

OSRAM Opto Semiconductors – Technologies for the Synergy of Light Quality and Energy Efficiency

OSRAM Opto Semiconductors ranks among the world's leading manufacturers of opto-electronic semiconductors and is considered to be the authority on innovative light technologies. For more than 30 years, the innovation leader's high-quality opto-electronic semiconductors have been setting standards in a wide variety of applications. The extensive product portfolio encompasses components for the fields of illumination, visualisation and sensor systems. The best-known products are high-efficiency light-emitting diodes (LEDs), semiconductor lasers, infrared diodes (IREDs), detectors and organic LEDs (OLEDs). The products in the LED segment range from miniature components for the back-lighting of small displays, all the way to extra-bright light sources for general lighting, TV screens and car headlights.

LED technology is extremely successful, thanks to its extraordinary technical characteristics and the rapid development of consumer electronics. Alongside the widespread use of the small light sources in mobile phone displays, computers and big screens, the LED is nowadays also turning into an innovative light solution in the field of general lighting. Apart from its small size, one of the decisive reasons for this is its impressive energy efficiency, which was also demonstrated for the first time in a study on the eco-balance of LED lamps from OSRAM Opto Semiconductors, published in August 2009. The study scrutinised the entire life cycle – the quantity of energy and raw materials consumed by the lamp during its lifetime for production, use and disposal, and the environmental burdens occurring in this context. The result: today's LED lamps match the eco-balance values of compact fluorescent lamps and are far superior to conventional incandescent lamps.

In theory, ubiquitous use of LED lamps would make it possible to save more than half the electricity needed for generating light worldwide. In combination with intelligent light management, the figure would even be as high as two-thirds.

Consequently, the market will become more and more dynamic in future, and LEDs will increasingly assert themselves as the universal light source type. Once the current global economic crisis has subsided, analysts are again expecting the market as a whole to achieve annual growth rates well into

double figures. Thanks to its capacity for innovation, its patented technologies and its established distribution structures, OSRAM Opto Semiconductors is well-equipped for these developments.

OSRAM Opto Semiconductors only recently succeeded in achieving another highlight in the lighting sector: the company presented the first, commercially available light source based on organic light-emitting diodes (OLEDs). This technology was thus able to take a further, important step on its way out of the laboratory and into general lighting. The Orbeos OLED panel is suitable for numerous applications in the premium segment, such as architecture, hotels and restaurants, offices, museums and shops. The panel's efficiency of 25 lm/W is already better than that of a conventional halogen lamp. The warm-white colour temperature of 2800 K corresponds to the warm light of an incandescent lamp and is therefore suitable for the atmospheric and yet functional illumination of rooms.

Light sources for projectors were likewise a field in which OSRAM Opto Semiconductors was successful in fiscal year 2009. Projectors are becoming smaller and smaller, and they will soon not only be available as add-ons measuring a few centimetres on computers, cameras and mobile phones. For the next step will be to integrate the projector into these devices, where high-efficiency light sources, such as LEDs or lasers, will provide extremely sharp, bright images and intensive colours. OSRAM Opto Semiconductors contributed a further two LEDs to the projection market in 2009: the OSTAR Compact and the OSTAR Power Projection. The OSTAR Compact is designed for small, efficient systems in mobile phones, PDAs or MP4 players, while the OSTAR Power Projection serves the market for high-performance projection systems, e.g. for the home cinema sector with diagonal screen sizes in excess of 70 inches. The LED portfolio of the semiconductor specialist now covers the entire projection system output range from 1 W to 300 W.

There was also a new development in laser light sources – the blue laser diode with an optimised TO38 housing. This technology has also brought OSRAM Opto Semiconductors one step closer to realising the vision of small projectors which can be integrated in mobile terminals, such as mobile phones and digital cameras. Similarly, OSRAM Opto Semiconductors was able to demonstrate success in the laboratory with the direct-emitting, green indium-gallium-nitride laser. It already achieves an optical output of 50 mW and, with a wavelength of 515 nm, emits in true green. Compared to semiconductor lasers using current technology, which operate on the basis of frequency doubling, the winning features of the direct-emitting green laser are its more compact design, greater temperature stability, easy control and high modulation capability.

Both of these semiconductor technologies will turn mobile terminals into sophisticated, multifunctional devices that can not only record visual content, but also present it in high-definition quality.

Power for cars: The automotive industry has also long since discovered the all-rounders. In addition to serving as a functional light source for cars in the form of standard daytime running lights and rear lights, LEDs are also popular designer pieces and distinguishing features – and no longer just for high-end vehicles. For instance, the Audi A 8 get its striking look from the unusual front LED headlights. However, opto semiconductors are used in less conspicuous areas of motor vehicles, too: semiconductor lasers and high-power infrared diodes also make for enhanced safety in pedestrian protection systems, for example. The first Night Vision System using high-power IREDS will be going into regular production as early as in 2011.

General lighting is one of the fields with the most promising future. Policy-makers are supporting this development by issuing guidelines aimed at more energy efficiency and more energy-efficient lighting. For example, LEDs are already being used in domestic and workplace lighting. Even now, LEDs are becoming a natural choice of lamp – as will OLEDs, too, in the longer term. The rapid development in terms of brightness suggests that many further innovations can be expected in entirely new fields of application. Designers and architects are also making use of this type of lamp and creating highlights through extravagant light design.

When equipping street lighting and architectural lighting, public-sector customers are increasingly opting for long-lived, environmentally friendly LED light systems. Starting in Asia and progressing via the USA all the way to Europe, more and more streets are being lit by LEDs. One instance in Europe: the Levi Ski Resort in Kittilä (Finland) set a good example in 2009 and became the first municipality in the country to use LEDs to illuminate its streets.

Research and development spending totalling more than 15 percent of the annual turnover creates stable framework conditions for achieving consistently high performance in product development and manufacture at OSRAM Opto Semiconductors. It is by these means that the company, which currently holds more than 4,000 patents, has been able to develop pioneering technologies over the past 30 years. Among other things, this achievement is due to special programmes designed to promote the culture of innovation in the company. For instance, scientific work and studies receive financial, structural and professional support. In addition to which, new technologies emerge as a result of interdisciplinary project partnerships in national and international funding programmes, or are based on innovative team work and close coordination with customers and partners. Milestones in connection with the numerous standards set in LED light technologies included the development of the first surface-mountable LED (TOPLED), the first LED with a white colour appearance and the OSTAR platform, a highly versatile form of production. The company has received awards for many of these developments.

The company has its headquarters in Regensburg, where the highly complex semiconductor chips are developed and produced, and new products are designed for new applications. LED production and global distribution have been based in Penang (Malaysia) for over 20 years. A chip production facility

was additionally opened there in mid-2009. Together with the Regensburg factory, OSRAM Opto Semiconductors now has the two most modern LED chip production facilities in the world. Corporate Headquarters for North America are located in Sunnyvale (USA), while Hong Kong is the home of the Headquarters for Asia. Having formerly been part of the Semiconductors Division of Siemens, the company has long-standing experience in the development and production of LED light solutions. It is today a wholly-owned subsidiary of light manufacturer OSRAM and thus part of the Siemens Industry sector.

More at: www.osram-os.com

Overview

OSRAM Opto Semiconductors GmbH

Established: 1999

Sector: Manufacturer of opto-electronic semiconductor components (LEDs, infrared diodes, semiconductor lasers). The company offers products and system solutions for lighting, visualisation and sensor systems.

Awards: "Best Electronics Design" for 2008

2007 Deutscher Zukunftspreis des Bundespräsidenten für Technik und Innovation

2007 Best Innovator (Wirtschaftswoche, AT Kearney)

2006 Wissenschaftspreis des Stifterverbandes

2006 PACE Award (Automotive News, SAP, Microsoft, et al.)

2005 Innovation Prize INTEL Design (INTEL)