

SEMI AROUND THE WORLD

SEMICON[®] China to Celebrate 20th Anniversary in March

The 20th anniversary celebrations for SEMICON China continue, culminating in SEMICON China 2008, to be held March 18-20 in Shanghai, China. The 2008 event marks 20 years for the exposition, and to celebrate the milestone SEMI China is holding a number of events.

Since 1988, SEMICON and the Chinese semiconductor industry have experienced strong parallel growth. From 100 booths the first year to more than 1,920 booths sold for the 2008 expo, SEMICON China has become the premier semiconductor trade show in China.

New additions to commemorate the 20th anniversary celebration include:

Semiconductor Museum: The Semiconductor Museum serves as a showcase, demonstrating each process of the semiconductor manufacturing supply chain, as well as key milestones in China's market. Visitors can see the Semiconductor Museum during their visit to SEMICON China 2008. The museum will also feature virtual training opportunities and a variety of technological innovations.

SEMICON China 2008 Mascot:

To commemorate the celebration, "Jing-Jing" will serve as the official mascot of SEMICON China 2008, carrying a message of goodwill to China's IC industry and to the companies responsible for its growth. The Chinese character "Jing" literally means "brilliant, clever, and clear," in addition to "silicon wafer," used in semiconductor manufacturing. "Jing-Jing" is a rhyming two-syllable name that is a traditional way of expressing affection for children in China.

For an additional list of celebration events, or for information on sponsorship opportunities, contact the SEMI China office at +86.21.6448.5666, or by email at semichina@semi.org. For more information about SEMICON China, visit www.semi.org/semiconchina.

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Building on a Solid Year

DECEMBER IS A TIME TO REVIEW THE HIGHLIGHTS of the past 12 months and look ahead to the New Year. By most accounts, 2007 will end up as a solid year for the semiconductor equipment and materials industry, with combined revenues of \$82 billion, up 7 percent from last year.

The 2007 forecasts for device sales started out the year averaging 8 percent. However, the old nemesis of eroding ASPs will see full-year growth come in at under 3 percent, which in turn has slowed equipment sales.

Looking ahead, the growth forecast for device sales in 2008 is in the range of 12 to 13 percent, while equipment revenues will be in the low single digits.

As our industry continually adjusts to change, so too does SEMI.

Over the past year, a number of significant issues were on the table. Let me highlight a few ...

450 MM

Industry discussions about the transition to a larger wafer size have sparked increased attention in recent months. There is no clear consensus among chip-makers, and SEMI members believe that 450 mm equipment development work is premature at this time. With limited resources, it is important for our industry to prioritize approaches to maximize productivity. Most believe that huge benefits can be attained by improving 300 mm fab productivity, collectively referred to as "300 mm Prime." Only after the gains from these and other endeavors are realized does it make economic sense to pursue a wafer size transition.

ENVIRONMENT, HEALTH AND SAFETY

SEMI has been active in the EHS area for more than a decade, and 2007 was a high point in terms of awareness of environmental issues. In fact, you could say a "green wave" swept over the world this year, largely driven by the global warming debate. During the year SEMI provided guidance on dealing with the European RoHS rules, as well

as the so-called China RoHS regulations.

NEW MARKETS

Although photovoltaics and flat panel displays are not new technologies, they are becoming significant markets for SEMI members. FPD market growth is being driven by the demand for flat screen TVs. SEMI has a range of specialized expos and conference events to address this sector. PV technology is being driven by energy issues and the "green wave" I mentioned earlier. Next year we are proud to present PVJapan 2008, a new event in which SEMI is a co-organizer.

INTELLECTUAL PROPERTY

SEMI and the SIA formed the Anti-Counterfeiting Task Force (ACTF) to evaluate requirements for standards that will provide for online authentication of content by distributors and purchasers further down the supply chain. Separately, SEMI continues to survey members regarding the economic impact of IP losses on the industry.

Many of the hot button issues of 2007 will remain so as we head into 2008. To get a handle on how these and other challenges will impact your business, I invite you to attend ISS U.S., our annual business and technology forum scheduled for January 13-16 at The Ritz Carlton Hotel, Half Moon Bay, California. Immediately following ISS will be the Strategic Materials Conference at the same location.

While it's always difficult to accurately forecast the year ahead, the outlook should become clearer after the industry's best and brightest gather for ISS and SMC. I hope to see you there. — *Stan Myers*





SEMI STANDARDS

New SEMI Standards Expand Existing MEMS Documents

SEMI HAS PUBLISHED EIGHT NEW TECHNICAL STANDARDS

applicable to the semiconductor, flat panel display (FPD) and MEMS manufacturing industries. The new standards, developed by technical experts from equipment and materials suppliers, device manufacturers and other companies participating in the SEMI International Standards Program are available for purchase in CD-ROM format; or, can be downloaded from the SEMI website, www.semi.org/standards.

SEMI Standards are published three times a year. The new standards, part of the November 2007 publication cycle, join more than 770 standards that have been published by SEMI during the past 34 years.

"These new SEMI Standards include two MEMS related documents, joining three other MEMS standards that have been available since spring 2007," said Bettina Weiss, SEMI director of International Standards. "As the MEMS industry grows and technical requirements become clearer, it is important for suppliers and MEMS producers to collaborate in developing these important documents."

The standards released today include guidelines for precursors used in low- κ CVD processes, a guide for equipment training best practices, and a test method to determine the strength of wafer-to-wafer bonds.

The new standards include:

SEMI C62 **Guideline for Porogen Precursors** **Used in Low- κ CVD Processes**

SEMI C62 provides consistent quality guidelines for porogen precursors that will minimize the risk of supplying inconsistent material to the industry. Inconsistent material between various suppliers impacts

the end user process which could result in increased costs for material re-qualification and contamination to equipment.

The implementation of these quality guidelines for the semiconductor industry will ensure consistent supply between various precursor suppliers. This is valuable to the industry because it offers end users multiple supply options that provide comparable material quality, minimizing the costs associated with material qualifications.

SEMI C63 **Guideline for Organosilicate Precursors** **Used in Low- κ CVD Processes**

SEMI C63 provides consistent quality guidelines for organosilicate precursors that will minimize the risk of supplying inconsistent material to the industry. As with SEMI C62, inconsistent materials may impact the end user process, which can increase the cost of material re-qualification and contamination to equipment.

SEMI E54.20 **Standard for Sensor/Actuator Network** **Communications for EtherCAT**

EtherCAT is a high-speed, low-cost Ethernet based Sensor/Actuator Network suitable for any kind of tool control, material handling, data acquisition or measurement application. EtherCAT breaks performance and topology barriers

imposed by legacy fieldbus systems, while supporting their seamless integration into the system if desired.

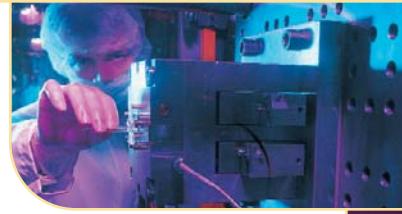
Due to its functional principle called "processing on the fly", it utilizes the Ethernet bandwidth in such a way that it is 50 to 100 times faster than many fieldbus systems. Up to 65,535 nodes can be connected in each segment using line, ring, star or tree topology, or any combination thereof.

EtherCAT provides the means to combine measurement, motion control, safety and I/O networks into one system, while supporting simplified vertical integration. As well as being a SEMI and IEC standard, EtherCAT is on its way to become the *defacto* standard for the semiconductor, FPD and MEMS industries, supported by large OEMs and device vendors in North America, Asia and Europe.

SEMI E150 **Guide for Equipment Training** **Best Practices**

SEMI E150 supports all manufacturing processes by recommending best training practices for improving the performance of the industry workforce. It is recognized that effective training practices can improve the equipment purchaser's ability to install, use, maintain, and repair equipment resulting in higher productivity, increased equipment uptime, reduced costs, and improved safety. The intent of this guideline is to facilitate the gap between awareness of performance-based equipment training and realizing its benefits through practice.

If the process and characteristics of performance-based equipment training described in this standard are implemented, more effective training will result.



These guidelines are not unique to the semiconductor industry. Rather, they represent best practices within the performance improvement profession as represented by the American Society of Training and Development (ASTD) and the International Society for Performance Improvement (ISPI).

The value of the E150 guide to the semiconductor manufacturing industry is to increase accessibility to this type of training information, thus enabling better performance throughout the industry.

SEMI F104 Particle Test Method Guidelines for Evaluation of Components Used in Ultraclean Water and Liquid Chemical Distribution Systems

SEMI F104 applies to any manufacturing process requiring liquid chemicals that either remain as liquid for process or are used as precursors.

Chemical purity standards are getting more and more stringent every year. By using this test method and particle specification (to be introduced at a later date), chemical distribution manufacturers will be able to select fluid handling components that contribute the least amount of particles to the chemical stream during use. This, combined with higher purity chemicals, allows manufacturers to meet higher purity demands.

New fluid handling components installed in systems introduce contaminants into the fluid stream in the early stages of use. Therefore, liquid distribution systems are usually run for a significant

amount of time before being used in actual process conditions. By using the best performing components found through particle testing, startup time is reduced, and costs associated with running the system are reduced as well.

In the past, liquid distribution system manufacturers did not test components for particle cleanliness; and if they did, it was on a haphazard basis with no performance criteria for qualification. With this standard, manufacturers can verify component performance at test agencies by referring to this test method. Customers now can generate performance comparisons to ensure that their systems contribute the least amount of contaminants as possible to process chemicals. Also, customers can continually monitor the particle performance of vendors' liquid components by particle testing on a regular basis.

SEMI F105 Guide for Metallic Material Compatibility in Gas Distribution Systems

SEMI F105 relates to any semiconductor wafer process step that requires equipment with a chemical delivery system, including PVD, CVD, and etch systems.

Previously, chemical compatibility was only defined for 316 stainless steel. Many other metallic materials are being used in chemical delivery systems, but their compatibility with the gases has never been documented. This document will help reduce contamination due to chemical incompatibilities which can lead to wafer

defects and yield loss. It will also provide the opportunity for more cost-effective materials to be used in certain applications, thus lowering the overall cost of the system. This standard is applicable to any semiconductor device or equipment manufacturer, or component supplier working with chemical delivery systems.

SEMI MS4 Standard Test Method for Young's Modulus Measurements

The SEMI MS4 applies to the MEMS manufacturing process, specifically material property quality testing. It provides a uniform test method where none, or not many, were available before. The adoption of MS4 reduces manufacturing cost because it helps improve quality control and increases reliability of MEMS products.

SEMI MS5 Test Method to Determine Strength of Wafer-to-Wafer Bonds

SEMI MS5 is a variation of MS4, with both standards applying to the MEMS manufacturing process, specifically material property quality testing. MS5 also provides a uniform test method where none or not many were available before. MS5 increases the reliability of MEMS product. In particular, it is applicable and useful to the automotive, navigational and medical devices. •

SEMI AROUND THE WORLD

Suppliers See Robust Growth for Silicon Wafers Through 2010

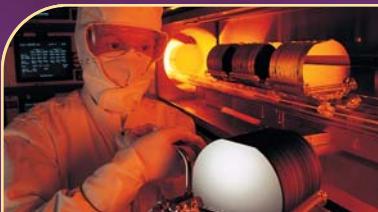
Silicon wafer shipments are forecast to reach 8,696 million square inches in 2007, 9,695 million square inches in 2008, 10,257 million square inches in 2009, and 10,840 million square inches in 2010, according to a survey of leading silicon suppliers. The survey was conducted by SEMI among members of the SEMI Silicon Manufacturers Group (SMG). Total wafer shipments are expected to experience robust growth through the entire forecast period, with an average CAGR of 8% from 2006 to 2010.

"Growth in silicon shipments continues to be driven by 300 mm," said Volker Braetsch, chairman of the SEMI SMG and corporate vice president of Siltronic AG. "Total 300 mm area is expected to exceed the total 200 mm

area by next year. Yet, 200 mm wafers will likely continue to be an important part of the market."

The forecast data includes polished silicon wafers, including virgin test wafers, epitaxial silicon wafers, and non-polished silicon wafers shipped by wafer manufacturers to end-users.

The Silicon Manufacturers Group acts as an independent special-interest group within the SEMI structure and is open to SEMI members involved in manufacturing polycrystalline silicon, monocrystalline silicon or silicon wafers. The purpose of the group is to facilitate collective efforts on issues related to the silicon industry including the development of market information and statistics about the silicon industry and the semiconductor market. •



PACKAGING MATERIALS REPORT

Packaging Materials: Market Challenges and Opportunities

by Dan Tracy, SEMI and Jan Vardaman, TechSearch International

Materials content is increasing in advanced packaging, with materials being critical in delivering the performance and reliability requirements demanded of electronic packaging. There has been strong adoption of chip scale packaging (CSP), stacked die packaging, and wafer-level (WLP) form factors in recent years; with mobile phones and other portable electronics being large volume drivers for these packaging technologies. Flip chip adoption continues to grow, driven mainly by performance but also form factor. As no single packaging technology meets all requirements or needs, the proliferation of package types will continue and material technology must evolve to meet critical industry needs in electrical and thermal performance as well as process integration and system reliability.

The table below shows the development

activities and needs for each packaging materials segment.

A healthy supply chain is required for the industry to support the innovation required for advance packaging technologies. New materials will be a key to solving the challenges that bring about true systems integration and lower cost electronics for consumers.

All of the information in this article was derived from a recently completed market research study, *Global Semiconductor Packaging Materials Outlook—2007–2008 Edition*, produced by Semiconductor Equipment Materials International (SEMI) and TechSearch International. In developing this report, over 100 in-depth interviews were conducted with semiconductor manufacturers, packaging subcontractors and packaging materials suppliers throughout the world. •

General Development Activities/Needs for Each Packaging Material Segment

Packaging Materials Segment	Needs/Development Activities
Organic Substrates	<ul style="list-style-type: none"> • Price reduction and price parity for green materials • Low CTE materials to minimize solder stress/die stress • Fine pitch and thin core requirements
Leadframes	<ul style="list-style-type: none"> • Alternative metals/alloys to lower cost • Surface treatments • Fine pitch inner leads
Bonding Wire	<ul style="list-style-type: none"> • Solutions/alternatives to higher gold prices • Longer wire and fine pitch applications
Mold Compounds/ Encapsulants/Die Attach	<ul style="list-style-type: none"> • Cost increases with green packaging transition • Reducing package warpage • Low-κ compatible/ultra-low stress materials • Moisture sensitivity
Underfill	<ul style="list-style-type: none"> • Solution for finer bumping pitches • Narrow material property/processing windows compatible to low-κ
Solder Balls	<ul style="list-style-type: none"> • Low temperature with lead-free

Source: SEMI, October 2006

CALENDAR OF EVENTS

JANUARY 2008

January 13–16
ISS US 2008
 The Ritz-Carlton
 Half Moon Bay, California
www.semi.org/issus

January 16–18
Strategic Materials Conference 2008
 The Ritz-Carlton
 Half Moon Bay, California
www.semi.org/smc

January 30–February 1
SEMICON Korea 2008
Convention and Exhibition Center (COEX)
 Seoul, Korea
www.semi.org/semiconkorea

MARCH 2008

March 2–4
ISS Europe 2008
 Hotel Westin Dragonara
 Malta
www.semi.org/isseurope

March 11–13
FPD China 2008
 Shanghai International Exhibition Center (INTEX)
 Shanghai, China
www.semi.org/fpdchina

March 18–20
SEMICON China 2008
 Shanghai New International Expo Centre
 Shanghai, China
www.semi.org/semiconchina

APRIL 2008

April 9–12
Global FPD Partners Conference
 Phoenix Seagaia Resort
 Miyazaki, Japan
www.semi.org/gfpc •

NEWS FLASH:

SEMI Announces Partnership to Host

inter solar North America

Trade Show in Conjunction with SEMICON West 2008.

For the latest updates, see www.semi.org.