



ATOMFAB

# PACE PERFORMANCE PLASMA

The fastest remote plasma high volume manufacturing ALD system for GaN power and RF devices.

FAST PACE | LOW DAMAGE | LOW CoO



# Pace

The first remote Plasma Atomic Layer Deposition (ALD) system specifically designed for your high volume manufacturing needs. Delivering the fastest, low damage, low cost of ownership, production plasma ALD processing for GaN power and RF devices.

## Solutions for your production needs

- Low CoO
- Quick, easy maintenance
- Excellent film uniformity
- High material quality
- Low particle counts
- Low substrate damage
- Faster deposition rate, high throughput
- Clusterable and automated wafer handling



# Performance

ALD offers precisely controlled ultra-thin films for advanced applications on the nanometre scale, with conformal coating of sensitive substrates structures.

## Process benefits for passivation of Power/RF devices

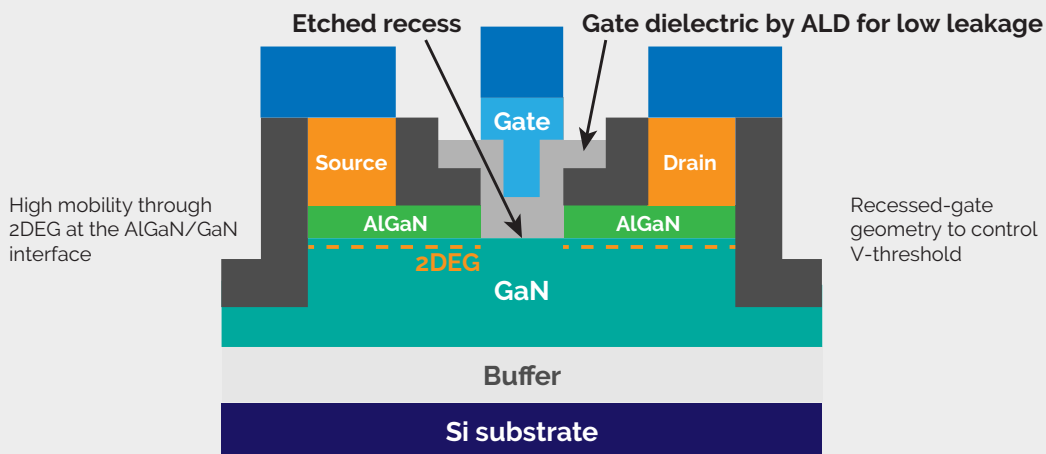
- Guaranteed processes setup by our engineers
- Lifetime process support for additional/new processes
- Low-damage plasma processing
- High quality deposition with low film contamination
- Low particle levels
- Short plasma exposure times enabling high throughput
- Plasma surface pre-treatments

## Advantages of Plasma ALD for GaN, Power & RF devices

- With plasma pre-treatment prior to deposition to enhance interface quality
- Low damage, uniform deposition
- Remote plasma ALD with controlled ion energy from near zero to 30 eV
- ALD passivation, gate dielectric by  $\text{Al}_2\text{O}_3$  films

**Increased throughput & improved uniformity to bring remote plasma ALD to high volume manufacturing.**

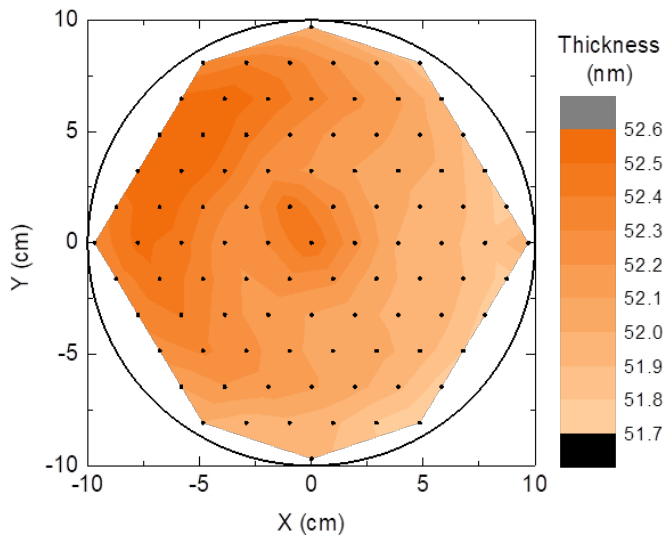
## GaN high-electron mobility transistors (HEMTs)



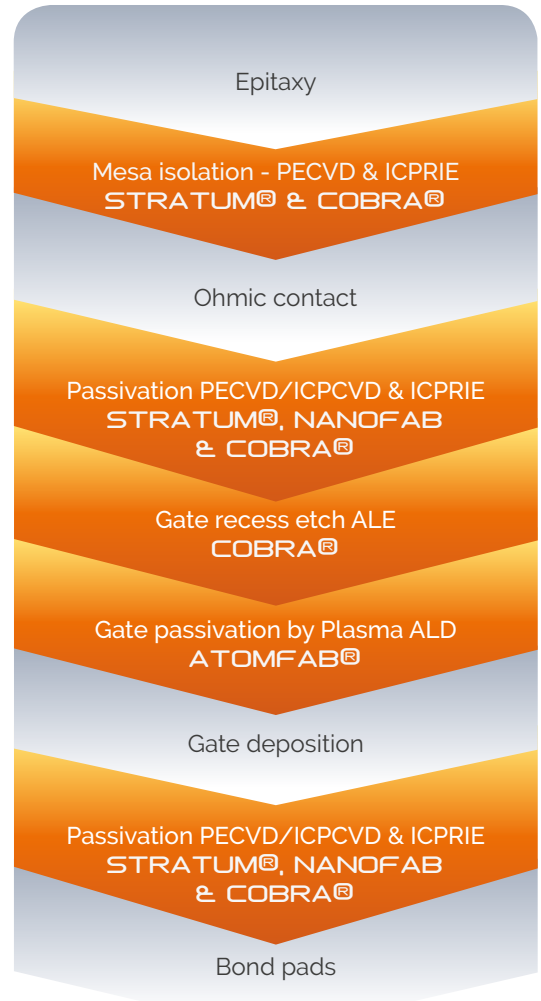
# Performance

## Process results

Plasma ALD $Al_2O_3$ at 300 °C	Specification
Within wafer thickness uniformity	<±1.0%
Wafer-to-wafer thickness repeatability	<±1.0%
Breakdown voltage	≥7.0 MV/cm



Ellipsometry map of 200 mm Si wafer with <±1.0% thickness uniformity for 20 nm  $Al_2O_3$  deposited at 300 °C





# Plasma

Up to 4 liquid/solid precursors with a choice of 600 ml or 1200 ml sizes with automatic changeover and the option for level sensing.

Excellent precursor and process control

On-board gas pod with 5 MFC controlled gases

Compact remote plasma source up to 200 °C

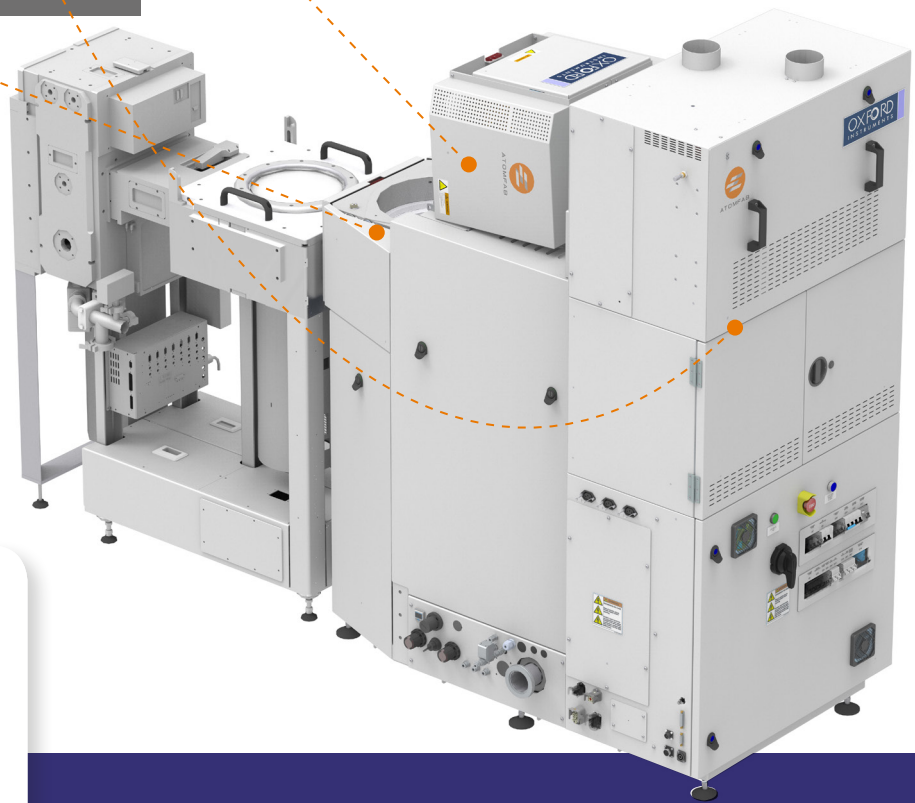
Easy access to precursor cabinet

200 mm wafer electrode up to 400 °C

Atomfab offers unique capability in engineering nanoscale structures and devices.

## Hardware benefits

- Optimisation of chamber, source and wafer position
- Easily removable components for maintenance
- Low damage to target power/RF GaN devices



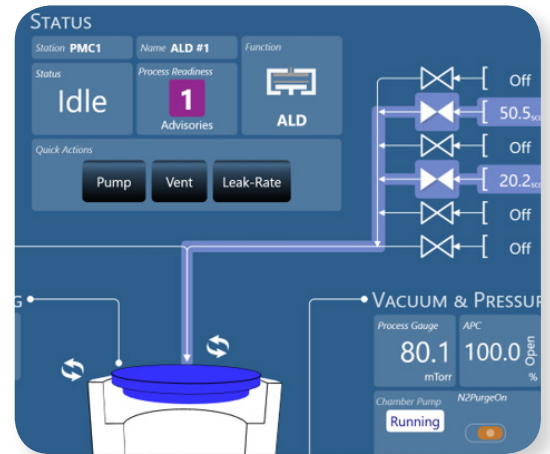
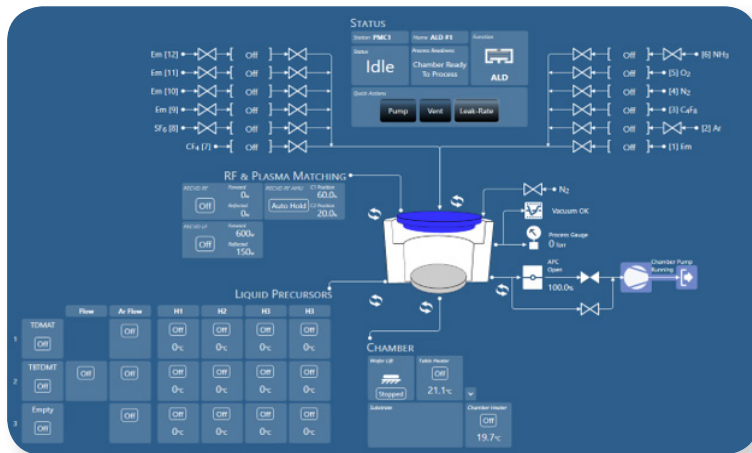
## Cluster options

- Clustering to automated handler
- Rear access (within MES) to:
  - Gas pod
  - Precursor cabinet
- Power distribution

# Plasma

## Software

- SEMI E95 software platform maximising wide screen and multiple displays
- Easy-to-use interface and PLC control
- Optimised recipe editor for ALD processing
- Ultra-fast PLC controller with 10 ms minimum step time and 1ms resolution thereafter
- Multi-user level password protected ideal for multi-user facilities
- All valves fully controllable via graphical interface



# Support

## Support contracts

	<b>STANDARD CARE</b> Contract	<b>COMPREHENSIVE</b> Care Contract	<b>TOTAL CARE</b> Contract
12, 24 or 36 month contract available from expiration of warranty	✓	✓	✓
Helpdesk and Team Viewer support***	Normal hours 0800 - 1700 Mon-Fri. Response time within 24h <sup>1</sup> .	Extended hours 0800 - 2200 Mon-Fri. Response time within 4h <sup>1</sup> .	Available 24/7. Response time within 4h <sup>1</sup> .
Replacement or repair of Oxford Instruments and Original Equipment Manufacturer (OEM) parts <sup>2</sup>	OI parts only plus 10% discount on OEM parts	OI & OEM parts	OI & OEM parts plus provision of consumables**
Log Viewer software (only available on X20)	✓	✓	✓
Training/Upgrades/Spares	5% discount	10% discount	15% discount
Engineer response to site (travel & expenses incl.)	Based on availability	Guaranteed within 5 working days	Guaranteed within 2 working days
Spare parts supply <sup>3</sup>	Based on availability	Agreed critical spares within 5 working days	Agreed critical spares within 2 working days
Annual planned preventative maintenance (PM) visit including PM kit, System test & validation post PM.	✓	✓	Customised PM & chamber cleaning plan according to tool type & usage.
Plasma Help Lightning – merged reality application		✓	✓
Mean time to repair (MTTR) performance target and report*			✓
Uptime performance target and report*			✓

## Warranty options

	<b>STANDARD CARE</b> Warranty	<b>COMPREHENSIVE</b> Care Warranty	<b>TOTAL CARE</b> Warranty
12 months duration from acceptance of the tool at site or shipment date plus 90 days	✓	✓	✓
Helpdesk and Team Viewer support***	Normal office hours 0800 to 1700 Mon-Fri. Response time within 24h <sup>1</sup>	Extended office hours 0800 to 2200 Mon-Fri. Response time within 4h <sup>1</sup>	Available 24/7. Response time within 4h <sup>1</sup>
Replacement or repair of Oxford Instruments & Original Equipment Manufacturer (OEM) parts <sup>2</sup>	✓	✓	Plus provision of consumables**
Log Viewer software (only available on X20)	✓	✓	✓
Engineer response to site (travel & expenses incl.)	Based on availability	Guaranteed within 5 working days	Guaranteed within 2 working days
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Annual planned preventative maintenance (PM) visit including PM kit, system test and validation post PM			✓
Plasma Help Lightning – merged reality application		✓	✓
Mean time to repair (MTTR) performance target and report**			✓
Uptime performance target and report*			✓

### NOTES

- Software bug fixes are included.
- \*Contract specific
- \*\*Consumables include items such as selected viewports, centering rings, gaskets, bearings, springs, thermal fluid, orings, filters & wafer clamping parts
- \*\*\*Team Viewer Support requires remote customer access and loaded software

1. Excludes national holidays. OIPT working days.
2. Within standard operating conditions and agreed usage plan. Please refer to FIS. OEM parts include items such as pumps, generators, chillers, arms, elevators and non OIPT handlers, MFCs, PCs, end point detectors, gauges and VAT valves.
3. Subject to regional location, transport routes and export requirements. Delivery of parts into high risk countries can not be guaranteed.

# Worldwide Service and Support

Oxford Instruments is committed to supporting our customers' success. We recognise that this requires world class products complemented by world class support. Our global service force is backed by regional offices, offering rapid support wherever you are in the world.

## We can provide:

- Flexible service agreements to meet your needs
- Tailored system training courses
- System upgrades and refurbishments
- Immediate access to genuine spare parts and accessories



For further information about our tools, please contact your local Oxford Instruments Plasma Technology office.

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INSTRUMENTS

