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Sensor Electronic Technology, Inc. reaches milestone UVC LED efficiencies of over 10%, bringing consumer disinfection markets within reach

Columbia, SC – April 23rd – Sensor Electronic Technology, Inc (SETi) announced record efficiencies of ultraviolet light emitting diodes (UV LEDs) operating in the germicidal UV-C range of 11% external quantum efficiency (EQE) with a corresponding wall-plug efficiency (WPE) of 8%. This industry beating result was achieved under the DARPA Compact Mid-Ultraviolet Technology (CMUVT) program and in collaboration with Army Research Laboratories (ARL).

This latest development from the world's leading supplier of UV LEDs represents more than a 5X improvement in performance: primarily attributed to improved light extraction from encapsulated LED chips with a novel transparent p-region and a reflective contact and further reductions in defect density in the LED structure, grown on sapphire substrates. Traditionally, UV LEDs have been manufactured with GaN p-layers, due to the difficulties of p-doping AlGaIn materials. However, GaN absorbs wavelengths shorter than 365nm, and therefore reduces the extraction efficiency of UV LEDs operating at short wavelengths. SETi have developed a completely new p-type region using doped AlGaIn, which is transparent, even in the UVC range. This coupled with a transparent p-contact significantly increases extraction efficiencies.

SETi has also further developed its MEMOCVD® growth process to reduce dislocation densities in the quantum well structure of UV LEDs grown on sapphire substrates and has demonstrated threading dislocation densities (TDD) of less than 2×10^8 (measured by TEM). This improvement in TDD leads to a high internal quantum efficiency (IQE) of 60%.

"This milestone is a very exciting development of UV LEDs, and represents a major step forward in reaching efficiencies of incumbent technologies, such as medium pressure mercury vapor lamps, which typically operate at efficiencies of 15% or less" said Dr. Remis Gaska, President and CEO of SETi

The 350um x 350um encapsulated LEDs were designed for emission at 278nm and measured at Army Research Laboratory where they were reported to emit 9.8mW at 20mA (the highest value ever reported for an LED shorter than 365nm at this forward current) and 30mW at 100mA. Details will be presented at CLEO 2012 meeting, San Jose, CA.

SETi has previously reported highly effective LED based water treatment systems that disinfect with >4 log reduction drinking water flowing at 0.5 liters per minute with less than 35mW of optical power at 275nm. The results from this development put UV LED disinfection systems within the reach of consumer markets for applications such as point of use water purification.

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