

SAXONY!



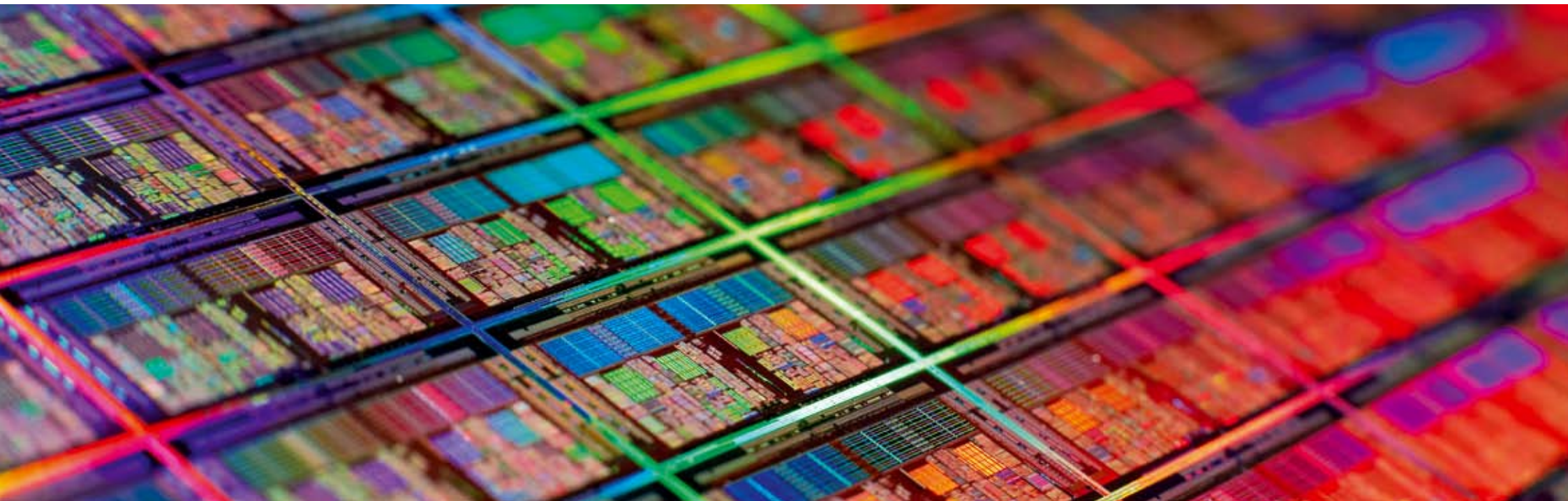
WIRTSCHAFTSFÖRDERUNG
SACHSEN

CHIPS·PROCESSORS·PHOTOMASKS
SEMICONDUCTORS·CHIP DESIGN
DISPLAYS·**MICRO!**·SOFTWARE·CO
ORS·COMPUTER·PHOTOVOLTAICS·
EQUIPMENT·ELECTRONICS·SENSOR

Microelectronics and Information Technology in Saxony



Microelectronics and Information Technology in Saxony



REGISTER OF COMPANIES AND INSTITUTIONS MENTIONED IN THIS BROCHURE

Company/Institution

URL

Integrated Circuits

GLOBALFOUNDRIES Inc.	www.globalfoundries.com
Infineon Technologies Dresden GmbH & Co. OHG	www.infineon.com
SAW COMPONENTS Dresden GmbH	www.sawcomponents.de
X-FAB Dresden GmbH & Co. KG	www.xfab.com

Circuit Design

Atmel Germany GmbH	www.atmel.com
Blue Wonder Communications GmbH	www.bluwo.de
DMOS GmbH	www.dmosdesign.com
Productivity Engineering GmbH, ASIC Design Center Dresden	www.pe-icdesign.de
ZMD AG	www.zmd.biz

Photomasks

Advanced Mask Technology Center GmbH & Co. KG (AMTC)	www.amtc-dresden.com
Photonics MZD GmbH	www.photonics.com
Toppa Photomasks Germany GmbH	www.photomask.com

Semiconductor Material

AIR LIQUIDE Electronics GmbH	www.airliquide.com
Freiberger Compound Materials GmbH (FCM)	www.fcm-germany.com
Siltronic AG, Freiberg Plant	www.siltronic.com

Equipment Suppliers and Service Providers

Applied Materials GmbH, Business Center Dresden	www.appliedmaterials.com
DAS Environmental Expert GmbH	www.das-europe.com
M+W Zander FE GmbH, Dresden Branch	www.mw-zander.com
Ortner cleanroom logistic systems GmbH	www.ortner-group.com
SGS INSTITUT FRESENIUS GmbH	www.institut-fresenius.de
SUSS MicroTec Test Systems GmbH	www.suss.com
Tokyo Electron Europe Ltd., German Branch	www.tel.com

Sensor Technology

ADZ NAGANO GmbH	www.adz.de
digades GmbH	www.digades.de
KSW Microtec AG	www.ksw-microtec.de
Microelectronic Packaging Dresden GmbH (MPD)	www.mpd.de

Software, Hardware and IT-Services

Comarch Software AG	www.comarch.pl/en
CoolCase GmbH	www.coolcase.com
MEGWARE Computer GmbH	www.megware.com
PC-Ware Information Technologies AG	www.pc-ware.com
SAP AG, Business Center Dresden	www.sap.com
T-Systems Multimedia Solutions GmbH	www.t-systems-mms.com

Photovoltaics

Deutsche Cell GmbH	www.deutschezell.de
Deutsche Solar AG	www.deutschesolar.de
heliatek GmbH	www.heliatek.de
Roth & Rau AG	www.roth-rau.de

Company/Institution

URL

Photovoltaics

SLS Solar Line Saxony GmbH	www.solar-line-saxony.de
SolarFactory GmbH	www.solarfactory.de
Solarion AG	www.solarion.de
SolarMaterial (Business Division of Deutsche Solar AG)	www.solarworld.de/solarmaterial
SOLARWATT AG	www.solarwatt.de
SolarWorld AG	www.solarworld.de
VON ARDENNE Anlagentechnik GmbH	www.vonardenne.biz

Display Technology

Novald AG	www.novald.com
Plastic Logic GmbH	www.plasticlogic.com
SeeReal Technologies GmbH	www.seereal.com

Networks

Nano-Technology Center of Competence »Ultrathin Functional Films« (NANO-CC-UFF)	www.nanotechnology.de
Organic Electronics Saxony e. V.	www.oes-net.de
Silicon Saxony e. V.	www.silicon-saxony.com
Smart Systems Campus Chemnitz	www.smartsystemscampus.de

Training and Research

Center for Application of Ion Beams in Materials Research (AIM)	www.fzd.de
Center for Microtechnologies (ZfM), TU Chemnitz	www.zfm.tu-chemnitz.de
Chemnitz University of Technology (TU Chemnitz)	www.tu-chemnitz.de
COMEDD – Center for Organic Materials and Electronic Devices Dresden	www.ipms.fraunhofer.de/en/comedd
»Cool Silicon« Cluster of Excellence	www.cool-silicon.de
Deutsche Telekom University of Applied Sciences (HfTL)	www.hft-leipzig.de
dresden chip academy (dca)	www.dresden-chip-academy.de
Dresden University of Technology (TU Dresden)	www.tu-dresden.de
Forschungszentrum Dresden-Rossendorf e. V. (Research Center Rossendorf)	www.fzd.de
Fraunhofer Center Nanoelectronic Technology (CNT)	www.cnt.fraunhofer.de
Fraunhofer Institute for Electron Beam and Plasma Technology (FEP)	www.fep.fraunhofer.de
Fraunhofer Institute for Material and Beam Technology (IWS)	www.iws.fraunhofer.de
Fraunhofer Institute for Photonic Microsystems (IPMS)	www.ipms.fraunhofer.de
Fraunhofer Institute for Ceramic Technologies and Systems (IKTS)	www.ikts.fraunhofer.de
Fraunhofer Research Institution for Electronic Nano Systems (ENAS)	www.enas.fraunhofer.de
Freiberg University of Mining and Technology (TU Freiberg)	www.tu-freiberg.de
Innovation Cluster »nano for production«	www.iws.fraunhofer.de/innovationscluster/e_index.html
Institute of Electronic and Sensor Materials, TU Freiberg	http://tu-freiberg.de/fakult5/esm
Institute of Semiconductors and Microsystems (IHM), TU Dresden	www.ihm.tu-dresden.de *
Nanoelectronic Materials Laboratory gGmbH (NaMLab)	www.namlab.com
Operating System Research Center (OSRC)	www.amd64.org

Further Contacts

»Invest in Saxony« – Saxony's Information Portal for Investors	www.invest-in-saxony.com
Information on microelectronics location Saxony	www.invest-in-saxony.com/micro
Saxony Economic Development Corporation (WFS)	www.wfs.saxony.de
Saxony State Ministry for Economic Affairs and Labor (SMWA)	www.smwa.sachsen.de

Welcome!

■■■ The Dresden-based Novaled AG corporation produces organic light emitting diodes, the so-called OLEDs. The screens and displays of the future will be made from OLEDs. Due to a patented procedure, OLEDs “made in Saxony” are twice as efficient as any and all competitive products. The company is a spin-off of the Dresden University of Technology as well as the Fraunhofer Institute for Photonic Microsystems (IPMS) Dresden.

■■■ Opened in September 2007, the new clean room featuring a purity level 10 (US standard) is at the core of microsystems development and fabrication at the Fraunhofer IPMS. On 1,500 sqm, state-of-the-art equipment for wafer processing is provided.

■■■ With about 2,000 employees, Infineon produces 150 different logic circuits in Dresden. The corporation has gained an excellent reputation in automobile electronics, in the chip card business, with baseband and high frequency chips for mobile phones, and in many other sectors.

■ The current capacity of GLOBALFOUNDRIES’ “Module 1” in Dresden amounts to 25,000 wafers starts per month. The fab is delivering a full range of AMD’s successful processor families.

It was in April 1998 when Richard Hornik, a reporter at TIME magazine, for the first time ever coined a new name for Saxony’s semiconductor industry: “Silicon Saxony.” The American global player AMD (Advanced Micro Devices, Inc.) was just setting up its first microprocessor factory in Dresden, and Mr. Hornik had traveled to Saxony to find out why AMD had, of all places, decided in favor of this region. “It’s all about people!” – was the simple answer provided by Jerry Sanders, the then CEO of AMD. He not only referred to the highly motivated and qualified specialists available in Saxony. He also meant the flexible work carried out by the public authorities which paved the way for the unique success story of AMD Saxony (today: GLOBALFOUNDRIES Inc., Fab 1 Dresden). Today, “Silicon Saxony” is Europe’s leading and the world’s fifth largest cluster for microelectronics.

Saxony’s enterprises are active along the entire electronic value creation chain. Approximately 200 enterprises develop, manufacture, and promote integrated circuits or act as material and equipment suppliers for the chip industry. All told, they employ about 20,000 people. If one adds those companies which manufacture and/or distribute electronic products and systems based on integrated circuits, develop and promote software, or establish and assist computer networks, then the branch includes more than 1,500 companies with more than 43,000 employees.



Excerpt from
TIME magazine, April 1998

Contents	
History of the Semiconductor Industry in Saxony	Page 6
Companies	Page 7
Integrated Circuits	Page 8
Circuit Design	Page 9
Photolithographic Masks (Photomasks)	Page 10
Semiconductor Materials	Page 11
Suppliers and Supporters	Page 12
Sensor Technology	Page 14
Software, Hardware, and IT-Services	Page 15
Photovoltaics	Page 16
Display Technology	Page 18
Networks	Page 20
Education and Research	Page 23
University Education & Research	Page 24
Non-University Education & Research	Page 25
Highlights of Research	Page 27
Imprint	Page 28

History of the Semiconductor Industry in Saxony

- 2009 — AMD and the Advanced Technology Investment Company (ATIC) from Abu Dhabi form a joint venture which will run all production sites worldwide. The new company – GLOBALFOUNDRIES – officially launches in March 2009.
- 2008 — Commissioning of one of the world's first e-paper display fabs in Dresden by the British company Plastic Logic Ltd.
- 2007 — Inauguration of the Nanoelectronic Materials Laboratory gGmbH (NaMLab) – an associated institute of the Dresden University of Technology
- 2006 — Start of the expansion of AMD's Fab 30 (200 mm technology) into Fab 38 (300 mm technology)
— Founding of AMD's Operating System Research Center (OSRC) in Dresden
- 2005 — Inauguration of the Fraunhofer Center Nanoelectronic Technology (CNT) in Dresden – an institution of the Fraunhofer Society as a public-private partnership with GLOBALFOUNDRIES
- 2003 — Groundbreaking ceremony for AMD's Fab 36 – AMD's first production site based on 300 mm wafers; production launch in 2005
- 2002 — Founding of the Advanced Mask Technology Center GmbH & Co. KG (AMTC) corporation – a joint venture of AMD and Toppan Photomasks for the development and pilot production of photomasks
— Founding of the "dresden chip academy" by Infineon Technologies Dresden, Siemens Professional Education, Silicon Saxony e.V.
- 1999 — The world's first introduction of copper technology at Dresden's AMD Fab 30
- 1998 — Founding of the Dresden Design Center (DDC) – AMD's European product development center
— Until 2000 development of the 300 mm technology by the companies Infineon Technologies Dresden and Motorola; construction of the world's first 300 mm factory
- 1996 — Production launch of ultrapure silicon at the Freiberg site of the Bavarian Wacker Siltronic GmbH corporation (today's Siltronic AG corporation)
— Groundbreaking ceremony for AMD's Fab 30 in Dresden; 1999 inauguration of the factory
- 1995 — Founding of the Freiburger Compound Materials GmbH (FCM) corporation – today, one of the world's leading manufacturers of GaAs wafers – by the Israeli Federmann Enterprises Ltd. corporation
- 1994 — Founding of the Siemens Microelectronics Center Dresden (as of 1999, Infineon Technologies Dresden)
— Production launch of solar silicon wafers at the Bayer Solar GmbH corporation in Freiberg (acquired by the SolarWorld AG corporation in 2004)
- 1961 — Founding of the "AME - Arbeitsstelle für Molekulartechnik" (Workplace for Molecular Technology) by physicist Werner Hartmann in Dresden for the development and production of integrated circuits
- 1957 — Founding of the VEB Spurenmetalle Freiberg (People's Enterprise Trace Metals Freiberg); 1966 production launch of monocrystalline silicon blocks and wafers
- 1911 — Heinrich Barkhausen – one of the pioneers of modern electronics – becomes the director of the Institute for Communication Engineering at Dresden's Technical University (today's Dresden University of Technology) – back then, Germany's first independent institute for communication engineering
- 1886 — Clemens Winkler, a chemist at the Freiberg Mining Academy, discovers the element "germanium" – the first semiconductor material
- 1703 — The universal scholar Gottfried Wilhelm Leibniz from Leipzig invents the dual system – the mathematical basis of the computer world consisting of ones and zeros



Prof. Dr. Silvia Roth »Saxony is my favorite place because neighborhood really matters here. It's fun to work with all the highly qualified local people – and to watch how rapidly things grow here.«
(Vice President Sales & Marketing, Roth & Rau AG)

MICRO!
Companies



8

Dr. Udo Nothelfer »Saxony's plus points include an outstanding network of highly qualified and dedicated people, its excellent interdisciplinary universities and research facilities and – last but not least – an effective and dynamic public administration. As a globally oriented semiconductor foundry, GLOBALFOUNDRIES continues the successful research and production activities which had been established by AMD at its Dresden location more than twelve years ago and which made this campus one of the world's top addresses in the semiconductor industry. We are very proud that we are an important part of this high tech cluster and are able to contribute to Saxony's good international reputation as a location for microelectronics.«

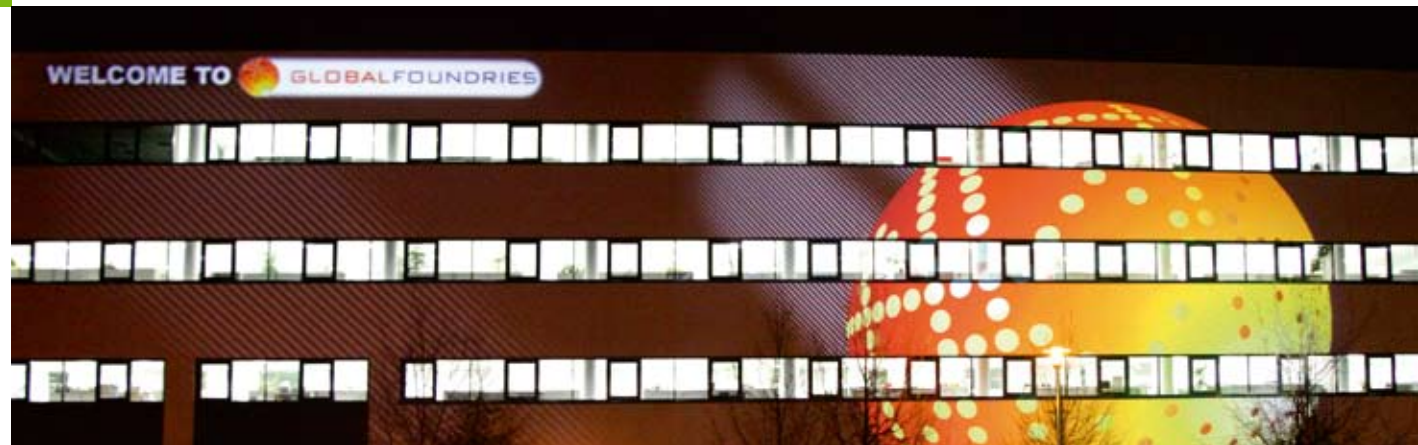
(Vice President Manufacturing & Technology, GLOBALFOUNDRIES Dresden)

Integrated Circuits

The Dresden site has been the cornerstone for AMD's microprocessor manufacturing operations for more than a decade and will continue to be the manufacturing cornerstone of GLOBALFOUNDRIES – a joint venture of AMD and ATIC Company (from Abu Dhabi) – for years to come. The **GLOBALFOUNDRIES Fab 1 in Dresden** is the manufacturing cornerstone of the newly founded global player, with two state-of-the-art semiconductor production facilities, Module 1 (former AMD Fab 36) and Module 2 (former AMD Fab 38), a total investment value of more than 6 billion USD up to today, and a workforce of about 2,600 highly qualified engineers, technicians and specialists.

In a joint venture created for development purposes with Motorola, Infineon was the world's first company to commence with volume production based on 300 mm wafers in Dresden in 2000. The **Infineon Technologies Dresden GmbH & Co. OHG** corporation is one of the most important production and development sites of the Infineon Technologies AG corporation. Its approximately 2,000 employees from 20 nations produce high-grade logic components by using a highly complex manufacturing technology based on 200 mm silicon wafers in the Dresden factory.

■■■ Both manufacturing facilities, or "modules," of GLOBALFOUNDRIES in Dresden consistently rank among the best in the world for productivity and advanced technology capabilities. In Module 1, GLOBALFOUNDRIES' first 300 mm wafer manufacturing facility, leading-edge microprocessors using advanced 45 nm and 65 nm technologies are produced. First preparations for 32 nm production are in progress.



9 ■■■ The overall capacity of X-FAB Dresden amounts to 8,000 eight inch equivalent wafer starts per month.

■■■ Infineon Technologies offers semiconductor and system solutions for automotive, industrial and multimarket sectors, as well as for applications in communication.

In 2007, the Erfurt-based X-FAB Semiconductor Foundries AG corporation took over the chip production facilities of the Zentrum Mikroelektronik Dresden (ZMD) AG corporation. The Group is among the world's ten largest foundries – i.e. production service providers which carry out the production on behalf of other chip manufacturers. The domain of the **X-FAB Dresden GmbH & Co. KG** corporation are mixed signal chips.

The **SAW COMPONENTS Dresden GmbH** corporation develops and produces electronic devices for all sectors of high frequency and radio transmission technology, sensors, and radio identification based on the Surface Acoustic Wave (SAW) effect. Every week, up to three million SAW chips leave the SAW factory in Dresden. They are used in products which can be radio controlled and/or read by radio – for example, as radio wave filters.

Circuit Design

The Atmel Corp. headquartered in San José (USA) runs one of its 22 design centers in Dresden – the **Atmel Germany GmbH** corporation.



Helmut Warnecke »Only a few chip producers worldwide cater to such a wide product range as Infineon: At our Dresden factory, we can produce at the same time about 150 different logic circuits with various fields of application. In order to provide our customers with maximum quality and reliability, it is essential to perfectly manage this complex production. This is, of course, only possible with highly qualified, experienced, and motivated employees and the superb infrastructure we have been finding here in Dresden for more than twelve years now.«

(Managing Director, Infineon Technologies Dresden GmbH & Co. OHG)



In Saxony's state capital, the latest generations of data memories and semiconductor solutions are developed, for example, for automotive applications.

Dresden's **DMOS GmbH** corporation develops application-specific (ASICs) and standard circuits (ASSPs) primarily for the automobile industry such as, for example, motor controls for ventilation and air conditioning systems as well as bus transceivers – sender and receiver units which ensure that the electronic components in a car can exchange data and signals via the bus system (line network).

The **Productivity Engineering GmbH** from Baden-Wurtemberg runs an **ASIC Design Center in Dresden**. The center offers development and design services in the field of Application Specific Integrated Circuits (ASICs) and standard products (ASSPs). Services include specification, feasibility analysis, consulting, and design of digital IP cells and ICs based on HDL (Hardware Description Languages) as well as of mixed signal and analog IP cells and ICs. The main competencies of the subsidiary in Dresden are in the areas of Smart Power, RFID, and sensor signal conditioning.

Blue Wonder Communications GmbH corporation is an independent design house for mobile broadband solutions serving the telecommunications and semiconductor industries. Blue Wonder's core competencies include mobile broadband modem design, OFDM based system development, and low power semiconductors design. The company was founded in December 2008 and is located in Dresden.

The **ZMD AG** corporation – as the successor of the “AME – Arbeitsstelle für Molekulartechnik” (Workplace for Molecular Technology) which was founded in 1961 – develops, tests and markets ASICs and ASSPs and is one of the leading enterprises in the 900 megahertz ZigBee technology. In 2007 ZMD changed over to a so-called “fabless company.” Its chip production facilities were taken over by the X-FAB Semiconductor Foundries AG corporation.

Photolithographic Masks (Photomasks)

In 2002, the **Toppan Photomasks Germany GmbH** corporation was founded in Dresden as a wholly owned subsidiary of Toppan Photomasks, Inc. With more than 130 employees, it is Europe's most modern production site for photomasks.

■■■ The specialty of DMOS are high voltage ASICs – circuits which are capable of handling up to 60 volts.

■■■ The “connected consumer – easy access to information anywhere, anytime” – development teams at Blue Wonder Communications are working on realizing this vision right here in Dresden.

■■■ The Freiburger Compound Materials GmbH (FCM) corporation is one of the technological leaders in its field: Already today, it is able to produce 200 mm GaAs wafers (the picture shows: End control of GaAs wafers) while the current wafer format in GaAs electronics is still 150 mm.



■■■ In addition to the large-scale production of photomasks, the approximately 130 employees of Toppan Photomasks in Dresden are also working on transferring the research results of the partner AMTC into production and are, thus, also working on the production of samples which are unique in the world and which are shipped to customers around the globe.

■■■ In a virtually particle-free environment, photomasks are produced in the clean room of Dresden's AMTC mask center.

■■■ Since 1995, Siltronic AG has invested far more than 600 million euros in Freiberg. Today, the factory is the Group's largest and most modern production site for 300 mm wafers with more than 1,150 employees.

The **Advanced Mask Technology Center GmbH & Co. KG (AMTC)** corporation develops photolithographic masks for tomorrow's micro-processors and memory chips (DRAMs). The AMTC plays a vital role in the development of immersion and EUV lithography. The mask center is located in Dresden between the corporate sites of GLOBALFOUNDRIES and Infineon. This permits very close cooperation with the production sites which, in turn, results in quick reactions to customer requirements. The employees of the AMTC and Toppan Photomasks work together in the same 1,400 square meter clean room. Thus, creating uniquely short distances between the development and production of photomasks – and to the customer.

Dresden's **Photronics MZD GmbH** corporation – a subsidiary of the American Photronics, Inc. – produces photolithographic masks for chip manufacturers in Germany, Europe, and Asia. In close cooperation with research institutes and industrial partners, it also develops masks with structural widths of 100 nm, for example, for specific optical and lithographic applications.

Semiconductor Materials

The **Siltronic AG** corporation manufactures the most important primary material for chip production in its **Freiberg Plant** – crystalline disks made of ultrapure silicon, the so-called wafers. Freiberg has ultra-modern production lines for 150 mm wafers and one of the world's most modern Czochralski pulling process factories for 200 mm silicon crystals. Another production line (investment amount: more than 400 million euros) for 300 mm wafers – Fab 300-2 – was opened at the end of July 2004. In 2006, this production site was expanded to a capacity of 200,000 wafers per month.

The **Freiberger Compound Materials GmbH (FCM)** corporation produces wafers from gallium arsenide (GaAs). The parent company – the Israeli Federmann Group – has invested about 110 million euros into the Freiberg site and has created 270 new jobs since 1995. FCM is the only company on the globe which successfully manages and applies both production procedures for the cultivation of monocrystals – LEC (Liquid Encapsulated Czochralski) and VGF (Vertical Gradient Freeze) – and is, thus, one of the leading manufacturers of GaAs substrates.





Dr. Wilhelm Sittenthaler »After an extended search, Siltronic finally decided to pick Freiberg as its new production site in 1995. Today, it has become apparent why this was the right decision. The 300 mm wafer production in Freiberg, which was launched in 2004, has been a milestone in the reengineering of Siltronic. And our investments into the continued expansion of the 300 mm wafer production emphasize how valuable the Freiberg venue has become for Siltronic. Another significant success factor are our highly educated and trained employees; their competence and motivation are the foundation for further growth.«

(President & Chief Executive Officer, Siltronic AG)



The **AIR LIQUIDE Electronics GmbH** corporation in Ottendorf-Okrilla is a subsidiary of the French Air Liquide S. A. Group. With more than 100 employees, it supplies numerous semiconductor producers located in Saxony with gases and technical equipment for gas handling and also provides customer service.

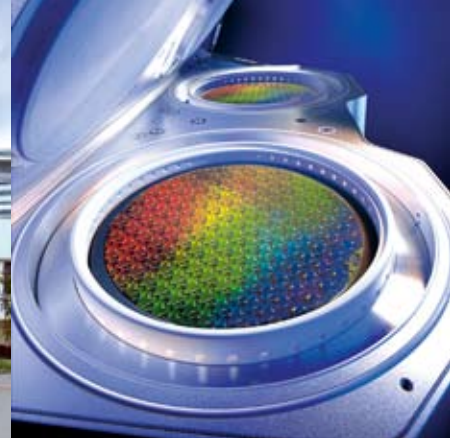
Suppliers and Supporters

The **Ortner cleanroom logistic systems GmbH** (Ortner c.l.s.) corporation – a subsidiary of the Saxony based Roth & Rau AG – installs and services systems for the transportation and storage of wafers in production facilities of the semiconductor and photovoltaics industry. The company also develops RFID writing and reading devices which permit chip producers to localize the position of wafer cassettes within the production chain at any time.

For 15 years now, Dresden's **SUSS MicroTec Test Systems GmbH** corporation – a subsidiary of the Munich-based SÜSS MicroTec AG – has developed and built systems which allow chip manufacturers to characterize wafers and circuits and to check them for errors. The subsidiary in Saxony functions as a "test division" within the corporate network and is one of the leading producers of test technology.

■ ■ ■ With about 120 employees, SÜSS MicroTec in Dresden develops test systems for wafers up to a size of 300 mm – including accessories and software.

■ ■ ■ IntelliTrack®- conveyor technology is a transport system classified for class 1 clean rooms developed by Ortner cleanroom logistic systems which can be used for almost any type and size of transport containers/carriers.



■ ■ ■ Almost 2,000 DAS systems are in use around the globe. The most prominent customers include Sony, Samsung, and Toshiba as well as GLOBALFOUNDRIES and Infineon. The picture shows: DAS staff member Jörg Fischer preparing a test system which is to be used for cleaning wastewater.

■ ■ ■ The corporate building of the ADZ NAGANO GmbH in Ottendorf-Okrilla unites research, development, and production under one roof.

■ ■ ■ Applied Materials coordinates the equipping of new, modern production sites in the photovoltaics industry in Saxony with complete production lines from its Dresden location. Its customers also include, for example, two manufacturers of thin-film solar modules which set up business in Saxony in 2007 – the Sunfilm AG (near Dresden) and the Signet Solar GmbH (near Döbeln). The picture shows: An applied producer HARP (High Aspect Ratio Process) system.

Established in 1991 by engineers from Dresden, the **DAS Environmental Expert GmbH** corporation is a leading manufacturer of systems for the disposal of environmentally hazardous gases in microchip and display production. A milestone in the growth of DAS was the participation of the Japanese Mitsubishi Kakoki-Kaisha Group (MKK) in 2004.

Statistically speaking, the **M+W Zander Group**, which is headquartered in Stuttgart, builds every second chip factory in the world. In **Dresden**, M+W Zander operates a **subsidiary** with 50 employees. In Saxony, the Group has built, for example, factories for the chip producers GLOBALFOUNDRIES and Infineon in Dresden as well as for the wafer manufacturers SolarWorld AG and Siltronic AG in Freiberg.

The 75 employees of the **SGS INSTITUT FRESENIUS GmbH** corporation in Dresden are highly valued specialists in the analysis of ultra-thin films. As a subsidiary of the Swiss SGS S.A. Group, it successfully manages and applies about 400 material testing technologies which include the entire range of imaging and analysis procedures. Such procedures are indispensable in all product sectors of nanotechnology – and, in particular, in process and quality control.

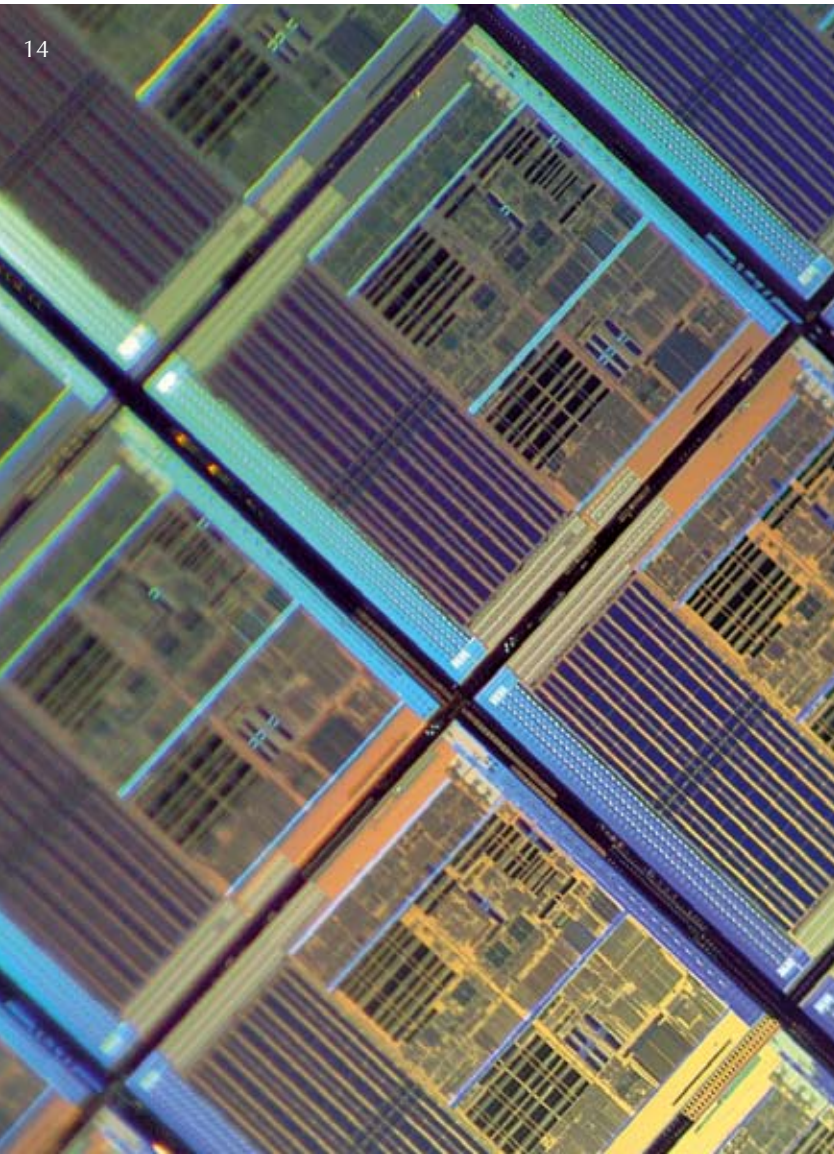
Applied Materials, Inc. from Santa Clara (USA) supplies all the renowned chip producers around the globe with a broad range of manufacturing technology, including etching systems, ion implanters, systems for the production of copper conductor systems and for the cleaning of wafers. In Dresden, the Group runs an efficient business center with approximately 230 specialists – the **Applied Materials GmbH** corporation.

The Tokyo Electron Ltd. (TEL) corporation manufactures a broad spectrum of production equipment for microchips and flat panel displays, including coaters and developers, plasma etching systems, coating systems, furnaces, cleaning and wet etching systems as well as wafer probe systems. With about 120 employees, the Dresden-based **Tokyo Electron Europe Ltd., German Branch**, assures the maintenance of all TEL systems in the German-speaking region and is, at the same time, the German sales and distribution center.



Dr. Horst Reichardt »It was not so difficult to establish the first contact to our Japanese partner, the Mitsubishi Kakoki Kaisha Group (MKK), because company scouts had already chosen us as an interesting partner via the internet. Initially, MKK was our licensee and later our co-partner. This helped strengthen our company and provided us access to the Japanese market. Our cooperation has been developing exceptionally well ever since.«

(Managing Director, DAS Environmental Expert GmbH)



Sensor Technology

The **ADZ NAGANO GmbH** corporation develops and produces electronic sensor systems for pressure and temperature measurements in Ottendorf-Okrilla near Dresden. Its products are used, for example, in the brake systems of trains, hydraulic systems of construction machinery, and industrial plants. The Japanese **NAGANO KEIKI CO. Ltd.** corporation, the global market leader for pressure sensors, holds a share in the Saxon company.

The Zittau-based **digades GmbH** corporation develops and produces devices and components for radio-controlled systems which are used, for example, in cars as well as for the automation of buildings and homes. The company's products include remote controls for infotainment applications in automobiles as well as radio control systems for the heating of rooms and buildings, blinds, and lamps. digades employs about 110 people.

The **KSW Microtec AG** corporation, which is located in Dresden, is a leading supplier of RFID components in the world for such standard and specialized applications as logistics and public transportation as well as such security sensitive fields of application as contactless credit cards and access systems. Established in 1994 by scientists of the Dresden University



■■■ An increasing number of forwarding agents equips its trucks with radio systems that control the tire pressure. The Zittau-based digades GmbH delivers the transmitters which transmit the tire pressure from the wheels into the cockpit.

■■■ T-Systems Multimedia Solutions repeatedly gained first place in the annual New Media Service Ranking of the Bundesverband Digitale Wirtschaft e. V. (Federal Association for the Digital Industry). It, thus, retains its leading position in the field of multimedia in Germany.

■■■ The superb references of MEGWARE include the high performance computers it delivered to the Gesellschaft für wissenschaftliche Datenverarbeitung mbH corporation in Göttingen, which included 300 processors (the picture shows: Development engineers testing this computer cluster with its 150 computer nodes) and to the Max Planck Institute for Gravitational Physics (Albert Einstein Institute) in Potsdam, which included 336 processors. In 2007, the latter ranked No. 192 among the 500 most efficient computers worldwide.

of Technology, the company is expanding in the two to three-digit range. Its Flip-Chip procedures (adhesive technologies) make the company one of the technological leaders of its field.

The **Microelectronic Packaging Dresden GmbH (MPD)** corporation is a manufacturing service provider for electronic sensor systems. The company successfully manages and applies such specific production procedures as the Chip-on-Board, Chip-on-Flex, Chip-on-Chip, and Flip-Chip technology. It helps manufacturers of sensor systems transfer their products into production, and handles their mass production.

Software, Hardware, and IT Services

The **PC-WARE Information Technologies AG** corporation, headquartered in Leipzig, is one of Europe's leading IT service providers which are independent of manufacturers. With its subsidiaries in 25 countries and 1,800 employees, it assists 85,000 business clients. PC-WARE provides a broad IT service spectrum ranging from the licensing of standardized software, licence management, software asset management all the way to complete system management services, including hardware procurement, IT infrastructural services as well as financial services.

The **SAP AG** corporation runs a sales and consulting **business center** in **Dresden** with more than 500 employees. As specialists for the computer-aided management of business processes, the Dresden SAP consultants assist hundreds of firms in Germany and Europe in linking their software programs with one another and/or supplementing them with important components in such a way that an optimal computing system is created.

With 800 employees, Dresden's **T-Systems Multimedia Solutions GmbH** corporation – a subsidiary of the Deutsche Telekom AG corporation – is one of Europe's largest IT service providers. Its services include the development and maintenance of portals for various industrial branches and subjects – for example, telecommunication, energy, trade, health care, or public administration – as well as cross-branch solutions for online marketing, e-procurement, e-commerce, e-services, e-learning, streaming services, etc.

In 2005, the Polish Comarch S.A. corporation relocated its German subsidiary – the **Comarch Software AG** – from Frankfurt on the Main to Dresden. The company provides IT solutions primarily in the sectors customer relationship management and business process optimization. It is not only the German sales and distribution center, but it is also involved in the development of new products in cooperation with the Dresden University of Technology.

The **MEGWARE Computer GmbH** corporation was founded in Chemnitz in 1990 and has been shaping its profile in the field of high performance computing – with a specific focus on Linux clusters. So far, more than 200 Linux clusters have been delivered not only to renowned research facilities, but also to commercial enterprises in Germany and many European countries. Some of these systems achieved top positions in the acknowledged Top500 list of the most efficient super computers in the world. The 50 specialists at MEGWARE plan super computers, test them, install them, and train the employees of their customers who will then work with these systems.

In August 2009, the **CoolCase GmbH** corporation took over case production from the Schäfer Gehäusesysteme GmbH and Schäfer IT-Logistik GmbH corporations in Dresden. Whether it be a part, a module or a finished product, CoolCase provides individual solutions for its customers and their specific requirements ranging from the idea and the design to tool and equipment construction all the way to manufacturing, assembly and logistics.

Photovoltaics

Located in the city of Freiberg, the SolarWorld Group manufactures all products of the photovoltaic value creation chain. Premium quality products are made in the modern production sites of its eight subsidiaries – from solar silicon to wafers and solar cells all the way to modules. **SolarWorld AG** also produces and recycles (solar) silicon and focuses its entire research and development activities **in Freiberg**. By 2010, the SolarWorld AG will have invested an additional 600 million euros and will have created 1,000 new jobs in Freiberg.

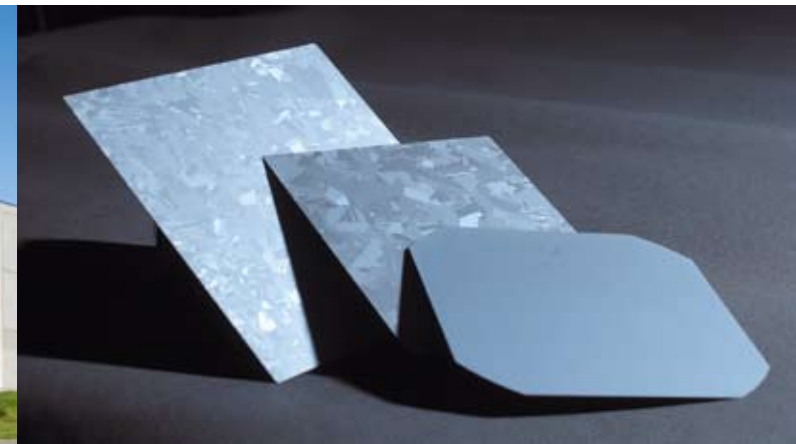
Established in 1993 by two microelectronics engineers from Dresden, Dresden's **SOLARWATT AG** corporation is Germany's third largest solar module producer today. In 2005, the Group also commenced with the production of solar cells by purchasing a factory in Heilbronn. The company employs more than 480 people.

The Leipzig-based **Solarion AG** corporation has been producing copper-indium-gallium-diselenide-(CIGS)-thin-film solar cells since its founding in 2000. The voltage does not come from silicon crystals, but from ultrathin semiconductor films and layers made from CIGS.

■ ■ ■ At CoolCase GmbH in Dresden, an in-house prototype construction department guarantees the quick transfer of new developments to real-world production. Professional know-how in metal processing, as well as a comprehensive service portfolio all ensure series production in large quantities and with certified quality.

■ ■ ■ SOLARWATT AG's corporate headquarters are located in the "date-base" commercial park north of Dresden. Between 2003 and 2006, a total production and storage space of 20,000 square meters had been built in three construction phases. In early January of 2007, the company moved into its new administration building.

■ ■ ■ Deutsche Solar AG produces mono-crystalline and multicrystalline solar wafers in various formats and thicknesses as specified by its customers. The wafers of the SOLSIX® brand achieve top values in the subsequent cell production. Under standard production conditions, the average degree of efficiency is 15 %.



■■■■ For Solarion solar cells, a layer thickness of 1/1,000 mm is sufficient for the CIS absorber to absorb the sunlight almost entirely. Applied on very thin foils, the solar cells can be rolled up like a sheet of paper; they are, thus, very suitable, for example, for applications on curved surfaces.

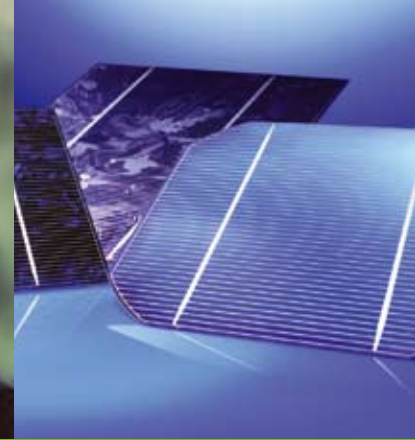
Solarion is one of the few manufacturers in the world capable of applying these films and layers on flexible plastic foils while the majority of the thin-film solar cell producers use glass as a substrate material.

In the field of photovoltaics, the core competence of Dresden's **VON ARDENNE Anlagentechnik GmbH** corporation includes thin-film technologies which are applied in the production of various types of solar cells. VON ARDENNE provides the appropriate production equipment needed for this purpose, including important technologies both for the production of thin-film as well as wafer-based solar cells.

In 1990, the Roth & Rau corporation was founded with an initial staff of 4 employees in Hohenstein-Ernstthal and transformed into a stock company in 2001. Today, **Roth & Rau AG** is one of the world's leading providers in the sector development and production of plasma process systems for the photovoltaic industry. The Roth & Rau corporation is the global market leader in its business field antireflective coating facilities for crystalline silicon solar cells with a total market share of approximately 40 % and about 270 systems sold.

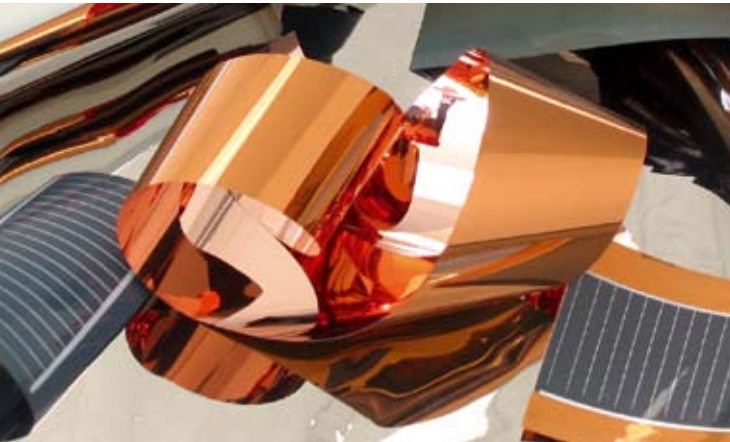
17 ■■■■ At the end of 2006, VON ARDENNE in Dresden-Weißig inaugurated its new production building – the company had expanded its “photovoltaics” product group for 6.5 million euros. The building “shines” as a result of a 300 square meter solar façade made of CIS solar modules. In 2008, the ground was broken for the next expansion stage – investment sum: 11.2 million euros, 4,740 square meters of floor space, 120 new jobs.

■■■■ The Deutsche Cell corporation produces multicrystalline and monocrystalline solar cells. With a current production capacity of 160 megawatts and as a result of its continuous expansion, Deutsche Cell assumes a top position on the international solar cell market.



Frank H. Asbeck »Within an extremely short period of time, we've turned Freiberg into Europe's largest solar wafer production site; we, thus managed to successfully enter the top echelon of solar technology manufacturers. But the best is yet to come: By 2010, we'll have set up a second solar wafer factory here which will ensure Freiberg's market position as the world's largest wafer production site. The experiences we've gained with our production specialists in Saxony are outstanding. With numerous innovations, they have made a vital contribution to the success of our company.«

(Chairman/CEO, SolarWorld AG)





18

Dresden's **heliatek GmbH** corporation is one of the first enterprises to work on organic solar cells. Even though these organic solar cells are not as efficient as silicon solar cells, they can be produced at very low cost. heliatek wants to be the first company to break the production cost limit of one euro per watt-peak. heliatek GmbH is a spin-off of the Dresden University of Technology and the Ulm University.

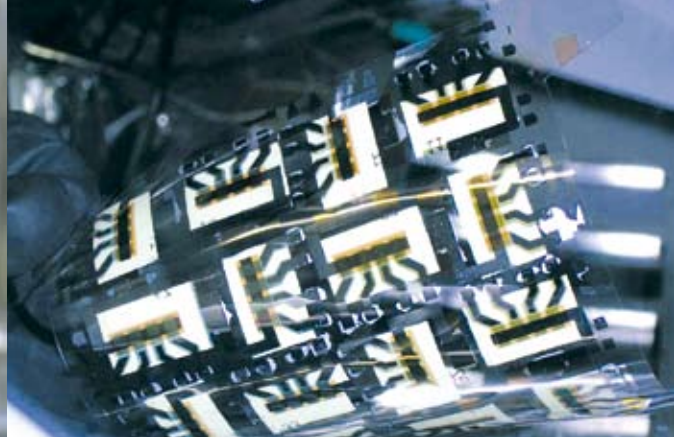
Display Technology

The Dresden-based **Novaled AG** is one of the companies that has paved the way for organic light emitting diodes (OLEDs). Novaled is a global leader when it comes to the brightness, life cycle, and low energy consumption of its OLEDs and, thus, holds the key to the industrial production of large-size OLED displays. By mid-2007, the company, which has 80 employees, held almost 300 patents. In a two-year joint research project with Saint-Gobain Recherche (SGR)

■■■ The newspaper and the book of the future will both come from Dresden. The convenience of reading these thin, light-weight, and robust displays made by Plastic Logic will be closer to printed paper than any other currently existing technology.

■■■ With the SiNA® equipment series which consists of 6 models, Roth & Rau provides SiN coating systems for various needs and requirements ranging from pilot production to the fully automated mass production of wafers.

■■■ heliatek technology permits the inexpensive and efficient roll-to-roll production of large-scale modules on low-cost, flexible substrates. In order to develop this technology further, the BASF Venture Capital GmbH and Robert Bosch GmbH corporations have each invested 1.6 million euros into the start-up enterprise which was founded in 2006.



■■■ The Novaled PIN-OLED technology provides an enormous potential for all sectors of organic electronics, in particular, where molecular dopants permit more efficient semiconductors.

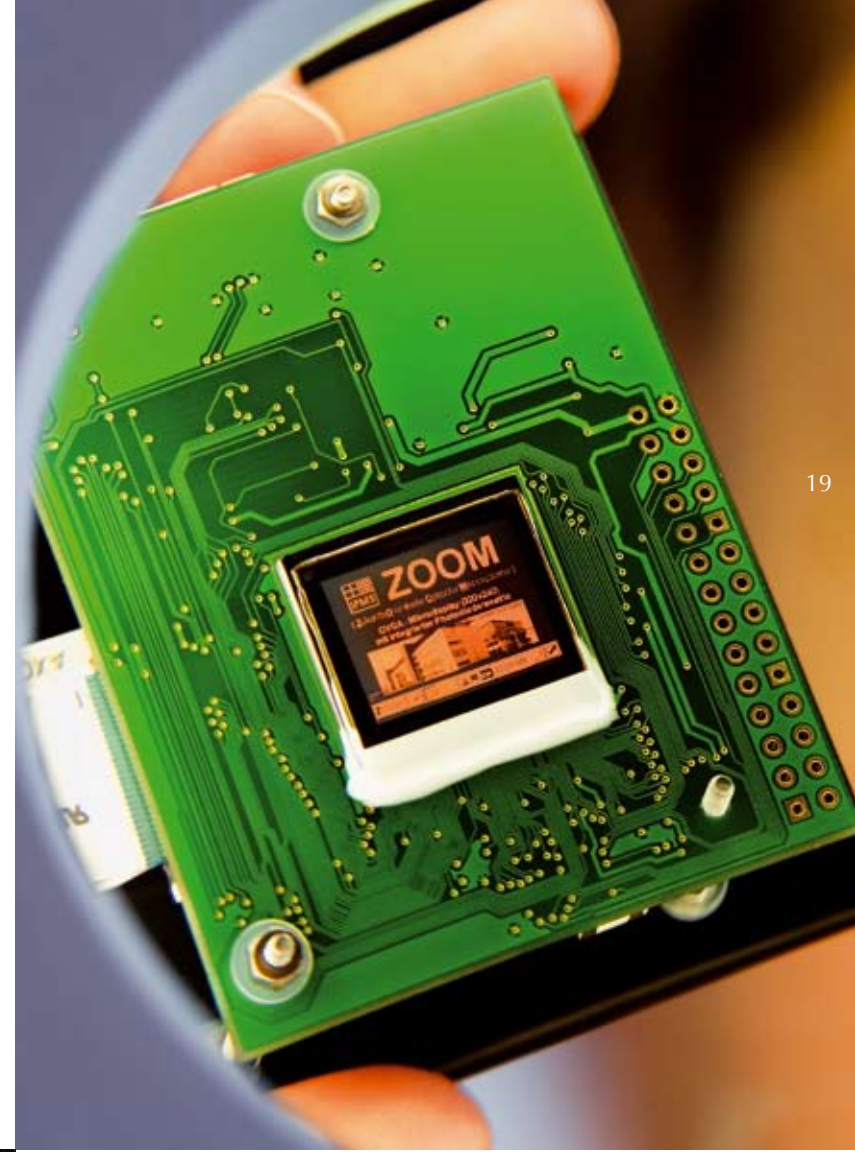
■■■ "Jurassic Park" in the living room – SeeReal has successfully developed a new generation of future holographic consumer products. The designs range from small, very thin holographic displays for mobile applications all the way to equally flat, holographic screens for computers and video games which permit a direct view of the images.

■■■ The Fraunhofer Institute for Photonic Microsystems (IPMS) in Dresden is working on the integration of organic LEDs into CMOS substrates, i.e. the combination of OLEDs with quick, efficient and space-saving electronics. The use of OLEDs in microsystems is of interest for numerous opto-electronic applications, including microdisplays (see picture) for portable multimedia devices such as cameras and glasses.

from France, Novaled achieved a breakthrough with light emitting diodes on large surfaces in 2008. Already today, illuminated surfaces of up to 100 square centimeters are possible.

In 2008, the British Plastic Logic Ltd. corporation – a spin-off of the University of Cambridge – has built a pilot factory for e-paper displays (e-paper = electronic paper) in Dresden. With 150 employees, the **Plastic Logic GmbH** corporation will produce approximately 100 million 10 inch displays per year.

With more than 90 patents and patent applications, Dresden's **SeeReal Technologies GmbH** corporation – founded in 2002 by scientists from the Dresden University of Technology – is a global leader in the development of holographic 3D display solutions. The company, for example, has developed the first holographic display in the world which is able to generate real spatial images with the processing power of standard personal computers.





Heinz Martin Esser »Dresden is my favorite place because the dynamics of the Dresden semiconductor industry inspires the entire Ortner team to achieve permanent progress and innovation. I also like it because the city and its citizens built up the new Dresden with the same dynamics. For me as an incomer it is a unique experience to see the magnificent results over time.«

(CEO, Ortner cleanroom logistic systems GmbH and Vice President, Silicon Saxony e.V.)

MICRO!

Networks



■■■ The annual innovation forum of the Silicon Saxony subcluster "Dresden Fab Automation" has already been held for 6 years now at which innovations of the automation branch, particularly for the semiconductor industry, are introduced and discussed.

■■■ Silicon Saxony e.V. regularly represents Saxony's semiconductor industry with joint booths at branch trade shows – for example, the "SEMICON Europa." And, on the initiative of the association, an increasing number of congresses for the semiconductor industry is being held in Dresden.

Silicon Saxony e.V. is Europe's largest and most successful branch association for microelectronics. Established in 2000 as an initiative of 20 partners in Dresden, it now links 270 commercial enterprises, research institutes, universities and colleges with a total of 35,000 employees and a turnover of 4 billion euros. The competencies of its member companies represent the entire value creation chain of the microelectronics industry. From the design and cooperation with suppliers, from silicon to the wafer, from ultramodern manufacturing processes to the individual chip all the way to complete applications, the members of Silicon Saxony e.V. provide innovative services, premium quality, and state-of-the-art technologies.

With the objective of strengthening the sustainability of the business region as a location for microelectronics at both the national and international level, the association sees itself as a communication and cooperation platform for its members. The close cooperation that exists within the network promotes and stabilizes the economic development of the member companies. Intelligent cooperative partnerships among the members permit knowledge transfer, synergies, close business relationships, and promote innovative power.



22 In order to create effective and efficient networks, the members of Silicon Saxony e.V. are organized into several work groups related to specific professional criteria. Thus, the association provides under its auspices active and vibrant forums for its members and specialists in which important trends and requisite requirements of the major microelectronics sectors are avidly discussed. At the same time, the work groups are an essential driving force in the development of new technologies and procedures, in the establishment of cooperation projects, and in the formation of bidding consortiums. The close cooperation within the work groups has created such new, specialized subclusters as “RFID Saxony” and “Dresden Fab Automation.”

The education and recruitment of urgently needed specialists and skilled employees for the semiconductor industry is also part of the network’s activities. That is why commercial enterprises and educational facilities meet at regular intervals in order to jointly create and implement cooperations and programs in the field of general and continued education as well as personnel development. In addition to the data bank “Kompetenzhaus Bildung” for general and continued education, which caters to the needs and requirements of member

companies, the association has also established a job portal on its website which serves as an integrative and flexible job community for applicants, service providers, and enterprises alike. Externally, Silicon Saxony e.V. makes a vital contribution to the active locational marketing as well as the creation of networks among European microelectronics venues.

Saxony is Europe’s largest R&D and manufacturing cluster for organic and printed semiconductors. The network **Organic Electronics Saxony e.V.** was founded in October 2008 by companies and research institutes from the organic sector in order to strengthen the location Saxony.

The **Nanotechnology Center of Competence “Ultrathin Functional Films” (Nano-CC-UFF)** is coordinated by the Fraunhofer Institute for Material and Beam Technology (IWS) in Dresden. 51 commercial enterprises, 10 university institutes, 22 research facilities, and 5 branch associations have joined forces in this network. Their objective is the joint, strategic development of potential industrial applications for ultrathin films as a key element in nanotechnology.

By being based in the start-up building, those setting up in business will benefit from the intelligent infrastructure at hand. They can make use of the university facilities, such as the library, research rooms and clean rooms, and therefore participate fully in the results of research projects.

The **Smart Systems Campus** in Chemnitz is a highly focused, dynamic network of microsystems technology competencies that revolves around the integration of science, research and industry. The extensive technology park, with an area of nearly 4.5 hectares in the immediate vicinity of the Chemnitz University of Technology and the Fraunhofer ENAS and IWU Institutes, provides close connections between high-quality R&D facilities and founding spirits and entrepreneurs. Newly founded companies can rent space at favorable conditions in the “Start-up building”. Commercial premises located right next to the start-up building provide an optimum environment for expanding high tech companies.



Prof. Dr. Peter Kücher »Dresden is my favorite place because it's a unique location where the close cooperation between research and production of memories and processors delivers leading edge innovations to the world. These masterworks of the semiconductor industry meet masterworks of painting such as in the ›Old Masters Gallery ‹.«

(Director, Fraunhofer Center Nanoelectronic Technology – CNT)

MICRO!

Education and Research

Often, Saxony's top-notch research is the reason why innovative companies decided to set up business in the region. The UK-based Plastic Logic Ltd. corporation, for example, tested the production of e-paper displays at Dresden's Fraunhofer Institute for Electron Beam and Plasma Technology (FEP) – and starting 2010, it will be producing electronic paper in Dresden. Founded in the Polish city of Krakow, the IT company Comarch S.A. is one of Europe's leading providers of software for customized telecommunications solutions. Comarch's German headquarters have been located in Dresden since 2005. A primary reason why this location was selected was the close cooperation with the Dresden University of Technology. With the employment of highly qualified Saxon software specialists, Comarch anticipates innovative solutions for the global IT market.

University Education & Research

With 2,200 students of electrical engineering and information technology as well as 3,100 computer science students, the **Dresden Uni-**

versity of Technology is the most significant "hotbed of talent" for the IT branch in Saxony. Almost half of the engineers who have been employed by AMD / GLOBALFOUNDRIES in the chip factories in Dresden since 1997 once studied at the Dresden University. Superbly equipped labs, top-notch scientists as professors, and the generous support of spin-offs contribute to the excellent reputation of the university. The **Institute for Semiconductor Technologies and Microsystems (IHM)**, for example, educates about 20 microelectronics engineers every year, has 400 square meters of class 10 to 1,000 clean room space, and runs the Nanoelectronic Materials Laboratory gGmbH (NaMLab) corporation.

At the **Chemnitz University of Technology**, highly qualified engineers are educated primarily at the Faculty of Electrical Engineering and Information Technology. The integrated **Center for Microtechnologies (ZfM)** is one of the best equipped university labs around and provides exceptional prerequisites for research and development in the field of metallization systems for circuits having the highest integration and in the field of microsystems technology.

■ ■ ■ At the Center for Microtechnologies (ZfM), silicon disks are coated with micrometer-thin mechanical structures – for example, for applications in the aviation and automobile industry.

■ ■ ■ In addition to sharing resources, it is, above all, the intention of creating synergies which characterizes the work of the IHM. The competencies of its employees range from electrical engineering to physics and materials science all the way to chemistry. The picture shows: Working with the atomic force microscope in the field of measurement technology.

■ ■ ■ Students at the Chemnitz University of Technology listen to a lecture in the "Auditorium Maximum," which seats 706 people and is the university's largest lecture hall.



■■■ Prof. David Rafaja of the Institute of Materials Science at the Freiberg University of Mining and Technology researches new procedures for the production of modern materials which are used, for example, in sensors.

■■■ NaMLab operates a research lab with four lab rooms, a clean room, and office space for a total of approx. 27 researchers and employees at the campus of the Dresden University of Technology.

■■■ Looking into the absorber chamber of the HfTL – here, students and instructors carry out test runs and research work in electromagnetic compatibility (EMC).

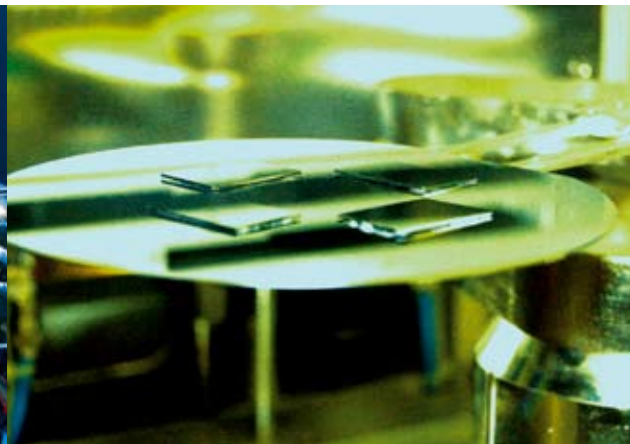
Its more than 240 years of competence in the field of materials sciences which the **Freiberg University of Mining and Technology** is able to contribute to education and research. The program “Electronic and Sensor Materials” started in 1999. Currently, approximately 30 students are enrolled in this program of studies which is unique in all of Germany. The graduates are already working in semiconductor companies in Saxony, for example, at Freiberger Compound Materials (FCM). In 2007, the **Institute of Electronic and Sensor Materials** was founded at the Faculty of Materials Science and Technology. Vibrant and beneficial research partnerships exist primarily with the companies Siltronic AG, SolarWorld AG, Freiberger Compound Materials in Freiberg, but also, for example, with Infineon in Dresden.

The **Deutsche Telekom University of Applied Sciences Leipzig (HfTL)** can educate up to 550 students and provides customized programs of studies. Founded by the Deutsche Telekom AG corporation, it educates communication engineers and telecommunication computer specialists. Specialized fields which shape the HfTL’s profile include optical networks, high frequency technology, mobile radio systems, and next generation network services.

Non-University Education & Research

The **dresden chip academy (dca)** was founded in 2002 by the companies Infineon Technologies Dresden, Siemens Professional Education as well as the branch network Silicon Saxony e. V. The dresden chip academy provides cooperative education and training for microtechnologists, mechatronic technicians, and electronic technicians specialized in automation technology for virtually all clean room companies in Saxony and Germany. Together with the Dresden University of Applied Sciences (HTW) and the Zwickau University of Applied Sciences (WHZ), the dca provides dual programs of study (vocational training + bachelor’s degree within 4.5 years).

The **Nanoelectronic Materials Laboratory gmbH (NaMLab)** corporation – an associated institute of the Dresden University of Technology – tries to find the best possible materials for tomorrow’s microchips. It looks primarily for suitable materials for the memory cells of DRAMs and flash memories as well as for innovative material solutions for future memory components. In addition to their research activities, the institute’s scientists are committed to education and instruction at the Dresden University.



“Cool Silicon”

– Around the world, computers and communication systems constantly consume more energy. This increases the CO₂ content in the atmosphere which already amounts to a quarter of the CO₂ emission produced by the global automobile traffic – with a rapidly increasing upward trend. A top cluster of Dresden researchers and entrepreneurs is attempting to halt this fatal development. “Cool Silicon” – that’s the name of the ambitious research project that wants to create the technological prerequisites so that IT products will only use one tenth of the energy needed today.



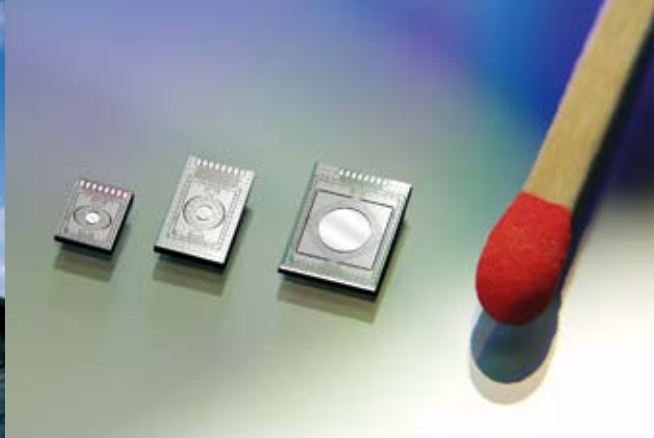
In April 2006, AMD Inc. established the **Operating System Research Center (OSRC)** at its Dresden location. As a global center of competence, the OSRC is optimizing the upcoming generations of AMD microprocessors to meet the requirements of modern operating systems. In 2009 the OSRC has moved to the new AMD office in the city center of Dresden.

AMD's OSRC in Dresden is the interface for the developers of AMD microprocessors and the software engineers who create the leading operating systems.

The **Research Center Dresden-Rossendorf (FZD)** has 550 employees and is an institute of the Leibniz Association. With its **Center for Application of Ion Beams in Materials Research (AIM)**, it has the technical prerequisites for analyzing and processing nanolayers like no other research institute in Europe. Numerous semiconductor firms, for example, Saxony's chip producers, use the AIM in the development of new nanotechnologies.

In Saxony, a total of nine Fraunhofer institutes in Dresden and Chemnitz are active in the field of microelectronics/IT. Among them are:

The **Fraunhofer Center Nanoelectronic Technology (CNT)** in Dresden develops and tests tomorrow's chip manufacturing technologies under production-like conditions. The CNT is located right between the cor-



■■■ In the building of the Fraunhofer Institute IWS, applied research and development is conducted in the fields of laser and surface technology in ultra-modern labs.

■■■ The Fraunhofer Institute IPMS has developed more than 40 different micro scanner mirrors. They are used for one or two-dimensional deflections as well as the modulation of the optical path length. The micro scanner mirrors which have been developed in Dresden excel above all with a large scanning range, small chip size, low power consumption as well as excellent electromechanical and mechanical properties.

■■■ The Fraunhofer Institute IPMS works on the development of OLEDs which permit an entirely new generation of systems for personal information management. One such example: A user is able to perceive the real world through eyeglasses while additional visual information is also projected into the field of vision (AR – augmented reality).

porate premises of GLOBALFOUNDRIES and Infineon in Dresden, has more than 800 square meters of clean room space, and can use the ultramodern 300 mm production technology of its industrial partners. This permits the scientists to gain valuable insights into the strengths and weaknesses of their innovations much quicker than under lab conditions.

With 100 scientists, Dresden's **Fraunhofer Institute for Electron Beam and Plasma Technology (FEP)** is developing electron beam, plasma, and sputter procedures. The **Fraunhofer Institute for Photonic Microsystems (IPMS)** Dresden is one of the leading development centers in photonics and for organic light emitting diodes (OLEDs). Scientists of the **Fraunhofer Research Institution for Electronic Nano Systems (ENAS)** are looking for methods which will lead to increasingly smaller and more intelligent products by utilizing all the opportunities provided by microsystems technology and materials sciences.

Highlights of Research

• Nanotechnology

Headed by the **Fraunhofer Institute for Material and Beam Technology (IWS)**, more than 20 Saxon firms and research institutes have joined forces in the Innovation Cluster "nano for production" in order to develop new nanotechnological procedures.

For example, solar technology: Specialists of the innovation cluster are developing etching procedures for processing solar cells which even work without an "expensive" vacuum. The prototype of such a system has already been completed; a model for industrial use is under construction.

Or, for example, carbon nanotubes: The Innovation Cluster is working with great vigor on industrial – and, thus, less expensive – production procedures for carbon nanotubes – the building material of the future for transistors and conductors or tiny nano drives.

• Organic Materials and Electronic Devices

In 2007, the **Center for Organic Materials and Electronic Devices Dresden (COMEDD)** commenced with its work at the Fraunhofer Institute IPMS. Currently, it is the leading European center for the customer- and application-specific research, development and pilot fabrication of novel device concepts and manufacturing methods in the field of vacuum-processed organic materials. The activities cover three main application areas – organic-based lighting and signage technology, organic solar cell technology and OLED-on-CMOS applications.



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Photographs by

- Page 4** Novaled AG
Fraunhofer Institute for Photonic Microsystems (IPMS)
Infineon Technologies Dresden
Sven Doering / GLOBALFOUNDRIES
- Page 5** Ingolf Seifert
- Page 8** GLOBALFOUNDRIES Inc.
- Page 9** X-FAB Dresden GmbH & Co. KG
Infineon Technologies Dresden
Silicon Saxony e. V.
- Page 10** DMOS GmbH
NXP Semiconductors
Freiberger Compound Materials GmbH (FCM)
- Page 11** Toppan Photomasks
Sven Doering / AMTC
Siltronic AG
- Page 12** Siltronic AG
SUSS MicroTec Test Systems GmbH
Ortner cleanroom logistic systems GmbH
- Page 13** DAS Environmental Expert GmbH
ADZ NAGANO GmbH
Applied Materials
- Page 14** Wirtschaftsförderung Sachsen GmbH / Jürgen Männel
DAS Environmental Expert GmbH
- Page 15** digades GmbH
T-Systems Multimedia Solutions GmbH
MEGWARE Computer GmbH
- Page 16** CoolCase GmbH
SOLARWATT AG
Deutsche Solar AG / SolarWorld AG
- Page 17** Solarion AG
VON ARDENNE Anlagentechnik GmbH
SolarWorld AG
Deutsche Cell GmbH / SolarWorld AG
- Page 18** Plastic Logic Ltd.
Roth & Rau AG
heliatek GmbH
- Page 19** Novaled AG
SeeReal Technologies GmbH
Fraunhofer Institute for Photonic Microsystems (IPMS)
- Page 21** Silicon Saxony e. V.
- Page 22** Chemnitz Business and Development Company (CWE)
- Page 24** Chemnitz University of Technology / Uwe Meinhold
Dresden University of Technology / Karsten Eckold
Chemnitz University of Technology
- Page 25** Freiberg University of Mining and Technology
NaMLab / Dresden University of Technology
Telekom University of Applied Sciences Leipzig
- Page 26** Jürgen Männel / Wirtschaftsförderung Sachsen GmbH
- Page 27** Fraunhofer Institute for Material and Beam Technology (IWS)
Fraunhofer Institute for Photonic Microsystems (IPMS)
- Page 28** Wirtschaftsförderung Sachsen GmbH / Michael Lange
- Page 7, 20 and 23** Silicon Saxony e. V.

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Microelectronics and Information Technology in Saxony

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