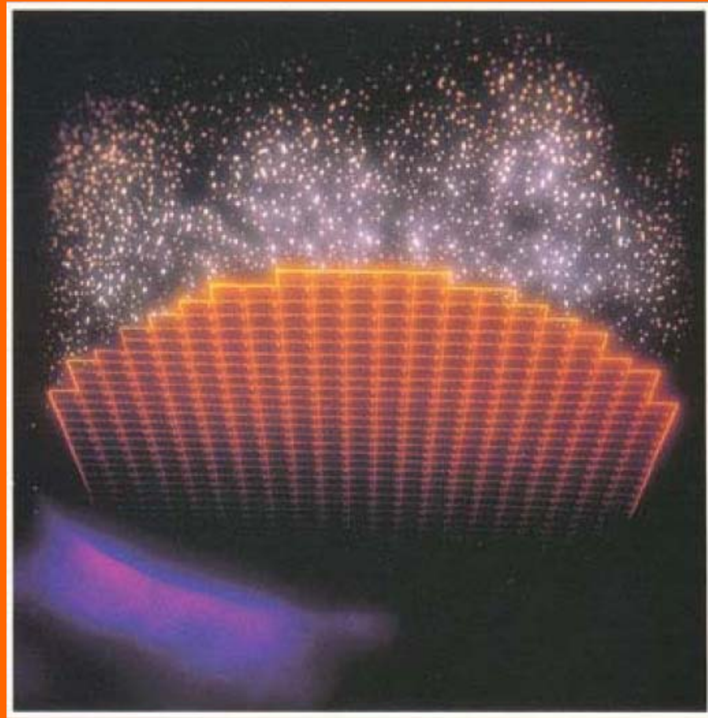
AccuSputter ® AW 4450-Series
Sputtering Deposition Systems



Allwin21 Corp.

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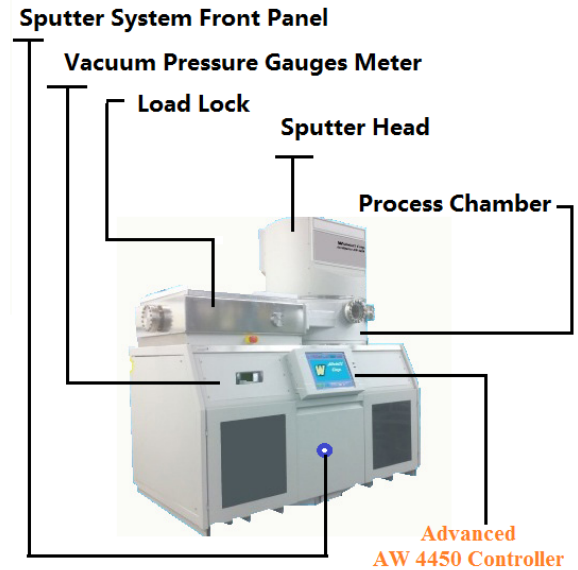
All Specification and information here are subject to change without notice and can not be used for purchase and facility planning.

AccuSputter ® AW 4450-Series System Overview

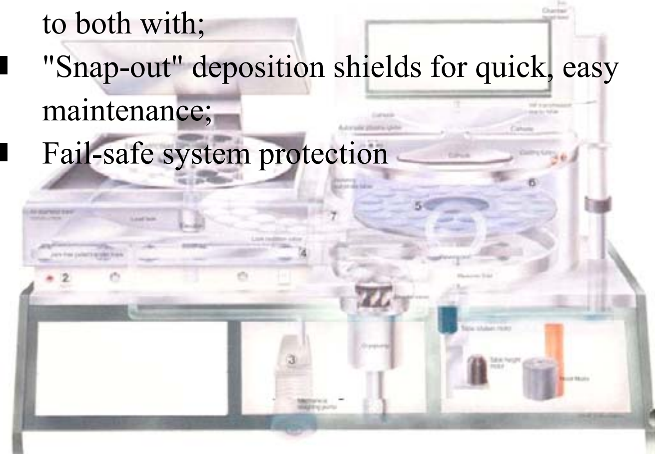
The **AccuSputter** ® AW 4450-Series Production Sputtering Systems are manufactured in the configuration of a manually-loaded system capable of fully automatic operation. The **AccuSputter** ® AW 4450 sputtering head is equipped with three Delta™ cathode or four round 8-inch positions (Mo flame sprayed shields and shutters standard). The **AccuSputter** ® AW 4450-Series Production Sputtering Systems deposit a wide variety of materials onto substrates such as ceramic, metal, plastics, glass and semiconductors. The system can also be used for RF sputter-etching, a process in which material is removed from, rather than being deposited on, the substrates prior to sputter deposition.



These sputtering systems sequentially deposit thin films of up to three or four different materials onto a single substrate, thus attaining sandwich-structured films such as multi-layer optical interference filters or semiconductor devices. Resulting thin films range in thickness from a few Angstroms up to several microns.

Description of Features:

- Advanced **AccuSputter** ® AW4450 Controller with GUI mounted in the main frame;
- Manual, Semi and Automatic one button operation;
- Customer programming of recipe for process parameters.
- GEM/SEC II functions (Optional)
- 24V DC control components
- DC Gear Motors for table rotate and carriage moving;
- Advanced vacuum gauges and control system;
- MFC gas control system;
- Advanced RF automatically matching network;
- DC and RF power are mounted in the main frame;
- Fast Cycle Load Lock Operation ;
- High rate Delta™ DC magnetron sputtering;
- High throughput operation: Automated load lock and controller sequences provide for efficient pump down and pallet transfer to process chamber
- High uniformity: ±7% deposition uniformity guaranteed with water-cooled rotating annular substrate table; ±5% achievable.
- Ultra-clean vacuum: Cryopumped and Meissner-trapped process chamber ensures contamination-free conditions especially important for critical processes such as the deposition of aluminum and platinum;
- Easy maintenance: Removable deposition shields permit easy system cleaning. Automatic cryopump regeneration minimizes downtime and inconvenience;
- Specialized pallets for ease of substrate leading/unloading;
- "Drop in" target for quick target changes, no screw to both with;
- "Snap-out" deposition shields for quick, easy maintenance;
- Fail-safe system protection



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AccuSputter ® AW 4450-Series Configuration

Typical Process Results

High quality metal films can be routinely achieved:
Material:Al-1%Si
Power:9kw
Table rotation:10 rpm
Argon pressure:8 mTorr
Film thickness:1.04 microns
Deposition time:5.8 minutes
Step height: 1.10 microns
Step slope: 80°
Step coverage: 62% horizontal-to-vertical
Specularity: 65-75%
Resistivity: 2.85μΩ-cm
Grain size:2 microns

Process Chamber

- 28" diameter X 12" high stainless steel cylinder with 6" CF flange viewport and load lock port
- 28" diameter stainless steel top plate with 3 delta cathode ports. Adaptor for 8-inch or 6-inch target is optional.
- 28" diameter stainless steel base plate
- $1^1/_2$" air-operated roughing isolation valve
- Air-operated gas inlet valve
- Air-operated vent valve
- $1^1/_2$" blanked-off leak check port
- Removable deposition shields
- 23" diameter, 3-position water-cooled annular substrate table with variable-speed motorized table drive
- Full circle shutter with vane shutter
- Chain drive pallet carrier transport
- Heavy duty electric hoist

Load Lock

- 30" x 28" x 8" stainless steel load lock chamber with aluminum cover
- 2" air-operated roughing isolation valve
- Air-operated vent valve
- 23" diameter molybdenum annular substrate pallet
- Pallet carrier and chain drive transport

Vacuum System

Roughing

- 36.7 cfm mechanical pump for process chamber and load lock roughing
- 2" diameter roughing lines with electro-pneumatic valve
- Surface-area Versa-trap™ in roughing line

High vacuum pumping

- 2 stage cryopump with 1000 l/s pumping speed for air, including chevron, water-cooled compressor and lines, automatic regeneration controller and plumbing kit.
- $7^1/_2$" O.D. (6" ASA) aluminum air-operated gate valve
- Air-operated venetian blind throttling valve

Residual gas pumping

- Full flood Meissner trap with 30,000 l/s pumping speed for water vapor
- Insylated LN_2 lines
- LN_2 sensor, solenoid and relief valve

Control

- Vacuum gauging package including basic digital vacuum gauge control, ionization tube and two thermal tubes
- Automatic pump-down controller
- Automatic lock controller

Options

- Load lock Hi-VAC pump

Power Options

- 5 kw programmable DC magnetron power supply
- 10 kw programmable DC magnetron power supply
- 1.2KW RF Generator
- 2 kw RF Generator
- 3 kw RF Generator

Cathode Options

- Delta DC magnetron cathode assembly
- Delta RF magnetron cathode assembly
- Delta RF diode cathode assembly
- 8" diameter RF magnetron cathode assembly
- 8" diameter RF diode assembly
- 8" diameter DC magnetron cathode assembly

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AccuSputter ® AW 4450-Series Configuration(Cont.)

Advanced AW 4450 Controller

The Advanced **AccuSputter** ® AW 4450 Controller uses a Pentium class computer and PCBs with AW 4450 Software to realize manual, semiautomatic and fully automatic operation

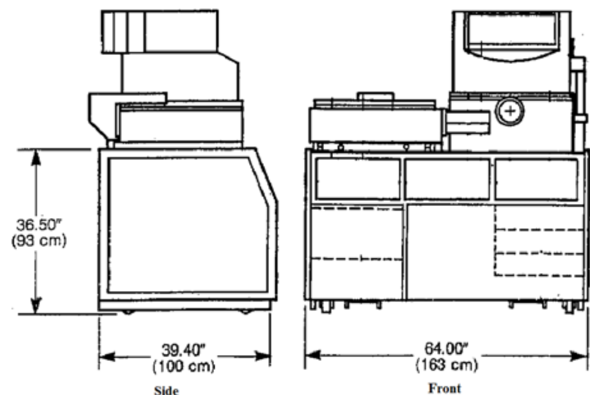
- Realize manual, semi and automatic one button operation.
- The AccuSputter AW 4450 control software runs on any Pentium class PC computer with a parallel (printer) port. The interface card that is provided interfaces to the AccuSputter AW 4450 with only one cable, the control interface cable.
- Automated calibration of all subsystems from within the AccuSputter AW 4450 software. This allows faster, easier calibration, leading to enhanced process results.
- Recipe creation. It features a recipe editor to create and edit recipes to fully automate the processing of wafers inside the chamber.
- Validation of the recipe, improper control sequences will be revealed.
- Storage of multiple recipes, process data and calibration files so that process and calibration results can be maintained and compared over time.
- Password codes which provide security for the system, recipe editing, diagnostics, calibration and setup functions.
- Simple and easy to use menu screen which allow a process cycle to be easily defined and executed.
- Troubleshooting features which allow engineers and service personnel to activate individual subassemblies and functions.

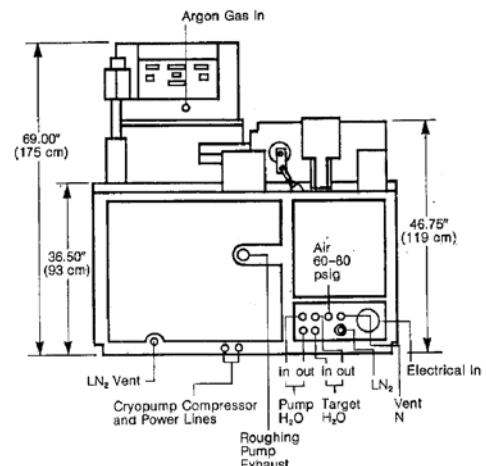
Utilities:

- Rear-mounted electrical, water, gas and LN2 inlet panel
- Power distribution box
- Water flow switch panel and manifold
- 10kW DC power supply: 208VAC, 60Hz, 3phases, 60A, 4 wires
- Vacuum system: 208VAC, 60Hz, 3phases, 60A, 5 wires
- Cooling Water: 1.8gpm3
- Process N2: 60-70 psi
- Process Argon: 5-10 psi
- CDA: 40-60 psi

Dimensions and Weight:

Width: 65.000 in (165.1 cm)
Depth: 46.000 in (116.8 cm)
Height: 68.000 in (172.7 cm)
Weight: 2,288 lb (1,038 kg)





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AccuSputter ® AW 4450-Series Typical Deposition Rates

Material	Delta[1] RF Diode	Delta[1] RF Magnetron	Delta DC Magnetron
Ag			480
Al			200
Al_2O_3[3]		40	
Au			400
Cr			180
CrN_x			160
$CrSi_2$			125
Cu	80		320
Mo			220
$MoSi_2$			150
Ni[2]			
Nichrome			125
Pd			390
Permalloy[2]			
Pt			280
Quartz[3]	25	50	
Si[3]		90	
Si_3N_4[3]		30	
Ta			150
TaN_x			140
Ti			140
TiN_x			125
Ti/W(10%)			150
W			150
Wn_x			125

Rates shown above are given in angstroms/min/kw, and are typical only. Actual rates for any given system will depend upon process and system parameters. Rates are approximately linear with applied power except where otherwise indicated. Some materials, due to their nature, are limited to power levels substantially less than the maximum power ratings for each cathode type.

[1] Insufficient data available for most materials with RF Delta operation - DC magnetron recommended for metals.

[2] Ferromagnetic materials - magnetron mode is possible with thin targets only but not recommended.

[3] Dielectric materials - require the use of RF power. Rates are non-linear.

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