

LP 中国激光杂志社  
CHINESE LASER PRESS

ISSN 0258-7025

CN 31-1339/TN  
CODEN ZHJIDO

# 中国激光

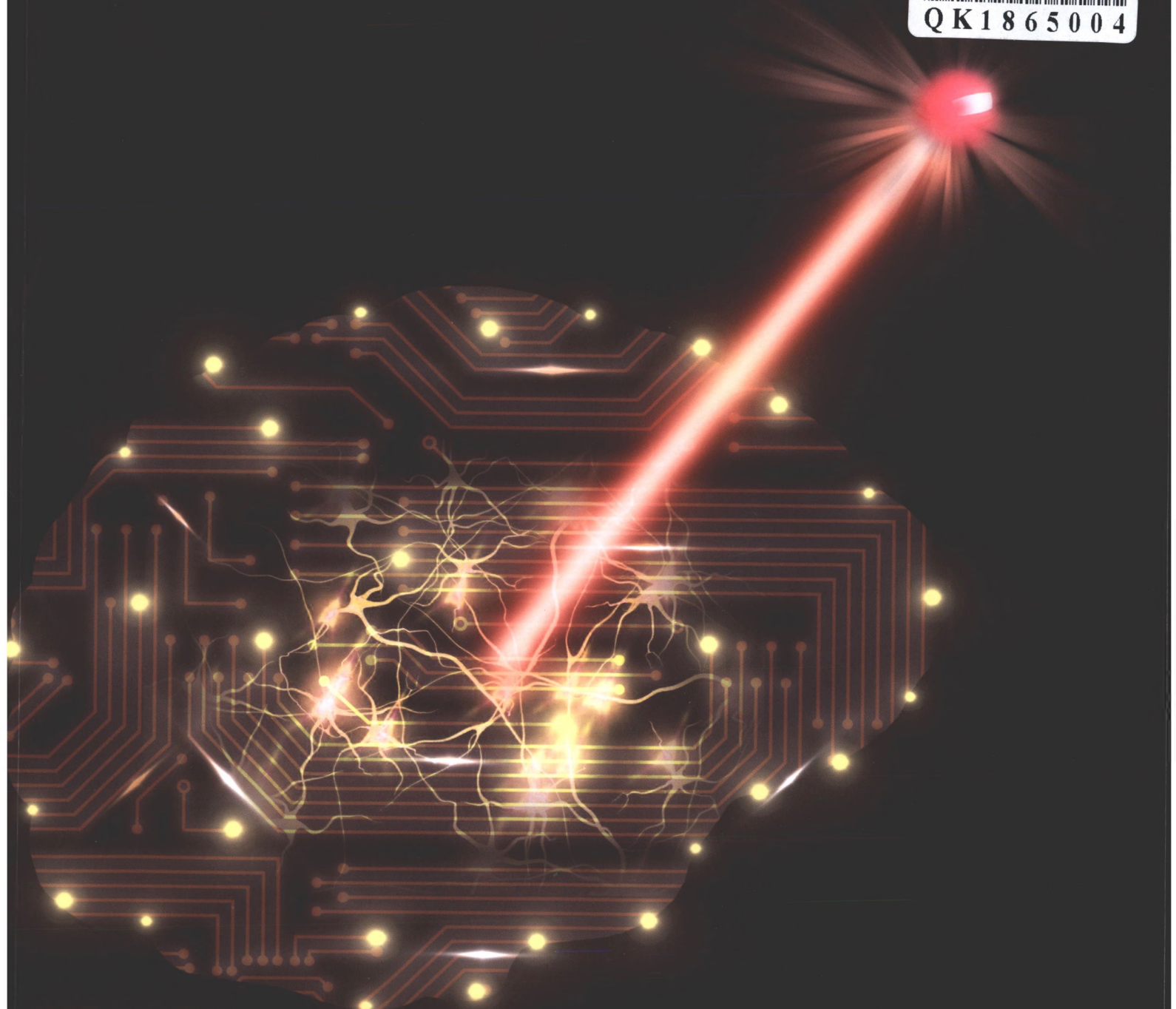
CHINESE JOURNAL OF LASERS [总第504期]



第45卷 | 第12期

Vol. 45 | No. 12

2018.12



万方数据

中国科学院上海光学精密机械研究所 主办  
中国光学学会

## 目 次

## · 激光器件与激光物理 ·

- 2294 nm 端面抽运 ZnWO<sub>4</sub> 拉曼激光器 ..... 谢建, 任席奎, 于永芹, 等 1201001
- 正弦调频下大带宽激光调频连续波测距技术 ..... 史春钊, 张福民, 潘浩, 等 1201002
- 蓝光二极管抽运掺镨氟化钪晶体腔内倍频 348.9 nm 紫外激光器 ..... 牛娜, 曲大鹏, 窦微, 等 1201003
- 高功率直接液冷固体薄片激光器的设计与实验 ..... 易家玉, 涂波, 曹海霞, 等 1201004
- 基于玻璃分相技术的大芯径掺镱光纤及其激光 ..... 褚应波, 刘永光, 刘长波, 等 1201005
- 激光辐照 PA2200 材料 3D 打印件的表面浸润性 ..... 曾勇, 魏小波, 蒋毅坚 1201006
- 车载激光捷联惯导系统初始对准可观测性分析 ..... 高亢, 任顺清, 陈希军, 等 1201007
- 被动调 Q 双腔双频 Nd:YAG 激光器设计及实验 ..... 周叶, 焦明星, 连天虹, 等 1201008

## · 激光制造 ·

- 基于次级烧结区域调控的 SLS 制件控形控性研究 ..... 童强, 薛锐华, 姚山 1202001
- 增材修复对激光沉积制造 TC4 组织与力学性能的影响 ..... 杨光, 马玥, 王超, 等 1202002
- 301L 搭接激光焊接接头拉伸过程的弹塑性演变及断裂数值分析 ..... 郭相忠, 刘伟, 王昌坤, 等 1202003
- 超声振动对激光熔覆及固溶时效 Ti6Al4V 合金组织和性能的影响 ..... 张安峰, 付涛, 王潭, 等 1202004
- 氩-氦混合保护气体对铝合金激光-MIG 复合焊接特性的影响 ..... 何双, 陈辉, 蔡创, 等 1202005
- 飞秒激光直写实现氧化锆玻璃内部光调制 ..... 张芳腾, 聂兆刚, 邱建荣, 等 1202006
- 高速激光电弧复合焊接高强钢焊缝的形貌及成形机理 ..... 顾思远, 刘政君, 张培磊, 等 1202007
- 医用不锈钢激光合金化铜钴合金的组织及其生物医学性能 ..... 孙桂芳, 陶丰, 姜波, 等 1202008
- 激光立体成形 Inconel 718 镍基高温合金  $\delta$  相析出规律 ..... 刘奋成, 吕飞闯, 任航, 等 1202009
- 激光选区熔化成形 TiB<sub>2</sub> 增强 S136 模具钢 ..... 胡辉, 周燕, 文世峰, 等 1202010
- Hastelloy-X 粉末成分对激光选区熔化成形各向成形性能的影响 ..... 魏菁, 李雅莉, 何艳丽, 等 1202011
- 激光熔覆制备马氏体/铁素体双相不锈钢层的力学与腐蚀性能研究 ..... 朱红梅, 李勇作, 张振远, 等 1202012

## · 测量与计量 ·

- 基于迈克耳孙干涉仪的共线自相关超短光脉冲测量 ..... 何伟, 崔明焱, 宋迪迪, 等 1204001
- 基于电光调制光频梳绝对测距的理论及实验分析 ..... 赵宇航, 曲兴华, 张福民, 等 1204002
- 基于 LabVIEW 的三光子符合计数实时 3D 显示系统 ..... 田亚玲, 李创社, 陈海霞, 等 1204003
- 线激光三维场景重建系统及误差分析 ..... 詹坤峰, 陈文建, 李武森, 等 1204004
- 角反射器对调制偏振光的偏振响应研究 ..... 高书苑, 石俊凯, 纪荣祯, 等 1204005
- 利用高灵敏的无自旋交换弛豫原子磁力仪实现脑磁测量 ..... 黄圣洁, 张桂迎, 胡正晖, 等 1204006

## · 光束传输与控制 ·

- 基于光学传输矩阵实现透过散射介质的动态目标成像 ..... 孙雪莹, 王剑南, 李伟, 等 1205001

## · 光纤光学与光通信 ·

- 一种大模场沟槽辅助型扇形瓣状光纤的研究 ..... 刘诗男, 宁提纲, 马绍朔, 等 1206001
- 基于异步射频信号驱动级联相位调制器产生平坦光学频率梳 ..... 刘昊明, 潘炜, 卢冰, 等 1206002
- 532 nm 光诱导下低损耗 As<sub>2</sub>S<sub>3</sub> 光纤纤芯的光敏性及其光阻断效应现象 ..... 邹林儿, 张泽, 傅继武, 等 1206003

## · 生物医学光子学与激光医学 ·

- 基于并行波前校正算法的大视场深穿透光学显微成像(封面文章) ..... 赵琪, 石鑫, 樊薇, 等 1207001

## · 全息与信息处理 ·

- 三维纯相位全息显示中的散斑噪声抑制 ..... 周婷婷, 韩超 1209001

有效视角图像切片嵌合法全息体视图的数值重构 .....	樊帆, 蒋晓瑜, 王培阳, 等	1209002
基于联合功率谱分区复用的光学多图像加密方法与实验 .....	刘杰, 白廷柱, 沈学举, 等	1209003
<b>· 遥感与传感器 ·</b>		
一种用于海洋温度快速测量的光纤法布里-珀罗温度传感器 .....	孟华, 李海洋, 曹占启	1210001
10 m 衍射口径天基合成孔径激光雷达系统 .....	胡焯, 李道京	1210002
基于激光器内腔调制的低探测极限折射率传感系统 .....	张超, 徐德刚, 石嘉, 等	1210003
<b>· 光谱学 ·</b>		
基于局部对称重加权惩罚最小二乘的拉曼基线校正 .....	赵恒, 陈娱欣, 续小丁, 等	1211001
基于激光诱导击穿光谱技术的铜铟镓硒纳米薄膜的分析探测研究 .....	修俊山, 刘世明, 王琨琨, 等	1211002
<b>· 量子光学 ·</b>		
纳米金刚石氮空位中心耦合机械振子的纠缠动力学特性 .....	廖庆洪, 金鹏, 叶杨	1212001
<b>· 微纳光学 ·</b>		
磁光效应下 PT 对称结构独特的非互易传输模式 .....	王誉雅, 夏景, 方云团	1213001

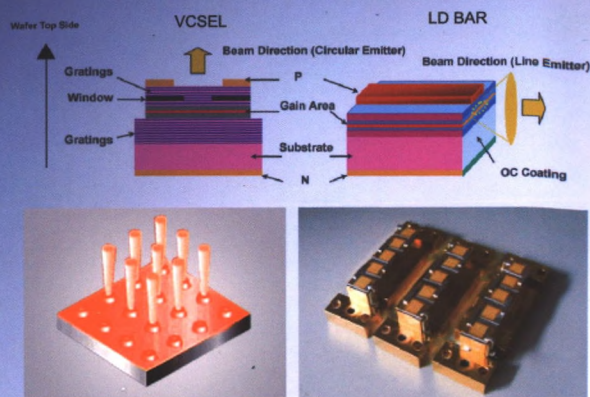
本刊电子版彩色效果请详见中国光学期刊网 [www.opticsjournal.net](http://www.opticsjournal.net)

## CONTENTS

<b>· Laser Devices and Laser Physics ·</b>		
2294 nm End-Pumped ZnWO <sub>4</sub> Raman Laser .....	Xie Jian, Ren Xikui, Yu Yongqin, et al.	1201001
Distance Measurement Technique of Large Bandwidth Laser Frequency Modulated Continuous Wave Under Sinusoid Frequency Modulation .....	Shi Chunzhao, Zhang Fumin, Pan Hao, et al.	1201002
348.9 nm Intra-Cavity Frequency-Doubling Ultraviolet Laser in Blue Laser Diode Pumped Pr <sup>3+</sup> YLF Crystal .....	Niu Na, Qu Dapeng, Dou Wei, et al.	1201003
Design and Experiment on High-Power Direct-Liquid-Cooled Thin-Disk Solid-State Laser ...	Yi Jiayu, Tu Bo, Cao Haixia, et al.	1201004
Extra-Large-Core Yb <sup>3+</sup> Doped Fiber and Its Laser Research Based on Glass Phase-Separation Technique .....	Chu Yingbo, Liu Yongguang, Liu Changbo, et al.	1201005
Surface Wettability of PA2200 3D Printing Parts by Laser Irradiation .....	Zeng Yong, Wei Xiaobo, Jiang Yujian.	1201006
Observability Analysis of Vehicle-Based-Laser Strapdown Inertial Navigation System Initial Alignment .....	Gao Kang, Ren Shunqing, Chen Xijun, et al.	1201007
Design and Experimental Investigation of Passively Q-Switched Two-Cavity Dual-Frequency Nd <sup>3+</sup> YAG Laser .....	Zhou Ye, Jiao Mingxing, Lian Tianhong, et al.	1201008
<b>· Laser Manufacturing ·</b>		
Accuracy and Performance Controlling of Part Made by Selective Laser Sintering Based on Secondary Sintering Region Regulation .....	Tong Qiang, Xue Kaihua, Yao Shan.	1202001
Effects of Additive Repair on Microstructure and Mechanical Properties of Laser Additive Manufactured TC4 Titanium .....	Yang Guang, Ma Yue, Wang Chao, et al.	1002002
Numerical Analysis of Elastic-Plastic Deformation Evolution and Fracture Behavior in Tensile Process of Laser Lap Welded 301L Joints .....	Guo Xiangzhong, Liu Wei, Wang Changkun, et al.	1202003
Effect of Ultrasonic Vibration on Microstructure and Properties of Laser Cladded and Solution-Aging Treated Ti6Al4V Alloys .....	Zhang Anfeng, Fu Tao, Wang Tan, et al.	1202004
Influence of He-Ar Mixed Shielding Gas on Laser-MIG Hybrid Welding Characteristic of Aluminum Alloys .....	He Shuang, Chen Hui, Cai Chuang, et al.	1202005
Realization of Optical Modulation in Germanium Oxide Glass by Femtosecond Laser Direct Writing .....	Zhang Fangteng, Nie Zhaogang, Qiu Jianrong.	1202006
Appearances and Formation Mechanism of Welds in High-Strength Steels by High Speed Laser-Arc Hybrid Welding .....	Gu Siyuan, Liu Zhengjun, Zhang Peilei, et al.	1202007
Microstructure and Biomedical Properties of Laser Alloyed Cu-Co Alloys on Medical Stainless Steel .....	Sun Guifang, Tao Feng, Jiang Bo, et al.	1202008
δ Phase Precipitation of Inconel 718 Ni-Based Superalloy Fabricated by Laser Solid Forming .....	Liu Fencheng, Lü Feiyue, Ren Hang, et al.	1202009

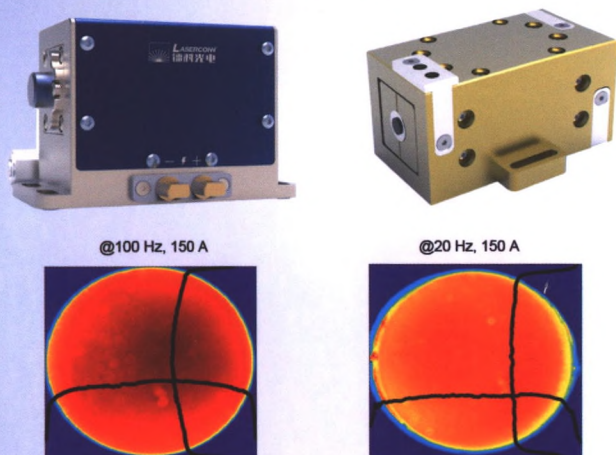
Selective Laser Melting of TiB <sub>2</sub> -Reinforced S136 Die Steels .....	Hu Hui, Zhou Yan, Wen Shifeng, et al. 1202010
Influence of Hastelloy-X Powder Composition on Anisotropic Forming Performance of Selective Laser Melting .....	Wei Jing, Li Yali, He Yanli, et al. 1202011
Mechanical and Corrosion Properties of Martensite/Ferrite Duplex Stainless Steel Prepared via Laser Cladding .....	Zhu Hongmei, Li Yongzuo, Zhang Zhenyuan, et al. 1202012
<b>• Measurement and Metrology •</b>	
Collinear Autocorrelation Measurement of Ultrashort Laser Pulse Based on Michelson Interferometer .....	He Wei, Cui Minghuan, Song Didi, et al. 1204001
Theoretical Analysis and Application of Absolute Distance Measurements Based on Electro-Optic Modulation and Optical Frequency Comb .....	Zhao Yuhang, Qu Xinghua, Zhang Fumin, et al. 1204002
Real-Time 3D Display of Three-Photon Coincidence Counting Using LabVIEW Program .....	Tian Yaling, Li Chuangshe, Chen Haixia, et al. 1204003
Line Laser 3D Scene Reconstruction System and Error Analysis .....	Zhan Kunfeng, Chen Wenjian, Li Wuseng, et al. 1204004
Polarization Response of Retroreflector to Polarization-Modulated Light .....	Gao Shuyuan, Shi Junkai, Ji Rongyi, et al. 1204005
Human Magnetoencephalography Measurement by Highly Sensitive SERF Atomic Magnetometer .....	Huang Shengjie, Zhang Guiying, Hu Zhenghui, et al. 1204006
<b>• Beam Transmission and Control •</b>	
Dynamic Target Imaging through Scattering Media Based on Optical Transmission Matrix .....	Sun Xueying, Wang Jiannan, Li Wei, et al. 1205001
<b>• Fiber Optics and Optical Communications •</b>	
Trench-Assisted Fan-Segmented Cladding Fiber with Large Mode Area .....	Liu Shinan, Ning Tigang, Ma Shaoshuo, et al. 1206001
Generation of Flat Optical Frequency Comb Based on Asynchronous RF-Signal-Driven Cascaded Phase Modulators .....	Liu Haoming, Pan Wei, Lu Bing, et al. 1206002
Photosensitivity and Optical Stopping Effect of Low-Loss As <sub>2</sub> S <sub>3</sub> Optical Fiber Core under 532 nm Light Irradiation .....	Zou Liner, Zhang Ze, Fu Jiwu, et al. 1206003
<b>• Biomedical Photonics and Laser Medicine •</b>	
Large Field-of-View and Deep Tissue Optical Micro-Imaging Based on Parallel Wavefront Correction Algorithm (Cover Paper) .....	Zhao Qi, Shi Xin, Gong Wei, et al. 1207001
<b>• Holography and Information Processing •</b>	
Speckle Noise Suppression in Three-Dimensional Phase-Only Holographic Display .....	Zhou Tingting, Han Chao. 1209001
Numerical Reconstruction of Holographic Stereograms with Effective Perspective Image Segmentation and Mosaicking Method .....	Fan Fan, Jiang Xiaoyu, Wang Peiyang, et al. 1209002
Experimental Research and Encryption Method of Optical Multi-Images Based on Joint Power Spectral Partition Multiplexing .....	Liu Jie, Bai Tingzhu, Shen Xueju, et al. 1209003
<b>• Remote Sensing and Sensor •</b>	
An Optical Fiber Farby-Perot Temperature Sensor for Rapid Ocean Temperature Measurement .....	Meng Hua, Li Haiyang, Cao Zhanqi. 1210001
Space-Based Synthetic Aperture LiDAR System with 10 m Diffractive Aperture .....	Hu Xuan, Li Daojing. 1210002
Refractive Index Sensing System Based on Fiber Laser Intracavity Modulation with a Low Detection Limit .....	Zhang Chao, Xu Degang, Shi Jia, et al. 1210003
<b>• Spectroscopy •</b>	
Baseline Correction for Raman Spectra Based on Locally Symmetric Reweighted Penalized Least Squares .....	Zhao Heng, Chen Yuxin, Xu Xiaoding, et al. 1211001
Analytical Investigation of Cu(In, Ga)Se <sub>2</sub> Thin Films Using Laser Induced Breakdown Spectroscopy Technology .....	Xiu Junshan, Liu Shiming, Wang Kunkun, et al. 1211002
<b>• Quantum Optics •</b>	
Entanglement Dynamic Properties of Nitrogen-Vacancy Centers Coupled to Mechanical Resonators in Nanodiamond .....	Liao Qinghong, Jin Peng, Ye Yang. 1212001
<b>• Micro and Nano Optics •</b>	
Unique Non-Reciprocal Mode with a Parity-Time Symmetric Structure under Magneto-Optic Effects .....	Wang Yuya, Xia Jing, Fang Yuntuan. 1213001

## VCSEL 芯片及抽运阵列



参数	VCSEL	LD BAR	VCSEL 优势
光谱宽度	~1 nm	~3 nm	窄线宽
波长温漂	0.07 nm/K	0.3 nm/K	温漂小
长期波长漂移	无漂移	漂移	长期稳定性高
工作温度	-45 — 85 °C	0 — 45 °C	耐高低温
准连续寿命	10 <sup>10</sup> — 2×10 <sup>10</sup> 次	10 <sup>9</sup> — 2×10 <sup>9</sup> 次	5 — 10 倍寿命
功率衰减	线性衰减	非线性衰减	寿命可预测

## VCSEL 抽运的激光增益模块



参数名称	水冷模块 (可定制)	风冷模块 (可定制)
重复频率	1 — 2000 Hz	1 — 100 Hz
抽运功率	1 — 27 kW	1.8 — 6 kW
储能范围	0.1 — 3 J @ 250 μs	0.1 — 0.6 J @ 250 μs
激光棒直径	2 — 15 mm	3 — 5 mm
抽运波长	800 — 810 nm	
适用晶体	Nd : YAG , Nd : YLF , Nd : Glass 等	
预期寿命	10 <sup>10</sup> — 2×10 <sup>10</sup> 次	
长寿命 • 均匀抽运 • 耐高温 • 高稳定性 • 高可靠性		

## VCSEL 抽运的固体激光器应用 (VPSSL®)

应用方向	激光器类型	参数及特点	部分激光器图片
LIBS	端面抽运全固态风冷激光器 VPSSL®	20 Hz, 5 mJ, 5 ns 无主动温控	
激光测距	侧面抽运全固态激光器 VPSSL®	20 Hz, 100 mJ, 10 ns -45 — 85 °C	
钛宝石抽运	大能量固体激光器 VPSSL®	532 nm, 200 mJ 100 Hz, 15 ns	
医疗美容	皮秒 (亚纳秒) 种子源 VPSSL®	500 ps, 2.2 mJ, 100 Hz	
激光清洗	高重复频率大能量固体激光器 VPSSL®	100 — 1000 Hz, 100 — 500 mJ 长寿命	

