

## Stats & Chats

Essential Information from our Industry Experts

### Semiconductors and Precious Metals...

#### Stable Bonding for Semiconductor Applications

##### *The Challenges of Metallization*

A solder-based die attach process is commonly used in the manufacture of wireless power amplifiers, high power SCRs, IGBTs, Power MOSFETs, laser diodes and high power LEDs. The following discusses the most common sputter-deposited metallization schemes used for solder-based die attach, and the specialty sputter target materials that Materion manufactures used for these applications.

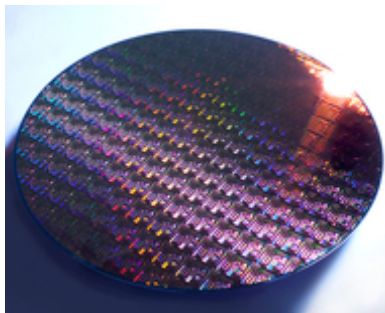


The metallization is typically comprised of an adhesion layer, a diffusion barrier/wetting layer and an oxidation protection layer. The composition of these layers depends on the semiconductor, which solder is being used, and the operating condition anticipated for the die.

To be considered successful, an interfacial metallization must accomplish the following: offer stable bonding at temperatures exceeding the die attach temperature; effectively wet the solder to the die; minimize brittle intermetallic formations, provide low thermal impedance and most important, create a stable bond between the die and the substrate or package during operation. [Read more about metallization...](#)

#### Semiconductor Market Update

##### *Are There Growth Opportunities?*



Overall, the growth in the semiconductor market remains strong despite occasional downturns. Revenues were somewhat lower in 2013 than during 2012. Revenue for total wafer fabrication materials was \$22.76 billion dollars compared to \$23.44 billion, and for packaging materials, \$21.36 billion compared to \$20.70 billion.

Currently, 300mm capacity expansion dominates, but there is still plenty of life remaining for 200mm wafers. A steady need for 200mm wafers is forecast through 2015, followed by a predicted decline through 2018 as larger wafers are introduced.

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### Face-to-Face Around Materion



Katie Gardinier, Director of Technology, is responsible for new product development. She has been an integral part of Materion's technical team for over nine years and is based out of the Milwaukee, WI, facility. She reports to the VP of Marketing, EJ Strother. Katie manages R&D staff across six sites in North America and Europe. When asked 'What do you like most about working at Materion,' Katie remarked: "It's all about the people. I work with some awesome people – both my team and the experienced folks around us." Katie's R&D group collaborates with customers to create

While the global semiconductor materials market may have decreased 3% in 2013 compared to 2012 (with revenues of \$43.5), worldwide semiconductor revenues increased 5%.

[Read more about the semiconductor market...](#)

## **Nickel, Gold and Silver - Critical Materials**

*Enabling Semiconductor, Optics & Large Area Solutions*

Certain metals are critical in the production of PVD coatings. As a global supplier of Semiconductor and Specialty Optics PVD materials, Materion focuses on their use as electrical contacts and key role as adhesion, barrier and working layers in reflectors for IR laser mirrors, LEDs and Low-e Glass. Following, we summarize characteristics of nickel (Ni), nickel-chrome (NiCr), nickel-vanadium (NiV), gold (Au), silver (Ag) and silver alloys.



### **Nickel (Ni)**

Is generally used as an under layer plating in electrical connector applications for other contact metals such as gold, tin or palladium. It simultaneously acts as a barrier layer to prevent diffusion of the base metal to the surface. In the case of tin-coated contacts, nickel prevents the formation of copper-tin intermetallics while passivating pores and bare edges, thus reducing the potential of pore and creep corrosion.

### **Gold (Au)**

Makes a soft, inert, low-friction, high conductivity coating. As an electrical contact, it has exceptional corrosion resistance and excellent reflection into the LWIR. However, gold wears easily, does not solder well, and requires an adhesion promoter and/or barrier layer to properly function. [Read more about critical materials for semiconductors...](#)

## **Additional Capacity - Shorter Lead Times**

*Precision Parts Cleaning Expanded at Wheatfield Facility*



Materion is expanding its chemical shield kit cleaning capacity in our Wheatfield, NY facility to meet increased customer volume in N. America. The enhanced capacity is expected to be available in August and will allow for greater process flexibility and improved services. A unique feature will be a dedicated R&D area to provide

start-of-the-art custom cleaning solutions for new and challenging deposition layers, as well as for non-standard shield kit substrates.

The expansion includes supplementary quality assurance equipment to certify parts to the customer's most stringent requirements. Plus, the necessary ancillary equipment to ensure continued full compliance with all environmental requirements for air and waste water treatment. The improvements will enable Materion to offer best-in-class service and continue its reputation as a good corporate citizen.

tailored solutions. Her team along with critical cross-company technical capabilities, discovers new materials and develops leading edge products.

[Read more...](#)

## **Streamlining the Manufacture of Wire and Strip**



Customers will benefit from the consolidation of Materion's strip and wire manufacturing at its Wheatfield, NY facility. This site now assumes full manufacturing responsibility from the Albuquerque, NM facility. Capabilities include the manufacture of braze, pure metal strip & wire as well as atomized powder. To ensure our customers receive the highest quality products with shorter lead times, a dynamic floor plan with work cells was developed. This allows operators to manufacture product in the most efficient manner using streamlined processes and upgraded equipment. Another advantage of the compressed footprint is that it allows Materion to more effectively utilize our metal resources. [More about wire & strip...](#)

## **Materion Honors Achievements**

The [2013 Continuous Improvement Awards](#) demonstrate commitment to excellence and a dedicated effort to create value for our customers. **First Place:** Milwaukee, WI team for their project on Zinc Arsenide Combustible Dust Improvement.

“The additional capacity in Wheatfield demonstrates our commitment to meeting the growing needs of our customers,” said Jim McMullen, Product Manager-Precision Parts Cleaning Services. “The expansion will allow for the development of innovative cleaning techniques, industry-leading part turnaround, improved precious metal returns and lower total cost of ownership. In addition, it will enhance our ability to remove precious metal depositions, as well as non-precious metal deposition layers.” [Read more about precision parts cleaning...](#)

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**Second Place:** Wheatfield, NY team for their work on Alternate Chemistry Shield Kit Cleaning. **Third Place:** Buffalo, NY team for their Cleanliness Improvements to Evaporation Slugs. [More about the Awards...](#)

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