**LED**

Itl unveils key new UV LED curing product launch for wide

**OPTOELECTRONICS**

Zephyr Photonics opens semiconductor fab and foundry unit

**ADVANCED PACKAGINGS**

SK Hynix readying for 3D stacked memory commercialization

**PLATINUM PARTNERS:**

Teledyne Calix

tronics microsystems

Integrated Microwaves

**EDITECH**

Korea: Ground Zero for the LED market’s recovery

On January 29, 2013, the LED & Power Electronics Industry Seminar was held at the Novotel Ambassador Hotel in Gangnam, Seoul, Korea. The event, powered by Yole Développement, was organized into two parts: a free seminar and a coffee break/lunch/cocktail hour during which attendees could discuss their opinions and challenges.

One of the seminar’s 90+ attendees partook in both parts, with the improving LED market being the main talking point. Korea has become synonymous with the LED market’s recovery, having shown a 70% recovery rate since late 2012; thus, it’s no surprise that our seminar was held in Seoul. Several Korean LED players were in attendance, including Samsung, LG and Seoul Semiconductor, along with materials companies such as KCC, Iijin, OCI, and Saphine Technology. It was exciting to see Korea’s entire LED chain gathered in one place.

At the LED Korea tradeshow, which ran from Jan. 30 – Feb. 1, more than 30% of the people who attended Yole’s seminar visited our booth to follow up. Needless to say, we’re quite pleased with how many LED players are now paying attention to Yole Development’s 2013 market forecast.

Thanks very much to everyone who attended our inaugural seminar. We wish your business much success in 2013!

Hailey Yang
Yole Développement, Korea office

**MEDTECH**

LabSmith and Fluigent join forces

Two leading microfluidic instrument manufactures are partnering to provide seamless access to an expansive range of tools for electrokinetic and electrophoretic experiments.

Fluigent, headquartered in Paris, France, is a microfluidic flow control and fluid handling expert. LabSmith Inc., based in Livermore, California, offers a wide range of tools for innovative laboratory electronic and microfluidic solutions. LabSmith and Fluigent join forces in the promotion of a microfluidic voltage control platform composed of LabSmith’s HVS448 Eight Channel High Voltage Sequencer and Fluigent’s MFCS™ (Microfluidic Flow Control System) and Electrowell device. Promotion of this tool combination highlights a simplified and automated platform for the control of fluids and voltage in a microfluidic set-up. «Combining the HVS448, MFCS™ and Electrowell systems will provide customers with a combined microfluidic solution for precise fluid and voltage control,» explains Fluigent CEO François Leblanc. Fluigent and LabSmith plan to leverage their technical expertise and market experience to offer products that can be easily integrated into any microfluidics experiments for R&D laboratories and industrial applications.

labsmith.com

www.fluigent.com

**MEMS**

Small footprint, very low power consumption

Bosch Sensortec introduces next-gen electronic compass BMC150 geomatric sensor and accelerometer in a single package.

With the new BMC150, Bosch Sensortec announces the second generation of its revolutionary electronic compass module. The new implementation again raises the bar in terms of package size, accuracy and versatility.

The BMC150 is a 6-axis electronic compass module based on Bosch’s proven FlipCore technology which provides high accuracy and at the same time low power operation for longer battery life for smartphones, tablet computers and similar mobile devices. With a size of just 2.2 x 2.2 mm2 and a power consumption as low as 190 µA it sets new standards for compactness and battery lifetime.

«Our focus for the BMC150 design was reducing the footprint and thus to help our customers to save valuable PCB real estate,» comments Bosch Sensortec CEO Stefan Finkbeiner. «An equally important goal was increasing the measurement range. As the result, the BMC is the ideal eCompass module for innovative applications in battery-driven mobile devices such as smartphones, tablet computers and watches.»

The BMC150 combines a 3-axis geomagnetic sensor and a state-of-the-art 3-axis accelerometer in a single package. Its high integration translates into another benefit for users: It reduces the number of components that otherwise have to be handled and qualified separately. Both sensors form a logical and functional unit, since the g-vector generated by the accelerometer is required to calculate the tilt compensation for the azimuth data produced by the geomagnetic sensor. The accelerometer and the geomagnetic sensor in BMC150, however, can also be used as two fully functional independent devices.

Besides high integration, the sensor offers very high accuracy. Its exceptionally wide measurement range of +/-1300 µT per axis makes it more tolerant to stray magnetic fields associated to loudspeakers or other magnetic components in smartphones. On the other hand, its extremely low noise of just 0.3 µT enables very accurate measurement.

Many applications for handheld devices such as user interface or navigation depend on an orientation vector. With eCompass library V3.0, Bosch Sensortec also offers a sensor data fusion software that performs the calculations for tilt compensation and thus generates precise heading information for compass applications.

**ZOOM**

NRL designs multi-junction solar cell based on InP substrate

U.S. Naval Research Laboratory scientists in the Electronics Technology and Science Division, in collaboration with the Imperial College London and MicroLink Devices have proposed a novel triple-junction solar cell with the potential to break the 50 percent conversion efficiency barrier, which is the current goal in multi-junction semiconductor development.

This cell design has the potential to break the 50 percent power conversion efficiency mark under concentrated illumination. In multi-junction (MJ) solar cells, each junction is “tuned” to different wavelength bands in the solar spectrum to increase efficiency. High bandgap semiconductor material is used to absorb the short wavelength radiation with longer wavelength parts transmitted to subsequent semiconductors.

**Acquisition of Kopin**

IQE has agreed to acquire the compound semiconductor epitwafer manufacturing business of Kopin Corporation (Kopin) for total consideration of $75 million in cash.

Kopin Wireless is a global manufacturer of heterojunction bipolar transistor (HBT™) materials which are used in power amplifiers (“PA”), a key wireless component in mobile devices. These are produced using Metal Organic Chemical Vapour Deposition (“MOCVD”) epitaxial wafer technology.

Acquisition highlights

- $60 million payable in cash (“Initial Consideration”) to Kopin on completion of the Acquisition (“Completion”) and $15 million payable in cash to Kopin on the third anniversary of Completion (“Deferred Consideration”)

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About Yole Développement
Beginning in 1998 with Yole Développement, we have grown to become a group of companies providing market research, technology analysis, strategy consulting, media in addition to finance services. With a solid focus on emerging applications using silicon and/or micro manufacturing, Yole Développement group has expanded to include more than 50 associates worldwide covering MEMS, MedTech, Advanced Packaging, Compound Semiconductors, Power Electronics, LED, Image Sensors and Photovoltaics. The group supports companies, investors and R&D organizations worldwide to help them understand markets and follow technology trends to develop their business.

Custom studies
• Market data, market research & marketing analysis
• Technology analysis
• Reverse engineering & reverse costing
• Strategy consulting
• Corporate Finance Advisory (M&A & fund raising)

Technology & market reports
• Collection of reports
• Players & market databases
• Manufacturing cost simulation tools
• Component reverse engineering & costing analysis
More information on www.yole.fr

Media
• Critical news, Bi-weekly: Micronews, the magazine
• Online disruptive technologies website: www.i-micronews.com
• Exclusive and editorial webcasts
• Live event with Market Briefings

Contacts
For more information about:
• Services : Jean-Christophe Eloy (eloy@yole.fr)
• Reports: David Jourdan (jourdan@yole.fr)
• Media: Sandrine Leroy (leroy@yole.fr)

MEMS
STMicroelectronics ships three billionth MEMS chip and reinforces its lead in motion sensors for phones, tablets and other consumer devices

MedTech
Trinean launches the Xpose, a new micro-volume spectrophotometer

Compound Semiconductors
Excess capacity to trigger massive consolidation and attrition: Will cell phone display covers come to the rescue? wonders Yole Développement

LED
Packaging cost reduction is driving new technology and design adoption

Imaging
USB3 standard ratified

Optoelectronics
Jenoptik targets €600M turnover by 2017

Photovoltaics
Solar wafer start-up 1366 Technologies opens new production-scale factory

Advanced Packaging
STATS ChipPAC and UMC unveil World’s first 3D IC developed under an open ecosystem model

Power Electronics
A $1B Si MOSFET market by 2018, forecast at 10.3% growth per year, announces Yole Développement

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RALF SCHNUPP

Vice President Segment Occupant Safety & Inertial Sensors
Continental Automotive GmbH

RENZO DAL MOLIN

Advanced Research Director, SORIN GROUP

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One particularly promising technology is the integration of piezoelectric thin films with semiconductor embedded die packaging (SESUB Packaging). This technology provides alternative solutions for today’s well-established packaging infrastructure that has the potential to improve operational performance.

Piezoelectric effect is reversible in that materials exhibiting the direct piezoelectric effect (the production of electricity when stress is applied) also exhibit the converse piezoelectric effect (the production of stress and/or strain when an electric field is applied). This is what makes the piezoMEMS technology so versatile. Due to this two-way operation of piezoelectric materials - going all the way from DC operation to several tens of MHz - piezoMEMS technology provides a huge pool of design opportunities.

A market analysis for piezoMEMS based devices was recently performed by Yole Développement. PiezoMEMS have already demonstrated their potential for use in mass product applications like ink-jet print heads by EPSON and Matsushita. As of 2012/2013 there are many others to come. Examples of known future applications include RF switches, filters, gyro sensor, tilted mirror arrays, energy harvesters, particle detection for biomedical applications and actuators for fine positioning - i.e. for optical lenses (www.polight.com).

The piezoMEMS process
piezoMEMS is fabricated using modified versions of established Mems processes as well as specially developed add-on processes. To develop this process deep knowledge about piezo and ferroelectric materials were needed and it is important to realize that the rules and processes used when designing and fabricating Si-MEMS often cannot be applied to piezoMEMS. One important issue is the incompatibility of non-CMOS materials in most MEMS fabs.

The full fabrication chain, including the development of high volume tools for thin film deposition and in-line quality control, has been in focus for several years, most recently through the FP7 project piezoVolume-coordinated by SINTEF.

The competence centre
The piezoMEMS Competence Centre at SINTEF (www.piezomicrosystems.com) is a perfect match for small and medium size companies that want to get started with piezoelectric MEMS based on PZT. Since piezoMEMS technology is quite new, and there are no open facilities for volume production of piezoMEMS, it is natural that the barrier for considering piezoMEMS technology is quite high. The Competence Centre has a large network of infrastructure as well as experts able to guide people through the challenges with this new technology. We cover the whole process from design to packaging and offer small-scale production of devices. People within the Competence Centre have worked with design, modelling, process development and prototyping of piezoMEMS since 2002 and several successful projects have been completed. The unique experience that has been acquired reduces the risks and time-to-market for our customers. Technology transfer from prototyping to high volume production is ensured through collaboration with independent MEMS fabs – in addition to the in-house capabilities at SINTEF. The continuing research in material science and fabrication processes at SINTEF ensures access to state-of-the-art technology. SINTEF has taken a leading role in the competence center, in a joint effort with our technology partners to bring piezoMEMS to the market. www.piezomicrosystems.com www.sintef.no

**REVERSE COSTING**

Rohm DC/DC micro converter using TDK-EPC embedded die packaging

*Component Cost 18%*
*Overheads 20%*
*Cost EMS 8%*
*Final test + Yield 2%*
*Passives Component Cost 18%*
*Passives Assembly Cost + TDK-EPC Overheads 20%*
*IC Die Cost 65%*

<table>
<thead>
<tr>
<th>Cost Category</th>
<th>Percentage</th>
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<tr>
<td>Components</td>
<td>18%</td>
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<tr>
<td>Overheads</td>
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<tr>
<td>IC Die</td>
<td>65%</td>
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**Recent reverse costing reports**

- ST LSM320: 4-axis 9-Axis IMU
- TI DLP: mDMD Projector
- SET UVTOP270: UV LED
- Mitsubishi CM450DY-24S: 1200V IGBT Power Module

Although fully compatible with the previously analyzed TI module, the process and cost structure is very different.

A full reverse costing report, including technological analysis of the device and detailed manufacturing costs, is currently available.
The equipment & materials business will grow by 4X in the next five years ...

**Mid-End** infrastructure is growing and is the leading driver and the fastest growing semiconductor packaging technology with more than 18% CAGR in units over the next 6 years.

Equipment & materials suppliers of front-end and back-end areas are finding business opportunities in the ‘Middle-End’ space, a new blur area at the cross-roads between wafer fabrication and back-end assembly processes.

Demand for ‘mid-end’ tools and related materials is surging, thanks to the growth of 3DIC & Wafer-Level-packaging technologies such as 3D TSV, FO WLP, 3D WLP, WL CSP, 2.5D interposers and Flip-chip wafer bumping.

According to Yole Développement’s analysts, the material market will grow from ~$ 590M this year to over $ 2B by 2017 with a CAGR of 24%, driven mainly by the expansion of 2.5D interposers and 3D TSV & WLP markets. The equipment market reached a value of ~$ 870M in 2011 with a CAGR of 28% fueled by the 3D IC technology with TSV interconnects, which represents one of the main emerging areas in the coming years; an area offering opportunities for new equipment modification and new materials development.

A slight decrease in 2012 is forecast, since manufacturers invested in equipment tools dedicated to the 3D TSV & WLP markets last year and high-volume production in 3D TSV, FO WLP, and 3D WLP has not started yet.

Market share for 3DIC/WLP: breakdown by equipment & materials

The materials market is diversified and segmented into several materials suppliers. Specialist material suppliers are involved and specialized in very specific equipment lines.

However, the equipment market for 3D TSV & WLP applications is quite fragmented and diversified.

Yole Développement identifies three main groups of equipment suppliers coming from different business markets:

- **Large equipment suppliers coming from the semiconductor and front-end area who have expanded their business into the 3D TSV & WLP semiconductor business through acquisition of other companies.**
- **Equipment suppliers coming from niche application wafer processing markets with a broad product portfolio.**
- **“Specialist” equipment suppliers that have developed knowledge and expertise in very specific equipment lines.**

The competitive landscape and market share for all main equipment & materials suppliers have been quantified and detailed by Yole Développement.

Demand for ‘Mid-End’ tool and related materials is surging due to the growth of 3DIC & Wafer-Level-Packaging technologies driven mainly by the expansion of 2.5D interposers and 3D TSV& WLP platforms. The wafer-level-packaging market remains a huge business opportunity and shows the greatest potential for significant future growth in the semiconductor industry.

**Strippable thick resist for WLP applications**

2011 Market share breakdown by supplier (in M$)

(Source: Equipment & Materials for 3DIC & Wafer-Level-Packaging, October 2012, Yole Développement)

- **JSR Micro**
  - $ 52,0 M
  - 40%
- **TOK**
  - $ 26,0 M
  - 20%
- **AZ Electronic Materials**
  - $ 39,0 M
  - 30%
- **Others**
  - $ 13,0 M
  - 10%
- **Dow Electronic Materials, Dupont, Shin-Etsu Chemical, Shin-Etsu MicroSi**

**TOT**

~ $ 130 M

(Source: Equipment & Materials for 3DIC & Wafer-Level-Packaging, October 2012, Yole Développement)
Small footprint, very low power consumption

From page 1

In cases where a highly dynamic orientation vector is indispensable – such as augmented reality or games – designers typically employ a gyro sensor to provide this information in a 9-axis sensor system. Along with Bosch Sensortec’s FusionLib V3.0 algorithm, the 3-axis standalone gyro sensor BMG160 is the ideal complement to the BMC150.

The inherent intelligence of the BMC150 helps to significantly reduce time to market for application developers. With its powerful and versatile interrupt system, the BMC150 greatly facilitates the design of a broad range of different applications.

The integrated smart interrupt engine enables the sensor module to automatically identify motion patterns and situations. For instance, it detects free fall conditions, orientation on a table, tap sensing or even no motion at all for a definable period of time. These status data enable the implementation of many innovative features for mobile devices such as activating sleep mode and waking it up by tapping it with a finger. Developers also benefit from the new FIFO buffer which acts as a temporary storage for measurement data until they are needed. This feature offloads the application processor further, effectively reducing the system’s overall power consumption.

The accelerometer section of the sensor can be adjusted to four different g ranges between +/- 2g and +/- 16g, enabling designers to select the g range that fits best their application.

www.bosch.com

Kionix introduces low power, full-featured 2x2x0.9mm accelerometer with FIFO/FILO buffer

The KX022 offers low current consumption and a full range of high performance embedded algorithms optimized for mobile applications.

Kionix announced the release of the KX022, a 2x2x0.9mm tri-axis, robust accelerometer with integrated FIFO/FILO buffer that maintains low power while offering a wide variety of embedded algorithms for maximum functionality. Embedded features include tap detection, orientation detection, activity monitoring, and motion wake-up algorithms, as well as an internal voltage regulator and self-test function. With an ultra-small package, high-performance embedded functionality, and current consumption as low as 2μA, the KX022 is ideally suited for smartphones, tablets, and health and fitness applications.

The KX022 also features a user-configurable, low-power, embedded motion wake-up function, allowing the user to conserve battery life by powering down other systems until needed. Combined with Kionix’s XAC sensor, which provides outstanding stability with a nearly unnoticeable drift, the KX022 provides customers with substantial reductions in power, noise, and cost.

"Kionix continues to aggressively address customer requirements for a small sensor footprint and for greater product functionality," said Scott Miller, Vice President of Engineering, Kionix. "As a result, we have successfully enhanced our previous 2x2 offering by adding in a full range of embedded algorithms and functionality and an integrated FIFO/FILO buffer, dropping current consumption, and reducing noise, thereby making this part perfect for mobile applications."

KX022 features include:

- Low current consumption in all modes: 2μA in standby, 10μA at normal resolution (25Hz ODR), and 130μA for high resolution
- User-selectable resolution and acceleration ranges at +/-2g, +/-4g or +/-8g, as well as user-selectable Output Data Rate (ODR)
- Embedded FIFO/FILO buffer
- Two interrupt registers
- Digital high-pass filter outputs
- Low noise for better resolution

Omron – New MEMS pressure sensor for medical, industrial and other applications (2SMPP-03 MEMS)

Omron Electronic Components Europe has added a new piezo-resistive gauge pressure sensor featuring an extended pressure range as well as low power consumption and small size.

The 2SMPP-03 MEMS based pressure sensor is seen as ideal for medical applications such as negative pressure wound therapy (NPWT) as well as leak detection, movement control, level indicators, home appliances and industrial control instruments. It offers precise measurement between -50kPa to +50kPa, complementing the 2SMPP-02 with a 0 to 37kPa range.

To read full article, please visit electropages website.

www.electropages.com
SiTime introduced the SiT8920 MEMS oscillator for industrial and high reliability applications. Due to its unique silicon MEMS and analog architecture, the SiT8920 outperforms quartz oscillators in every major performance category. While operating over the widest temperature range, -55°C to +125°C, the SiT8920 consumes half the power of quartz oscillators, is twice as stable, 20 times more reliable and 30 times more robust to shock and vibration. These key benefits dramatically improve system performance and reduce failures in harsh environments. In addition, SiTime’s MEMS and analog expertise allows us to deliver unique, leadership products that are available in the market," said Piyush Sevalia, executive vice president of marketing at SiTime. "The SiT8920 is a win-win for customers developing industrial and high-reliability applications. They benefit from dramatically better robustness and reliability, while simultaneously improving system performance. SiTime’s MEMS oscillators incorporate unique features that are simply not available from quartz products. For example, the SiT8920 incorporates SiTime’s unique SoftEdge™ function that helps achieve start-up control that reduces system EMI without additional components, expensive shielding or PCB re-design. By offering such compelling benefits, SiTime is transforming the timing industry with its silicon MEMS solutions.”

SiTime is also introducing two additional devices that are well suited for replacing quartz oscillators and crystal resonators.

- SiT1618 – a fixed-frequency oscillator that operates over -40°C to +125°C
- SiT8918 – a programmable oscillator that operates over the same temperature range and supports any frequency between 1 and 110 MHz as well as 1.8V and 2.3 to 3.3V operation

These new high-temp oscillators offer many unique features and benefits listed below.

- Best robustness: 30 times better than quartz oscillators
- 0.1 ppb/g vibration sensitivity, the best in the industry
- -50,000 g shock and 70 g vibration resistance
- Best reliability: 500 million hours MTBF (2 FIT), 20 times better than quartz oscillators
- Best frequency stability: ±25 ppm over the operating temperature for better system timing
- Low power consumption: < 4 mA typical

Integrated Device Technology (IDT®) announced the industry's first high-performance quad frequency MEMS oscillators with multiple synchronous outputs. IDT's enhanced 4E MEMS oscillators offer configurable outputs in an industry-standard package footprint, saving board area in communication, networking, and storage applications.

IDT's enhanced 4E MEMS oscillators offer configurable outputs in an industry-standard package footprint, saving board area in communication, networking, and storage applications. The IDT 4E series ±50 ppm enhanced MEMS oscillators integrate an LVDS or LVPECL output with a synchronous CMOS output into a single package, eliminating the need for an external crystal or secondary oscillator. Available in frequencies up to 600 MHz, the new oscillators save board area, simplify the application circuit, and reduce BOM cost in any high-performance application requiring an LVDS or LVPECL frequency source. Additionally, the oscillators feature two control pins to select between four factory-programmable output frequencies, allowing for the replacement of four components with a single device. This enables the customer to reduce their BOM count, consolidate their inventory, and realize cost benefits.

"Our new CrystalFree™ MEMS oscillators eliminate the need for additional quartz crystals and bring tremendous value to our customers," said Christian Karmarrec, vice president and general manager of the timing and synchronization division at IDT. "Our new 4E series provides our customers with what they’ve been asking for – simplicity and cost savings. Not only have we met these demands, we’ve also maintained backward compatibility with their existing socket footprints to ease the transition to these new devices.”

The IDT 4E series oscillators are designed with the physical dimensions and modes of operation of an industry-standard six-pin CMOS, LVDS or LVPECL oscillator, but with four additional pins (10 pins total) strategically placed to maintain backward compatibility with existing six-pin sockets. This allows designers to use the oscillators in existing sockets while offering additional functionality for new designs.

The IDT 4E MEMS oscillators are currently sampling to qualified customers and are available in a standard 7.0 x 5.0 mm VFQFN package.
Akonni pre-clinical results on rapid, low-cost array moves company closer to commercialization for its infectious disease test portfolio

Data demonstrate that the TruDiagnosis® platform is ready for expanded, multi-site clinical trials.

Akonni Biosystems announces results from three pre-clinical studies that contribute to the body of clinical evidence that verifies the efficacy of Akonni’s TruDiagnosis molecular diagnostics (MDx) platform. Akonni’s TruArray® Tests are designed to fulfill market needs for mid-multiplex molecular diagnostics (tens of hundreds of molecular markers) deployed in near point-of-care settings, at a similar cost to conventional culture tests and with the accuracy and speed of gold-standard low-multiplex approaches.

These studies, including those for methicillin-resistant Staphylococccus aureus (MRSA), multi-drug resistant Mycobacterium tuberculosis (MDR-TB), and influenza subtyping, were funded and developed over the past six years by carefully leveraging more than $45M in private and public funding from the National Institutes of Health (NIH), Centers for Disease Control (CDC), National Science Foundation (NSF), and the Department of Defense (DOD).

Well positioned to take advantage of a $3.08 billion market opportunity

The aggregate market opportunity for infectious disease diagnostics exceeds $3B in the United States alone, according to an October, 2012 report by Cowen & Company. The United States alone, according to an October, 2012 report by Cowen & Company, Akonni is well positioned to take advantage of a $3.08 billion market opportunity for infectious disease diagnostics, detecting lower-resource settings are particularly useful for infectious disease diagnostics, detecting lower-resource settings are particularly useful for infectious disease diagnostics, detecting tuberculosis (MDR-TB), and influenza subtyping, were funded and developed over the past six years by carefully leveraging more than $45M in private and public funding from the National Institutes of Health (NIH), Centers for Disease Control (CDC), National Science Foundation (NSF), and the Department of Defense (DOD).

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Rubicon Technology patent allowed for ultra-flat, high-throughput wafer lapping

Rubicon Technology that the United States Patent and Trademark Office (USPTO) has allowed Rubicon’s patent application entitled, “Ultra-flat, high-throughput wafer lapping process.”

The patent covers Rubicon’s process developed to perform grinding and polishing to achieve consistent, ultra-flat and defect-free surface quality for the high-volume production of large diameter sapphire wafers.

Rubicon’s customers in the LED and SOI/RFIC markets have very demanding requirements for the high flatness of sapphire wafers used in their applications. The patent addresses the quality and flatness challenges inherent in the production of sapphire wafers at larger diameters. The patented ultra-flat, high-throughput lapping process enables Rubicon to achieve high levels of flatness and quality while maintaining the highest levels of throughput in the production of large diameter sapphire wafers. As wafers are lapped and polished, the platen faces the wafers become worn and deformed, leading to the deterioration of wafer quality. In the patented process, the platen are continuously self-conditioned and self-optimized to maintain high performance.

“Rubicon continues to build its patent portfolio and increase its technological leadership throughout the sapphire wafer manufacturing process,” said Raja M. Parvez, President and CEO of Rubicon Technology. “This patent underscores our dedication to improving the large-diameter sapphire manufacturing process and improving the leading technology platform for the high-throughput production of high-quality large diameter sapphire wafers for our customers.”

www.graphensic.com

Swedish Graphensic is granted business support for graphene on silicon carbide

The Swedish energy agency supports Graphensic for business development. The funding will give the company increased opportunities for international development of graphene on silicon carbide.

Graphene is a material that has a promising future. Swedish research has shown to be leading in manufacturing graphene on silicon carbide. The applications range from demanding electronics to various approaches of biosensors.

The company was founded in November 2011 by the researchers who have taken the first steps of the commercialization and as entrepreneurs. The business development office has an international team judged from the customers during the first year. And this can be speeding up. Some of the potential applications are energy related. Therefore the Swedish Energy Agency supports the company with about €60000 for business development that will bring the company to a balanced evolution.

Last year Graphensic was selected as one of the 33 hottest technology start-up companies in Sweden. The company is a member of LEAD Incubator that support start-up companies from university research. The new financing will provide the company the possibility to raise the vision with an experienced entrepreneur.

The financing is intended for a chairman of the board, and that person will also be working with sales and marketing, says Mikael Syvajärvi, co-founder and project manager against the Energy Agency.

The company will during 2013 be in contact with investors. The need of production may increase fast, and new equipment will then be needed.

www.graphensic.com

ZOOM

Acquisition of Kopin Wireless for $75 million, placing to raise $16.5 million and trading update

Placing

- Significantly extends IQE’s market share and leadership in wireless industry supply and delivers a market leading position in MOCVD HBT
- Builds substantially on IQE’s risk mitigation strategy in wireless - adding Skyworks Solutions, Inc. (“Skyworks”), which has a long standing supply agreement with Kopin Wireless, as a major customer
- Taiwan manufacturing facility adds to IQE’s global manufacturing footprint and will provide the Group with a strong position to access the growing Asian semiconductor market
- Attractive terms - earnings enhancing from 2013 financial year onwards
- Significant cost synergies of at least £7 million per annum expected from 2014

Acquisition financing

- New banking facility with HSBC for $40 million
- $20 million will be funded from the $16.5 million proceeds of the Placing (defined below)
- Organic cash flow to pay the deferred consideration of $15.5 million payable in January 2016

Trading update for 2012

For the year ended 31 December 2012, IQE expects revenue to be in the range of £87 million to £88 million, with earnings before interest, tax, depreciation and amortisation in the range of £16 million to £17 million and net debt as at 31 December 2012 of approximately £15.5 million.

Drew Nelson, CEO of IQE, said:

“This acquisition is our third key transaction in the past 12 months. It significantly enhances our scale and provides us with a highly complementary product line in the wireless space. “The transaction marks another major step forward in our risk mitigation strategy, whilst significantly boosting our wireless market share. At the same time, it delivers excellent opportunities for additional business growth, particularly in Taiwan and from there into the Asian semiconductor market.”

www.iqep.com
UGA researchers invent new material for warm-white LEDs

LEDs are known for their energy efficiency and durability, but the bluish, cold light of current white LEDs has precluded their widespread use for indoor lighting. Now, University of Georgia scientists have fabricated what is thought to be the world’s first LED that emits warm white light using a single light-emitting material. The phosphor, which serves as the emitting center for illumination, is described in detail in the current edition of the Nature Publishing Group journal «Light: Science and Applications.»

Two main variables are used to assess the quality of artificial light, Pan explained. Correlated color temperature measures the coolness or warmth of a light, and temperatures of less than 4,000 kelvins are ideal for indoor lighting. Correlated color temperature above 5,000 kelvins, on the other hand, give off the bluish color that white LEDs are known for. The other important measure, color rendition, is the ability of a light source to replicate natural light. A value of more than 80 is ideal for indoor lighting, with lower values resulting in colors that don’t seem true to life. The material that Pan and his colleagues fabricated meets both thresholds, with a correlated color temperature of about 4,500 kelvins, on the other hand, give off the bluish color that white LEDs are known for. The other important measure, color rendition, is the ability of a light source to replicate natural light. A value of more than 80 is ideal for indoor lighting, with lower values resulting in colors that don’t seem true to life.

Although his team’s results are promising, Pan emphasized that there are still hurdles to overcome before the material is used to light homes, businesses and schools. The efficiency of the new material is much lower than that of bluish white LEDs. Scaling the production to an industrial scale will be challenging as well, since even slight variations in temperature and pressure in the phosphor synthesis process result in materials with different luminescent colors. The new yellow phosphor also has a new lattice structure that has not been reported before. The researchers currently are working to discern how the ions in the compound are arranged in hopes that a better understanding of the compound at an atomic level will allow them to improve its efficiency.

The microLED is currently being used in a range of applications including life sciences, consumer electronics and OEM equipment. The microLED (µLED) can be fabricated as a single pixel, large clusters of pixels or as addressable arrays where each pixel is individually switchable. The single pixels can be used to produce high intensity, collimated light over a small area or to produce useable light at ultra-low currents. The single pixels can be used to produce high intensity, collimated light over a small area or to produce useable light at ultra-low currents.

Additionally, the high current densities achievable and low capacitance allows the microLEDs to be switched at very high speeds. Experimental work is on-going with the Tyndall National Institute and the results will be announced shortly.

www.infiniled.com
Cost-effective process to improve performance of CMOS sensors

Image sensors are at the core of every digital camera. Before a snapshot appears on the display, the sensors first convert the light from the lens to electrical signals. The image processor then uses these to create the final photo.

Ultra-thin: Organic sensors can be applied to CMOS chips over large and small surfaces, as well as to glass or flexible plastic films. Many compact and cellphone cameras contain silicon-based image sensors produced using CMOS (complementary metal oxide semiconductor) technology. Prof. Paolo Lugli and Dr. Daniela Baiari from TUM have developed a cost-effective process to improve the performance of these CMOS sensors. Their approach revolves around an ultra-thin film made of organic compounds, in other words plastics.

The challenge lay in applying the plastic solution to the surface of the image sensors. The researchers tested spin- and spray-coating methods to apply the plastic in its liquid, solution form as precisely and cost-effectively as possible. They were looking for a smooth plastic film that is no more than a few hundred nanometers thick. Spray-coating was found to be the best method, using either a simple spray gun or a spray robot. Organic sensors have already proven their worth in tests: They are up to three times more sensitive to light than conventional CMOS sensors, whose electronic components conceal some of the pixels, and therefore the photactive silicon surface.

Organic sensors can be manufactured without the expensive post-processing step typically required for CMOS sensors. Every part of every single pixel, including the electronics, is sprayed with the liquid polymer solution, giving a surface that is 100 percent light-sensitive. The low noise and high frame rate properties of the organic sensors also make them a good fit for cameras. Another advantage of the plastic sensors is that different chemical compounds can be used to capture different parts of the light spectrum.

Collection of customs duty on image sensors suspended

FRAMOS eliminates cost factor for European industry.

RAMOS has achieved a Europe-wide suspension of customs duty on CMOS image sensors with the support of two members of the German Bundestag (lower house of parliament) and the industrial association VDMA. Allowing imported goods into the correct customs tariff class is a complicated task, especially when a range of applicable tariff groups exist. A typical example in this regard is the correct allocation of imaging sensors, especially CCD and CMOS sensors.

As all of the main functional assemblies are housed on a chip, it is reasonable to allocate CCD and CMOS to tariff group 8542 for “Integrated circuits” and thus to account for them as exempt from duty. However, the usual interpretation applied by customs officials is that this tariff group is not applicable to these components, since almost all sensors commonly used nowadays also contain purely optical elements (micro lenses, colour filters) without an electrical input or output signal.

Under this interpretation, such an imaging sensor is not an integrated circuit. Instead, the sensors are to be allocated to tariff group 8529 – “Parts for television cameras” and are therefore subject to a hefty rate of duty. A customs duty suspension has already been in place for special CCD sensors within the applicable customs tariff number 85.29.9092 since 2010. As the technical description broadly applies both to CCD and to CMOS within the scope of this customs duty suspension, the FRAMOS Group, one of the biggest European importers of image sensors, filed an application to have the customs duty suspension extended to cover CMOS sensors. This application was approved with effect from 1 January 2013.

The prevalence of CMOS sensors has increased in virtually every relevant branch of industry in recent years. The automotive industry, in particular, is increasingly reliant on imaging techniques and extensively on CMOS technology. The trend is also sharply upwards in the areas of quality assurance, process automation and medical technology.

www.framos.com
ASML expects slow start to 2013

Lithography firm expecting to post EUV tool sales of around €700 million this year.

ASML closed out its fiscal 2012 with annual sales of €4.7 billion – in line with expectations but down from the record-breaking 2011 figure of €5.7 billion. “2012 fourth-quarter and full year sales and profit came in as expected, making the year our second best ever,” reported Eric Meurice, CEO at the market-leading lithography firm, in its full-year results. “We plan net sales for 2013 at a similar level to that of 2012, with a slow Q1 start, recovering in Q2 and a relatively large second half.”

That prediction is based on an expected transition to more lithography-intensive 14-20 nm foundry and logic nodes as 2013 unfolds, driven by the requirements of next-generation portable devices. “All semiconductor architecture leaders have designs pending and need initial capacity,” said Meurice. But market demand for deep-UV lithography systems remains subdued among memory chip manufacturers, although ASML’s CFO Peter Wennink told an investor conference that there could be an upturn in the NAND sector towards the end of the year.

To the complete article, please visit optics.org website

optics.org

Zephyr Photonics opens semiconductor fab and foundry unit

Company to provide DMEA-accredited, ITAR-compliant services for semiconductor developers.

Zephyr Photonics, a developer of harsh environment, optical interconnect solutions for intelligence, defense, aerospace and diverse industrial applications, based in Zephyr Cove, NV, USA, has launched a Semiconductor Fabrication and Foundry Services business unit.

Tom Steding, the company’s CEO, commented, “Our fab and foundry unit was formed to match the growing demands of fabless semiconductor companies and semiconductor companies with our growth, fabrication, testing and production capabilities. Zephyr Photonics currently provides time-critical device development, testing and production services for a number of key industry customers.”

Among Zephyr Photonics’ resources is its 10,000 square foot cleanroom in its Zephyr Cove facility, which includes a wide variety of growth, processing, testing, and production equipment. The facility is accredited by the US Government’s DMEA, the Defense Microelectronics Activity. Furthermore the new Zephyr facility is ITAR-compliant and ISO 9001:2008 certified.

Tim McAllister, Zephyr Photonics VP of Business Development, added “We are excited about this opportunity to play a key fabrication role in the semiconductor industry, enabling our customers’ innovation and improving their time to market by leveraging our experience, in-depth knowledge, process libraries, IP and facilities.”

“Our new business unit will grow to be a very important part of our overall corporate mission, to be a high-performance, specialized and trusted foundry partner.”

Zephyr Photonics’ SFFS is fully operational and is now ready to begin customer engagements.

www.zephyrphotronics.com

Free-space optics market to reach $58M by 2018

Nanotechnology market research firm forecasts annual growth from $4.7 million in 2013 to reach $58M by 2018

The full report on new forecast by market researchers at i-Micronews.com is available at www.i-micronews.com/reports/optics-02-2013.pdf

The rapid growth of Free-space optics is expected to be driven by the requirements of next-generation portable devices. "All semiconductor architecture leaders have designs pending and need initial capacity," said Meurice. But market demand for deep-UV lithography systems remains subdued among memory chip manufacturers, although ASML's CFO Peter Wennink told an investor conference that there could be an upturn in the NAND sector towards the end of the year.

To the complete article, please visit optics.org website.

NANOTECHNOLOGY

European Commission selects Graphene as one of Europe’s Future Emerging Technology flagships

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Phoenix Solar completes flagship project in Saudi Arabia

Ground-mounted solar power plant with a peak power of 3.5 megawatts. The installation is equipped by 12,684 crystalline silicon PV modules supplied by Suntech and is owned by Saudi Arabian oil company Saudi Aramco.

Intevac receives first production order for ENERGi Ion Implant system for solar industry

The compact ion implant ENERGi system meets the cost, efficiency and productivity requirements of solar cell manufacturing and is the most cost-effective doping solution.

EMCORE delivers 1 Millionth solar cell to Space Systems/Loral

EMCORE has been supplying Space Systems/Loral with high-efficiency, multi-junction solar cells for more than 10 years. EMCORE’s business relationship with Space Systems/Loral has been integral to the development of the Company’s photovoltaics division and the growth of its space satellite solar power business. Since its formation in 1999, EMCORE Photovoltaics has grown to be the world’s leading manufacturer of high-efficiency, multi-junction solar cells for space power applications. EMCORE’s industry-leading multi-junction solar cells have a Beginning-Of-Life (BOL) conversion efficiency nearing 30% and the option for a patented, onboard monolithic bypass diode to provide the highest available power to interplanetary spacecraft and earth orbiting satellites. EMCORE’s proven manufacturing capability, technology leadership, and high-reliability solar cells and panels make us the supplier of choice for demanding spacecraft power systems.

Solar wafer start-up 1366 Technologies opens new production-scale factory

The new production facility is based on the Direct Wafer technology and has the annual production capacity of 25 MW.

Plants to build additional 1 GW facility 1366 states that it expects to begin its search for a location in 2013.

NRL designs multi-junction solar cell based on InP substrate

In theory, an infinite-junction cell could obtain a maximum power conversion percentage of nearly 87 percent. The challenge is to develop a semiconductor material system that can attain wide gaps of bandgaps and be grown with high crystalline quality. By exploring novel semiconductor materials and applying band structure engineering, via strain-balanced quantum wells, the NRL research team has proposed a design for a multi-junction solar cell that can achieve band gaps of 0.5 to 1.4 electron volts (eV) in September 2011. 1366 notes that it expects to begin its search for a location in 2013.

Recently awarded a U.S. Department of Energy (DoE), Advanced Research Projects Agency-Energy (ARPA-E) project, NRL scientists, working with MicroLink and Rochester Institute of Technology, Rochester, N.Y., will execute a three year proposal process, ARPA-E seeks out transformational, breakthrough technologies that have fundamental technical promise but are too early for private-sector investment. These projects have the potential to produce game-changing breakthroughs in energy technology, form the foundation for entirely new industries, and to have large commercial impacts.
Spreadtrum adopts STATS ChipPAC’s eWLB for China’s smartphone market
eWLB packaging technology platform delivers transformative performance and form factors at competitive cost for Spreadtrum’s mobile chipsets.

Stats ChipPAC announced implementation of breakthrough performance and packaging innovation in multiple advanced chipsets for the rapidly developing smartphone market in China. Spreadtrum Communications, a leading fabless semiconductor provider in China, has adopted Stats ChipPAC’s packaging innovations for a number of its mobile chipsets. The combination of Spreadtrum’s advanced silicon design capabilities with Stats ChipPAC’s next generation embedded Wafer Level Ball Grid Array (eWLB) packaging technology offers increased performance and compact form factor at a competitive cost for the fast-growing China smartphone market.

Spreadtrum offers mobile chipsets for a range of smartphones, feature phones and other consumer electronics products that support 2G, 3G and 4G wireless communications standards. Spreadtrum’s TD-SCDMA is a 3G mobile telecommunications standard that is currently utilized in China to enable data, voice, video and media in mobile phones and internet-enabled devices.

eWLB is a powerful fan-out wafer level packaging (FOWLP) technology and integration platform that provides significant advantages including a more space-efficient package design enabling a smaller footprint, higher density input/output (I/O) and a lower package height than is possible with laminate or flip chip semiconductor packages. Spreadtrum and Stats ChipPAC are jointly working to utilize innovative packaging technology across a full spectrum of complex product designs such as dual and quad core mobile processors.

www.statschippac.com

PVA Tepla and imec demonstrate 3D TSV void detection using acoustic microscopy

Scanning Acoustic Microscopy (SAM) for non-destructive void inspection after wafer bonding improves wafer thinning performance and tool stability and can also be applied to detect voids in TSVs during processing.

imec and PVA Tepla present breakthrough results in the detection of TSV voids in 3D stacked IC technology. After having applied Scanning Acoustic Microscopy to temporary wafer (de)bonding inspection, they successfully used new advanced GHz SAM technology to detect TSV voids at wafer-level after TSV Copper plating. Together, they will continue to investigate the applicability of high-frequency scanning acoustic microscopy for non-destructive submicron void detection. The initial focus of the collaboration was on developing metrology aimed at detecting voids after temporary wafer bonding, allowing for proper rework of 3D wafers. Temporary wafer (de)bonding and thin wafer handling remains challenging for 3D stacked IC technology. The development of interface particles and voids during the temporary bonding process has a detrimental impact on the subsequent wafer thinning process steps, affecting the wafer thinning performance as well as long-term tool stability and performance. PVA Tepla and imec have developed an automated four-to-fouf, wafer-level inspection based on 200MHz Scanning Acoustic Microscopy (SAM) using Tepla’s AutoWafer 300 tool.

After demonstrating non-destructive detection of interface particles and voids, imec used PVA Tepla’s high-resolution capability GHz frequency SAM tool to successfully detect voids in TSVs of 5um diameter and 50μm depth, immediately after plating. Future work will concentrate on further refining the process and implementing GHz SAM capability to increase the spatial detection resolution. Moreover, imec and PVA Tepla will investigate the applicability of GHz SAM to detect submicron voids in TSV and to investigate other aspects related to 3D technology such as bump connection quality.

www2.imec.be
www.pvatepla.com

SK Hynix readying for 3D stacked memory commercialization: a closer look

At the recent RTI 3D ASIP Conference in Redwood City Minsuk Suh, principle engineer at SK Hynix was available to discuss stacked memory technologies. iMicronews thought review of Hynix stacked memory technology was worth…

Suh indicated that SK Hynix like their competitors Samsung and Micron/Elpida are readying themselves for stacked memory product introductions. Suh noted that “Cost is the 1st barrier for successful TSV memory stack business” and this is the issue that all memory suppliers are working on.

Suh, currently a SK Hynix assignee to the Sematech 3D Interconnect program, which SK Hynix joined in 2011, explains their goal at Sematech “…collaborating with industry-leading partners, we expect to play a critical role in accelerating the commercialization of wide I/O DRAM and to realizing 3D’s potential as a manufacturable and affordable path to sustaining semiconductor productivity growth.”

www.yole.fr

For more information and to register, please go to www.i-micronews.com/webcasts.asp or click here

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Flip Chip: An established platform still in mutation... …And despite its longevity, Flip Chip is still able to serve the most advanced packaging technologies

*8:00 AM San Francisco; 5:00 PM Paris, 12:00 AM Tokyo

essembled wafer-level-package activity is expected to pick-up above $200M by 2015

FOWLP & Embedded Die Packages

Discover the NEW report on i-Micronews.com/reports
Semikron acquire all shares in electric and hybrid car drives developer Compact Dynamics

Oliver Blamberger appointed new general manager / Three managing directors to leave company as scheduled.

After acquiring the majority of Compact Dynamics, the development specialist for electric and hybrid cars, in May 2010, Semikron International GmbH now have acquired the remaining 30 percent of shares that were so far held by the three Managing Directors, Maximilian Eck, Bernhard Hoffmann and Dr. Andreas Gründl. All three of them will leave Compact Dynamics GmbH on February 28, 2013, as scheduled, and will remain active consultants to the company.

At the same time, Semikron International GmbH have appointed, with immediate effect, Oliver Blamberger the new General Manager of Compact Dynamics. As of March 01, 2013, Mr. Blamberger will be the solely responsible business manager for Compact Dynamic, while closely cooperating with the mother company.

«I am proud to be holding a key position within such a highly innovative and exciting field of technology», says Blamberger. «We are delighted to have found in Mr. Blamberger an experienced business leader to lead our innovative team into the future», said former business owners, Maximilian Eck, Bernhard Hoffmann and Dr. Andreas Gründl.

www.semikron.com
For information on our reports and specific market analysis services, please contact D. Jourdan (jourdan@yole.fr).

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**LED Packaging**

Packaging cost reduction is driving new technology and design adoption, and fueling a booming equipment and material market.

Depending on the device type, packaging can represent 40% to 60% of LED total cost. As such, packaging represents the single-largest opportunity for cost reduction, which is required in order for the industry to access the "Holy Grail" that is General Lighting. However, if you’re expecting this cost reduction to come from standardization, you can abandon all hope. The creativity of LED engineers and specificities of each application have led to an infinite number of package type and formats.

Released in February 2013

**Sapphire Substrates 2013**

Excess capacity to trigger massive consolidation and attrition. Will cell phone windows come to the rescue?

The sapphire material shortage experienced from 2010 to early 2011 created a window of opportunity for new entrants. In the last two years, more than 80 companies announced their intention to enter the industry, bringing the potential number of players to 130+ — with more than 50 of these potential new entrants located in China. Coupled with slow demand from LED makers in 2012, this has created a very challenging environment with cores and wafers often selling at prices at or below manufacturing cost. Revenues increased 15% in 2011 but are expected to drop 9% in 2012 due to lower Average Selling Prices, despite volume increase and a favorable product mix with the percentage of PSS wafers increasing dramatically.

Released in December 2012

**Status of the CMOS Image Sensors Industry**

New technologies & application opportunities promise a bright future to the CMOS image sensors industry. CMOS image sensor market is expected to grow at an 11% CAGR in revenue in the 2012-2017 period, growing from $6.6B in 2012 to $11B in 2017. Many different applications are driving the integration of CMOS image sensors. If mobile handsets accounted for ~65% of total shipments in 2011, many new applications are poised to drive the future growth of this industry. Three fast emerging applications of significant size should drive the growth of the market to an expected CAGR over 30%: Tablets, Automotive, and Smart TV. More details are available in the report on each application.

Released in October 2012

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**LED & PE seminar, powered by Yole Développement: more than 90 attendees including Samsung, LG, Seoul Semiconductor ...**

For the first time, Yole Développement organized an LED & Power Electronics seminar just prior to SEMICON Korea, in Seoul. Dedicated to the areas of LED and Power Electronics, the seminar consisted of Yole Développement presentations on the aforementioned market areas, along with presentations from System Plus Consulting on their Reverse Costing and Cost Simulation tools. Featured speakers were Dr. Philippe Roussel, Yole Développement Business Unit Manager; Pars Mukish, Yole Développement Technology & Market Analyst for LED & Compound Semiconductors; and Michel Alain, CEO of System Plus Consulting.

Sources: Semiconductor Packaging News – LEDNewsKorea – Global LEDs/OLEDs – EDN network – CompoundSemiconductor.net – Electronic Specifier ...