

## TOPTICA presents “All Wavelengths” at CLEO

From May 15<sup>th</sup> – 17<sup>th</sup>, TOPTICA Photonics will present their high-performance lasers at CLEO Conference at San Jose Convention Center, San Jose, California (USA). At **booth 1825**, TOPTICA will showcase their broad product portfolio which covers **All Wavelengths** from deep-UV (190 nm) to terahertz radiation (0.1 THz, corresponding to 3 mm). These lasers support a multitude of applications in quantum technology, microscopy and materials metrology.

In particular, TOPTICA’s **tunable diode** lasers are ideal tools for demanding tasks in modern quantum optics experiments. They are available with stabilized wavelengths and narrow linewidth, ultrawide mode-hop-free tuning ranges and intelligent control features. With the help of frequency-conversion and amplifier systems, these lasers cover an ultrabroad spectrum reaching from 190 to 3500 nm with high output power up to 4W.

The **DFC CORE +** is TOPTICA’s compact high-performance frequency comb. It features turnkey operation in a robust, small volume housing while supporting high-end applications like **optical clocks** or **low-noise microwave generation**. High bandwidth locking to an optical reference is available remotely through a convenient user interface and will be demonstrated **LIVE** at the CLEO and IFCS exhibitions.

For applications like **high-resolution spectroscopy** and **interferometry** the DFC product line can be combined with TOPTICA’s diode lasers and locking electronics to offer complete stabilized diode laser systems between 420 and 2200 nm. Characteristics like remote locking of TOPTICA diode lasers to the comb or integration into ready to use, transportable 19-inch rack systems (**DFC SDL**) help simplifying customers everyday life.

With the new **MDL pro**, TOPTICA’s established product line of tunable diode lasers are now available in a transportable and compact design. It combines four tunable diode lasers in one 19-inch module with the same specifications as TOPTICA’s well known **DL pro** and **DFB pro** series. The digital low-noise **DLC pro** controller is at the heart of the newest platform of these tunable diode lasers. The MDL pro combines excellent laser performance with the unique and easy to use standard electronic sub-racks. Such a transportable solution will advance the development of mobile experiments like optical clocks, quantum computers or sensors.



TOPTICA’s frequency combs provide everything that is required for a stabilized diode laser system.



The DFC SDL is a stabilized diode laser system in a transportable 19 inch rack.



The MDL pro integrates up to four DL pro or DFB pro laser modules

Mode-hop-free tuning lasers are an important requirement for more and more applications like micro-cavities, quantum dots and component testing. A new generation of external cavity diode lasers (ECDLs) called **CTL** (continuously tunable laser) is ideally suited for this task. These lasers offer very wide tuning with exceptional resolution while at the same time showing narrow linewidth, lowest noise and drift. The CTL enables quantum technology experiments that were previously not possible with ECDLs. Partly, these improved properties stem from the all-digital controller, **DLC pro**. It offers the lowest commercially available noise figures for diode current, piezo voltages and temperature, resulting in free-running linewidths below 10 kHz. DLC pro also has integrated frequency and power stabilization functionality and is conveniently controlled via an integrated touch/knob interface – or remotely via TCP/IP. It is also responsible for guaranteeing single mode-operation in an active feedback loop (SMILE) and for automatically optimizing the laser cavity (FLOW) if necessary to insure hands-off operation.



TOPTICA's CTL offers mode-hop-free wavelength tuning up to 110 nm.

TOPTICA's frequency-converted diode lasers provide deep-UV wavelengths as short as 190 nm. By providing essential wavelengths like 193 nm, 213 nm, 257 nm or 405 nm in pure cw-TEM<sub>00</sub>-mode quality, the **DLC TA-SHG/FHG pro** is an ideal solution for **testing and inspection** or advanced material processing, e.g. **lithography patterning**. **White-light holography** is served with our tunable solutions around 457 nm, 532 nm and 647 nm. The lasers provide more than enough power for each application. On top of that, they are much easier to handle at considerably lower operating costs.



TOPTICA's TA-SHG pro support lithography patterning for holographic applications.

The multi-laser engine **iChrome CLE** for **biophotonics** provides 405, 488, 561 and 640 nm with 20 mW at the end of the fiber. The iChrome CLE is a cost-effective system for multi-color microscopy applications due to its compact design and economic operation. Even the 561 nm light is generated by a laser diode instead of a solid-state laser, allowing this system to be directly modulated at high speed (1 MHz) while maintaining complete-off, i.e. zero photons, in the dark state. The iChrome CLE is the latest member of TOPTICA's **iChrome** product line which also includes the powerful **iChrome MLE** (up to 100 mW and four laser lines). All iChrome systems have a unified user interface, unique modulation features and COOL<sup>AC</sup>, TOPTICA's proprietary and fully automated beam alignment algorithm guaranteeing consistent power out of the fiber.



The 4-color laser engine iChrome CLE is cost-effective and ideal for confocal microscopy.

For **multiphoton microscopy**, TOPTICA's **FemtoFiber ultra** femtosecond fiber lasers are excellent tools. These ultrafast lasers provide powerful pulses centered at 780 nm (500 mW average power and below 150 fs pulse duration), at 1050 nm (5 W average power with an unprecedented short pulse duration of typically 90-100 fs), as well as 1560 nm (up to 2 W power and 200 fs pulse duration). They are ideal light sources for **multiphoton (SHG) microscopy**, **supercontinuum generation**, **material processing**, as well as **OPCPA or amplifier seeding**.



The FemtoFiber ultra systems provide powerful femtosecond laser pulses.

**Semicon inspection or Raman applications** at 266 nm are enabled by TOPTICA's **TopWave 266**. This industrial-grade, continuous-wave laser system provides 300 mW. It stands out with excellent power stability, low noise and extended lifetime with a digital control architecture and an optimized, completely sealed doubling cavity.



The TopWave 266 provides 300 mW at 266 nm with excellent lifetime >10,000 h.

Contact-free material characterization with unprecedented data rates is now possible thanks to TOPTICA's **TeraSpeed**. This superfast terahertz-sensing platform enables applications like **non-destructive testing, plastic inspection or process control** with a sampling rate of 100 million data points per second. The TeraSpeed complements TOPTICA's unique portfolio of terahertz systems, which also includes **TeraFlash**, a time-domain terahertz platform. **TeraFlash** has an unsurpassed peak dynamic range of 90 dB and a bandwidth of 6 THz. If a frequency-domain terahertz platform is required, TOPTICA's **TeraScan** allows for a frequency resolution better than 10 MHz and a dynamic range up to 100 dB.



Non-destructive testing is possible with TOPTICA's time-domain terahertz platform TeraFlash.

TOPTICA's **Faraday Optical Isolators** are specially designed and manufactured in-house by the laser experts of TOPTICA to give industry-leading performance in single and dual stage configurations. Single stage devices provide at least 38 dB isolation and 85 % transmission (>43 dB and >92 % average) over individual wavelength ranges in total spanning 395 - 425 nm and 630 - 1400 nm. Dual stage models provide at least 60 dB isolation and 80 % transmission (> 67 dB and >90 % average) over individual wavelength ranges in total spanning 640 - 1100 nm. All models are wavelength adjustable and can handle power densities up to 4 kW / cm<sup>2</sup>.



TOPTICA's isolators enable state of the art protection for the most stable lasers in the world.

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*TOPTICA Photonics AG develops, manufactures, services and distributes technology-leading diode and fiber lasers and laser systems for scientific and industrial applications. Sales and service are offered worldwide through TOPTICA Germany and its subsidiaries TOPTICA USA and TOPTICA Japan, as well as all through 11 distributors. A key point of the company philosophy is the close cooperation between development and research to meet our customers' demanding requirements for sophisticated customized system solutions and their subsequent commercialization.*