



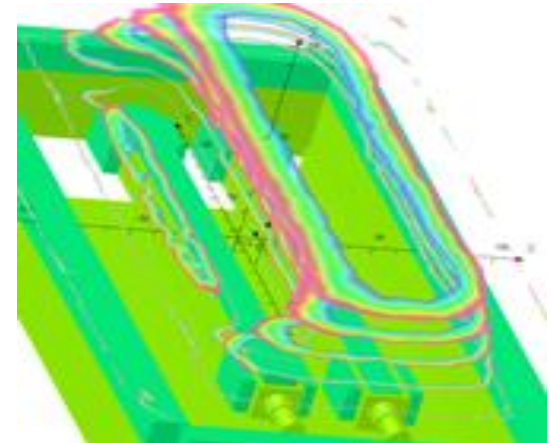
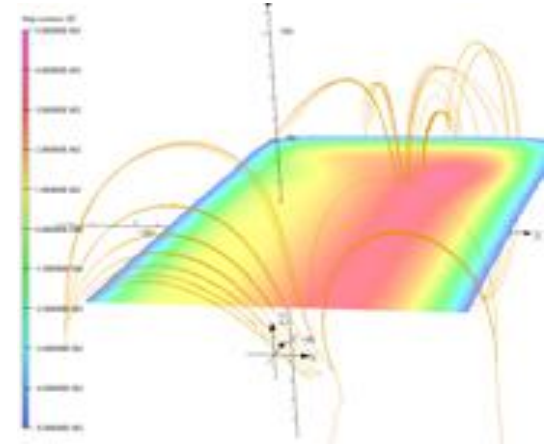
Gencoa subcontract services overview
presentation for development of thin film
coating structures, plasma treatment &
process simulation services

Perfect your products and process with GENCOA Thin Film Components & Vacuum Technology



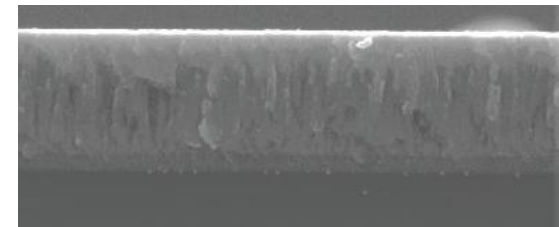
Gencoa Key Company Info

- **Gencoa** is a private limited company (Ltd)
- Located in Liverpool, UK
- Critical component supplier to the vacuum deposition industry, 95% of products exported from the UK
- Products and development services for the plasma thin film deposition community
- One-stop 'shop' for layer and plasma product research and development services
- 39 employees with local sales or support staff in China, Germany & USA
- > 5000 magnetrons in the field
- > 3000 speedflo control systems in the field



GENCOA Key Company Facts

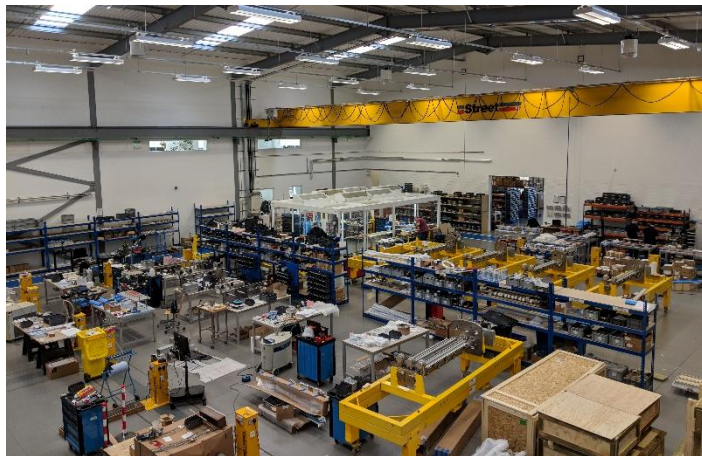
- **GENCOA** is a private limited company (Ltd)
- Founded 1995 by Dr Dermot Monaghan
- Located in Liverpool, UK
- Employs 39 people
 - 3 design (Creo (Pro E) 3D CAD)
 - 6 process & product development & simulation
 - 12 assembly & test
 - 3 UK based sales and support
 - 4 sales & tech support in local markets (1 China, 1 Germany, 1 USA)
 - 6 administration & accounts
 - 3 hardware & software (Speedflo & OPTIX)



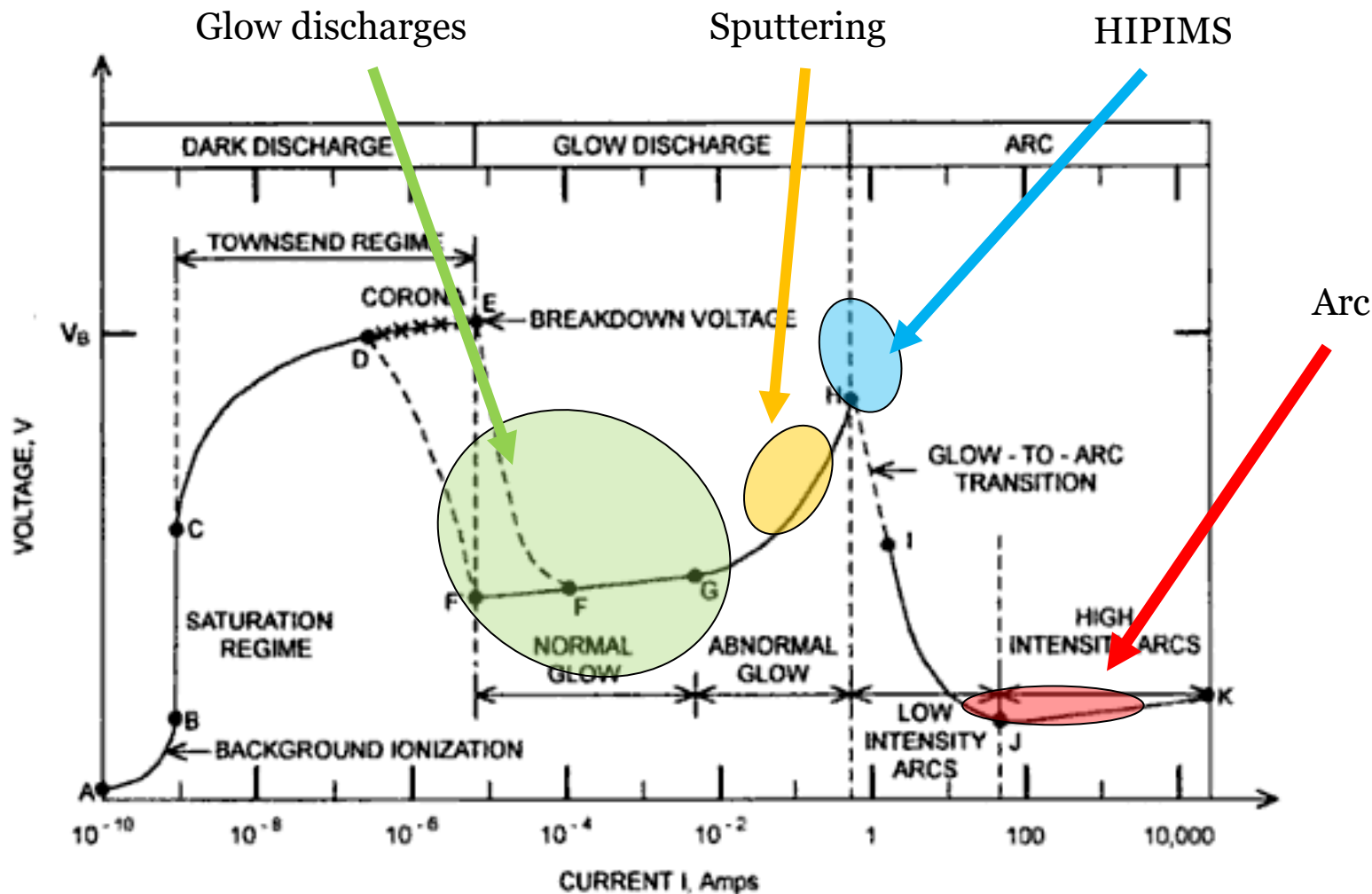


Gencoa Purpose Built Factory

Purpose built factory completed May 2016
27,000 sqft of office, manufacturing and R&D space



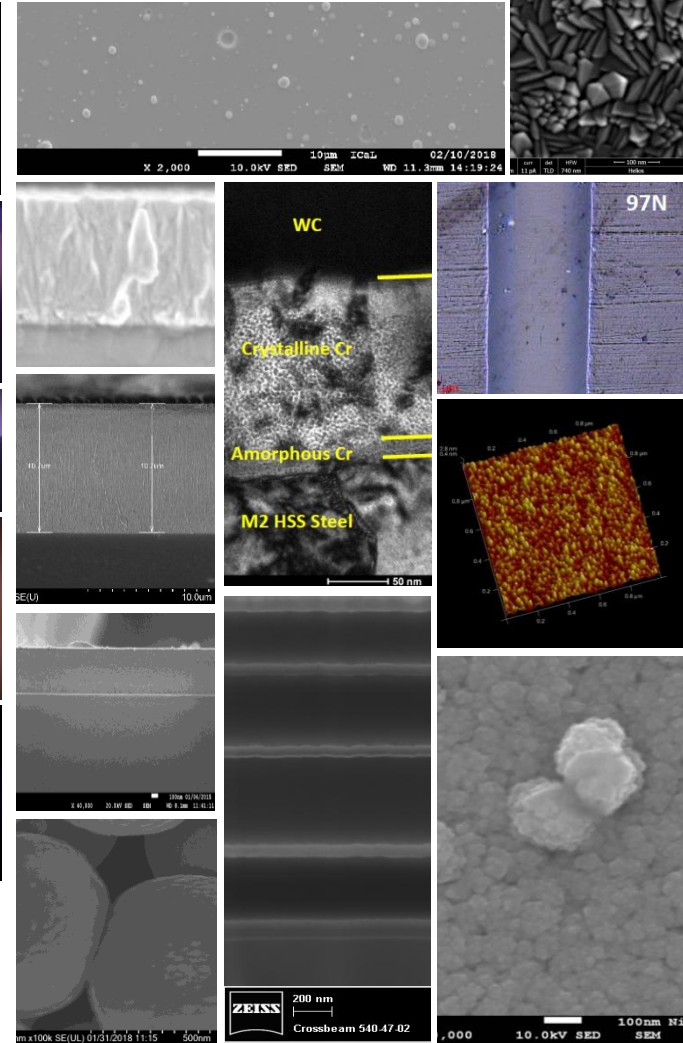
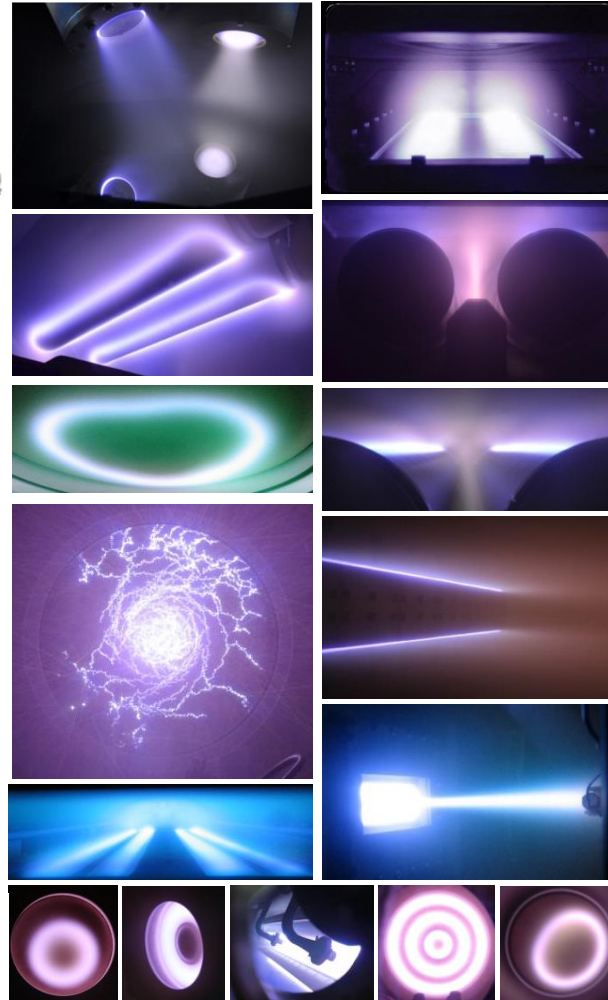
Genco product and coating development services span the Plasma Spectrum





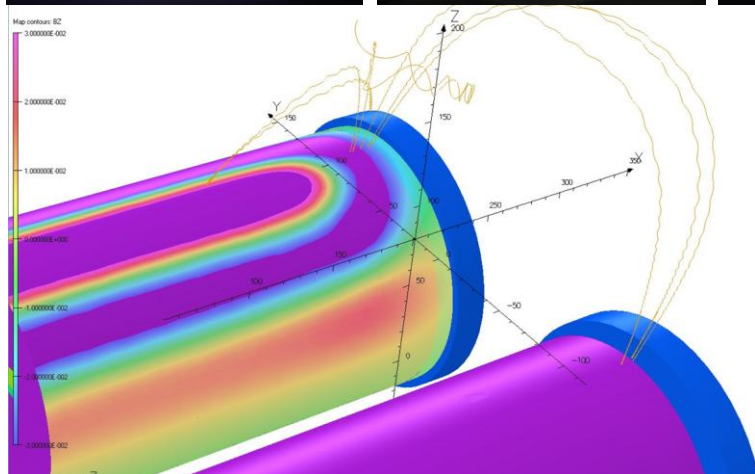
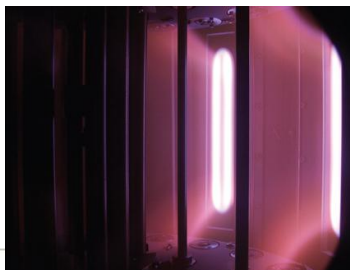
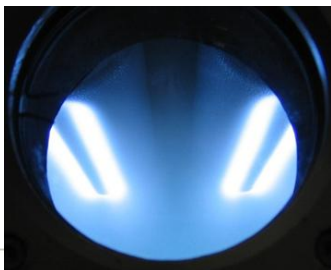
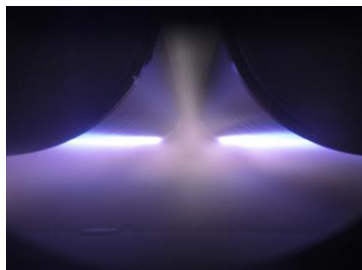
27 Years experience creating products and thin film structures

Rotatable & Planar Magnetron Sputter Cathodes • Retrofit magnetic packs • Plasma Treaters • Speedflo Reactive Gas Controllers • IM Ion Sources & power supplies • Arc MAX sources & power supplies • Active Anodes and Gas Delivery Bars • OPTIX Gas and Chemical Sensing • S and Se Sensor • PEC Pulsed Effusion Cell • V⁺DLC - Transparent DLC • IC Nano antimicrobial layer technology • Process implementation & tuning •

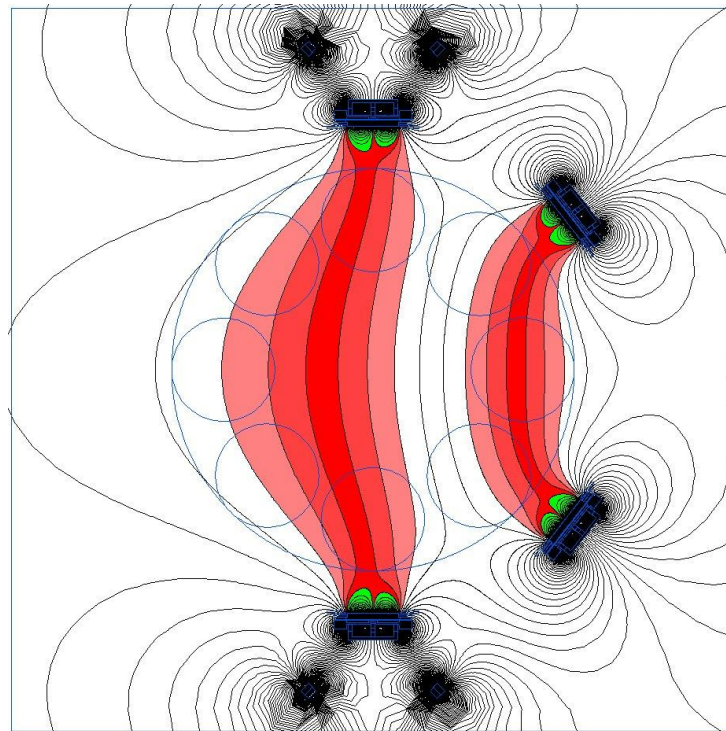


Design of processes and system magnetic field arrangements

Gencoia provides 2 and 3d magnetic field modelling of multiple sputter and plasma sources mounted with a process chamber in order to optimise the process and thin film properties. Magnetic fields control the plasma electrons, hence it is critical to treat the whole process chamber as a single plasma zone. Gencoia also work in partnership with Nano4Energy in Madrid in the field of Hipims to ensure the power mode can be used to it full potential.



www.gencoia.com

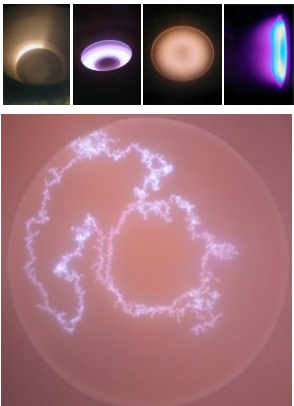
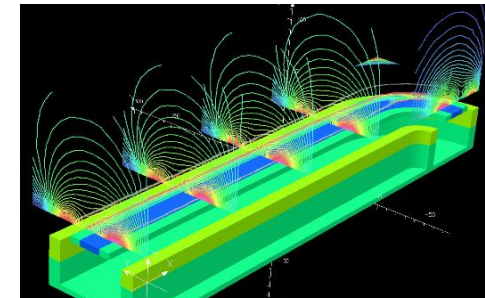
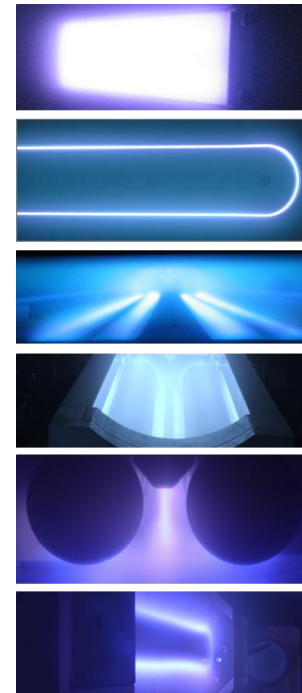
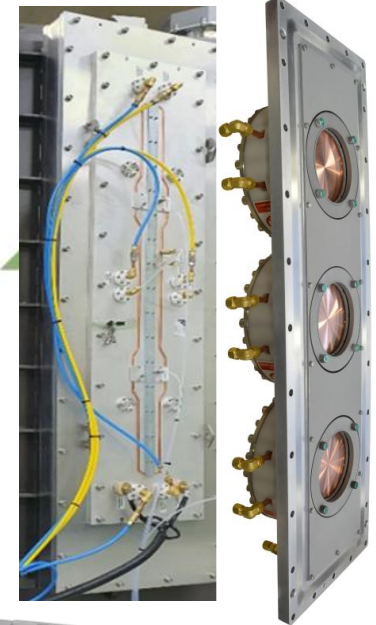


nano4ENERGY

R&D techniques and equipment

Genco combines scientific knowledge with practical application of various coating and plasma technologies

- 2 & 3D modelling and magnetic scanning
- Power Modes: DC, DC pulse, AC (AE Ascent & sinewave), RF, Hipims, Hip3+
- Planar and rotatable sputter sources in all configurations
- Circular Arc Sources
- Ion and plasma cleaning sources (6 types)
- Gas monitoring (OPTIX, RGA...)
- Plasma diagnostics (optical & Langmuir)
- Coating characterisation (SEM.....)
- Reactive Gas Feedback Control





Gencoa has a very active R&D department and 8 vacuum systems for coating process development and source testing

Gencoa undertakes contract R&D services for customers.

Full range of sputter and plasma system, source, control and power geometries.

Rapid development phases by highly experienced staff members.

Different levels of R&D coating development possible
(from single samples to small pilot production studies)

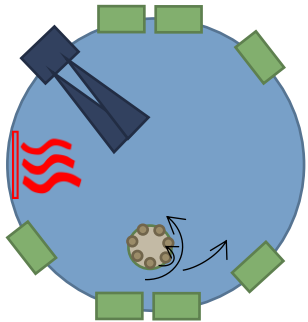


BIG BEN: 1.5m source batch coater

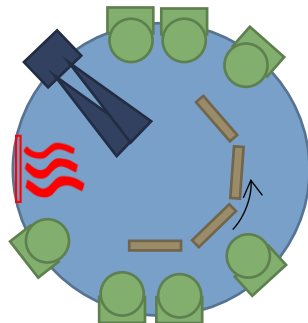
Vertical with linear ion source pre-cleaning and 7 coating sources

Ideal for developing multi-functional multi-stack coatings, with multi-material doping option

2-axis rotation (3D)



Single rotation (2D)

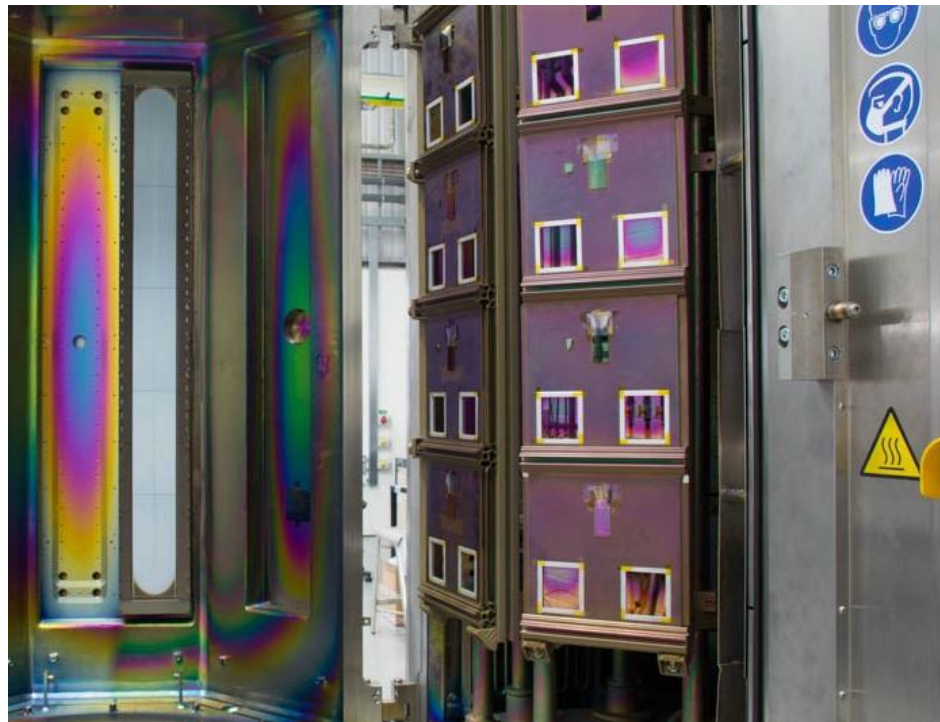


Planar cathodes used as standard. Rotatables available as an option

BIG BEN batch coater

Example: 32 off 250x250 flat samples can be installed at each run

In-vacuum degassing resistive heater available, to minimise humidity



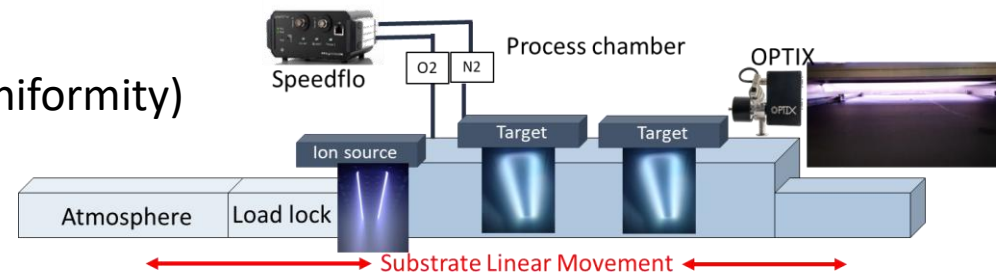
In-line OTB coater: Horizontal with load-lock. linear ion source pre-cleaning and 2-3 coating sources

Development and pilot production on 2D parts, flat glass & plastic

Sample requirements:

600mm max width (limited to 400mm for uniformity)

Max thickness: **10mm**

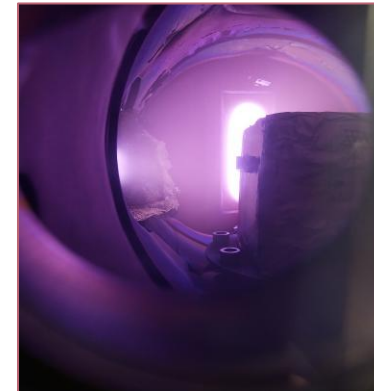


R&D chamber coater:

Medium coating development system with 2/3 sputter sources and a linear ion source

Flexible system to coat 2 & 3D part geometries

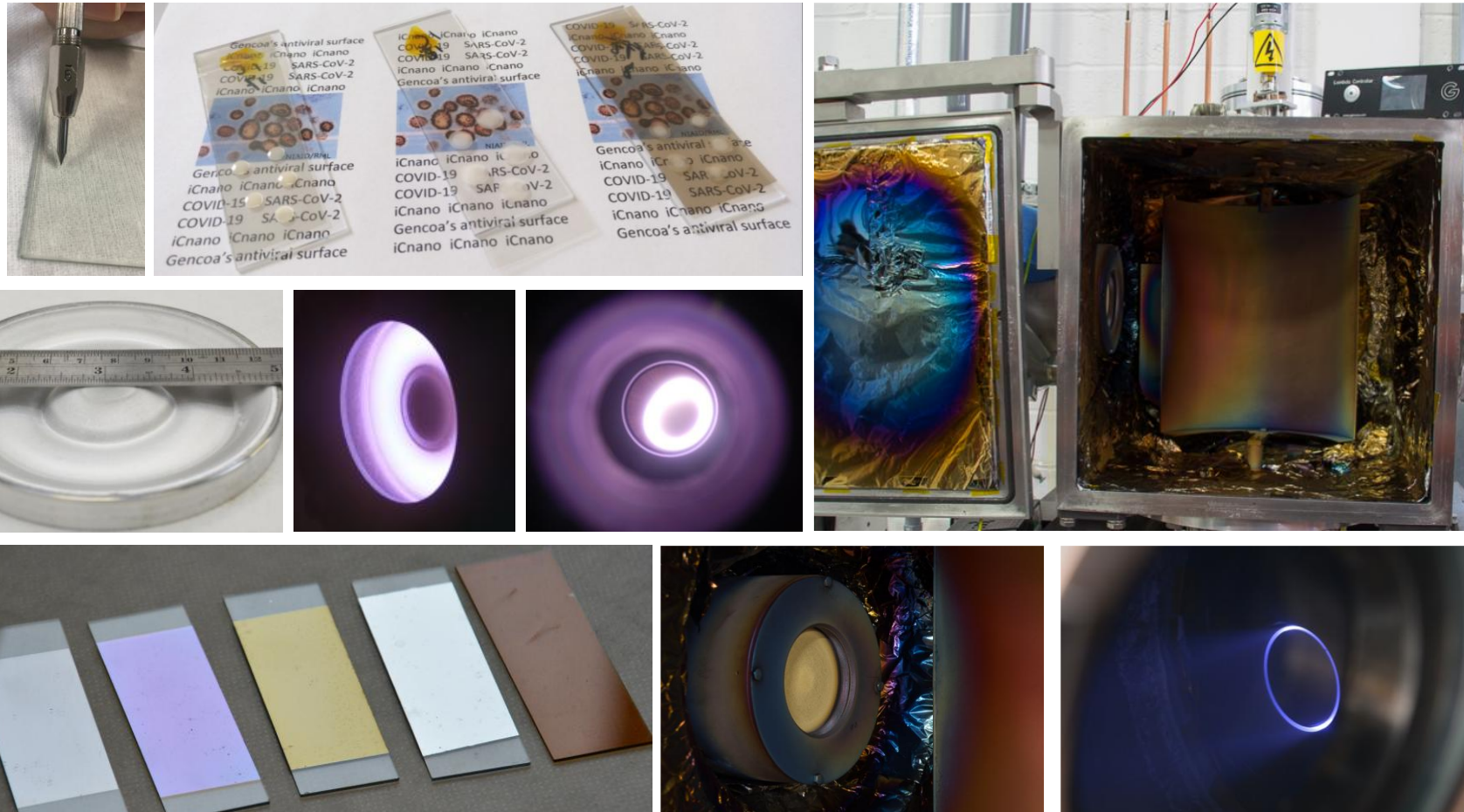
- Flexible Multi-magnetron system, with ion source (multi-stack, doping)
- Used for smaller R&D studies – 250mm max coating area
- 1- and 2-axis rotations available
- Ideal for initial depositions to determine





Square chamber coater: Small circular source-based coating development and test system

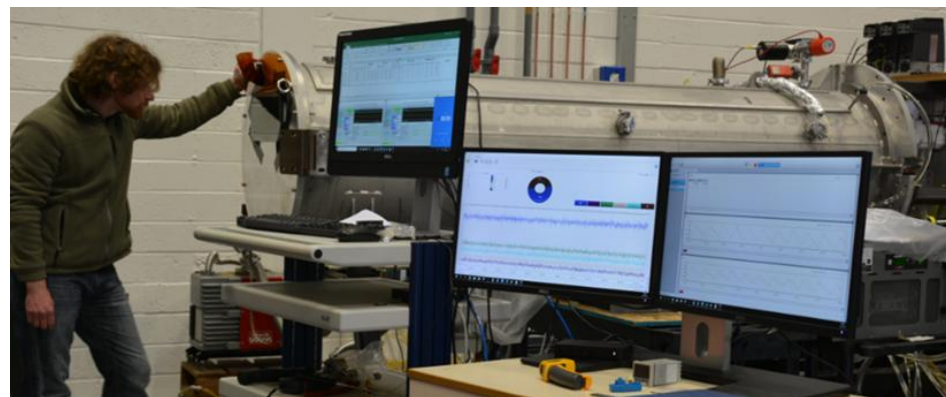
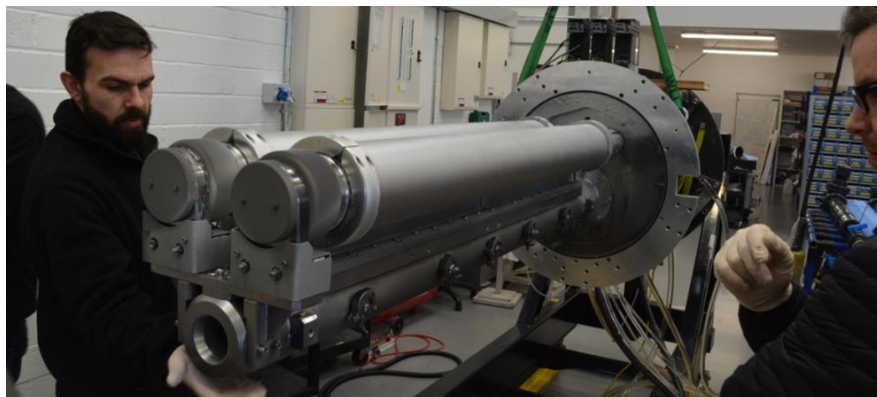
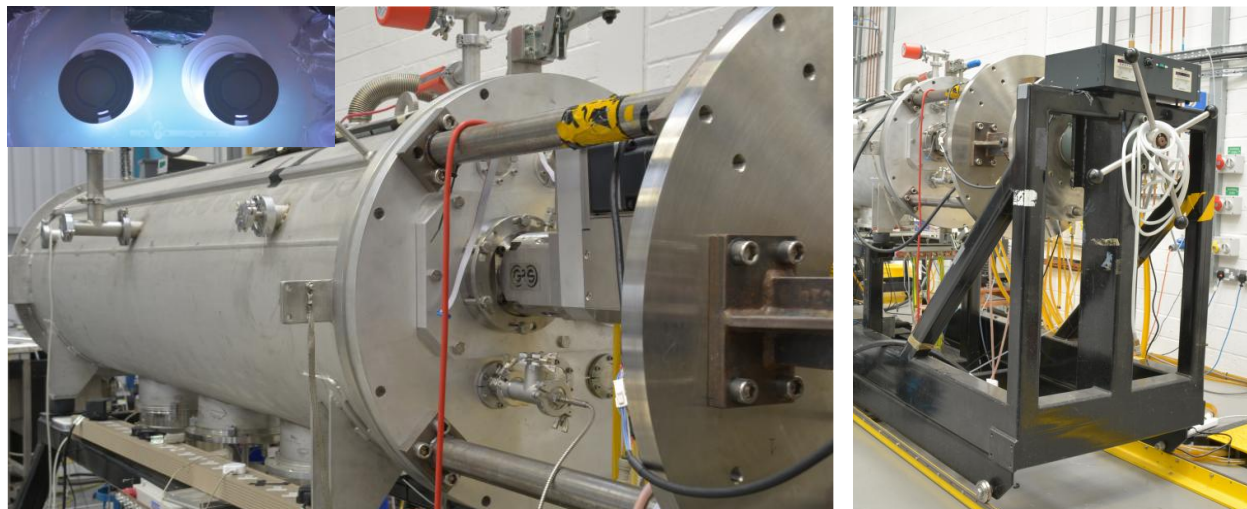
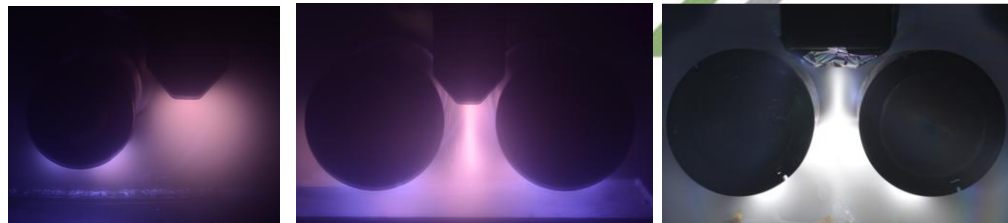
Combines ion cleaning with sputter deposition on small sized samples – typically glass microscope slides – initial layer development before scale-up



Suzutora coater/test chamber: 2.5 m source development and test chamber for cantilever mounted cathodes and dual rotatable cathodes and active anode

Flexible development system for
upto 2m long rotatable targets on
flat glass & plastic, with substrate
heating and shutters

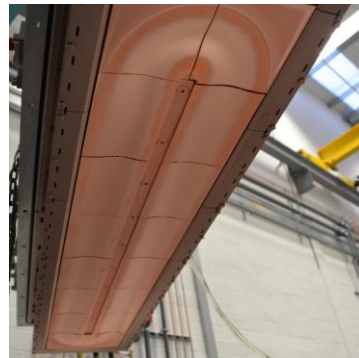
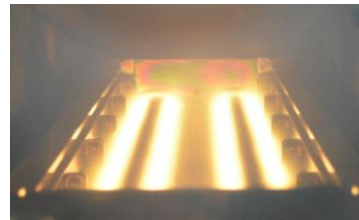
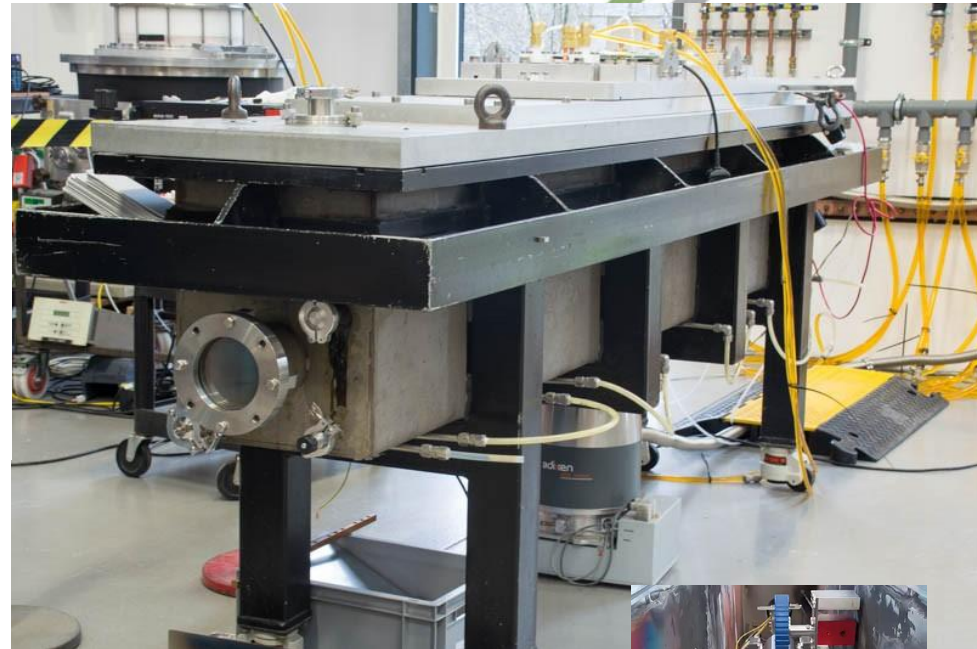
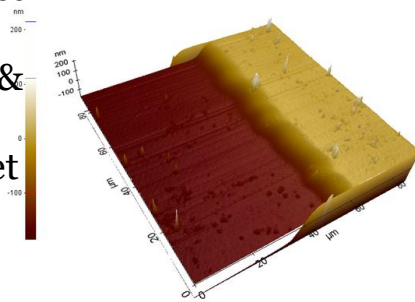
- Long term testing of GRSC rotatable magnetrons
- Substrate temperature studies
- New plasma treatment sources and improved substrate cleaning methods
- Deposition of G-DLC onto A4 size substrate with option heating
- CO₂ plasma cleaning studies with dual GRSC & AA



Coffin coater/test chamber: 2.5m long test tank for planar and rotatable magnetron test and plasma source cleaning and etch studies

All geometries of single
magnetron and plasma sources

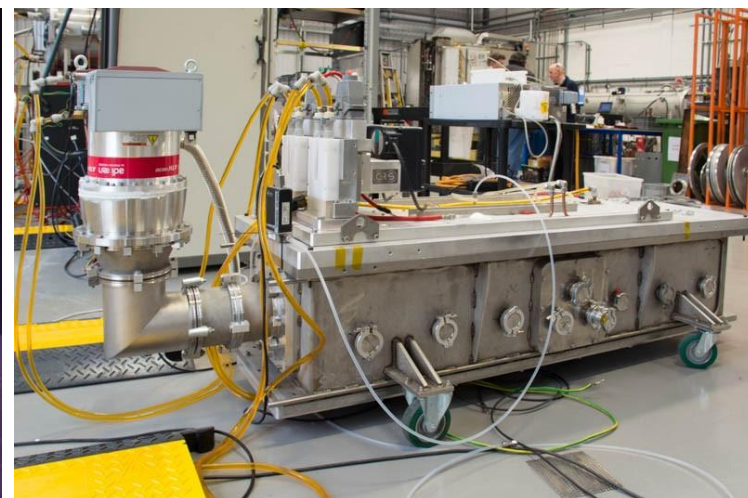
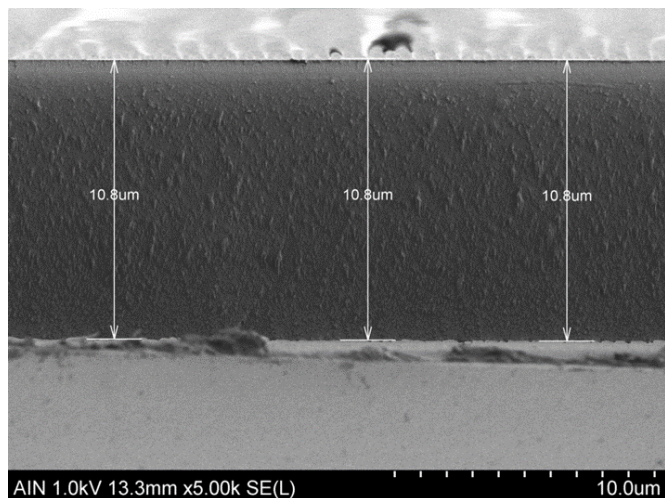
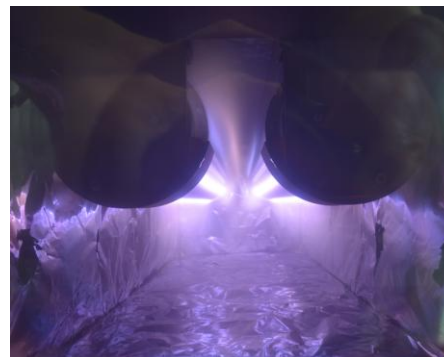
- Upto 200mm wide target
- Anode studies
- RF plasma distribution & uniformity tuning
- Magnetic field and target erosion optimisation
- Tube coater



Koffin-X1.5m long 'wider' test tank for dual planar and rotatable magnetron tests, CO₂ plasma source cleaning and etch studies

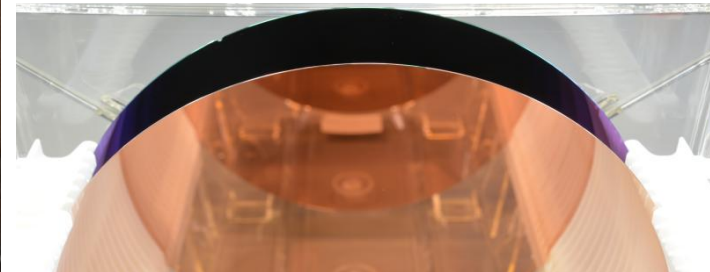
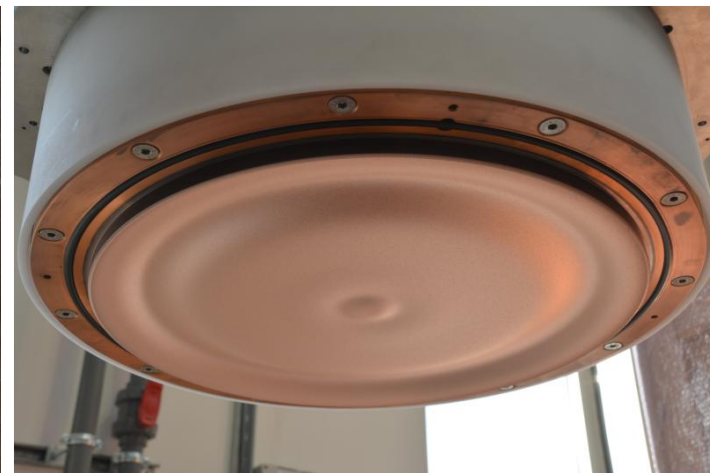
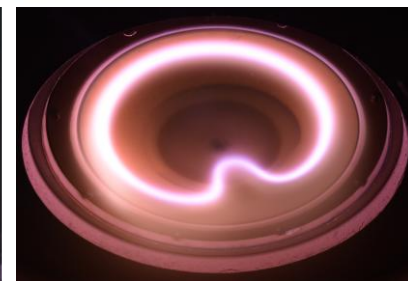
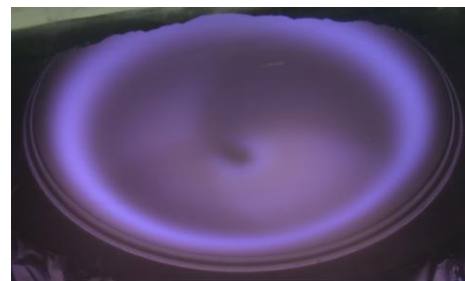
Suitable for dual rotatable or dual planar magnetrons

- Active anode studies, substrate heating and target voltage reduction tests
- Deposition of reactive layers with Active Anodes and different power modes



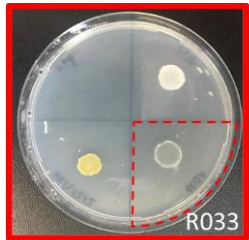
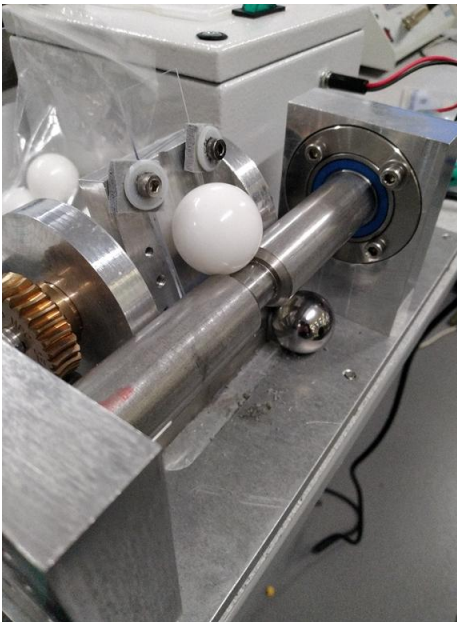
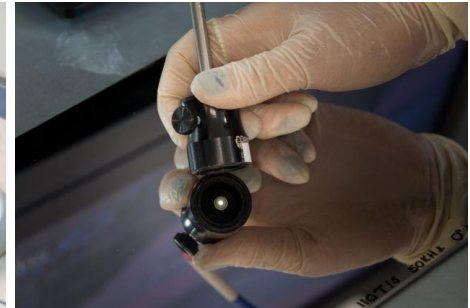
Barrel coater/testing chamber: Development and test chamber for FFE circular targets and coating deposition for the semiconductor

Layer creation on wafers with FFE
magnetrons, testing of uniformity with
new magnetic ffe designs, different power
modes and reactive gas





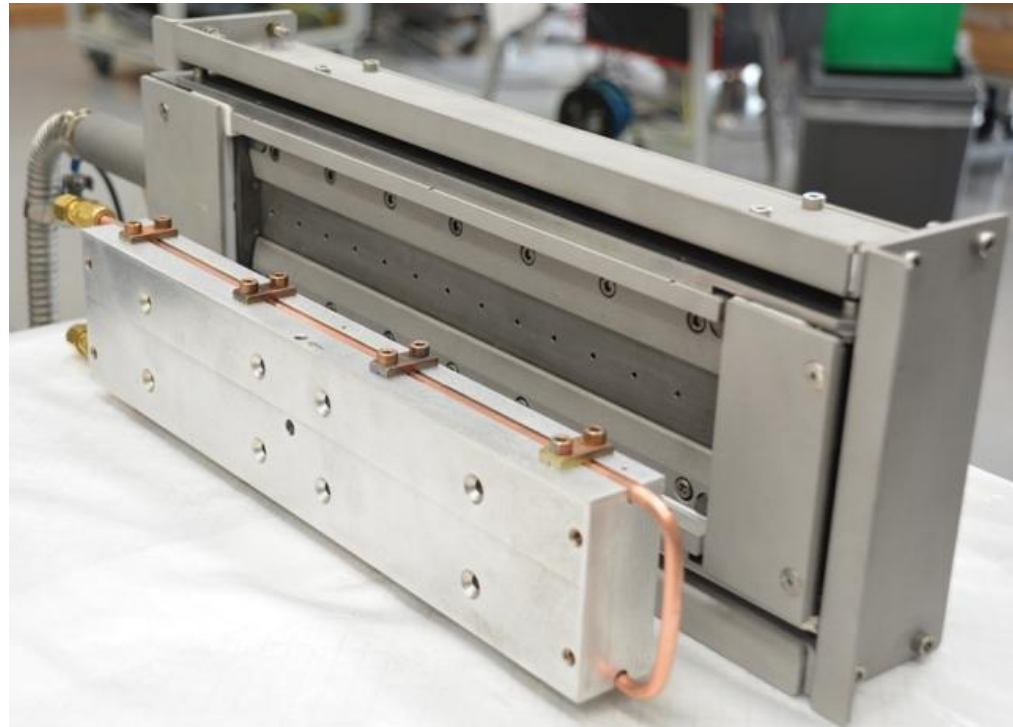
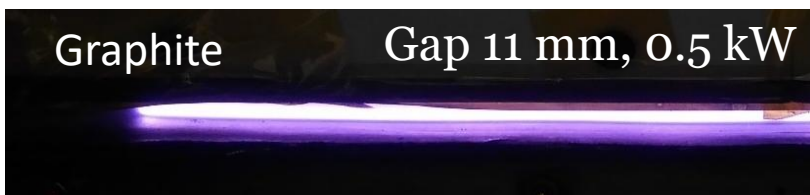
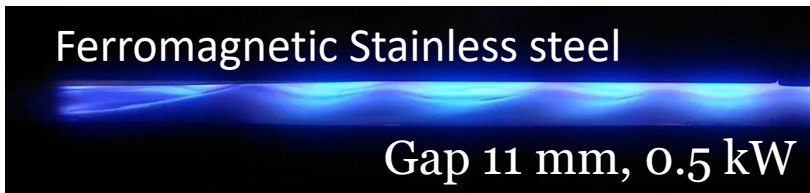
Genco have a range of in-house testing to rapidly assess the nature of the coatings and use local Universities and Laboratories for more in depth analysis



Need a special source? Gencoa can design and test



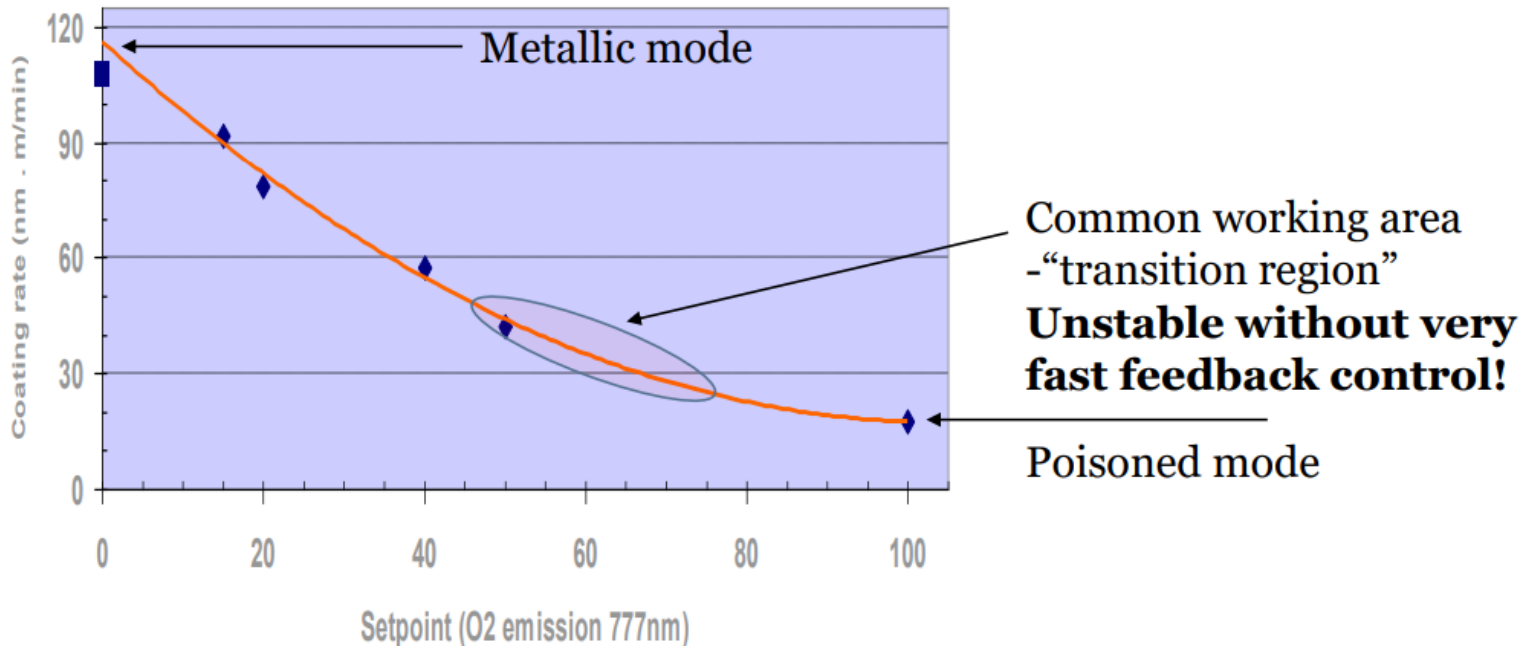
- Example of contactless Pulsed DC surface etching of metallic web via inverted magnetron electrodes
- RF surface etching of oxide coated webs or insulating materials
- Non-magnetic and ferro-magnetic webs (with contact)



Advanced process control



- Optimised and fast actuating feedback control system for reactive processed
- A variety of process sensors can be used to control process

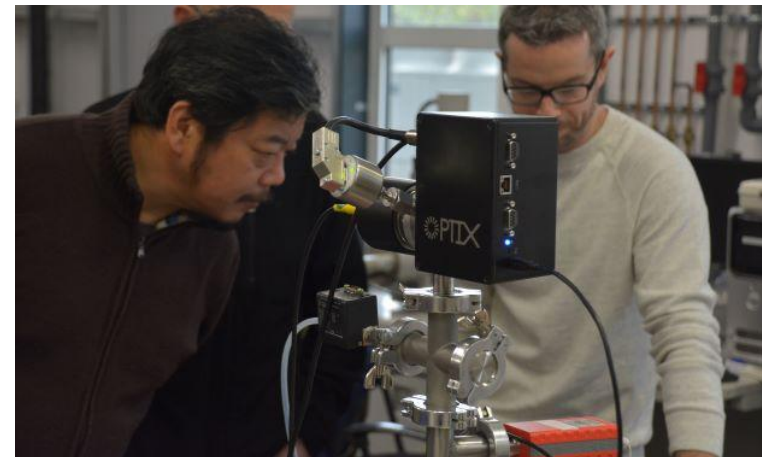
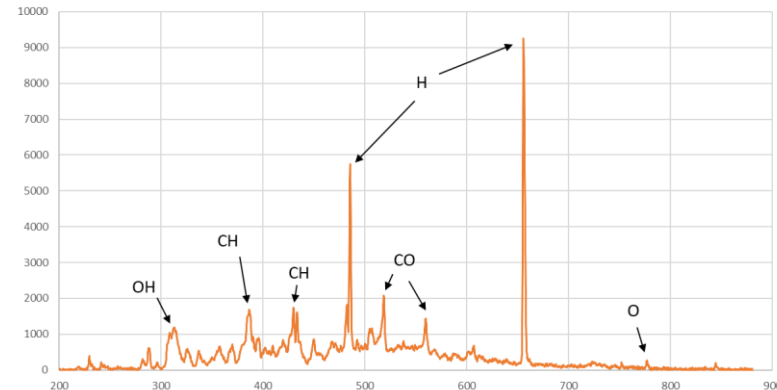


Advanced process control

- A stand alone device for gas analysis under vacuum
- Can sense from atmospheric pressures with simple rotary vane backing pump
- Can be used to monitor vacuum quality, for leak detection, start/end point detection.
- In combination with Speedflo, it can be used to control reactive processes by using the reactive gas partial pressure as a process sensor



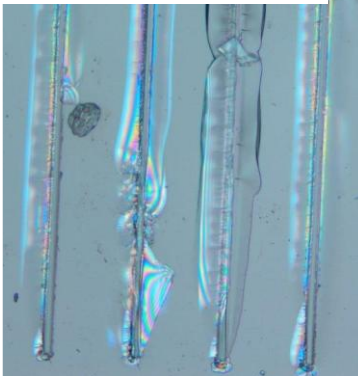
Isopropanol ($\text{CH}_3\text{CHOHCH}_3$)



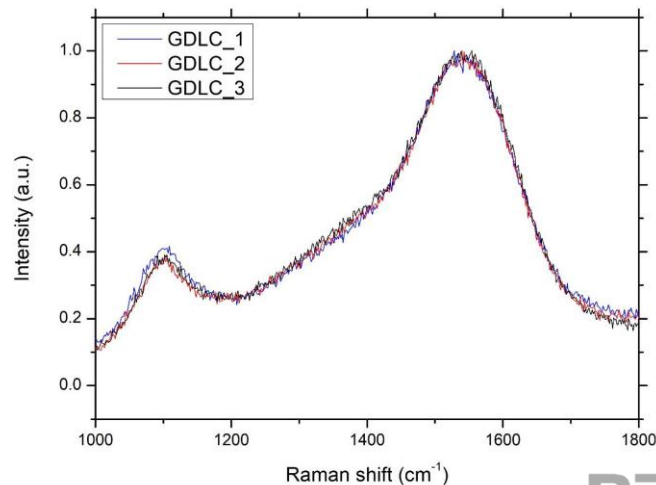
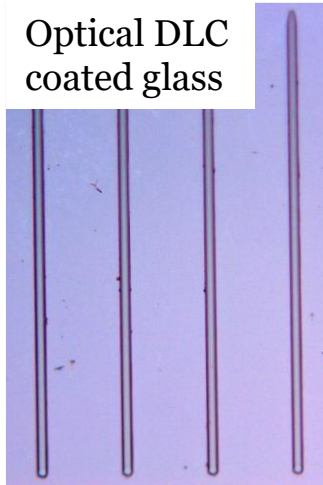
Need a transparent hard coating? G-DLC Hard Carbon Coating

- Gencoa and N4E have developed a transparent hard carbon as a protective overlay for glass and plastic <1% transparency loss in the visible range
- Based upon HipV⁺ power, sputtering and active anode technology
- Positive voltage reversal and electron guidance to achieve >35 Gpa hardness, Mohr 9 scratch resistance on glass
- Scalable to any size with process implementation / transfer

Nano-scratch test on Bare glass



Optical DLC coated glass





Gencoa are at the forefront of PVD and
plasma process technology
Supporting customers for 30 years

