

Ophthalmology

3mikronTM - High-power, diode pumped laser technology (2 - 3 μm)

Starting in 2000 many experiments were performed regarding the usage of flashlamp pumped Er:YAG-lasers for ophthalmologic applications by different institutes and companies. The results clearly show, that contrary to ultrasound systems flashlamp pumped Er:YAG-laser can be used for cataract extraction (including precise capsulorhexis) as well as for vitrectomy. As regards cataract extraction it has several benefits as listed in the box on the right:

Our new generation diode pumped Er:YAG laser based on the 3mikronTM technology extends the advantages of the flashlamp pumped Er:YAG-laser while at the same time removing flashlamp laser's disadvantages because of its high efficiency, compactness and high repetition rates.

In the last few years several companies presented femtosecond laser systems, which are comparable to 3mikronTM lasers as regards the clinical advantages for cataract extraction. However compared to 3mikronTM femtosecond technology isn't recommendable for hard lenses and its costs are about 10 times higher.

APPLICATION BENEFITS

- . Less invasive
- . Easier to use
- . Suitable for hard lenses
- . Suitable for precise capsulorhexis
- . Less heating of surrounding tissue

Comparison of different technologies for ophthalmologic applications

	3m.i.k.r.o.n. TM Phaco*	Ultrasound Phaco	Flashlamp Phaco*	Femtosecond Laser*
Invasiveness	very good	medium	good	very good
Usability	very good	medium	good	?
Hard lenses	very good	medium	very good	low
Heat	x/10	x	x/10	?
Speed	very good	very good	low	very good
Size	460 x 380 x 250 mm ¹	380 x 350 x 150 mm ²	360 x 650 x 970 mm ²	> flashlamp phaco ²
Weight	12 kg ¹	15 kg ²	85 kg ²	> flashlamp phaco ²
Repetition rate	up to 2 kHz	n.a.	up to 30 Hz ²	up to 30 kHz ²
Cost	x	x	x	10x

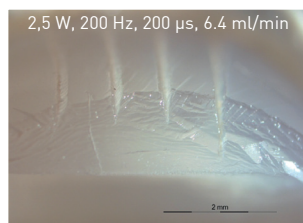
* Ophthalmologic systems are not (yet) commercially available.

¹ P.L.E.A.S.E.® Professional device (intraepidermal drug delivery, dermatology & aesthetics); www.pantec-biosolutions.com.

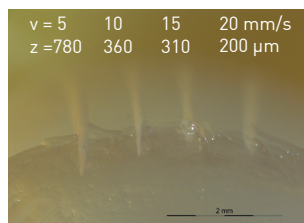
² Typical device.

All specifications and ratings are assumptions based on literature.

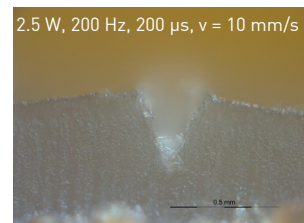
This work was done in cooperation with the Institut für Lasertechnologien in der Medizin und Meßtechnik at the University of Ulm, Germany



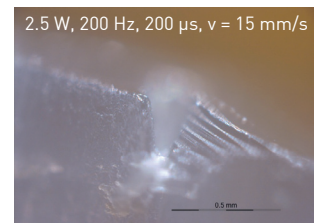
Humid pork lenses, > 365 days in formalin



Humid pork lenses, > 365 days in formalin

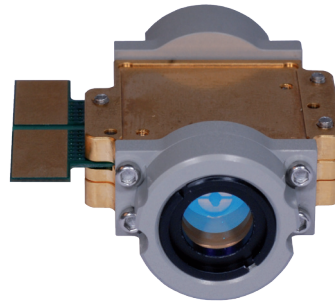


Humid pork lenses 72h in formalin



Humid pork lenses 24h in formalin

Optical parameters	DPM-2 (HE)
Technology	Monolithic DPSSL
Wavelength	2940 nm
Average Output Power (max)	2 W
Pulse Energy (max)	10 mJ (HE: 50 mJ)
Pulse Repetition Rate	up to 2 kHz (HE: 30 Hz)
Pulse Duration	30 to 250 μ s (HE: 2 ms)
Duty Cycle (max)	10%
Mode of Operation	Pulsed
Ideal Fiber Diameter	$\leq 100 \mu$ m
Beam Quality	$M^2 < 5$
Efficiency (optical-optical)	$\sim 10\%$
Divergence (half angle) (mrad)	< 25 mrad
Beam Diameter	0.6 mm
Beam Shape (focus)	top hat like



Pantec Medical Laser strives for innovative solutions in the field of minimal-invasive laser based medical engineering. As exclusive supplier of unique laser technologies - 3mikron™ and fam™ - Pantec Medical Laser provides customized solutions from laser unit to complete application devices. Pantec Medical Laser is a business unit of Pantec Engineering AG.



Pantec Engineering AG provides solutions in automation and mechatronics for the mechanical engineering and medical device industries worldwide. Through its rigorous focus on niche strategies and high degree of service orientation, the company has become a world leader in its five primary markets.

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