CFM650 Reactive Closed Field Magnetron Sputtering System

CHAMBER

Single walled, vertical axis, stainless steel, water cooled (or heated) via trace cooling channels. Access is by means of a hinged front opening door. Multiple ports for location of the rectangular magnetron sources.

- Chamber diameter (internal) 714mm
- Chamber height (internal) 837mm
- Chamber diameter (external) 724mm
- Chamber height (external) 881mm.
- Drum diameter 424mm
- Linear magnetron length 610mm
- Magnetron width (target size) 133mm
- Magnetron positions: 4
- Available coating area (±1%): 5040 cm^2

Further ports in the chamber walls are included as follows:

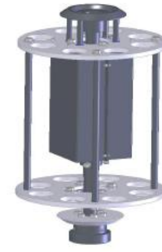
- 2 - view ports, 2" diameter.
- 1 - 70FC flanged port, to accommodate a mass spectrometer.
- 5 - NW25 flanged ports
- 4 - NW10 flanged ports.

For all systems, one set of removable shields are included to simplify periodic chamber cleaning.

DRUM SUBSTRATE CARRIER

CFM systems are equipped with a precision single axis drum with fixturing to accommodate a range of substrate sizes. The substrates are rotated at typically 50rpm. This ensures <±1% thickness uniformity over the central drum surface.

One universal precision drum with shutter is supplied – drum shown with shutter removed:



Universal drum configuration

Segment sizes are interchangeable. Specific segment widths to be agreed with the customer. Cylindrical drum geometries are available for coating of flexible sheet. A segmented drum for lens loading is shown as follows for a CFM 650 system.

MAGNETRON SPUTTER SOURCES

Four magnetron positions are available. Two magnetrons are supplied as standard. The magnetrons are designed to produce intense ion bombardment of the substrates during deposition.

The magnetrons are arranged in the patented closed field magnetron configuration (CFM). The systems enable coating deposition to be carried out using a high density of low energy bombarding ions at room temperature. This results in deposition of very dense, non columnar coating structures with low internal stresses.

The use of a low bias voltage during deposition also allows deposition of coatings with dense structures at room temperature temperatures.

The ion bombardment power drawn by the substrates during ion cleaning is very much higher than that drawn during deposition which significantly increases the efficiency of ion cleaning resulting in coatings with very high levels of adhesion.

The use and design of the CFM system is covered by the following patents: UK patent No. 2258343, European patent No. 0521045, US Patent No. 5554519, Japanese Patent No. 3397786.

VACUUM PUMPING SYSTEM

Backing pumps: Edwards E2M80 rotary pump with EH500 roots blower combination.

Main chamber pumping: Edwards 1600 l/sec turbo molecular pump or equivalent.

Water vapor pump: Telemark model TVP 1800 and meissner coil.

Note different pump suppliers can be used on customer request. The pumping sequence is automatically controlled.

VACUUM GAUGES

Pressure is monitored by a Penning/Pirani combination with an active gauge controller with digital display.

MAGNETRON POWER SUPPLIES

The two magnetrons are powered by one Advanced Energy Pinnacle 5x5 pulsed DC unit. These have excellent arc suppression and can operate on constant current, voltage or power. Power supplies can be run to allow simultaneous deposition from each magnetron.

GAS CONTROL

Two gas inlets are provided as standard, one for argon mass flow control and the other associated with the reactive gas control system. Gas lines are configured for two linear magnetrons although this can be extended to four magnetron positions on request.

Reactive gas flow is maintained at the appropriate rate by a gas controller monitoring magnetron. This system is used to control the exact composition and stoichiometry of reactively deposited coatings. A continuously tunable gate valve can be incorporated for real time active pressure control.

PROCESS CONTROL

The CFM650 system is supplied complete with fully automatic computer control.

The system can be monitored from the factory by internet link.

The computer fully controls the vacuum system and allows easy writing of coating sequences using the recipe writer section of the program.

The following data is logged and may be displayed;

- Magnetrons - current, voltage
- Bias - current, voltage
- Pressure – chamber and backing pressure
- Time
- Rate of rise before run
- Process gas and flows

A trending screen is displayed during the process, the data that is displayed is chosen by the operator and can be changed during the process if required. Once the run has finished, the data is logged in a spreadsheet format file. The process recipe is then attached to the end. Recipe editing for single and multilayer layer deposition is available. This includes substrate cleaning, target conditioning stages, magnetron stabilisation, deposition and shutdown.

WARRANTIES

All bought out items will carry the original manufacturer's warranty. This includes pumps, power supplies, controllers, etc. All other items are warranted by Applied Multilayers LLC and any defect in materials or workmanship reported within one year of purchase will be repaired or replaced free of charge.

SPARES

A comprehensive spares list is provided. We stock most major items and will supply replacement parts by air transport on notification of breakdown. This will be a free service under the warranty for the first year, but will be charged after the end of the warranty period.

INSTALLATION REQUIREMENTS

415V AC, 3 phase supply, 45kW total. Water cooling flow 20 litres/minute, pressure 3 bar; 18°C. Compressed air at 100psi clean, dry and filtered. Research grade Argon and Oxygen gas.

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