

PLASMA BASED ION IMPLANTATION AND DEPOSITION

Tools for R&D and Small Scale Production

03

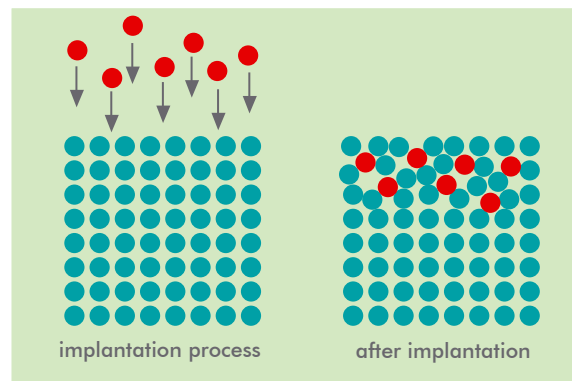
The PIII-300 series provided by DTF is based on a modular concept for implantation, doping and deposition processes. With a variety of optional RF antennas, magnetrons, measurement and process control systems the system can be adapted to a broad range of applications.

PBII - Technology

Ion implantation is a unique tool to change or modify the surface properties of different materials, creating new phases and alloys, far away from the thermal equilibrium.

However, the commercial use of ion implantation is limited due to the high treatment costs and problems of uniform implantations in three dimensional shaped objects, since conventional ion implantation is a typical line of sight process. Plasma based ion implantation (PBII) has been developed to circumvent these limitations.

A substrate is immersed into plasma. Applying negative high voltage pulses (up to -100 kV) to the substrate, ions are extracted from the plasma, accelerated by the potential drop in the sheath, and implanted into the outermost surface of the sample.



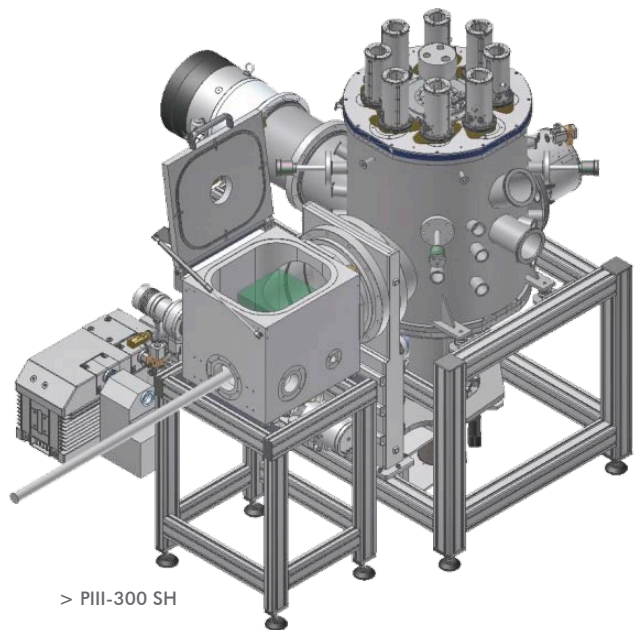
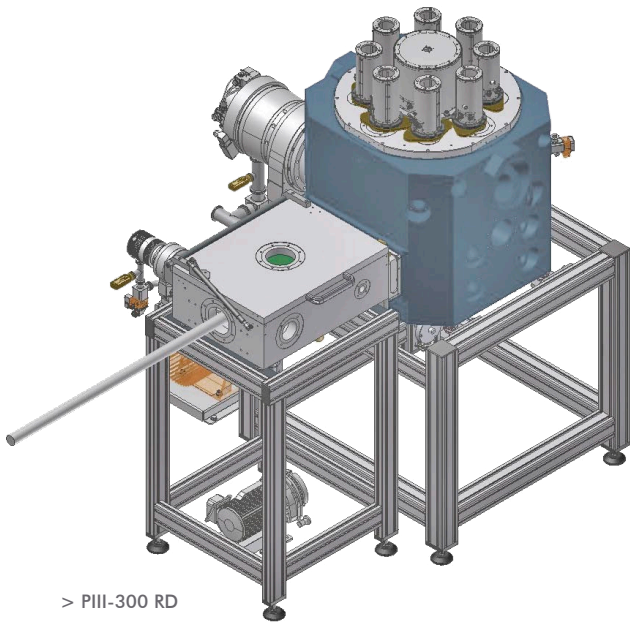
The implantation into the surface leads to a mixing of implanted ion species with the substrate material.

The parameters of this implantation allow to control:

- depth profiling (by adjusting the energy of the implanted ions using pulses at different voltages)
- dose of the implanted species (by adjusting pulse length and number of pulses)

Advantages of PBII

- high ion current density
- fast processing
- implantation & deposition of 3D-objects possible
- no scanning system required
- implantation time is size independent
- improved process control
- low cost of ownership / scalable process



	PIII-300 RD	PIII-300 SH
Application	<ul style="list-style-type: none"> • doping of solar cells /wafers • dopants: Diborane, BF₃, PH₃ 	<ul style="list-style-type: none"> • deposition (hard & protective coatings) • metal layers, nitrides, oxides
Chamber	aluminium	stainless steel
Substr. size	max. 300 mm diameter, 10 mm height	3D substrates (200 x 200 x 200 mm ³)
Substr. holder	<ul style="list-style-type: none"> • rotatable (30 rpm), z-drive: 250 mm • with water cooling 	<ul style="list-style-type: none"> • rotatable (30 rpm), z-drive: 250 mm • with water cooling
Vacuum system	turbo pump Leybold MAG 1500CT (resistant against corrosive gases)	turbo pump Leybold T1600
Plasma generation	RF antenna system (up to 10 single antennas)	<ul style="list-style-type: none"> • magnetrons (4 x 2" or 1 x 6") • optional RF antenna
Pulse voltage	up to 20 kV	up to 40 kV
Pulse duration	10 ... 100 μs	10 ... 100 μs