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Plessey Semiconductors to cut LED lighting costs

British technological breakthrough claims will cut the cost of energy-efficient high-brightness (HB) LED lighting by 80% through the use of 6-inch gallium nitride (GaN) on silicon technology

By K.C. Krishnadas
(February 08, 2012)

The U.K.'s Plessey Semiconductors' acquisition of CamGaN Limited, will enable it to exploit synergies with its 6-inch processing facility in Plymouth, England to produce HB LEDs based on CamGaN's proprietary 6-inch GaN-on-silicon technology.

Plessey, into semiconductor products for sensing, measurement and control applications, said this acquisition positions it among the first commercial players to successfully manufacture HB LEDs on 6-inch silicon substrates. CamGaN is a University of Cambridge spin-out formed to commercialise novel technologies for the growth of gallium nitride (GaN) high-brightness LEDs on large-area silicon substrates.

The newly acquired Plessey HB LED solution enables the growth of thin HB LED structures on standard, readily available, silicon substrates. Current technologies use silicon carbide (SiC) or sapphire substrates, which are expensive and difficult to scale-up.

Plessey's GaN-on-silicon solution offers cost reductions of the order of 80% compared to LEDs grown on SiC or sapphire by:

- (i) reducing scrap rates
- (ii) minimising batch time and
- (iii) enabling the use of automated semiconductor processing equipment.

These cost reductions will be achieved while enabling outputs in excess of 150 lumens per watt later this year - a combination that will allow Plessey to offer the most cost effective solutions in the HB LED industry.

"HB LED lighting represents the future of domestic, architectural, medical and automotive lighting. Achieving the goals of high efficiency and brightness is key to the rapid deployment of energy saving, solid state lighting. This new British technology provides cost and performance advantages that will constitute a game-changing step forward towards the replacement of incandescent and fluorescent bulbs with HB LED lamps," said Michael LeGoff, Plessey's Managing Director

Dr John Ellis, Chief Engineer at Plessey, said: "To date, the biggest technological challenge preventing the commercialisation of HB LEDs grown on large-area silicon substrates has been the large lattice mismatch between GaN and silicon. Plessey's new GaN-on-silicon process has overcome this challenge and our expertise combined with the intrinsic cost savings of using automated 6 inch processing equipment will position Plessey's HB LED lighting products at the forefront of the industry."

Professor Sir Colin Humphreys, CBE FREng, Director of the Cambridge Centre for Gallium Nitride, Professor of Experimental Physics at the Royal Institute and co-inventor of the GaN-on-silicon technology, added: "This technology is the product of substantial R&D investment over the past decade and the plans for its commercial development within Plessey have tremendous potential. The opportunities to develop affordable smart-lighting products for domestic, medical, automotive and other applications provide a real opportunity to have a positive impact on people's lives."

Plessey also announced its plan to release a range of products for smart lighting concepts that incorporate existing Plessey sensing and control technologies including the EPIC sensor. These smart lighting products will enable intelligent energy management, remote control, controlled dimming and automated response to ambient conditions.

Backgrounder

Plessey's first samples of a blue LED are characterised by peak emission at 460nm. The technology extends to other emission wavelengths such as cyan and green. Being able to achieve such high brightness at the blue end of the spectrum enables phosphors to be used to produce white light with a balanced spectrum of light emission that is better for the eye. White output powers of 150 lumens/watt are planned towards the end of the year.

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