PICO HELIOS 785

Empowering
PICO with NANO

LASEROPTEK®
Transforming Technology to Enrich Your Life

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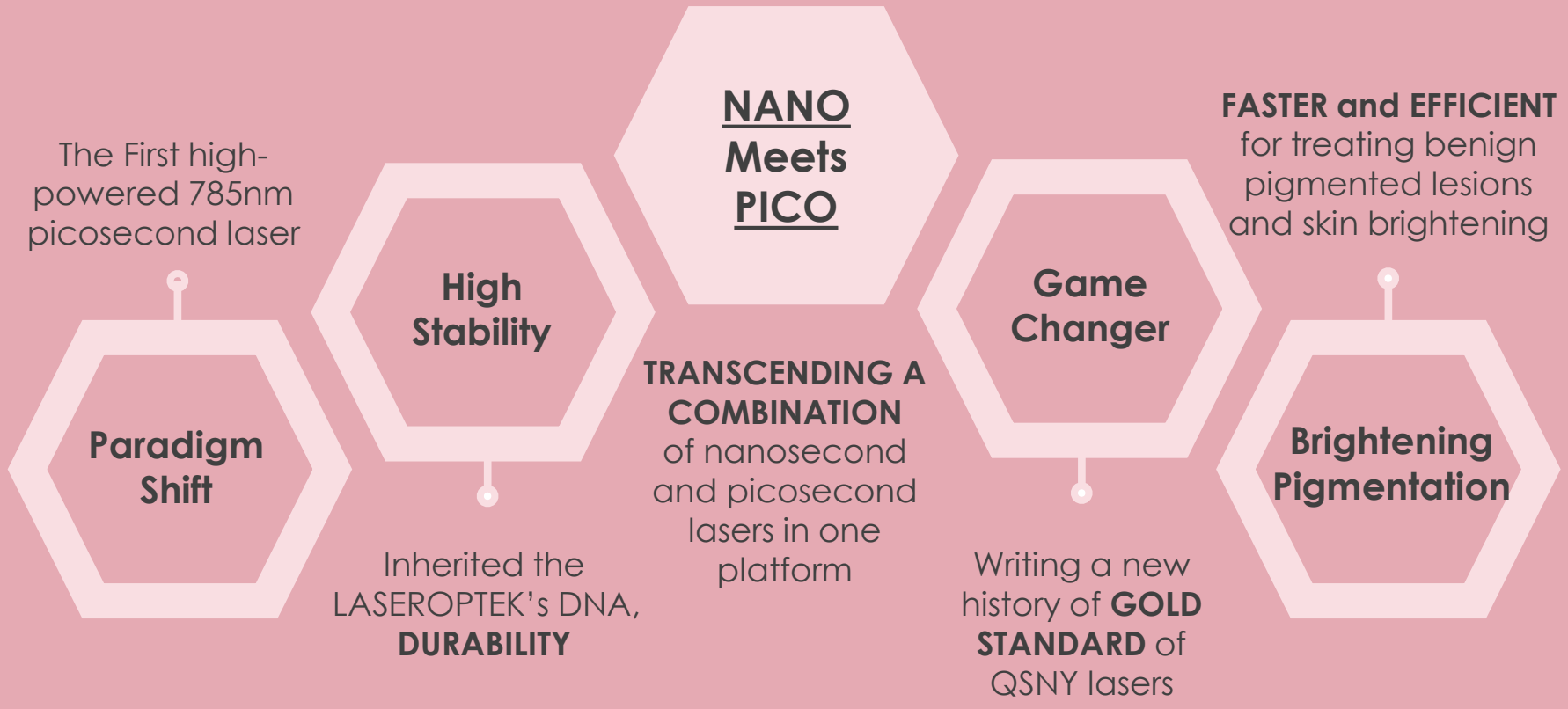
KEY BENEFITS



TECHNICAL SPECIFICATIONS

	Nanosecond		Picosecond
Wavelength (nm)	1064	532	785
Pulse Energy (mJ)	100 – 1400 300 – 2000 (RTP)	20 – 500	10 – 200
	300 – 3000 (FR)		
Pulse Duration	5 – 10 ns 300 µs (FR)		600 ps
Repetition Rate (Hz)	1 – 10		
Spot Size (mm)	5 x 5	4 x 4*	5 x 5
	1 – 7 (Zoom)		1 x 1 – 7 x 7
	5 – 10 (Zoom Colli)		7 x 7 (Colli)
Handpiece	1064 FX Zoom Zoom Collimator		Dia FX 785 S 785 Zoom 785 Collimator
Display	10.4" 1024 x 768 TFT LCD		
Dimension (mm)	298 (W) x 819 (D) x 936 (H)		
Weight (kg)	80		

OPTIONAL			
Wavelength (nm)	532	595	660
Pulse Energy (mJ)	20 – 500	300	200
Repetition Rate (Hz)	1 – 10		
Spot Size (mm)	4 x 4		
Handpiece	532 FX	595 Dye	660 Dye

CONFIGURATION

System

Handpieces

*optional

NEW GRAPHIC USER INTERFACE

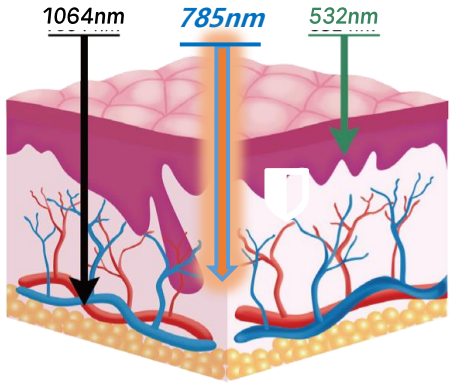
WHY **785nm** WAVELENGTH?

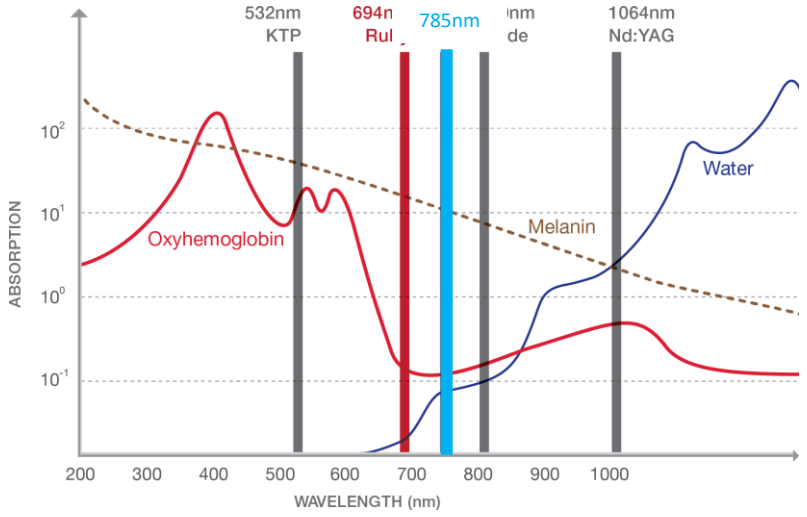
- Optimized 785nm wavelength for treating benign pigmented lesions and skin brightening
- High stability implemented by LASEROPTEK's proprietary picosecond technology enable faster and safer treatment
- Stronger melanin absorption than 1064nm
- Good for blue and green tattoo ink removal
- Minimized PIH

Faster Result

Safer for Darker Skin

Optimized for Pigmented Lesions

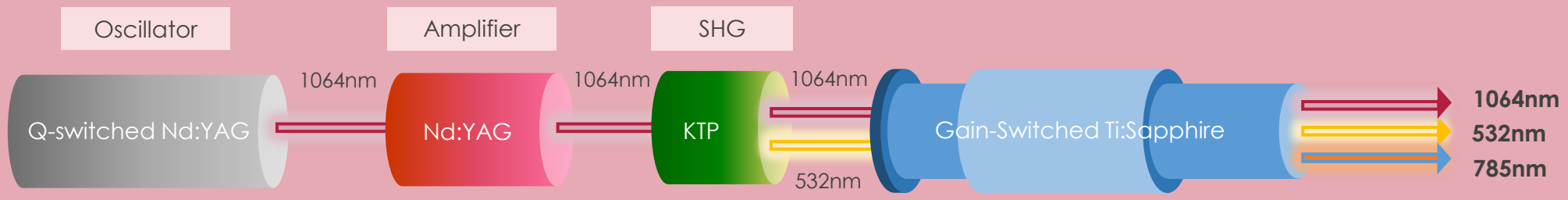




REDEFING CUTTING EDGE TECHNOLOGY

Unique Laser Resonator Design

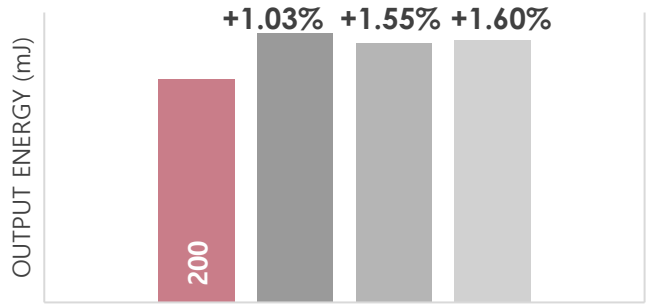
- LASEROPTEK's unique design of a solid-state laser resonator enables 785nm true pico pulse and 1064/532nm nano pulses in one platform.
- LO's micro cavity design enabled the high-power Ti:Sapphire laser.



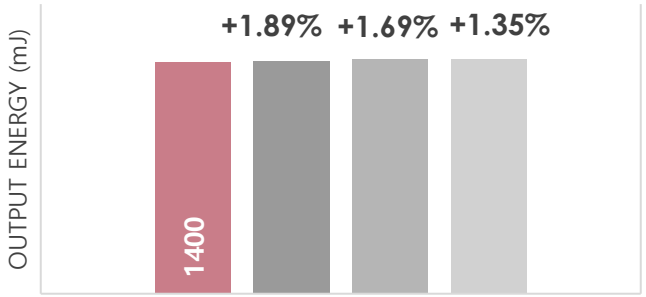
Simplified H785 Laser Resonator Design Scheme

CONSTANT STABLE OUTPUT ENERGY & PULSE DURATION

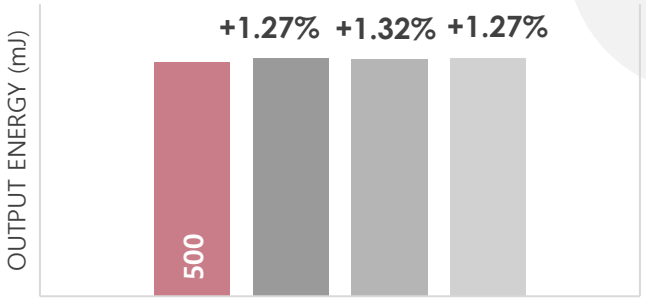
Std Dev for Output Energy
< 2%



785nm



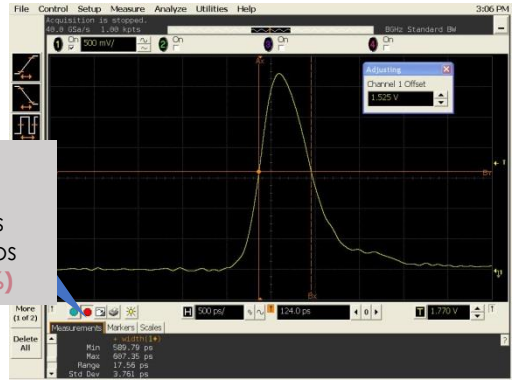
1064nm



532nm

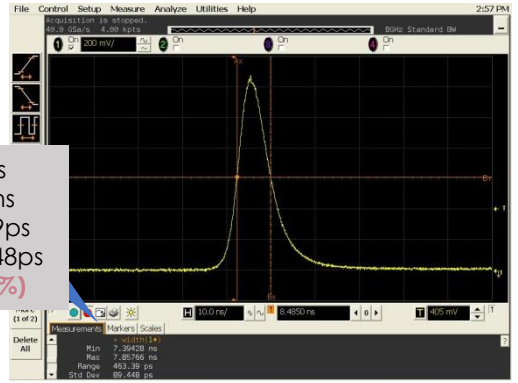
H4 1-10 11-20 21-30

Std Dev for Pulse Duration
< 1%



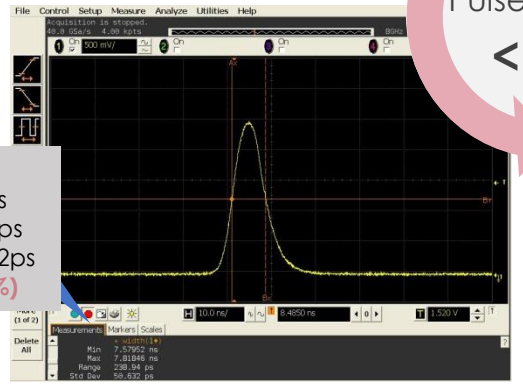
Min: 589.79ps
Max: 697.35ps
Range: 17.56ps
Std Dev: 3.761ps
(0.58%)

785nm



Min: 7.39428ns
Max: 7.85766ns
Range: 463.39ps
Std Dev: 39.448ps
(0.52%)

1064nm



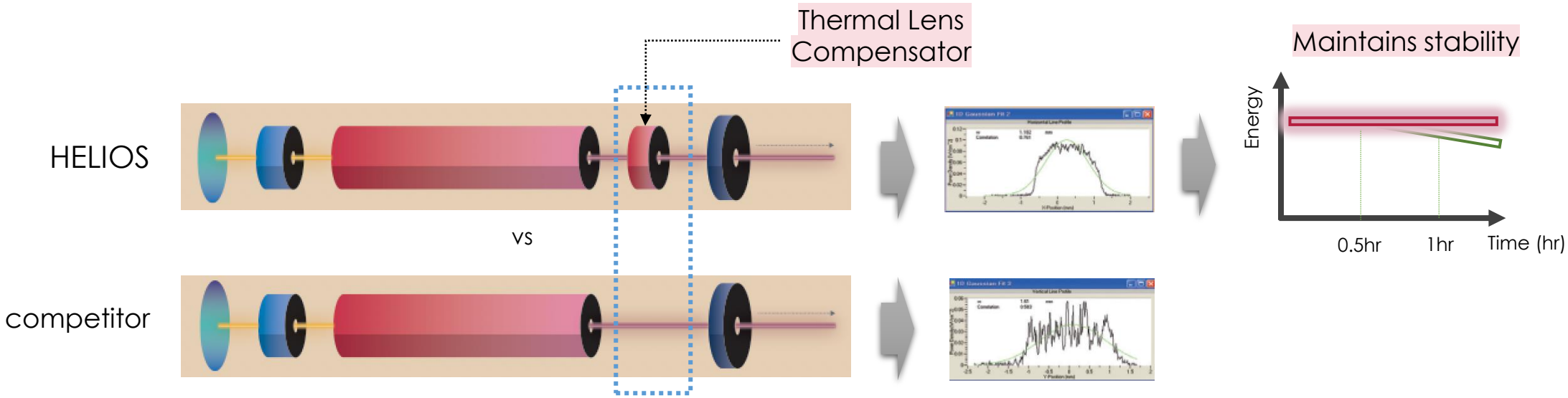
Min: 7.57972ns
Max: 7.81846ns
Range: 238.94ps
Std Dev: 50.632ps
(0.66%)

532nm

Above output energy values were measured using an energy meter and pulse duration graphs using an oscilloscope

THERMAL LENS COMPENSATING TECHNOLOGY

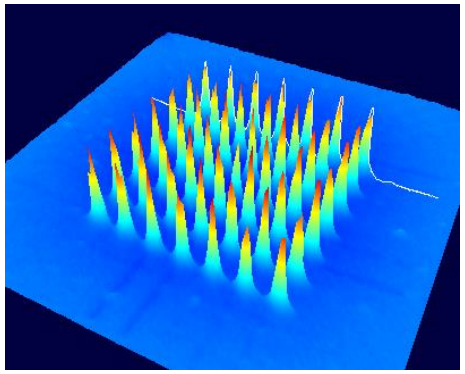
LASEROPTEK's proprietary thermal lens compensating technology prevent not the only thermal lens but also thermal birefringence to keep a very uniform beam quality and high output energy stability.



PROPRIETARY DOE FRACTIONAL TECHNOLOGY

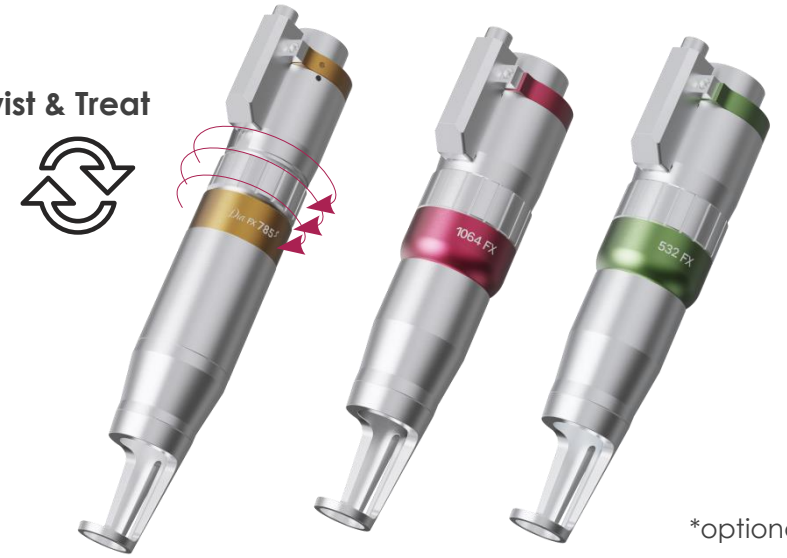
LASEROPTEK adopts DOE technology to its fractional handpieces. DOE (Diffractive Optical Element) is designed to split a single laser beam into a predefined number of beams. Each microbeam has uniformed energy intensity and penetration depth. The characteristic of DOE is that the quality of the output laser beam is independent of that of the input beam helps the output laser beams uniform and stable all the time.

Dia FX 785 S is available in 5mm x 5mm



Dia FX 785 S's 49 DOE micro beams

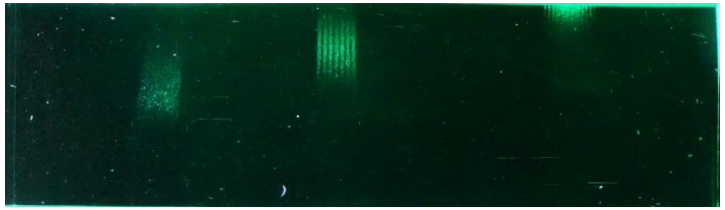
Twist & Treat



*optional

Dia FX 785 ***S*** 1064 FX 532 FX*

Dia FX 785 Penetration Depth



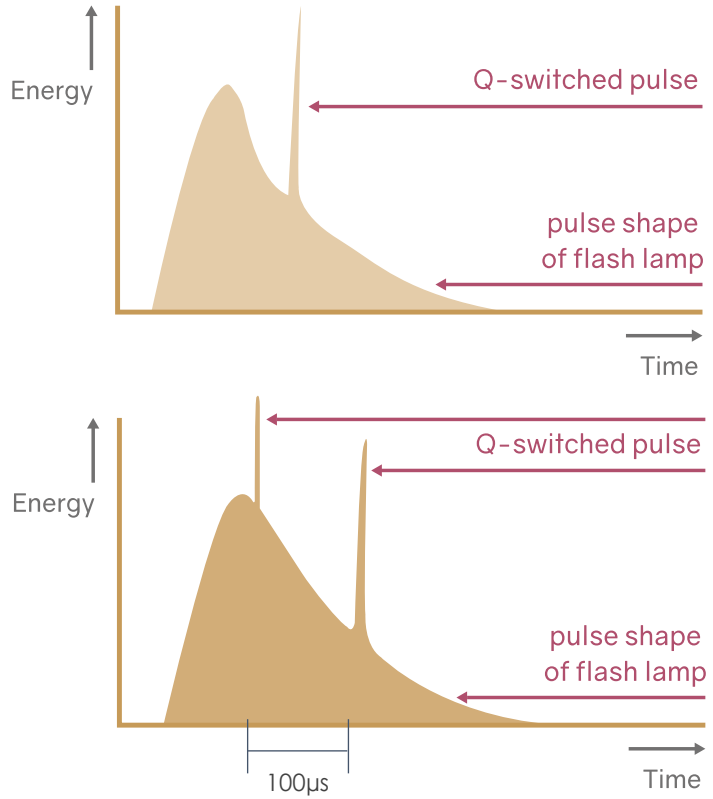
Lv. I Lv. II Lv. III

*Tested on crystal

MULTIPLE LASER MODES

RTP (Real Twin Pulse) Mode

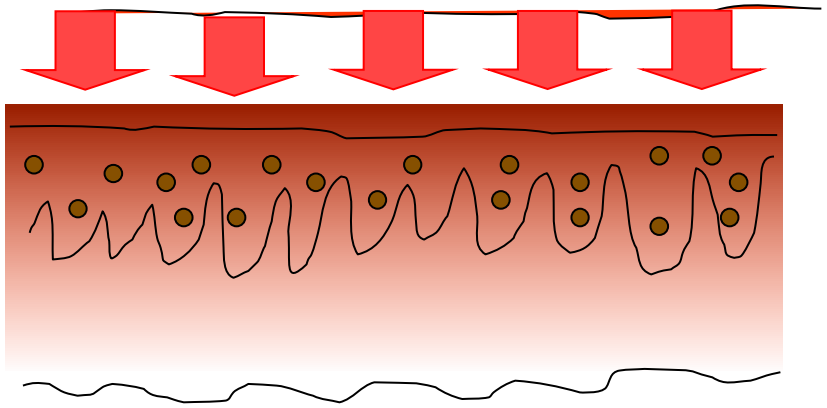
Core technology to have the same energy between two identical pulses



FR Mode

Genesis (Quasi Long) technique mechanism of action

Quasi- Long Pulse (300μs) Nd:YAG Laser Beams



**** Stimulates skin cells regeneration***

WHAT'S NEW FROM HELIOS III (Nd:YAG)

	HELIOS III	HELIOS 785
Pulse Energy	Max 1300mJ Min 500mJ (RTP/FR)	Max 1400mJ Min 300mJ (RTP/FR)
Spot Size	1 – 8mm	1 – 10mm
Handpiece	1064/532 FX Zoom Collimator	1064 FX, 532 FX* Zoom Zoom Collimator
Display	10.4" 800 x 600 TFT LCD	10.4" 1024 x 768 TFT LCD
Facilities		Energy meter implemented Improved Zoom sensing Improved energy output efficiency

Energy meter implemented to monitor output energy status

Improved Zoom handpiece's sensing type to minimize sensing errors (Image sensing type)

Re-designed to improve the energy output efficiency

*optional

COMPARISON

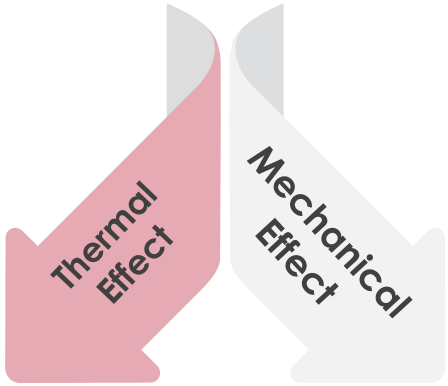
Specifications	HELIOS 785	A	B
Wavelength	785nm	785nm	755nm
Pulse Energy	Max 200mJ	Max 85mJ	Max 200mJ
Pulse Duration	600ps	300ps	750ps
Peak Power	0.33GW	0.28GW	0.26GW
Repetition Rate	1 – 10Hz	1 – 5Hz	
Handpieces	Dia FX 785 S 785 Zoom 785 Collimator	785nm Ti:Sapphire	755 Zoom Fixed H/P

COMPARISON

Model	HELIOS 785	Revlite SI	PicoSure	StarWalker QX	Q Plus C Evo	Hollywood Spectra
Manufacturer	LO	Cynosure	Cynosure	Fotona	Quanta	Lutronic
Laser Type	Pico/QSNY	QSNY/ Dye	QS Alexandrite	QSNY	QSNY +Ruby	QSNY
Wavelengths (nm)	1064/532/785 *595/660	1064/532/ 585/650	532/755	1064/532 *585/660	1064/532/694	1064/532 *585/660
Pulse Energy (mJ)	1064: ~1400 532: ~500 FR: ~3000 1064RTP: ~2000 **785: ~200**	1064: ~1600	755: 200 532: 20	1064: ~1600 532: ~600 1064 long: ~15000 532 long: ~2000	1064: ~1500 532: ~500 694: ~1200	1064: ~ 1200/1400 532: ~ 400 Spectra: ~1500
Pulse Duration	**785: 600ps** 5~10nsec FR: 300µs RTP: 5 - 10nsec	5~20ns <7ns (585/650 dye)	532: < 600ps 755: 750ps	5~20 ns Long: 600~50,000 µs	6n dbl pulse; OP: 6ns + 150µs + 6ns PT: 300µs	5-10ns 1064 Q-3/Q-4: 10-20ns Spectra: 190µs
Features	785 picosecond 200mJ 0.33GW	Gold standard, Soft beam	Focus Lens Array	Long mode (0.6~50msec)	Ruby 694nm	4 pulses Spectra mode (0.3ms)
Handpieces	1064/532 Zoom, Zoom Colli, 785 Zoom, Colli, 1064 FX, Dia FX 785 S *532 FX	SI, 532Lite, Dye 585, Dye 650	755 Zoom, Fixed 532, Fixed 755	R28, R29, R58, FS20A, FS20B, FS20C, FS50B *R585, R650		Dual Focused Dots, Fractional (MLA), Zoom Colli, Zoom *585/650 Dye
Released Year	2021	2013	2012	2017	2012	2021

APPLICATIONS

- **Skin toning and skin brightening**
  - Skin brightening and lightening
  - Skin rejuvenation
  - Genesis
- **Treating Benign pigmented lesion**
  - Café-au-lait birthmarks
  - Solar lentiginos, and senile lentiginos
  - Becker's nevi
  - Freckles
  - Melanochiae
  - nevus spilus, nevus of ota, and abnom
  - PIH, etc.
- **Tattoo Removal:**
  - black, blue, red, sky blue, green, red, and purple



PICO

HELIOS 785

BEFORE AND AFTER PHOTO

Tattoo Removal
Black Tattoo

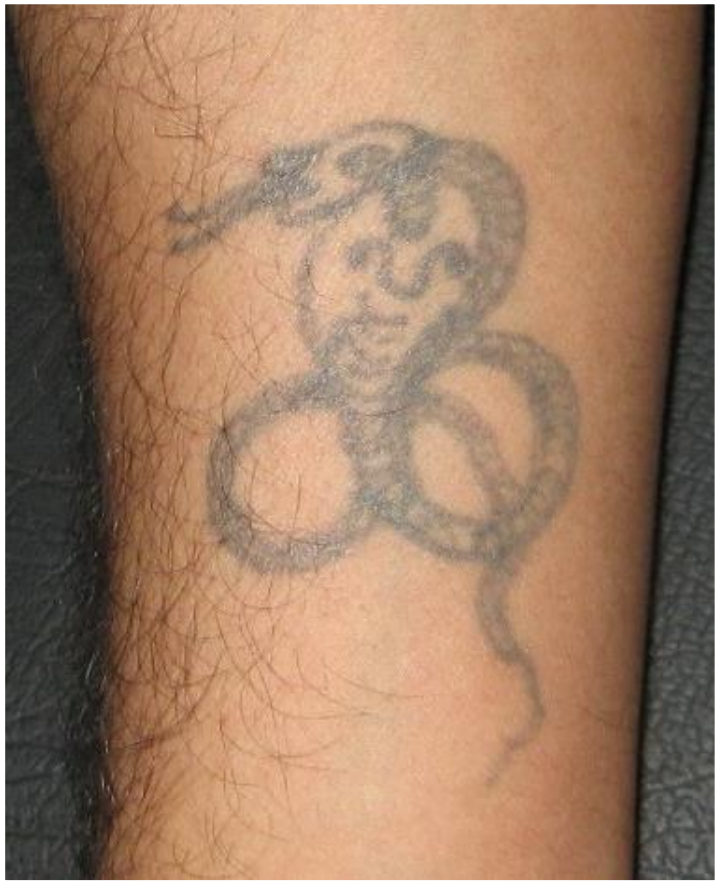
Zoom HP, 3-4mm, 1064nm, 9.9J/cm^2, 1-5hz, 1pass

Before

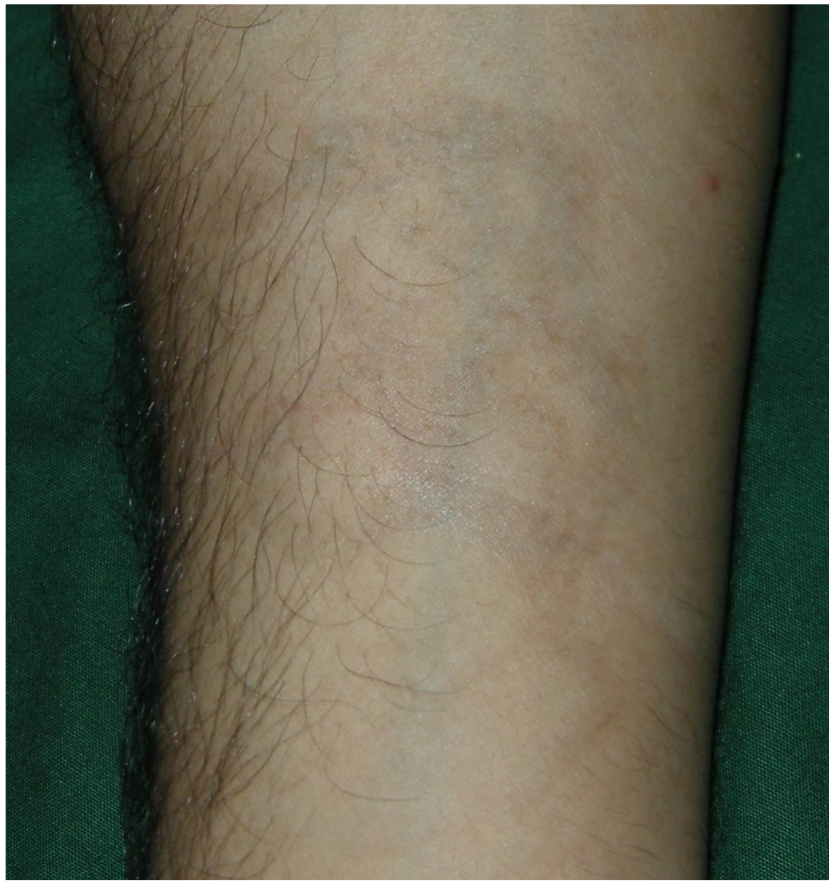
After

Tattoo Removal
Black Tattoo

Zoom HP, 3-4mm, 1064nm, 8.5J/cm^2, 1-5hz, 1pass



Before



After 3 sessions

Tattoo Removal

Black Tattoo

Fractional 1064 HP (5x5mm), 1064nm, 800-1000mJ 1-5hz, 1pass

Before

After 2 sessions

Tattoo Removal

Black Tattoo

Zoom HP, 3-4mm, 1064nm, 5.0-7.0J/cm^2, 1-5hz, 1pass

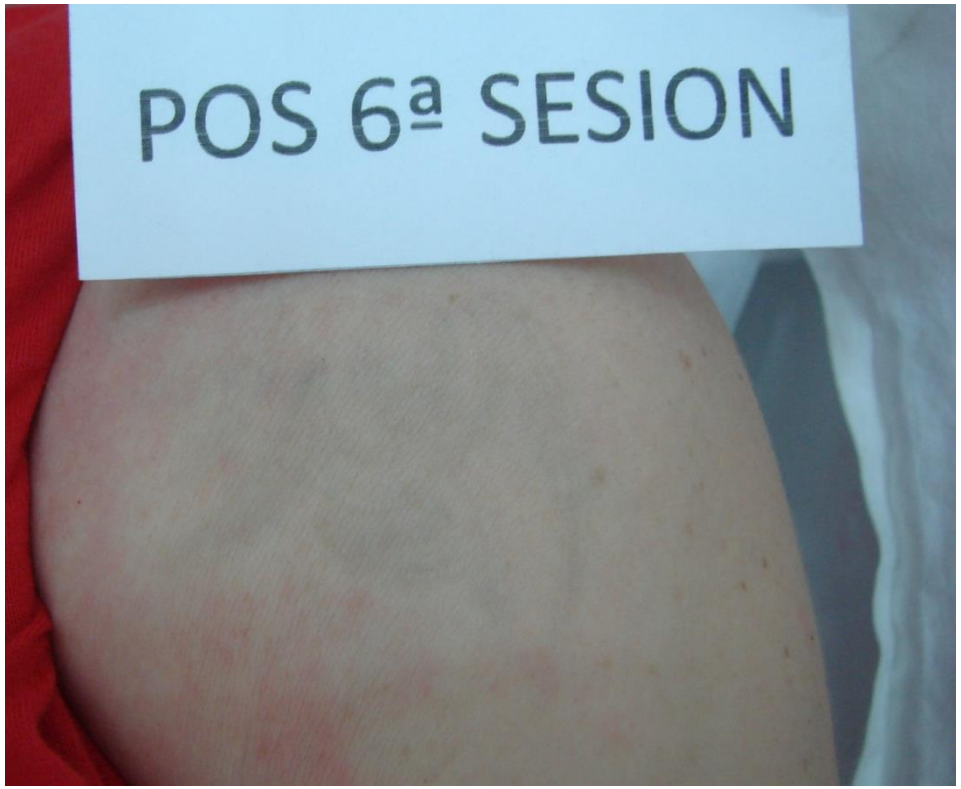
Before

After 1 session

Tattoo Removal
Black Tattoo

Zoom HP, 3-4mm, 1064nm, 5.0-7.0J/cm^2, 1-5hz, 1pass

Before



After 6 sessions

Tattoo Removal

Black Tattoo

Zoom HP, 3-4mm, 1064nm, 5.0-7.0J/cm^2, 1-5hz, 1pass

Before

After 6 sessions

TATTOO REMOVAL

785 Zoom, 3x3-5x5mm, 0.8-1.9J, 2hz, 1pass
1064 Zoom 4-5mm, 5.0-7.0J, 2hz, 1pass
532 Zoom 3-4mm, 2.0-2.7J, 2hz, 1pass, 4TX

BEFORE

AFTER

Provided by LASEROPTEK

TATTOO REMOVAL

Blue color

Blue: FX 785hp level 1 0.8J , 785 Zoom, 3x4mm, 1.2J, 2hz, 1pass
Black: FX 1064 hp, 4.0J, 1pass
Red: Zoom hp,532nm, 5mm, 1.0J, 2hz, 1pass

Before

After 9 Tx

Photos courtesy Yoonseok Yang,M.D, Renewme skin clinic

TATTOO REMOVAL

Green& Red color

Green: FX 785hp level 1 0.8J , 785 Zoom, 3x4mm, 1.2J, 2hz, 1pass
Black: FX 1064 hp, 4.0J, 1pass
Red: Zoom hp,532nm, 5mm, 1.0J, 2hz, 1pass

Before

After 9 Tx

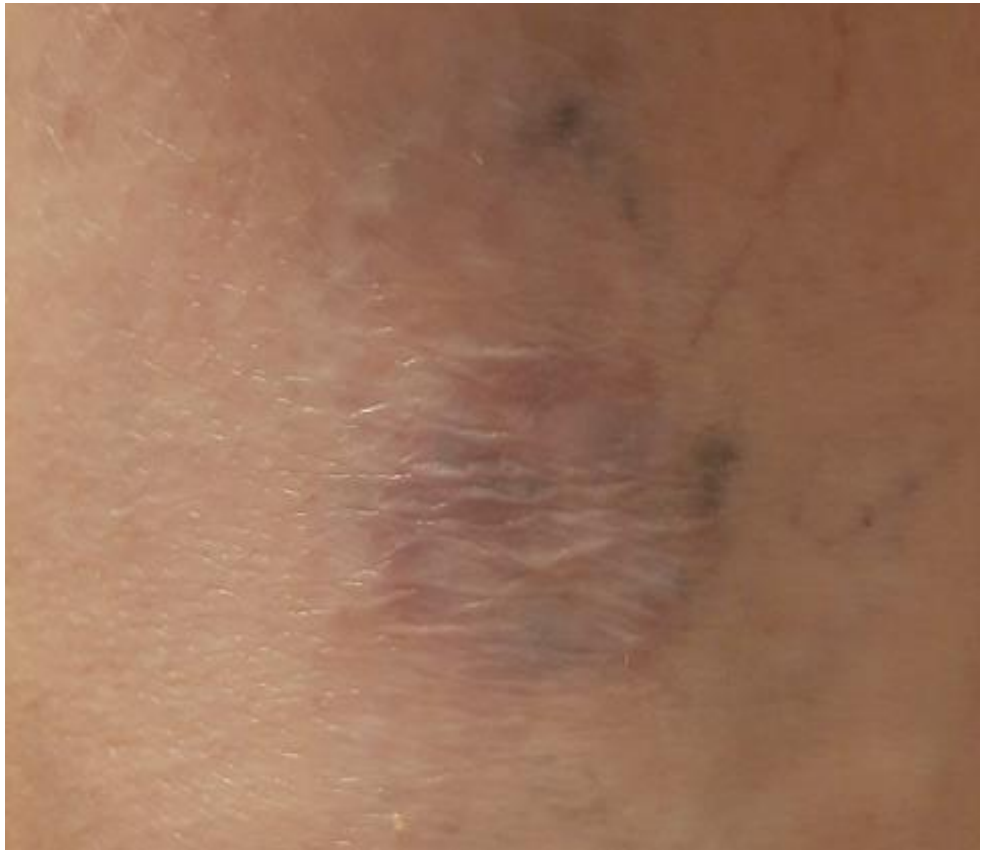
Photos courtesy Yoonseok Yang,M.D, Renewme skin clinic

TATTOO REMOVAL

785 Zoom hp, 5mm, 0.8J/cm^2, 5hz, 1pass

Blue color

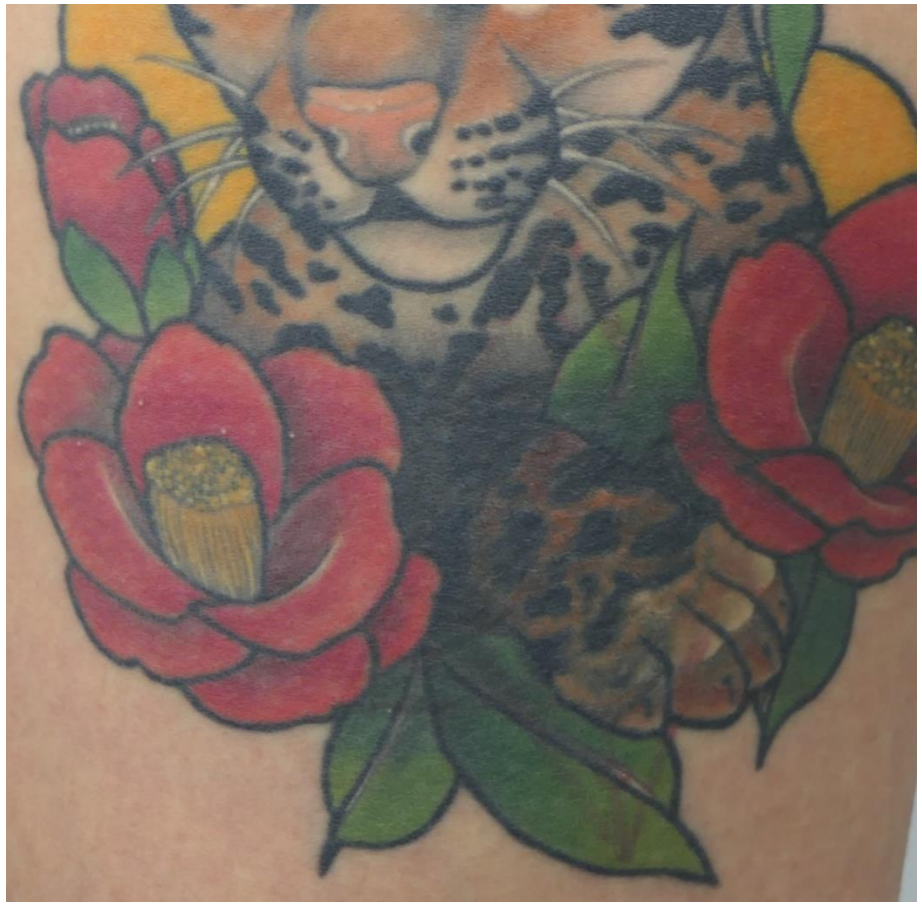
Before



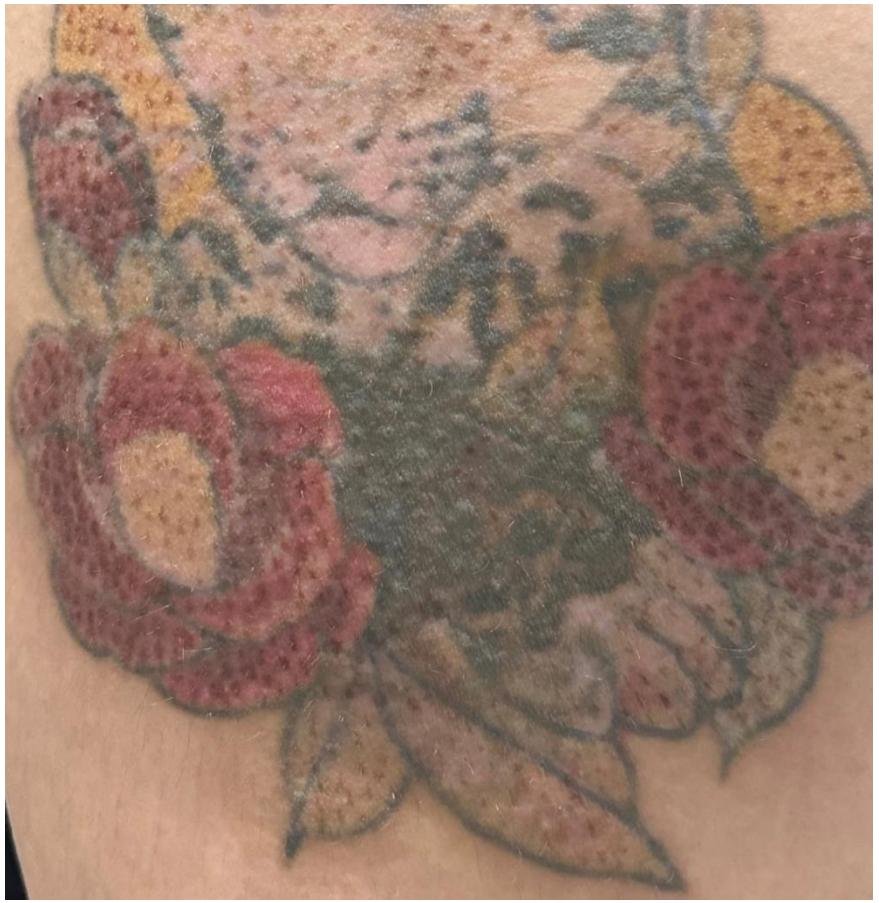
After 1 Tx

TATTOO REMOVAL
Multicolor

Green: FX 785hp level 1 0.8J , 785 Zoom, 3x4mm, 1.2J, 2hz, 1pass
Black: FX 1064 hp, 4.0J, 1pass
Red: Zoom hp,532nm, 5mm, 1.0J, 2hz, 1pass

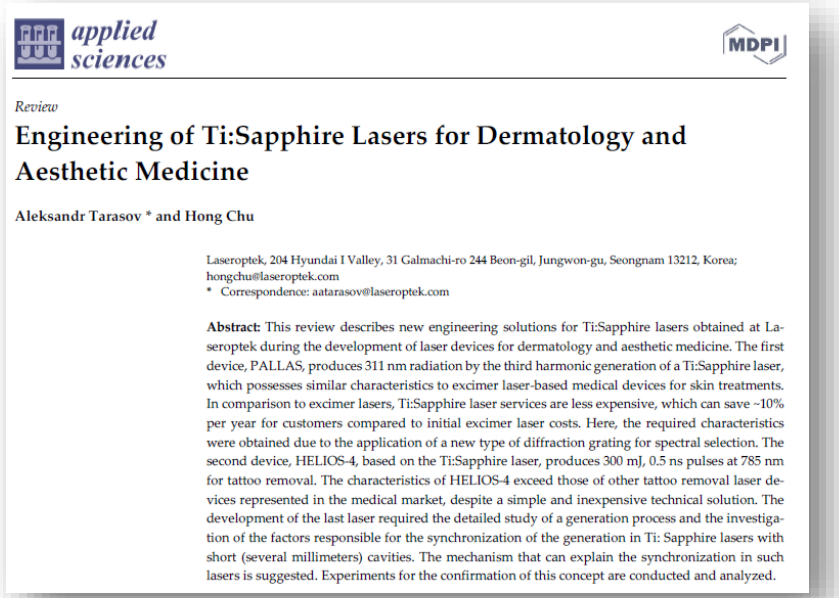


Before



After 3 Tx

PUBLICATION



applied sciences

MDPI

Review

Engineering of Ti:Sapphire Lasers for Dermatology and Aesthetic Medicine

Aleksandr Tarasov * and Hong Chu

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* Correspondence: aatarasov@laseroptek.com

Abstract: This review describes new engineering solutions for Ti:Sapphire lasers obtained at Laseroptek during the development of laser devices for dermatology and aesthetic medicine. The first device, PALLAS, produces 311 nm radiation by the third harmonic generation of a Ti:Sapphire laser, which possesses similar characteristics to excimer laser-based medical devices for skin treatments. In comparison to excimer lasers, Ti:Sapphire laser services are less expensive, which can save ~10% per year for customers compared to initial excimer laser costs. Here, the required characteristics were obtained due to the application of a new type of diffraction grating for spectral selection. The second device, HELIOS-4, based on the Ti:Sapphire laser, produces 300 mJ, 0.5 ns pulses at 785 nm for tattoo removal. The characteristics of HELIOS-4 exceed those of other tattoo removal laser devices represented in the medical market, despite a simple and inexpensive technical solution. The development of the last laser required the detailed study of a generation process and the investigation of the factors responsible for the synchronization of the generation in Ti: Sapphire lasers with short (several millimeters) cavities. The mechanism that can explain the synchronization in such lasers is suggested. Experiments for the confirmation of this concept are conducted and analyzed.

https://doi.org/10.3390/app112210539

Applied Sciences, 2021

Engineering of Ti:Sapphire Lasers for Dermatology and Aesthetic Medicine

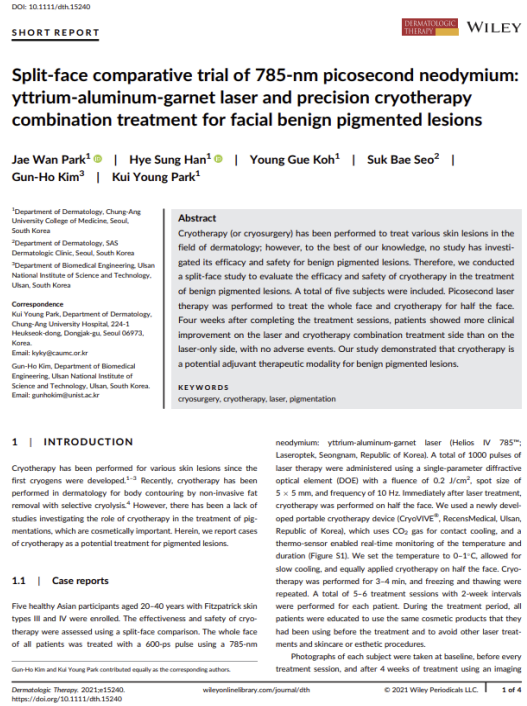
Abstract: This review describes new engineering solutions for Ti:Sapphire lasers obtained at Laseroptek during the development of laser devices for dermatology and aesthetic medicine.

HELIOS-4, based on the Ti:Sapphire laser, produces 300mJ, 0.5ns pulses at 785nm for tattoo removal. The development of the last laser required the detailed study of a generation process and the investigation of the factors responsible for the synchronization of the generation in Ti:Sapphire lasers with short (several millimeters) cavities.

- Aleksandr Tarasov
- Hong Chu

Laseroptek Co., Ltd., Gyeonggi-do, Korea

PUBLICATION



DOI: 10.1111/dth.15240

SHORT REPORT

DERMATOLOGIC THERAPY WILEY

Split-face comparative trial of 785-nm picosecond neodymium: yttrium-aluminum-garnet laser and precision cryotherapy combination treatment for facial benign pigmented lesions

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Gun-Ho Kim, Department of Biomedical Engineering, Ulsan National Institute of Science and Technology, Ulsan, South Korea.
Email: gunhokim@unist.ac.kr

Abstract

Cryotherapy (or cryosurgery) has been performed to treat various skin lesions in the field of dermatology; however, to the best of our knowledge, no study has investigated its efficacy and safety for benign pigmented lesions. Therefore, we conducted a split-face study to evaluate the efficacy and safety of cryotherapy in the treatment of benign pigmented lesions. A total of five subjects were included. Picosecond laser therapy was performed to treat the whole face and cryotherapy for half the face. Four weeks after completing the treatment sessions, patients showed more clinical improvement on the laser and cryotherapy combination treatment side than on the laser-only side, with no adverse events. Our study demonstrated that cryotherapy is a potential adjuvant therapeutic modality for benign pigmented lesions.

KEYWORDS
cryosurgery, cryotherapy, laser, pigmentation

1 | INTRODUCTION

Cryotherapy has been performed for various skin lesions since the first cryogens were developed.[1-3] Recently, cryotherapy has been performed in dermatology for body contouring by non-invasive fat removal with selective cryolysis.[4] However, there has been a lack of studies investigating the role of cryotherapy in the treatment of pigmentations, which are cosmetically important. Herein, we report cases of cryotherapy as a potential treatment for pigmented lesions.

1.1 | Case reports

Five healthy Asian participants aged 20–40 years with Fitzpatrick skin types III and IV were enrolled. The effectiveness and safety of cryotherapy were assessed using a split-face comparison. The whole face of all patients was treated with a 600-ps pulse using a 785-nm neodymium: yttrium-aluminum-garnet laser (Helios IV 785™; Laseroptek, Seongnam, Republic of Korea). A total of 1000 pulses of laser therapy were administered using a single-parameter diffractive optical element (DOE) with a fluence of 0.2 J/cm², spot size of 5 × 5 mm, and frequency of 10 Hz. Immediately after laser treatment, cryotherapy was performed on half the face. We used a newly developed portable cryotherapy device (CryoVIVE®, RecensMedical, Ulsan, Republic of Korea), which uses CO_2 gas for contact cooling, and a thermo-sensor enabled real-time monitoring of the temperature and duration (Figure S1). We set the temperature to 0–1°C, allowed for slow cooling, and equally applied cryotherapy on half the face. Cryotherapy was performed for 3–4 min, and freezing and thawing were repeated. A total of 5–6 treatment sessions with 2-week intervals were performed for each patient. During the treatment period, all patients were educated to use the same cosmetic products that they had been using before the treatment and to avoid other laser treatments and skincare or esthetic procedures.

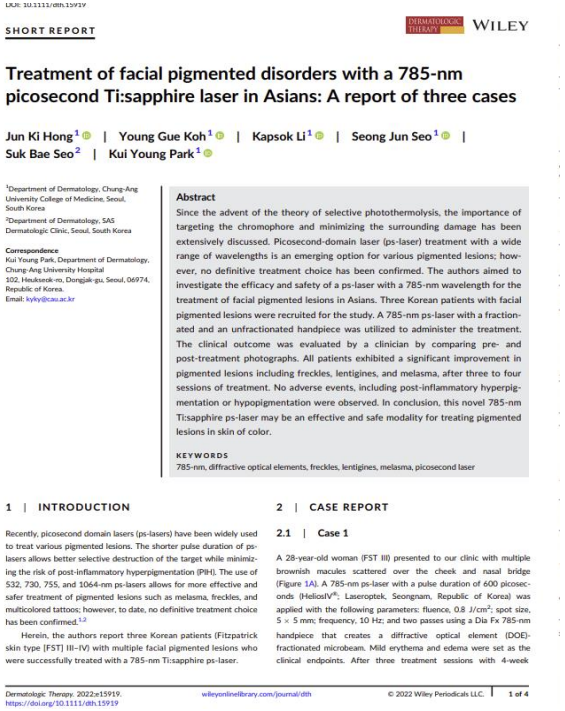
Photographs of each subject were taken at baseline, before every treatment session, and after 4 weeks of treatment using an imaging

Gun-Ho Kim and Kui Young Park contributed equally as the corresponding authors.

https://doi.org/10.1111/dth.15240

- **Title:** Split-face comparative trial of 785-nm picosecond Nd:YAG laser and precision cryotherapy combination treatment for facial benign pigmented lesions
- Published on Dermatologic Therapy, 2021
- **Authors:** Jae Wan Park, Hye Sung Han, Young Gue Koh, Suk Bae Seo, Gun-Ho Kim, Kyui Young Park
- **Key Points:**
  - The whole face of all patients was treated with a 600ps pulse using a 785nm Nd:YAG laser (HELIOS IV 785)
  - A total of 1000 pulses of laser therapy were administered using a single-parameter DOE with a fluence of 0.2J/cm², spot size of 5mm x 5mm and frequency of 10Hz
  - HELIOS IV 785
  - Clinical improvement of pigmented lesions and satisfaction of subjects were higher on the laser and cryotherapy combination treatment side than on the laser-only side.

PUBLICATION



SHORT REPORT

WILEY

Treatment of facial pigmented disorders with a 785-nm picosecond Ti:sapphire laser in Asians: A report of three cases

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Abstract

Since the advent of the theory of selective photothermolysis, the importance of targeting the chromophore and minimizing the surrounding damage has been extensively discussed. Picosecond-domain laser (ps-laser) treatment with a wide range of wavelengths is an emerging option for various pigmented lesions; however, no definitive treatment choice has been confirmed. The authors aimed to investigate the efficacy and safety of a ps-laser with a 785-nm wavelength for the treatment of facial pigmented lesions in Asians. Three Korean patients with facial pigmented lesions were recruited for the study. A 785-nm ps-laser with a fractionated and an unfractionated handpiece was utilized to administer the treatment. The clinical outcome was evaluated by a clinician by comparing pre- and post-treatment photographs. All patients exhibited a significant improvement in pigmented lesions including freckles, lentigines, and melasma, after three to four sessions of treatment. No adverse events, including post-inflammatory hyperpigmentation or hypopigmentation were observed. In conclusion, this novel 785-nm Ti:sapphire ps-laser may be an effective and safe modality for treating pigmented lesions in skin of color.

KEYWORDS
785-nm, diffractive optical elements, freckles, lentigines, melasma, picosecond laser

1 | INTRODUCTION

Recently, picosecond domain lasers (ps-lasers) have been widely used to treat various pigmented lesions. The shorter pulse duration of ps-lasers allows better selective destruction of the target while minimizing the risk of post-inflammatory hyperpigmentation (PIH). The use of 532, 730, 755, and 1064-nm ps-lasers allows for more effective and safer treatment of pigmented lesions such as melasma, freckles, and multicolored tattoos; however, to date, no definitive treatment choice has been confirmed.[1,2]

Herein, the authors report three Korean patients (Fitzpatrick skin type [FST] III–IV) with multiple facial pigmented lesions who were successfully treated with a 785-nm Ti:sapphire ps-laser.

2 | CASE REPORT

2.1 | Case 1

A 28-year-old woman (FST III) presented to our clinic with multiple brownish macules scattered over the cheek and nasal bridge (Figure 1A). A 785-nm ps-laser with a pulse duration of 600 picoseconds (HeliosIV®; Laseroptek, Seongnam, Republic of Korea) was applied with the following parameters: fluence, 0.8 J/cm²; spot size, 5 × 5 mm; frequency, 10 Hz; and two passes using a Dia Fx 785-nm handpiece that creates a diffractive optical element (DOE)-fractionated microbeam. Mild erythema and edema were set as the clinical endpoints. After three treatment sessions with 4-week

https://doi.org/10.1111/dth.15919

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- Published on Dermatologic Therapy, 2022
- **Authors:** Jun Ki Hong, Young Gue Koh, Kap sok Li, Seong Jun Seo, Suk Bae Seo, Kui Young Park
- **Key Points:**
  - Three Korean patients with multiple pigmented lesions who were successfully treated with a 785-nm PS-laser (HELIOS IV 785)
  - All pigmented lesions were markedly improved using Dia FX 785-nm and zoom hp with 0.8J/cm2 and 3x3mm , 1.2j/cm2 respectively without adverse effects.
  - HELIOS IV 785
  - Novel 785-nm Ti:Sapphire PS-laser may be an effective and safe modality for treating pigmented lesions in skin of color

PUBLICATION

JOURNAL OF DERMATOLOGICAL TREATMENT
2024, VOL. 35, NO. 1, 2293640
https://doi.org/10.1080/09546634.2023.2293640

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RESEARCH ARTICLE

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Efficacy and safety of a novel 785 nm picosecond neodymium-doped yttrium aluminum garnet laser for the treatment of facial benign pigmented lesions in Asian skin: a pilot study

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ABSTRACT

Background and Objectives: Benign pigmented lesions and a general uneven tone in people with skin of color are growing issues that have been presented to dermatologists. To the best of our knowledge, this is the first controlled study to examine the efficacy and safety of using the newly introduced 785 nm neodymium-doped yttrium aluminum garnet (Nd:YAG) picosecond laser to treat facial benign pigmented lesions in Asian patients with diffractive lens array.

Materials and Methods: A 785 nm Nd:YAG picosecond laser was used to treat 15 healthy female volunteers older than 18 years who had Fitzpatrick skin types II–IV and facial benign pigmented lesions. Each volunteer received five weekly treatments in dual modes. The clinical improvement was assessed by independent investigators and by objectively measuring the melanin index.

Results: After the treatment, the melanin and erythema indices decreased, and the pigmented lesions showed clinical improvements. No serious adverse effects were observed during the study period.

Conclusions: A 785 nm Nd:YAG picosecond laser may be safe and effective in treating facial benign pigmented lesions in Asian skin.

ARTICLE HISTORY
Received 2 March 2023
Accepted 5 December 2023

KEYWORDS
Picosecond; laser; dyschromia; pigmentation

Introduction

Benign pigmented lesions, or a general uneven tone in people with skin of color, are common and growing concerns that have been presented to dermatologists (1). They are characterized by brown to grayish patches mainly in the periorbital and zygomatic areas on the face (2). They can not only cause significant cosmetic disfigurement but also have a negative emotional impact. This disfiguring hyperpigmentation is one of the most notable manifestations of photoaging caused by chronic exposure to the sun, particularly in Asian skin.

Since the first use of the Q-switched (QS) neodymium-doped yttrium aluminum garnet (Nd:YAG) laser for pigmentation, numerous laser technologies have been used to treat hyperpigmentation in the cosmetic field over the past 25 years (3). Various laser modalities, such as QS Nd:YAG (532 nm), QS alexandrite (755 nm), intense pulsed light, and QS ruby (694 nm) lasers, have been reported to be effective in treating pigmented lesions (4). However, Asians with dark skin are likely to experience postinflammatory hyperpigmentation and/or lesion worsening after receiving laser treatment (5–7).

Picosecond Nd:YAG lasers have recently become commercially available (8). Picosecond lasers can generate high peak powers and high photomechanical effects with low undesirable heat diffusion into neighboring tissues owing to their short pulse duration, which can be as fast as 450 picoseconds in the sub-nanosecond range (9). This advantage makes it possible to minimize the risk of epidermal injury and dyspigmentation (10,11). However, there is a lack of controlled studies regarding the efficacy of picosecond lasers in treating pigmentary disorders, particularly in the Asian population. To the best of our knowledge, this is the first controlled study to examine the efficacy and safety of using the newly introduced 785 nm Nd:YAG picosecond laser to treat facial benign pigmented lesions in Asian patients.

Materials and methods

Participants

This study involved 15 healthy female participants older than 18 years who had Fitzpatrick skin types II–IV and had visited Chung-Ang University Hospital because of facial benign pigmented lesions. This study excluded participants who were photosensitive or receiving medications to induce photosensitivity, participants who had an active sun tan, and participants who had applied a laser procedure, chemical peels, or lightening creams to the treatment area within the past six months. Patients who were either pregnant or lactating were also excluded. All participants voluntarily agreed to participate in this study and provided written informed consent. They were allowed to withdraw from this study at any time.

Treatment protocols

A picosecond Nd:YAG laser with a 785 nm wavelength (600 picoseconds, Helios IV 785™; Laseroptek, Seongnam, Korea) was used

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https://doi.org/10.1080/09546634.2023.2293640

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- **Authors:** Ji Yeon Hong, Sun Hye Shin, Young Gue Koh, Joon Seok, Kui Young Park
- **Key Points:**
  - 15 female patients older than 18 years (skin types II-IV) with benign pigmented lesions were successfully treated with a 785nm Nd:YAG picosecond laser
  - The melanin and erythema indices decreased, and the pigmented lesions showed clinical improvements.
  - A 785nm Nd:YAG picosecond laser may be safe and effective in treating benign pigmented facial lesions in Asia skin. in

THANK YOU