湖北激光 | 50周年系列活动
HUBEI LASER 50TH ANNIVERSARY ACTIVITIES

湖北省科协海智计划
《激光先进制造国际论坛》

Hubei Assoiciation for Science and Technology HOME Program
"International Forum on Laser Advanced Manufacturing"

会议手册

Conference Manual

中国·武汉 2021年11月6日
Wuhan, China, November 6, 2021

◎ 主办单位/Host

湖北省激光学会
Laser Society of Hubei Province

◎ 协办单位/Co-organizers

武汉·中国光谷激光行业协会
Wuhan China Optics Valley Laser Industry Association

武汉激光学会
Wuhan Laser Society

激光加工国家工程研究中心
National Engineering Research Center for Laser Processing

湖北武汉中俄科技合作中心
Hubei Wuhan China-Russia Science and Technology Cooperation Center

国家激光加工产业技术创新战略联盟
National Laser Processing Industry Technology Innovation Strategic Alliance

湖北激光 50周年系列活动
HUBEI LASER 50TH ANNIVERSARY ACTIVITIES

Conference Agenda

会 议 议 程

湖北省科协海智计划《激光先进制造国际论坛》

Hubei Assoiciation for Science and Technology
HOME Program "International Forum on Laser Advanced Manufacturing"

湖北省激光界长期致力于与“一带一路”国家在工业激光器和激光制造设备领域的国际科技合作，尤其是中俄激光科技合作取得了重要成果。本次会议针对“一带一路”国家以及欧美西方国家开展激光科学与技术领域的学术交流与科技合作，面向国家战略新兴产业的显示面板、集成电路、5G网络、移动终端等行业和湖北省的优势产业“光芯屏端网”领域的激光先进制造关键技术和装备进行技术交流。针对激光先进制造中的“卡脖子”技术和装备问题，寻求合作内容，探索合作途径。引导湖北激光企业积极参与“一带一路”的建设，促进湖北省现有的高质量激光技术产品开拓国际市场。

Hubei laser industry has long been committed to the international scientific and technological cooperation with "Belt and Road" countries in the field of industrial lasers and laser manufacturing equipment, especially the Sino-Russian laser scientific and technological cooperation has achieved important results. The conference aims to carry out academic exchanges and scientific cooperation in the field of laser science and technology with "Belt and Road" countries and western countries for the national strategic emerging industries of display panels, integrated circuits, 5G networks, mobile terminals and other industries and Hubei Province's advantageous industries "optical core, screen, end network" and other areas of laser advanced manufacturing key technologies and equipment. Aiming at the bottleneck technology and equipment problems in laser advanced manufacturing, the cooperative contents and ways are sought. Guide Hubei laser enterprises to actively participate in the construction of "Belt and Road", and promote the development of high quality laser technology products in Hubei province in the international market.

会议时间：2021年11月6日 8:30-18:00（全天）
Conference Time: November 6, 2021, 8:30-18:00 (all day)
地　　点：武汉光谷 丽顿酒店 16楼彩悦厅
Venue: Caiyue Hall, 16th Floor, Wuhan Optics Valley Lytown Hotel

会议规模

因疫情，此次会议采用线上线下同步方式进行，预计200人。主要由国内外企业、高校、科研院所专家学者、技术及管理人员、投融资等行业专家构成；其中邀请了外方专题报告9个，包含俄罗斯、德国、美国、英国、波兰、法国、新西兰等多个国家，中方专题报告5个。

Conference Scale: Due to the epidemic, the conference was held in an online and offline synchronized manner, and 200 people were expected. It mainly consists of domestic and foreign enterprises, universities, research institutes experts and scholars, technology and management personnel, investment and financing and other industry experts; among them, 11 foreign presentations were invited, including Russia, Germany, the United States, the United Kingdom, Poland, France, New Zealand and many other countries, and 5 Chinese presentations.

组织机构 ORGANIZATION

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国家激光加工产业技术创新战略联盟
National Laser Processing Industry Technology Innovation Strategic Alliance

会议专家委员会/Conference Committee of Experts

俄罗斯ITMO大学Veiko 教授；
Prof. Veiko, ITMO University, Russia

美国University of Nebraska-LincolnProf. Yongfeng Lu；
Prof. Yongfeng Lu, University of Nebraska-Lincoln, USA

华中科技大学激光加工国家工程研究中心主任、湖北省激光学会名誉理事长 朱晓 教授；
Prof. Zhu Xiao, Director of the National Engineering Research Center for Laser Processing, Huazhong University of Science and Technology, and Honorary Chairman of the Laser Society of Hubei Province

华中科技大学激光加工国家工程研究中心副主任、湖北省激光学会理事长 唐霞辉 教授；
Prof. Tang Xiahui, Deputy Director of the National Engineering Research Center for Laser Processing, Huazhong University of Science and Technology, and Chairman of the Laser Society of Hubei Province

武汉大学、武汉激光学会理事长龚威 教授；
Prof. Gong Wei, Chairman of the Wuhan Laser Society, Wuhan University

华中科技大学、湖北省激光学会秘书长李政言 教授；

Prof. Li Zhengyan, General Secretary of the Laser Society of Hubei Province, Huazhong University of Science and Technology

华中科技大学、武汉激光学会秘书长秦应雄 教授；

Prof. Qin Yingxiong, General Secretary of Wuhan Laser Society, Huazhong University of Science and Technology

会议执行主席/Conference Executive Chairman

华中科技大学张金伟 教授，赵鹭明 教授；

Prof. Zhang Jinwei, Prof. Zhao Luming, Huazhong University of Science and Technology.

会议联系人/Conference Contact

湖北省激光学会副秘书长　　汤阳 13971132793

Vice General Secretary of the Laser Society of Hubei Province, Tang Yang 13971132793

《激光先进制造国际论坛》会议议程

"International Forum on Laser Advanced Manufacturing" Conference Agenda

会议时间：2021年11月6日 8:30-18:00（全天）
地点：武汉光谷丽顿酒店16楼彩悦厅
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Venue: Caiyue Hall, 16th Floor, Wuhan Optics Valley Lytown Hotel

开幕式 Opening Ceremony		
时间/Time	**演讲题目/Speech Topic**	**演讲嘉宾/Speech Guests**
8:30-8:40	华中科技大学、湖北省激光学会 理事长：唐霞辉 教授介绍重要嘉宾 Prof. Tang Xiahui, Chairman of the Laser Society of Hubei Province, Huazhong University of Science and Technology	
8:40-8:50	湖北省科学技术协会党组成员、副主席陈兴荣 致辞 Address by leader of Hubei Science and Technology Association	
8:50-9:00	揭牌：中俄碟片激光应用联合实验室 Unveiling: Sino-Russian Joint Laboratory of Disc Laser Applications	
主持人：华中科技大学　张金伟 教授 Host: Prof. Zhang Jinwei, Huazhong University of Science and Technology		
9:00-9:25	具有高晶格完整性和掺杂浓度的金刚石的激光辅助生长 Laser-assisted growth of diamonds with high lattice integrity and doping concentrations	美国激光协会前主席 University of Nebraska-LincolnProf. Yongfeng Lu
9:25-9:50	基于功能纳米材料的激光微纳增材制造技术 Laser micro-nano additive manufacturing Technology based on functional nanomaterials	华中科技大学熊伟　　教授 Prof. Xiong Wei, Huazhong University of Science and Technology

9:50-10:15	激光表面结构化和功能化 Surface structuration and functionalization by laser	法国ALPHA RLH光电与微波协会 中国区总代表Balthazar BOYER巴赫 Balthazar BOYER, General Representative in China of ALPHA-RLH
10:15-10:40	高功率超快碟片振荡器 High power ultrafast thin-disk oscillators	华中科技大学 张金伟 教授 Prof. Zhang Jinwei, Huazhong University of Science and Technology
10:40-11:05	克尔谐振腔中矢量光孤子的性质与应用 Features and applications of vector cavity solitons in Kerr resonators	新西兰奥克兰大学 徐刚 博士 Dr. Xu Gang, University of Auckland, New Zealand
11:05-11:30	超快光纤激光器及其在制药和环境监测领域的应用 Ultrafast fiber laser and its applications in the field of pharmacy and environmental monitoring	日本东京大学 金磊 助理教授 Jin Lei, Assistant Professor, University of Tokyo, Japan
11:30-13:30	中餐 Lunch	
	主持人：华中科技大学、湖北省激光学会理事长 唐霞辉 教授 Host:Prof. Tang Xiahui, Chairman of the Laser Society of Hubei Province, Huazhong University of Science and Technology	
13:30-13:55	光纤激光器中色域的产生机理 Formation mechanism of color domains in fiber lasers	俄罗斯科学院西伯利亚分院自动化技术与测电学研究所 Institute of Automation and Electrometry, SB RAS, Russia Dr. Andrey Komarov
13:55-14:20	基于飞秒光学参量振荡器的宽谱及可调谐中红外激光 Femtosecond optical parametric oscillator-based broad-spectrum and tunable mid-infrared laser	华中科技大学 张兆伟 教授 Prof. Zhaowei Zhang, Huazhong University of Science and Technology
14:20-14:45	声光技术及应用 Acoustooptic technology and applications	卡扎若夫科学公司，CTO Alexy 博士

14:45-15:10	基于特定色散和双折射性质的微结构设计：相干超连续谱产生中的噪声管理策略 Microstructure design for specific chromatic dispersion and birefringence characteristics as noise management strategies in coherent supercontinuum generation	华沙大学(University of Warsaw) Dr. Mariusz Klimczak
15:10-15:35	超快激光螺旋钻孔技术发展现状 Status Quo of Ultrashort-Pulsed Laser Helical Drilling Technology	Dr.-Ing. Chao He Technology Manager Laser Micro/Nano Processing 德国亚琛联合科技有限公司 ACUNITY GmbH
15:35-15:50	超快激光精密加工与光场调控技术 Ultrafast laser precision processing and optical field control technology	湖北工业大学 刘顿 教授 Prof. Liu Dun, Hubei University of Technology
15:50-16:15	中功率传输光纤及其应用 Medium power energy transmission optical fiber and its application	Markus Pulka 德国FCC公司CTO (CTO, FCC FiberCableConnect GmbH, Germany)
16:15-16:40	大芯径光纤的研制及其在电力传输中的应用 Development of a large core fiber and their applications in power delivery	Yangtze Optical Electronic Co. Ltd. Wuhan, China 武汉长盈通光电技术股份有限公司 廉正刚博士
16:40-17:00	论坛交流、点评、总结 Communication/Conclude/ Assess	华中科技大学激光加工国家工程研究中心主任 湖北省激光学会名誉理事长 朱晓教授 Prof. Zhu Xiao, Director of the National Engineering Research Center for Laser Processing, Huazhong University of Science and Technology, and Honorary Chairman of the Laser Society of Hubei Province

嘉宾介绍 INTRODUCETHEGUESTS

陆永枫教授 Prof. Yongfeng Lu

演讲题目：具有高晶格完整性和掺杂浓度的金刚石的激光辅助生长
Laser-assisted growth of diamonds with high lattice integrity and doping concentrations

个人简介：陆永枫博士目前是内布拉斯加大学林肯分校（UNL）工程系的Lott杰出教授。他于1984年在清华大学（中国）获得学士学位，并于1988年和1991年在大阪大学（日本）获得理学硕士和博士学位，均为电气工程专业。1991年至2002年，他在新加坡国立大学的电子和计算机工程系任教。他于2002年加入UNL的电子工程系。他在微/纳米结构材料的加工和表征方面有超过30年的经验。他的研究团队的研究项目由美国国家科学基金会、AFOSR、ONR、DTRA、DOE、DOT、NCESR、NRI、私人公司和基金会资助，近年来的研究支出超过3500万美元。他的研究导致了一些商业化和产品的开发。陆博士撰写或合作撰写了573篇期刊论文和491篇会议论文。他曾在2014年担任美国激光学会（LIA）主席和国际光子学和激光工程学会（IAPLE，英国）主席。他曾被选为SPIE会士、LIA会士、OSA会士和IAPLE会士，还担任过该领域主要国际会议的主席和总主席，包括2007年和2008年国际激光和电光应用大会的大会主席，以及2014-2017年LASE in Photonics West的联合主席。他也是2016年LIA著名的Schawlow奖的获得者。

Dr. Yongfeng Lu is currently the Lott Distinguished Professor of Engineering at the University of Nebraska-Lincoln (UNL). He received his bachelor degree from Tsinghua University (China) in 1984 and M.Sc. and Ph.D. degrees from Osaka University (Japan) in 1988 and 1991, all in electrical engineering. From 1991 to 2002, he was a faculty in the Department of Electrical and Computer Engineering at National University of Singapore. He joined the Department of Electrical Engineering at UNL in 2002. He has more than 30 years of experience in processing and characterization of micro/nanostructured materials. His group has research projects funded by NSF, AFOSR, ONR, DTRA, DOE, DOT, NCESR, NRI, private companies, and foundations, with research expenditures over $35 million in recent years. His research has led to a number of commercialization and product developments. Dr. Lu has authored or co-authored 573 journal papers and 491 conference papers. He served as the President of the Laser Institute of America (LIA) in 2014 and the President of International Academy of Photonics and Laser Engineering (IAPLE, UK). He has been elected to SPIE fellow, LIA fellow, OSA fellow, and IAPLE fellow. He has also served as chair and general chair for major international conferences in the field including the general congress chair for the International Congress of Applications of Lasers and Electro-Optics in 2007 and 2008, and general co-chair for LASE in Photonics West 2014-2017. He is also the recipient of the prestigious Schawlow Award of LIA in 2016.

演讲摘要：在不破坏结晶度的情况下追求高水平的掺杂是非常困难的，但在科学上对释放材料隐藏的能力至关重要。本研究通过激光振动激发生长临界自由基(如氨(NH3)和二氢化硼(BH2))，为高导电氮(N)和硼(B)掺杂金刚石(NDDs和BDDs)燃烧化学气相沉积(CVD)提供了一条保持晶格完整性的有效途径。以BDD的生长为例，金刚石结晶度的提高归因于激光使热非平衡抑制了硼氢化物(BH)的相对丰度，硼氢化物的过量存在会引起硼偏析并扰乱结晶过程。BDDs的B浓度为4.3×1021 cm-3，膜电阻率为28.1 mΩ·cm，空穴迁移率为55.6 cm2·V-1·s-1。高导电和结晶的BDDs在感应血糖方面表现出更高的效率，证实了激光激发在生产高性能BDD传感器方面的优势。

Pursuing high-level doping without deteriorating crystallinity is prohibitively difficult but scientifically crucial to unleashing the hidden power of materials. This study demonstrates an effective route for maintaining lattice integrity during the combustion chemical vapor deposition (CVD) of highly conductive nitrogen (N) and boron (B)-doped diamonds (NDDs and BDDs) through laser vibrational excitation of a growth-critical radicals, such as ammonia (NH3) and boron dihydride (BH2). For the growth of BDD as an example, the improved diamond crystallinity is attributed to a laser-enabled, thermal nonequilibrium suppression of the relative abundance of boron hydrides (BH), whose excessive presence induces boron segregation and disturbs the crystallization. The BDDs show a B concentration of 4.3×1021 cm-3, a film resistivity of 28.1 mΩ·cm, and hole mobility of 55.6 cm2·V-1·s-1. The highly conductive and crystalline BDDs exhibit enhanced efficiency in sensing glucose, confirming the advantages of laser excitation in producing high-performance BDD sensors.

熊伟 教授 Prof. Xiong Wei

演讲题目：基于功能纳米材料的激光微纳增材制造技术
Laser micro-nano additive manufacturing Technology based on functional nanomaterials

个人简介：熊伟现为华中科技大学教授，武汉光电国家研究中心激光与太赫兹功能实验室主任，主要从事微纳尺度激光3D/4D打印，纳米功能材料的激光诱导合成与组装，以及非线性超快激光成像与表征等方面研究。近年来在Advanced Materials、Science Advances、Light：Science & Application、Nano Letters 等国际知名期刊发表论文50多篇，申请授权和公开国内外发明专利二十余件。在本领域国际会议如Photonics West、MRS、ICALEO 等报告20多次，曾获得美国激光协会ICALEO国际会议最佳论文奖，并曾担任美国激光协会ICAELO会议激光纳米加工与制造的分会主席，POEM国际会议激光分会的共主席，现任湖北和武汉激光学会副理事长。

Prof. Xiong Wei is currently a professor at Huazhong University of Science and Technology and the director of the Laboratory of Laser and Terahertz Functionality at Wuhan National Research Center for Photonics. He is mainly engaged in research on micro- and nano-scale laser 3D/4D printing, laser-induced synthesis and assembly of nano-functional materials, and nonlinear ultrafast laser imaging and characterization. In recent years, he has published more than 50 papers in international journals such as Advanced Materials, Science Advance, Light: Science & Application, Nano Letters, etc. He has applied for more than 20 granted and published invention patents both domestic and abroad. He has presented more than 20 speech in international conferences such as Photonics West, MRS, ICALEO, etc. He has won the best paper award in the International Conference of ICALEO, and has served as the section chairman of ICAELO Conference on Laser Nanofabrication and Manufacturing, and co-chairman of POEM International Conference on Laser Chapter. He is currently the Vice Chairman of the Laser Society of Hubei Province and the Wuhan Laser Society.

演讲摘要：近年来随着多功能、高密度微纳集成系统包括微机电系统、微光学系统、生物芯片、组织工程器件、微纳机器人等领域的发展，传统的基于半导体平面光刻工艺的微纳制造技术正面临着巨大的挑战。如何实现多功能材料的高精度异质异构集成以及复杂三位微纳功能结构的高效成型制造成为了亟待解决的关键科学技术问题。在本报告中，将介绍本研究团队近年来利用超快激光直写技术在纳米功能材料生长、精密材料组装和三维微纳功能结构制造等方面所做的一些工作，主要展示超快激光技术不仅在传统的减材精密加工中优势明显，而且还在微纳增材制造方面具备广阔的发展前景，包括功能纳米材料的高精度高效率激光诱导合成生长、低维纳米材料的可控定向组装、任意三维复杂微纳结构的成形与器件集成等。纵观近年来国际超快激光领域在材料加工范围、加工质量、加工效率等诸方面的快速进步，预期超快激光微纳增材制造技术将会在多功能微纳集成系统的研发和制造方面发挥更大潜力。

With the development of multifunctional and high-density micro-nano integrated systems including MEMS, micro-optical systems, bio-chips, tissue engineering devices, micro-nano robots and other fields in recent years, the traditional micro-nano fabrication technology based on semiconductor planar lithography process is facing a great challenge. How to realize the high-precision heterogeneous integration of multifunctional materials and the efficient molding and fabrication of complex three micro-nano functional structures has become a key scientific and technological problem that needs to be solved. In this report, we will introduce some of the work done by our team in recent years using ultrafast laser direct writing technology in the growth of functional nanomaterials, precision material assembly and fabrication of three-dimensional functional micro-nano structures, mainly demonstrating that ultrafast laser technology not only has obvious advantages in traditional subtractive precision processing, but also has broad development prospects in micro-nano additive manufacturing, including high precision and high efficiency of functional nanomaterials Laser-induced synthetic growth of functional nanomaterials, controlled directional assembly of low-dimensional nanomaterials, forming and device integration of arbitrary three-dimensional complex micro-nano structures, etc. Looking at the rapid progress of the international ultrafast laser field in recent years in terms of material processing range, processing quality and processing efficiency, it is expected that ultrafast laser micro and nano additive manufacturing technology will play a greater potential in the development and manufacturing of multifunctional micro and nano integrated systems.

巴赫 Boyer Balthazar

演讲题目：激光表面结构化和功能化

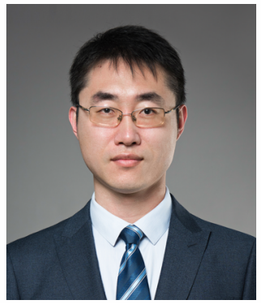
Surface structuration and functionalization by laser: principle and opportunities

个人简介：巴赫（Boyer Balthazar）是法国光学和微波协会Alpha RLH的中国区总代表。巴赫毕业于拉罗谢尔大学和武汉大学，自2011年起担任Alpha RLH的中国区总代表。10多年来，他为协会的法方成员的利益开展了多种活动，增加他们在订货商和工业界有更高的知名度。

Boyer Balthazar is the China representative of French optic and microwave cluster Alpha RLH. Graduated from La Rochelle University and Wuhan University, Boyer Balthazar is the China representative of Alpha RLH cluster since 2011.For more than 10 years he has carried out actions for the benefit of its French members to give them more visibility with order givers and industry.

演讲摘要：本报告将介绍我们协会成员在激光器结构和功能化方面的一些合作原则、机会和已有实例。

The presentation will introduce some principles, opportunities and examples done by our company members' lasers in terms of structuration and functionalization.



张金伟 教授 Prof. Jinwei Zhang

演讲题目：高功率超快碟片振荡器
High power ultrafast thin-disk oscillators

个人简介：张金伟现为华中科技大学教授。近年来，他在Nature Photonics、Light: Science and Applications, Laser & Photonics Reviews, Optics Letters, Optics Express和IEEE JSTQE等期刊发表了许多文章，还被邀请在CLEO和CLEO-Europe会议上介绍他的工作。目前他主要的研究方向为1-μm和2-μm的高功率超快碟片激光器及其在中红外成像中的应用。

Jinwei Zhang is a full professor at Huazhong University of Science and Technology. In recent years, he has published a lot of papers in the journals such as Nature Photonics, Light: Science and Applications, Laser & Photonics Reviews, Optics Letters, Optics Express and IEEE JSTQE. He was also invited to present his work at CLEO and CLEO-Europe conferences. His current research interests include high-power ultrafast 1- and 2-μm thin-disk lasers and their applications in the mid-infrared generation.

演讲摘要：基于碟片技术的高功率超快激光器在平均功率和能量放大方面取得了重大进展。到目前为止，直接由锁模Yb:YAG碟片振荡器提供的功率达到几百瓦，峰值功率超过40兆瓦。这种高功率激光系统具有广泛的应用前景。在这里，我们将介绍碟片激光器的发展和未来的展望。

Substantial progress has been made in average power and energy scaling of high-power ultrafast lasers based on the thin-disk technology. Until now, Power levels of several hundred Watts and peak powers of more than 40 MW have been delivered directly from mode-locked Yb:YAG thin-disk oscillators. Such high power laser systems are beneficial to a wide range of applications. Here we will talk about the development of the thin-disk lasers and its future prospect.

徐刚博士 Dr. Gang Xu

新西兰奥克兰大学 University of Auckland, New Zealand

演讲题目：克尔谐振腔中矢量光孤子的性质与应用
Features and applications of vector cavity solitons in Kerr resonator

个人简介：徐刚（2015年获博士学位，2012年获硕士学位，2010年获学士学位）目前在奥克兰大学（新西兰）的激光实验室担任研究员。他的研究方向包括非线性波动力学、超快光学、激光物理学、光学孤子和频率梳。他已发表30篇期刊文章，35篇会议论文和3篇书籍章节。

Gang Xu (PhD15, MSc12, BSc10) currently works as a research scientist in the laser lab in the University of Auckland (New Zealand). His research interests include nonlinear wave dynamics, ultrafast optics, laser physics, optical solitons and frequency combs. He has co-authored 30 peer-reviewed journals, 35 conference papers and 3 book chapters.

演讲摘要：在光学和光子学中，耗散孤子是一种表现为持续存在的光束的局部结构，是从超短脉冲锁模激光器到微谐振器光频梳等众多应用的基础。在这次汇报中，我将展示耗散性光孤子自发偏振对称性破缺的首次实验观察。我们的实验是在一个无源的、相干驱动的、非线性光学环形共振器中进行的。我们设计了谐振腔的两个正交偏振模之间的简并，并表明在完全对称的工作条件下，腔内维持的孤子可以自发地打破它们的对称性，产生两个不同但共存的矢量局域态，其具有镜像的不对称偏振态。

In optics and photonics, dissipative solitons are localized structures that manifest themselves as persisting beams of light, and underpin numerous applications from ultra-short pulsed mode-locked lasers to microresonator optical frequency combs. In this communication, I will demonstrate the first experimental observation of spontaneous polarization symmetry breaking of dissipative optical solitons. Our experiments are performed in a passive, coherently driven, nonlinear optical ring resonator. We engineer degeneracy between two orthogonal polarization modes of the resonator, and show that despite perfectly symmetric operating conditions, the solitons sustained in the cavity can spontaneously break their symmetry, giving rise to two distinct but co-existing vector localized states with mirror-like asymmetric polarization states.

金磊博士 Dr. Lei Jin

演讲题目：超快光纤激光器及其在生物制药和环境监测领域中的应用

Ultrafast fiber laser and its applications in the field of pharmacy and environmental monitoring

个人简介：金磊分别于2005年和2007年在中国哈尔滨工业大学获得应用物理学学士和硕士学位，并于2014年在日本东京大学获得电子工程和信息系统博士学位。

2014年进入量子工程系任研究员，2017年至2018年在日本名古屋大学电子系任项目助理教授。目前，他担任日本东京大学先进科学技术研究中心的助理教授。他的研究方向是超快非线性光学、光纤激光器和光纤传感器及其在生物学和环境科学中的应用。

Lei Jin received the B.S. and M. S. degrees in applied physics from Harbin Institute of Technology, Harbin, China, in 2005 and 2007, respectively, and the Ph.D. degree in electrical engineering and information systems from the University of Tokyo, Tokyo, Japan, in 2014.

In 2014, he joined the Department of Quantum Engineering as a Research Fellow, and from 2017 to 2018 was a Project Assistant Professor in the Department of Electronics, Nagoya University, Nagoya, Japan. At present, he has been the Assistant Professor in Research Center for Advanced Science and Technology, the University of Tokyo, Tokyo, Japan. His research focuses on ultrafast nonlinear optics, fiber lasers, and fiber sensors and their applications in biology and environmental science.

演讲摘要：用于制药和环境监测的气体和颗粒传感器对我们的日常生活具有重要意义。除了电子或化学技术，激光光谱和激光散射/衍射分析技术具有高速、高精度和高分辨率的优势，在环境领域得到了广泛的应用。在这些应用中，超快光纤激光器是很有前途的候选种子源。这里我们将汇报我们在基于紧凑和稳定的光纤系统的气体和粒子传感系统方面的工作，其中讨论了新型激光光源和分析子系统。

Gas and particle sensors for pharmacy and environmental monitoring are with great importance for our daily life and society. Besides electronic or chemical techniques, laser spectroscopy and laser scattering/diffraction analysis techniques take the advantage of high speed, high precision and resolution, and have been widely applied in environmental field. Ultrafast fiber lasers are promising candidates of seed sources in these applications. Here we report our works on the gas and particle sensing system based on compact and stable fiber systems, where the novel laser source and analysis subsystem are discussed.

Dr. Andrey Komarov

俄罗斯科学院西伯利亚分院自动化技术与测电学研究所
(Institute of Automation and Electrometry, SB RAS, Russia)

演讲题目：光纤激光器中色域的产生机理

Formation mechanism of color domains in fiber lasers

个人简介：Andrey Komarov分别于1998年和2000年获得俄罗斯新西伯利亚国立大学（NSU）物理学学士和硕士学位，并于2015年获得俄罗斯SB RAS激光物理研究所的博士学位。他的研究领域是激光器和各种非线性系统中超短脉冲的非线性动力学。他发展了激光被动锁模理论，该理论描述了辐射量子化为相同的耗散孤子、多稳定性和多滞后现象、被动锁模的阈值自启动以及其他效应。他是非线性光学系统数值模拟方面的专家，发表了150篇著作。

Andrey Komarov received the bachelor's and master's degrees in physics from Novosibirsk State University (NSU), Russia, in 1998 and 2000, respectively, and the Ph.D. degree in physical and mathematical sciences from the Institute of Laser Physics, SB RAS, Russia, in 2015. The field of his scientific interests is nonlinear dynamics of ultrashort pulses in lasers and various nonlinear systems. He developed the theory of laser passive mode-locking which describes the quantization of radiation into identical dissipative solitons, multistability and multihysteresis phenomena, threshold self-start of passive mode-locking, and other effects. He is a specialist on numerical simulation of nonlinear optical systems. He is the author of 150 publications.

演讲摘要：利用数值模拟，我们研究了具有双子光谱的激光器中彩色孤子的产生，它由两个具有不同频率的辐射片段组成。这种孤子的形成是由于非线性损耗随着强度的增加而增加，折射率的分散导致不同频率的辐射片段相对移动，光谱增益的不均匀性，以及由于相应的光谱相关的激光器内损耗而产生的双子辐射光谱。所提出的理论可以解释光纤激光器中色域形成的主要实验规律，并有可能在激光辐射的非线性动力学的控制方式上有着更进一步的发展。

Using numerical simulation, we investigate the generation of color solitons in a laser with a doublet spectrum, which consist of two radiation fragments with different frequencies. Formation of such solitons is due to nonlinear losses that increase with increasing intensity, dispersion of the refractive index which leads to the movement of radiation fragments with different frequencies relative to each other, spectral gain inhomogeneity, and generation of doublet radiation spectrum that is due to the corresponding spectrally dependent intralaser losses. The proposed theory makes it possible to explain the main experimental regularities in the formation of color domains in fiber lasers and has the potential for further development of methods for controlling the nonlinear dynamics of laser radiation.

张兆伟 教授 Prof. Zhaowei Zhang

华中科技大学 Huazhong University of Science and Technology

演讲题目：基于飞秒光学参量振荡器的宽谱及可调谐中红外激光

Generation of broadband and widely-tunable midinfrared lasers using ultrafast optical parametric oscillators

个人简介:张兆伟目前是华中科技大学光学与电子信息学院的教授。他于2007年在英国南安普顿大学光电子研究中心获得博士学位。他的研究领域包括中红外光子学、光参量振荡器及其在医疗、环境和制造方面的应用。

Zhaowei Zhang is currently a professor in the School of Optical and Electronic Information, Huazhong University of Science & Technology, Wuhan, China. He obtained the PhD degree in Optoelectronics Research Center in the University of Southampton, UK in 2007. His research interests include mid-infrared photonics, optical parametric oscillators and their applications in healthcare, environment, and manufacturing.

演讲摘要：中红外飞秒激光器是空间相干光源，在科学研究、材料加工、环境测量和生物医学成像方面有许多应用。同步泵浦光参量振荡器（OPO）已被确立为在中红外波长区域产生飞秒脉冲的技术方案。在本次汇报中，我将报告我们在探索OPO的新型脉冲形成机制方面的进展，并回顾我们在开发基于OPO的中红外飞秒激光源方面的实验进展，包括产生瞬时带宽为3-5微米的惰波的啁啾脉冲OPO，以及可在3-5微米以上调谐的OPO。

Mid-infrared femtosecond lasers are spatially coherent light sources with numerous applications in scientific research, material processing, environment measurement, and biomedical imaging. Synchronously-pumped optical parametric oscillators (OPO) have been established as a technical scheme to generate femtosecond pulses at midinfrared wavelength regions. In this talk, I will report our progress in exploring novel pulse-formation mechanism in OPOs, and review our experimental progress in developing OPO-based mid-infrared femtosecond laser sources, including a chirped-pulsed OPO generating an idler wave with an instantaneous bandwidth covering 3-5 μm, and an OPO tunable over 3-5 μm.

Dr. Mariusz Klimzack

波兰 华沙大学 (Faculty of Physics, University of Warsaw, Poland)

演讲题目：基于特定色散和双折射性质的微结构设计：相干超连续谱产生中的噪声管理策略

Microstructure design for specific chromatic dispersion and birefringence characteristics as noise management strategies in coherent supercontinuum generation

个人简介:Mariusz Klimczak于2010年在华沙理工大学获得PhD博士学位，2016年在华沙大学物理系获得DSc博士学位。他的研究领域是非线性光纤光学和用于超快科学和传感应用的空芯光纤。他曾在波兰科学院高压物理研究所（2010-2013年）和华沙电子材料技术研究所（2013-2019年）担任研究职务，并在法国弗朗什孔泰大学和FEMTO-ST研究所担任访问学者（2018年）。目前他是华沙大学物理系的助理教授。

Mariusz Klimczak obtained his PhD degree from Warsaw University of Technology in 2010 and his DSc degree from University of Warsaw, Faculty of Physics in 2016. His research interests are nonlinear fiber optics and hollow core fibers for ultrafast science and sensing applications. He has held research positions at Institute of High Pressure Physics, Polish Academy of Sciences (2010-2013) and at Institute of Electronic Materials Technology in Warsaw (2013-2019), as well as a visiting fellowship at Université de Franche-Comté and FEMTO-ST Institute in France (2018). Currently he is an assistant professor at University of Warsaw, Faculty of Physics.

演讲摘要：光谱学和光学成像使人们能够深入了解物质的基本方面，如分子振动动力学，以及非常实用的知识，如温室气体排放与污染物颗粒的相互作用。高亮度和高光谱覆盖是超连续光源的两个特点，在这些实验技术中都非常方便。值得特别强调的例子包括受激辐射耗尽显微镜（STED）、光声光谱学和光学相干断层扫描，特别是在眼科和早期皮肤癌诊断方面的应用。然而，大多数形成超连续脉冲的非线性光学过程具有固有的随机性，因此这些脉冲的相干性只是空间上的。巨大的振幅和相位波动原则上可以通过平均化来管理，但只能以降低测量速度为代价，而一些令人兴奋的应用，如超短激光脉冲合成，则被排除在外。超连续体的锁模激光泵浦可以大大抑制这些有害的影响，在某些情况下可以实现连贯的超连续体脉冲。

在这次汇报中，我将讨论通过色散工程或者说在更广义上通过光纤的微结构工程来实现锁模激光泵浦超连续的噪声管理。该讲座将讨论超连续谱生成中的主要噪声源，进而讨论管理超连续谱的两种主要方式，即色散工程和其他线性特性（如双折射）的光纤微结构控制。基于直接的、相对强度的噪声测量结果，将介绍不同光子晶体光纤实现的噪声指纹记录。还将讨论用交叉相关频率解析光学门控和ptychography检索算法获得的结果，揭示非线性光纤的不同双折射特性如何影响偏振诱导的调制不稳定性。最后，将提供一个相干超连续体应用的例子，涉及在Tm和Tm+Ho窗口工作的超低噪声、超快光纤放大器的种子源。

Spectroscopy and optical imaging have enabled fascinating insight into both the fundamental aspects of matter, like molecule vibration dynamics, and very practical knowledge e.g. on how greenhouse emissions interact with the pollutant particles. High brightness and hyperspectral coverage are the two characteristics of supercontinuum light sources, which are very convenient in each of these experimental techniques. Examples deserving special highlight include stimulated emission depletion microscopy (STED), photoacoustic spectroscopy and optical coherence tomography, especially in the ophthalmology and early skin cancer diagnostics applications. However, most of the nonlinear optical processes forming the supercontinuum pulses have inherently stochastic nature, thus the coherence of these pulses is only spatial. The large amplitude and phase fluctuations can in principle be managed by averaging, but only at the cost of measurement speed reduction, while some exciting applications, e.g. in ultrashort laser pulse synthesis are excluded. Mode-locked laser pumping of supercontinuum can significantly suppress these detrimental effects and under certain circumstances serve to realize coherent supercontinuum pulses.

In this seminar, I will discuss noise management in mode-locked laser pumped supercontinuum implemented by chromatic dispersion engineering and, in an even broader context, by microstructure engineering of optical fibers. The talk shall move through discussion of the primary noise sources in supercontinuum generation into two main ways of its management, i.e. chromatic dispersion engineering and fiber microstructure control for other linear characteristics, like birefringence. Noise fingerprints recorded for different photonic crystal fiber realizations will be presented based on direct, relative intensity noise measurement results. Results obtained with cross-correlation frequency resolved optical gating and ptychography retrieval algorithms will also be discussed, revealing how different birefringence properties of nonlinear fibers contribute to onset of polarization-induced modulational instability. Finally, an example of coherent supercontinuum application will be provided, involving seeding of ultra-low noise, ultrafast fiber amplifiers operating in the Tm and Tm+Ho windows.

何超博士 Dr.-Ing. Chao He

德国亚琛联合科技有限公司ACUNITY GmbH
Technology Manager Laser Micro/Nano Processing

演讲题目：超快激光螺旋钻孔技术发展现状
Status Quo of Ultrashort-Pulsed Laser Helical Drilling Technology

个人简介：何超目前在德国弗劳恩霍夫激光技术研究所(Fraunhofer Institute for Laser Technology)的分支机构ACUNITY担任激光微纳米加工技术经理。他于2020年获得德国亚琛工业大学机械工程博士学位。他在Fraunhofer激光技术ILT研究所工作了8年多，专注于使用超短脉冲激光的微纳米结构，专门从事使用特别开发的螺旋光学和皮秒/飞秒激光器的高精度钻孔和切割技术领域。此外，他还致力于开发激光钻孔和激光表面构造系统技术，并将其从实验室研究转移到工业应用。

Chao He is now working as Technology Manager Laser Micro/Nano Processing at ACUNITY, a spin-off of the Fraunhofer Institute for Laser technology. In 2020 he obtained his PhD degree in mechanical engineering from RWTH Aachen University in Germany. Having worked in the Fraunhofer Institute for Laser Technology ILT for more than eight years, he focuses on micro and nanostructuring using ultrashort pulsed lasers, specialized in the field of high precision drilling and cutting technology using a specially developed helical optics and ps/fs lasers. In addition, he endeavors to develop systems technology of laser drilling and laser surface structuring and transfer them from laboratorial research to industrial applications.

演讲摘要：基于旋转的多维棱镜的螺旋钻孔光学器件可以通过改变螺旋光学器件的参数来精确调整孔的几何形状，如直径和锥度。因此，结合超短脉冲激光器，可以制造出高精度的微孔，用于工业应用。为了提高工业应用的产量，开发了使用衍射光学元件（DOE）的多光束技术。此外，市场上有亚皮秒脉宽和高峰值单脉冲能量的超短脉冲激光源，可用于多波束螺旋加工。

The helical drilling optics based on spinning Dove prism can adjust the hole geometry such as diameter and taper precisely by changing the parameters of the helical optics. High-precision micro holes, therefore, can be fabricated for industrial application in combination with ultrashort pulsed lasers. In order to enhance the throughput for industrial applications, multi-beam technology using diffractive optical element (DOE) is developed. Moreover, ultrashort pulsed laser sources with sub-1-ps pulse duration and a high maximum single pulse energy are available in the market and can be employed for the multibeam helical processing.

刘顿 教授 Prof. Dun Liu

湖北工业大学 Hubei University of Technology

演讲题目：超快激光精密加工与光场调控技术

Ultrafast laser precision processing and optical field control technology

个人简介：刘顿，湖北工业大学机械工程学院教授，武汉金顿激光公司总工程师，武汉激光学会副理事长。2003-2012年在英国利物浦大学攻读硕士、博士学位并担任博士后研究员。2012年入选湖北省“百人计划”回国工作，2016年获湖北省科技进步二等奖。作为负责人承担国家、省、市各级项目30余项。近年来发表学术论文50余篇，获批发明专利20余项。长期从事超短脉冲激光微加工的研究工作，主要研究领域包括基于空间光调制器的多光束并行加工、偏振控制、光束整形技术；超快激光材料表面改性、浸润性控制、激光直写光子器件、激光清洗等。

Dun Liu, Professor of School of Mechanical Engineering, Hubei University of Technology, Chief Engineer of Wuhan Kington Laser Company, Vice President of Wuhan Laser Society, studied Master's and Doctoral degrees and worked as a postdoctoral researcher at the University of Liverpool, U.K. from 2003 to 2012, and was selected to work in Hubei Province in 2012 under the "100 People Plan". In 2016, he won the Second Prize of Hubei Provincial Science and Technology Progress. He has undertaken more than 30 projects at national, provincial and municipal levels as a responsible person. In recent years, he has published more than 50 academic papers and has been granted more than 20 invention patents. He has been engaged in the research of ultrashort pulse laser microprocessing for a long time. His main research areas include spatial light modulator based multi-beam parallel processing, polarization control, beam shaping technology; ultrafast laser material surface modification, infiltration control, laser direct writing photonic devices, laser cleaning, etc.

演讲摘要：空间光调制器是一种可编程衍射光学器件，可在随时间变化的电驱动信号或其它信号的控制下，调整空间光束的振幅或强度、相位、偏振态以及脉宽，从而实现多光束并行加工、动态偏振控制、光束整形、脉冲整形等，可应用于体光栅加工、微群孔加工、多焦点切割、贝塞尔光束切割、全系光镊等领域。本次汇报介绍了光场调控包括多光束叠加、光束整形的基本原理和算法，以及光场调控技术在超快激光精密加工领域的应用，包括透明材料加工、晶圆开槽、材料表面微纳织构等。

Spatial light modulator is a programmable diffractive optical device, which can adjust the amplitude or intensity, phase, polarization state and pulse width of spatial light beam under the control of time-varying electric drive signal or other signals, thus realizing multi-beam parallel processing, dynamic polarization control, beam shaping, pulse shaping, etc. It can be applied to body grating processing, micro-group hole processing, multi-focus cutting, Bessel beam cutting, full-system optical tweezers and so on. This presentation introduces the basic principles and algorithms of optical field modulation including multi-beam superposition and beam shaping, and the applications of optical field modulation technology in ultrafast laser precision processing, including transparent material processing, wafer slotting, material surface micro-nano-weaving, etc.

Markus Pulka

德国FCC公司CTO (CTO, FCC FiberCableConnect GmbH, Germany)

演讲题目：中功率传能光纤及其应用

Medium power energy transmission optical fiber and its application

个人简介：德国FCC公司成立于2007年，总经理是Markus Pulka和Adam Kucharski，总部设在柏林的阿德勒肖夫科技中心。FCC公司是一家光电子领域的制造商，在光纤领域提供高效、经济、高质量的客户专用解决方案。

FCC FiberCableConnect GmbH was founded in the year 2007. The managing directors are Markus Pulka and Adam Kucharski. The headquarters is in Berlin in the science and technology center Adlershof. FCC FibreCableConnect GmbH is a manufacturer in the field of photonics and provides efficient, cost-effective and high-quality customer-specific solutions in the area of fiber optics.

演讲摘要：FCC公司的产品和服务范围主要包括工业和医疗用激光传输光缆的开发和生产。此外，也包括光谱学光纤束和探头，光纤耦合器，以及客户专用光束制导系统的开发和建设。这次汇报介绍了中功率传能光纤的特点和优点，解决了如激光焊接、激光切割和激光钻孔等激光加工中经常遇到的问题。

The range of products and services mainly include development and production of optical fiber cables for laser beam transmission for industrial and medical applications. Moreover, fiber bundles and probes for spectroscopy, optical fiber coupler and also the development and construction of customer-specific beam guidance systems. This presentation describes the features and advantages of the special products, which solve problems frequently encountered in laser processing such as laser welding, cutting and drilling.

廉正刚 博士 Dr. Zhenggang Lian

武汉长盈通光电技术股份有限公司
Yangtze Optical Electronic Co. Ltd. Wuhan, China

演讲题目：大芯光纤的开发及其在电力输送中的应用
Development of a large core fiber and their applications in power delivery

个人简介：廉正刚于2009年在诺丁汉大学获得电子工程博士学位；随后加入南安普顿大学光电子研究中心，担任博士后。从2014年开始，他在中国武汉的一家创业公司工作，从事特种光纤的设计和制造。他已经发表或与人合著了70多篇论文，70多项专利。

Zhenggang Lian obtained Ph.D. degree in Electronic Engineering from the University of Nottingham in 2009; then he joined the Optoelectronics Research Centre at the University of Southampton as a post-doc. From the year of 2014, He worked in a startup company in Wuhan China, in the field of design and fabrication of specialty optical fibers. He has generated or co-authored more than 70 publications, 70 patents.

演讲摘要：能量传输光纤的纤芯直径一般较大，具有大功率传输能力、柔韧性好、强度高、透光性好等优良特性。报告的第一部分主要介绍了方型大芯光纤的设计和制造技术。方形纤芯适用于制备捆绑部件，并产生均匀的光束。第二部分报告了更多传统光纤的特点和应用，包括石英包层和塑料包层的功率传输光纤。石英包层光纤可以传输更高的激光功率，并具有良好的抗光损伤能力；塑料包层光纤主要采用低折射率的掺氟丙烯酸树脂包层光纤，具有更高的柔性。报告的第三部分更新了各种类型的特殊光纤的最新进展，如多芯和空芯光纤。

The core diameter of the energy-transmitting fiber is generally large, and it has excellent properties such as high-power transmission capacity, good flexibility, high strength, and good light transmittance. The first part of the report focuses on the design and fabrication technologies of square shaped large core fiber. The square shaped cores are suitable for the preparation of bundled components and generate homogenized beam. The second part reports the characteristics and applications of the more conventional fibers, include quartz-clad and plastic-clad power transmitting optical fibers. Quartz-clad fibers can transmit higher laser power and have good resistance to optical damage; plastic-clad fibers are mainly using low-refractive index fluorine-doped acrylic resin-coated fibers, which are more flexible. The third part of the report updates the recent progress in the development of various types of special optical fibers, such as multi-core and hollow-core optical fibers.

Aleksei Kozlov

M.F.斯捷利马赫极地研究所研究员

个人简介：R&D Company A.B. Kozlov建立于2007，总经理是Aleksei Kozlov。其总部位于莫斯科，该公司是一家光子学领域的制造商，其主要提供声光领域的高效解决方案，多种光学器件如碟片增益介质，碟片激光器及激光加工机器。

R&D Company A.B. Kozlov was found in the year 2007. The managing director is Aleksei Kozlov. The headquarters is in Moscow. R&D Company A.B.Kozlov is a manufacture in the field of photonics and provide efficient custom-specific solutions in the area of acousto-optical devices, different photonic devices and its components like disk active elements, disk lasers, laser-processing machines.

演讲摘要：公司的产品和服务主要包括声光调制器(AOM)、声光可调谐滤波器(AOTF)、声光可调谐滤波器（AOTF），声光偏转器（AOD）此外，公司还提供多种激光产品，如碟片激光器，碟片增益介质以及激光加工机器。这次报告主要介绍了声光器件的原理、特性、优势及其应用。

The range of products and services mainly include development and production of acousto-optical devices like acousto-optical modulators (AOM), acousto-optical tunable filters (AOTF), acousto-optical deflectors (AOD). Additionally the company produce different kinds of laser technics: disk lasers, disk elements and laser-processing machines.

The presentation describes the principles, features and advantages of the acousto-optical devices and its applications.

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