Q150V PLUS
For ultra-fine coatings

SPUTTER AND EVAPORATION
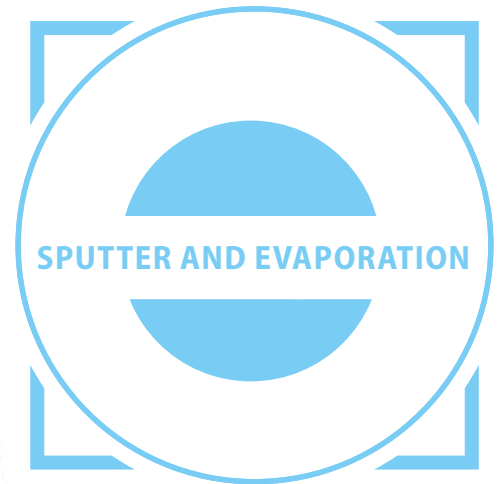
The Q150V Plus is optimised for high-vacuum applications, with an ultimate vacuum of 1×10^{-6} mbar. Together with the use of a wide-range Penning/Pirani gauge, this enables the sputtering of oxidising metals with ultra-fine grain sizes, which are suitable for high resolution imaging. The lower background pressure removes oxygen nitrogen and water vapour from the chamber, avoiding chemical reactions during the sputter process, which could otherwise lead to impurities or defects in the coatings. Similarly, lower scattering allows for high purity, amorphous carbon films of high density. The Q150V Plus offers all the benefits of the Q150T Plus, but with a finer grain size and thinner coating, for ultra-high-resolution applications (above x 200,000 magnification).

Sputter coating of noble and oxidising metals using the Q150V S & ES Plus for SEM applications.

Recommended for magnifications:
- **up to x 50k using Au**
- **up to x 100k using Pt**
- **above x 100k using Cr, Ir**

Ideal for thin film applications such as coating with ITO, W, Al, Zn

Other targets are available

Carbon rod coating using the Q150V E & ES Plus.

Recommended applications:

- **Ultra-high-resolution magnification SEM**
- **Carbon coating of TEM grids**
- **Protective platinum layers for FIB**
- **R&D of corrosion-, friction-, and wear-protective layers**
- **Protective layers on medical devices**
- **BSE imaging**
- **EDX, WDS, EBSD analysis**
- **Carbon coating of replicas**
- **Nano-technology e.g. Zeolites, polymer nanobrushes**

The Q Plus Series has it covered: **quorumtech.com**

Q150V Plus features

New user interface has been thoroughly updated:

- **Capacitive touch screen is more sensitive for ease of use**
- **User interface software has been extensively revised, using a modern smartphone-style interface**
- **Comprehensive context-sensitive help screen**
- **USB interface allows easy software updates and backing up/copying of recipe files to USB stick**
- **Process log files can be exported via USB port in .csv format for analysis in Excel or similar. Log files include date, time and process parameters.**

- **16GB of flash memory can store more than 1000 recipes**
- **Dual-core ARM processor for a fast, responsive display**

Allows multiple users to input and store coating recipes, with a new feature to sort recipes per user according to recent use.

Intelligent system logic automatically detects which insert is in place and displays the appropriate operating settings and controls for that process.

System prompts user to confirm target material and it then automatically selects appropriate parameters for that material.

Intuitive software allows the most inexperienced or occasional operator to rapidly enter and store their own process data. For convenience a number of typical sputtering and carbon coating recipes are already stored but also allows the user to create their own.

Software detects failure to achieve vacuum in a set period of time and shuts down the process in case of vacuum leak, which ensures pump protection from overheating.

Algae spore trapped in spider silk coated with 5nm Au mag x 11k
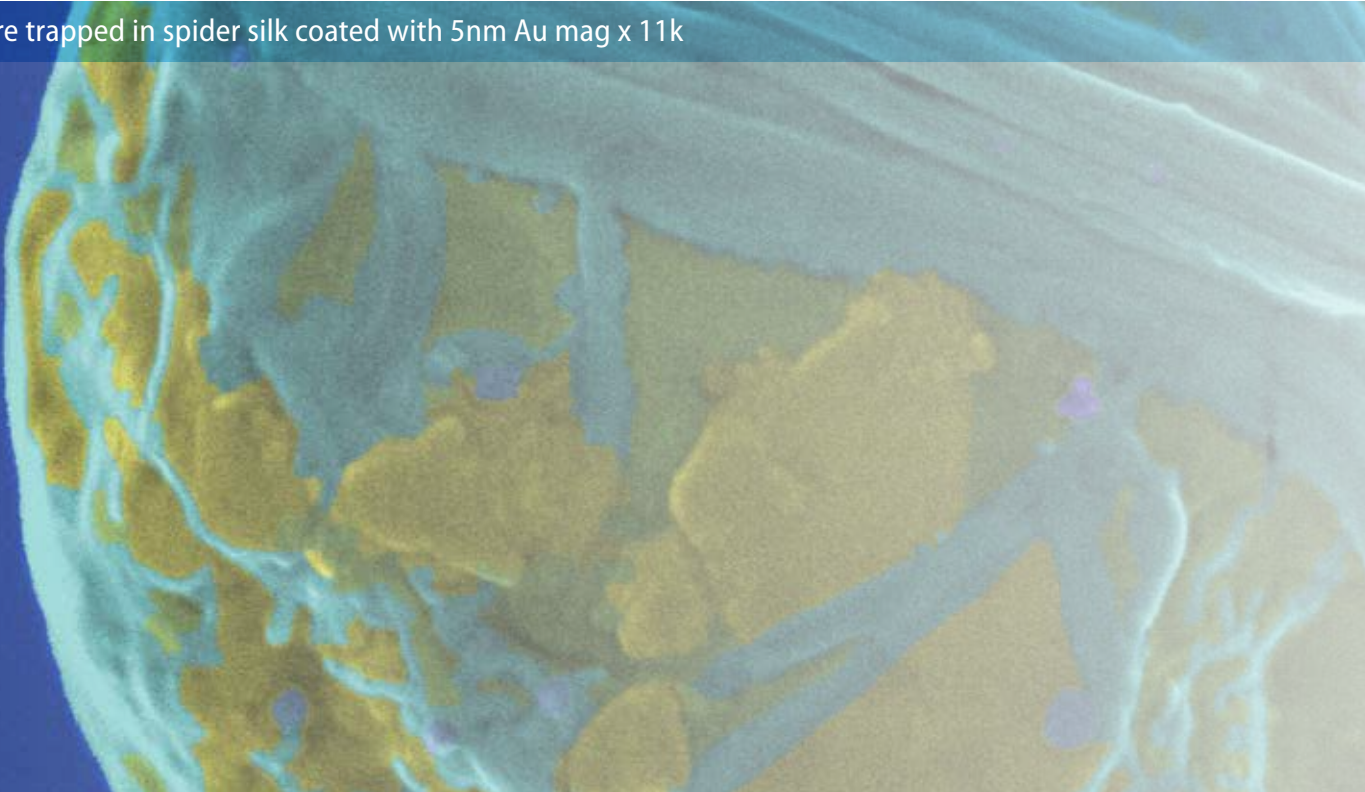
The Q150V Plus is available in three configurations:

Q150V S Plus

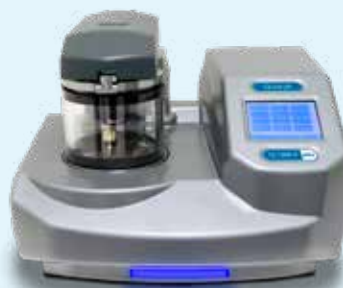Automatic sputter coater for oxidising metals with ultra-fine grain size

Available sputtering targets include chromium, iridium and all noble metals

Q150V E Plus

An automatic carbon coater (rod/cord) for TEM applications

For carbon coating TEM grids

Q150V ES Plus

A combined system capable of both sputtering and carbon coating

The deposition head inserts can be swapped in seconds. Metal evaporation/aperture cleaning option available.

The Q150V Plus is part of Quorum Technologies internationally acclaimed Q series of coaters, used by thousands of customers worldwide. Designed to provide high-quality coating solutions for SEM, TEM and thin-film applications, the Q series is versatile, affordable and easy to use. **These products are for Research Use Only.**

Automatic, controlled carbon rod evaporation for TEM applications

Careful evaporation allows precise control of carbon thickness (with or without the optional film thickness monitor). The quality of the resulting carbon films is also enhanced by the eradication of "sparking" that is a common feature of less advanced coaters.

For reproducible high-quality carbon films, we would recommend the use of shaped carbon rods. Rods are higher purity, less susceptible to debris and easier to control. Pulsed and ramped carbon rod recipes are supplied as standard.

Cool magnetron sputtering

Sputter coating is a technique widely used in various applications; it is possible to create a plasma and sputter metals with high voltage, poor vacuum and no automation. However, this is not suitable for electron microscopy applications because it will heat the sample and can result in damage when the plasma interacts with the sample. The Q150V Plus series uses low temperature enhanced-plasma magnetrons optimised for the turbomolecular pump pressures, combined with low current and deposition control, which ensures your sample is protected and uniformly coated.
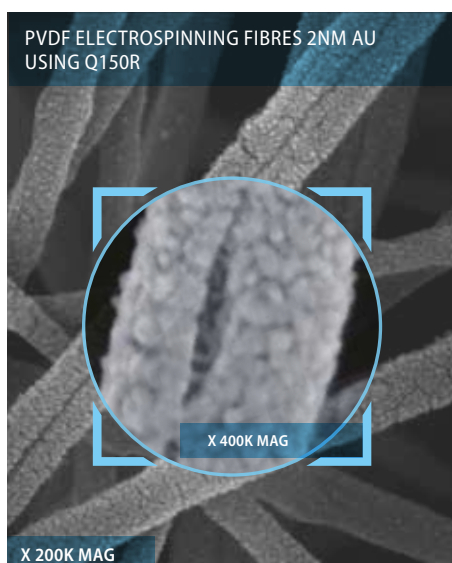
The Q150V S Plus and Q150V ES Plus use easy-change, 57 mm diameter, disc-style targets which are designed to sputter oxidising and noble metals. The Q150V S Plus and Q150V ES Plus are fitted as standard with a chromium (Cr) sputter target. Other targets options include: Au, Au/Pd, Pt/Pd, Pd, Pt, Cu, Ir, W, ITO and Al. *Others are available on request.*

## Pulsed cleaning for Al sputtering

Aluminium (Al) rapidly forms an oxide layer, which can be difficult to remove, but the ES & S Plus have special recipes for aluminium that reduce the oxide removal time and prevent excessive pre-sputtering of the target.


NEW INTUITIVE TOUCH & SWIPE SCREEN

NEW IMPROVED ULTIMATE VACUUM

NEW VISUAL STATUS INDICATOR

Q150V Plus comparative performance:

PVDF ELECTROSPINNING FIBRES 2NM AU USING Q150R

X 400K MAG

X 200K MAG

PVDF ELECTROSPINNING FIBRES 1NM AU, LOW SPUTTERING CURRENT, USING Q150T PLUS

X 400K MAG

X 200K MAG

ELECTROSPINNING FIBRES 1NM AU, LOW SPUTTERING CURRENT, USING Q150V PLUS

X 400K MAG

X 200K MAG

Dense coating allows for good imaging contrast, although further investigation of a single fibre morphology is difficult. The coating tends to glue together fibres that are close together, making them look like one.
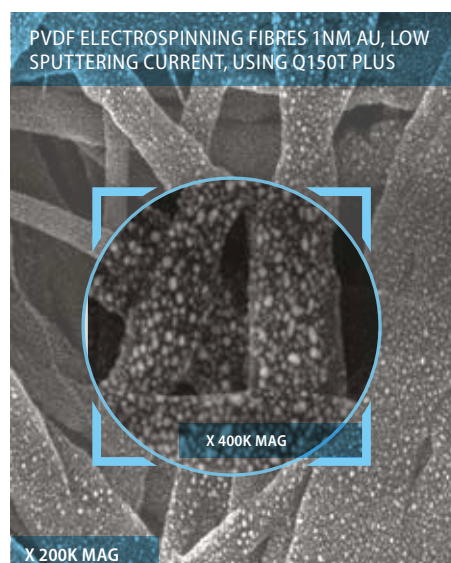
Smaller grain size allows for fibre morphology features to be seen and allows for individual fibres to be identified.
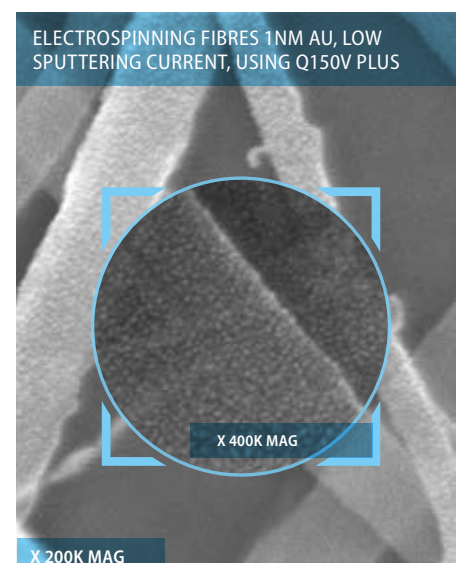
Ultra-fine grain size coating and high density allows for imaging a fibre's discrete morphology - like steps, tears or inclusions, even for fibres as small as 10nm diameter.

Q150V Plus features

Interchangeable plug-in heads

This allows the user to configure the system as a sputter coater, evaporator or glow discharge system - all in one space saving format. A carbon cord evaporation insert is available as an option. Automatic detection of the head type when changed.

Detachable chamber with built-in implosion guard

Removable glass chamber and easily accessible base and top plate allows for an easy cleaning process.

Users can rapidly change the chamber, if necessary, to avoid cross contamination of sensitive samples.

Tall chamber option is available for carbon evaporation to avoid sample heating, to improve uniformity for sputtering and to hold taller samples.

Multiple stage options

The Q150V Plus has specimen stages to meet most requirements. All are easy-change, drop-in style (no screws) and are height adjustable (except for the rotary planetary stage).

Some examples:

- **Rotation stage (supplied as standard):** 50 mm Ø can accommodate six standard stubs. Height can be pre-set.
- **Rotate-tilt stage for improved uniform coating:** 50 mm Ø. Tilt and height can be pre-set.
- **Variable angle, rotary planetary stage for heavily contoured samples.**
- **Large flat rotation stage with offset gear box for 4"/100 mm wafers.**
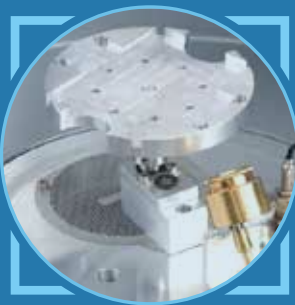- **Rotation stage for glass microscope slides.**

*Other options are available on request.*

Safety

The Q150V Plus meets key industry CE standards

- **All electronic components are protected by covers**
- **Implosion guard prevents user injury in event of chamber failure**
- **Vacuum interlocks remove power from deposition sources to prevent user exposure to high voltage in event of chamber being opened**
- **Electrical interlocks remove power when source head cover opened**
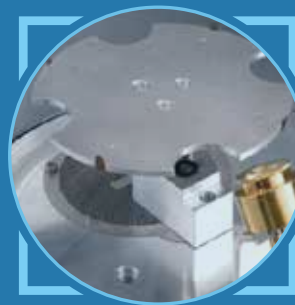- **Overheating protection shuts down power supply**

Examples of stages, shown with optional FTM

Microscope slide stage
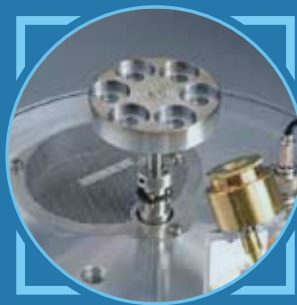
Rotation stage

Wafer stage

Rotacota planetary stage

Specifications

Instrument case

585 mm W x 521 mm D x 410 mm H (total height with coating head open: 650 mm)

Weight

32.4 kg (packed: 42 kg)

Packed dimensions

725 mm W x 660 mm D x 680 mm H

Work chamber

Borosilicate glass 150 mm ID x 133 mm H

Display

115.5 mm W x 86.4 mm H (active area), 640 RGB x 480 (display format), capacitive touch colour display

User interface

Full graphical interface with touch screen buttons, includes features such as a log of the last 1000 coatings and reminders for when maintenance is due

Sputter target

Disc-style 57 mm Ø. A 0.3 mm thick chromium (Cr) is fitted as standard. V S and V ES versions only

Specimen stage

50 mm Ø rotation stage with rotation speed of 8-20 rpm. *Other stages available on request.*

Vacuum

Rotary pump: 5 m3/hr two-stage rotary pump with oil mist filter. Hydraulically-formed bellows stainless-steel backing line.

Turbo pump: Internally mounted 67 L/sec N_2 air-cooled

Vacuum Measurement: Wide range gauge (10428)

Ultimate vacuum: 1×10^{-6} mbar*

Pump down time: 5×10^{-6} mbar in 30 mins*

Sputter vacuum range: Between 5×10^{-3} and 1×10^{-1} mbar for gold targets

Typical ultimate vacuum of the pumping system in a clean instrument after pre-pumping and venting with dry nitrogen gas

Processes

Sputtering: Sputter current 1-150 mA to a predetermined thickness (with optional FTM) or by the built-in timer. The maximum sputtering time is 60 minutes (without breaking vacuum and with automatically built-in cooling periods)

Evaporation: Carbon evaporation using rods/cord. Thermal evaporation of metals from filaments or boats. For cleaning TEM apertures a standard molybdenum boat (supplied) can be fitted

Visual status indicator

A large multi-colour status indicator light provides a visual indication of the state of the equipment, allowing users to easily identify the status of a process at a distance.

The indicator LED shows the following states:

- Initialisation
- Process running
- Idle
- Coating in progress
- Process completed
- Process ended in fault condition

Audio indication also sounds on completion of the process.

Quorum

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