



PVD Combinatorial Sputter Systems



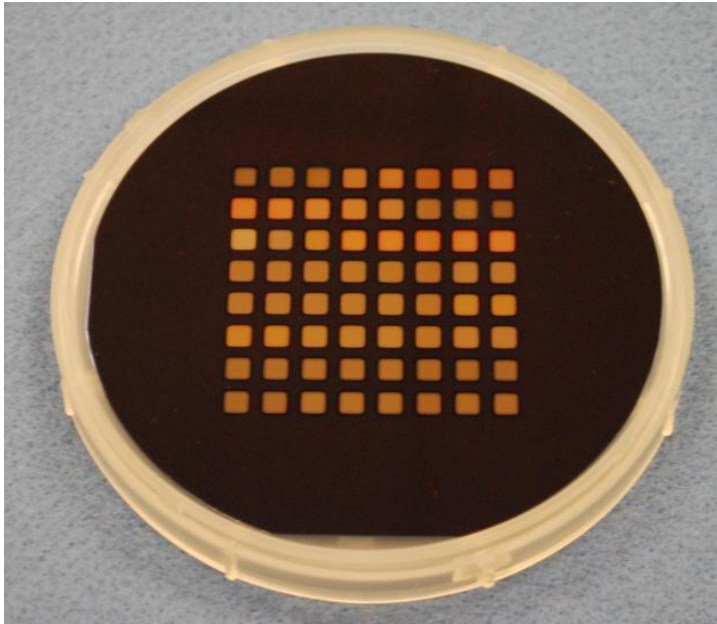
A sputtering system for growing multiple combinatorial thin film test pads on substrates up to 100 mm in diameter. The system includes four magnetrons with four DC power supplies, two RF power supplies along with a programmable X-Y Stage and mask assembly. The system is an ideal way to create combinatorial libraries of new material compositions in a quick and reproducible fashion.

PVD Products provides unique combinatorial sputter deposition systems to meet the customer's thin film requirements for the creation of new material compositions. We can

provide systems capable of providing compositional film libraries on wafers from 50 mm up to 300 mm in diameter as required. Our systems incorporate PVD Titan Magnetron's for ease of use.



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Photograph of a 100 mm diameter Si wafer with an array of 64 different test pads 4 mm square each with a different composition. Compositions can be binary, ternary, or quaternary depending on your need and system design. Concentrations of elements can vary from less than 1 to over 99% depending on deposition conditions. In the case shown the materials used were Cu, Ti, V, and Al. Oxides, carbides, etc can also be fabricated as required.

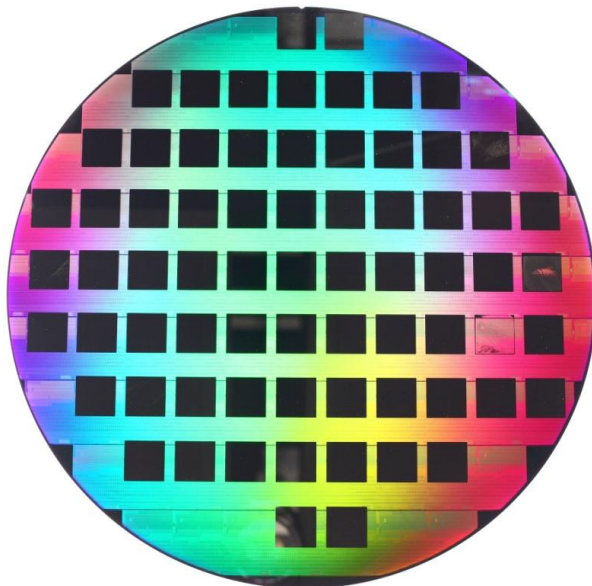




Photograph of a 300 mm diameter wafer with forty-eight 25 mm square test pads each deposited with predefined unique compositions.



Photograph of the inside of a 300 mm diameter Combinatorial Sputter system showing four magnetrons and a metal mask on a programmable vacuum compatible stage. Each magnetron is also mounted on a computer controlled Z-stage to adjust target-to-substrate distance for fine adjustment of deposition rates.



Photograph of a 300 mm diameter wafer with 68 test pads deposited over pre-patterned underlying circuits for quick electrical evaluation of each test pad composition's electrical properties. After deposition of each test pad it was then capped with a metallic layer to form the final device for electrical testing purposes.





PVD Products can provide a wide array of Combinatorial Sputter Systems to meet your specific needs. Wafer sizes can vary from 50 to over 300 mm in diameter. Square substrates can also easily be handled.

Systems can include magnetron sputter sources with either 1.5" or 2" diameter targets, and up to four sources per system, with RF and DC capability. Systems can include a wide variety of MFC's for different gasses, power supply packages, single or multi wafer loadlocks, etc. Magnetrons can be mounted on Z-stages to provide a wide range and resolution of deposition rates.

Test pad sizes can range from about 2 mm square to over 25 mm square depending on requirements. It is very easy to change test pad size and step and repeat distances with software in the field.

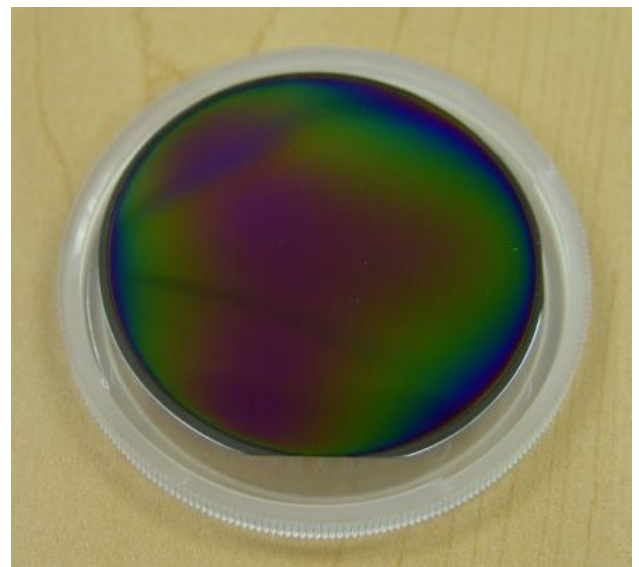
Substrate heating and localized RF bias are also possible in some cases. Systems include a quartz crystal microbalance on a Z-stage to provide calibration of each sputter source under a wide variety of deposition conditions such as MFC gas composition, pressure, and flow rates, power supply power, target-to-substrate distance, etc. Data is stored in easily accessed look-up tables. Deposition recipes can easily be written for a single array on one wafer or multiple arrays on many wafers when loadlocks are used. All systems are fully computer controlled and provide complete data logging of all relevant deposition parameters.

PVD's combinatorial sputter systems will provide the user with a wide range of capabilities for the growth of new materials. Such equipment will quickly help the customer determine the proper composition needed for specific applications saving

significant time and money testing 100's of unique compositions one at a time.

Systems come complete with all necessary components such as power distribution boxes, power supplies, MFCs, wafer flow interlock switches, pneumatic valves, along with closed-loop feedback for constant pressure control, various pumping packages, full featured Lab View™ software, etc. Each machine can be individually tailored for the customer's specific requirements. Please contact PVD Products today with your needs and we will be happy to provide you with a quotation.

PVD Products also makes **Pulsed Laser Deposition** systems which provide wafers with continual spreads in composition as shown in the photo of a 50 mm diameter wafer in the photo below. Please see our web site to learn more about these types of systems.



Photograph of a 50 mm diameter wafer with three materials deposited via PLD providing a continual compositional spread across the wafer surface. This is another approach to combinatorial deposition. Please contact PVD Products for more information.

