

SEMI AROUND THE WORLD

Chip Equipment Sales to Top \$50 Billion by 2009

The leading manufacturers of semiconductor equipment reported that sales reached \$40.6 billion in 2006, according to the year-end edition of the SEMI Capital Equipment Consensus Forecast.

The forecast indicated that following a 12 percent market decline in 2005, the equipment market grew 24 percent in 2006. Survey respondents see the market growing at a single-digit rate in 2007, double digits in 2008 and then back to single digits to reach \$50.4 billion in 2009.

"For most of the past year, our industry has experienced a significant increase in demand for semiconductor devices, as well as strong economic conditions," said SEMI president and CEO Stanley Myers. "SEMI members saw strong overall sales of chip manufacturing equipment in 2006, and they anticipate a \$50 billion market within the next three years."

Wafer processing equipment was expected to grow over 26 percent in 2006 to \$28.8 billion. The market for assembly and packaging equipment expanded 13 percent to \$2.40 billion in 2006, while the market for test equipment increased by about 22 percent to \$6.45 billion last year.

The Japanese market remains the largest region for worldwide equipment sales with \$9.11 billion of new equipment sold into the region in 2006, up 11 percent from the previous year.

South Korea continued its expansion in 2006, with projected growth of 20 percent. Sales of new equipment in China and the Rest-of-World market regions grew 80 percent and 31 percent respectively.

The SEMI Year-End Consensus Forecast is based on interviews conducted between late October and November 2006 with companies representing a majority of the total sales volume for the global semiconductor equipment industry. •

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SEMICON® Korea: 20 Years and Going Strong

MY FIRST TRIP TO SOUTH KOREA was in the early 1980s. I worked for Siltec and my assignment was to establish a silicon manufacturing joint venture with Lucky Goldstar. Though Korea was just emerging on the global semiconductor stage when I began visiting, the potential of the region was already evident.

Local companies had successfully developed a 64K DRAM in the early 1980s, but it wasn't until the early 1990s – when Korean semiconductor producers began mass production of the 4M DRAM – that the region truly became a recognized force in the chip industry.

Since the mid-1990s Korean device makers have been the leading suppliers of DRAMs, and now account for nearly half of global DRAM production.

The rapid growth of the semiconductor industry contributed greatly to the country's economic and technological development. Today Korea, the 10th largest economy in the world, has become one of the world's most technologically advanced and digitally-connected nations. It has the second-highest broadband Internet connections per capita and is a global leader in semiconductors, consumer electronics, mobile phones and flat panel displays. It is also a huge market for capital equipment and materials.

Korean device makers continue to be vigorous capital spenders. In the period from 2003 to 2006, Korea constituted 16 percent of the worldwide equipment market. The near-term future for equipment consumption looks bright as well, with plans for 11 new fab lines to be built over the next 18 months.

Korea is also a significant market for semiconductor materials. In 2006, the local materials market grew 18 percent to just over \$5 billion. This year looks almost as good,

with forecasted growth of 11.5 percent to reach \$5.8 billion.

SEMI has supported the development of the Korean market from its inception with information, standards and a substantial global exposition that has been the foundation for hundreds of thousands of important business connections. SEMICON Korea has grown with the local industry and undoubtedly supported its efficient development.

The history of the event dates back to 1986, when discussions began with local industry leaders. The first show debuted in November 1987, and was considered a major success. It attracted 7,872 visitors and 187 exhibiting companies from 12 countries. Four technical sessions were held at the first show, on the topics of process and contamination control, possibilities for GaAs on silicon, VLSI packaging and test strategies, and submicron lithography.

Other SEMI milestones over the past two decades include the establishment of a liaison office in Seoul in April 1988, followed by a full-time office in March 1990.

Given the important role paralleling Korea's industry development, we are very proud to celebrate the 20th anniversary edition of SEMICON Korea. The anniversary event will be held January 31 to February 2 at the Korea Exhibition Center (KOEX).

The keynote speaker on January 31 will be George Scalise, president of the Semiconductor Industry Association (SIA). Other programs include a nanotechnology seminar, intellectual property seminar, market briefing, international reception, and the SEMI Technology Symposium (STS).

I hope to see you at SEMICON Korea 2007. — *Stan Myers* •



JAPAN: BY DAN TRACY AND LARA CHAMNESS

Japan Remains Biggest Spender on Semiconductor Equipment

SEMI AROUND THE WORLD

Silicon Wafer Shipments Up in Third Quarter 2006

Worldwide silicon wafer area shipments increased over 5 percent during the third quarter 2006 when compared to the second quarter 2006 area shipments, according to the SEMI Silicon Manufacturers Group (SMG).

Total silicon wafer area shipments were 2,074 million square inches during the most recent quarter, an increase from the 1,966 million square inches shipped during the previous quarter. The new quarterly total area shipments are over 18 percent above third quarter 2005 shipments.

"We have seen tremendous growth in demand for silicon wafer shipments over the past year", said Tatsuhiko Shigematsu, chairman of the SEMI SMG and technology officer of SUMCO Corporation. "Going forward, we expect the growth rate to be in the single digits [in 2007], but anticipate double digit growth in 2008," he said.

The Silicon Manufacturers Group acts as an independent special interest group within SEMI 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. •

WITH THE ECONOMIC CHALLENGES faced over the past 15 years, semiconductor manufacturers in Japan have adjusted to changing end markets and the emergence of competition from companies in other parts of Asia. While some may perceive that the semiconductor industry in Japan has been flat or even has declined during that time, the truth is that Japan remains the global region with the largest overall installed fab capacity.

In 2006, Japan accounted for 26 percent of global capacity, measured in theoretical 200 mm equivalent wafer starts, according to the World Fab Watch database from Strategic Marketing Associates.

Following the severe industry downturn of 2001 and 2002, Japan has emerged as the largest regional spender on capital equipment. According to the SEMI World Semiconductor Equipment Market Statistics (WWSEMS) report, semiconductor manufacturers in Japan will have spent \$31 billion on equipment from 2003 through 2006. This

ramping production in Japan. This installed 300 mm capacity, assuming the new fabs are fully ramped, represents an estimated 632,000 wafer starts per month capacity. However, when it comes to 300mm fab capacity, Taiwan leads with 30 percent share, followed by Korea with 20 percent and Japan with 17 percent.

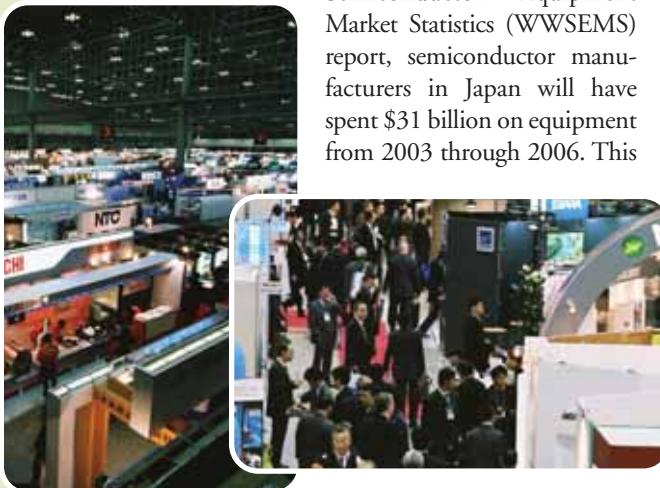
Besides 300 mm wafer fabrication, Japan remains a key region for investment in final manufacturing. Device manufacturers in Japan will have spent an estimated \$6.23 billion on test, assembly and packaging equipment from 2003 through 2006. While many semiconductor manufacturers in Japan have relocated plants that assemble and test leadframe-type packages to China, much of the advanced packaging and test remains on-shore.

The overall Japanese semiconductor equipment market grew 11 percent in 2006 to reach \$9.11 billion, according to the year-end edition of the SEMI Capital Equipment Consensus Forecast. In 2007, equipment growth rates will moderate across all regions, according to survey participants. However, Japan will be one of the strongest performers this year, with a forecasted growth of 5.7 percent in equipment sales to \$9.6 billion.

It is true that equipment spending by other regions in Asia-Pacific has attracted much of the industry attention regarding manufacturing investments, especially for memory device production and foundry capacity. However, Japan has been the leader in terms of equipment spending and is the region with the largest installed fab capacity. •

About the Authors

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represents almost a quarter of the world total of \$133 billion spent on equipment over that time period.

Investment in 300 mm technologies is one of the reasons behind this spending. The World Fab Watch database lists a dozen 300 mm fab lines currently in production and another six under construction or

CHINA TFT-LCD INDUSTRY

FPD Market to Top \$100B by 2008: China Panel Makers Move Ahead

Liquid crystal displays (LCDs) are ubiquitous. You see them on everything from cell phones and portable gaming devices, to MP3 players, personal digital assistants (PDAs), notebook computers, TVs and even refrigerators.

Large TV screens are currently drawing the most attention with their large and bright displays. This interest is driving up the demand for flat panels—particularly LCDs. According to DisplaySearch, the flat panel display (FPD) market is projected to rise from \$84 billion in 2006 to over \$103 billion within the next two years. The thin film transistor (TFT) LCD is the largest technology segment, accounting for more than 80 percent of the FPD market starting in 2005.

In the period from 1999 to 2006, cumulative investment in TFT-LCD manufacturing equipment totaled just over \$61 billion, according to DisplaySearch. However, the equipment market is expected to decline this year before rebounding slightly in 2008.

As reported in the Flat Panel Fabs database, there are over 24 fabs producing Gen 5/Gen 6 flat panels and more than eight fabs in the Gen 7/Gen 8 arena. In July 2005,

Sharp announced plans to invest about \$4.6 billion in a Gen 8 LCD manufacturing plant located in Kameyama, Mie Prefecture, Japan.

In March 2006, Chi Mei Optoelectronics (CMO) claimed to be the first Taiwan-based panel maker to announce plans to construct a Gen 8 LCD plant. CMO states that it will commence volume production at this plant in late 2008. S-LCD Corporation, a joint venture

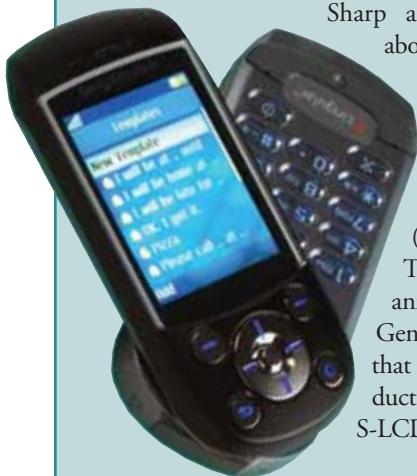
between Samsung Electronics and Sony, recently announced plans for a Gen 8 substrate with the panel size of 2,200 x 2,500 mm. The company is planning to invest approximately \$2 billion and production is targeted to start in fall 2007.

The move to larger panel production is important to LCD panel makers looking to increase production capacity, improve productivity, and enable the manufacture of 40-inch or larger LCD panels.

Besides the new larger generation of substrates, there are many companies that are still involved in smaller substrates. Companies like AU Optronics, Chi Mei, Chunghwa Picture Tube (CPT), HannStar, Hitachi, LG.Philips, Samsung, and many more are involved in the production of LCD panels on substrates as small as 320x400 mm and a variety of larger sizes. The smaller size panels are used mainly in portable electronics devices, including mobile phones.

While Japan, Korea and Taiwan have dominated FPD manufacturing in the past, China is emerging as a potential new force in the market. Sizeable investments are occurring in China's TFT-LCD industry with several local panel makers ramping up for commercial production.

Two of the largest manufacturers, Shanghai SVA-NEC and BOE-OT, are currently producing Gen 5 panels with 90K and 85K monthly capacity, respectively. Meanwhile, InfoVision Optronics (IVO), located in Kunshan, Jiangsu province, is producing Gen 5 panels. The company reported reaching 90 percent yield with 30K monthly capacity, starting in September 2006. Additional investments in various stages of planning include a Gen 2.5 project by



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IP PROTECTION

SEMI Increasing Focus on Intellectual Property Protection

New SEMI Web Portal Section Focuses on IP Activities

CALENDAR OF EVENTS

FEBRUARY 2007

February 4–6

**ISS Europe
Kongresshaus**
Zurich, Switzerland
www.semi.org/isseurope

MARCH 2007

March 7

**SEMI New England
Breakfast Forum**
N. Billerica, Massachusetts
www.semi.org

March 13–15

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

March 21–23

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

April 2007

April 11–14

**Global FPD Partner
Conference**
Nagasaki, Japan
www.semi.org/gfpc

April 16–17

**SEMI Executive Conference
in Israel**
Tel-Aviv, Israel
www.semi.org/israelconference

April 23–25

**Strategic Business
Conference (SBC) 2007**
Napa Valley, California
www.semi.org/sbc •

STRONG AND EFFECTIVE INTEL-lectual property (IP) protection is crucial in order for semiconductor suppliers to invest in the R and D necessary to continue technological advancement and survive in a competitive global electronics supply chain. SEMI members are increasingly concerned about this global issue.

SEMI takes a strong position on IP. We support rigorous adherence to internationally recognized intellectual property laws. We urge governments to ensure that they have effective IP protection and enforcement policies. We also urge companies to take steps to effectively protect their own IP and to avoid infringement of others' intellectual property.

To promote these goals, SEMI is actively working on a range of IP activities. These efforts are focused on providing educational opportunities for companies, working with governments to strengthen IP

enforcement, and advocating on the industry's behalf. To support these goals, SEMI has launched a new IP section on the SEMI portal and has created IP Working Groups.

The SEMI portal's new IP section provides companies with information on association activities, industry-specific information, IP-related events, and recommended resources. The website is available at www.semi.org/IP.

The new IP Working Groups are comprised of member company executives interested in working on these issues on a collective basis. The groups are organizing educational activities and providing input for government relations efforts. The first groups have been created through SEMI North America and SEMI Europe, and other regions are seeking member input as well. If you are interested, please contact your SEMI regional office. •

CHINA TFT-LCD INDUSTRY CONTINUED FROM PAGE 103

Truly Semiconductor, Shanghai Tianma's Gen 4.5 TFT-LCD project, and a Gen 6 fab by Shanghai SVA Group.

The majority of global TFT-LCD panel makers have also established liquid crystal module assembly plants in China to leverage lower labor costs.

As FPD manufacturing capabilities expand in China, a supply chain consisting of both domestic and overseas companies will develop to support the panel manufacturers. There has been limited activity in the area of TFT-LCD materials and components in China. However, both foreign-owned and Chinese players are starting to build local facilities.

NEC, through its NEC Lighting unit,

is making cold-cathode fluorescent lamps for backlight units. Corning and Nippon Electric Glass both plan glass substrate plants in China. Recently, Shanghai SVA Group announced plans for producing Gen 5 color filters internally with technology support from Fuji Film.

With investment in FPD production facilities likely to slow in the rest of the world, China has potential to increase its share of the total world market for TFT-LCD manufacturing equipment. •

Portions of this article were derived from the *China TFT-LCD Industry Report*, recently published by SEMI, and the Flat Panel Fabs database, produced by DisplaySearch and sold only through SEMI.