Leibniz Ferdinand Braun Institut

Press Release

Full value chain – tailored diode lasers and UV LEDs

FBH presents its capability in diode lasers and UV LEDs at the *Photonics West 2018* trade show and the accompanying conferences. All devices are optimized to fit the respective application; developments range from chips to ready-to-use systems.

Berlin, December 19, 2017
The Ferdinand-Braun-Institut (FBH) presents novel developments and advancements of its diode lasers and UV light-emitting diodes (LEDs) at *Photonics West 2018*. The event is hosted in San Francisco (USA) from 30 January - 1 February 2018. FBH is also extensively represented at the accompanying conferences (27 January - 1 February 2018) with more than 30 scientific contributions. At the German Pavilion, FBH showcases its full range of capabilities, offering the full value chain in-house: from design through chips to modules. The institute increasingly advances these devices up to the operational system. Exhibits include:

High-power pulse laser source for LiDAR systems

Lasers generating short optical pulses with widths in the range from 200 ps to 20 ns are key components for a broad range of applications including LiDAR (Light Detection and Ranging), e.g., for autonomous driving, 3D object detection, laser scanning (airborne, satellite, and terrestrial) as well as fluorescence spectroscopy and micro-machining systems. FBH has developed a suitable, very compact laser source. The laser module uses a tailored design for pulse generation from the institute's diode laser technology as well as a laser driver with GaN transistor in the final stage offering pulses up to 250 A with controllable pulse amplitude and width. Integrated on these drivers is FBH's latest generation of wavelength-stabilized laser diodes that emit 5 ns pulses with 40 W (single emitter) or up to 100 W (3-emitter array) pulse power near 905 nm with good beam quality and up to 85°C. This concept can, of course, be transferred to further wavelengths.

Compact laser module offering outstanding frequency stabilization for interferometry

FBH has developed a very compact laser module with emission at 633 nm. The semiconductor laser module, sized only 76x54x15 mm³, uses a novel butterfly-type housing and aims at replacing bulky HeNe lasers. It offers a flexible platform for the integration of a wide range of photonic components, thus simplifying adaptation for different application scenarios. The particular module presented features an all-semiconductor master-oscillator power-amplifier (MOPA) combined with an iodine gas cell to stabilize output power as well as emission wavelength. The MOPA uses newly developed chips, achieving an optical output power of more than 30 mW. A miniaturized optical isolator, purpose-built for the wavelength of 633 nm, is interposed between MO and PA. It features optical isolation of more than 30 dB and a transmission loss of less than 3 dB. The iodine gas cell is also miniaturized, offering a length of only 30 mm and a clear aperture of 2 mm. The frequency of the module's emission could be stabilized by the project partner Toptica to be absolute within a 10 MHz band over a time period of one hour. This corresponds to a frequency stability of $2 \cdot 10^{-8}$, which translates to an accuracy of about 2 microns on a length scale of 100 m. Such accuracy could previously only be reached by large-sized HeNe lasers. The new laser modules will allow a significantly higher degree of miniaturization of interferometric measurement systems in the near future.

Wavelength-stabilized high-brightness light sources
The Ferdinand-Braun-Institut develops customized wavelength-stabilized high-power diode lasers with laser emission in the spectral range between 630 nm and 1180 nm for spectroscopic applications and as pump sources for non-linear frequency conversion. Developments include monolithic dual-wavelength DBR diode lasers with optical output powers up to 200 mW providing two emission lines with a small spectral linewidth for Shifted Excitation Raman Difference Spectroscopy (SERDS). With SERDS, Raman signals can be extracted efficiently and rapidly from disturbing backgrounds such as fluorescence and ambient light, thus improving Raman spectroscopy in real-world applications. DBR tapered lasers and MOPA systems show diffraction limited output powers up to 10 W and are used for efficient second harmonic generation of the emission into the visible spectral range and up-conversion of mid-infrared radiation via sum frequency generation to the near-infrared range.

Visit us at *Photonics West 2018*, German Pavilion, booth 4529-51. Find an overview of the more than 30 FBH contributions to the accompanying conferences here: https://www.fbh-berlin.com/news-dates/dates/detail/fbh-auf-der-photonics-west-2018 .

Press pictures of all devices described are available for download. We will provide you with alternative image(s) most suitable for your purposes promptly. Further images are provided on our website: http://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 28.2 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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