



INSIGHT

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SINDRE® – FULLY AUTOMATIC

SINDRE®400 SETS A NEW STANDARD

AIMING FOR THE SUN

OBDUCAT INCREASES PHOTO-
VOLTAIC EFFORTS

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OBDUCAT PLANS AHEAD TO ENABLE FURTHER GROWTH

With 90 percent of the volume guaranteed in the imminent share issue by European Nano Invest (ENI), the continued focus on business development is secured. ENI as one of the main shareholder in Obducat have gathered a consortium that secures issue. ENI is company co-owned by leading key officials in Obducat. The overall share issue including subscription rights could generate a capital injection in the range of MEUR 20 until end of 2012 which enables us to plan ahead in a more effective manner than what previously has been possible, which is very positive.

We will continue to push forward in our focused application areas LEDs, HDDs and Display/Photovoltaic and with the first signs of recovery in the industry from the



financial crisis it is likely that we will resume stepwise during the second half of this year to more normal business conditions which Obducat will benefit from.

Contrary to its downplayed role in this issue of InSight, the Sindre®400 is a headliner in all other aspects. With it, Obducat enters the big league in terms of becoming a supplier of high volume manufacturing equipment – a setting we intend to remain and take the lead in. Sindre®400 is aimed specifically at applications within the LED industry. Read more about it on page four.

Keen readers of this newsletter will recognise PV as a topic from two issues back (2/08), which also mentioned the interesting convergence of photovoltaic development and NIL technology. Several external scientific reports show good results when incorporating nanotech structures in photovoltaic cells. As high costs are the greatest obstacle to achieving cost-efficient solar power, NIL offers excellent possibilities for a market sector that is destined to boom before long.

Last minute preparations are ongoing regarding the exhibition Intersolar next week which will be the first exhibition with a specific focus on PV that Obducat participates in – in the next InSight we will make a short report on the highlights from Intersolar.

As mentioned before, 2009 is an exciting and challenging year for Obducat. Follow Obducat InSight, and you won't be left out.

Please enjoy.

Patrik Lundström
CEO



SINDRE® 400 – FIRST OF THE FULLY AUTOMATIC SINDRE® PLATFORM

The launch of Obducat's Sindre®400 is a big event. Most certainly for Obducat, but in many other respects as well – even for the field of nanotechnology as a whole. Not only does the new Sindre® set a completely new standard in terms of production capacity for super-small structures. It is also the first model to come out of Obducat's new, fully automatic Sindre® platform that is likely to redefine production yield within several nanotech application areas. Here follows a short presentation of the Sindre® machine and platform as well as the qualities that make them unique.

VOLUME AND REPEATABILITY

Sindre®400 is a lithography system used for replication of both nano- and microstructures on semi-standard substrates so-called wafers. The system is designed to perform the process under optimised conditions resulting in a high yield at low cost. Sindre®400 is a fully automatic, high-volume production system that handles batches of wafers, rather than one wafer at a time. The repeatability is very high since all handling is automatic and optimised for 24/7 continuous operation. The system is operated by a production engineer, but any deep knowledge of imprint lithography will not be necessary. Using Soft Press® technology in combination with IPS

(intermediate polymer stamp) in an optimised process makes the system excellent for e.g. HB LED (high-brightness LED) production. Initially the system will be used for production of optoelectronic devices. The requirement is high-resolution replication with high yield, and Sindre®400 makes this possible in a volume-manufacturing environment.

SINDRE®400 – TAILORED FOR LED PRODUCTION

The general challenge within HB LED is that the wafers are not flat, which makes it hard to avoid e.g. EPI defects (surface irregularities). But the Sindre®400 has the advantage of using a technology that allows imprinting on rough wafers and still produce high quality nanopatterns on such surfaces. The typical yield that our customers reach today is above 95 percent. This performance level is unique and makes the production of such devices highly cost-effective.

OTHER APPLICATION AREAS IN SIGHT

A very important aspect of the Sindre® platform is that it can be used for other application areas than LED. Next in line from Obducat is Sindre®HDD, a system specially developed for the hard disk industry, and beyond that there are applications such as flat panel display (large-area imprint) and photovoltaic device manufacturing.



Press gathering 20 May 2009



CEO Patrik Lundström presents Sindre®400



A BIG STEP UP FROM SEMI-AUTOMATIC MACHINES

The basic technology is the same for both semi- and fully automatic Sindre® systems. But in semi-automatic systems, the procedure for running the system is operator dependent, and the user must have some degree of lithography knowledge in order to run the system and maintain the production quality. In Sindre®400, all operations and wafer handling are hands-off. This means that the system has optimised operation, allowing high yield and fast processes. Mistakes caused by manual handling are eliminated. Operation round the clock naturally means vastly improved production yield. A Sindre®400 system produces 30 wafers per hour. The system is designed and manufactured for continuous operation and makes the replication on entire wafers with high repetition. The system also provides perfect clean-room environment, which keeps substrate and stamp free from contaminations, prolonging the lifetime of the original stamps.

BIG CUSTOMERS

Sindre®400 is made for high volume manufacturing. The users are industrial device manufacturers who have requirements for high resolution and high yield at low cost. Although the number of potential customers is not unlimited, the target group principally consists of very large, multinational manufacturers of consumer electronics as well as their subcontractors.

” THIS QUALITY IS
UNIQUE AND MAKES
THE PRODUCTION OF
SUCH DEVICES HIGHLY
COST-EFFECTIVE.



Municipal Commissioner Ilmar Reepalu in the lab



Ilmar Reepalu with Obducat Chairman Henri Bergstrand



OBDUCAT INCREASES PHOTO- VOLTAICS EFFORT

Obducat InSight's last issue of 2008 had PV, or photovoltaics, as its main topic. The article below is partly a condensed and updated version of that article, but this also marks Obducat's intent to make inroads into solar-cell technology. With NIL technology showing promising research results – including higher efficiency, lowercost – combined with the booming market interest in PV and the recent launch of the Sindre® platform applicable also for solar cell manufacturing, makes it a natural step for Obducat to take.

Converting sunlight into electricity – commonly referred to as photovoltaics – is an excellent concept. The sun provides Earth with 10,000 times the energy that all of humanity is using. The only, yet paramount, problem

has been poor efficiency and high costs. But with new technology and new materials being developed, solar power as a serious energy solution is quickly gaining momentum.

The key challenge is CPW, cost per watt. To lower CPW, manufacturers can either reduce cost – by improving yield, increasing throughput, etc – or they can increase the wattage available from a given panel area. In turn, increasing output power requires improved conversion efficiency: the panel must capture more incident photons, convert more of them to free carriers, and deliver more of those carriers to the panel's terminals. Each of these steps – capture, conversion, and transport – shaves points from the total efficiency and offers opportunities for performance improvements.

The structure of a photovoltaic cell is highly complex. Simply put, it consists of a combination of layers designed to make photons (light) knock electrons (electricity) into motion. Both the layering and other technical factors decide the efficiency and cost of the cell.

NIL OFFERS COMPETITIVE TECHNOLOGY

Several technologies compete in the quest for better solar cells. Cell designers need to improve voltage, current, and fill factor simultaneously. Surface texturing, for example, can introduce surface recombination sites at the same time that it improves light capture.

On the subject of NIL, photovoltaic-research scientist Nanditha Dissanayake of the University of Surrey, says: "Nanoimprinting can be utilised as a high-throughput, facile and highly scalable fabrication method for organic and dye-based solar cells. There have been several reports where these techniques are applied successfully for the fabrication of OLEDs. The same principles can be utilised to engineer photovoltaics devices as well. Furthermore, NIL presents a novel method of texturing active layer surfaces to increase light harvesting by increasing the interfacial area, enabling greater charge separation. NIL can also be used to improve local properties in the microstructure using facile surface techniques.



FACTS ABOUT SOLAR POWER

- The sun provides us with 10,000 times as much energy as we need.
- Photovoltaic production has doubled every two years since 2002 (average increase of 48 percent a year), making it the world's fastest-growing energy technology.
- World solar-cell production was estimated at 3.4 GW in 2007.
- Solar power contributes with 0.039 percent of the world's electricity needs.
- PV installations in 4 percent of the world's deserts would meet global energy needs.
- Solar power is currently too costly for widespread consumer take-up.

These local properties can result in increased light absorption as well as increase in charge carrier mobility."

It's important to remember that efficiency is less important than CPW. To succeed, a design must be not only efficient, but also cost-effective. All things considered, NIL shows great promise for future development of the photovoltaic cell. The nanoscale structure of the light-exposed surface is key for efficiency, and subsequently also the production cost of solar cells. These factors make NIL a strong contender in the coming years.

” THE SUN PROVIDES EARTH WITH 10,000 TIMES THE ENERGY THAT ALL OF HUMANITY IS USING.



A CFO's PERSPECTIVE

Jonas Hansson joined Obducat at the beginning of the year as the company's new Chief Financial Officer. Jonas came from a position as Chief Financial Officer (CFO) at BTJ Group in Lund. Obducat InSight asked him about heading a financial department in a high-tech company.

1. WHAT BROUGHT YOU TO OB Ducat?

I've followed Obducat from afar the last few years and always thought it was an interesting company with great potential. When the opportunity presented itself, I saw it as a challenge I had to take. This has given me the opportunity to work with a company that has a very interesting scope of business.

2. HOW DOES WORKING AT OB Ducat DIFFER FROM YOUR OLD JOB?

An advantage of working as a CFO is that most companies have a basic structure that is quite similar, regardless of the company's area of business. Obducat, however, differs a lot from the companies I've worked at previously in terms of size, processes and business models. The biggest difference is that Obducat is in a stage of development with limited resources, which puts far greater requirements on flexibility both in terms of the range of work tasks as well as how the operations should be monitored.

3. WHAT ARE THE HARDEST ASPECTS OF YOUR WORK AT OB Ducat?

Being the CFO, with a business administration background, of a company which is very technology focused creates a number of challenges, one of the biggest is to understand how the products work, how the business model is set up, and in what way development and products generates value for at our customers side.

4. HOW DO YOU LIKE WORKING FOR OB Ducat?

The first few months at Obducat have been intense, but at the same time stimulating and very fun. I think the company is characterised by employees with great commitment and a positive mindset, which makes it easy to go to work even in tough times like these.



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