



# EVAPORATION SYSTEMS

AJA INTERNATIONAL, INC.

## GENERAL INFORMATION

AJA International, Inc. Evaporation Systems are available in three versions: ATC-E, ATC ORION-E (taller versions of the popular ATC and ATC Orion Series Sputtering Systems) and PVDX (a through-the-wall box coater configuration). These systems are designed to deliver maximum performance and quality for limited budgets. Available in both HV and UHV versions, these units inherit many design features and common parts from the highly evolved ATC & ATC ORION sputtering tools and can be outfitted with single or multi-pocket, linear and rotary e-beam sources, thermal evaporation sources, ion / plasma sources, Knudsen cells, low temperature evaporation cells for organic materials, Radak Sources, and magnetron sputter sources. In addition, these systems are available with load-locks, OCM monitoring and control, heated or cooled substrate holders, planetaries, various pumping packages and automated control.

## TYPICAL SYSTEM CONFIGURATIONS



### ATC ORION 8-E UHV

5 POCKET LINEAR E-BEAM WITH 850°C SUBSTRATE HEATER



### ATC 1500-E HYBRID UHV

DUAL CHAMBER SPUTTER / EVAP WITH 4 K-CELLS



### ATC 2400-E UHV

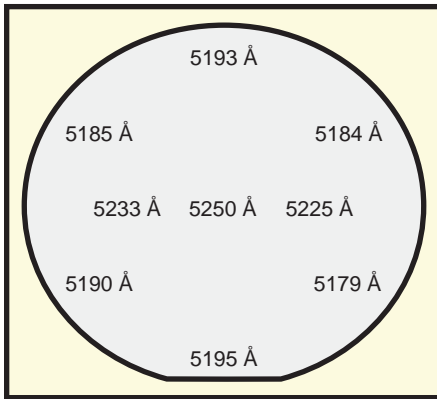
UP TO 4 MAGNETRON SPUTTERING SOURCES  
AND 5 POCKET LINEAR E-BEAM SOURCE IN "E-BEAM WELL"



### PVDX 1800-E HV

4 POCKET ROTARY E-BEAM SOURCE, (2) THERMAL SOURCES  
AND A 4x100mm FLAT PLANETARY

## TYPICAL RATE / UNIFORMITY DATA

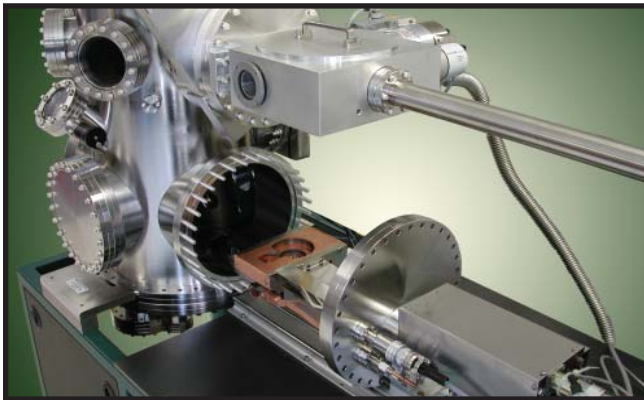


AJA International, Inc. Evaporation Systems can be configured for high rate, low rate, multi-layer and co-deposition applications depending on the chamber, sources, substrate carrier and general configuration chosen. Proper power, crucible liner or boat material, soak, and XY sweep decisions must be made for each material to be evaporated to ensure the desired rates, stability and film characteristics. Typically materials with good heat transfer properties (eg. Al) do not require XY sweep but may require a liner (Au) whereas materials with poor thermal properties (Cr) tend to tunnel and spit unless the e-beam power is diffused with an XY sweep. Proper substrate fixturing is required to obtain the best uniformity.

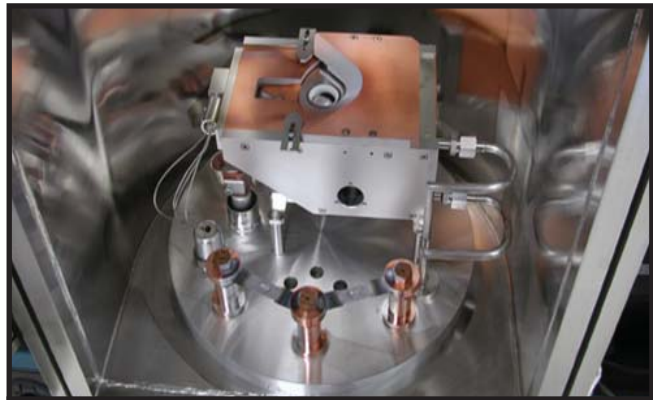
LEFT: Deposition of Aluminum with no XY sweep on 100mm diameter Si wafer mounted to 4 x 100 mm flat planetary, for 60 seconds at 6 kW, 10kV, 450 mm working distance. Uniformity is  $\pm 0.69\%$ .

## EVAPORATION SOURCES

AJA offers a wide variety of evaporation sources on the ATC-E, ATC ORION-E and PVDX-E deposition systems. The vertical cylinder ATC-E and ATC ORION-E UHV chambers are best suited to linear, multi-pocket, UHV, e-beam sources which are side mounted and fitted to a convenient slide rail for service and loading access. Spare ports on the chamber bottom straddling the linear e-beam source allow for the addition of up to 4 thermal evaporation sources. The smaller ATC ORION chambers are ideally suited to multiple, small, thermal evaporation sources (k-cell, resistive boat, Radak, low temp organic) often in combination with magnetron sputter sources. The PVDX-E cylindrical back, HV, box coaters with large loading doors are generally fitted with rotary pocket e-beam sources, resistive thermal sources and some form of planetary substrate carrier to handle multiple substrates per batch.



**SLIDE MOUNTED, 5 POCKET,  
LINEAR, UHV E-GUN**



**4 POCKET, ROTARY, HV E-BEAM GUN &  
2 RESISTIVE THERMAL SOURCES**

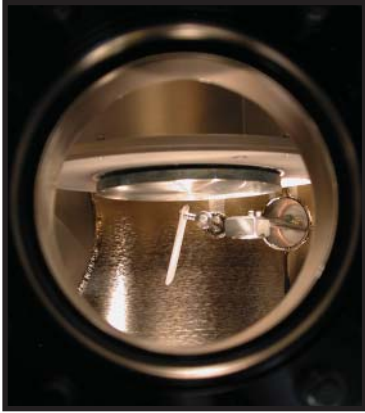


**40 cc KNUDSEN CELL and Ti BALL  
EVAPORATOR in W/C CHIMNEYS**



**4cc RADAK CELL and  
MINI-THERMAL CELLS**

## **SUBSTRATE HOLDERS with HEATING / COOLING**



AJA International, Inc. can fit your customized evaporation system with a wide variety of substrate holders including motorized, rotating substrate holders and planetaries to achieve excellent uniformity, heating up to 850 °C (special heaters to 1000 °C are available for small substrates), substrate RF and DC bias capability, in-situ manual or motorized Z motion (for working distance adjustment and load-lock transfer) and in-situ mask exchange (available only with certain configurations). Cooled substrate carriers (air / water / LN 2 / LHe) are also available depending on the application requirement. Process gas ring or gas distributor options are offered for reactive processing or applications requiring an anneal step.

## **PHASE II-E COMPUTER CONTROL**



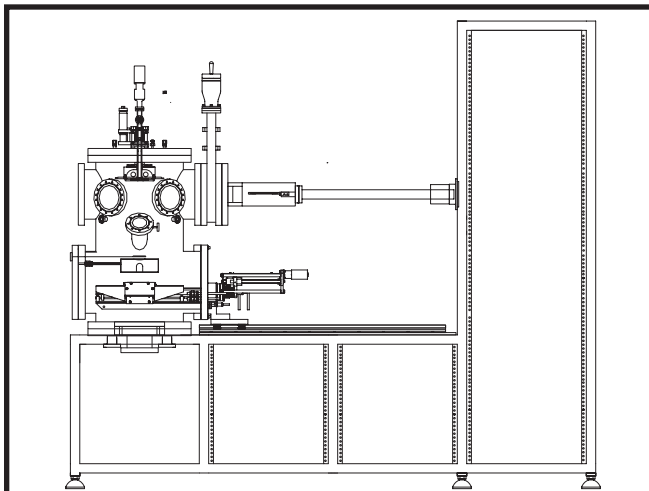
AJA International's Labview based Phase II-E computer control system is offered on all AJA International, Inc. Evaporation Systems. This straightforward, user-friendly control system utilizes a large, flat-screen laptop in a 19" rack drawer connected to a single 7" high x 19" wide rack mount hardware module. The back panel of the hardware module is populated with connectors to interface to all aspects of the sputtering system.

The Phase II-E control system allows the user to operate in either the "manual mode" or the "automated processing mode". In the "automated processing mode" the user designs process "layers" which are then compiled and saved as a "process". The system allows 10 unique user entry points which are accessible only by password, limiting access to a user's layers and preventing unexpected corruption of a user's saved processes.

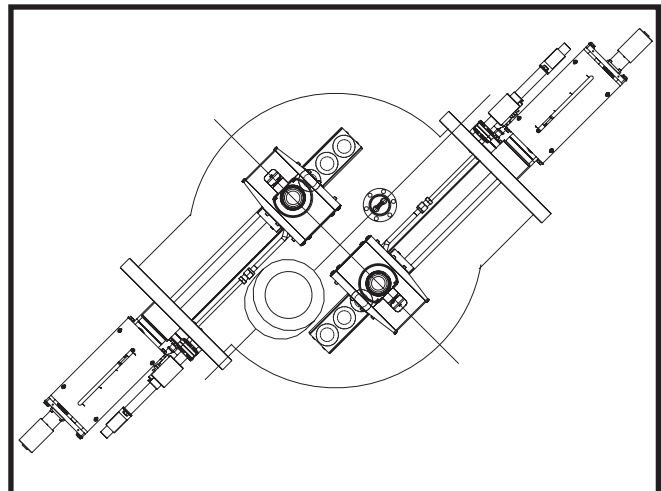


The standard Phase II-E control system will accommodate up to (2) e-beam sources, (4) thermal sources, (1) ion source or (1) RF bias supply, (3) process gases, (2) thickness monitors, (6) shutters, closed loop automatic pressure control if required and substrate temperature control. Processes are aborted if proper feedback is not detected. Special "soak layers" can be easily incorporated into the process. Finally, data logging is standard with an adjustable refresh period. Process data can be downloaded to common spreadsheet programs.

## **TYPICAL AJA EVAPORATION SYSTEM SCHEMATICS**



**ATC ORION 8-E 5 POCKET UHV  
with LOADLOCK**



**ATC 2400-E UHV with DUAL 4 POCKET,  
THERMAL & ION SOURCE**

# SYSTEM OPTIONS



PLANETARY SUBSTRATE HOLDERS



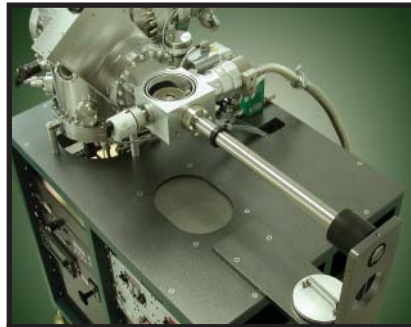
HEATING / COOLING / ROTATION / RF



POSITIONABLE QCM



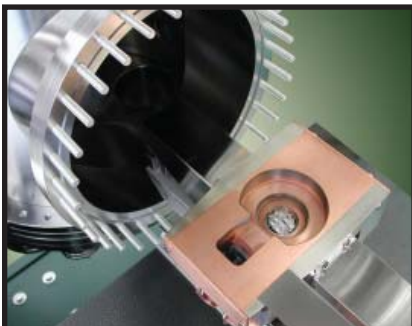
VACUUM PUMP OPTIONS



TURBO-PUMPED LOAD LOCKS



POWER DISTRIBUTION MODULES



E-BEAM SOURCE OPTIONS



THERMAL EVAP OPTIONS



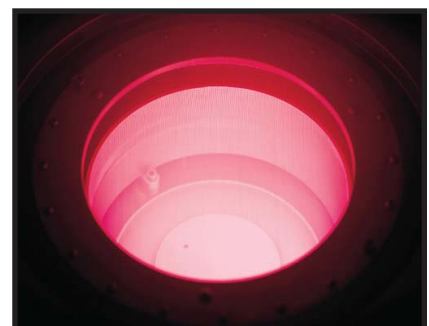
COMPUTER CONTROL



EVAP POWER SUPPLIES & CONTROL



EVAPORATION MATERIALS



RF ION SOURCES