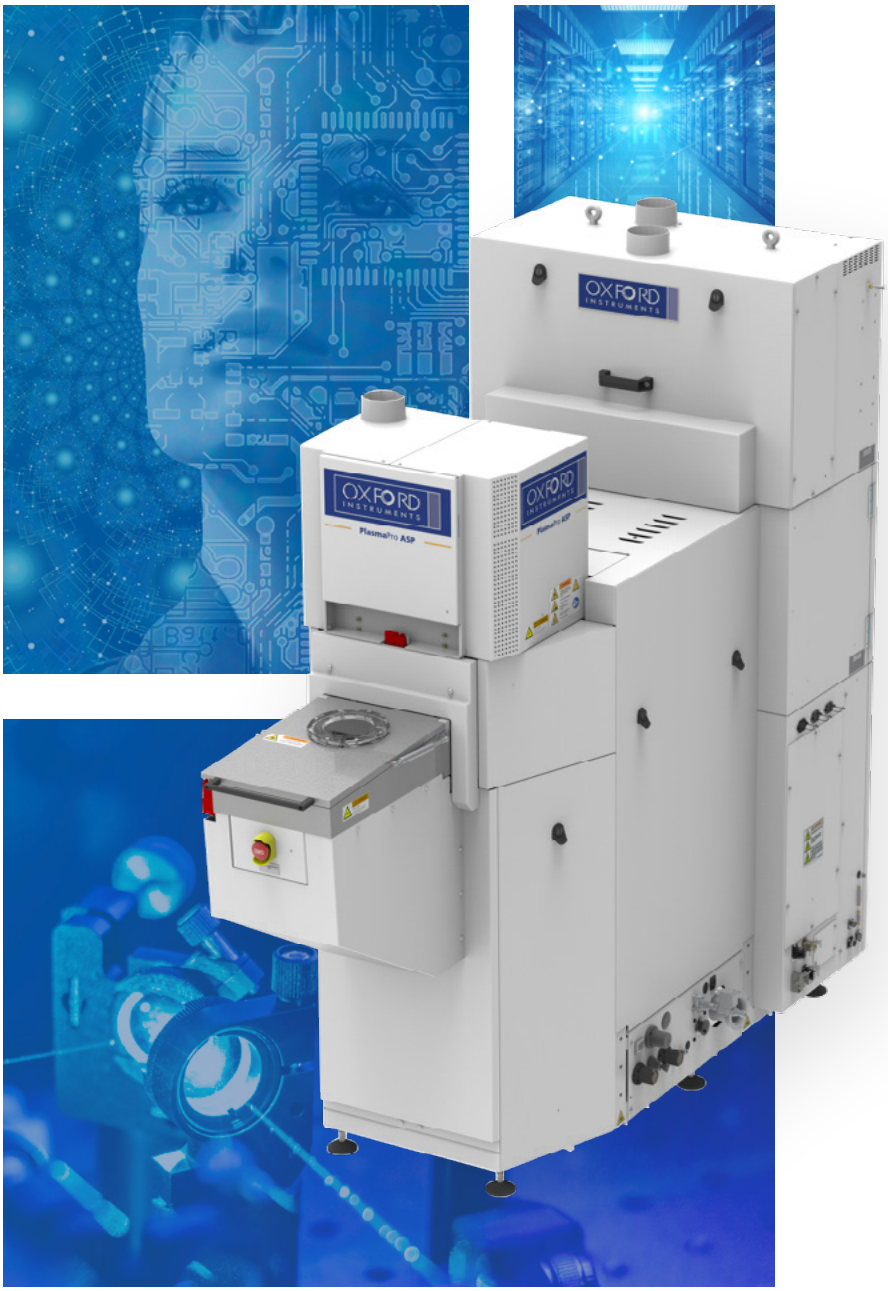
OXFORD INSTRUMENTS

Flexible Atomic Scale Processing



PlasmaPro® ASP

Part of the **Atomfab** platform range

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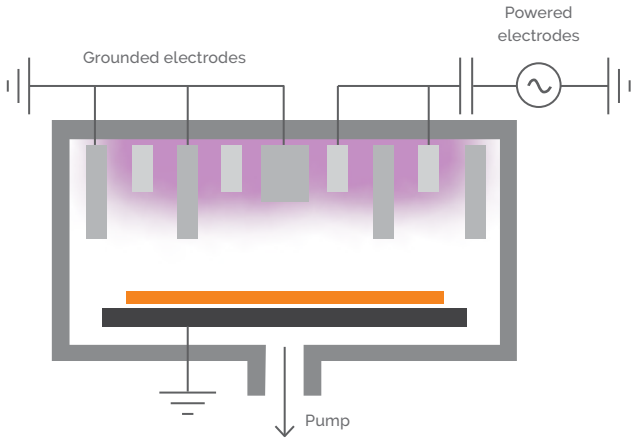
Modern devices require atomic scale film engineering to achieve material characteristics and interfaces for advanced technologies like electronics, photonics and quantum. Atomic layer deposition has long been noted for conformality, atomic-scale control of thickness, and tunable film properties, but has previously been limited by low deposition rates.

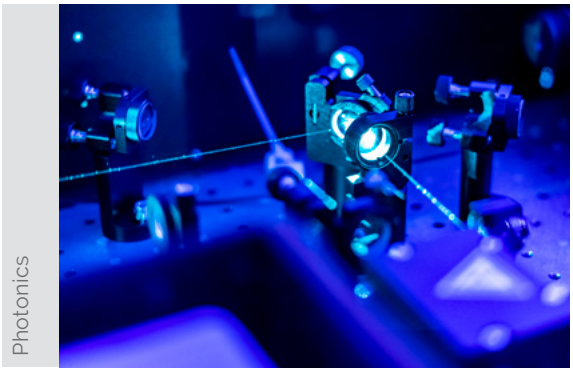
PlasmaPro ASP delivers a step-change in capability, with **rapid, high-rate** deposition of **conformal, tunable** oxides and nitrides. The module expands the applicability of ALD to new use cases and allows much faster process development where ALD is established.



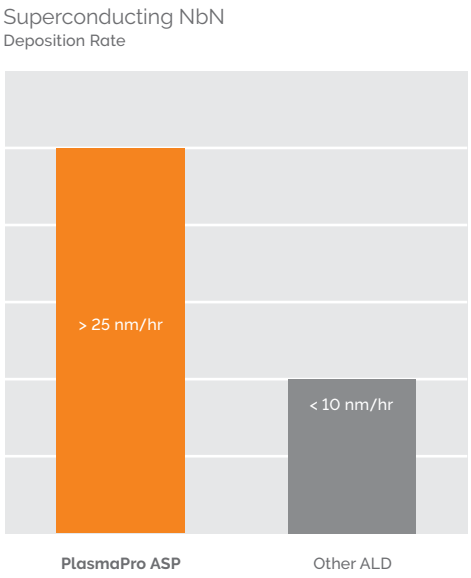
- High rate process enabled by Oxford Instruments patented* plasma source design
- Stage bias for ion energy control
- Low volume chamber enables fast switching times
- Latest intuitive PTIQ Software
- Easy to Maintain
- Flexible R&D ALD system based on our production-proven Atomfab

*Patented Plasma Source (EP3794628B1).

High-rate biased plasma ALD with low damage for R&D.



Fast, Versatile Atomic Layer Processing



Speed

- Faster Process Development
- Apply ALD to new technologies
- Reduced overnight unattended running
- Faster baselining
- Wider Process Windows
- Faster development without compromise

PlasmaPro® ASP NbN Process Results	
Deposition temp. (˚C)	320 ˚C
Growth rate	> 50 nm in 2 hrs
Growth per cycle	0.6-0.7 Å/cy
Uniformity 150 mm (%) [max-min]	< ±5%
Repeatability (%)	1%
Conformality	100% in 8:1 trench
Cleaning	> 6 µm of material
Resistivity	< 250 µΩ.cm
RI @632.8nm	2.1-2.3
T_c	> 11K
Stress	< 1.5 GPa

PlasmaPro® ASP

Exceptional flexibility and throughput

Efficient remote plasma source 1

- High and uniform radical density and low ion energies for low damage, fast saturation
- PLC and AMU control allows rapid plasma striking

Wafer electrode 2

- 200 mm wafer electrode with bias
- Up to 400 °C deposition temp.
- 200 °C heated inner chamber

Ease of cleaning 3

- Removable metal surfaces in chamber
- Purged outer chamber and lower pumping areas

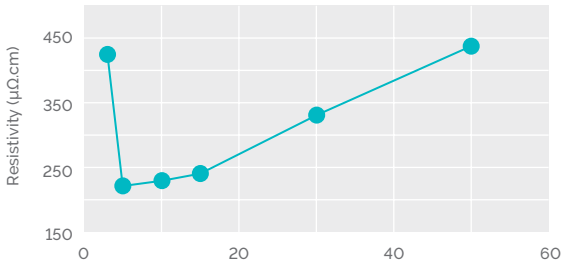
Excellent precursor and process control 4

- Up to 6 precursors, bubbled or vapour drawn

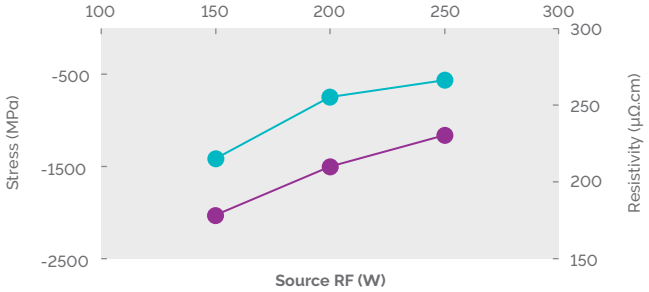
Control system 5

- Ease of service, simplified wiring
- Improved diagnostics for service
- No separate 'electronics' rack

PlasmaPro® ASP is part of the Atomfab platform range which shares common design features and will extend to other atomic scale processing technologies.



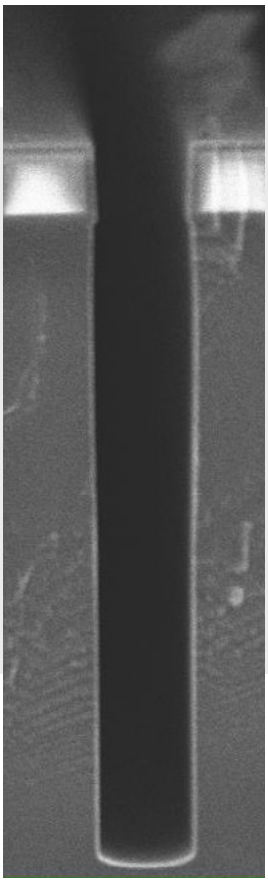
Adding a small amount of bias improves the resistivity of the NbN film.

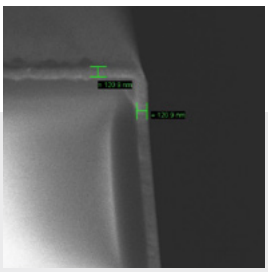


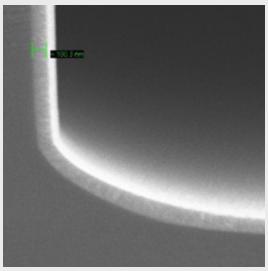
Varying the plasma power is another way to adjust the stress of the deposited NbN.

Conformality

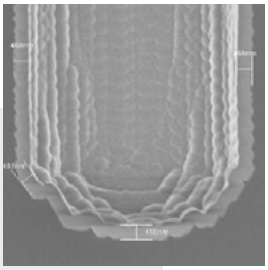
ALD nitrides and oxides







130 nm conformal superconducting NbN deposited in 8:1 aspect ratio trench using PlasmaPro ASP. Trench etched using Oxford Instruments **Plasma**Pro® **100** Estrelas in cryogenic mode.



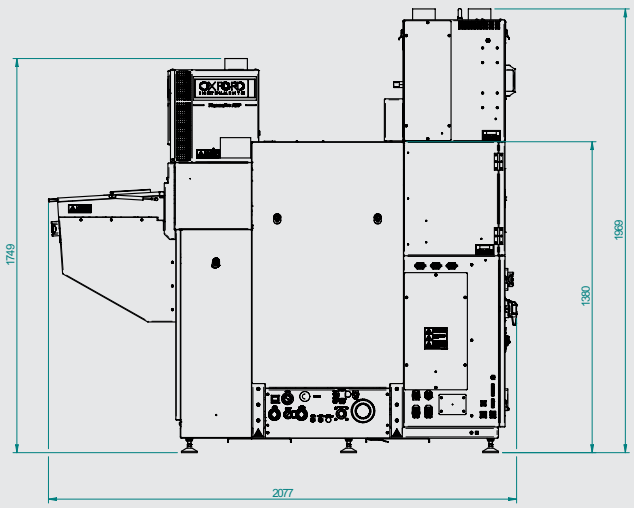
450 nm conformal SiO_2 deposited in 32:1 aspect ratio trench using PlasmaPro ASP.

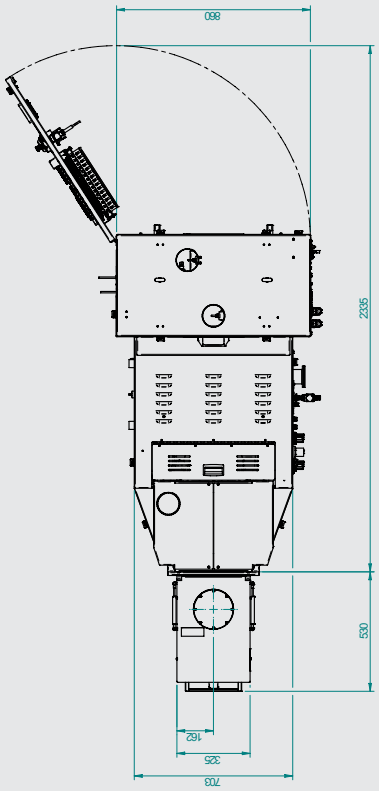
Superior Technical Capabilities

Compatible with 50mm to 200mm substrates and incorporates advanced technology the system operates seamlessly in R&D and low-volume production environments.

Specifications

Precursor lines	Maximum 6 (any combination)
Precursor type	Vapour draw - cooled Vapour draw - heated Bubbled – heated
Handling	Loadlock
Gas pod	5 line onboard
Electrode	400 °C grounded/biased





PlasmaPro® ASP

PlasmaPro® ASP

System operation and support

System control

- Clear and simple to use software for process operators, while retaining the full functionality for production facility managers and service staff
- Fully SECS/GEM compatible
- The front-end visual interface, which controls and monitors the process tool, is configured exactly for the customer's system
- Process recipes are written, stored and recalled through the same software, allowing a comprehensive recipe library to be built
- Password controlled user login allows different levels of user access and tasks, from 'one -button' run operation to full system control
- Continuous system data logging ensures effective traceability of each wafer and process run

Global process support for the lifetime of the tool

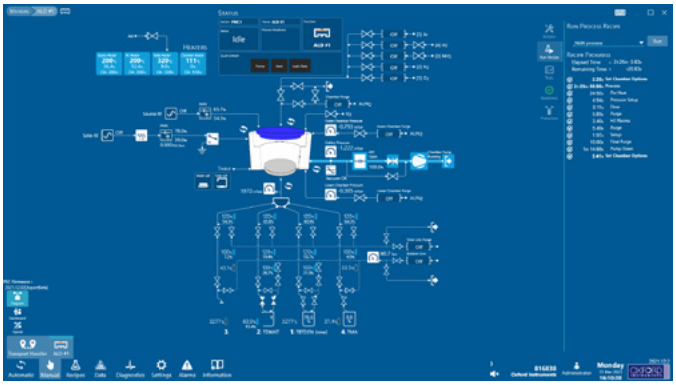
The priorities of Oxford Instruments' applications teams are:

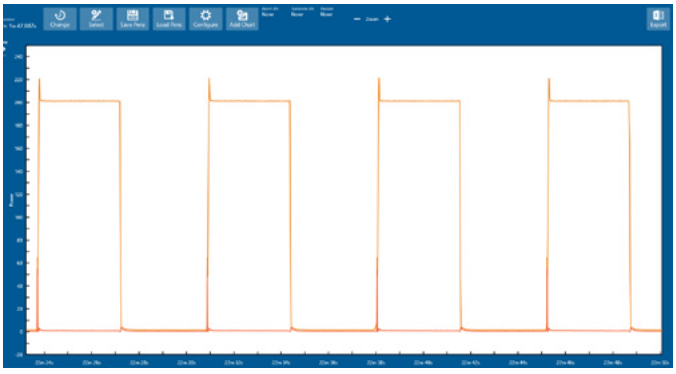
- Fast turnaround of pre-sale development samples
- Effective post-sales support for the lifetime of the tool

To achieve this, we have dedicated applications laboratories in the UK, USA and Taiwan. With over 25 plasma systems in our labs, our engineers have the tools available to constantly be working on process and hardware developments.

PTIQ

- Intuitive GUI
- Sophisticated datalogging
- Role-based security





Worldwide Service

For further information please contact your local Oxford Instruments Plasma Technology office.

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

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