

OPT

Evaporation Vacuum Coating Equipment

Equipment Overview

Model	OPT-T	OPT-E
Working principle	Physical vapor deposition (resistance heating evaporation)	Physical vapor deposition (high-energy electron beam evaporation)
Machine structure	Vertical and horizontal	Split vertical
Applications	Automotive headlights, plastic consumer products, packaging shells, etc.	Mobile 3D glass, precision optical lenses, semiconductor wafers, etc.
Coating effect	Silver/chromium mirror, colored and NCVM non-conductive films, etc.	Precision optical films (AR/HR), functional anti-reflection and anti-fingerprint (AF) coatings, etc.
Machine features	Very fast deposition and high single-cycle output; suitable for heat-sensitive substrates such as plastics.	Continuous multilayer deposition; crystal and optical monitoring for precise nanoscale film-thickness control.
Common coating materials	Aluminum wire, nickel-chromium wire, silver wire, etc.	Silicon dioxide, titanium dioxide, zirconium dioxide, silicon monoxide, etc.
Ion-assisted system	Not applicable	RF, hollow cathode or filament Hall ion source



Equipment Parameters

Model	OPT-T	OPT-E
Coating technology	Thermal evaporation	Electron beam evaporation
Substrate materials	Plastics (ABS, PP, PC, TPU, PET, etc.)	Glass, quartz, silicon wafers, ceramics, etc.
Coating effects	Chrome, silver, gold, gun black, semi-transparent (NCVM non-conductive film), rainbow and other decorative effects	Precision optical films (AR, HR, filters), semiconductor electrodes/contacts, anti-fingerprint films, anti-reflection films with high color rendering, etc.
Equipment structure	Split type; vertical side-opening door; 2 viewing windows	
Control mode	Manual / semi-automatic / fully automatic; touchscreen + PLC	
Process gases	Argon	Argon, oxygen, nitrogen
Ultimate vacuum	6 × 10 ⁻⁴ Pa (no load, clean-room conditions)	
Working temperature	Room temperature to 80 °C	Room temperature to 300 °C, adjustable
Chamber diameter (mm)	1400 / 1600 / 1800	900 / 1100 / 1350 / 1550 / 1800 / 2050 / 2350 / 2700
Chamber height (mm)	1600 / 1800 / 2000	1500
Workpiece carrier structure	Vertical drum carrier	Dome-shaped workpiece disk / planetary flat disk
Carrier specification	6 / 8 / 9 axes	Integrated dome / 4-axis planetary disk
Carrier motion	Revolution and rotation; variable-frequency stepless speed control	Revolution or planetary rotation; variable-frequency stepless speed control
Pump system	Mechanical, Roots, molecular/diffusion and holding pumps	Mechanical, Roots, molecular/diffusion, holding and cryogenic pumps
Power system	Evaporation power supply; ion bombardment power supply	Electron gun, filament heating and ion source power supplies

Application Fields

Decoration



Optics



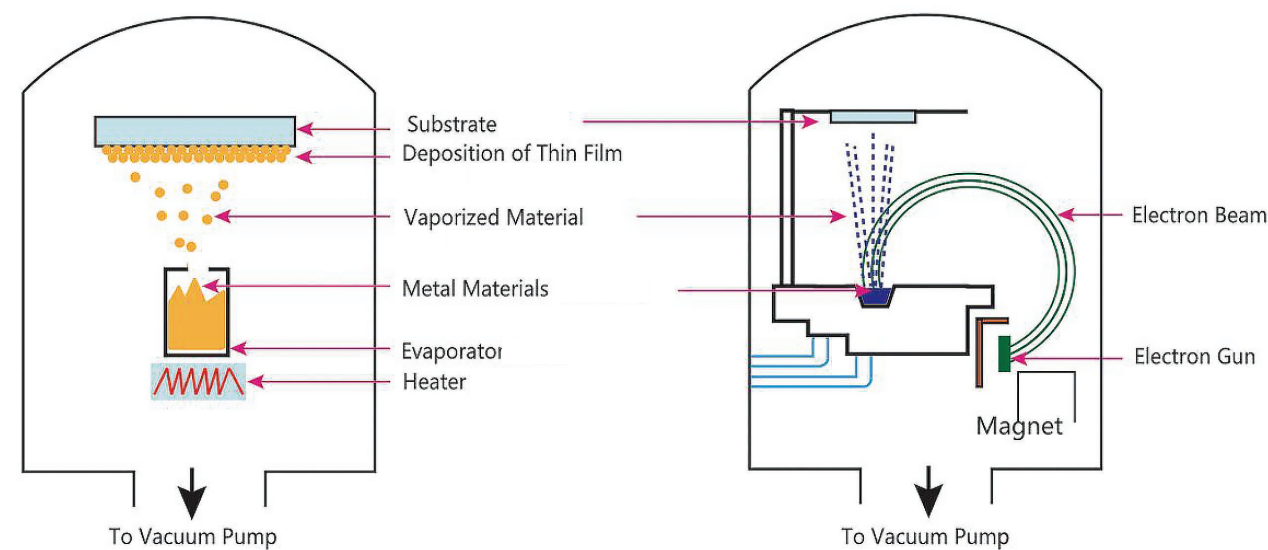
OPT

Evaporation Vacuum Coating Equipment

Technical Features

Vacuum evaporation coating uses resistance heating or high-energy electron beam bombardment to vaporize or sublime coating materials under high vacuum. The released vapor travels towards the substrate and deposits as a solid thin film on its surface.

PRINCIPLE DIAGRAM



Resistance Heating Evaporation

- Thermal evaporation includes evaporation and condensation in a vacuum chamber. A heat source evaporates the source material a few centimeters from the substrate; the vapor then condenses on the substrate. Resistance heating and electron beam sources can be used.
- Film quality and thickness depend on evaporation-source temperature and shape, substrate position, vacuum level and other factors.

Electron Beam Evaporation

Evaporation Process

- Thermal energy vaporizes or sublimates coating materials into gaseous particles (atoms, molecules or atomic clusters) with energies of 0.1-0.3 eV.
- Gas particles travel towards the substrate in nearly collision-free straight-line motion.
- Particles deposit and condense on the substrate to form a thin film.
- Film-forming atoms rearrange or form chemical bonds.

Product Features

OPT-T

- Streamlined structure for convenient operation and maintenance.
- Very fast film deposition and high production efficiency.
- Short thermal-radiation exposure; compatible with low-melting-point plastic substrates.
- Ion bombardment cleaning significantly improves substrate adhesion.



OPT-E

- Ultra-high-purity thin films with excellent density.
- High-precision crystal and optical monitoring controls nanoscale thickness and optical wavelength.
- A self-developed high-performance ion source improves film density and adhesion and eliminates spectral shift.

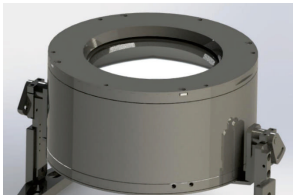


Evaporation Source

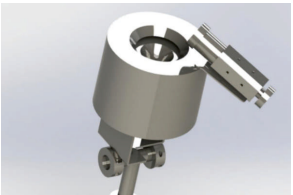
- Vacuum evaporation sources are classified by their heating principle: resistance heating, electron beam heating, high-frequency induction heating, arc heating and laser heating.
- OPT-T uses a long-life resistance-heating source. High-melting-point metals such as tungsten, molybdenum and tantalum form evaporation boats or holders for rapid evaporation of low-melting-point metals.
- OPT-E combines a high-power deflection electron gun with a water-cooled copper crucible. Concentrated energy supports high-melting-point metals and precision oxide ceramic coating materials.

Ion Source

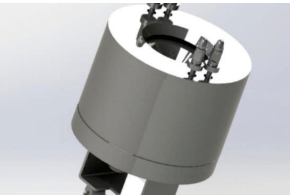
- RF ion source: ultra-low absorption in ultraviolet, visible and near-infrared bands. Its filament-free, long-life design provides high process purity for stable deposition of ultra-high-purity semiconductor electrodes and precision optical multilayers.
- Hollow cathode ion source: low absorption in visible and near-infrared bands, high ionization rate and excellent process stability for long-term auxiliary deposition of multilayers such as precision band-pass (BP) filters.
- Filament Hall ion source: mature and stable technology with high beam output and process economy; used for conventional anti-reflection and reflective films and for ion cleaning before coating.



RF ion source



Hollow cathode ion source



Filament Hall ion source

OPT-S

Magnetron Sputtering Vacuum Coating Equipment

Equipment Overview

Working principle	Physical vapor deposition; glow discharge
Machine structure	Vertical type; batch / in-line
Applications	Optical lenses, automotive panels, display screens, LiDAR, HUD head-up displays, etc.
Coating types	Cut-off filters, band-pass filters, RGB filters, AR, hard AR, IR-AR, HR, AS/AF, ITO, etc.
Coating features	High density, strong adhesion, no spectral drift, high hardness and wear resistance
Machine features	Environmentally friendly equipment, no hazardous gas or wastewater emissions; sturdy, durable stainless-steel chamber
Common target materials	Silicon, titanium, niobium, tantalum, aluminum, chromium, zirconium and their corresponding compounds
Power supply type	Mid-frequency sputtering power supply; bias power supply
Process gases	Argon, nitrogen, oxygen, acetylene



Equipment Parameters

Model	OPT-S 800	OPT-S 1500	OPT-S 1700	OPT-S 1800
Coating technology	Magnetron sputtering			
Etching technology	Ion source etching			
Substrate materials	Glass, crystal materials, polymers, ceramics, metals, etc.			
Equipment structure	Integrated type; vertical side-opening door; 2 viewing windows			
Control mode	Manual / semi-automatic / fully automatic; touchscreen + PLC			
Ultimate vacuum	8 × 10 ⁻⁵ Pa (no load, clean-room conditions)			
Working temperature	Ambient temperature to 300 °C, adjustable			
Chamber size (mm)	Φ1150 × H980	Φ1200 × H1650	Φ1200 × H1900	Φ1200 × H2180
Effective coating area (mm)	Φ650 × H450	Φ940 × H1000	Φ940 × H1200	Φ940 × H1600
Workpiece carriers (customizable)	Φ135 × 10 shafts	Φ170 × 12 shafts	Φ170 × 12 shafts	Φ170 × 12 shafts
Carrier motion	Vertical planetary cylindrical workpiece carrier system			
Sputtering sources (planar/cylindrical options)	4	8	8	8
Molecular pumps	2	5	6	8
Roots pumps	1	1	1	1
Holding pumps	1	1	1	1
Mechanical / dry pumps	1	2	3	4
Mid-frequency power supplies	2	4	4	4
Bias power supplies	1	1	1	1
Footprint (m)	L3.8 × W1.8 × H2.3	L4.0 × W2.1 × H2.8	L4.0 × W2.1 × H3.1	L4.0 × W2.1 × H3.3

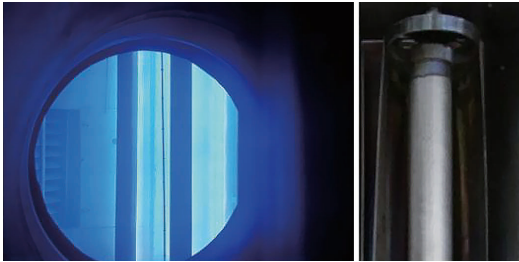
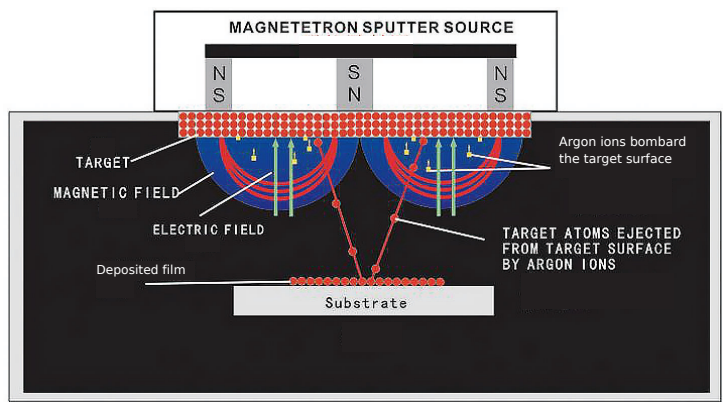
OPT-S

Magnetron Sputtering Vacuum Coating Equipment

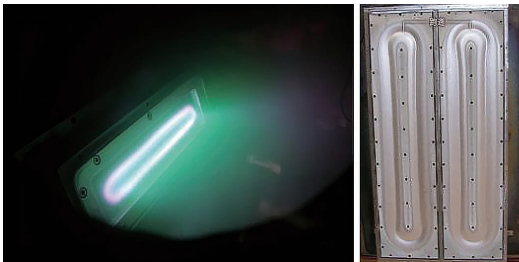
Technical Features

- Under plasma conditions, argon is ionized into positive ions that bombard the target surface. Ejected target particles deposit on the substrate to form a film.
- Magnetron sputtering provides low-temperature processing, easy control and fine film structure.

Magnetron Sputtering Film Deposition Schematic



Cylindrical Target



Rectangular Planar Target

Main Parts



Deposition Process

- An inert gas, typically argon, is introduced to create a glow discharge and charged ions.
- Electric-field-accelerated ions bombard the target, ejecting target atoms and generating secondary electrons. The magnetron field confines secondary electrons near the target, increasing ionization and plasma density while reducing substrate heating.
- Secondary electrons strike gas atoms and generate more ions.
- Energetic target particles deposit on the substrate.
- The workpiece carrier rotates and revolves to optimize film-thickness distribution, maintain spectral consistency across individual pieces and batches, and build multilayer optical films.

Product Features

- High density. High-energy sputtered particles and self-bombardment create dense films, avoiding the columnar-crystal voids found in conventional coatings.
- No spectral drift. Dense films block moisture penetration and prevent spectral red-shift or drift under complex temperature and humidity conditions.
- Online nanoscale thickness control. An integrated high-precision optical monitoring system (OMS) measures spectra in real time. Extremum or fixed-wavelength termination improves control and batch repeatability for complex stacks containing tens or hundreds of layers.
- Strong adhesion. High-energy ion deposition forms strong chemical bonds between the film and substrate.
- Low loss and optical performance. Accurate film stoichiometry provides ultra-low absorption and scattering losses, enabling high transmittance, high reflectivity and sharp cut-off spectral characteristics.

Application Fields

