Press release

Off to short wavelengths!
State of the art and trends of UV light-emitting diodes

Ferdinand-Braun-Institut presents its UV LED developments in talks and at the accompanying exhibition at *ICULTA-2018* – from chips to ready-to-use modules. The institute co-organizes the international conference hosted in Berlin.

Berlin, April 12, 2018
It is all about light-emitting diodes (LEDs) at *ICULTA-2018 – International Conference on UV LED Technologies & Applications 2018*. The focus of the international expert meeting, held from April 22 to 25, 2018 in Berlin, is on the ultraviolet (UV) spectral range and thus at wavelengths below 400 nm. Talks deal with progress in manufacturing technologies, current developments, applications and trends related to UV LEDs. The Ferdinand-Braun-Institut (FBH) and its spin-off UVphotonics NT GmbH are represented with several (invited) talks and booths at the accompanying exhibition, respectively.

Progress in development makes UV LEDs attractive for industrial applications

Increased efficiency and output powers make UV LEDs more and more attractive for a constantly growing number of applications. Unlike mercury vapor lamps, UV LEDs consist of non-toxic substances, and their wavelengths can be flexibly adjusted over a wide spectral range. Moreover, their small size enables various configurations of UV radiation systems. UV LEDs can be quickly switched and dimmed, and heat losses are efficiently dissipated via heat sinks. It is therefore to be expected that environmentally friendly light-emitting diodes will increasingly replace conventional UV light sources and open up novel applications. Their fields of use are manifold: UV radiation can be used, amongst others, to disinfect water, air and surfaces, to detect pathogenic germs, as well as for curing of synthetic materials.

Scientists from the FBH and its spin-off UVphotonics report in their talks on progress achieved regarding UV LED efficiency and reliability. They identified, amongst others, a degradation mechanism pointing to an operation-induced electro migration of hydrogen in the UV-B LED structure during the first hours of operation, which is accompanied by a drop in the optical power of the device. After respective design adjustments, UV-B LEDs with L50 lifetimes of 8,000 hours could be demonstrated. Optimization of the devices has led to even further improvements in the reliability of the LEDs with significantly longer L50 lifetimes expected. In addition, their output power at 350 mA could be increased to 30 mW. Methods to increase internal quantum efficiency and for efficient light extraction have been investigated in detail, too.

At the conference, FBH scientists also present a compact diode laser-based light source for the deep UV spectral range with an emission wavelength of 222 nm and therefore in a region difficult to access with LEDs. The device converts the light of a GaN-based high-power diode laser into the UV spectral range via frequency doubling (single pass) and offers the potential for miniaturization. The wavelength-stabilized, narrow-band light source is particularly suited for spectroscopy applications, such as absorption and Raman spectroscopy applied in medical diagnostics but also in substance analysis.

From customized housings to ready-to-use modules

The FBH also develops the optimum package for each application and, supported by its Prototype Engineering Lab, even complete modules that are tailored precisely to fit the range of use. For one of its research partners, for example, FBH has developed and realized several illumination systems, irradiating plants with LED light of specific wavelengths. In this way, the proportion of health-promoting secondary plant metabolites can be systematically enhanced. For use in greenhouses, UV LEDs need to be protected by special packages against enhanced degradation caused by the warm and humid environment. FBH displays one of these plant illumination modules along with a small water disinfection system at its exhibition booth.

FBH closely entwined with the conference

ICULTA-2018 is jointly organized by 'Advanced UV for Life' and 'International Ultraviolet Association'. The Advanced UV for Life consortium brings together 50 partners from research and industry, managed by the Ferdinand-Braun-Institut. Further FBH scientists play a leading role at the conference: Prof. Michael Kneissl is co-chair of the conference – he is Head of the Joint Lab GaN Optoelectronics that is jointly operated by FBH and TU Berlin – and Prof. Markus Weyers, Head of the Materials Technology Department at Ferdinand-Braun-Institut, is chair of the program committee.

Visit us at *ICULTA-2018* in MELIÃ hotel , Berlin. Further information on the conference and FBH contributions are provided here: www.advanced-uv.de/conference

Press pictures are available for download. Further images are provided on our website: www.fbh-berlin.com/press/download-center. All images are copyrighted.

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Backgroundinformation – the FBH

The Ferdinand-Braun-Institut, Leibniz-Institut fuer Hoechstfrequenztechnik (FBH) researches electronic and optical components, modules and systems based on compound semiconductors. These devices are key enablers that address the needs of today's society in fields like communications, energy, health, and mobility. Specifically, FBH develops light sources from the visible to the ultra-violet spectral range: high-power diode lasers with excellent beam quality, UV light sources and hybrid laser systems. Applications range from medical technology, high-precision metrology, and sensors to optical communications in space. In the field of microwaves, FBH develops high-efficiency multi-functional power amplifiers, and millimeter wave frontends targeting energy-efficient mobile communications as well as car safety systems. The FBH has a strong international reputation and ensures rapid transfer of technology by working closely with partners in industry and research. The institute has a staff of 290 employees and a budget of 33 million Euros. It is part of the Forschungsverbund Berlin e.V., a member of the Leibniz Association and plays an active role in various networks.
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