

## SEMI AROUND THE WORLD

### SEMI "High Tech U" Program Debuts in Japan in March 2007

SEMI will host its highly acclaimed High Tech U program in Kumamoto Prefecture, Japan on March 26–27. A partnership between the SEMI Foundation and various companies in the semiconductor manufacturing industry, High Tech U is a unique program designed to generate greater interest and awareness in math and science and to encourage high school students to become productive members of the global workforce through the pursuit of careers in high technology.

The inaugural Japanese High Tech U program will be held at the Tokyo Electron Plant in Koshi, Kumamoto Prefecture, and represents the fourth SEMI High Tech U program to be held outside of the United States.

The High Tech U program offers a highly interactive curriculum and includes many hands-on experiments that demonstrate semiconductor manufacturing concepts and help explain microchip logic, as well as sessions focusing on educational roadmaps and career planning. Since High Tech U began in 2001, 51 programs have been delivered to over 1,600 students and teachers in the U.S. and Singapore. In 2007, SEMI will introduce the program in Japan and France.



The SEMI Foundation delivered its first international High Tech U program to Singapore in 2006.

"Because SEMI is a global industry association, it is part of the SEMI Foundation's mission to help prepare young people everywhere for  
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## The 450 mm Debate



SEMICONDUCTORS ARE POWERFUL technology enablers, spawning countless numbers of new electronics products that have improved the lives of just about everyone on the planet. The Moore's Law correlation of reduced cost and increased performance has delivered ICs with price points and capabilities not imagined even a few decades ago. Innovation, the lifeblood of the semiconductor industry, has been the driving force of this technology advancement. While there has always been a cost to innovation, the technology demands we are facing today require a whole new level of industry research and development funding.

Many in the industry agree that economics, as well as technical challenges, will be a future barrier to technology advancement. The challenges we face in funding device scaling and materials advancements have sparked another debate, namely a proposed transition to 450 mm wafers. It has been estimated that the cost of the 300 mm wafer transition was \$12 billion, with the investment spread over the 1996 to 2003 timeframe. As we look at a transition to 450 mm, it appears that such a transition could take as long as eight years to bring to market and according to some industry estimates could cost well over \$20 billion.

The difficulty with this debate is that most suppliers feel they have yet to recoup their investment in the 300 mm transition. Additionally, industry experts agree that existing and planned 300 mm fabs are currently operating below their optimum performance. A move to 450 mm at this time would not only diffuse efforts to improve the performance of 300 mm fabs, but also create competition for limited R&D funding.

The motivation for moving to larger wafers is improved silicon productivity.

However, this can be achieved through means other than traditional wafer diameter scaling. Many in the industry, including SEMI, support an approach that is designed to maximize the efficiency and lifetime of existing platforms. The "300 mm Prime" concept, first coined by ISMI and still being fine-tuned in terms of its definition, is aimed at maximizing the return on the industry's existing investment in 300 mm wafer fabs. We believe this approach is also more suited to the requirements of the market today. The shift to consumer-driven electronics has resulted in a short run, high product mix for fabs. These requirements are better served by more productive use of existing 300 mm fabs.

Clearly, there will be fewer device makers willing to make the transition to a 450 mm wafer substrate. The optimum output for a 300 mm fab is 80,000 wafers per month. For a 450 mm fab, the optimum could be in the range of 120,000 to 150,000 wafers per month, resulting in an investment of \$12 billion to \$15 billion per fab, according to some industry experts.

Before a successful transition to 450 mm can be conceived, the industry will need to fund the investment in a way that provides a reasonable return to the supply infrastructure whose participation will be required. At this time, it is not clear that there is a benefit to the industry that outweighs the increased cost of the equipment required.

In the past, leading U.S. chip manufacturers were willing to bear the brunt of the research and development costs necessary for a transition to larger wafer sizes. However, when the industry migrated from 200 mm

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## CHINA REPORT

# China Fabs Seek to Satisfy Burgeoning IC Demand

### SEMI AROUND THE WORLD

fulfilling, productive careers in high technology," said Stanley T. Myers, president and CEO of SEMI. "Innovation is the future of the high tech industry, and High Tech U provides today's youth with a clear path to the tremendous opportunities within semiconductor manufacturing."

High Tech U is designed to increase interest and awareness of math, science and technology courses, to educate children on the many opportunities such an education affords, and ultimately to ensure a strong global pool of qualified candidates for the semiconductor manufacturing industry. •

### SEMI Joins with PTI to Host Semiconductor Short Courses

SEMI has partnered with PTI Seminars Inc., a provider of instructor-led semiconductor short courses, to present semiconductor education opportunities.

During 2007 the organizations will host more than 100 short courses, which will take place in San Jose, California and in San Francisco, California during the SEMICON® West exposition.

Courses range from fundamental to advanced, and will cover wafer fabrication, assembly, packaging, yield improvement, metrology, semiconductor physics, IC design, optics, reliability, MEMS, basic electronics and lasers.

"SEMI is pleased to expand its relationship with PTI by offering more educational courses of interest to our membership and the semiconductor manufacturing industry as a whole," said Pat Gardner, senior director of SEMI North America Regional Operations. "These new PTI short courses will increase the number of SEMI education programs to more than 100 courses throughout the year." To preview courses go to [www.pti-inc.com](http://www.pti-inc.com) or phone 1.636.343.1333 for additional information. •

**IN THE LATE 1980s CHINA OPENED** its door to the world and has become more and more a part of the global economy, particularly since its accession to the World Trade Organization (WTO) in 2001. China is now a worldwide manufacturing hub for systems-level electronic products. As a result, IC demand in China surged from just 6 percent of the worldwide total in 2000 to 21 percent in 2005, according to IC Insights.

However, about 95 percent of the ICs consumed in China were imported from overseas IDMs and fabless companies. China's IC manufacturing capacity and capabilities are simply insufficient to support this fast-growing market. The semiconductor fabs built in recent years have helped boost domestic supply capability, yet the forecasted widening gap between local market supply and demand will serve as a stimulus for China's policymakers to invest resources and build more fabs.

As of July 2006, there were six established foundry/IDM manufacturers in China with at least one 200 mm fab capable of volume production. These companies are Semiconductor Manufacturing International Corporation (SMIC), Advanced Semiconductor Manufacturing Corporation (ASMC), Grace Semiconductor Manufacturing Corporation (GSMC), Shanghai Hua Hong NEC Electronics Company (HHNEC), Hejian Technology (Suzhou) Company (HJTC) and TSMC (Shanghai).

Most of these existing chip manufacturers are now under great pressure to reach breakeven and profitability in the next one or two years. More moderate annual growth in capital spending is expected over the next three years since each manufacturer will strive to maintain low depreciation costs for equipment and other fixed assets. At the same time, companies such as SMIC must maintain a certain level of capital and

research and development spending in order to compete in the international foundry market against such competitors as Chartered Semiconductor, United Microelectronics Corporation (UMC) and TSMC.

For those existing foundry/IDM semiconductor manufacturers with 150 mm fabs, capital spending is expected to decline over the next few years. Most established 150 mm fab lines have reached full capacity with no room for further expansion. Future capital spending will be largely for limited process upgrades, spare parts procurement and regular maintenance.

In 2005 new semiconductor fab equipment sales into the China market were \$761 million, representing a decline of more than 60 percent from the \$1.93 billion reported for 2004. China, in comparison with other world regions, is still considered an emerging market in terms of market size and maturity. 300 mm wafer capacity buildup is expected to dominate capital investment in the China semiconductor market over the period from 2006 to 2008.

Fab material spending in China is driven more by ongoing device production than by capital budgets. China has been the fastest growing market for fab materials for the past two years. As additional productive capacity is added and manufacturing is shifted to China, the market for fab materials is expected to remain strong over the next three years. The Chinese share of fab materials sales may reach 6 percent of the \$22.4 billion world market by 2008.

In order to maintain sustainable growth and profit margins, China's leading foundry and IDM fabs have been as aggressive as possible in pushing ahead on technology development, despite the tough technology learning curve and export controls imposed under the general framework of the Wassenaar Arrangement.

Continued advances in process technology – both through technology alliance licenses and in-house research and development – are vital to the China semiconductor makers' ability to compete in the world market. This is of particular importance to the top-tier fabs in China that are heavily dependent on overseas fabless customers for sales. China does have a domestic fabless semiconductor industry that has grown rapidly over the past several years, both in terms of sales and process technology (now in the 0.13 micron to 0.18 micron range), but is still small enough that it could only fill less than 15 percent of Chinese fab capacity by 2008.

Recently, China's fabs have been forming alliances with domestic equipment suppliers to develop and improve the Chinese semiconductor equipment industry and to develop process recipes domestically. These partnerships may

eventually change the equipment supply landscape in China by providing China's fabs access to lower cost production equipment. This trend may push global equipment makers to increase their commitment to the China market, and may also help push the U.S. government to ease export control regulations.

Another important trend is that engineers at China's top-tier fabs have become more experienced in handling used fab equipment. These top-tier companies leverage used fab equipment to help lower cost-of-ownership and to manufacture those devices with less advanced process technology requirements. •

This article is an edited extract from the "China Semiconductor Wafer Fab and Foundry Outlook" report, published by SEMI in August 2006. An update to the report was published in December 2006.

## PERSPECTIVES

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to 300 mm wafers, the equipment and materials companies carried a significant portion of the research and development burden with the promise of financial returns as the device industry moved to these larger wafers for production.

It doesn't make sense for the equipment and materials community, which we represent, to invest in a transition to 450 mm wafers in the near future. That's because industry revenues are not growing in line with rising research and development costs. The best course forward is to allow the industry to maximize its investment in 300 mm before considering a new wafer size transition.

— Stan Myers •

## SEMI EUROPE

# Focus on the Future at SEMI Brussels Public Policy Forum

THE EUROPEAN ADVISORY BOARD OF SEMI RECENTLY held discussions on the competitiveness of the European semiconductor industry with members of the European Parliament, high-level representatives of the European Commission, and officials from the European Semiconductor Industry Association (ESIA).

The platform for the discussions was the second SEMI Brussels Public Policy Forum. The objectives of the forum were to gather information and exchange views on current European Union policy developments related to the semiconductor industry, to build and strengthen relationships with policymakers, and to increase the visibility of the industry among policymakers while improving their understanding of industry-specific issues and opportunities.

The keynote speech at the forum was given by Wilfried Kraus of the German Ministry of Research and Education. Germany will preside over the EU Council until June 2007, and Kraus presented the Presidency's priorities in the

areas of research and development, including the launch of Framework 7 and the Joint Technology Initiatives. In addition, he discussed the future EU budget on research and the contribution of structural funds, as well as the further deployment of the European Research Area which involves cooperation between national and EU research programs.

In Framework 7, more than 9 billion Euros will be allocated for research and development in information and communication technologies over the period 2007 to 2013. An additional 3.5 billion Euros will be devoted to nanotechnologies and nanomaterials, and a further 2.3 billion Euros for energy. Dirk Beernaert, head of the nanoelectronics and photonics unit at DG Information Society, outlined the main aspects of the program, including the future role of Technology Platforms (including ENIAC, in which SEMI is a member) and interaction with other research and development



Rob Hollering (left), of ASM International, and Andre Auberton Herve (right), of Soitec, attended the second Brussels Public Policy Forum hosted by SEMI.

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**SEMI ISS**

## Forecasters Express Cautious Optimism

AT SEMI's RECENTLY CONCLUDED INDUSTRY STRATEGY SYMPOSIUM, held in Half Moon Bay CA on January 8 – 10, 2007, several recognized industry analysts described their expectations for 2007 as "cautious and guarded optimism." The leadoff speaker, Jim Feldhan of SEMICO Research, noted that major end markets expect varied growth, from 3% for desktop PCs to 10% for game consoles and 17% for laptops, especially with new growth in ultraportables. Feldhan and SEMICO expect 2007 will be a market correction year for semiconductor equipment, with that market falling 4% in 2007. Bill McClean, president of IC Insights, was slightly more optimistic, projecting growth in the semiconductor equipment sector of 5%. Risto Puhakka, the president of VLSI Research, sounded further notes of caution, expecting semiconductor equipment growth at about 3.2%, while Klaus Rinnen of Gartner Dataquest projected semiconductor equipment growth of 1% for 2007.

All analysts noted that 2006 was a very good year for equipment suppliers, as the market grew between 18% and 20%; the reduction in capex for 2007 is to be expected, as end users are absorbing those capital purchases as they produce the next generation consumer products. The consistent and positive message from these analysts was that the industry is mitigating the wild volatility of previous years and is absorbing capital equipment in an ordered, calculated manner.

The Webcast of this presentation is available at <http://www.videonewswire.com/event.asp?id=37095> •

**CALENDAR OF EVENTS**
**MARCH 2007**
**March 7**

**SEMI New England Breakfast Forum**  
N. Billerica, Massachusetts  
[www.semi.org](http://www.semi.org)

**March 13–15**

**FPD China 2007 Shanghai International Exhibition Center (INTEX)**  
Shanghai, China  
[www.semi.org/fpdchina](http://www.semi.org/fpdchina)

**March 21–23**

**SEMICON China 2007 Shanghai New International Exhibition Centre (SNIEC)**  
Shanghai, China  
[www.semi.org/semiconchina](http://www.semi.org/semiconchina)

**March 22**

**Silicon Valley Lunch Forum Santa Clara Marriott**  
Santa Clara, California  
[www.semi.org/svlf](http://www.semi.org/svlf)

**April 2007**
**April 11–14**

**Global FPD Partner Conference**  
Nagasaki, Japan  
[www.semi.org/gfpc](http://www.semi.org/gfpc)

**April 16–17**

**SEMI Executive Conference in Israel Intercontinental Tel-Aviv**  
Tel-Aviv, Israel  
[www.semi.org/israelconference](http://www.semi.org/israelconference)

**April 23–25**

**Strategic Business Conference (SBC) 2007 The Heritage Resort**  
Napa Valley, California  
[www.semi.org/sbc](http://www.semi.org/sbc)

**May 2007**
**May 8–10**

**SEMICON Singapore 2007 Suntec Singapore International Convention and Exhibition Centre**  
Singapore  
[www.semi.org/semiconsingapore](http://www.semi.org/semiconsingapore) •

**BRUSSELS PUBLIC POLICY FORUM** CONTINUED FROM PAGE 63

bodies in the deployment of the European Research Agenda for nanoelectronics.

Alfred Hoffman, vice president of Government Relations at Infineon Technologies, opened the session on the "Competitiveness of the European Semiconductor Industry" with a summary of the ESIA Competitiveness Report, which outlines the status of the European semiconductor industry compared with its main competitors.

The ESIA report contains a number of recommendations to the EU, including opening up the educational systems, enabling more and stronger multiple partnerships, promoting global free and fair trade for semiconductors, ensuring a legislative environment compatible with the imperatives of competitiveness, and rationalizing and simplifying procedures for effective intellectual property (IP) protection.

Ileas Konteas, a representative from UNICE, the Confederation of European Business, gave an overview of the current thinking within the European Com-

mission regarding the status of the proposed European Patent. A new patent policy was expected to be unveiled by the European Commission by early 2007. Konteas explained that UNICE strongly supports the adoption of such a patent as it would foster innovation, improve patent recognition and reduce conflict litigation throughout the whole EU. Konteas also said that the European Parliament was willing to push for a common EU patent policy.

At the conclusion of the forum, the SEMI European Advisory Board recommended that SEMI Europe select a limited number of topics on which a common position could be adopted and presented to the EU on behalf of SEMI members. This would be organized so that position papers could be presented at the next Brussels Public Policy Forum in November 2007.

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