



(Model IMPULSE-100)

PLASMA DOPING SYSTEM

IMPULSE-100series

(Ref. #001)

Introduction

(Model IMPULSE-100)

System Picture

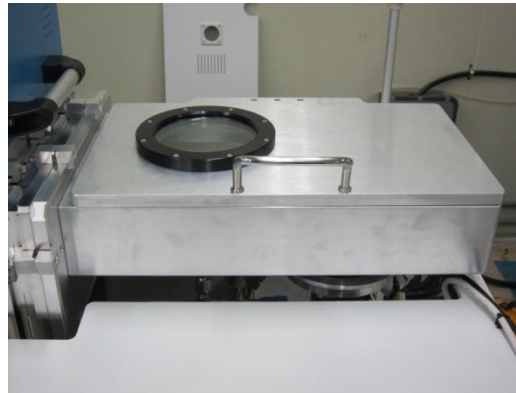


Process

- 1) Application :
N-type & P-type Plasma doping
- 2) System performance
-. Dose : $5 \times 10^{12} \text{ cm}^{-2} \sim 1 \times 10^{14} \text{ cm}^{-2}$
- 3) Wafer size : 4inch
- 4) Product yield : 1 wafer/run

System Pictures

(Model IMPULSE-100)



ULTECH Co., Ltd.



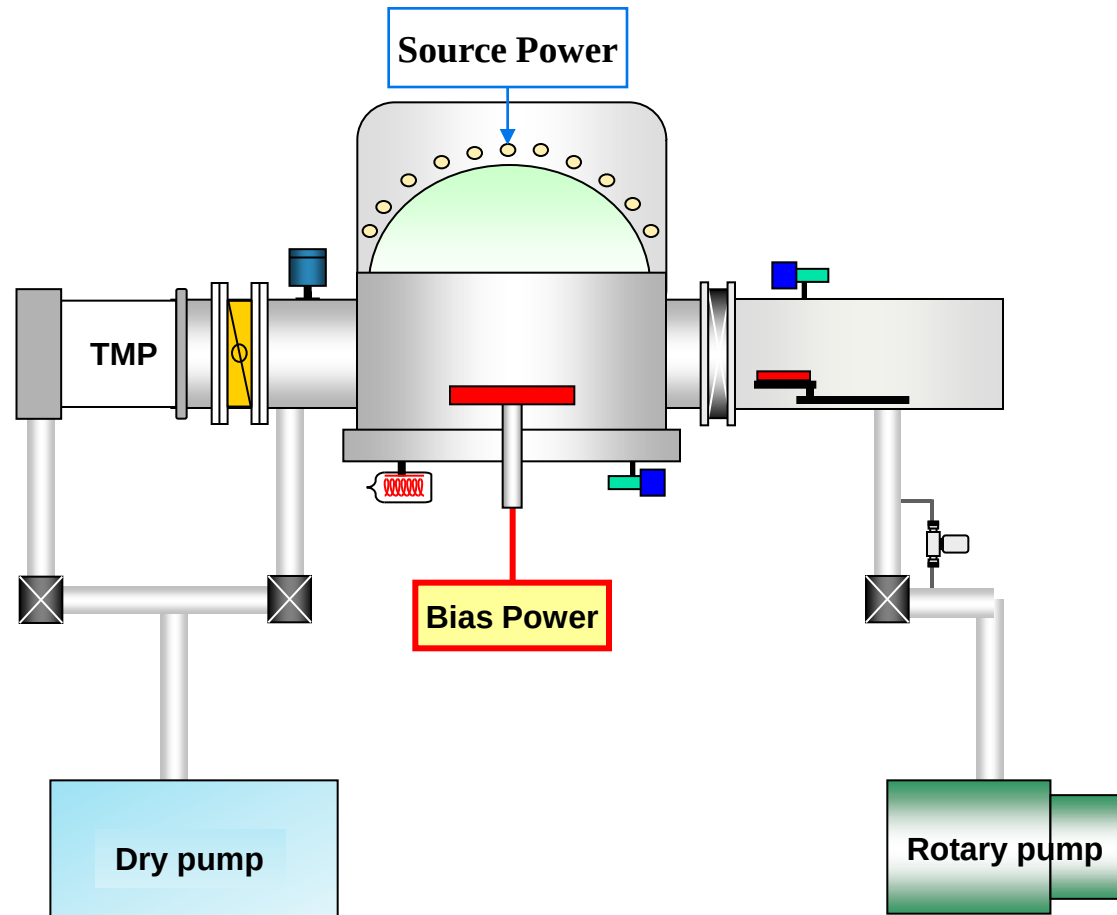
Configuration

(Model IMPULSE-100)

- Substrate size & load capacity : 4inch wafer – 1 wafer/run
- Water cooling chuck for Plasma doping
- RF generator 600W + Auto matcher
- Dry pump + TMP– Plasma doping
- Rotary pump (mineral type) – loadlock chamber
- Throttle valve + pressure controller –
- MFC: PH₃, B₂H₆, Ar, CHF₃ , SiH₄, O₂
- Top plate open/close type by manual
- PC control

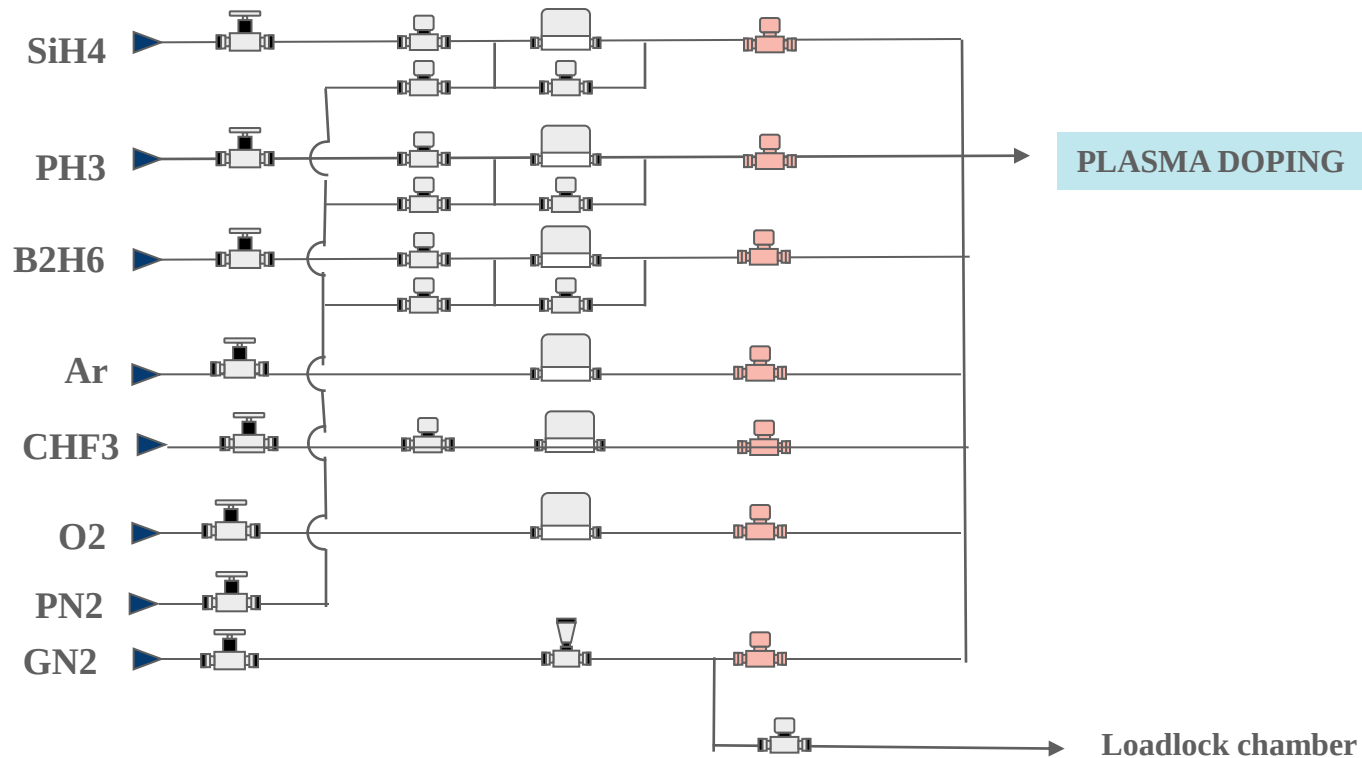
Schematic

(Model IMPULSE-100)



Schematic (Gas line)

(Model IMPULSE-100)



Process Chamber Module for Plasma doping

- Process chamber
 - Chamber material : Aluminum
 - Substrate loading/unloading : Automatic loading/unloading by Loadlock
 - View port with shutter
 - Cleaning cover
 - Process gas is injected the gas distributor unit.
- Substrate unit
 - Wafer size & capacity : 4 inch , 1(one) wafer
 - Ion accelerating power : Negative pulsed high voltage power (-500V~-5kV)
 - Pin up & down by air-cylinder
- ICP source unit
 - Uniform plasma density suitable for 4inch wafer processing
 - ICP cavity wall : Dome type quartz
 - Coil isolator
 - Water cooling for coil



< Chamber view >



< ICP source >



Specifications

(Model IMPULSE-100)

- Negative Pulsed High Voltage Power Unit
 - Output Voltage : - 500 ~ -5kV
 - Output Current : 2.5 A, average
 - Pulse width : 10 ~ 100 [μ sec]
 - Output Frequency : 0 ~ 1 KHz Max.
 - High Voltage Protection : Over load, Over voltage, Over heat
 - Cooling : Water cooling
 - Electricity (Power) : 380V, 70A, 3phase

Specifications

(Model IMPULSE-100)

Power Supply Module

- RF generator
 - Output power : 600W
 - Frequency : 13.56MHz
 - DC self bias display
- RF matching network
 - Automatic matching type
 - Frequency : 13.56MHz
- RF cable kit



< RF Power supply >



< RF matching unit >

Specifications

(Model IMPULSE-100)

Vacuum Module for Plasma doping

- Vacuum pump
 - Dry pump : 1,500 L/min (Maker: Pfeiffer)
 - TMP : 700L/sec@N₂ (Maker: Agilent)
 - Ultimate pressure : 5×10^{-6} Torr
- Pressure gauge (Maker: Atovac-Korea)
 - Low vacuum gauge : Convectron gauge
 - High vacuum gauge : Hot cathode ion gauge
 - Pressure readout & cable kit
- Pressure control
 - APC (Automatic Pressure Controller, Maker: Genius-Korea)
 - Electrical Throttle valve (Maker: Genius-Korea)
 - Baratron gauge : Full scale 1Torr (Maker: Inficon)
- Vacuum valves & lines
 - All valves Pneumatic type
 - Auto vent line
 - Stainless steel hard line and flexible bellows line



< Dry pump >



< TMP >



< Pressure gauge set >



< Automatic pressure controller
& Throttle valve >

Specifications

(Model IMPULSE-100)

Loadlock Module

- Loadlock chamber
 - Substrate tray capacity : One(1) wafer
 - Automatic transfer operation
- Vacuum unit
 - Rotary pump : 600L/min
 - Ultimate pressure : 5×10^{-3} Torr
- Pressure gauge
 - Low vacuum gauge : Convectron gauge
 - Pressure readout & cable kit
- Vacuum valves & lines
 - Roughing line valve : Pneumatic type angle valve
 - Soft pumping line valve : 1/2inch Pneumatic type diaphragm valve
 - Auto vent line
 - Stainless steel hard line and flexible bellows line



< Loadlock Chamber



< Rotary pump >



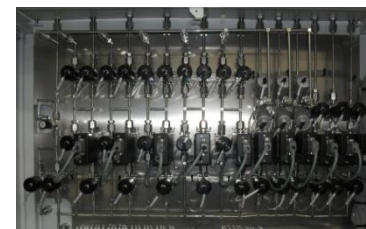
< Pressure gauge set >

Gas Delivery Module

- Used gases & flow control
 - Process :

Ar :	MFC (Maker: MKS)
CHF3 :	MFC (Maker: MKS)
O2 :	MFC (Maker: MKS)
PH3 :	MFC (Maker: MKS)
B2H6:	MFC (Maker: MKS)
SiH4:	MFC (Maker: MKS)
PN2	
 - Purge & vent :

N2 :	Metering valve
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- Gas valves & gas line
 - Pneumatically operated diaphragm valve
 - Metering valve for N2 purge & vent
 - The gas line is helium-leak tested to 10⁻⁹ Torr·L/sec.



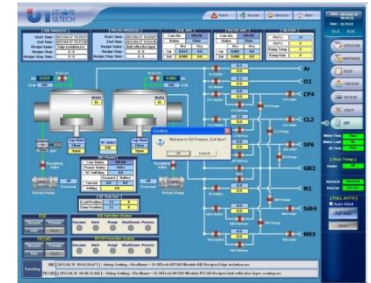
< Gas delivery module >

Specifications

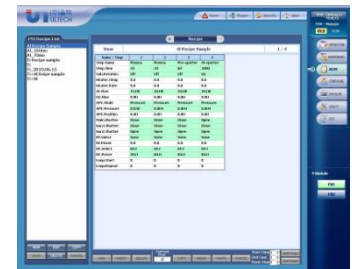
(Model IMPULSE-100)

Control Module

- System control
 - System is controlled by PC automatically & manually
 - MS Window 7Pro
 - UPRO software
 - Industrial PC (PENTIUM, 17" LCD monitor)
 - Including analog & digital input/output card
 - Process control software
 - User friendly screen & easy Graphic User Interface (GUI)
 - Process data logging
 - Recipe edit, save, download, run
- Main Frame with electrical contact mechanism
 - Electrical power drive panel (ON/OFF/Emergency switch)
 - RF power control panel
 - Vacuum & pressure control/display panel
 - Gas flow control/display panel



<Control program GUI >



<Control program RECIPE >

Frame Module

- System frame is mild steel
- White & Blue colored panels & frame covers
- 19inch control panel mountable
- Easily movable casters & leveling foots

Specifications

(Model IMPULSE-100)

- Chiller for substrate cooling unit **(OPTION)**
 - Working temperature : 4 ~30 °C
 - Refrigerator capacity : $\frac{3}{4}$ Hp
 - Flow rate : 40 L/min



< Chiller >

Warranty

Manufacturer warrants for a period of one(1) year from the final acceptance.

This warranty shall become null and void upon any modification and/or improper service performed to the equipment by the customer. This warranty shall not be extended to those defects caused by improper operation, maintenance and handling by the customer.

All consumable, such as CF gasket, O-rings, view port glasses, gauge sensors, fuses and others, are entirely excluded from warranty.



(Model IMPULSE-100)

PLASMA DOPING System **Technical data**

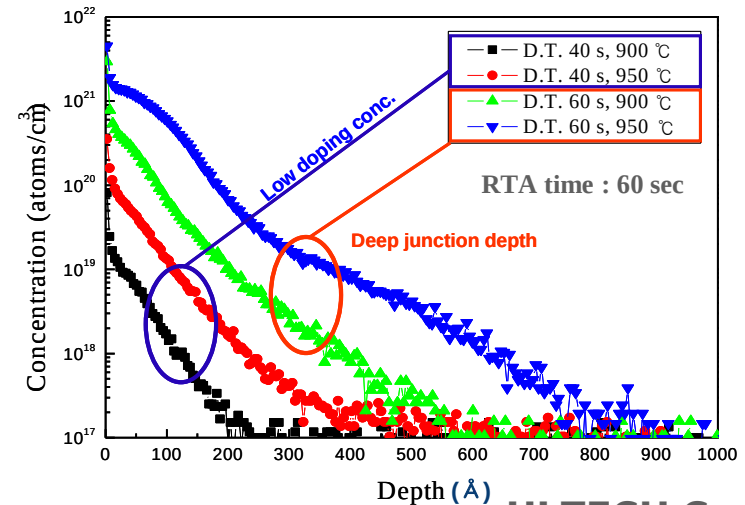
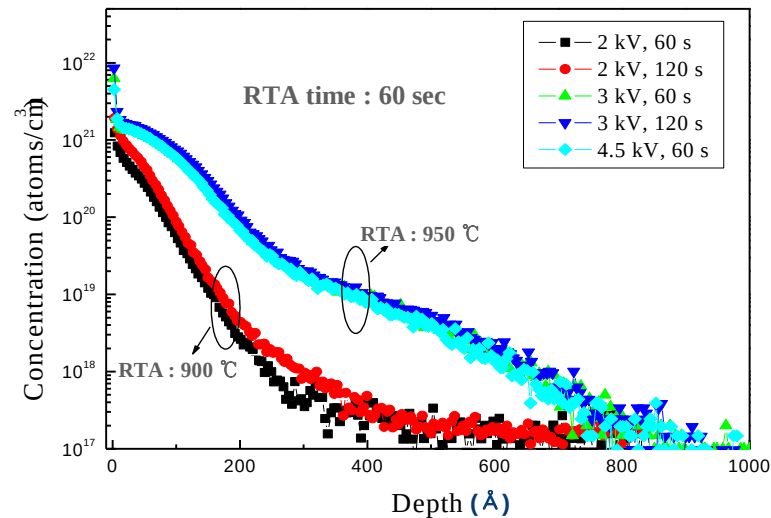
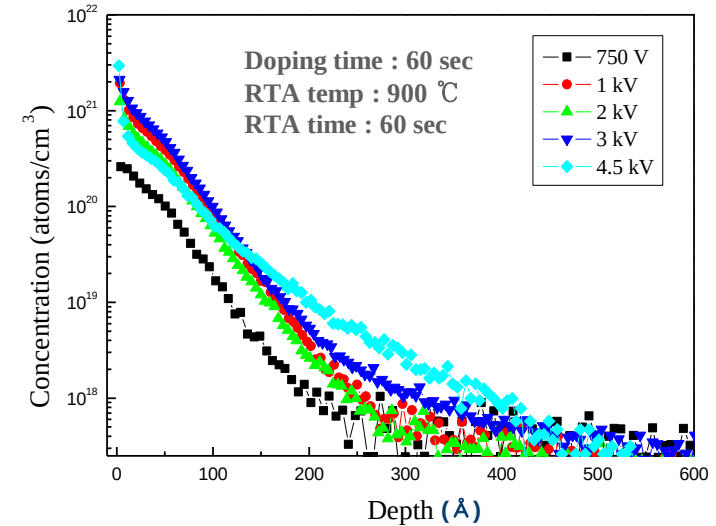
Process Data (PDS)

(Model IMPULSE-100)

P-type doping

Substrate	Un-doped poly Si/SiO ₂ /Si
Gas	BF ₃
Bias	Variable
Doping Time	60 sec
RF Power	200 W
Pressure	10 mTorr
RTP	Variable

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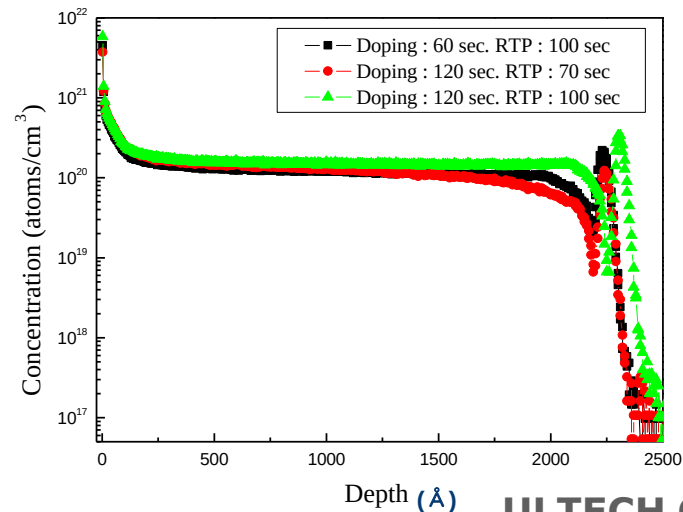
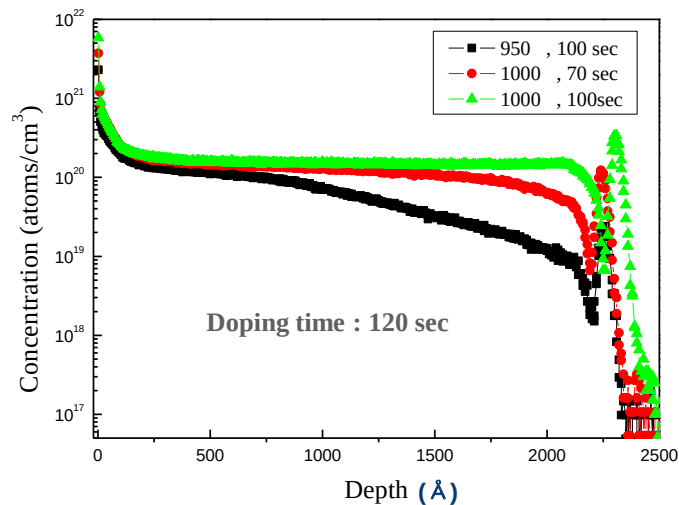
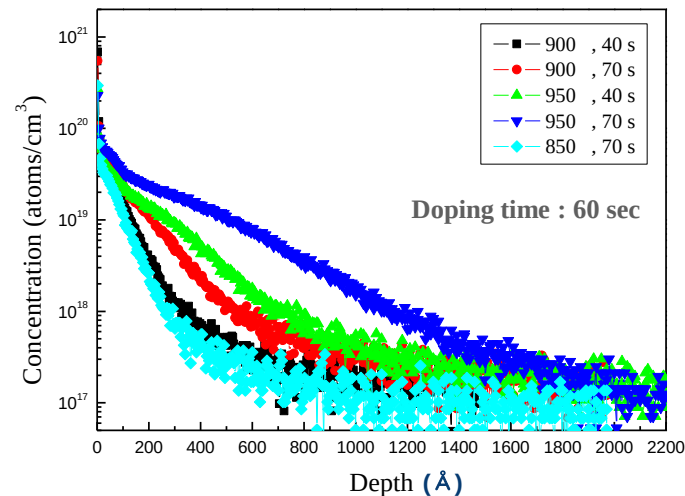


Process Data (PDS)

(Model IMPULSE-100)

N-type doping

Substrate	Un-doped poly Si/SiO ₂ /Si
Gas	10 % PH ₃ /90% He + Ar
Bias	4.5 kV
Doping Time	60 sec, 120 sec
RF Power	200 W
Pressure	10 mTorr
RTP	850 °C ~ 1000 °C, 40~100 sec



Process Data (PDS)

(Model IMPULSE-100)

Sheet resistance

