



July 2012

Thin Film Deposition Materials & Electronic Packaging Products

Materion Provides Optimal Thin Film Uniformity

One key to the advancement of many technologies is the ability to reduce the feature size, such as CMOS gate length or thin film head track width, of the devices produced. When working with thin film deposition processes, a reduction in feature sizes requires thinner deposited film layers. For example, in the Thin Film Head industry, some layers are less than 20 angstroms thick! So, as feature size gets smaller, and layers get thinner, the film thickness uniformity of the deposited layers becomes a major factor in product yields. Additionally, in magnetron sputtering systems, uniform magnetic penetration of the target can affect the uniformity of the deposited film, especially when working with ferromagnetic materials.

At Materion, with our decades of experience in manufacturing PVD materials, we continually optimize our manufacturing processes to provide our customers with materials that enable consistent, superior film thickness uniformity. To enable this high level of uniformity, it is crucial to take grain size and overall material microstructure into account. Materion accomplishes this through precise control of not only the size and shape of the grains (Figure 3), but also their random orientation. (Figures 1 & 2). This tight control needs to exist not only across the face of a target, but also through the thickness of every target in each and every lot produced.

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Reducing Nodules on Sputtering Targets



Sputtering targets are used by major equipment manufacturers for high volume production of film for metals, dielectrics, transparent conductors, and AR coatings. Materion has been a leading manufacturer of sputtering targets for decades with experience producing targets to support many markets including: semi-conductor, data storage, wireless, optical, hybrid/micro electronics and performance films.

We offer a solution to the key problem in nodule formation: reducing particulate contamination in the sputtering targets. One of the challenges with sputtering targets is that they can "grow" nodules as the deposition run proceeds which can ultimately be detrimental to the customer's product quality. These nodules tend to form on the surface of sputtering targets near the racetrack region (redeposition zone) and may take the shape of a hillock, cone or pyramid. In an extreme case, nodules can cover in excess of 30% of the target surface area. The nodules pose concerns because they can change the sputtering rate, change the angular distribution of sputtered atoms, cause arcing, process drift and destabilization and eventually result in defects in the sputtered

In This Issue

[Thin Film Uniformity](#)
[Nodules Sputtering Targets](#)
[New Clean Room](#)
[Parts Cleaning West Coast](#)
[Settlement Accuracy](#)
[New SEM](#)



[Contact Us](#)

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Face to Face

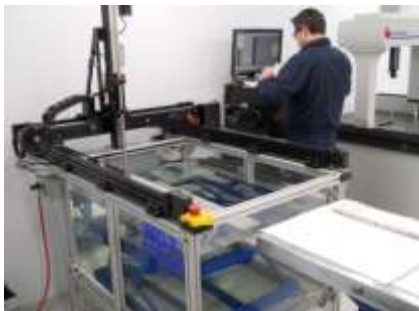
CS Mantech: Paper Presentation and iPad Drawing

At this year's CS Mantech Conference (April 23-26), Materion's Alan Duckham presented a paper entitled *PVD Magnetron Sputtering Parameters and their Effect on the Composition of AuSn Solder*. It was co-authored with Heiner Lichtenberger, and NEXX System's Steve Golovato and George Saragian.

film. These nodule problems can cause undesired downtime due to the need for frequent cleaning of target surfaces.

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New Clean Room Exceeds Industry Standard



To meet our customers' stringent standards and increase our production, Materion has constructed an additional "Clean Room" at its Buffalo facility. The benefit of this cleaner work area is the elimination of contaminants that could compromise a customer's target sputtering performance. The new 750 square foot facility took approximately three months to build and was designed to provide a state-of-the-art clean environment to supplement the one currently in use. It is now operational under the direction of Rick Stevens for final

inspection, finish cleaning and sealing of all targets for the target/bonding departments. The room features two laminar flow hoods, rated at ISO 14644-1, Class 3, in which targets are final-cleaned and sealed, a C-Scan operated by Josh Bateman, which inspects bond integrity, and a new Coordinate Measuring Machine (CMM) used for the inspection of targets and backing plates.

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Precision Parts Cleaning Expanded to Serve West Coast

Materion is pleased to announce the opening of our state-of-the-art PVD parts cleaning operation in Mesa del Sol, New Mexico, expanding our industry-leading precision cleaning services to include a regional presence in the Midwest. The strategically located facility in the Albuquerque area, offers the convenience and savings of local service and faster turn-around time. The 10,000 square foot facility will offer reclamation programs for precious metals and other valuable materials. It will provide dedicated support services to Materion PVD customers from a broad range of industries. It employs the latest advancements in chemical and mechanical cleaning techniques to maximize precious metal recovery allowing our customers to optimize their processes and cost efficiencies.

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Materion Database Safeguards Accurate Settlements

Our customers have a substantial investment in precious metals. When they submit material for refining at Materion's Buffalo location, they expect to obtain a settlement (cash or credit) that accurately reflects their submitted refine. To ensure that this happens, we have several safeguards in place. Our reputation for fair and accurate settlements has helped build trusting relationships with our customers.



Materion's "Accuracy Database," maintained by Amanda Janicki in Accounting, is the mainstay of our settlement process and the last step taken before the customer receives a settlement report. It contains the activity history of our most active accounts with electronic records documenting all related information from submission until final

Materion, as a producer of precious metals sputtering targets and leader in the development of gold base solders, and NEXX, a producer of semiconductor process equipment, partnered to develop a smarter solution for producing precision AuSn solder films. The achieved goal was to optimize the manufacturing methods for producing AuSn sputtering targets and control the composition of sputtered solder for customer's optimal thin film deposition.

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With Jim Militello of Materion are iPad Winners Mike Barsky of Northrup Grumman & Homan Khaki of Skyworks

[Read Complete AuSn Target Presentation](#)



Materion is Proud to Present.....

The first recipient of the IPMI Materion Student Award is Branko Zucig of Tufts University. Branko's thesis is entitled, "Catalytic Production of Bio-LG from the Fermentation of Biomass-derived Sugars using Pd-based Catalysts." His unique methods do not include rare earth metals.

settlement. Settlements are compared to a statistical analysis of a customer's prior returns and what the expected amount of the return refine will be. The database will red flag anything outside of those statistical limits.

If something is red-flagged, there is a follow-up procedure to check for any discrepancy on the Materion side. Due diligence is initiated by Brian Rusek in Accounting. He will investigate the point in question, checking with the refining department as to whether a re-assay is necessary, or pursue other further analysis internally or with the customer. If no red flag is raised by the database, we are confident of the accuracy of our settlement report and it can be processed and passed on to the customer.

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Addition of New SEM Enhances Quality Control



failure analysis capability.

Materion's Buffalo site welcomes the arrival of a Hitachi TM3000 Scanning Electron Microscope. The new state-of-the-art SEM has many advanced features that will complement existing metallography and light microscope capability. The SEM also possesses Energy Dispersive Spectroscopy (EDS) for elemental, phase identification and compositional microanalysis. With its addition, Materion continues to expand its product development, quality control and

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and only small amounts of platinum. His cutting-edge approach holds the key for the next generation of PEM fuel cell systems for vehicular and stationary applications.

The award was presented by Michael O'Neill, at the IPMI Conference on June 12, 2012.



*Pictured left to right:
Michael O'Neill of
Materion, Branko Zugic,
and Matthew Waz of
Materion.*

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