Workshop of Photonics

FemtoLAB-kit

Laser micromachining system for laboratory use

System Features

- XYZ high accuracy sample positioning

- Beam delivery and shaping for selected wavelengths*

- Control of entire system through single-window software

- Easily extendable, custom design

- 1 year warranty**

* laser source provided by end user or third party

** extendable upon request

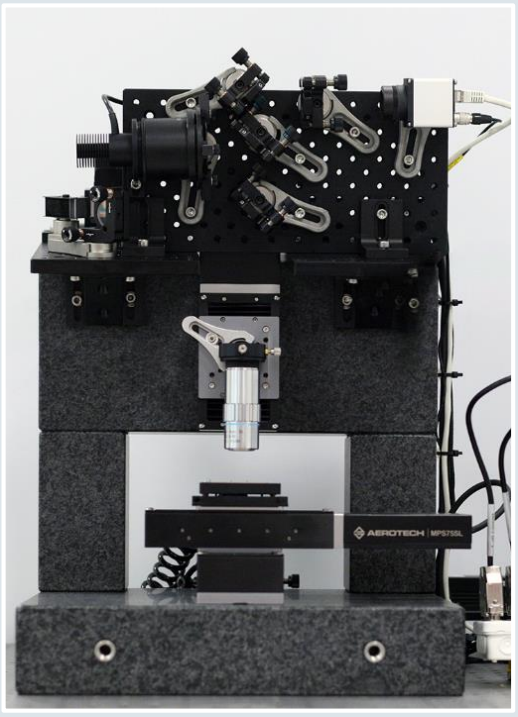


Fig. 1 FemtoLAB kit

Applications (*depends on end user laser)

- Surface micro- and nano-structuring

- Selective ablation

- Micro-drilling

- 3D direct laser writing

- Refractive index modification

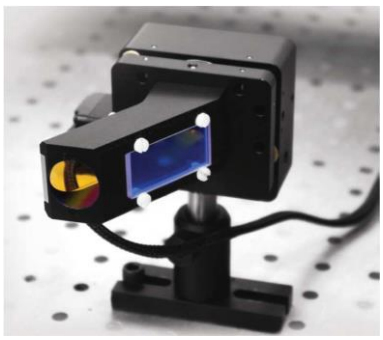
- Dicing and cutting

- Multiphoton polymerization (mPP)

Mokslininku st. 6A, Vilnius LT-08412, Lithuania, tel.: 370-5-2725738, fax: 370-5-2723704, e-mail: info@wophotonics.com, www.wophotonics.com

Workshop of Photonics

Standard system specifications

Model	Specifications	Value	Unit
XYZ positioning stages			
	Total travel XYZ	50x50x25 (160x160x160*)	mm mm
	Accuracy	±3 (±0,25*)	µm
	Resolution	0,1 (0,001*)	µm
	Max speed	50 (500*)	mm/s
	Max. load	3	kg
	Repeatability	±0,75 (±0,075*)	µm
	XYZ ortogonality	5	arc sec
	In-Position Stability	±0,1 (±0,001*)	µm
	Integrated sample holder with tilting	yes	
	* with ANT-PLUS series * parameters may be customized upon request		
XYZ controller			
	Amplifiers	PVM	
	Continuous Current	5	A
	Peak Current	10	A
	Number of Axes	3	
	Power Supply	240	VAC
	Position synchronized output (XY)	dual PSO	
	Connection to PC	LAN	
Motorized power attenuator			
	Model	ULTRAFAST with zero order waveplate	
	Aperture diameter	15 mm	
	Antireflection Coating	R <0.25 %	
	Time dispersion	t<4 fs for 100 fs	
	Polarization Contrast	>500:1	
	Automated power calibration	yes	

Mokslininku st. 6A, Vilnius LT-08412, Lithuania, tel.: 370-5-2725738, fax: 370-5-2723704, e-mail: info@wophotonics.com, www.wophotonics.com

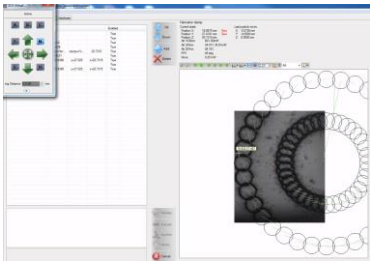
Workshop of Photonics

Focusing optics

NA	0.42 or higher	
Focal length	4 or smaller	mm
Working distance	17*	mm
Focus spot size	≈3*	µm

* depends on objective selected and customers laser

Machine vision

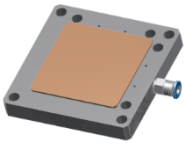


Coaxial lightning	@590	nm
CCD matrix size	1280x1024	
Resolution	1	µm
Speed (GigE interface)	15	fps

Beam delivery

Dielectric mirror HR	99,5	%
No dispersion		

Sample holder with vacuum chuck



Porous stone	
Air to vacuum converter	yes

SCA Software (Controls all system devices)

Laser triggering	on/off
Pulse rep. rate	Yes, if laser supports
Power attenuation	Yes
Position stage control	yes
Supported file types	DXF, STL, BMP, PLT, TXT, FAB

SCA manual available online: http://www.wophotonics.com/products/laser-software/laser-machining-software-sca-professor-v2-5/

Mokslininku st. 6A, Vilnius LT-08412, Lithuania, tel.: 370-5-2725738, fax: 370-5-2723704, e-mail: info@wophotonics.com, www.wophotonics.com

Workshop of Photonics

Optional features

- Galvanometer scanners
- Safety enclosure
- External safety/modulation shutter
- Autofocus system
- Spatial light modulator
- Polarization rotator
- Polarization converter (Circular, radial or azimuth)
- your device integration

Principal optical system scheme

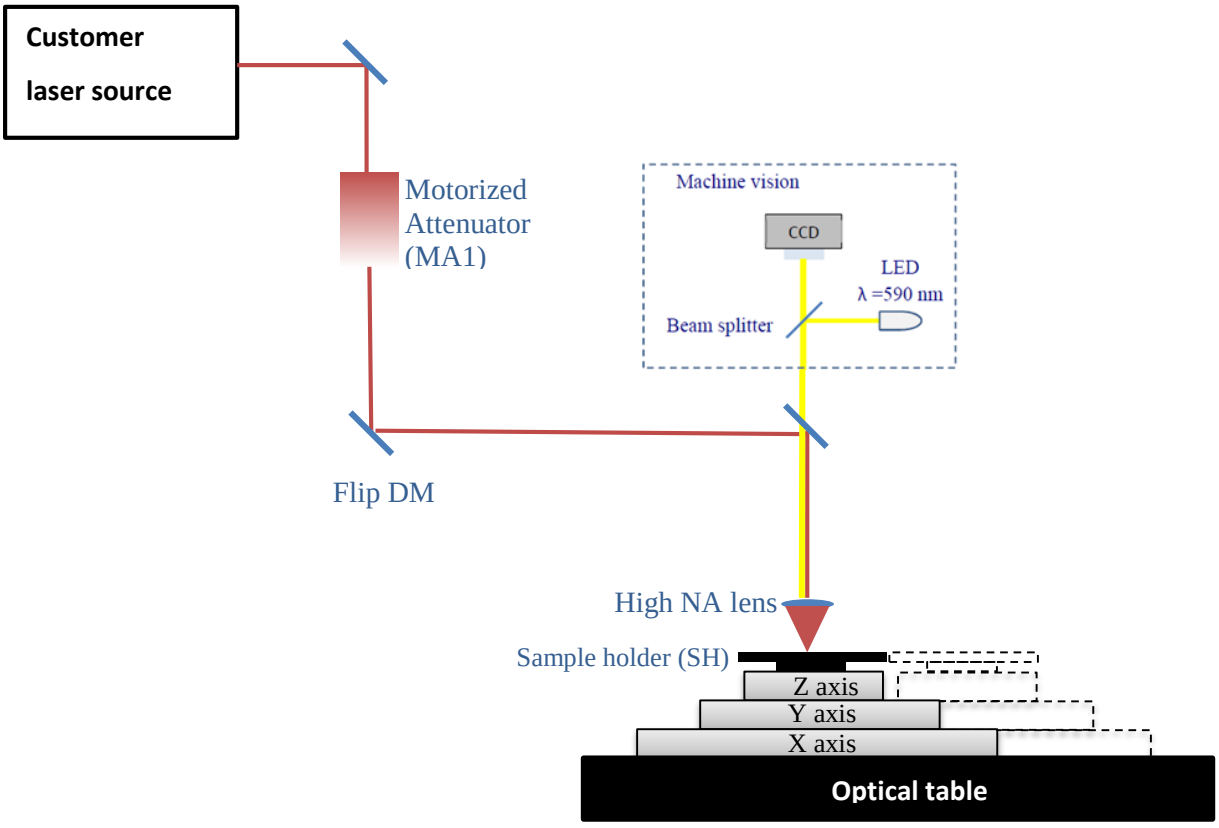


Figure 1 principal optical femtoLAB scheme: motorized attenuator (MA1) for power control, high reflection dielectric mirrors (DM), machine vision, focusing optics, high precision XYZ sample positioning system with integrated sample holder. Optical path designed to minimally widen pulse duration. System will be built on an optical table which ensures stable surface - system footprint is less than 1000x1000 mm (without laser sources).

Mokslininku st. 6A, Vilnius LT-08412, Lithuania, tel.: 370-5-2725738, fax: 370-5-2723704, e-mail: info@wophotonics.com, www.wophotonics.com

Workshop of Photonics

Installation and trainings

Installation and trainings are quoted separately upon request.

Test and acceptance

After system installation a test of system parameters can be performed by customer together with Altechna R&D.

System configuration

Main components of the system are listed in quotation. Minor components and exact configuration is determined during system design stage.

Set of spare optical components (mirrors, beam splitters, polarizers) is included in system price.

Delivery Terms

System will be assembled and tuned in Lithuania by Altechna R&D or its subcontractors.

Final system commissioning will take place in at customer site. It may be performed by experienced and trained customer's staff or Altechna R&D or its subcontractors.

Customer is responsible for preparation of installation premises.

Maintenance Terms

All technical issues during the warranty period, arising from proper use of the system should be solved by Altechna R&D or its subcontractors.

Any technical issue should be discussed through Skype or phone and effort should be made from both sides to solve the problem in a distance through consultations.

If remote solving of the problem fails, system should be packed and shipped to Vilnius, Lithuania for repairs. A visit by a service engineer from Altechna R&D or its subcontractors can be quoted on request.

After the warranty period expires, Altechna R&D ensures fee based maintenance for a period of 10 years.

Warranty

The key components of the system bear one year of warranty as a default. Extension of warranty of the system will be quoted on request. Laser beam delivery, focusing and harmonic generator optics shall be treated as consumables, therefore only limited installation warranty is valid for two weeks after installation.

Mokslininku st. 6A, Vilnius LT-08412, Lithuania, tel.: 370-5-2725738, fax: 370-5-2723704, e-mail: info@wophotonics.com, www.wophotonics.com

Workshop of Photonics

Fabrication samples

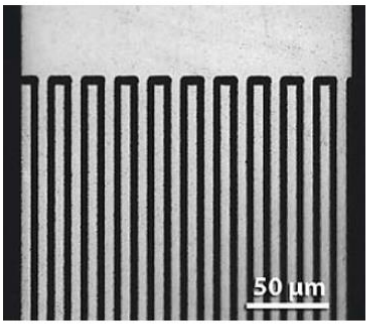


Fig. 1. Selective thin chromium layer ablation from $LiNbO_3$ crystal surface (Pharos-10W laser, 1030 nm fundamental output). *Courtesy of Workshop of Photonics, Altechna R&D Ltd.*

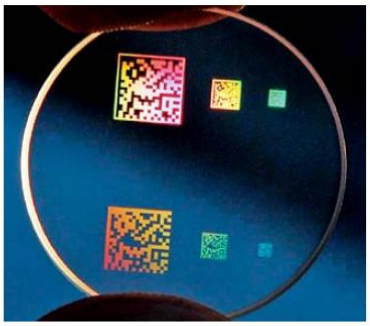


Fig. 2. Sapphire bulk marking Colors produced by diffraction from printed microscopic structures. *Courtesy of Workshop of Photonics, Altechna R&D Ltd.*

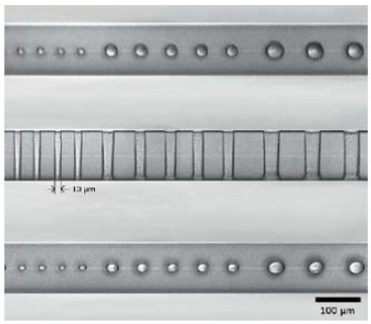


Fig. 3. Example of single mode fibre drilling (Pharos-10W laser, 343 nm third harmonic output). *Courtesy of Workshop of Photonics, Altechna R&D Ltd.*

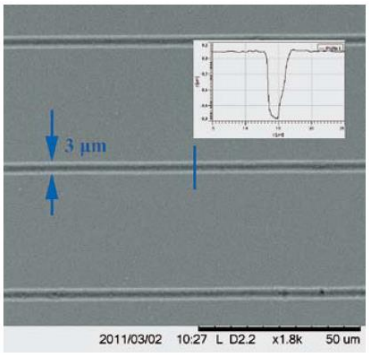


Fig. 4. Machining of grooves in fused silica for micro fluidic applications (Pharos-10W laser, 257 nm). *Courtesy of Workshop of Photonics, Altechna R&D Ltd.*

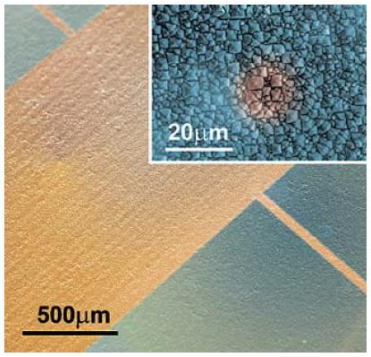


Fig. 5. Contact pathways opened by Pharos laser beam in dielectric SiN_x coated cSi solar cell. Inset – SiN_x layer selectively removed from the front surface of cSi wafer for subsequent Ni deposition. *Courtesy of Workshop of Photonics, Altechna R&D Ltd.*

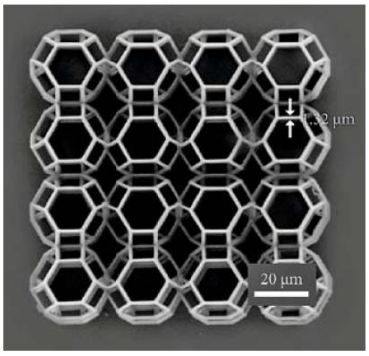


Fig. 6. Cell 3D scaffolding of biocompatible polymer produced by two photon photopolymerisation. *Courtesy of Vilnius University, Laser Research Center.*

Mokslininku st. 6A, Vilnius LT-08412, Lithuania, tel.: 370-5-2725738, fax: 370-5-2723704, e-mail: info@wophotonics.com, www.wophotonics.com