

PROCEEDINGS OF SPIE

SPIDigitalLibrary.org/conference-proceedings-of-spie

Front Matter: Volume 9521

, "Front Matter: Volume 9521," Proc. SPIE 9521, Selected Papers from Conferences of the Photoelectronic Technology Committee of the Chinese Society of Astronautics 2014, Part I, 952101 (5 March 2015); doi: 10.1117/12.2189540

SPIE.

Event: Selected Proceedings of the Photoelectronic Technology Committee Conferences held August-October 2014, 2014, China, China

PROCEEDINGS OF SPIE

Selected Papers from Conferences of the Photoelectronic Technology Committee of the Chinese Society of Astronautics 2014, Part I

**Xun Hou
Zhihong Wang
Lingan Wu
Jing Ma**
Editors

**10–12 and 13–15 August 2014
Harbin and Changchun, China**

Organized by
Photoelectronic Technology Committee, Chinese Society of Astronautics (China)
Freespace Optical Communication Technology Research Center, Harbin Institute of
Technology (China)
Science and Technology on Low-light-level Night Vision Laboratory (China)

Sponsored by
Chinese Society of Astronautics (China)

Published by
SPIE

Volume 9521

Proceedings of SPIE 0277-786X, V.9521

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

Selected Papers from Conferences of the Photoelectronic Technology Committee of the Chinese Society of Astronautics 2014, Part I, edited by Xun Hou, Zhihong Wang, Lingan Wu, Jing Ma, Proc. of SPIE Vol. 9521, 952101 · © 2015 SPIE · CCC code: 0277-786X/15/\$18 · doi: 10.1117/12.2189540

Proc. of SPIE Vol. 9521 952101-1

The papers included in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. The papers published in these proceedings reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from this book:

Author(s), "Title of Paper," in *Selected Papers from Conferences of the Photoelectronic Technology Committee of the Chinese Society of Astronautics 2014, Part I*, edited by Xun Hou, Zhihong Wang, Lingan Wu, Jing Ma, Proceedings of SPIE Vol. 9521 (SPIE, Bellingham, WA, 2015) Article CID Number.

ISSN: 0277-786X

ISBN: 9781628416527

Published by

SPIE

P.O. Box 10, Bellingham, Washington 98227-0010 USA

Telephone +1 360 676 3290 (Pacific Time) · Fax +1 360 647 1445

SPIE.org

Copyright © 2015, Society of Photo-Optical Instrumentation Engineers.

Copying of material in this book for internal or personal use, or for the internal or personal use of specific clients, beyond the fair use provisions granted by the U.S. Copyright Law is authorized by SPIE subject to payment of copying fees. The Transactional Reporting Service base fee for this volume is \$18.00 per article (or portion thereof), which should be paid directly to the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923. Payment may also be made electronically through CCC Online at copyright.com. Other copying for republication, resale, advertising or promotion, or any form of systematic or multiple reproduction of any material in this book is prohibited except with permission in writing from the publisher. The CCC fee code is 0277-786X/15/\$18.00.

Printed in the United States of America.

Publication of record for individual papers is online in the SPIE Digital Library.

SPIE 
Digital Library

SPIDigitalLibrary.org

Paper Numbering: Proceedings of SPIE follow an e-First publication model, with papers published first online and then in print and on CD-ROM. Papers are published as they are submitted and meet publication criteria. A unique, consistent, permanent citation identifier (CID) number is assigned to each article at the time of the first publication. Utilization of CIDs allows articles to be fully citable as soon as they are published online, and connects the same identifier to all online, print, and electronic versions of the publication. SPIE uses a six-digit CID article numbering system in which:

- The first four digits correspond to the SPIE volume number.
- The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B ... 0Z, followed by 10-1Z, 20-2Z, etc.

The CID number appears on each page of the manuscript. The complete citation is used on the first page, and an abbreviated version on subsequent pages. Numbers in the index correspond to the last two digits of the six-digit CID number.

Contents

vii	<i>Authors</i>
xi	<i>Conference Committee</i>

SELECTED PAPERS FROM CONFERENCES OF THE PHOTOELECTRONIC TECHNOLOGY COMMITTEE OF THE CHINESE SOCIETY OF ASTRONAUTICS 2014, PART 1

9521 02	The theoretical simulation on electrostatic distribution of 1st proximity region in proximity focusing low-light-level image intensifier [9521-1]
9521 03	Research on the inversion of one-dimensional attitude of the space shuttle model based on scattering spectroscopy [9521-3]
9521 04	The analysis on the optical power of focal length tunable liquid lens [9521-4]
9521 05	Low spherical aberration of the focal length tunable liquid lens [9521-5]
9521 06	Performance simulation of heterodyne synchronous receiving system in coherent optical communication [9521-6]
9521 07	Human motion recognition based on features and models selected HMM [9521-8]
9521 08	In-line print defect inspection system based on parallelized algorithms [9521-9]
9521 09	Simulation and detection of electron back-scattering in ion barrier films of micro-channel plate [9521-10]
9521 0A	Photochromism of spirooxazine-doped polymers studied by monitoring dynamics of holographic gratings [9521-11]
9521 0B	Charge transfer efficiency improvement of 4T pixel for high speed CMOS image sensor [9521-12]
9521 0C	TCAD simulations for a novel single-photon avalanche diode [9521-13]
9521 0D	The analysis of demodulation characteristic on the resonant optical gyro using frequency modulation technique [9521-14]
9521 0E	The law of wet oxidation rate in 850nm VCSELs [9521-15]
9521 0F	New method of echo detection for diffuse reflection laser ranging [9521-16]
9521 0G	H_∞ control for fast steering mirror based on the incremental PI controller [9521-18]
9521 0H	Retina-like sensor image coordinates transformation and display [9521-19]

- 9521 OI **Optical signal measurement of iso-octane autoignition behind reflected shock wave** [9521-27]
- 9521 OJ **Experimental study of polarization and backscattering noise of resonator fiber optic gyro** [9521-28]
- 9521 OK **An adaptive fusion strategy of polarization image based on NSCT** [9521-29]
- 9521 OL **Temperature characteristic of 808nm VCSELs with large aperture** [9521-30]
- 9521 OM **The relevant research on AOD and concentration of PM_{2.5} pollutant** [9521-32]
- 9521 ON **Overview and trend of steady tracking in free-space optical communication links** [9521-33]
- 9521 OO **A method for detecting small targets based on cumulative weighted value of target properties** [9521-34]
- 9521 OP **Study on the gain characteristic of dual MCP cascade system** [9521-40]
- 9521 OQ **Research on defogging technology of video image based on FPGA** [9521-41]
- 9521 OR **An iterative trilateral filter algorithm for depth map** [9521-45]
- 9521 OS **Design of fire detection equipment based on ultraviolet detection technology** [9521-46]
- 9521 OT **Influence by x-ray facula on dimension measurement** [9521-48]
- 9521 OU **Research and test on noise factor of two-cascaded MCPs** [9521-53]
- 9521 OV **THz spectrum of iron corrosion products** [9521-54]
- 9521 OW **Design and simulation of a new compound eye with a wide field of view** [9521-58]
- 9521 OX **Solar-blind ultraviolet optical system design for missile warning** [9521-59]
- 9521 OY **Experimental investigation of gamma ray radiation effects on 1550nm single mode fiber** [9521-64]
- 9521 OZ **Research on silicon microchannel arrays oxide insulation technology** [9521-66]
- 9521 10 **Research on resistance properties of conductive layer materials of microchannel plate film dynode** [9521-67]
- 9521 11 **Research on the detection technology to dim and small target** [9521-70]
- 9521 12 **The imaging simulation of space target based on the target visible scatter characteristics** [9521-74]
- 9521 13 **A set of measurement systems for the dynamic visible scatter characteristics of space target** [9521-76]

- 9521 14 **Comparison of swarm intelligence algorithms in atmospheric compensation for free space optical communication** [9521-78]
- 9521 15 **Optical design of athermalization stepping-zoom dual FOV MWIR system** [9521-81]
- 9521 16 **Design of natural user interface of indoor surveillance system** [9521-82]
- 9521 17 **Design of wideband multilayer planar absorber using a new differential evolution algorithm** [9521-85]
- 9521 18 **Design of multipass frequency selective surface** [9521-87]
- 9521 19 **Retrieval of aerosol optical thickness over land from airborne polarized measurements in Tianjin and Tangshan** [9521-95]
- 9521 1A **Research of two analysis methods on propagation modes of light in optic slab waveguide** [9521-99]
- 9521 1C **Separation of FBG wavelength mixed caused by temperature and vibration based on improved Fast-ICA and self-adapting** [9521-102]
- 9521 1D **Review of radiation hardening techniques for EDFAs in space environment** [9521-103]
- 9521 1E **Influence and analysis on ion barrier film to the noise factor of micro-channel plate** [9521-105]
- 9521 1F **Design of high-brightness 976nm fiber-coupled laser diodes based on ZEMAX** [9521-108]
- 9521 1G **Measurement and analysis on ion barrier film of MCP by ion beam sputtering deposition** [9521-109]
- 9521 1H **The design and implementation of microstrip passband filter based on ADS simulation** [9521-111]
- 9521 1I **Application of image processing for terahertz time domain spectroscopy imaging quantitative detection** [9521-113]
- 9521 1J **A low noise high readout speed 512×128 ROIC for shortwave InGaAs FPA** [9521-121]
- 9521 1K **Study on numerical simulation of flowfield in afterburner for ducted rocket** [9521-123]
- 9521 1L **Comparative study on atmospheric correction methods of visible and near-infrared hyperspectral image** [9521-124]
- 9521 1M **Study of image matching algorithm and sub-pixel fitting algorithm in target tracking** [9521-125]
- 9521 1N **Effect of annealing time on the adsorption of cesium atoms** [9521-127]
- 9521 1O **A research on the effects of practicing Baduanjin on the lower extremities by using sEMG** [9521-128]

- 9521 1P **Numerical simulation of different pulse width of long pulsed laser on aluminum alloy** [9521-131]
- 9521 1Q **Research on space-based optical surveillance's observation strategy of geostationary-orbit's pitch point region** [9521-132]
- 9521 1R **Numerical simulation of different pulse width of long pulsed laser on aluminum alloy** [9521-133]
- 9521 1S **Analysis and design of low noise column stage in CMOS ROIC for UV GaN focal plane array** [9521-134]
- 9521 1U **Reviews of a Diode-Pumped Alkali Laser (DPAL), a potential high powered light source** [9521-139]
- 9521 1V **Optimal design of a new type space laser communication optical system** [9521-140]
- 9521 1W **The application of parallel computing technology in the data processing of the imaging spectrometer** [9521-142]
- 9521 1X **Cistanches identification based on fluorescent spectral imaging technology combined with principal component analysis and artificial neural network** [9521-144]

Author Index

Numbers in the index correspond to the last two digits of the six-digit citation identifier (CID) article numbering system used in Proceedings of SPIE. The first four digits reflect the volume number. Base 36 numbering is employed for the last two digits and indicates the order of articles within the volume. Numbers start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B...0Z, followed by 10-1Z, 20-2Z, etc.

An, Guofei, 1U
An, Wei, 1Q
Bai, Tingzhu, 0H
Bai, Xiaofeng, 02
Bi, Juan, 1R
Cai, He, 1U
Cai, Hong-xing, 03
Cao, Fengmei, 0H
Cao, Jingtai, 14
Cao, Kairui, 0G
Cao, Nan, 0H
Cao, Ning, 16
Cao, Yuqiang, 1C
Chao, Lv, 08
Che, Chi, 0Y
Chen, Chang, 1G, 1N
Chen, Cheng, 19
Chen, Guang-aiu, 0K
Chen, Guibo, 1P, 1R
Chen, Jing, 1O
Chen, Qisheng, 0I
Chen, Xinglin, 0G
Chen, Yu, 0X
Chen, Yu, 1J
Chen, Zeng-ping, 0O
Cheng, Hongchang, 09, 1N
Cheng, Wei, 1G
Chu, Sheng, 0S
Cui, Ning, 0G
Deng, Xiao-guo, 1V
Ding, Xiaoyu, 1K
Dong, Jia, 1X
Dou, Zhiguo, 0I
Du, Ping, 15
Duan, Jin, 0K
Duan, Jing, 1V
Duanmu, Qingduo, 02, 09, 0T, 0Z, 10
Fan, Xiaoli, 13
Fan, Ya, 03
Fang, Gang, 0D, 0J
Fang, Jiexiong, 1J
Feng, Chen, 11
Feng, Dawei, 0L
Feng, Jianfeng, 14
Feng, Yuan, 0E, 0L
Fu, Qiang, 0K
Fu, Shencheng, 02, 09, 0A
Gao, Jiao Bo, 1W
Gao, Kai, 0R
Gao, Meng, 1W
Gao, Ming, 1U
Geng, Yaguang, 15
Guo, Lijun, 0D, 0J
Han, Juhong, 1U
Han, Yue, 1H
Hao, Yongqin, 0E, 0L
He, Qian, 1L
Hong, Jin, 19
Hou, Linbao, 1F
Hou, Weizhen, 19
Huang, Furong, 1X
Huang, Jianming, 11, 12, 13
Huang, SongLei, 1J
Huang, Zhangcheng, 1J
Huo, Furong, 0X
Jia, Jianjun, 1M
Jia, Lei, 1C
Jia, Lili, 16
Jiang, Kai, 1V
Jiang, Mu-Jin, 16
Jiang, Shanchao, 1C
Jiang, Zhigang, 1U
Jin, Guangyong, 1R
Jin, Li, 1O
Jin, Xiangliang, 0B, 0C
Jin, Xing, 0O
Jin, Xing, 1K
Kou, Yang-qiang, 0Z
Li, Dan, 1E, 1G
Li, Gang, 1V
Li, Jun, 1Q
Li, Lan, 0I
Li, Li-juan, 1I
Li, Mingxin, 1P, 1R
Li, Ran, 1O
Li, Tong, 0M
Li, Xiangyang, 1S
Li, Xiaojuan, 1S
Li, Yang, 0E, 0L, 0P, 0U, 1F
Li, Ye, 02, 09, 0P, 0T, 0U
Li, Yuanpeng, 1X
Li, Zaijin, 0E
Li, Zhaokun, 14
Lin, Chuan, 17, 18

Liu, Chang, 1L
 Liu, Cihang, 0D, 0J
 Liu, Dan, 16
 Liu, Fang, 0O
 Liu, Guojun, 0E
 Liu, Hong-lan, 0V
 Liu, Jin, 0S
 Liu, Kai, 1V
 Liu, Qingfeng, 0Y
 Liu, Shuo, 0Q
 Liu, Wei, 14
 Liu, Weihui, 0B, 0C
 Liu, Xiao-jian, 1E, 1G
 Liu, Yiquan, 04, 05
 Liu, Yu, 03
 Liu, Yu, 11
 Liu, Zhao-lu, 1E, 1G
 Liu, Zhenji, 0S
 Lu, Haixiang, 07
 Lu, Peng, 0E, 0L
 Ma, Ding, 1S
 Ma, Jing, 0N, 0Y
 Ma, Tao, 15
 Ma, Xiaohui, 1F
 Ma, Zhiguo, 1X
 Ma, Zhongtian, 0N
 Meng, He Min, 1W
 Miao, Xin-hui, 03
 Miao, Zhuang, 09
 Mo, Chun-he, 0K
 Ni, Xiaochang, 0M
 Nie, Jing, 1E, 1G
 Ning, Liang, 0D, 0J
 Niu, Sen, 1N
 Peng, Ling-ling, 10
 Piao, Yan, 0Q, 0R
 Ping, Chao, 0S
 Qiang, Jia, 1M
 Qin, Xulei, 0T
 Qing, Anyong, 17, 18
 Quan, Lin, 0F
 Ren, Jiao-jiao, 1I
 Shan, Qiu-sha, 1V
 Shi, Feng, 09
 Shi, Feng, 0A, 1N
 Shi, Hongli, 1N
 Shi, Jing, 03
 Song, De, 02
 Song, Shengyu, 0H
 Song, Wei, 03
 Song, Zhenming, 0M
 Sui, Qingmei, 1C
 Sun, Gang, 0O
 Sun, Qing, 0V
 Sun, Xiaobing, 19
 Tan, Liying, 0N, 0Y
 Tan, Yong, 03
 Tang, Hengjing, 1J
 Tang, Lizhen, 0B, 0C
 Tao, Tao, 1L
 Tian, CuiPing, 1D
 Tian, Ye, 1O
 Tong, ShouFeng, 06
 Wang, Guangping, 1L
 Wang, Guo-zheng, 0Z, 10
 Wang, Han, 19
 Wang, Hongwei, 1A
 Wang, Hongyuan, 1U
 Wang, Jian-yu, 1M
 Wang, Jing, 1C
 Wang, Jiqiang, 1S
 Wang, Kun-peng, 0F
 Wang, Ling, 1S
 Wang, Long, 1N
 Wang, Pu, 1D
 Wang, Qian, 1D
 Wang, Sheng, 1I
 Wang, Shu-fei, 1E
 Wang, Wei-hua, 0O
 Wang, Xing-qi, 0F
 Wang, Xiuli, 0A
 Wang, Xuan, 0M
 Wang, Xue-ying, 1Q
 Wang, Ying, 12
 Wang, YingYing, 1D
 Wang, Yong, 0E, 0L
 Wang, You, 1U
 Wang, Zhaoyang, 1A
 Wei, Xiangquan, 11, 12, 13
 Wu, Di-bo, 0V
 Wu, Feng, 0N
 Wu, Jingli, 1L
 Wu, Ke-xin, 0Z
 Wu, Yu-hao, 1Q
 Xian, Ruiyi, 1X
 Xiao, Chi, 1X
 Xiao, Xiangguo, 1W
 Xiao, Yuzhi, 13
 Xie, Jing, 1S
 Xie, Jingjing, 0P, 0U
 Xie, JunHu, 1W
 Xie, Xin, 0A
 Xin, Jianguo, 04, 05
 Xu, Chuanghuan, 0G
 Xu, Li, 1F
 Xu, Lijuan, 0M
 Xu, Rong, 03
 Xu, Shifeng, 1A
 Xue, Liangping, 1U
 Yan, Changling, 0E, 0L
 Yan, Lei, 1N
 Yan, Pei-pei, 1V
 Yang, Dongchun, 13
 Yang, Hongjiao, 0B, 0C
 Yang, Jia, 0B, 0C
 Yang, Ji-kai, 0Z, 10

Yang, Ming-dong, 1M
Yang, Qingbo, 0Y
Yao, Huan, 0M
Ye, Qinglin, 1C
Yu, Siyuan, 0N
Yu, Zhiliang, 0G
Yuan, Shuming, 0W
Yuan, Xiaobing, 0S
Yuan, Yonggang, 1S
Yuan, Yuan, 1N
Zang, Jiefeng, 17, 18
Zang, Yiqing, 0P, 0U
Zhan, Naiyan, 0A
Zhang, Chenguang, 04, 05
Zhang, Fan, 1E, 1G
Zhang, Fang, 1W
Zhang, He, 1F
Zhang, Jing-he, 0R
Zhang, Lei, 1W
Zhang, Liandong, 02
Zhang, Min-shan, 03
Zhang, Ni, 1E, 1G
Zhang, Peng, 1K
Zhang, Tai-min, 1E, 1G
Zhang, Wei, 1P, 1R
Zhang, Wei, 1U
Zhang, Yan, 0F
Zhang, Yu, 1V
Zhao, Chang-xia, 0K
Zhao, Culing, 15
Zhao, Duo, 1I
Zhao, Hui, 0V
Zhao, Kun, 0V
Zhao, Peng, 0F
Zhao, Peng, 0T
Zhao, Xiaohui, 14
Zhao, Xin, 1F
Zhao, Yu-je, 1W
Zheng, BaiChao, 06
Zheng, Liqin, 0X
Zheng, Meiling, 0A
Zhou, Hongjun, 07, 08
Zhou, Jie, 1U
Zhou, Ming-xing, 1I
Zhou, Yanping, 0Y
Zhu, Yu-feng, 1E, 1G
Zou, Yonggang, 1F

Conference Committee

Conference Chairs

Xun Hou, Xi'an Institute of Optics and Precision Mechanics, CAS
(China)

Zhihong Wang, Science and Technology on Low-light-level Night
Vision Laboratory (China)

Lingan Wu, Institute of Physics, CAS (China)

Jing Ma, Harbin Institute of Technology (China)

Technical Committee

Liyang Tan, Harbin Institute of Technology (China)

Ye Li, Changchun University of Science and Technology (China)

Weiqi Jin, Beijing Institute of Technology (China)

Shensheng Han, Shanghai Institute of Optics and Fine Mechanics,
CAS (China)

Program Committee

Mingshan Zhao, Dalian University of Technology (China)

Shanghong Zhao, Air Force Engineering University (China)

Jin Lu, Tianjin Jinhang Institute of Technical Physics (China)

Feng Shi, Science and Technology on Low-light-level Night Vision
Laboratory (China)

Qiang Sun, Changchun Institute of Optics, Fine Mechanics and
Physics, CAS (China)

Zhongyang Wang, Shanghai Advanced Research Institute, CAS
(China)

