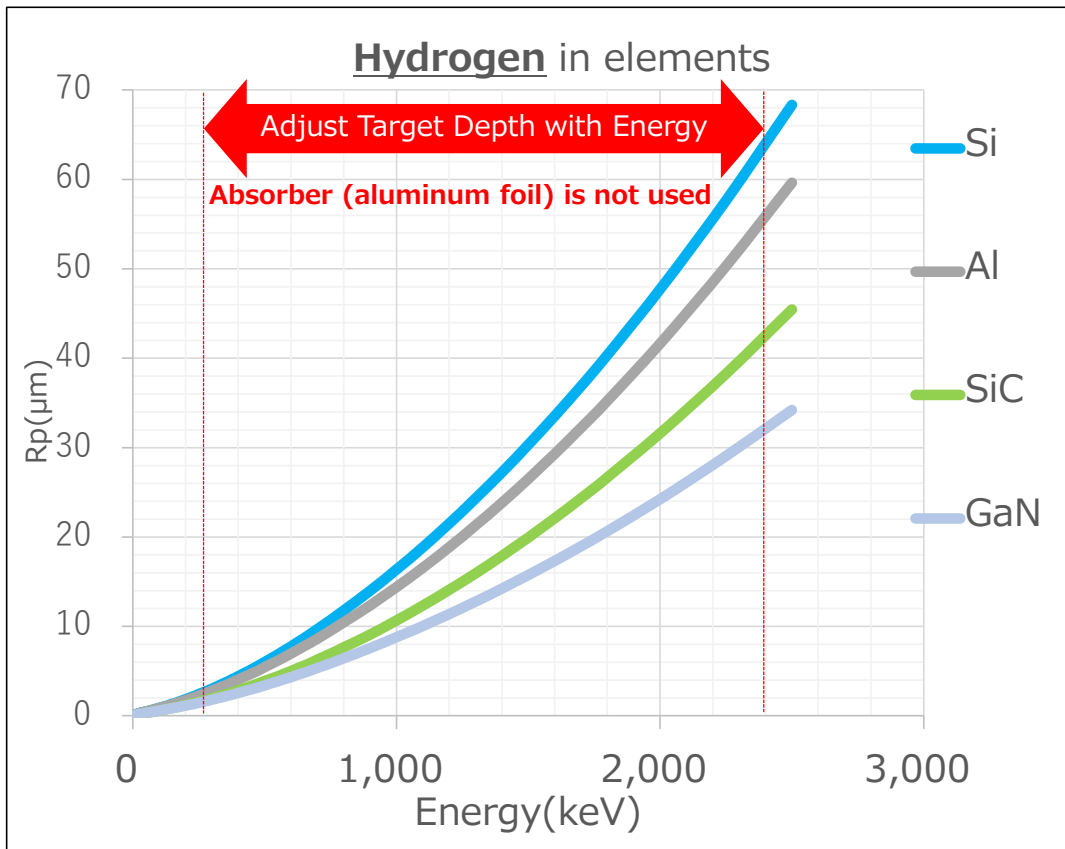
Transport Cart

Specifications of Wafer Transfer System (Okayama Center)

Item		Specification	
Accelerator	Accelerated Ion	Proton	Helium
	Acceleration Energy	260keV~2400keV	
Wafer Transfer System	Target Wafer	6,8,12inch	
	Irradiation Angle	0°~45°	
	Wafer Transfer	The Al plate with the mounted wafer is transferred by a robot	
	Maximum wafer capacity	60wafers	
	Effective wafer irradiation area	8-inch wafer: Φ190	

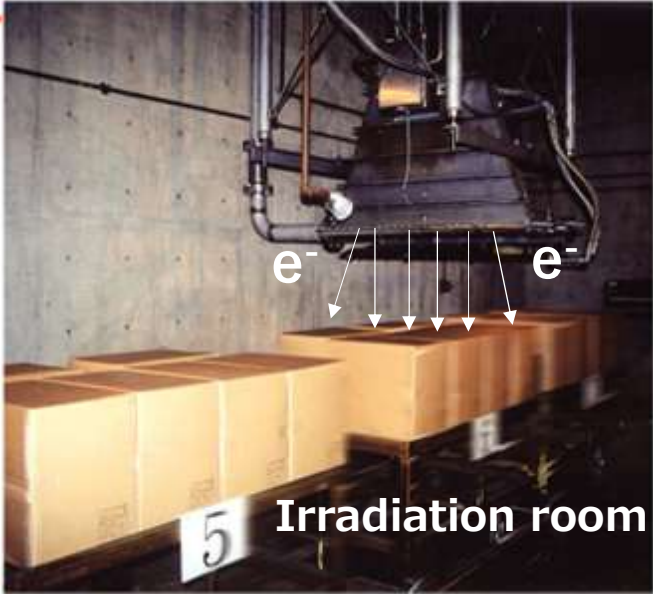
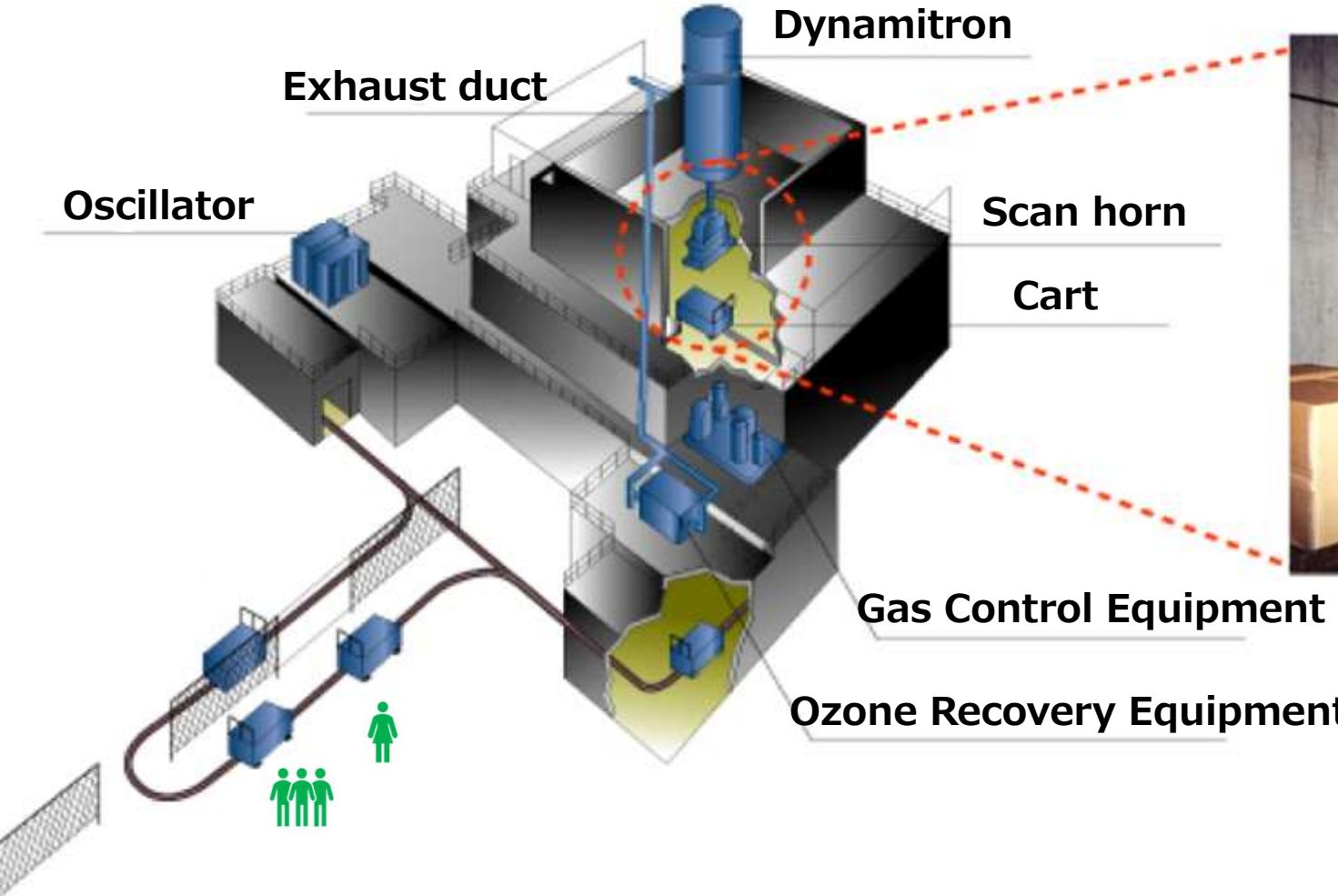
Introduction to Ion Irradiation (Tandem)

Relationship Between Target Depth and Energy

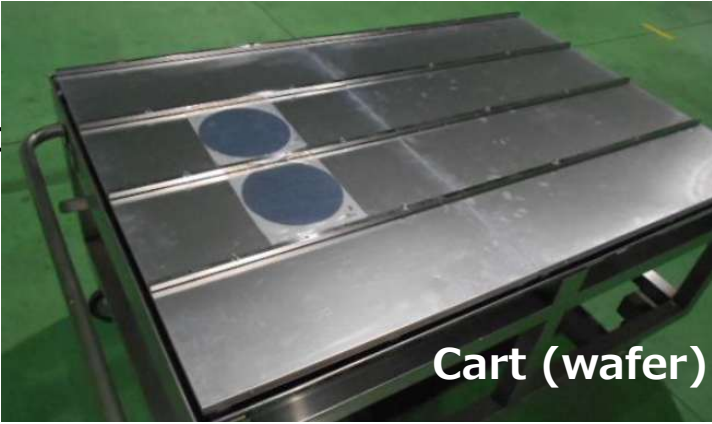


Electron Beam Irradiation by Dynamitron

Electron beam Irradiation facility

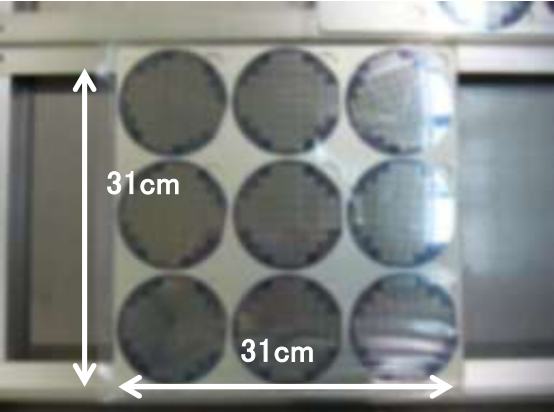


Irradiation room

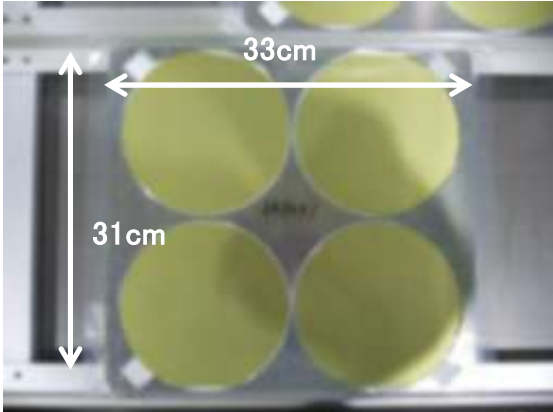


Cart (wafer)

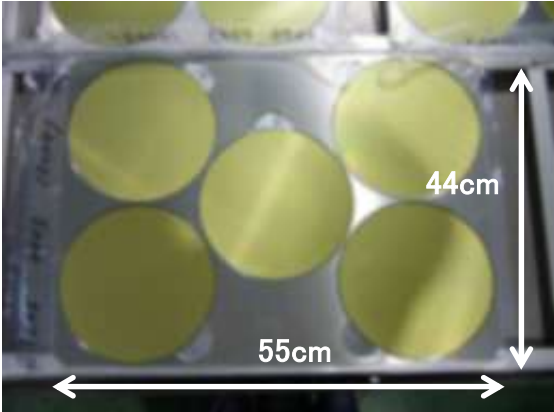
Wafer Set (Electron beam Irradiation)



4 i n c h wafer in (MAX 9sls)



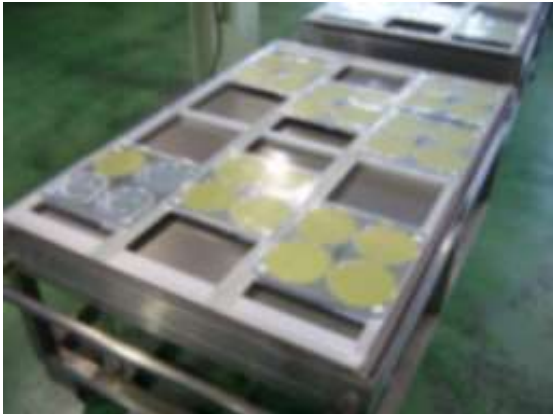
6 i n c h wafer (MAX 4sls)



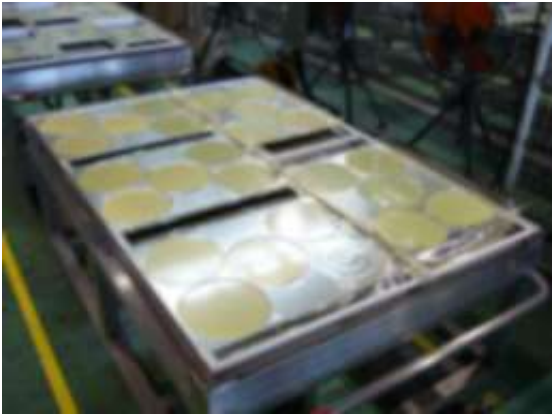
8 i n c h wafer (MAX 5sls)



Tray Setting for 4inch wafer (MAX 10 tray)



Tray Setting for 6inch wafer (MAX 12 tray)



Tray Setting for 8inch wafer (MAX 5 tray)

Outline of Ion and Electron irradiation technology for power semiconductors



Manufactured by SHI-ATEX AW800H-X18587

item	AW800H-X18587
Wafer Size	8inch
Power	2.5~ 7.5kw
Frequency	60kHz
Hot Plate Temp.	Max 400℃
Gas	H ₂ , N ₂
Gas Flow Rate	Max 600L/min
Transport Speed	0.4~25mm/sec

Target : Power Semiconductors,etc

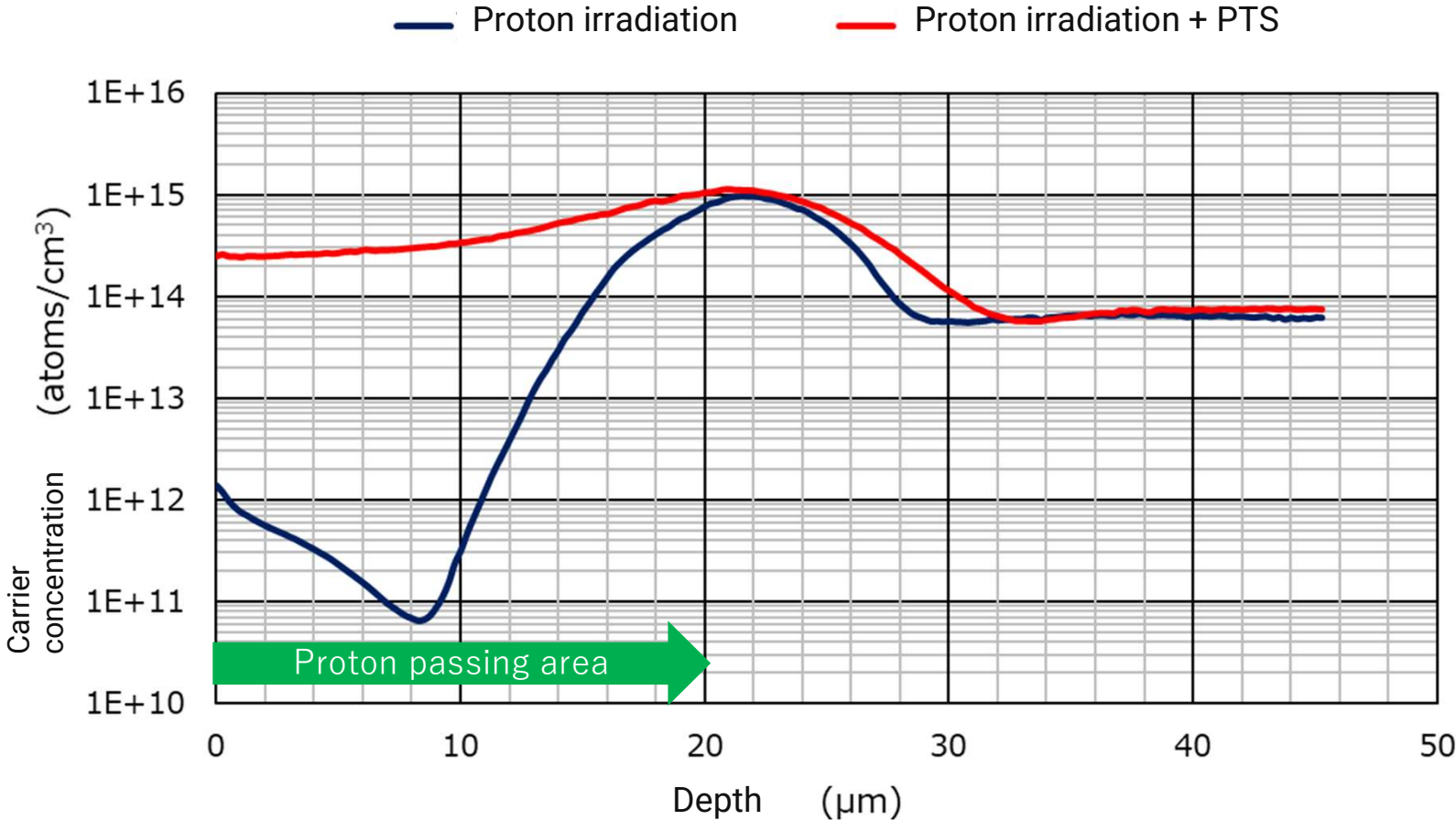
Correspondence : Preproduction · Mass production

Processing power : 150wafer/8hr、 13,500wafer/month (Depends on conditions)

Work Area Cleanliness : Class 1000 (Temperature control management)

Measurement results by SRP (Carrier concentration)

※SRP : Spreading Resistance Profiling



Laser Annealing Service (LAS)



Made by Sumitomo Heavy Industries
SWA-90GDA

Item	SWA-90GDA
Wafer Size	6 & 8inch
Laser Power	Gr : 75W×2 / IR : 500W
Frequency	3kHz @25mJ
Annealing Time	1~30us
Delay	Gr : 0~1,000nsec
Delay Fluctuation	Gr : 20nsec or less
Beam Size (FWHM)	Gr : 0.3mm×2.5mm IR : 0.24mm×4.2mm
Process Atmosphere	Air or N2
Energy Density	Gr : max 2.0J/cm2×2 IR : max 8.0J/cm2

subject : Power semiconductors, optical image sensors, etc.

support : Prototype and mass production support

throughput : 100wafer/8hr、 9,000wafer/month (Depends on processing conditions)

Work Area Cleanliness : Class 1000 (Temperature control management)