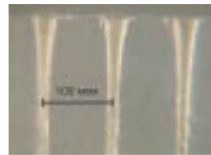
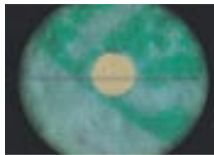


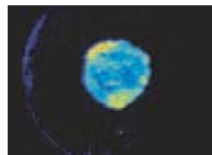
# DEEP SEA<sup>TM</sup> Excimer Lasers

Wide range of applications

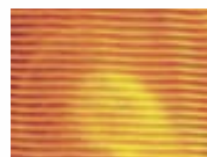
## Micromachining



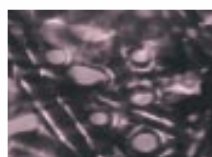
## Fluorimetry



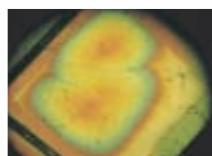
## MEMS and diffraction gratings



## Self-organizing structures



## Semiconductor structures



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## DEEP SEA DS5000

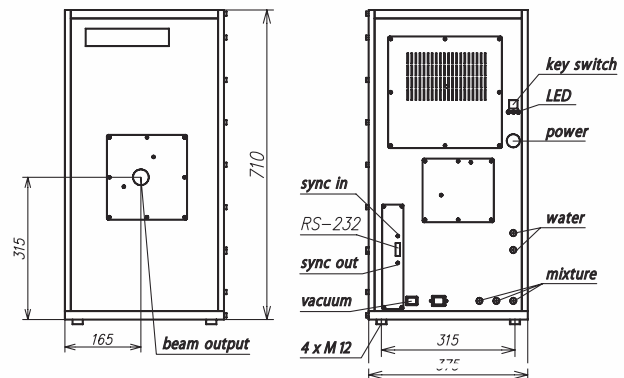
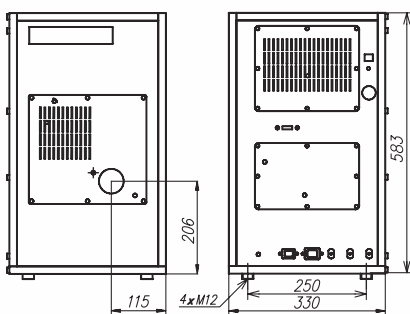
	ArF	KrF	XeCl
Wavelength <sup>1</sup>	193 nm	248 nm	308 nm
Tube material	Ceramic		
Preionization	Spark or STSD-corona <sup>1</sup>		
DC 5100	Spark or STSD-corona <sup>1</sup>		
DC 5200	STSD-corona <sup>1</sup>		
DC 5300	STSD-corona <sup>1</sup>		
Nominal Pulse Energy	20 mJ	40 mJ	25 mJ
Average power			
DC 5100	2 W	4 W	2,5 W
DC 5200	4 W	8 W	5 W
DC 5300	5 W	10 W	7 W
Max Rep Rate			
DC 5100	100 Hz		
DC 5200	200 Hz		
DC 5300	300 Hz		
Pulse duration <sup>2</sup>	8-10 ns	9-11 ns	
Stability of pulse energy	$\sigma < 2\%$		
Beam size <sup>3</sup>	5 × 12 mm	6 × 12 mm	
Beam divergency <sup>2</sup>	2 × 4 mrad (stable resonator)		
Time jitter	$\sigma < 2$ ns		
Dimensions	800 × 330 × 583 mm (L×W×H)		
Weight	80 kg		
Cooling	Air		
DC 5100	water < 1 liter/min		
DC 5200/5300	water < 1 liter/min		
Power	220V / 50Hz, 10 A, ≤ 1000 VA		
Gas	1 premix cylinder		
Control	RS 232, DOS/W indows		

## DEEP SEA DS7000

	ArF	KrF	XeCl
Wavelength <sup>1</sup>	193 nm	248 nm	308 nm
Tube material	Ceramic		
Preionization	Spark		
Nominal Pulse Energy	250 mJ	400 mJ	300 mJ
Average power			
DC 7020	5 W	10 W	6 W
DC 7050	10 W	20 W	15 W
DC 7100	20 W	40 W	25 W
Max Rep Rate			
DC 7020	20 Hz		
DC 7050	50 Hz		
DC 7100	100 Hz		
Pulse duration <sup>2</sup>	17 ns	20 ns	20 ns
Stability of pulse energy	$\sigma < 2\%$		
Beam size <sup>3</sup>	6 × 20 mm	6 × 21 mm	7 × 22 mm
Beam divergency <sup>2</sup>	1,5 × 4,5 mrad (stable resonator)		
Time jitter	$\sigma < 2$ ns		
Dimensions	1360 × 382 × 720 mm (L×W×H)		
Weight	170 kg		
Cooling	Air		
DC 7020	water < 1 liter/min		
DC 7050/7100	water < 1 liter/min		
Power			
DC 7020	220V / 50Hz, 10 A, ≤ 1500 VA		
DC 7050	220V / 50Hz, 10 A, ≤ 1800 VA		
DC 7100	380/220V, 50Hz, 10A, ≤ 3500 VA, 3 phases		
Gas	1 premix cylinder		
Control	RS 232, DOS/W indows		

Specifications are subject to change without notice due to product improvements

- 1 - 157 nm - optional
- 2 - 1 kHz - optional
- 3 - FW HM



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## DEEP SEA™ Excimer Lasers

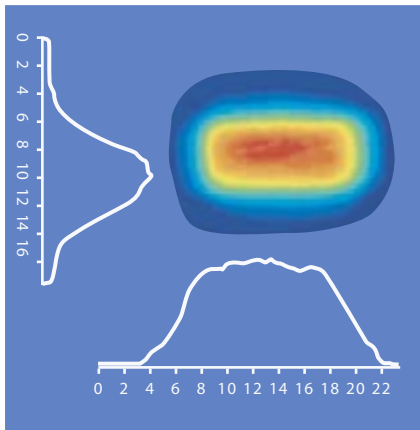
- UV-radiation 157, 193, 248, 308, 351 nm
- ceramic discharge chamber
- single unit design
- power stabilization
- single gas vessel (premix gases)
- computer control



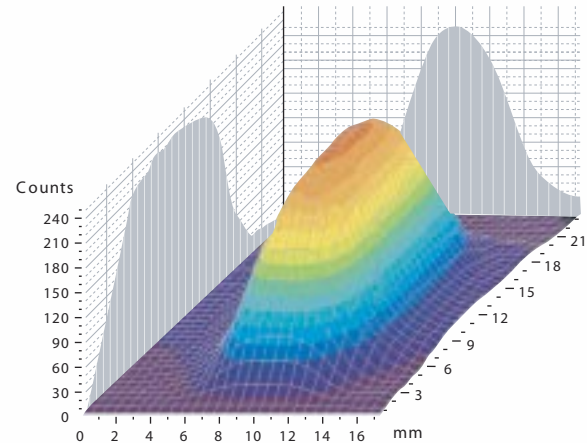
Discharge Chamber CL 5000

## Beam Profile

Distribution of the laser beam intensity for DEEP SEA excimer lasers



2-D beam profile of DS5000 (ArF) excimer laser at the distance of 40 sm from the output mirror. Beam size: 12 × 5 mm.



3-D beam profile of DS (ArF) excimer laser at the distance of 40 sm from the output mirror. Beam size: 12 × 5 mm.

## DEEP SEA Navigation™ Software

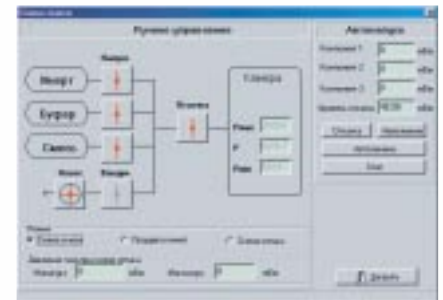
DEEP SEA™ excimer lasers are controlled by DEEP SEA navigation software running under Windows™. This multifunctional program allows not only operating the laser and controlling its state but also has a whole range of functions for diagnostics and maintenance. It comprises manual and auto change of mixture, registration of the basic laser parameters (pressure, energy) over the time as well as their graphic representation.



Oscilloscope panel



Main program panel



Gas mixture panel

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## Scientific Research

Excimer Lasers DS – a source of power UV-radiation in the wide wavelength range 308, 248, 193, 157 nm.

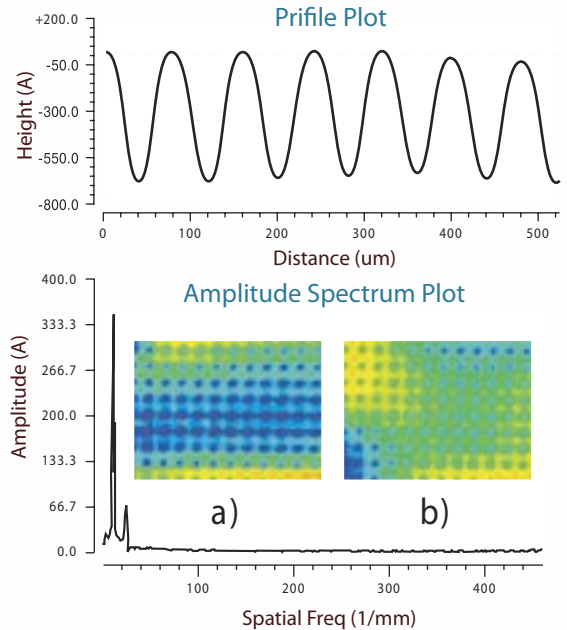
Applications:

- dye lasers pumping, used in spectroscopy and isotope separation
- LIF-spectroscopy (narrow band version of DS lasers)
- optic lithography with high resolution for ICs production
- production of planar diffraction structures and diffraction gratings in optical fiber (version of DS 7000 lasers with high spatial (>10 mm) and time (>2 mm) coherence)\*
- material microprocessing – engraving, marking, drilling (polymers, ceramics, glass, superhard alloys, diamonds)

\* S.K.Vartapetov, M.A.Kurzanov, A.Z.Obidin, Y.V.Larionov, A.A.Rybalovskiy. Excimer laser with extended Coherence. International Conference of Lasers 2001. December 3-7, 2001. Tucson, US.

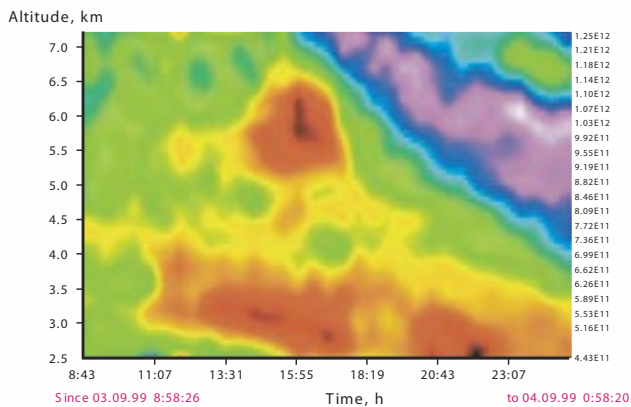
\* I.A.Bufetov, M.M.Bubnov, Y.V.Larionov, M.A.Melkoumov, A.A.Rybalovskiy, S.L.Semjonov, E.M.Dianov, S.K.Vartapetov, A.Z.Obidin, M.A.Kurzanov. 1480 nm Two-cascaded Highly Efficient Raman Fiber Laser. CLEO 2002.

\* K.M. Golant, O.V. Butov, A.N. Denisov, V.M. Mashinsky & O.D. Sazhin, C.M. Smith, S.V. Muraviov, Oxygen Deficient Centers in Germanosilicate Glassy Films Synthesised by Hydrogen free Plasmachemical Deposition. Published in Physics and Chemistry of Glasses. Proceedings of the 19th International Congress on Glass, July 1–6, 2001, Edinburgh, Scotland.



Surface relief on germanosilicate film, obtained by DS 5100 excimer laser through phase mask a) 248 nm KrF; b) 193 nm ArF

## Lidars



Temporal evolution of tropospheric ozone distribution obtained by lidar with excimer laser Series DS 7000

Compact and powerful excimer lasers DS are widely used in atmospheric studies. The most common types of lidars based on such lasers are: stratospheric ozone lidar (XeCl with Raman shifter)\*, tropospheric ozone lidar (KrF with Raman shifter)\*\*, Raman (XeCl, XeF) lidar for the measurements of water vapor and aerosols in troposphere, day time Raman lidar (KrF) with high spatial resolution, fluorescent lidar (XeCl, KrF).

\* V.S.Bukreev, S.K.Vartapetov, I.A.Veselovskii, A.S.Galusov, Y.M.Kovalev, E.S.Svetogorov, S.S.Khmelevtsov. Combined lidar system for stratospheric and tropospheric ozone measurement. Appl.Phys. B 62, 97 101 (1996).

\*\* I.Veselovsky, B.Barchunov. Excimer laser based lidar for tropospheric ozone monitoring. Appl. Phys. B 68, 1131-1137 (1999).

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