



A good news for the European optoelectronics industry !

As you will discover in this issue of Micronews, five large

European companies have created a consortium to sustain the European competitiveness in optoelectronics: the EPIC project. The five companies are Aixtron, Cambridge Display Technology, Osram Opto-Semiconductors, Philips Lighting, and Sagem. But EPIC is also actively looking for more members: 75 to 100 members from companies and institutions. The goal of EPIC is to build sustainable growth for European optoelectronics industries by bringing together the three important sectors - fabrication equipment manufacturing, component production and device use. EPIC will develop and maintain a technology roadmap for photonics technologies that are critical for the development of European industries. This roadmap will be a basis for discussions with European Commission in order to design research and development programmes.

Here, at Yole, we find this initiative really encouraging for the European optoelectronic industry. This initiative will contribute to the definition of a roadmap for Europe. What is missing now is a Eureka cluster like Medea + or Eurimus, in order to support the European photonics industry. Eureka, the market-oriented European network, supports the competitiveness of European companies through international collaboration with a very precise objective: to bring high quality research and development efforts to the market. The budget for Eurimus 2 has been approved. This shows the success of Eurimus 1 into turning MEMS research and development into real market-oriented products. I strongly believe that photonics will play an increasing role into the future of IT. An initiative to support this field would be highly welcomed by numerous industrial players and R&D institutions.

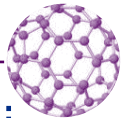
Jean-Christophe Eloy, Manager

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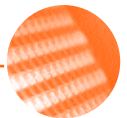
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The nanotechnology column is done in collaboration with the IoN. If you have some news that may be relevant to these columns, please contact Ottilia Saxl at the Institute, o.saxl@nano.org.uk

List of companies cited in "Micronews"

MEMS Suss MicroTec, Sensoror, ITRI, Unaxis, Alcatel MMS, ANKA GmbH, IMT, IMM, Dalsa Semiconductor, Coventor, Olivetti I-Jet, LioniX BV, Akustica, Microbridge Technologies, Memscap **NANO** Applied Nanoworks, Tegal, Simplus, Sony, Toshiba, Hitachi, Tokai, DuPONT, Samsung, Nanophase, Malvern InstrumentsBohlin, Dow, Microemissive Displays, Asahi Glass Co **OPTICS** EPIC, Fujitsu, Sumitomo, AFC, Marconi, PICMOS, Lumileds, Belgacom, Alcatel, Cree, RHK, Tellabs, Elcoteq, HighWave, Eastman Kodak, Pirelli, Sharp **SEMICONDUCTORS** ADMtek, Applied Materials, ASML, Fairchild Semiconductor, IC Insights, IMEC, Infineon, Intel, Isiltec, Motorola, Okmetic, Philips, PSi Technologies, Rockwood, SEZ, SIA, Siemens, SMIC, Soitec, ST Microelectronics, VLSI Research, Wacker **BIO** Affymetrix, Amersham Biosciences, Biomérieux, Caliper Life Sciences Cellomics, Cepheid, Fluidigm, Illumina, Micronics, MWG Biotech, Proteus Biomedical, PSivida, Sequenom, The European Molecular Biology Laboratory (EMBL)

Book to Bill ratio reached 1.16 in December

VLSI Research, a market research company based in Santa Clara, CA, announced December's Worldwide Semiconductor Equipment Book-to-Bill ratio reached 1.16. Of the Billings, \$1462M were for Wafer Processing equipment, \$754M for Test and Related Equipment, \$180M for Assembly, and \$358M for Service and Spares. Front-end capacity utilization rate reached 96.5% in January, according to VLSI Research.

<http://www.vlsiresearch.com>

Million USD	Billings (3-month avg.)	Bookings (3-month avg.)	Book-to-Bill
November 2003 (final)	2712.0	3009.3	1.11
December 2003 (prelim.)	2754.3	3184.0	1.16
January 2004 (Forecast)	2618.4	3154.3	

Billion USD	Billings (3-month avg.)	Bookings (3-month avg.)	Book-to-Bill
December 2003 (prelim.)	14.23	17.95	1.26

Source: VLSI Research, January 2004

Global Semiconductor Sales Rise Record 6.8% in October

Semiconductor Industry Association (SIA) reported worldwide sales of semiconductors rose to \$15.4 billion in October 2003, a 6.8 percent increase from the \$14.4 billion recorded in September, and a 23.3 percent rise from October of 2002. With the October 2003 gain, the strongest since 1990, industry revenue has grown 16.4% in the year to date. "October is always a strong month for our industry, but this exceeds historical norms," stated SIA President George Scalise.

"This growth cycle is dynamic and broadly-based, drawing strength from all geographic markets, all product sectors and all end markets, especially computation, communications and global consumer," he added. All geographic markets recorded rising chip sales in October, with Asia Pacific up 6.2 percent sequentially, Japan up 5.9 percent, Europe up 9.3 percent, and the Americas up 6.7 percent. The industry has forecast double-digit growth for both 2003 and 2004.

<http://www.sia-online.org>

October 2003 (Billions)

Month-to-Month Sales	Last Month	Current Month	% Change
Market			
Americas	2,75	2,94	6,7%
Europe	2,72	2,97	9,3%
Japan	3,36	3,56	5,9%
Asia Pacific	5,62	5,97	6,2%
TOTAL	14,45	15,43	6,8%
Year-to-Year Sales	Last Year	Current Month	% Change
Market			
Americas	2,65	2,94	10,9%
Europe	2,46	2,97	20,8%
Japan	2,85	3,56	24,8%
Asia Pacific	4,56	5,97	31,0%
TOTAL	12,51	15,43	23,3%

Optical components market on course for growth

According to new research by RHK Inc., revenues in the global optical component market were up 8% in the third quarter of 2003, underscoring the long-awaited stabilization of the market and confirming that the market is finally poised for growth. Revenues show a marked improvement--from \$469 million in the second quarter of 2003 to \$509 million in the third quarter. On a rolling four-quarter basis, the market share leaders changed dramatically. JDS Uniphase and Agilent are in a virtual tie for first place, with JDSU narrowly maintaining its lead with 15.2% market share. According to the report, JDSU's nearest competitors--Sumitomo (8%), Finisar (7.3%), Bookham (6.9%) and Infineon (6.7%)--offer limited competition today; each company sells around \$30-40 million each quarter. Other market leaders include Mitsubishi, Furukawa, and Avanex. Companies with strong exposure to the datacom market, such as Infineon, Finisar, and Sumitomo, have seen the largest quarterly gains in market share. "Growth trends for the market during the first half of 2004 point toward modest, single-digit growth now that the market seems to have bottomed and is stabilizing," reports senior analyst Brenna Hawtof. "This is largely due to the fact that carriers are focused on financial stability and are carefully evaluating next-generation networks before committing to building them." RHK expects the optical components market in 2004 to be affected by the following trends:

- Continued industry consolidation for both vendors and service providers
- Pricing stabilization in some markets, such as in DWDM modules and SONET/SDH transceivers
- Pockets of growth, such as in datacom market segments Gigabit Ethernet and Fibre Channel
- Risk-averse behavior by service providers who are using free cash flow to reduce debt rather than upgrade their networks.

<http://www.rhk.com>



About Yole

Yole Développement is a market research and strategy consulting company, specialised in :

- MEMS
- Compound semiconductors
- Equipment and materials for the production of semiconductor devices
- Instrumentation for biology markets
- Nanotechnologies

Yole Développement offers different kind of services :

- Custom market research analysis
- Technology analysis
- Business development services
- Specific reports

Created in 1998, Yole Développement is the world leader in the analysis of the Micro and Nano technologies markets. With more than 15 consultants, Yole Développement is working worldwide with the key industrial companies, R&D institutes and investors in order to help them to understand the markets and technology trends. Yole Développement is taking into account the complete value chain in its analysis, including materials and capital equipment business, device manufacturers and system manufacturers, users of the devices.

New Projects

We are currently working on the following projects :

- Acceleration sensor markets
- Development of the design houses markets
- Industrial impact of Medea + cluster
- Creation of new fab for MEMS manufacturing
- New process for the in-vitro-diagnostic industry
- GaN markets
- Micro-manipulation and micro-actuation tools
- Micro-fuel cell and linked markets
- New services and instrumentation for optical devices

New Reports

The following reports are available at Yole Développement :

World MEMS fab : report analysing the MEMS applications/markets and describing all MEMS manufacturers worldwide

Report name : WMF

Publication date : April 2003

Number of pages : 80 pages plus a CD ROM including 366 of company profiles

Price : 4.500 Euro/5.600 US\$

SiC World Markets. From materials to devices : report analysis the SiC markets for the materials, production equipment and devices (paper report, Excel file for market evaluation and 80 profiles, 4.500 Euros)

Report name : SIC

Publication date : September 2004

Number of pages : 133 (PowerPoint presentation) plus 160 pages of company profiles (80 profiles) plus a complete Excel file presenting SiC markets, from materials to equipment and devices

Price : 4.500 Euro/5.600 US\$

World Inertial Sensor Markets : report analysing the MEMS inertial sensor markets and applications, manufacturing organisations and products on the market (paper report and 20 profiles, 2.900 Euros)

Report name : WISM

Publication date : January 2004

Number of pages : 80 (PowerPoint presentation) plus 45 pages of company profiles.

Price : 2.900 Euro/3.800 US\$

[New multi-customer action.](#)

We are launching new multi-customer action on the following subjects :

- GaN markets : from materials to devices
- Polymer MEMS
- Micro fuel cells
- World MEMS equipment and materials markets

Contact to have more information on Yole Développement activities:

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MEMS Market Forecast

In 2002, the MEMS components has been estimated to be \$3.6 billions; in 2005, this figure will grow to \$5.7 billion (Yole source). This estimation, lower than what is usually published, is due to the fact that we have considered the MEMS market at the chip-level only.

Over the past years, many MEMS market surveys have been published. However, the figures published have large discrepancies, due to the different definitions used in the studies. Here at Yole, we have calculated the MEMS market using the following definitions and methodology.

For MEMS (Micro Electro-Mechanical Systems):

- Only devices including moving parts in μm to mm range and using photolithography process for manufacturing have been considered.

- Biochips and magnetic heads are not included because of the manufacturing technologies close to the IC processes.

Methodology:

- Only stand-alone MEMS components, not the full system including MEMS devices, have been considered.

- Volumes and prices are for a packaged MEMS (including or not electronics according to the component technology)

With these definitions and methods, the market size for MEMS in 2002 is \$3.6 billion and will be \$5.7 billion in 2005. The following figure (Figure 1) shows the MEMS supply chain (in the special report of Micronews 24, the market figures for equipments, materials and chemicals will be detailed).

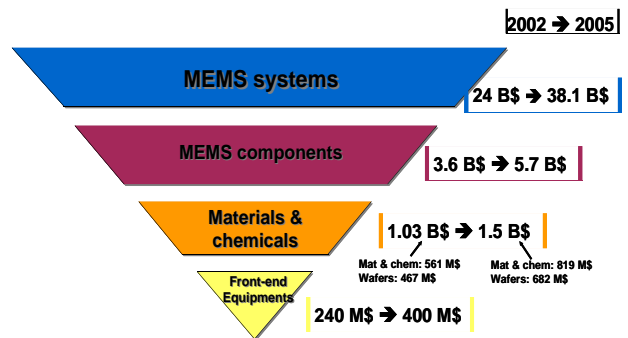


Figure 1: MEMS supply food chain (Yole source)

IT and telecommunications applications are the largest part of the MEMS market (Figure 2). In terms of MEMS components, it is inkjet heads, followed by pressure sensors, micro-mirrors for projection (the Texas Instruments' DLP) and accelerometers which are the most part of the market (Figure 3).

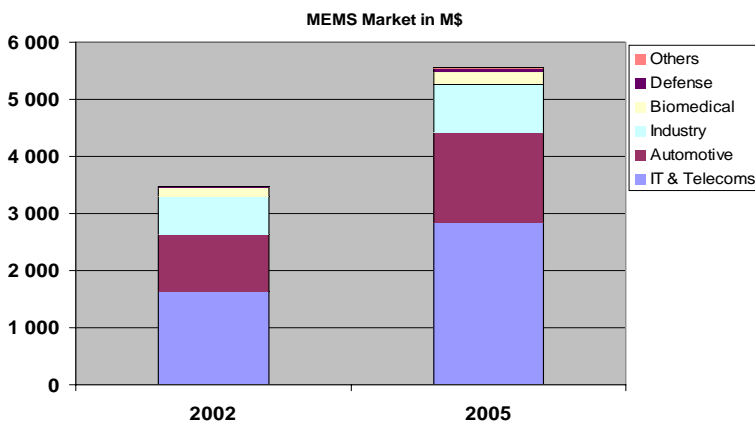


Figure 2: MEMS market per application (Yole source)

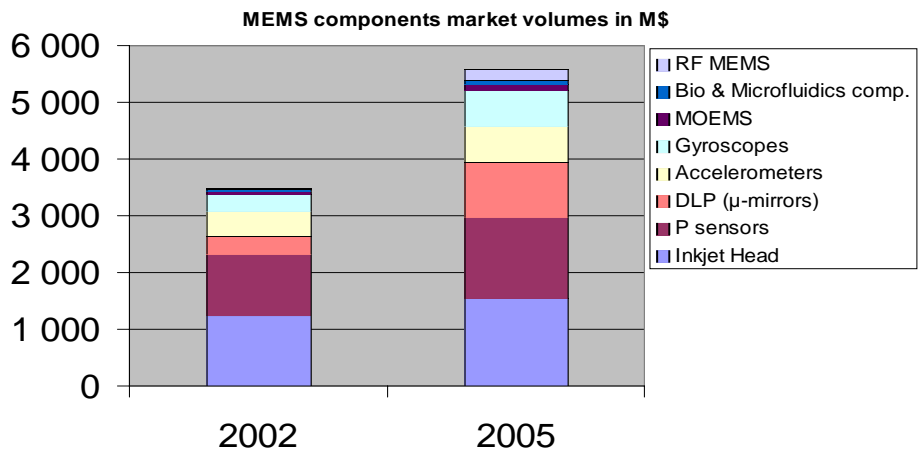


Figure 3: MEMS components market size (Yole source)

The Yole market figures (\$3.6 billion in 2002, \$5.7 billion in 2005) give a GAGR of 17%. If these market sizes and growth rate are compared to other existing studies, they are the lowest forecasts in the MEMS world! (Figure 4). Released in the 1990 – 2000 period, the market studies had very high growth rate (up to 63.4% for the SRI Consulting study market). Today, the CAGR are in the range 15 to 20%. Moreover, our low forecast is explained by the very restrictive definition we used (considering the stand-alone MEMS chips only). If the sub-system level is included in our analysis, we get closer to the Nexus 2000 market study results. Finally, our results are close to the last In-Stat study released in 2002.

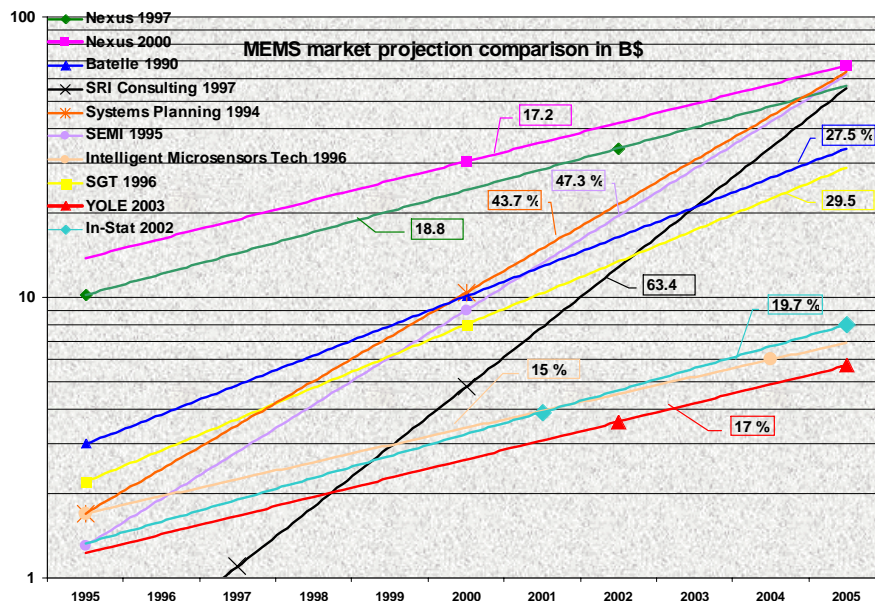


Figure 4: MEMS market studies comparison (Yole source)

Today, more than 70% of the MEMS markets is generated by few mature MEMS devices which are:

- Ink jet heads
- Micro-mirrors for projection
- Pressure sensors, accelerometers and gyros for automotive and medical applications

The majority of MEMS applications are linked to small volume production and specific processes with high NRE cost, specific process for each application.

The MEMS devices (pressure, accelerometers) took 8 to 15 years from first R&D to industrialisation. The DMD of TI took 15 years from R&D to the first products on the market. In general, now the development of a new process (from R&D to first production) takes 3 to 6 years and the development/adaptation of a new device on an existing process takes 2 to 3 years (from R&D to first production). This is faster than in previous years but the development of a new product is still linked to the development of a new market or a new application (few replacement markets).

These results are extracted from the World MEMS Equipment Market study, just released by Yole Développement. If you are interested, please contact Jean-Christophe Eloy at eloy@yole.fr.



Microbridge unveiled the Rejutor and selected X-Fab as foundry partner

Microbridge Technologies, a privately held technology company located in Canada, announced the introduction of the Rejutor™, the world's first electronically precision-adjustable passive micro-resistor device. The Rejutor is a passive, VLSI and MEMS compatible micro-resistor. It is non-volatile, and re-adjustable many times, bi-directionally, to very high precision, using only electrical signals. Rejutors can also be Temperature Coefficient matched with other Rejutors, again using only electrical signals. All adjustments can be carried out at low voltage and low current before and/or after packaging or even in-circuit after years of operation, said the company. Later in the month, Microbridge announced it had selected X-Fab as a foundry partner to manufacture the Rejutor.

<http://www.mbridgetech.com>

Sensoror selects MEMS equipment package from Suss Microtec

SUSS MicroTec announced that SensoNor, one of the major MEMS manufacturers for the global car manufacturing industry, has chosen SUSS MicroTec MEMS production systems for the manufacture of tire pressure sensors. The three systems consisting of two MA150e production mask aligners and an ABS150e volume production bond cluster will support the advanced photolithographic and high volume aligned bond processes at the facility. Tire pressure monitoring is expected to become the main driver for MEMS based pressure sensors. According to the European Commission's NEXUS report the production volume for automotive pressure sensors will increase from 80 million units in 2000 up to 230 million by 2005. A new US Traffic Safety regulation paves the way for semiconductor makers to provide automakers with 80 million chips a year in North America alone.

<http://www.suss.com>

<http://www.sensoror.com>

ADI's iMEMS® technology provides airbag-like sensor detection for IBM's ThinkPad® computers

Analog Devices announced that its iMEMS(R) (integrated micro electrical mechanical system) accelerometer technology, used in automotive airbag systems, will be used in IBM's ThinkPad(R) mobile computers. An ADI accelerometer on the ThinkPad motherboard detects shocks or free fall conditions, and within a fraction of a second, signals the drive's read/write heads to temporarily park, helping prevent contact with the disk drive until the system is stabilized.

<http://www.analog.com>

<http://www.ibm.com>

Suss announced ITRI selects NPS 200

SUSS MicroTec announced that ITRI, a research organization located in Hsinchu, Taiwan, has chosen the new SUSS NPS 200 to handle successfully Cold and Hot embossing applications at wafer level. The scope of ITRI Nanotechnology covers aspects in electronics, data storage, packaging, energy, display, photonics, biotechnology, platform technology, application in traditional industries, and facilities built-up. Chosen for its highly flexible configuration, the NPS 200 is available either as a manually loaded machine or as a fully automated system with wafer loading capability. Optimized for cost-effective production of devices of micro or nanometer scale features, the SUSS NPS 200 achieves a post-printing accuracy better than 1 µm. When equipped with the automatic alignment option, the NPS 200 is capable of performing submicron alignment of the substrate or wafer with respect to the stamp.

<http://www.suss.com>

<http://www.itri.org.tw>

Unaxis Semiconductor has delivered DSE system to Technical University of Berlin

Unaxis Semiconductors has sold a system to the Microsensor and Actuator Technology Center (MAT) at the Technical University of Berlin, Germany, for use in their silicon microsystems program. The system, with its deep silicon etching (DSE(TM)) capabilities, will be used to advance R&D efforts, most notably of new microsensors and microactuators, and provide device prototyping. Continued collaboration between the two partners will promote the joint goals of education, innovation, and technology. The new addition will provide the University's fabrication facility with sophisticated technology that will support local industry in developing new MEMS devices and applications.

<http://www.semiconductors.unaxis.com>



Techno News

Alcatel MMS announced completion of the installation of its "I-Speeder" at SIMIT

In the middle of December 2003, Alcatel Micro Machining Systems (MMS) announced it has completed the installation of its "I-Speeder" deep plasma etching tool at the Shanghai Institute of Microsystem and Information Technology (SIMIT). The Institute is recognized as one of the key research centers involved in MEMS research. SIMIT is a division of the Chinese Academy of Science (CAS) and it disposes of a 1,600 m² dedicated MEMS class 100 clean room. With the installation at the Shanghai institute, Alcatel added another chapter to its Chinese success story that the company set off in early 2002. In less than two years time, no less than seven Chinese leading-edge MEMS Research institutes have equipped their clean rooms with the Alcatel "I-Speeder" MEMS etcher.

<http://www.alcatelvacuum.com>

Business News

MEMSCAP gave growing Q4 and fiscal year ended revenues

MEMSCAP, a provider of innovative solutions based on micro-electro-mechanical (MEMS) technology, gave its revenues for the fourth quarter and fiscal year ending December 31, 2003. In parallel, the Group gave several insights on its strategy for 2004, conceived to set the path towards profitability. Revenues for Q4 2003 amount to 2.1 million euros (2.5 million US dollars), representing the third quarter of sequential growth. This quarter brings the consolidated full year revenue of the Company to 7.7 million euros (8.8 million US dollars), showing a year to year growth of 35% in euros and 47% in US dollars, despite the drastic cost-cuttings and reorganisation measures that have been conducted throughout the year.

<http://www.memscap.com>

Akustica reached \$8 million in a second round funding

Akustica, Inc., a MEMS-focused semiconductor company providing acoustic system-on-chip solutions, announced it has closed a second round of equity funding totaling \$8 million. Investors in this second round were Rangos Investments and Chamberlain Investments (co-leaders) and also Palo Alto, CA-based Mobius Venture Capital, a leading technology-focused venture capital firm with numerous investments targeting the wireless communications industry. With this second round of funding, the company has raised a total of \$12.5 million. In addition, Akustica announced that John Rangos, Jr., a Pittsburgh-based investor, has been named to the company Board of Directors.

<http://www.akustica.com>

Microbridge announced second round of financing

Microbridge Technologies Inc., a privately held technology company announced the completion of the second round of financing, raising a total of \$2.65 million CDN in venture capital. The Fonds de solidarité FTQ and Innovatech Montréal were the major investors in the round. The funds will be used to develop Microbridge's first products and commence the company's business development and marketing efforts. In the same time, the company announced the appointment of Michael S. Foster as president and CEO.

<http://www.mbridgetech.com>

Alliance & Mergers

Dalsa and Coventor signed a licensing deal

DALSA Semiconductor, a division of DALSA Corporation, semiconductor and electronics system provider, and Coventor, Inc., the leading supplier of software tools for designing Micro-Electro-Mechanical Systems (MEMS) and microfluidics devices, announced an alliance. DALSA Semiconductor will license Coventor's CoventorWare™ software for use in providing MEMS product design and development services that support its MEMS foundry services operations. Under the terms of this alliance, DALSA Semiconductor and Coventor plan to produce component libraries and MEMS building blocks, which Coventor will later make available as standard templates within the CoventorWare™ software suite.

<http://www.dalsasemi.com> <http://www.coventor.com>



Alliance & Mergers

Olivetti I-Jet and Lionix have entered into agreement to combine expertise in the field of MEMS

Olivetti I-Jet S.p.a. and Lionix BV have entered into an agreement to combine the expertise of both companies in the area of design, development and volume production in the field of microsystems (MST/MEMS/MOEMS etc.) for OEM customers. Under the terms of the agreement the companies collaborate together in the design, development and volume production. Lionix will transfer to Olivetti some of their technology platforms. Dr. Hans van den Vlekkert-CEO and co-founder of Lionix states: "Our relationship with Olivetti strengthens our design for manufacturing capabilities and allows us to offer our customers a straight forward manufacturing strategy for their MST/MEMS based products".

<http://www.lionixbv.nl>

<http://www.olivettitecnost.com>

NEW OFFERS FROM YOLE DEVELOPEMENT

WORLD MEMS INERTIAL SENSOR MARKETS

This report provides a complete analysis of the micromachined acceleration sensor and gyroscopes applications and markets. Yole Développement is also describing for the first time the market shares in the automotive fields of the different manufacturers, a comparison of the different devices available on the market, complete profiles of all the manufacturers worldwide (including manufacturing facilities) and a clear analysis of the technology trends.

Report name : WISM
 Publication date : January 2004
 Number of pages : 80
 Price : 2.900 Euro/3.800 US\$

Contact to have more information or to purchase the report :
 JC ELOY
 Tel : +33 472 83 01 82
 Email : eloy@yole.fr

Research project: Micro/mini fuel cells and peripherals for portable applications

Yole Développement is launching a multi-customer analysis in order to bring together several companies interested in analyzing the micro and mini fuel cells market. The objective of this action is to make a complete and in-depth description of this area and to provide specific answers to the participants.

The survey will focus on portable fuel cells and peripherals involved in the generation of power:

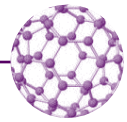
- Micro fuel cells: sub-watt / a few watts of power generated
- Mini fuel cells: a few tens of watts
- Peripherals for fuel processing

The following information will be provided to all participants:

- Description of the applications: civil applications: personal digital assistant; digital camera, walkman, Mobile phone, PCs, Military applications (if the information is available)
- Potential markets: synthesis on market volumes perspectives according to critical quantitative analysis review and market players interviews
- Market players: description of the companies involved in the development and production of micro/mini fuel cells. Presentation of the major research teams (and their research topics)
- Description of the organisation of the industrial food chain
- Technologies: presentation of the status of the different manufacturing technologies.

Contact:

For further information, please contact Mr. Pascal Boulon:
 Phone: (33) 472 83 01 84 - Email: boulon@yole.fr



Successful development of new next-generation non-volatile memory cell

Japan, Dec. 2003. The Asahi Glass Co. and a research group led by Professor Koyanagi at Tohoku University have succeeded in developing a new non-volatile memory, Metal Nano Dot (MND) Memory, which is expected to be substituted for existing flash memory in the near future. The MND memory is based on Asahi's MND film, composed of extremely dense metal nano dots embedded in an insulating matrix. Through MND Memory, the Asahi Glass Co expects to increase its share of the existing flash memory market (1 trillion yen) and the magnetic storage media market (2.6 trillion yen).

<http://www.agc.co.jp>

Rapid growth makes clean nanotubes

Carbon nanotubes are of great interest for electronics applications, but it's important that they are of high quality. With this in mind, scientists at the University of Cambridge, UK, Rutgers University in the US, and Thales Research and Technology in France have developed a growth technique that produces single-walled carbon nanotubes without amorphous carbon. "One of the key problems for electronics is in getting high-quality (defect-free) carbon nanotubes that are also 'clean' (i.e. amorphous carbon/particle by-product free), as undesirable by-products from the growth process can cause short circuits," said Rodrigo Lacerda of the University of Cambridge. "Traditional high-temperature methods like arc discharge or laser ablation do indeed produce high-quality nanotubes but have 30-60% carbon

by-products or particulates, which need to be filtered off." Lacerda and colleagues used chemical vapour deposition to grow the nanotubes onto an oxidized silicon substrate coated with a triple-layer thin-film catalyst of aluminium, iron and molybdenum. They heated the samples to 1000°C in helium in a quartz-tube vacuum furnace, before evacuating the chamber and introducing a burst of acetylene for about 5 seconds. Then they refilled the chamber with helium and cooled it to room temperature. The resulting nanotubes were around 5 to 10 microns long, with a diameter of approximately 1.3 nm. This corresponds to a deposition rate of about 1-2 microns per second. Auger electron spectroscopy showed that amorphous carbon was not present on the surface of the tubes, but nanotubes grown with acetylene present for 10 minutes had a surface layer of amorphous carbon roughly 30 nm thick.

<http://www.eng.cam.ac.uk/>

Science magazine recognizes quantum dot research

California, Dec. 2003. Quantum dot bio-imaging technology has been named by Science Magazine as one of the top 10 scientific breakthroughs of the year. It highlighted researchers from the Ecole Nationale Supérieure in Paris who used Quantum Dot Corporation's Qdot nanocrystals for neuronal imaging; revealing the workings of the human nervous system more clearly than ever before. This will lead to better drugs for treating diseases such as depression and schizophrenia.

<http://www.qdots.com>
<http://www.phys.ens.fr>

Samsung breaks density barrier with introduction of 8 Gbit NAND flash

Korea, Dec 2003. Samsung Electronics has introduced the industry's first 8Gbit NAND flash memory device. This device will enable a new level of functionality in storage subsystem designs to meet demand for memory from products like digital cameras, USB Flash Drives, PDAs and MP3 players. Mass production of Samsung's new 8Gbit NAND components is expected to begin in the first quarter of 2004.

<http://www.samsung.com>

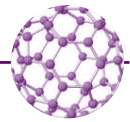
Nanophase announces commercial availability of new nanomaterial

Nanophase January 22, 2004. Nanophase Technologies Corporation announced (on Jan. 16) commercial availability of a new nanomaterial from the Company's patented PVS technology. The new nanomaterial, tin oxide, is approximately 30 nanometers with tight particle size distribution and is targeted for electronic applications and transparent conductive coatings.

<http://www.nanophase.com>



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Techno News

DuPONT- LED team uses DNA for sorting CNT

Delaware, Dec. 2003. Carbon nanotubes have excellent electrical properties that make them potential building blocks for many applications, including sensitive medical diagnostic devices, and mini-transistors over 100 times tinier than those found in today's microchips. Carbon nanotubes of different electronic types tend to randomly clump together, deterring consistent conductivity. The ability to sort and assemble them will enable many applications to be realized.

<http://www1.dupont.com>

Business News

Hitachi teams with Tokai to produce fuel cells for hand-held computers by 2005

Dec 2003. Hitachi, the electronics giant, and Tokai, maker of disposable lighters, have created a prototype cartridge about the size of an AA battery that contains methanol at a 20 percent concentration which could power a PDA for six to eight hours. The companies plan to raise the concentration to 30 percent by the time mass production begins, meaning longer cell life.

<http://www.hitachi.com>

<http://www.tokai.com>

Asia-Pacific governments invest in nano labs and research centers

January 22, 2004 A number of new research parks have opened in the Asia-Pacific region in the past few months, illustrating an increased level of commitment by local governments toward investment in nanotechnology and related fields. Among the new centers is Singapore's Biopolis research park, aimed at establishing bio and nanotech businesses. Biotech firm Novartis AG has already set up labs and Edison Liu, formerly of the U.S. National Cancer Institute, now heads the Genome Institute of Singapore, which took the lead in sequencing the SARS virus in 2003.

Alliances & Mergers

Applied Nanoworks announces exclusive nanotechnology agreement with Rensselaer to produce nanocrystals

New York, Dec. 2003. Applied NanoWorks have acquired exclusive global licensing rights to nanotechnologies from Rensselaer Polytechnic that will enable high volume fabrication of agglomerate-free semiconductor, metal and oxide nanocrystals, ranging from 2nm – 100nm. Applications include: semiconductor, cosmetics, performance papers, composite materials and the bio- and medical luminescence industries.

<http://www.appliednanoworks.com>

<http://www.renselaer.edu>

Malvern Instruments acquires Bohlin

Nov 2003, UK. Malvern Instruments, world leader in particle characterization, has acquired Bohlin Instruments, a major developer and manufacturer of rheology measurement systems. There is a clear synergy between Bohlin's rheological measurement and Malvern's particle characterization, especially in the areas of dispersion technology and colloid science. Malvern Instruments employs around 300 and is part of Spectris plc, the precision instrumentation and controls company.

<http://www.malvern.co.uk>

Dow and MicroEmissive Displays sign agreement

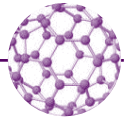
Nov 2003, Midland, MI. An agreement between Dow's Advanced Electronic Materials business and MicroEmissive Displays (MED) means that Dow receives a percentage of MED's microdisplay module sales, in exchange for a supply of LUMATION* Light-Emitting Polymers (LEP) material. As very little LEP material is required per display, this new approach benefits both companies. MED was founded in 1999 by Jeff Wright and Ian Underwood as a spin-out from Napier and Edinburgh Universities. It is on track to becoming a leading provider of microdisplays for electronic viewfinders in high-growth markets such as digital still cameras and camcorders.

<http://www.dowlumation.com>

<http://www.microemissivedisplays.com>



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Alliances & Mergers

US calls for closer cooperation on nanotechnology

Washington, Dec 2003. Joseph Bordogna, deputy director of the US National Science Foundation, called for closer cooperation between the scientific and engineering research communities on nanotechnology development. Issues to be tackled include designing research, education and development so that new knowledge rapidly and effectively delivers social and economic benefits. International collaborations and building partnerships early were critical factors. He warned that researchers need to guard against unintended consequences that could harm individuals or the environmental systems that sustain life.

<http://www.nsf.gov>

Toshiba and Sony jointly plan 65 nm chip for 2005

Dec. 2003. Toshiba and Sony have joined forces to produce 65nm chips which could put them ahead in the race to develop smaller, more powerful semiconductors. One possible application is in Sony's PlayStation, transforming it into a complete home entertainment provider and information conduit to the Internet. Trial production for the 65nm technology is scheduled for the second half of 2004, and full production is expected in 2005.

<http://www.toshiba.com>

<http://www.sony.com>

Tegal purchases assets of Simplus systems

California, Dec. 2003. The Tegal Corporation, designers and manufacturers of plasma etch and deposition systems used in integrated circuit production, has purchased the assets of Simplus Systems - specifically a multi-chamber tool incorporating processes similar to Atomic Layer Deposition (ALD) but with much higher throughput. The market for these highly conformal deposition tools, is one of the fastest growing segments in semiconductor device manufacturing.

<http://www.tegal.com>



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5. Back-End Manufacturing Equipment Suppliers for MST/MEMS - worldwide
6. MNT Web Directories and On-Line Communication Channels - worldwide

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Alliances & Mergers

Lumileds LEDs used in Audi headlights

Unveiled at the Detroit Auto Show, the Audi A8 6.0 is the first production vehicle to feature headlights that incorporate LEDs. The automobile's daytime running lights feature Luxeon LEDs from US-based Lumileds Lighting. The Luxeon LEDs create a distinctive cloverleaf-shaped daytime running lamp (DRL) within the headlamp assembly, marking the first appearance of LEDs in front lighting in a production vehicle after years of use in other automotive lighting components. Each headlamp in the Audi A8 6.0 incorporates a module with five white Luxeon LEDs arranged in a five-point pattern, like the five spots on a dice, to form a combination daytime running lamp and night-time position lamp. The Audi headlamps were assembled by Germany-based Hella. The daytime running lamp is expected to be just the first step of a transition by automobile manufacturers to LEDs being used in all headlamp components, including high and low beams. LED headlamps have previously appeared in concept cars such as the Ford Model U and the Audi Nuvolari.

<http://www.lumileds.com>

AFC announces agreement to acquire Marconi's North American Access business

Advanced Fibre Communications (AFC) announced the signing of a definitive agreement pursuant to which AFC will acquire North American Access (NAA), a business unit of Marconi Communications, a subsidiary of Marconi Corporation plc.

<http://www.afc.com/>

<http://www.marconi.com/>

Five European companies have set up a European Photonics Industry Consortium (EPIC).

The famous five are Aixtron, Cambridge Display Technology, Osram Opto-Semiconductors, Philips Lighting, and Sagem. EPIC comes as the result of the OPTIMIST coordinating programme of the IST-5th framework research programme of the European Commission. The goal of EPIC is to build sustainable growth for European optoelectronics industries by bringing together the three important sectors - fabrication equipment manufacturing, component production and device use. EPIC will develop and maintain a technology roadmap for photonics technologies that are critical for the development of European industries. This roadmap will be a basis for discussions with European Commission in order to design research and development programmes. Dr Bernd Schulte has been made president of the newly-formed association. He reports: "EPIC

is seeking 75 to 100 members from companies and institutions that are highly committed to the success of photonics products that are conceived in Europe and sold all over the world." EPIC is owned and operated by its members who determine the actions and the initiatives of the association. Membership is open to companies, research institutions, universities, and financial institutions that have operations in the European economic area, including the countries of the European Community, candidate countries, as well as all non-member European states.

http://www.ist-optimist.org/pdf/news/brochure_EPIC.pdf

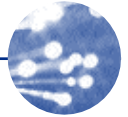
Fujitsu and Sumitomo to launch joint venture

The Japanese electronics giants plan to consolidate their compound semiconductor device operations by creating a joint venture company. Fujitsu and Sumitomo Electric are planning to consolidate their compound semiconductor device operations by creating a single joint-venture company. The Japan-based companies say that the venture should be

operational by April 1 this year. As yet without a name, the new company is expected to have an initial staff of around 1100 and annual sales of 30 billion yen. Fujitsu and Sumitomo Electric will each own half of the equity in the new venture. The new company will combine the expertise of Fujitsu Quantum Devices (FQD), which makes devices for microwave and optical communications, with Sumitomo's Photo-Electric Device division. Although the new venture will benefit from Sumitomo's expertise in GaAs and InP substrates and epitaxy, the materials business itself is not involved in the joint venture directly. Sumitomo Electric and Fujitsu say that the joint venture company will concentrate on building a research and development platform focused on process technologies and device performance. They say that the new company will take a "dominant position in the market for telecommunications infrastructure devices", as well as seek out new markets with high-growth prospects such as broadband communications, digital home appliances and home networking.

<http://www.fujitsu.com>

<http://www.sumitomo.com>



Alliances & Mergers

InP-based optical interconnect project kicks off

The European Union, IMEC, ST Microelectronics and others have ploughed 4.2 million into a three-year project to integrate InP-based optical interconnects and silicon ICs. Known as the Photonic Interconnect Layer on CMOS by wafer-scale integration (PICMOS), the project is an attempt to solve the bottleneck expected from conventional interconnects in future electronic circuits. Co-ordinated by Belgian microelectronics research specialist IMEC, and including seven organizations in all, the project team will look at two different integration strategies. Both the strategies will be based on a planar interconnect layer built from a high-density optical wiring circuit integrated with InP-based sources and detectors. The first strategy involves a wafer-to-wafer bond technology where the photonic interconnect layer is fabricated in parallel with the electronic circuit wafer. Both

wafers would then be bonded together. The second strategy will be an "above-IC" approach, where the photonic layer is fabricated directly on top of the electronic circuit. According to the project abstract, III-V epi material for the active photonic devices will be bonded on top of the waveguide circuits before the substrate is removed. The active devices will then be defined in the remaining membrane. To combat the large size difference between InP and silicon wafers and the limited space available to the active photonic devices, the project team says that it will develop a rapid die-to-wafer bonding step. The seven partners involved in PICMOS are: IMEC, ST Microelectronics, the University of Ghent in Belgium, the Grenoble-based CEA/LETI laboratory and Tracit Technologies, the University of Lyon in France, the Technical University of Eindhoven in The Netherlands and the Greek National Center for Scientific Research.

<http://fmnt.online.fr/PICMOS.pd>

Belgacom enhances its optical network with Alcatel equipment

Alcatel has announced the signing of a multi-million Euro, four-year frame agreement with Belgacom SA, the Belgium incumbent operator, to upgrade and expand its existing core and metro optical transport networks, beginning in 2004. The project will enhance the efficiency and capacity of Belgacom's transport network to more cost-effectively carry advanced broadband services and new optical services.

<http://www.alcatel.com>

Life and Death

Infineon ponders its fiber-optic options

Infineon is looking at various options to sell or spin off its struggling fiber-optic components business. In its latest earnings announcement, the German semiconductor manufacturer Infineon indicated that it is preparing to spin off or sell its fiber-optic components business, which performed below expectations. In its financial results statement, Infineon said that it was "preparing strategic options for Fiber Optics by carving out the business into a separate legal entity." "[Infineon] is in the process of evaluating potential strategic partners to maximize the value of the business," continued the statement. Revenues for Infineon's Wireline Communications group were Euro 107 m (\$134 m) in the final quarter of 2003, down 12% from the previous quarter, and up 1% year-on-year. The sequential revenue decrease was due mainly to lower revenues in the fiber-optics market, partially offset by growth in access product revenues. Revenues were also negatively impacted by the weakening of the US dollar against the Euro, and ongoing price declines. Infineon manufactures a wide range of fiber-optic components, including lasers, recei-

vers, vertical-cavity surface-emitting lasers, transceivers and parallel optical links. Earlier this year, it announced a manufacturing agreement with Taiwan's United Epitaxy Company. Despite seeking to offload its Fiber Optics business, Infineon said that it sees "solid growth for its Wireline Communications business group in the current fiscal year [ending September 30, 2004]". Overall the world's sixth largest semiconductor manufacturer posted revenues of Euro 1.62 bn for the last quarter of 2003, a decrease of 8% sequentially, but an improvement of 13% on a year-on-year basis. The sequential revenue decrease was due mostly to continued price decline throughout all business segments, as well as the negative impact of exchange rates. The company is generally optimistic about 2004. "All business indicators show that the semiconductor industry is finally in an upswing phase. The worst crisis ever experienced in the semiconductor market seems to be over," commented Ulrich Schumacher, Infineon's president and CEO. "With the market back on track, we also see positive business development for the current fiscal year. All segments are expected to show stable growth in 2004."

<http://www.infineon.com/>



Life & Death

European competition authorities approve the manufacturing transition of Tellabs International's products to Elcoteq

National competition authorities in Europe have approved a plan under which Tellabs will transfer ownership of its Espoo manufacturing operations to Elcoteq, effective January 1, 2004.

"This necessary step takes Tellabs further along the path to profitable growth," said Anders Gustafsson, president, Tellabs International. "Tellabs will continue focusing on the core competencies of customer relationships and product development. We will carry on working directly with our customers to provide the high quality service they have to come to know us for." Tellabs provides data switching and bandwidth management solutions to carriers around the world. More than two-thirds of telephone calls and Internet sessions in several countries, including the United States, flow through Tellabs equipment, according to the company. Tellabs customers include many of the largest and strongest carriers, and the company's equipment is deployed in more than 100 countries worldwide.

<http://www.elcoteq.fi/>

New consolidation for HighWave

HighWave Optical Technologies, a French provider of customized subsystems for sophisticated Ultra Long Haul, Long Haul and Metro core optical networks, announced a new consolidation. This consolidation will reduce the number of employees to achieve the objective of reducing the cash consumption by a factor of two.

<http://www.highwave-tech.com/>

Business News

Annual TIA report forecasts turnaround in U.S telecom equipment spending

Total spending in the U.S. telecommunications industry rose 4.7% in 2003 to an estimated \$720.5 billion, according to the recently released 2004 edition of the "Telecommunications Market Review and Forecast," an annual study published by the Telecommunications Industry Association (TIA). Double-digit increases in wireless services, services in support of equipment, specialized services (unified communications, video- and audio-conferencing, and high-speed Internet access) offset decreases in equipment spending and local- and toll-service revenues. The U.S. telecommunications industry will grow at a projected 9.2% compound annual rate from 2004 to 2007, reaching \$1 trillion.

<http://www.tiaonline.org>

More records as Cree invests in R&D

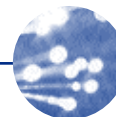
Revenue jumps 28% year-on-year as the LED manufacturer looks to invest in its next generation of products. Cree has reported revenue for the quarter ended December 28, 2003 of \$73 million, a 28% increase over the comparable quarter last year. Net income for the period increased 45% to \$13 million over the prior year's figure. Cree President Chuck Swoboda said: "Our record revenue and higher profitability were driven by strong LED sales as we benefited from increased demand for LEDs in mobile phone applications." "During the quarter we generated a record \$52.4 million of cash from operations." In its outlook, Cree indicated that revenue in the next quarter would be \$75-76 million, while higher research and development expenses would be needed to support the new product pipeline.

<http://www.cree.com>

Metro Ethernet equipment tops \$2.9 billion in 2003, expected to net \$7.5 billion by 2007

Worldwide metro Ethernet equipment revenue hit \$2.9 billion in 2003 and is projected to grow over 150% to \$7.5 billion by 2007--a compound annual growth rate (CAGR) of 27%, contends a new report from Infonetics Research. Worldwide metro Ethernet equipment ports reached 1.1 million in 2003--up from 906,000 in 2002--and will grow over 400% to 5.8 million by 2007, a CAGR of 52%.

<http://www.infonetics.com/home.html>



An organic semiconductor interconnect

Scientists at Eastman Kodak's Display Technology Laboratory have created an optically transparent, organic semiconductor interconnect for use with organic light emitting diodes (Applied Physics Letters, upcoming issue). The material could be used to stack OLEDs for brighter, stabler, longer-lived light sources. Varying the operating voltage using stacks is also seen as possible.

<http://www.kodak.com>

Pirelli has announced a raft of new products that will be spun out of its nanophotonics R&D programme in the next 12 months.

Photonic-crystal materials exploit lattices of tiny air holes to create photonic bandgaps - structures that can be engineered to provide extremely tight confinement of light within an optical waveguide. Pioneers of the technology, including Pirelli, argue that photonic crystals will help manufacturers to reduce the dimensions of optical circuits from centimetres to millimetres, while at the same time providing a route to low-cost, high-volume production. The first release based on Pirelli's photonic-crystal technologies is a dynamically tunable laser, the DTL-C13. The laser is a hybrid device with an external cavity, the resonance frequency of which is controlled by a tunable mirror. Specifications include a wavelength range of 1530 to 1565 nm, a frequency accuracy of ± 1.5 GHz, an output power of up to 13 dBm and a tuning speed of 10 ms. Pirelli is currently working

on two other components for optical comms applications. The first is an optical add-drop multiplexer (OADM) that enables add or drop of up to four software-defined wavelengths without affecting the pass-through channels. Scheduled for sampling next June, the OADM uses photonic-crystal technology to ensure a compact footprint. The other product in the pipeline is a termination device, or triplexer, for passive optical networks. Slated for sampling in December 2004, the triplexer comprises a laser and two photodiode receivers integrated onto a 4 x 4 mm mux-demux chip, with the active components mounted on the wafer using automated pick-and-place technology. The next 12 months will see Pirelli release the OADM and triplexer chip, following which, the firm has some big ideas for the longer-term evolution of its nanotechnology-based products. The laboratories are now working on ways to increase the complexity of the optical chips, by integrating photodiodes into the silicon, for example. Pirelli is also looking to incorporate optical amplification (of about 3 dB) into the chips. As optical circuits become more complex, they also become more lossy - integral amplification may help counteract this problem.

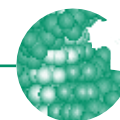
<http://www.pirelli.com>

Sharp fabricates blue laser diodes using MBE

Scientists at Sharp Laboratories of Europe (SLE) have produced the world's first blue-violet laser diodes fabricated using MBE. Jonathan Heffernan and colleagues at the UK-based subsidiary of the Japanese electronics giant reported their work in the latest issue of the journal Electronics Letters. Grown on a sapphire substrate, the ridge waveguide InGaN multiple quantum well lasers operate at room temperature with an output wavelength of 400 nm. To date, only low-power blue LEDs have been fabricated using MBE. The blue LEDs and lasers developed by Shuji Nakamura and colleagues at Nichia Chemical Industries in Japan in the mid-1990s were all fabricated using MOVPE and this technique has dominated since then. SLE says that it has a patented MBE system that has been speci-

fically designed for growing GaN devices. One key advantage of the MBE method is its much lower consumption of source materials for device growth, in particular the amount of ammonia required as the source of nitrogen. According to Heffernan and colleagues, another significant difference is that the MBE-grown devices require no post-growth thermal annealing to activate the p-type dopant, a process that is required for devices fabricated using MOVPE. The SLE team is still some way short of producing commercial-grade devices, however. At the laser threshold current of 1.5 A, the operating voltage was 33 V. The threshold current density is approximately 30 kAcm⁻². The lasers currently operate in pulsed mode with a pulsewidth of 200 ns. For commercial applications, a continuous-wave device would be required.

<http://www.sle.sharp.co.uk/>



Affymetrix and Caliper signed a collaboration and supply agreement

The two largest companies involved in biochips development and microfluidic tools signed collaboration in which Caliper will develop and provide Affymetrix with automated target preparation instruments for the GeneChip® Probe Array systems, the new High Throughput Array (HTA) system and future GeneChip platforms. New automation systems are expected to reduce array processing time, variability and costs. They will also enable researchers to industrialize their genomic research.

Caliper Technologies, now Caliper Life Sciences will develop liquid handling, automation and microfluidic solutions thanks to its expertise in these fields. Affymetrix will bring its expertise in microarray technology and applications. First products will be commercialized later 2004.

The US company decided to change its name in order to reflect new Caliper's strategy. As a provider of macro and microfluidics laboratory solutions for the life sciences industry, Caliper Life Science (with a new website : <http://www.caliperSL.com>) is a result of the fusion between Caliper Technologies and Zymark Corporation, bought last year.

<http://www.affymetrix.com>

<http://www.caliperLS.com>

16.7 million Euros for Fluidigm

Fluidigm raised 16.7 million from international investors : EDB Investments Pte Ltd (EDBI), the Singapore Economic Development Board, and New-York based Invus, LP. The company also received strong insider support. Investments will be used to expand international sales, marketing and support to help the commercial development of Topaz™ product line. Fluidigm's integrated fluidic circuit (IFC) technology is developed for Topaz product used in drug discovery research.

<http://www.fluidigm.com>

Cellomics closed its round of equity financing

The US company, based in Pittsburg closed its sixth round of equity financing with 4.2 million. Existing Investors are Carl Zeiss MicroImaging, Inc., Oxford Bioscience Partners, Vector Fund Management, InterWest Partners, Alta California Partners, Burrill Biotechnology and Axiom Venture Partners. CK Capital also participated. Cellomics' technology is focused on cellular extraction. It integrates fluorescence-based reagents, cell lines, multi-parametric assays, HCS instrumentation (both fixed end-point and kinetic systems), and informatics tools to achieve a flexible, broadly applicable platform for users in the life sciences.

<http://www.cellomics.com>

pSivida, a Qinetiq company on German exchange

The company announced that it will trade on the Berlin, Munich and Stuttgart stock exchanges. Involved in the biomedical nanotechnology sectors, pSivida focuses its activities on the development of nano-structured porous silicon (BioSilicon™) for multiple potential applications in human and animal healthcare through its UK operating subsidiary, pSiMedica Limited. pSivida, also a public company in Australia, signed a licensing agreement with a German research agency in the field of diagnostic.

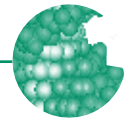
<http://www.psidea.com.au>

Alliance & Mergers

Combimatrix will collaborates with Washington University

The two partners announced their partnership to develop a system for the synthesis of libraries of diverse, non-nucleic acid molecules. These libraries will be synthesized using Combimatrix's semiconductor based microarrays and electrochemical synthetic methods. Combimatrix NanoArrays will be used for the diverse chemical synthesis. Combimatrix's array technology has been developed for several applications in genetic analysis, RNAi drug discovery, biodefense applications, chemical sensing and nanomaterials discovery. At the same time, Combimatrix signed a co-development agreement with Cyrano Sciences based on nanotechnologies for chemical sensors. Cyrano Sciences develops electronic nose technology. Objectives of this collaboration are to merge Combimatrix's microarray technology and Cyrano's electronic nose technology.

<http://www.combimatrix.com>



EMBL will use bioarray system from Amersham Biosciences

The European Molecular Biology Laboratory, based in Heidelberg in Germany, selects the CodeLink bioarray system from Amersham Biosciences to perform gene expression experiments in its Developmental Biology Unit and Genomics Core Facility. Under this agreement, the two organizations will jointly organize training and access to CodeLink technology through EMBL's core facility.

<http://www.amersham.com>

<http://www1.embl-heidelberg.de>

Cooperation between Greiner Bio-One and Scienion

The two companies offer combined solutions for new formats microarrays. This solution enables customers to perform a wide range of cost-effective and time saving chip-based biological assays. It is dedicated to diagnostic labs and pharma screening : pharmacogenomics and toxicogenomics. With this collaboration, both companies signed an important evolution in the use of microarray technologies for diagnostic applications. Greiner Bio-One and Scienion will present their innovative system at the LabAutomation 2004, in San Jose, California, USA at the beginning of February. The new platform has been developed in two formats : plastic slides with 12 arrays and microplates with 96 wells. Each array or well has a single chip resulting in the parallel analysis of 12 or 96 individual arrays.

<http://www.scienion.de>

<http://www.gbo.com>

Strategic commercial program between Cepheid and Biomérieux

The two companies signed a collaboration to develop DNA testing products embodying Biomérieux's NASBA (Nucleic Acid Sequence Based Amplification) technology to be run on systems employing Cepheid's Smart Cycler® and GeneXpert® platform technologies. Under this agreement, Cepheid will receive 12 million in upfront and milestone payments in addition of products purchases and royalty payments on end-user GeneXpert® test cartridges sales.

<http://www.biomerieux.com>

<http://www.cepheid.com>

Collaboration between Sequenom and the Health Protection Agency

Sequenom announced a pathogen analysis research collaboration with the Health Protection Agency (HPA) based in London to apply Sequenom's MassArray technology in the genetic identification and differentiation of microbes. The co-development is focused on the discovery of genetic markers that differentiate pathogenic from non-pathogenic strains of these microbes. The Health Protection Agency is a national organization for England and Wales.

<http://www.sequenom.com>

New Products

Whole genome expression analysis for Illumina

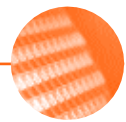
The US company has launched two Sentrix® BeadChips .The first chip is designed to analyze six discrete whole-human-genome samples in parallel on approximately 48,000 transcripts from the estimated 30,000 genes in the human genome. The second one allow to analyze eight samples in parallel on 22,000 genes from the consensus RefSeq database, a well-characterized whole-genome subset used broadly in genetic analysis. Microarrays are expected to be commercialized by mid-2004.

<http://www.illumina.com>

Two new patents for Micronics

Micronics announced two new patents 6,656,431 and 6,674,525 for the laboratory-on-a-card (Lab-on-a-card) applications in flow cytometry. Flow cytometry is the ability to analyze multiple features of individual cells or particles of interest. Micronics' strategy is based on the development of a key technology: miniaturization and enhancement of complex flow cytometry processes and systems on a lab card format. Microcytometer lab card is a credit card-sized device that allows rapid analysis. The final instrument is a small, handheld or portable systems into which the card is inserted.

<http://www.micronics.net>



2004 forecasts for semiconductor equipment market

According to a report from VLSI Research, sales for chipmaking equipment in 2004 will increase to \$43.5 billion. IC sales are set to grow 32.8% to \$169.6 billion, supporting electronics sales of \$1.190 trillion (up 10.4%). Front-end capacity utilization is forecast up from 88.7% in 2003 at 94.1%.

VLSI Research expects "a price-led upturn of the strong likelihood that the equipment industry will not be able to respond fast enough to the sudden spike in demand". Many cutbacks in the last couple of years mean that production can't be easily ramped up.

<http://www.vlsiresearch.com>

Intel announced fourth quarter and year ended 2003 revenues

Revenue for 2003 was \$30.1 billion, up 13 percent from \$26.8 billion in 2002 announced the giant chip manufacturer Intel. Net income was \$5.6 billion, up 81 percent from \$3.1 billion in 2002. Earnings per share were \$0.85, up 85 percent from \$0.46 in 2002. For the fourth quarter, revenues reached \$8.74 billion, up 12% sequentially and up 22 percent year-over-year. The fourth quarter 2003 results included the impact of a \$611-million goodwill write-down related to the Wireless Communications and Computing Group (WCCG). Intel expects revenues in the first quarter to be between \$7.9 billion and \$8.5 billion. For 2004, Intel forecasts revenues for the first quarter to be between \$7.9 and \$8.5 billion.

<http://www.intel.com>

Pure-play IC foundry market driven by communication systems

According to a report from the market research company IC Insights, communications applications like cellular phones, networking systems, are once again driving tremendous growth in the pure-play foundry market.

In 2003, the pure-play foundry IC market increased 31 per-

cent, almost twice the total IC market growth of 16 percent. Foundry sales to the communications market represented 38 percent of the total pure-play foundry IC market in 2003. For 2004, IC Insights believes that the pure-play foundry business will surge 43 percent, a rate that would once again be significantly better than the forecasted total IC industry growth of 27 percent. Overall, pure-play foundry IC sales are expected to display a 23 percent compound annual growth rate (CAGR) from 2003 through 2008, 10 points higher than the total IC industry CAGR during the same timeframe, said the market research company. In total, the pure-play foundry communications IC market exhibited 58 percent growth in 2003, compared with the pure-play foundry computer and consumer IC segments growing only 18 and 17 percent, respectively, in the same period.

<http://www.icinsights.com>

Fairchild announced 2003 Q4 and year end results

Fairchild Semiconductor, global supplier of high performance products announced results for the fourth quarter and full year ended December 28, 2003. Fairchild reported fourth quarter sales of \$369.2 million, 12% higher than the prior quarter and 4% greater than fourth quarter 2002. Fairchild reported net income of \$5.3 million or \$0.04 per diluted share. Full year revenues for 2003 were \$1,395.8 million, compared to

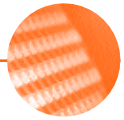
\$1,411.9 million in 2002. Fairchild reported a net loss of \$81.5 million or \$0.69 per share in 2003, compared to a net loss of \$2.5 million or \$0.02 per share in 2002. For the first quarter of the year 2004, Fairchild expects revenues to increase 1 to 4% percent sequentially.

<http://www.fairchildsemi.com>

SEZ reports record orders in Q4 and financial results for 2003

The SEZ Group announced results for the fourth quarter of 2003, achieving a record order intake of CHF 88.0 million (Eur. 56,15 million), representing a quarter-over-quarter increase of 80 percent and confirming the strong global demand for SEZ Spin-Processors. The striking uptick was principally driven by orders for 300-mm projects, both from foundries in the Asia-Pacific region and Japanese microchip manufacturers. During the business year 2003 the SEZ Group received new orders worth CHF 201.6 million (Eur. 128.25 million) and improved the corresponding book-to-bill-ratio from 0.96 to 1.19. Order backlog of CHF 70.6 million at year-end exceeded the previous year value by 73 percent. Preliminary sales in the fourth quarter improved by almost 60 percent compared to the previous quarter, reaching CHF 62 million.

<http://www.sez.com>



Business News

ASML announced financial results for 2003

ASML Holding NV (ASML) announced 2003 fourth quarter and annual financial results. Total sales in Q4 2003 of EUR 526 million, including sales of 61 lithography systems – 43 new and 18 refurbished systems – and services. In 2003, total net sales were EUR 1,543 million, including sales of 169 lithography systems and services. In Q4 2003, ASML generated a net profit of EUR 16 million or EUR 0.03 per ordinary share. Compared with Q3 2003 and Q4 2002, respectively, ASML generated net losses of EUR 31 million or EUR 0.06 per ordinary share and EUR 50 million or EUR 0.10 per ordinary share. As announced in July 2003, ASML is in the process of reducing its workforce by 11 percent. ASML and its works council are nearing the completion of a joint study on implementing these workforce reductions in the Netherlands. However, the Dutch workforce reduction has been delayed and, correspondingly, the results of cost reductions have been delayed. In addition, ASML announced that Doug Dunn, president and CEO, has advised the Supervisory Board and Management Board that he plans to retire before the end of 2004.

<http://www.asml.com>

ST reports fourth quarter and full year 2003 revenues

ST Microelectronics reported financial results for the fourth quarter and year ended December 31, 2003. Net revenues for the fourth quarter were \$2,113 million, a 17.1% sequential increase over the \$1,804 million reported in the 2003 third quarter, and 18.3% above the \$1,786 million of last year's fourth quarter. Revenues from differentiated products were \$1,464 million or 69.3% of net revenues for the 2003 fourth quarter.

For the full year 2003, net revenues were \$7,238 million, up 14.6% from the \$6,318 million reported in 2002. Gross profit was \$2,566 million, or 35.5% of net revenues. Operating income was \$334 million, or 4.6% of net revenues. Excluding impairment, restructuring charges and other related closure costs and R&D in process, operating income was \$544 million, or 7.5% of net revenues. Research and development costs for 2003 were \$1,238 million, or 17.1% of net revenues, compared to \$1,022 million in 2002, or 16.2% of net revenues. ST expects a good first quarter 2004 with revenues comprised between \$2 billion and \$2.1 billion; thanks to solid order backlog and strong fundamental demand for products serving key high-growth applications.

<http://www.st.com>

Okmetic announced preliminary results for 2003 year end

The result development of Okmetic in the fourth quarter of the year was weak, as predicted. In accordance with the re-evaluation of the strategy, the company will begin a restructuring programme that aims at improving the efficiency of the Group's activities and at increasing profitability. In 2004, 3.5 million euro will be allocated for the realisation of the structural changes. A total of 25.0 million euro worth of assets will be written off during 2004. Operating result for 2003 was negative, according to the preliminary financial statements. The turnover of the Okmetic Group in 2003 amounted to 50.1 million euro, which signifies a decrease of 13 percent from the previous year.

For the product group deliveries, results are as followed :

	2003	average 2002
MEMS	29 %	25 %
POWER	35 %	28 %
ICprime	36 %	47 %

Source : Okmetic, January 2004

According to the group, the growth in the Okmetic product segments will, however, remain slow at least during the first half of 2004.

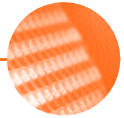
<http://www.okmetic.com>

Infineon first quarter 2004 financial results and expectations for full year

Infineon Technologies AG, the world's sixth largest semiconductor manufacturer in 2003, announced results for its first quarter in fiscal year 2004, ended December 31, 2003. Revenues of Euro 1.62 billion reflected a decrease of 8 percent sequentially, but an improvement of 13 percent on a year-on-year basis. The sequential revenue decrease was due mostly to continued price decline throughout all business segments, as well as the negative impact of the weakening US-dollar exchange rate. Net income amounted to Euro 34 million, compared to net income of Euro 49 million in the previous quarter and a net loss of Euro 40 million year-on-year.

For the second quarter of fiscal year 2004, Infineon expects a return to growth in revenues in the wireline communications segment, but expects a slight sequential decrease in revenues in the secure mobile solutions segment due to seasonally-reduced demand after Christmas, and continued phasing out of some cordless business.

<http://www.infineon.com>



Business News

Siemens sold 150 million shares of Infineon

Siemens announced on January 12, 2004, that it has sold 150 million ordinary registered shares of Infineon Technologies AG, representing approx. 20.8 % of the outstanding share capital of the company in an accelerated book-build offering. Pricing of the Offering has been expected to take place the same day. The offer price is expected to be announced after the close of business. With this transaction, Siemens' current ownership interest decreases from nearly 40 percent to approx. 19 percent. The Offering comprises an international private placement to institutional investors outside the United States under Regulation S (as defined in the U.S. Securities Act of 1933, as amended (the "Securities Act")) and to qualified institutional buyers (as defined in Rule 144A under the Securities Act) in the United States.

<http://www.siemens.com>
<http://www.infineon.com>

Alliances & Mergers

Infineon announced it has signed agreement to acquire ADMtek

Infineon Technologies announced that it has signed an agreement to acquire ADMtek Inc., a fabless, integrated circuit (IC) design company based in Hsinchu, Taiwan, for around Euro 80 million in cash, which includes an earn out portion of about Euro 20 million if certain performance and development milestones are achieved within two years after completion. The company expects the establishment of a new company, Infineon-ADMtek Co. Ltd, headquartered in Hsinchu, which will focus on developing broadband customer premise equipment (CPE) ICs and enable Infineon to enter the home gateway market. This is Infineon's first acquisition of a controlling stake in an Asian semiconductor company. The acquisition, which will be structured as a statutory merger under Taiwan law, is expected to be completed in April 2004, and is subject to approval by the shareholders of ADMtek.

<http://www.infineon.com>
<http://www.admtek.com.tw>

Motorola took stake in SMIC

Motorola Inc. took a significant stake in SMIC, selling the foundry its MOS-17 wafer facility in Tianjin, China, in exchange for SMIC shares. Motorola China Electronics Ltd., a wholly owned subsidiary of Motorola, announced that it had closed the deal, an agreement originally released in October 2003. The cooperation also sees the companies entered into a foundry relationship and IP partnership for CMOS technology. While Motorola maintained that the deal sees it become a "significant" equity holder in SMIC, entitling it to a seat on SMIC's board, financial terms and capacity plans were not disclosed. Independently, SMIC announced that it had scored a \$285 million loan with four major Chinese banks in Shanghai - Industrial and Commercial Bank of China, China Construction Bank, Bank of Communications and Shanghai Pudong Development Bank, used to expand the capacity of SMIC's three 8-inch fabs located in Shanghai and has a repayment period of five years.

<http://www.motorola.com>

Rockwood completed acquisition of Isiltec

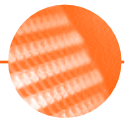
Rockwood Specialties GmbH, a wholly owned subsidiary of Rockwood Specialties Group Inc. ("Rockwood") recently completed the acquisition of ISILTEC (Innovative Silicon Technologies GmbH), a leading German wafer reclaim company specializing in 300mm reclaim including copper reclaim technology. The acquisition enhances Rockwood's wafer reclaim capabilities with the addition of ISILTEC's state-of-the-art 300mm facilities for copper reclaim and for non-copper reclaim. This acquisition complements Rockwood's existing reclaim activities and enables Rockwood to offer a complete range of reclaim services to the semiconductor manufacturing market. ISILTEC already supplies reclaim services to a leading European 300mm semiconductor wafer Fab and participates in major European research programs. Rockwood recently completed a \$7 million expansion at its Gréasque, France facility (high volume 200mm manufacturing), and the company also maintains a 300mm capable reclaim facility in Prescott, AZ, USA

<http://www.rockwoodspecialties.com>
<http://www.isiltec.com>

PSi Technologies and Philips signed supply agreement

PSi Technologies announced the signing of a long-term supply agreement with Royal Philips Electronics to provide outsourced power semiconductor assembly and test services through PSi's facility in Chengdu, Sichuan Province, Peoples' Republic of China. The products to be packaged and tested for Philips are bipolar power products ranging from epitaxial diodes, deflection transistors, damper diodes, triacs and thyristors. As part of the agreement, Philips will progressively transfer its production of bipolar products, currently located in Philips' assembly and test facility in Cabuyao, Laguna Province, Philippines, to PSi in China. The transfer will commence in the first quarter of 2004 and extend to 2005. PSi currently provides assembly and test services to Philips in the Philippines, augmenting Philips' internal capacity to meet market demand for its products and packages.

<http://www.psitechnologies.com>
<http://www.semiconductors.philips.com>



Life & Death

Soitec appointed Jean-Luc Ledys COO of Picogiga

Soitec, a producer of silicon-on-insulator (SOI) wafers and other engineered substrates for use in semiconductor manufacturing, announced it has appointed Jean-Luc Ledys chief operating officer (COO). Mr. Ledys operates at its Picogiga International (Les Ulis, France) division specialized in the development and manufacture of compound semiconductor products. He will oversee business operations for Picogiga, and is tasked with developing and implementing, in concert with Soitec's corporate objectives, a long-term business strategy to drive the broader adoption of compound semiconductor products. Mr. Ledys comes from the R&D Group of Gemplus International, the world's leading provider of smart-card solutions, and will report to Soitec COO Pascal Mauberger.

<http://www.soitec.com>

Infineon reinforce its presence in China

Infineon Technologies announced the establishment of its latest IC Design Center and new subsidiary - Infineon Technologies Xi'an Co., Ltd - in Xi'an, China. This represents another move of the company's steady business expansion and long-term presence in the Chinese market. Located at Xi'an High-Tech Park, the new IC Design Center plays a vital role for integrated circuit design for all of Infineon's business groups, with the primary focus on developing innovative applications for communications as well as for automotive and industrial electronics, said the German-based company. The new IC Design Center will enable Infineon to better serve the customers' needs and to harness the R&D talents in Western China to foster greater technology innovation.

Headed by Jean-Loup Leclere, General Manager of Infineon Technologies Xi'an Co Ltd, more than 1,000 employees are expected to join the Xi'an R&D Center by 2007, which will make it one of the largest IC design centers in Asia.

<http://www.infineon.com>

Wacker Siltronic is to be spun-out of its German parent company

Germany's Wacker-Chemie GmbH is reportedly planning to spin off its silicon wafer unit, Wacker Siltronic, into a new and independent company, according to sources in the industry. The silicon wafer unit will also file for an IPO and there's also talk the operation will change its name, according to sources. The move enables Wacker-Chemie to focus on its core chemicals business.

According to Tom Fahey, director of human resources at the Portland plant, rumors that the company is being sold are unfounded, but he added that any changes in the ownership structure would be announced by the parent company in Germany.

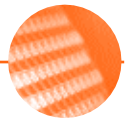
<http://www.wacker.com>

Techno News

Philips announced low power EEPROM for its 0.18µm CMOS18 process technology

Royal Philips Electronics announced its new low-voltage low-power EEPROM option for its 0.18 µm CMOS18 process technology, targeting industry demand for higher storage capacity and greater flexibility in smart card applications, as well as applications in consumer, communications and automotive markets. With the introduction of proposed new security measures such as the inclusion of biometric data on smart cards, plus the trend towards greater card functionality, the amount of information that must be stored on them continues to increase. At the same time, power consumption must be kept under control, particularly in contactless smart card applications where the only power available to the card is the electrical energy it can pick up from a local RF (Radio Frequency) field. Philips' new byte-alterable EEPROM technology provides both the high density and low power consumption needed to fulfill these requirements, while at the same time being fully compatible with the company's existing embedded Flash memory technology to allow mixed Flash/EEPROM systems. Philips' new CMOS18 EEPROM memory option is available for design in now and is supported by all the company's CMOS18 design tools, including the provision of memory test facilities through a standard JTAG interface.

<http://www.semiconductors.philips.com>



Infineon introduced 512Mbit Flash chip

Infineon Technologies launched the world's first NAND compatible flash chip based on TwinFlash™ technology. The 512Mbit flash chip has been developed by Infineon Technologies Flash GmbH & Co. KG, a joint venture of Infineon Technologies and Saifun Semiconductors. Initial production has started in Infineon's 200mm DRAM Dresden facility.

TwinFlash is realized in Saifun NROM® technology, a leading edge non-volatile memory technology developed by Saifun Semiconductors and proven in the past as basis for NOR-Flash and EEPROM, which stores two (Twin) locally separated bits in one transistor cell. Compared to competing single-bit-per-cell floating gate technologies with equivalent process structures TwinFlash offers 40% smaller die sizes due to its two-bit-per-cell approach and less mask levels resulting in a competitive production cost position. By end of 2004 more than 10,000 wafer starts per month on 170nm technology are planned.

<http://www.infineon.com>

Applied Materials completed evaluation program with ST

Applied Materials, Inc., the largest supplier of products and services to the global semiconductor industry, announced the completion of a comprehensive evaluation program with STMicroelectronics (ST), Crolles, France, that demonstrated superior results using the 200mm Applied Mirra Mesa CMP(chemical mechanical polishing) system configured with the NovaScan 2020 Copper integrated metrology unit from Nova Measuring Instruments. ST found that this integrated system is highly accurate in the measurement of erosion and the detection of copper residue. These demonstrated capabilities are key to enabling the reduction of scrap and the improvement of cycle time at the Crolles 1 facility.

The evaluation of Nova's in-line Copper metrology system on an Applied Mirra Mesa polisher was conducted for six months at ST's Crolles site using its copper production process and production wafers.

<http://www.appliedmaterials.com>

<http://www.st.com>

IMEC and ASML extends their collaboration on immersion lithography

IMEC, Europe's largest independent microelectronics and nanotechnology research center, extends its long-term collaboration with ASML to immersion lithography and will launch an industrial affiliation program (IIAP) on 193nm liquid immersion lithography that will run in parallel with its 157nm lithography IIAP.

IMEC immersion lithography industrial affiliation program to be launched mid 2004, will include ASML's TWINSCAN™ XT:1250i tool.

The objectives of the program are to explore the immersion-specific processing effects, such as the interaction of resist-water on lithographic performance and defect mechanisms, and to develop a liquid immersion process that overcomes the observed issues. The program also aims to explore immersion-induced imaging effects and to develop solutions.

<http://www.asml.com>

<http://www.imec.be>