

Press Release

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New: Deep UV cw Lasers

All diode based UV lasers for scientific and industrial applications

Advanced applications in spectroscopy, micro imaging or material science can be based on wavelength sensitive chemical reactions or smallest focal diameters. In many cases deep UV cw lasers are required.

The typical spectrum of laser requirements comprises:

- Best possible beam quality (fundamental mode)
- Wavelengths, which are suited for photochemical reactions (e.g. < 300 nm)
- Long coherence length (i.e. small linewidth)
- True cw operation (no q-switch, mode locking or quasi cw)
- Reliable setup

The technical realization of these lasers up to now is challenging. Conventional approaches either show poor beam and spectral quality (Excimer lasers) or require high peak powers (q-switch or mode locked solid state lasers). Neither of these approaches fulfills a majority of the requirements mentioned above.

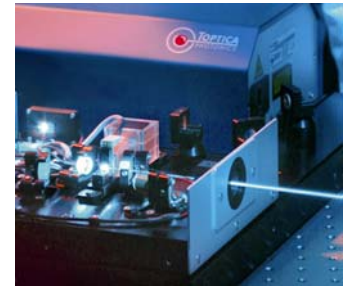
The most promising technical approach for deep UV cw lasers currently is based on frequency converted tunable diode lasers.

Diode lasers can be operated with an extremely small linewidth in the MHz regime using additional grating stabilization. This small linewidth can be used efficiently for resonant enhanced doubling in external frequency converting resonators, hence efficiently doubling the frequency of cw light in the regime of < 1 Watt. By using two frequency doubling steps, powerful IR light from well-proven IR diodes can then be converted into visible and deep UV light.

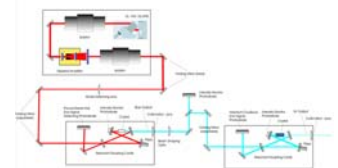
TA-FHG 110 – all diode based deep UV cw laser

The new TA-FHG 110 is an all diode based laser with a wavelength spectrum between 205 and 270 nm.

The maximum optical output power is 15 mW at 243 nm. Based on modular diode laser systems the chosen two stage frequency doubling approach allows to generate cw light in the deep UV range without cooling water and external power supply. A laser linewidth of 4 MHz combined with a mode-



Deep UV cw Laser Light from the Diode Laser System TA-FHG 110.



Principle setup of two stage frequency doubling.

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hop free detuning of 40 GHz are unique features. An automatic relock feature allows frequency scanning of 100 GHz and more. The compact setup of the frequency converting units (size: 410 (D) x 1010 (W) x 150 (H) mm³) is highly interesting for scientific and industrial customers with limited space requirements. All basic laser stages (IR diode laser, Amplifier, frequency doubling stages) are developed and manufactured by TOPTICA, providing the customer a well integrated solution out of one hand to the customer.

Deep UV cw applications

The TA-FHG 110 will find interest initially in the research arena, but also will stimulate an interest in a multitude of commercial UV applications.

The main focus on scientific applications will be driven by the fact, that finally practical-to-use-atoms like Cr, Ag, Au, Si, Mg can be resonantly excited and spectroscopically analyzed, e.g. for magneto-optical trap experiments.

Industrial imaging or interferometry applications especially appreciate the combination of short wavelength and high coherence length. Typical applications include lens testing, ellipsometry setups for material thickness analysis or photo electron spectroscopy/microscopy.

Material science or processing applications are looking for lasers with short wavelength for photochemical reactions and a beam quality, which can be steered via galvo driven scanners. One key feature is the requirement that the laser should not be q-switched, since this will lead to irregular pulsed processing pattern, when using vector based motion systems. Typical applications include lithography, mastering, glue curing or polymer hardening.

Many of these applications are longing dearly for a substitute to current gas or dye laser based technologies.

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 is offered worldwide through TOPTICA Germany and its subsidiary TOPTICA USA, as well as all through 12 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 commercialisation.

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