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PROBLEM SOLVED

Desk Sputter Coater and Carbon/Thermal Evaporator – DSCT-T



DSCT-T

High Vacuum Desk Sputter and Carbon/ Thermal Evaporator

VacTechniche Ltd.

Address: Moondarra, Gorsethorn Way, Hastings TN35 4BQ

Tel: +44 (0)1424 814411

E-mail: sales@vactechniche.com

Web: www.vactechniche.com

For technical and applications advice including online order for spares and consumables parts please visit www.vactechniche.com

Disclaimer

The components and packages described in this document are mutually compatible and guaranteed to meet or exceed the published performance specifications. No performance guarantees, however, can be given in circumstances where these component packages are used in conjunction with equipment supplied by companies other than VacTechniche Ltd.

High-Vacuum Desk Sputter Coater and Carbon/Thermal Evaporator DSCT-T

The sputter coater and carbon/thermal evaporator – DSCT-T is configured as a sputter coater, carbon coater, and Thermal Evaporator with three interchangeable heads in one instrument suitable for scanning electron microscope (SEM) sample preparation and deposition of a wide range of noble and oxidizing materials such as gold (Au), platinum/palladium (Pt/Pd) alloy, silver (Ag), chromium (Cr), tungsten (W), iridium (Ir), etc., together with thermal evaporation of different sources like metals or carbon fiber/rod to coat on samples with non-conductive or poorly conductive surface for electron microscopy imaging or other applications.



Moreover, the thermal head can be used to clean TEM and SEM apertures. This high-vacuum SEM coater equipped with a turbomolecular pump offers high quality uniform films with fine grain sizes, suitable for specimens that require high-resolution and high-quality characterization such as FE-SEM, EDS/WDS, TEM, and EBSD.

The DSCT-T, sputter coater and carbon/thermal evaporator with a 2" magnetron cathode, is supplied with a high voltage switching DC power supply for sputtering and a high-current power supply for carbon and thermal evaporation, hence could be used for research areas concerning different thin film applications such as micro and nano electronic and sample preparation.

DSCT-T can be equipped with a water-cooled cathode which makes it suitable for long time sputtering deposition.

Also, DSCT-T can be provided with a 160 W power supply to facilitate sputtering of targets like chromium, tungsten, and other oxidizing metal targets (Optional).

The full-automatic sputter and carbon coating processes allows easy, precise, and repeatable performance.

The maximum size of the substrates in this model could be 4 inches.

Features

Hardware:

- **High vacuum level with built-in turbo pump 90 L/s (Leybold)**
- **Two-stage rotary vane backing pump (Diaphragm and scroll pump)**
- **80 W sputtering switching DC power supply**
- **500 W switching DC power supply for carbon fiber deposition**
- **1.2 kW high-current DC power supply for thermal evaporation**
- **Carbon fiber evaporation head**
- **Thermal evaporation head**
- **Quartz crystal thickness monitor with precision of 1 nm and resolution of 1 Å**
- **One 2-inch magnetron cathode**
- **Automatic venting valve**
- **Sample rotation, height, and tilt adjustable**
- **Planetary sample holder (Optional)**
- **Electronic shutter**
- **Easy-to-change specimen stages (Rotation stage as standard)**

- **Two-year warranty**
- **CE conformity**

Automation:

- **Intuitive touch screen to control the coating process and rapid data input**
- **User friendly software, updatable via network**
- **Repeatable and programmable coating process in the automatic mode**
- **Semi-full automatic sputtering deposition process in timed or thickness modes**
- **Semi-full automatic carbon fiber/rod deposition process**
- **Automatic carbon fiber coating in flash or pulsed modes**
- **Automatic carbon rod coating in pulsed or ramped modes**
- **Records and plots coating parameters graphs**
- **Storing coating recipes for repeatable depositions**

Carbon Evaporation of DSCT-T

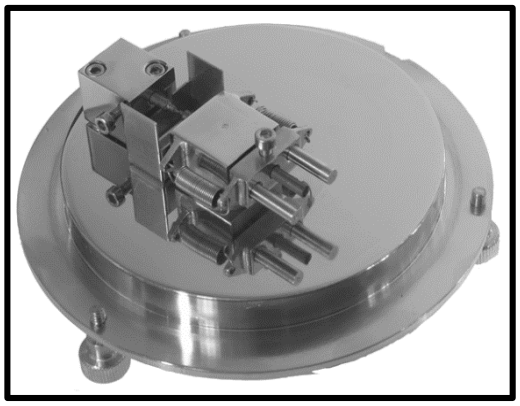
The mini-size coating system model DSCT-T can coat carbon layers with fine grains to produce uniform thin films on different surfaces using carbon fiber or carbon rod (Optional).

Pulsed Carbon Fiber Evaporation

The DSCT-T coater is able to perform pulsed carbon fiber evaporation. Short pulses provide more controlled deposition and significantly reduces the amount of debris associated with traditional carbon deposition.



Carbon Rod Evaporation (Optional)



The DSCT-T could be equipped with carbon rod evaporator head (Optional). For this case an external 0-100 A high current power supply should be used instead of the internal high current power supply which is designed for carbon fiber evaporation.

Thermal Evaporation

The DSCT-T, sputter coater and carbon/thermal evaporator, is equipped with a thermal head for evaporation of metals with low evaporation temperature such as gold, aluminum, silver, etc., as well as TEM apertures cleaning.

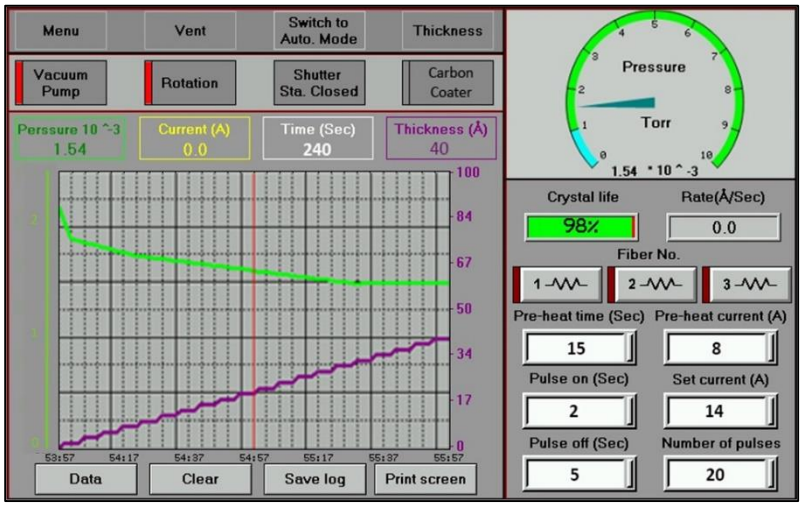
One thermal source (Boat or basket) with a length of 4-10 cm can be fit onto the thermal electrode extensions on the head, with adjustable source-to-substrate distance. Thermal evaporation provides a wide range of applications, such as fabrication of metal films, thin-film sensors, optical components, nano and microelectronic devices, and solar cells.

Clean Vacuum

The vacuum chamber is made up of stainless steel and a portable cylindrical Pyrex. The DSCT-T is fitted with an internally mounted 90 L/s turbo molecular pump, that can be backed by a 6 m^3/h two-stage rotary vane pump (optionally supplied by the manufacturer), or a scroll or diaphragm pump (based on the customer choice). It introduces clean vacuum without oil contamination which normally exists with ordinary diffusion pump.

Touch Screen Control

DSCT-T is equipped with a 7” colored touch-screen panel and full automatic control using a user-friendly software to control and adjust the deposition process data. The vacuum and coating sequence information can be observed as digital data or curves on the touch screen. The last 300 coatings information is saved on the history page.



Sample Holder Stages

The DSCT-T can be equipped with different sample stage configurations depending on the user requirements. The standard sample stage is rotatable with adjustable height and angle and can be changed easily. The rotary planetary sample stage is a good choice for uniform coating of porous specimens (Optional).



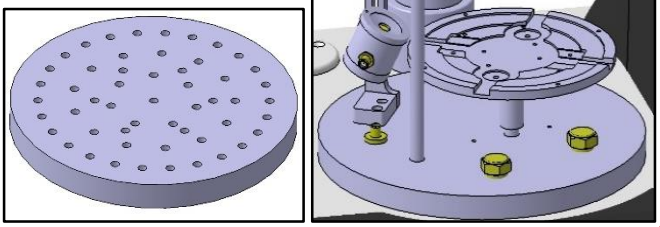
Standard Sample Stage



Rotary Planetary Sample Stage

Newly Designed Sample Holder

A new 4-inch rotating sample holder with an optional gear offset is designed for the system to increase the deposition area and the number of coating stubs in a run.



Applications

- **Fine grain structural deposition of carbon and metals (noble and oxidizing) thin films for SEM, FE-SEM, EDX, and TEM sample preparation**
- **Nano and microelectronic**
- **Conductive layers**
- **Thin film sensors**
- **Solar cells**
- **Optical components**
- **GLAD sputtering**
- **TEM grid plasma treatment for improved hydrophilicity (Optional)**

Specifications

- **Suitable for deposition of metals, carbon fiber, and rod (Optional)**
- **Precise control over coating rate and pressure to achieve finer grain structures**
- **Automatic control of the cathode's temperature to protect the lifetime of the magnets**
- **Rapid data input through fully automatic touch screen panel**
- **Real-time plots of coating parameters**
- **Max. consuming power: 2 kW**

Options and Accessories

- **Carbon evaporation heads for carbon fiber or rod**

- **High current power supply**
- **Quartz crystal sensor**
- **Planetary sample rotation stage**
- **Spare cylindrical vacuum glass chamber**
- **Sputtering targets**
- **Sealing gaskets**
- **Carbon fiber source**
- **Thermal evaporation sources (Boat/basket)**
- **Glow discharge plasma**
- **4-inch sample holder with gear offset**

Detailed Features

Dimensions	520 × 620 × 480 mm (H × W × D)
Weight	36 Kg (without backing pump)
Vacuum Chamber Dimension	Borosilicate Glass, 170 mm Dia.× 50 mm Height SST, 170 mm Dia. × 90 mm Height
Display Screen	7” Diagonal (16:9) 800×480 High Color- Graphic TFT- LCD
Data Transfer	USB Port – For Transferring the data and graph to PC
Target Dimension	1 Disc, Diameter ranging 50-56 mm, Thickness 0.1~3 mm (The preferred thickness is less than 1 mm, for ferromagnetic targets should be less than 0.5 mm). ✓ A silver target is installed on the cathode when delivered.
Carbon fiber	Carbon fiber thread diameter: 0.8 mm (Thicker fiber is not recommended)
Carbon rod	Carbon rod diameter: 3.2 mm
Evaporator filament: boat/basket	**Boat:** max. 1 mm thickness, max. 8 mm width, 30-65 mm length **Basket:** Single wire with 0.5-0.8 mm Dia.
Sample Holder Dimension	Standard holder with 60 mm Dia., can contain: • 23×9.6 mm stubs or • 14×12.7 mm stubs or • 5×19 mm stubs Sample holder with 100mm Dia. with Offset gear box can contain 40×12.7 mm stubs (optional)
Chamber’s Lid	Made of Aluminum/SST that can locate 1 cathode or triple carbon fiber (thread) holder or a rod holder or electrode extensions for thermal source on it.
Thickness Sensor	

Specification	Crystal thickness gauge with sensor, Gold/Silver coated crystal quartz for Sputter and Thermal/Carbon deposition thickness monitoring, oscillator
Resolution	±1 Angstrom
Accuracy	±1 nanometer
Vacuum Equipment	
Turbo Molecular Pump	Pumping Speed of 90 L/s, (Leybold)
Backing Pump	Two-stage rotary vane/diaphragm pump/scroll pump
Pressure Gauge	Leybold (Ionivac model); Full Range
Final Vacuum	$<5\times10^{-6}$ Torr
Sputtering Vacuum Range	$2\times10^{-3} \sim 5\times10^{-2}$ Torr
Process	
Sputtering	Continuous Sputtering, Time, and Thickness dependent
Carbon Coating	Pulsed and Flash mode carbon fiber coating
	Pulsed or Ramped mode carbon rod coating
Metal Evaporation	Resistive thermal evaporation of small amounts of metal loaded in the boat/basket
Glow Discharge Plasma (Optional)	• TEM grid plasma treatment • Enhancing surface hydrophilicity
Service and other Information	
Gas	Argon as a carrier gas with %99.999 purity
Electric Power Supply	DC: 80 W switching DC power supply HC: 24V, 20A (Carbon fiber evaporation) HC: 12V, 100A (Metal and Carbon rod evaporation)
Control of Argon supply	Electronic leak valve
Shutter	1 piece
Electrical Inlet	Inlet: 220-240V, or 110V, 50/60Hz *

*** Single-phase AC power with appropriate earth connection is required.**