

# update

EXPANDING MARKETS • IMPROVING ACCESS

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## ENVIRONMENTAL CONSERVATION:

# THE Next Challenge in EHS



Photo courtesy Tokyo Electron, Ltd.

### Tokyo Electron, Limited

has always placed a high priority on environmental conservation and the health and safety of our employees, our customers, the employees of our partner companies, and local communities.

As many of you know, Akira Inoue, a past president of Tokyo Electron, was instrumental in defining our vision of being an environmentally responsible manufacturer, and we continue to place great emphasis on our environmental, health and safety activities.

As a member of the semiconductor and LCD industries, Tokyo Electron

is expected to continually respond to concerns for the environment and for people's health and safety. We have incorporated the best practices of the industry into our manufacturing processes, and we are always looking for ways to improve how we design, build and support products for our customers.

However, there is a limit to what a single company can accomplish in this endeavor, and therefore the co-operation of the entire semiconductor and LCD industries—that is, the entire supply chain—is essential. Product safety cannot be achieved without the use of safe parts and materials. In order to manufacture environmentally benign products, appropriate materials must be selected, and environmental considerations must be taken in the manufacture of parts.

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TETSURO HIGASHI

CHAIRMAN AND CHIEF EXECUTIVE OFFICER

TOKYO ELECTRON, LTD.

## SEMI MORNING IN SAN FRANCISCO

The annual SEMI Membership Meeting will take place on Wednesday, July 18, 2007, from 7:30am to 9:00am in the Club Bar of the San Francisco Marriott, San Francisco, California. This meeting is open to all SEMI members. SEMI Board of Directors election results, member recognition and other accomplishments will be highlighted. Reservations are required, so please R.S.V.P. by June 22 to Deborah Rotbert at 1.408.943.6969 or email [drotbert@semi.org](mailto:drotbert@semi.org).



## ENVIRONMENTAL CONSERVATION:

CONTINUED FROM PAGE 1

In parts production, manufacturing equipment must incorporate energy-saving features, and parts must be structurally designed for easy disassembly and sorting for more effective recycling. Also, proper and safe use of gases and chemicals, and safe control of emissions are the essence for our environmental conservation and the sustainability of our world society and the earth. For such purposes, Tokyo Electron spent a great amount of time and effort working with SEMI and the industry in setting and revising EHS guidelines such as SEMI S2 on semiconductor manufacturing equipment, S13 on safety manuals, S16 on end-of-life of equipment, S24 on multi-employer work areas, and many more. We also aggressively support and participate in the regulatory monitoring program that greatly helps our entire industry and its supply chain to comply with international and regional EHS regulations such as European CE Marking and China RoHS.

A major advantage of a membership organization like SEMI is that we can work with SEMI to help define the issues facing us all and standardize the appropriate responses for an entire industry. With SEMI's neutral standing, the best decisions for all partners—from supplier to customer, and even from regulators to ordinary citizens—will be made, and we will all reap the benefits of our collective intelligence

and innovation in addressing environmental, health and safety issues. This is true around the world, as SEMI membership is truly global. By enabling SEMI members from all regions to participate, we can achieve a consistency of thought and purpose that helps us guide the best solutions around the world.

Globally, many companies use Tokyo Electron products, and therefore we attribute our business success to the continued support of our partner companies. The health and safety

of the employees of our partner companies are very important to us. Without safeguards in these areas, we would neither be able to improve the reliability of parts and materials or ensure stable product supply, nor could we maintain equipment safety and reliability, shorten delivery time, or reduce facility startup and maintenance time.

Tokyo Electron is determined to continue actively addressing environmental, health and safety issues. We are now actively pursuing energy conservation as a major factor in improving our environmental awareness and performance, and we are depending on SEMI to help define the appropriate standards, to align the appropriate industry resources, and to provide an arena in which we can all agree on the best approaches to address this issue for the entire semiconductor and flat panel manufacturing supply chain. Tokyo Electron actively participated in the first SEMI standard development in this area as the global task force leader

*“We are now actively pursuing energy conservation as a major factor in improving our environmental awareness and performance, and we are depending on SEMI to help define the appropriate standards.”*

*—Tetsuro Higashi*

that initially resulted in SEMI standard S23—now widely used in our industry to measure equipment energy consumption to promote energy conservation in semiconductor manufacturing. We are also supporting an annual environmental forum organized by SEMI and JEITA at SEMICON Japan to facilitate industry-wide discussion. There can be great energy and cost savings today, and we can perhaps make the world a better place for our children and their children.

SEMI honors our past president every year by presenting the Akira Inoue Award, recognizing significant achievement in improving environment, health and safety in our industry. I would like to invite all of you to make a commitment now to work within the SEMI framework as we overcome new challenges in EHS; this will honor the memory of Mr. Inoue and will also honor our descendants by making intelligent, well-informed decisions about the environment today.

### SEMI EHS EFFORTS PAY OFF IN EUROPE

“Thanks to the good collaboration with ESIA and after many constructive discussions with national and European authorities, we (SEMI) managed to obtain an exemption for the use of PFOS in critical semiconductor applications.”

CATHERINE JAKUS, PH.D.  
REGULATORY AFFAIRS  
JSR MICRO







**SEMICON  
China 2007**

**Booths**  
2,064 PAID BOOTHS: 2,037

**Exhibitors**  
979 PRIMARY EXHIBITORS: 747  
CO-EXHIBITORS: 232

**INTERVIEWS WITH TWO PARTICIPANTS**

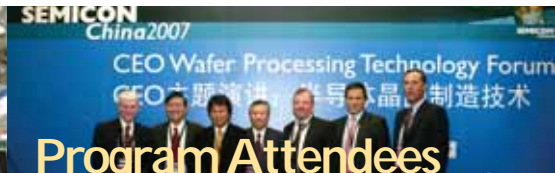
<p><b>Who was interviewed</b></p>	 <p><b>Geng Jinqi</b> President North Microelectronics (NMC) Beijing</p>	 <p><b>Lei Jifeng (Jeff Lei)</b> Grikin Advanced Materials Co., Ltd. International Business Director</p>
<p><b>Why did your company join SEMI?</b></p>	<p>Since the target market for our products is the fab community, the tools need to meet SEMI standards. And we need to attend SEMI's meetings, seminars and workshops in order to know more about software protocols and so on. That was the main reason for us to join SEMI as a member. Also, SEMI members can enjoy some show and event discounts. That is another reason for us to join.</p>	<p>SEMI is the authoritative association of the semiconductor industry. All the industry players and our customers are SEMI family members. We hope to be part of them to enhance better communication with other players. The industry is growing very quickly, and only through SEMI membership can we enjoy equal opportunity.</p>
<p><b>Why did you attend SEMICON China 2007?</b></p>	<p>North Microelectronics (NMC) was founded in 2001. We were in the tool research period for several years, and in September 2005 we shipped the first tool to a fab for validation. We won the order from the fab in September 2006, and that was a milestone for NMC. In order to push our tool to the market quickly and to build more awareness in China, we attended the SEMICON China 2007 show.</p>	<p>We are one of the most important PVD material manufacturers and suppliers for the semiconductor industry in China. So it seems quite necessary for us to appear at such an important event. Our customers will visit the show while our competitors will exhibit at the show. So it is quite necessary for us to bring our latest and best products to SEMICON China to show our development and capability. Furthermore, the localization of the supply chain is the trend. With more and more fabs setting up in China, local suppliers should keep the same pace with the IC manufacturing industry. As a material supplier, we are advancing with our customers. The SEMICON China show is one of the best places to show our growth and progress.</p>
<p><b>What were your expectations for the show?</b></p>	<p>We wanted to gain more recognition from our customers and future customers, and to let more vendors know us. That was our expectation.</p>	<p>SEMICON China show brings us value although the cost was a little bit high. We can meet the procurement agents and engineers from most of our customers during the show, and we can also see our competitors.</p>
<p><b>What did you like about the show?</b></p>	<p>The show was great! We met almost all the persons we expected to see, including fab managers and CTOs from most China fabs. Since this was the first time we attended the SEMICON show, many of our customers had an interest to know more about us. So setting up our booth at SEMICON China was just like building a communication platform. NMC is still young, and we might not have many opportunities to drop by to visit fab managers very frequently, so the show helped us build these relationships. We really gained a lot during the show.</p>	<p>The show was well-organized with a very good exhibition hall.</p>
<p><b>What would you like SEMI to improve for next year's show?</b></p>	<p>The only thing that needs to improve is to resume the technical seminars. Technical seminars can be found in every SEMICON show. That has become one of the most important parts of the show.</p>	<p>We'd like to have SEMI add some material-related topics in the program part.</p>
<p><b>Was your show experience a success, and why?</b></p>	<p>Yes, because we achieved our target. We met almost all the important persons we planned to meet.</p>	<p>Yes.</p>



Visitors  
29,342



Exhibitor Countries  
22



Program Attendees  
1,874

## A GLIMPSE INTO THE CHINA SEMICONDUCTOR EQUIPMENT AND MATERIALS MARKET

BY SAMUEL NI, LILY FENG AND EDWIN HALL, SEMI

China has become the major hub for system level electronics manufacturing. The region has an extensive portfolio of products that are manufactured in China, from televisions to media players to mobile phones. More and more companies are relying on China to produce their products to compete in an aggressive global market.

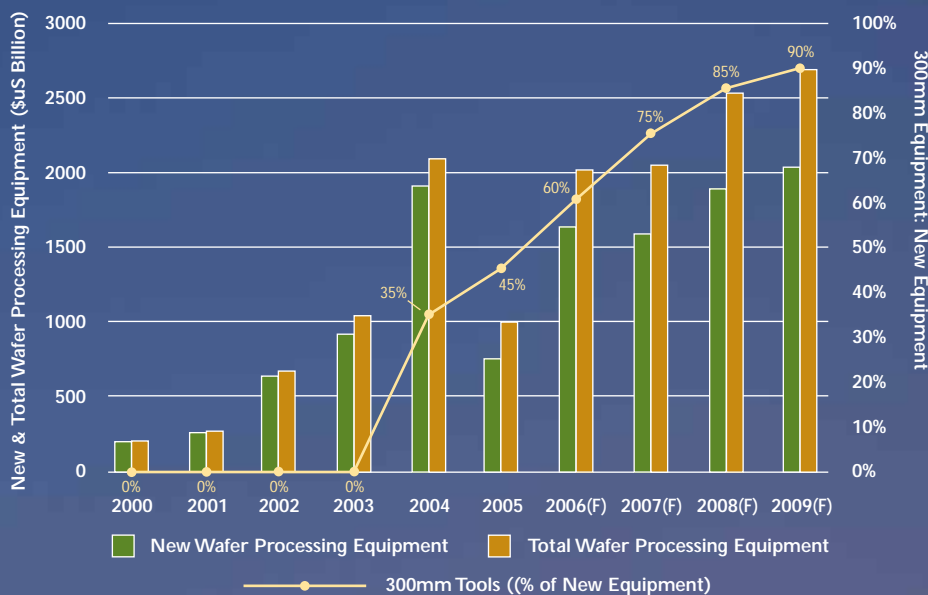
As a result, China has been very active in the semiconductor equipment and materials arena. Last year was an exceptionally good year for most of the semiconductor wafer process equipment vendors in China as the market rebounded strongly from the weak year of 2005.

Looking forward, fab equipment spending in China will remain high in the next three years with a more stable growth pattern when compared with the 2001–2006 period of time. While 300 mm wafer process equipment will dominate in the new equipment market, the used fab equipment market is expected to thrive as more and more fab capacity will be transferred from overseas to mainland China.

With additional 300 mm wafer process capacity installed in China and capacity transferring to China from such market regions as Korea and Taiwan, the estimated fab material growth from 2006 to 2007 may exceed 60 percent. By 2008, it is projected that China will be more than 5 percent of the world market in fab material consumption. In the past five consecutive years, China maintained the highest year-over-year growth rate among all the market regions and it is expected that the China market will remain strong in the next three years.

Driven by tight profit margins and competition in the world foundry marketplace, China's semiconductor manufacturers have con-

FAB PROCESS EQUIPMENT MARKET IN CHINA (\$US BILLIONS)



tinually shifted their fab capacity to a more advanced technology node. Volume production with 90 nm process technology has been deployed at the end of 2006. There are research and development efforts in 65 nm that are currently underway. With the trend of foreign Integrated Device Manufacturers (IDMs) building the fabs in China, the overall fab capacity in China will further shift to more advanced technology in the next three years.

China has sizeable investments in fabs as well as in efforts in the domestic equipment industry. Equipment produced by domestic manufacturers is priced lower than imported products with similar functions/configurations, and it is mainly sold into the China market. Some local Chinese equipment vendors have developed, or are developing, both 200 mm and 300 mm tools. Use of domestically-developed tools for volume production at leading

fabs is not an immediate trend, though some semiconductor manufacturers are evaluating, or have plans to evaluate, locally-made equipment.

Collaboration among fabs and domestic equipment companies also has quietly taken shape to co-develop the critical process tools and process recipes for 0.25 μm–0.10 μm process technologies.

China will continue to be a manufacturing powerhouse resulting in continued cautious growth in the area of semiconductor equipment and materials.

Portions of this article were derived from *China Semiconductor Wafer Fab and Foundry Outlook* and the *China Domestic Fab Equipment Suppliers* reports. These reports are essential business tools for any company keeping track of the semiconductor equipment and material market in China. Additional information can be found at [www.semi.org/marketinfo](http://www.semi.org/marketinfo).



*“Coming from the technology side, I needed to learn to sell. The SEMI-organized course specialized in ‘Selling to the Semiconductor Industry’ was a very good starting point for that.”*

Photo courtesy DR YIELD

#### NAME/TITLE

**Dieter Rathei**

Managing Director

#### COMPANY

DR YIELD software & solutions GmbH

#### SEGMENTS & PRODUCTS

Yield Control Software

#### NUMBER OF EMPLOYEES

Seven in Austria; overseas we use local distribution partners to reach our customers. We currently have representatives in Japan, Singapore, and the US.

#### TYPICAL CUSTOMERS

“Early adopters” of innovative technology, who are eager to gain an “advantage edge” by employing our software solutions.

#### OUTLOOK FOR THE NEXT YEAR

Aggressive growth: Not unusual for a start-up in its third year, we expect to multiply our turnover from past year.

#### YEAR BECAME A SEMI MEMBER

2006

## SEMI MEMBER PROFILE

For us as a “software” company (that is, a specialist in yield control software) it is very important to distinguish ourselves from other software companies. We think of our software as “equipment” for semiconductor manufacturing, so it was a logical step for us to join SEMI. We want to be perceived by the customer as an equipment supplier dedicated solely to the semiconductor industry. In a related manner, we always emphasize that all our programmers and salespeople have worked in or for the semiconductor industry before joining DR YIELD.

*We are currently presenting papers* on posters mainly on SEMI-sponsored or organized industry conferences like ISSM or ASMC. These conferences are excellent places to get the right technical contacts at various customers. Many opportunities to present our YieldWatchDog solution at customer sites arose from those contacts met at SEMI conferences.

*Coming from the technology side,* I needed to learn to sell. The SEMI organized course specialized in “Selling to the Semiconductor Industry” was a very good starting point for that. There we also got the first contacts that led to our U.S. representation.

We will continue to participate at conferences, and new salespeople will definitely be sent to the above-mentioned training programs. Once we become larger, we also plan to participate in the SEMICON shows, of course.

*Our first product, YieldWatchDog,* enables semiconductor manufacturers to quickly identify potential threats that may cause yield degradation. As lots typically move with varying speed through the semiconductor lines, there are usually early warning signs within the electrical test data for any major yield problem. If they remain undetected, the subsequent costs can be huge.

*YieldWatchDog provides the capability* to detect such early warnings with high

sensitivity in the huge amount of electrical test data. Thus, semiconductor manufacturers are able to react to early warning signs, and not only after the yield degradation strikes.

*We have an innovative, fab-proven product* and an enthusiastic, fab-experienced team of developers. We position our company as a solid, reliable provider of yield software solutions to the semiconductor industry. We are open for cooperation with other equipment suppliers, as long as this provides mutual benefits.

*Please visit the DR YIELD website:* [www.dryield.com](http://www.dryield.com)

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# SEMI AWARDED GRAND PRIZE

FOR BUSINESS CONTINUITY MANAGEMENT SUPPORT BY BCAO JAPAN



Yoshihiro Kohno of SEMI Japan (center) receiving the Grand Prize Award.

*The Business Continuity Advancement Organization (BCAO), a Japanese non-profit corporation* dedicated to the advancement of business continuity planning, or BCP) recognized three groups for their advanced promotion of BCP in Japan in 2006.

SEMI received the grand prize for its efforts in promoting business continuity planning and management in the semiconductor, flat panel, and related industries. The BCM Special Interest Group at SEMI Japan produced the first guidelines in an industry domain in Japan in 2004 and has been publishing books on BCP since 2005. These activities earned SEMI the grand prize.

Yoshihiro Kohno, the leader of the BCP SIG at SEMI Japan, explained the

reason for SEMI's work in the field of continuity planning: "Manufacturing semiconductors and flat panel displays often demands special chemicals, materials, or processes, which have no feasible alternatives. Any disruption to the supply chain could have a serious impact on the semiconductor and flat panel display business for an extended period of time. We need to plan and practice the steps of world-class BCP in order to help ensure the continuity of our supply chain. We know that disasters can happen, and whether it's a typhoon, earthquake, or fire, the only way to be prepared is to plan effectively."

Kohno noted that semiconductor makers worldwide now demand assurances regarding BCP from their equipment and material suppliers, and

that mobile phone manufacturers started requiring that semiconductor and flat panel display makers implement well-planned and structured BCP since October, 2005.

In addition to the grand prize awarded to SEMI, prizes were given to the "Loan Program for Promoting Disaster Management" operated by Development Bank of Japan and the "BCP Guidelines for Construction" developed by Japan Federation of Construction Contractors (JFCC).

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## THE LONG ROAD TO STANDARDS ADOPTION

make the material supplier create something just a bit different." Sievert continued, "Most if not all buyers at chipmakers today still insist on their own paperwork. As a chemical supplier, we're lucky if any of these customers request materials using the SEMI standards."

Frustrated by the slow adoption of standards that he believed could save the industry a significant amount of money, Dr. Sievert expanded his role in the SEMI standards program, becoming the chairman of the European SEMI standards group from 1985 to 1997. He is still active on this committee, now being an advisor to the SEMI European Regional Standards Committee and he is a member-at-large of the European Liquid Chemicals Committee.

As his role grew, so did Dr. Sievert's appreciation for the efforts and

commitment of the SEMI staff, and for the value of the SEMI standards process itself.

"SEMI provided—and continues to provide—a platform for discussion, for meeting colleagues and friends in the industry, for networking, and for seeing industry-wide trends without having business interests be paramount," said Sievert. "This is a more academic, a more questioning and information-driven environment than would be possible otherwise, so the industry can move forward by building and sharing non-competitive knowledge. This improves the whole problem identification and solution development process."

"Today, engineers can talk to engineers without purchasing people nearby. SEMI can put users and suppliers into an artificial academic environment where decisions aren't influenced by

purchasers and buyers and finance. A significant SEMI value is that it is a neutral organization where we can all talk about opportunity."

While the standards adoption rate may not be what he'd like, Dr. Sievert is still strongly positive about SEMI and the value it brings to the semiconductor manufacturing industry. "SEMI allows us to meet under the umbrella of an impartial organization. It's a very good and very helpful institution, and we use it a lot. There is, though, just so much more that could be done."

"It's up to the industry to define its future," says Dr. Sievert, now leading the customer-focused development work at Honeywell Specialty Materials in Seelze, Germany while heading his own independent consultancy group. "SEMI will be able to help, but we all need to understand and work better together."

# THE LONG ROAD

## TO STANDARDS ADOPTION

*When Dr. Wolfgang Sievert was manufacturing reagents for chemical analysis in the 1970s for the Riedel-de Haën Company in Seelze, Germany, he often received requests for information and quotations from semiconductor manufacturing companies—especially Siemens and IBM. Being a curious type, and also intrigued by semiconductors, Dr. Sievert began his life-long interest in chemical processing for the semiconductor industry.*



Photo courtesy, Dr. Wolfgang Sievert

"MOST, IF NOT ALL, BUYERS AT CHIPMAKERS TODAY STILL INSIST ON THEIR OWN PAPERWORK. AS A CHEMICAL SUPPLIER, WE'RE LUCKY IF ANY OF THESE CUSTOMERS REQUEST MATERIALS USING THE SEMI STANDARDS."

**WOLFGANG SIEVERT**

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Dr. Sievert began attending early SEMICON shows to develop his knowledge of the processes into which semiconductor fabs were putting his chemical analysis and reagent materials. With a background in defining methodologies and standards (Dr. Sievert founded and was the chairman of the DIN-NMP 221.3 committee for many years), he was intrigued by the early attempts by SEMI to define standards and methods for chemical processing.

When he noticed that several Japanese companies and their European technology partners (for example, Hitachi and Toshiba) required higher quality materials, Dr. Sievert began working on defining and distributing information about the need to fully understand chemical product descriptions through standards. He published several articles on the practice of standards for chemicals, but still found that the industry was slow to adopt a common set of guidelines.

Some of the hesitancy, he found, was due to the underlying difficulty in assessing chemicals. "By their nature," he says, "chemical compounds cannot be measured like, for example, a drinking glass. With the glass, you can measure the height, width, volume, and so on, and be confident in your accuracy. Measuring chemical compounds is

different. A chemical and its sample can be affected by its history, its storage, its temperature and pressure, and so on. Further, a certain size sample taken from one point in a container may not be exactly the same as from another, because there may be areas of higher or lower concentrations of a particular component in the sample. And then one analysis tool may use a different methodology than another tool, so results may differ."

This characterization issue led Dr. Sievert to investigate methods of identifying compounds that would be acceptable to the entire semiconductor industry. He felt that such standards would allow for common understanding of the statistical probability that a quantity of a compound contained the required materials, and that such a standard basis would improve the quality of the chemicals used in semiconductor manufacturing.

When he did more research by working with suppliers and purchasers, Dr. Sievert found that adopting such an industry-wide solution was more difficult than expected. He found that there was a surprisingly large gap in the knowledge of the actual chemicals usage processes among those engineers developing and writing standards. This gap made acceptance of chemical analysis standards among production engineers difficult. As Dr. Sievert says, "Engineers would tell me that 'we're different here.' And they would read the standards, and even perhaps use the standards as a reference, but they always added some other requirements that precluded them from actually implementing the standards. They would write up their own specifications, with small differences from the proposed standards, and that would

**CONTINUED ON PAGE 7**