DENTON

Discovery™ 18 Sputtering System

Standard Features

- *Affordable*
- *Complete System*
  - Both RF/DC sputtering power supplies are standard
- *Fully Featured*
  - Two magnetron sputter cathodes
  - Confocal sputtering arrangement
  - Precision mass flow control
  - Comprehensive gauges
  - Rotating substrate platform
- *Clean, High Vacuum (≤10^{-7} torr)*
  - 140 l/s turbomolecular pump
  - 11 cfm rotary vane pump
  - LN_2 trap
- *Optional Accessories*
  - Additional and/or larger sputter cathodes
  - Substrate load lock
  - DVOCS automation package
  - Additional power supplies
  - Capacitance manometer
  - Film thickness control

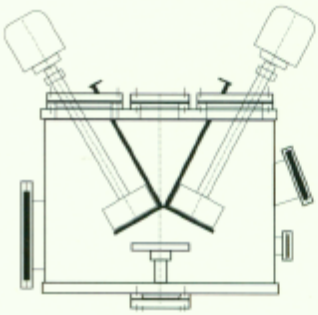
Discovery 18 Sputtering System for Research and Smaller Production Applications.

Denton Discovery™ 18 Sputtering System

VERSATILE RF AND DC MAGNETRON SPUTTERING... IN A COMPLETE, LESS COSTLY PACKAGE FOR BOTH RESEARCH *AND* LIMITED PRODUCTION APPLICATIONS.

The Denton Discovery 18 has been specifically designed to fill the need for a smaller, less costly sputtering system that provides the versatility and operating benefits of larger, more costly systems. The standard system features an 18˝ diameter x 13.5˝ high deposition chamber. An optional 6.0˝ diameter x 10.5˝ long load lock allows manual transfer of substrates up to 5.0˝ diameter onto the substrate stage. The system's mechanical pump evacuates the load lock. Load lock turbo pumping is available.

Chamber access to cathodes, fixtures and substrates is through a full diameter, hinged top plate. Up to three (3) magnetron sputter cathodes can be placed in the chamber top plate in a ***confocal*** arrangement. The confocal arrangement provides excellent uniformity and allows co-sputtering.



Unique Confocal Cathode Arrangement

BENEFITS OF CONFOCAL SPUTTERING

In a ***confocal*** cathode arrangement, the cathodes are focused on a central area of the substrate table. Table rotation during sputtering permits co-deposition, provides continuous substrate exposure to the cathodes, and results in excellent coating uniformity.

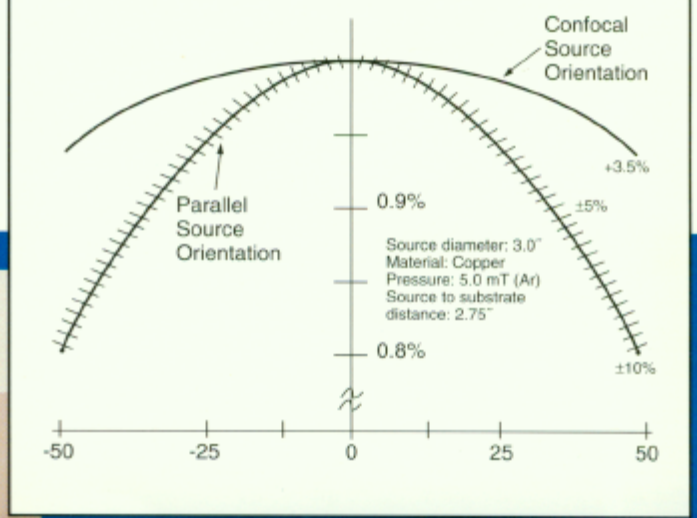
With the confocal arrangement, the cathodes can be *smaller* than the substrate and still provide better than ±5% uniformity. Smaller targets also *reduce* *cost* of target material.

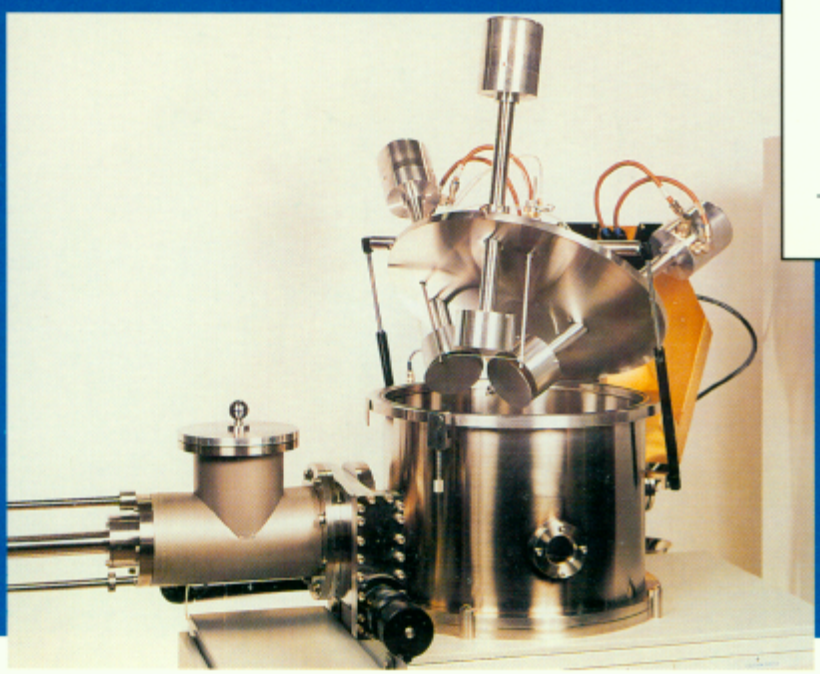
MAGNETRON SPUTTER SOURCE

Denton's Magnetron Cathode Sputter Sources feature a patented anode grid and "encapsulated" magnet assemblies for massive cooling of the magnet set.

The patented grid delivers ***improved*** films and finer grain structure (particularly with aluminum) and keeps the substrate cooler during coating. The "potted" magnet sets provide isolation from cooling

RELATIVE FILM THICKNESS





Internal View of Discovery 18 with Confocal Cathode Arrangement

*Patent No. 4395323

water to ***prevent*** corrosion, allow ***easy*** backing plate ***repair*** or ***replacement***, and permit long term use of sources at ***high power***.

All cathode assemblies are delivered with an electro-pneumatic shutter. All cathodes are RF/DC compatible. Standard RF/DC connectors and shields ensure efficient power transmission and operator safety.

DISCOVERY 18 INTERNAL STALK-MOUNT MAGNETRON CATHODE

- **Compression fitting mount permits quick adjustment of "substrate to target" spacing**
- **Available in 2", 3", or 4" diameters**
- **Standard 8"- 15" length**
- **Ideal for co-sputtering applications**
- **Water and electrical connections are external to vacuum**
- **Usable with clamped or bonded targets**

APPLICATIONS

The Denton Discovery 18 System is used for many applications including:

- **Supermodulus materials**
- **Superconductors**
- **Contact metalization**
- **Macro laminants**
- **Hybrid metalization**
- **Optical/magneto and optical films**

Proven Off-The-Shelf Subsystems

A wide selection of in-stock subsystems is available to upgrade or customize any sputtering system to your specific needs.

LOAD LOCK CHAMBER

Denton load lock chambers are constructed from electropolished 304 stainless steel. Each load lock chamber is equipped with all required ports and feedthroughs for substrate manipulation, vacuum gauging, pumping, etc. The load lock is separated from the deposition chamber by a manual gate valve. Load lock turbo pumping to achieve high vacuum conditions is available. Since a large (6.0" diameter) load lock isolation valve is standard, substrates up to 5.0" diameter or slightly larger can be transferred through the load lock.

RF BIAS SUBSTRATE TABLE

Denton's Biasable Rotating Substrate Table is available for DC to RF applications and is rated up to 5,000 volts. RF bias tables are available in 4", 6", 8", and larger diameter sizes, handle weight capacities up to 100 lbs. and mount in any position for easy system integration. Robust water cooling, high purity dielectrics, and tight manufacturing tolerances ensure long, reliable life in demanding production environments.

HIGH TEMPERATURE SUBSTRATE TABLE

Denton's unique Heated Rotary Substrate Tables are available as a complete system (with power supply), provide stage temperatures up to 600° or 900°C, and are capable of simultaneous heating and rotation in high vacuum (10^{-7} torr) applications. Table sizes of 2" and 4" are standard. Tables can be easily mounted in any position in new or existing systems. All high temperature tables feature short ramp times to operating temperature for maximum throughput, and are compatible with Denton load lock manipulators.

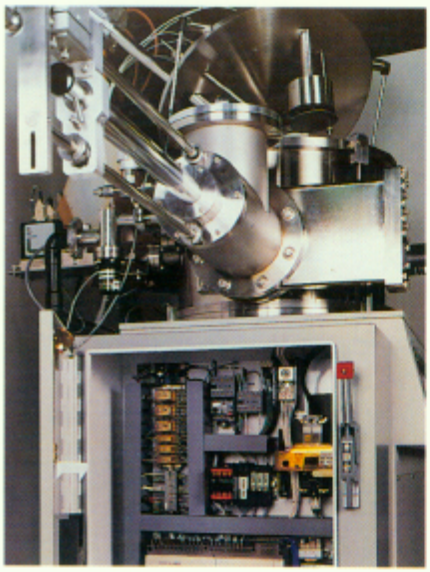
RADIANT SUBSTRATE HEATER SYSTEM

Denton's standard SCR controlled, proportional substrate heater system provides constant temperatures and ranging capability from ambient to 300°C. Both quartz lamps and high thermal inertia calrod heaters are available.

POWER SUPPLIES

Denton's 500-600 watt RF power supply with automatch network allows sputtering of nonconductive materials. An additional 500-600 watt RF power supply with automatch network is available for co-sputtering or RF bias applications.

One (1.0) KW switching DC power supply is included in the base machine for DC sputtering applications. An additional DC power supply or larger DC power supplies are optional.



SYSTEM CONTROLS

Denton's user-friendly, programmable logic controller allows the user to perform standard control functions including auto venting and pumping with "soft" valve interlocks. A control interface is also offered for external automation and data acquisition.

PRESSURE/FLOW INSTRUMENTATION

Up to four mass flow controllers, each with a close-coupled shut-off valve can be integrated into the Discovery 18. A heated capacitance manometer with 45 psia overpressure capability may be added to improve the resolution of pressure measurements in the sputtering regime. Auto ranging cold cathode high vacuum gauging is standard. Hot filament vacuum gauging is available.

MORE STANDARD FEATURES – BETTER VALUE

Denton's Discovery™ 18 System offers these ***standard*** features so you receive a complete system and outstanding value:

- **20˝ Stainless Steel Base Plate** and valve trap assembly
- **Integral LN_2 Trap** for enhanced water vapor pumping speed
- **Metal Bellows,** sealed electro-pneumatic high vacuum main valve, backing and roughing valves
- **Microprocessor Based PLC Control** of vacuum valves, auto pump/auto vent sequencing and "soft" system interlocks
- **Auto Ranging Digital High Vacuum Cold Cathode Ionization Gauge** and thermocouple gauges on foreline and chamber
- **Precision Mass Flow Control** with power supply and digital readout
- **High Resolution Sputtering Pressure Gauge**
- **Two DVI 2.0˝ Diameter, Internal "Stalk-Mount" Planar Magnetron Sputter Cathodes (RF/DC)** with independent shutters
- **One RF Power Supply** with automatch network and rack mounted control panel (500 watt)
- **One 1.0 kW DC Switching Power Supply (600V-1.7 amp)**
- **Variable Speed (0-25 RPM) Rotating Substrate Platform**

SYSTEM SPECIFICATIONS

FEATURE	DISCOVERY 18
Chamber	304L SS 18˝ Diameter x 13.5˝ Deep
Baseplate	304L SS 20˝ Diameter
High Vacuum Pump	140 l/s Turbomolecular Pump
Mechanical Pump	11 cfm
Control Cabinet	Single 19˝ Standard EIA Rack, with Single Point Power Connection
High Vacuum Gauge	Digital Cold Cathode Auto-Ranging
Controls	PLC Control of Auto Pump Sequence
Feedthroughs	Baseplate (15) 1.0˝, (2) 2.75˝ Conflats (2) 1.33˝ Conflats
Floor Space	96˝ Wide x 48˝ Deep
Chamber Viewports	(1) 4.0˝ Diameter
High Vacuum Valve	Horizontal, 5.75˝ Diameter Bellows Sealed

Note: Specifications Subject To Change Without Notice

OTHER DENTON SYSTEMS OFFERED INCLUDE:

Vacuum Systems

Production Systems
- Sputtering, Evaporation Sources
- Bell Jars
- Box Coaters (18" to 60")
- Ion Sources
- Optical Monitors
- Fully Automated Systems
- In-Line Sputtering Systems

Electron Microscopy Sample Preparation Systems
- "High-Resolution" Coaters
- Sputter Coaters
- Evaporators
- Freeze Etch, Freeze Dry Systems
- Critical Point Dryers
- Ion Milling Systems, etc.

R&D/Quality Control Systems
- CV Dot Makers
- Sputtering Systems
- Electron Beam/ Thermal Evaporators

Compact Disc Coating Systems
- Mastering Systems
- Q.C. Aluminizers

THE DENTON INVITATION . . .We invite you to talk with us about any question or problem you have, any idea you have, about coating equipment and services. Simply call (609) 439-9100, write, or FAX: (609) 439-9111.

Decades of R&D in Thin Film Manufacturing

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