



# BATCH COATING SYSTEMS

AJA INTERNATIONAL, INC.

## GENERAL INFORMATION

The AJA International, Inc. ATC-B Series Batch Coaters are custom engineered sputtering systems built to handle small production runs of multiple substrates. The final system configuration will depend on the actual requirement. For sputter up / down geometries, vertical cylinder chambers are commonly used. Horizontal cylinders or rectangular, in-line systems are employed for horizontal (side) sputtering applications. Side sputtering is generally preferred for extended process times since material build-up has no chance to fall onto the substrate or into the magnetron source thereby aborting the process in mid stream.

In order to optimize these system to a given process, AJA engineers can draw on a long history of standard and custom sputter source and substrate holder designs to satisfy the specific needs of the application. For example, one ATC-B horizontal cylinder has special magnetron sputter sources designed to reliably run processes which last 4 days each.

## TYPICAL SYSTEM CONFIGURATIONS



### ATC-B-PVDX

The ATC-B-PVDX is a zero-footprint, "through the wall" box coater with 4 pocket rotary e-beam source and dual thermal sources. This model was fitted with a 4 x 4" wafer flat planetary substrate holder.



### ATC-B-3400-H

The ATC-B-3400-H shown above is an extended process batch coater. The proprietary application for this machine required 40-50 thousand layers per run thus side sputtering was chosen and special, AJA STXL-EO (extended operation) magnetrons were designed to prevent aborted processing due to source shorting. This tool processes (8) 6" substrates or hundreds of smaller substrates per batch.



### ATC-B-2436

The ATC-B-2436 is used for CD mastering, handles (1) rotating substrate at a time and employs a single AJA Nautilus Series Rotating magnetron for optimum uniformity



### ATC-B-3400

The ATC-B-3400 mask making tool processes (6) 8" wafers per batch with up to (3) materials deposited from AJA TR5313 triangular magnetrons for optimum uniformity. The system also includes a 7 substrate cassette in the load-lock to boost throughput to up to (60) 8" substrates (or thousands of small substrates) per 8 hour period.



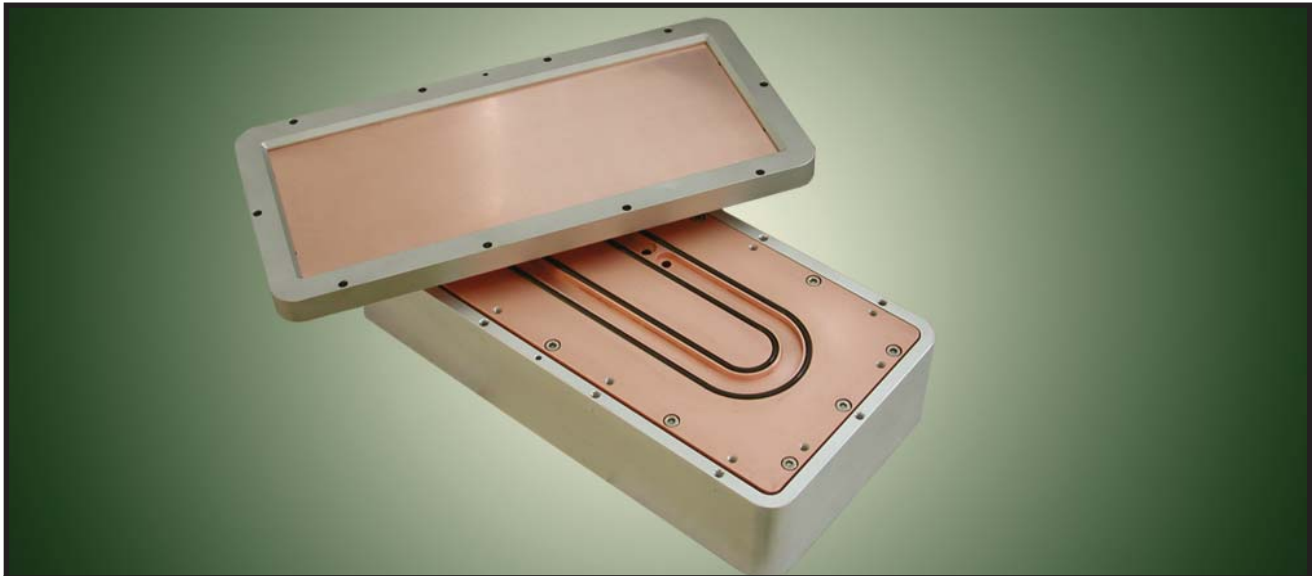
### ATC-B-2848

The ATC-B-2848 is a small in-line coater designed to utilize AJA STXL rectangular magnetrons to coat multiple substrates on a moving pallet. The pictured system was used to make large quantities of 1mm x 5mm, temperature sensitive, Platinum on ceramic sensors for use in thermostats.

## SPUTTERING SOURCES

With over 100 different types of magnetron sputter sources designed and delivered since 1991, AJA International, Inc. has the capability to precisely match the sputter source to the requirement with proven technology. The STXL Series (linear, 2", 3", 4", 5" or 6" wide and up to 40" long), the STX Series (6" to 12" diameter), the Nautilus Series Rotating Magnetrons (8", 10" and 12" diameter), the TR Series Triangular Magnetrons and the CTM Series Hollow Cathode Cylindrical Magnetrons (2" to 12" ID) are all AJA designs with proven track records which can be employed to get the job done as efficiently and as reliably as possible.

Most AJA International, Inc. production magnetron sputter sources feature the unique modular magnet array allowing them to be configured for balanced, unbalanced, magnetic material and facing target sputtering.



AJA's STXL Series Magnetrons feature direct-cooled copper backing plates for maximum deposition rate and easily accessible magnet arrays allowing the end user to choose between optimum uniformity or optimum target utilization of up to 60-70%. The sources feature integral gas injection and high power RF or DC operation.

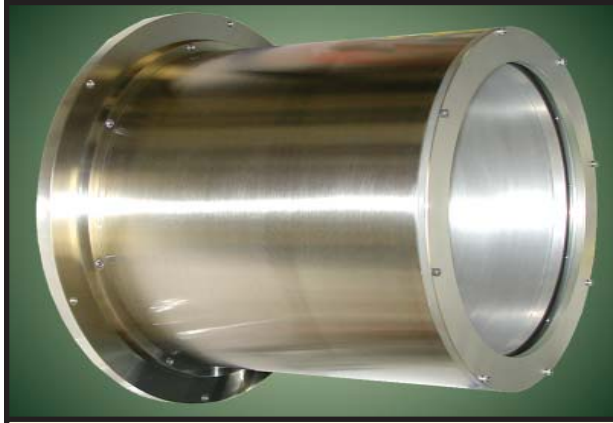


AJA International has built numerous Turret Sources, multiple source heads on a single, rotating/indexing support tube. These sources allow deposition of multiple materials in the minimum amount of space. Two turrets in combination can deposit more than a dozen different materials with up to 36 different, co-deposited combinations. AJA A300-XP UHV and Stiletto HV source heads can be chosen depending on the requirement.



The AJA NT-80 Nautilus Series Rotating Magnetron pictured above features a configurable magnet array allowing the user to optimize target utilization, uniformity, or even "intentional non-uniformity". Philips in the Netherlands has also used this source with segmented, multi-material targets depositing onto spinning substrates to perform co-deposition tests from a single magnetron.

## **SPUTTERING SOURCES continued ...**



The AJA CT1210 cylindrical target magnetron is used for 3D sputtering where substrates are inserted into the target / cathode.

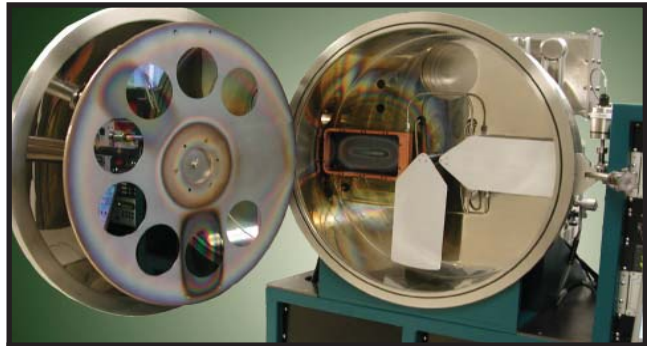


The AJA TR5313 triangular magnetrons are specialty sources designed to optimize deposition uniformly onto a circle of substrates up to 8" diameter.

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



This custom flat planetary features instantly removable carriers for convenient, benchtop substrate mounting or cleaning. This assembly accommodates (4) 4" wafers or numerous smaller substrates. Larger versions up to (4) 300 mm wafers are also available.



Pictured above is a rotary substrate platen which can accommodate up to (9) 6" wafers, 6 (8") wafers or a large number of smaller substrates. This continuously rotating assembly can be configured with RF/DC bias, backside heating and a "quick exchange" substrate pallet.

Custom pilot production batch coating systems require customized substrate holders and fixturing. AJA international has designed over 130 different types of substrate holders since 1991. These include rotating, indexing, linear and planetary motion, plus heating, cooling and RF/DC biasing. Different aspects of these proven designs can be combined to create a new, yet highly reliable custom substrate holder. Reliable substrate holder design is one of the most crucial parts of a custom batch coater and manufacturer experience can easily account for the difference between a maintenance intensive machine and the high throughput machine everyone desires.

## **PHASE II-J COMPUTER CONTROL**



AJA International's Labview based Phase II-J computer control system is used on all ATC 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.

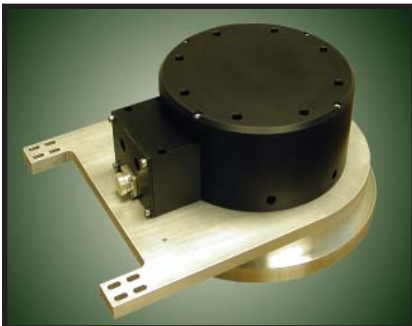
The Phase II-J control system allows the user to operate in either the "manual mode" or the "automated processing mode". In the "automated processing mode" the user designs process "layers" which are then compiled and saved as a "process". The system allows 10 unique user entry points which are accessible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

## PHASE II-J COMPUTER CONTROL *continued...*



The standard Phase II-J control system will accommodate up to (5) DC power supplies, (4) RF power supplies, (1) 4-way DC switchbox, (1) 3-way RF switchbox, (4) process gases, closed loop automatic pressure control and substrate temperature control. Processes are aborted if plasma 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.

## SYSTEM OPTIONS



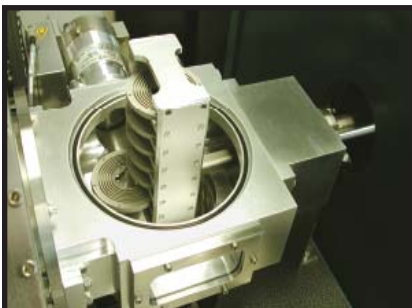
MAGNETRON SPUTTER SOURCES  
W/ AJA CUSTOM OPTIONS AVAILABLE



SUBSTRATE HOLDERS WITH  
HEATING / COOLING / ROTATION / RF



VACUUM PUMPING FOR  
ATC-B SERIES SYSTEMS



TURBO-PUMPED CASSETTE LOAD-  
LOCK FOR 3", 4", 6" & 8" SUBSTRATES



TURBO-PUMPED LOAD LOCK FOR  
SINGLE SUBSTRATES UP TO 8" Ø



POWER DISTRIBUTION  
MODULES



RF / DC POWER SUPPLIES



MFC GAS HANDLING



COMPUTER CONTROL