

## SEMI AROUND THE WORLD

### Silicon Wafer Shipments Increased in 2Q 2007

Worldwide silicon wafer area shipments continued to grow, increasing nearly 5 percent during the second quarter of 2007 when compared to the first quarter of 2007 area shipments, according to the SEMI Silicon Manufacturers Group (SMG) in its quarterly analysis of the silicon wafer industry.

Total silicon wafer area shipments were 2,201 million square inches during the most recent quarter, up from the 2,100 million square inches shipped during the previous quarter. The new quarterly total area shipments are about 12 percent greater than second quarter 2006 shipments.

"Despite recent concerns regarding the health of the industry, wafer shipments continue to increase," said Volker Braetsch, chairman of the SEMI SMG and corporate vice president of Siltronic AG. "Growth is primarily coming from 300 mm shipments, which in the second quarter accounted for roughly 35 percent of the total silicon area shipped." •

### SEMI Launches FPD Website

To highlight challenges and opportunities in the flat panel display (FPD) manufacturing industry, SEMI has launched *FPD Today* ([www.fpdtoday.com](http://www.fpdtoday.com)), a website dedicated to fostering growth, sustainability and profitability across the entire FPD supply chain. While there are many sites dedicated to advancements in graphic chips, new FPD products or market data on panel shipments, *FPD Today* is the first site dedicated to the FPD manufacturing supply chain.

*FPD Today* serves multiple purposes as an industry news aggregator and news generator. The site features the most comprehensive industry-wide FPD event calendar, a database of suppliers, and a rich set of online resources, including links to FPD sites and organizations from around the world. •

## Global Trends at a Glance

WHILE SEMICONDUCTOR MANUFACTURING IS STILL one of the most critical and enabling areas of high technology, it is seeing an inevitable shift from the double-digit annual growth rates of a young industry to the moderate single-digit growth rates of a larger and more established industry today.

The most recent forecasts for global chip sales this year range from minus half a percent to 6 percent growth, with the average being 2.8 percent.

The semiconductor device market is forecasted to reach \$252 billion this year, and that's going to be an all-time record for the industry. In fact, the forecast is for growth every year through to 2010, when the market is expected to top \$305 billion. The volatility of the past cycles has gone and we are now seeing stable, single-digit growth year-on-year.

Global fab capacity continues to shift to Asia. Over the past several years the share of fab capacity in Taiwan, China and Korea has increased significantly. It's important to note that although market share is declining in North America, Japan and Europe, chip manufacturing capacity on an absolute basis is still increasing in those regions.

300 mm fab capacity accounted for one quarter of the total in 2006 and is steadily gaining market share. The crossover point, when 300 mm capacity exceeds that of 200 mm, is expected to occur in 2008. Worldwide 300 mm capacity will double from the start of this year to the end of 2008 as 25 new 300 mm fabs come online.

In 2007, 45 nm technology started to displace 65 nm in terms of spending on equipment. That will accelerate next year when 45 nm investments are forecasted to exceed 50 percent of total fab equipment spending.

The regional breakout for wafer fab materials shows Japan as the largest single market this year, worth almost \$6 billion, followed by North America with \$5 billion. Taiwan is the third largest

fab materials market, with sales expected to reach \$4.3 billion in 2009.

While the semiconductor industry as a whole is facing declining ASPs, one sector that has not experienced downward price pressure recently is polysilicon. The photovoltaics market has been consuming record amounts of polysilicon, which has led to a tight supply situation. The solar industry is growing at 30 percent per year and now accounts for 50 percent of polysilicon demand.

A growing and vital part of the overall materials market is that of packaging materials. Packaging is key to achieving systems integration in electronics devices, with materials technology providing solutions to achieving integration. Material suppliers and their customers face critical challenges in developing and integrating new materials to enhance package reliability and meet more stringent requirements for finer pitch interconnects.

To address this important sector, SEMI and TechSearch have collaborated for the third time to produce a new and updated *Global Semiconductor Packaging Materials Outlook* report, available this month (October).

The packaging materials study is just one of a suite of in-depth reports published by the SEMI industry research and statistics (IRS) group. In addition to these reports, SEMI offers several comprehensive database products to track fab capacity and equipment spending by individual fab lines.

For further information on SEMI market data products, visit [www.semi.org](http://www.semi.org). — *Stan Myers* •





## SEMICON WEST 2007 TEST SUMMIT

# Best of Times for Test

## Test Segment Growth Tempered by Challenges

**THESE ARE SOME OF THE BEST TIMES FOR THE SEMICONDUCTOR** test industry, even though significant challenges remain, according to speakers at the inaugural SEMICON West 2007 Test Summit.

"If I look at the last 25 years, these are the best times for test in terms of the integration [of device design and process technology]," said Ashoke Seth, director of Intel's test division. However, on the downside he believes test equipment suppliers are not as proactive as they should be. "We have roadmaps in other areas, but we are reactive in test," he said. "Proactiveness is

ductor test division, pointed out that the cost of test capital has gone down from 4 percent to 2 percent. "Our industry has done a good job of lowering the capital intensity of test," he said.

Lavi Lev, president and CEO of Credence Systems, said the role of ATE needs to change significantly. "If you just look at the ATE industry, the cost might

down to writing a test program for these devices, we don't have the equivalent ability to reuse test IP cores, so that's a laborious problem, a bottleneck," he said.

On the issue of industry consolidation, the Test Summit panelists expressed mixed views. Lev of Credence agreed that there were too many suppliers in the market, but added that there will always be too many. "Companies can go [away] through



The SEMICON West 2007 Test Summit

panelists (from left to right):

Tim F. Moriarty, president, Nextest Systems Corporation; Mark Jagiela, president, Semiconductor Test Division, Teradyne Inc.; Keith Barnes, chairman, CEO, and president, Verigy Ltd.; R. Keith Lee, president and CEO, Advantest America; and Lavi Lev, president and CEO, Credence Systems Corp.

directly proportional to investment. My observation is that in the test area the investment mentality has not been there," according to the Intel executive.

Seth said test equipment companies need to find a way to invest ahead of the curve and take some risks. "They need to start making small bets in five or 10 different areas and for sure, not all of them will pay off. But the one that pays off will make up for the rest," Seth said.

While semiconductor manufacturing costs were going down in most areas, in accordance with Moore's Law, the test sector was not doing as well, according to Seth. "The cost has been flat [for the last two nanometer generations] when it should have been going down", he said.

Taking a different viewpoint, Mark Jagiela, president of Teradyne's semicon-

stay flat. If you look at the cost of validating that something is working as intended, that is skyrocketing," he said.

"The ATE industry needs to take a keen interest in what happens to the chip before tape-out. They need to turn more from measurement instrumentation to data processing, data optimization ... to help designers fix the problems much more quickly," he explained.

Keith Barnes, president and CEO of Verigy, said that having a strong link between the EDA world and the test world is a requirement for success. "We don't just test parts, we can find a way to rapidly increase yield," he said.

Jagiela of Teradyne pointed out that chip designers today increasingly rely on reusable IP cores, which have made IC design more efficient. "But when it gets

acquisition, but there are more start-ups. There are enormous opportunities for innovation and talented individuals who want to start companies," he said.

Barnes of Verigy was adamant that it wasn't a good idea to acquire technology. "You see companies buying companies because they are not able to create. We will focus on creation rather than acquisition," he said.

Keith Lee, president and CEO of Advantest America asked the open question of whether there was enough research and development funding for the test industry. He said the solution may not be in "thinning the herd", but rather in adapting strategies for the industry. "The ATE community needs to take a hard look at the partnership strategy and adopt what makes sense," Lee said. •

# A Glimpse into the European Semiconductor and Emerging Technology Industries

by Dan Tracy, senior director; Christian Gregor Dieseldorff, senior analyst; and Ed Hall, senior business development manager, SEMI Industry Research & Statistics



EUROPE IS HOME TO MORE THAN 278 PRODUCTION and research and development fabs that manufacture a diverse range of integrated circuits (ICs), MEMS, power devices, compound semiconductors and innovative packages. It accounts for an estimated 12 percent of global IC fab capacity and about 30 percent of the world production for power devices. Europe is home to three world-class semiconductor R&D centers of semiconductor excellence: Inter-university Micro Electronics Center (IMEC) in Belgium, Laboratory of Electronics and Information Technology (LETI) in France, and Fraunhofer Institute in Germany. With changing markets and emerging opportunities, several device companies and a number of equipment companies have increased their involvement in the area of microelectromechanical systems (MEMS) and photovoltaics (PV) manufacturing.

Included in this population are several 300 mm wafer fabs and several fabs with sub-90 nm technology. This diverse mix of production resources represents about \$6.6 billion in semiconductor equipment and materials spending this year, making Europe a larger market than China.

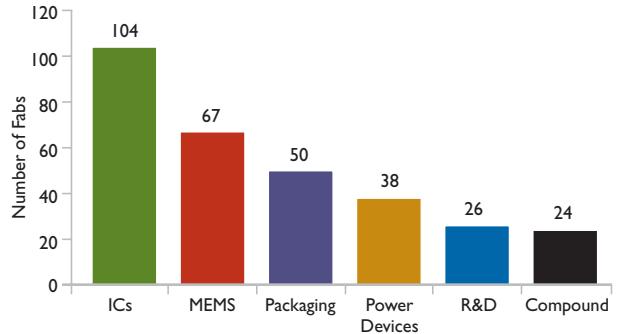
For the “traditional” semiconductor IC fabs, construction spending in Europe is anticipated to reach over \$700 million this year, up from over \$450 million last year. In terms of capex, companies are expected to spend about \$2.5 billion on fab equipment, which is down compared to last year (over \$3 billion). However, we expect spending to increase in 2008 by about 9 percent (*note that this includes all equipment, used and new. The SEMI consensus reports new equipment and forecast predicts 5 percent growth in 2008.*)

As outlined in the Q2 '07 edition of the Fab Capacity database, the largest spenders in terms of fab construction projects and fabs equipping in 2007 are AMD and Intel. Numonyx, the flash memory joint venture between Intel and ST Microelectronics formed in December 2006, is also expected to spend over \$600M for upgrades in their Fab 18 in Kiryat Gat, Israel. We also expect the 300 mm fab (M6) in Catania, Italy, which has been an empty shell for many years to be reactivated soon under the Numonyx joint venture. AMD is pushing out the completion of the 300 mm conversion from Fab 30 to Fab 38 in Dresden into 2008.

In 2007 the four companies responsible for most of the fab capacity in Europe are, as expected, Infineon, Intel, NXP and STMicroelectronics. Together they have a capacity of over 700,000 wafers per month (in 200 mm equivalents) accounting for over 41 percent of all European fab capacity. It will be interesting to see how these and other fabs play out in the coming months.

Comparing the fab capacities within Europe, Germany, France, and Ireland are countries with the largest capacities.

Field of Activity—All European Fabs



Notes: The chart includes high and low volume production fabs. A fab may be involved in several fields (technologies).

Source: SEMI European Microelectronics Market Study, January 2007

Dresden in Germany is considered to be the hot spot with Infineon, Qimonda and AMD as the leading fab companies. Ireland is led by Intel which maintains two 12-inch fabs and one 8-inch fab in Lexlip, Ireland. In France, ST Microelectronics, Altis, Atmel and Freescale are the leading fabs providing most of the capacity. ST Microelectronics is also leading in Italy followed by Micron and Numonyx.

As for the PV market, it is estimated that the global solar photovoltaics market — now in excess of \$7 billion — will grow to over \$16 billion in 2012. SEMI has identified nearly 200 companies globally that produce manufacturing equipment for the PV market and almost 100 of those companies are headquartered in Europe, with many semiconductor suppliers diversifying into photovoltaics. These companies are using their semiconductor experience to build state-of-the-art production systems and facilities to efficiently produce PV cells and modules.

The MEMS equipment market reached \$646 million worldwide in 2006:

- \$338 million is equipment used in front-end processing (52%)
- \$203 million for assembly, packaging and test back-end processing (32%)
- \$105 million (approximately) are R&D tools (16%)

The MEMS equipment market is expected to expand to \$838 million in 2009 and \$999 million in 2011. The five-year CAGR forecast for MEMS equipment is 9%. According to the January European Microelectronics Market Study, Europe accounts for 16% of MEMS worldwide sales and Germany has the highest number of MEMS fabs. STMicroelectronics and Robert Bosch are respectively the third and fourth largest MEMS players in terms of sales.

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## FLAT PANEL DISPLAY

# FPD International to Spotlight Growing TFT-LCD Market

FPD INTERNATIONAL 2007, ORGANIZED BY NIKKEI BUSINESS AND co-organized by SEMI, will put the spotlight on the flat panel display industry. The event will be held at the Pacifico Yokohama, Japan, from October 24–26. LCD TV is the leading application consuming display modules, accounting for 26.6 percent of the total value. This sector grew at a rate of 84 percent in 2006, representing the strongest growth of all FPD applications. With the new, larger TFT-LCD fabs that have been optimized for large panels, this trend is in line with analyst expectations.

Desktop monitors account for 23 percent of all LCDs produced, with this share expected to remain stable in the coming year. There are many other sizable markets for display modules. The top 10 list of FPD applications illustrate the breadth of the market and the availability of markets—other applications include mobile phones, notebook PCs, digital cameras, industrial and automobile displays.

The installed capacity of TFT fabs, measured in millions of square meters of area per year, has increased tremendously from 2002 to 2007. In Korea, investments by LG.Philips LCD increased its fab capacity from 2.7 million square meters per year to 14.2 million square meters per year in just five years. Samsung's increase was even greater, from 2.6 million square meters per year to 16 million.

In Taiwan, AU Optronics increased capacity from 2 million to 15 million square meters per year over the past five years, while Chi Mei increased from 1 million to over 10 million in the same period.

The TFT-LCD equipment industry reached its all-time high in 2004, when spending topped \$13 billion. This growth was led by a large number of Gen 5 investments in Taiwan and China, as well as Gen 6 and Gen 7 lines in Japan and Korea. The following year saw a 20 percent decline in spending, while 2006 recovered with about 11 percent growth to \$11.8 billion.

Most analysts expect a downward capex trend through to 2010 as array, cell,

module and color filter capital equipment purchases face slowing generational growth. However, even at the forecasted \$8.1 billion in 2009, the TFT-LCD equipment market is substantial and will be 2.2 times the size it was in 1999.

The increase in size of the substrate is still the most significant challenge for TFT-LCD equipment makers. The sheer size of Gen 7 and Gen 8 equipment poses challenges in several areas, including material procurement, parts machining, installation, substrate handling, and safety. Shipping and transportation is also a challenge. Current generation equipment is already too big to fit inside a Boeing 747, and too large for toll booths in Korea and roads in Japan.

The establishment of FPD technical standards is helping address some of these issues. More than 50 SEMI FPD standards have been published, with strong momentum in FPD safety standards in Japan, Korea and Taiwan.

As part of SEMI's commitment to serve equipment and materials suppliers in the FPD industry, the association plans to extend its core competencies in EHS, standards, market research and events to serve existing and potential members of the FPD industry.

A recent development that will help serve the industry was the launch of *FPD Today*, the first website dedicated exclusively to FPD manufacturing. For further information, visit [www.fpdtoday.com](http://www.fpdtoday.com). •

## CALENDAR OF EVENTS

### NOVEMBER 2007

**November 4–7**  
**International Trade Partners Conference 2007 (ITPC)**  
Grand Wailea Resort  
Maui, Hawaii  
[www.semi.org/itpc](http://www.semi.org/itpc)

### DECEMBER 2007

**December 5–7**  
**SEMICON Japan 2007**  
Makuhari Messe  
Chiba, Japan  
[www.semi.org/semiconjapan](http://www.semi.org/semiconjapan)

### JANUARY 2008

**January 13–16**  
**ISS US 2008**  
The Ritz-Carlton  
Half Moon Bay, California  
[www.semi.org/issus](http://www.semi.org/issus)

**January 16–18**  
**Strategic Materials Conference**  
The Ritz-Carlton  
Half Moon Bay, California  
[www.semi.org/smc](http://www.semi.org/smc)

**January 30–February 1**  
**SEMICON Korea 2008**  
Convention and Exhibition Center (COEX)  
Seoul, Korea  
[www.semi.org/semiconkorea](http://www.semi.org/semiconkorea) •

## EUROPE *continued*

Will Europe become the triple threat (ICs, MEMS, and PV)? Only time will tell as European companies continue to diversify and grow in these markets. Faced with tough competition from other regions, Europe does have a strong R&D infrastructure and, therefore, potential for additional revenue and market share. •

Portions of this article were derived from the Fab Capacity Report, Equipment Market Data Subscription, and the Global MEMS/Microsystems Markets and Opportunities. These reports are essential business tools for any company keeping track of the semiconductor equipment and material market in Europe. Additional information regarding this report and other market research reports can be found at [www.semi.org/marketinfo](http://www.semi.org/marketinfo). •