

PROCEEDINGS OF SPIE

Infrared, Millimeter-Wave, and Terahertz Technologies V

Cunlin Zhang
Xi-Cheng Zhang
Masahiko Tani
Editors

12–13 October 2018
Beijing, China

Sponsored by
SPIE
COS—Chinese Optical Society

Cooperating Organizations
Tsinghua University (China) • Peking University (China) • University of Science and Technology of China (China) • Zhejiang University (China) • Tianjin University (China) • Beijing Institute of Technology (China) • Beijing University of Posts and Telecommunications (China) • Nankai University (China) • Changchun University of Science and Technology (China) • University of Shanghai for Science and Technology (China) • Capital Normal University (China) • Huazhong University of Science and Technology (China) • Beijing Jiaotong University (China) • Shanghai Institute of Optics and Fine Mechanics (China) • Changchun Institute of Optics and Fine Mechanics (China) • Institute of Semiconductors (China) • Institute of Optics and Electronics (China) • Institute of Physics (China) • Shanghai Institute of Technical Physics (China) • China Instrument and Control Society (China) • Optoelectronics Technology Committee, COS (China) • Optical Society of Japan (Japan) • Optical Society of Korea (Korea, Republic of) • The Australian Optical Society (Australia) • Optics and Photonics Society of Singapore (Singapore) • European Optical Society

Supporting Organizations
CAST—China Association for Science and Technology (China)
NSFC—National Nature Science Foundation (China)

Published by
SPIE

Volume 10826

Proceedings of SPIE 0277-786X, V. 10826

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

Infrared, Millimeter-Wave, and Terahertz Technologies V, edited by Cunlin Zhang, Xi-Cheng Zhang,
Masahiko Tani, Proc. of SPIE Vol. 10826, 1082601 · © 2018 SPIE
CCC code: 0277-786X/18/\$18 · doi: 10.1117/12.2522342

Proc. of SPIE Vol. 10826 1082601-1

The papers 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. Additional papers and presentation recordings may be available online in the SPIE Digital Library at SPIDigitalLibrary.org.

The papers 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 these proceedings:

Author(s), "Title of Paper," in *Infrared, Millimeter-Wave, and Terahertz Technologies V*, edited by Cunlin Zhang, Xi-Cheng Zhang, Masahiko Tani, Proceedings of SPIE Vol. 10826 (SPIE, Bellingham, WA, 2018) Seven-digit Article CID Number.

ISSN: 0277-786X
ISSN: 1996-756X (electronic)

ISBN: 9781510622500
ISBN: 9781510622517 (electronic)

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 © 2018, 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/18/\$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. A unique citation identifier (CID) number is assigned to each article at the time of 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 and print versions of the publication. SPIE uses a seven-digit CID article numbering system structured as follows:

- The first five 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.

Contents

vii	<i>Authors</i>
xi	<i>Symposium Committees</i>
xv	<i>Conference Committee</i>

SESSION 1 INFRARED, MILLIMETER-WAVE, AND TERAHERTZ TECHNOLOGIES I

10826 03	Concentration dependence of terahertz generation in jets of water and ethanol mixtures (Invited Paper) [10826-3]
10826 04	Hydration of gelatin molecules studied with terahertz time-domain spectroscopy [10826-4]

SESSION 2 INFRARED, MILLIMETER-WAVE, AND TERAHERTZ TECHNOLOGIES II

10826 06	Terajet effect of dielectric sphere and THz imaging (Invited Paper) [10826-7]
10826 07	Label-free detection of the carcinoembryonic antibody protein based MoS2 nanosheets using terahertz spectroscopy [10826-8]

SESSION 3 INFRARED, MILLIMETER-WAVE, AND TERAHERTZ TECHNOLOGIES III

10826 0B	Wavelength dependent terahertz wave modulation based on preformed air plasma (Invited Paper) [10826-12]
10826 0C	Terahertz emission and detection in magnetic materials (Invited Paper) [10826-13]
10826 0D	Terahertz microstructure for artificial birefringence and its applications [10826-14]
10826 0G	Sparse adaptive filter estimation/equalization comparison for underwater acoustic communication [10826-17]

SESSION 4 INFRARED, MILLIMETER-WAVE, AND TERAHERTZ TECHNOLOGIES IV

10826 0H	Sensitive THz material characterization with microfluidic device in total internal reflection geometry (Invited Paper) [10826-18]
10826 0K	Spectroscopy and sensing of fluid using terahertz waves (Invited Paper) [10826-23]

- 10826 OL **Application status and development trend of spaceborne infrared detectors** [10826-24]
- 10826 OM **Design and performance of a signal process system for spaceborne multi-spectral imaging spectrometer covering VIS to LWIR** [10826-25]

POSTER SESSION

- 10826 ON **Effect of inhibition on apoptosis of bEnd.3 cells induced by terahertz radiation** [10826-5]
- 10826 OP **Theoretical analysis of beam pointing resolution in photonic true time delay units** [10826-27]
- 10826 OQ **Systematic scheme and key parameters of moon-based imaging spectrometer** [10826-28]
- 10826 OR **An improved method based on a new wavelet transform for overlapped peak detection on Raman spectra** [10826-29]
- 10826 OS **Characterization of Nb and TiN superconducting CPW lines with thru-line calibration method** [10826-30]
- 10826 OT **Stimulated polariton scattering in β -BTM crystal** [10826-31]
- 10826 OU **Dual-comb spectroscopy in THz region using a single free-running dual-wavelength mode-locked fiber laser** [10826-32]
- 10826 OW **Preparation of composite anti-reflective and protective films with diamond-like carbon films coated on ZnS substrate** [10826-34]
- 10826 OY **A small dual-band (LWIR/VIS) color video camera with common optical path and its real-time fusion method** [10826-36]
- 10826 OZ **Terahertz computed tomography of high-refractive-index object based on a novel experimental procedure** [10826-37]
- 10826 10 **The effect of water content of microbial material on the extinction performance of infrared band** [10826-38]
- 10826 12 **Identification of weak vibration targets based on laser micro-Doppler effect** [10826-40]
- 10826 13 **A high-selectivity THz band-stop filter based on a flexible polyimide film** [10826-41]
- 10826 14 **Enhance the contrast for the terahertz pulse parametric imaging** [10826-42]
- 10826 15 **Terahertz reflection time-domain spectroscopy for measuring alcohol concentration** [10826-43]
- 10826 16 **Encapsulated morphology measurement based on continuous-wave terahertz reflective off-axis digital holography** [10826-44]

- 10826 17 **Spectral reflectance measurement and the principal component analysis and correlation analysis of trees in visible and near infrared** [10826-45]
- 10826 18 **Improving the measurement accuracy of trace compositions in biological fluids with multi-dimension and multi-mode spectroscopy method** [10826-46]
- 10826 19 **Reduction of the impact of differences in flexible conveying tubes on on-line spectral analysis** [10826-47]
- 10826 1B **A new regular hexagonal THz wave modulator based on metamaterials and vanadium oxide phase-change materials** [10826-49]
- 10826 1C **Numerical and experimental analysis of Bessel beam properties based on continuous-wave terahertz radiation** [10826-50]
- 10826 1D **Multilayer graphene based tunable metasurface for terahertz wave control** [10826-51]
- 10826 1F **The study of terahertz wave generation via pre-ionized air plasma** [10826-53]
- 10826 1G **THz wave generation from air plasma induced by vortex beam** [10826-54]
- 10826 1H **Analysis of loss characteristics of nature rubber aged at high temperature** [10826-55]
- 10826 1I **Preparation and optical properties of transparent polycrystalline ZnS bulk materials** [10826-56]
- 10826 1J **Optically controlled graphene based terahertz modulator** [10826-57]
- 10826 1K **Generation of tunable and ultra-broadband microwave frequency combs** [10826-58]
- 10826 1L **THz modulation of monolayer WSe₂-silicon hybrid structure and its performance after oxidation** [10826-59]
- 10826 1M **Spatial dispersion of intense terahertz generation in lithium niobate** [10826-60]
- 10826 1P **Resonance coupling and optical modulation properties in terahertz asymmetric double-wire structures** [10826-63]
- 10826 1Q **Study on asymmetric terahertz metamaterials for biosensing** [10826-64]
- 10826 1R **Estimating detection range of ballistic missile in infrared system based on near space platform** [10826-65]
- 10826 1T **Hyperspectral imaging techniques for diagnosis and monitoring of potato diseases** [10826-67]
- 10826 1U **Simulations of link opportunities between LEO Satellite and ground sites via modernized BDS** [10826-68]

- 10826 1V **Two difference transmission media photonic switch** [10826-69]
- 10826 1W **A kind of ultralow temperature nuclear fusion reactor** [10826-70]
- 10826 1X **Mid-/long-wave dual-band infrared focal plane array based on type-II InAs/GaSb superlattice** [10826-71]
- 10826 1Y **HEMT terahertz detector enhanced by bow-tie antenna at room temperature** [10826-72]
- 10826 1Z **Broadband antireflection coating for the near-infrared InAs/GaSb Type-II superlattices photodetectors by lift-off process** [10826-73]
- 10826 20 **A broadband graphene absorber based on alternating structure of MgF₂ and SiO₂** [10826-74]

Authors

Numbers in the index correspond to the last two digits of the seven-digit citation identifier (CID) article numbering system used in Proceedings of SPIE. The first five 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.

Aoki, Katsuyoshi, 0K
Baldycheva, Anna V., 1D
Bi, Shengshan, 0Q
Cai, Zhiming, 1U
Chai, Shusu, 1M
Chang, Sheng-Jiang, 0D
Chang, Tianying, 1H
Chen, Liming, 1M
Chen, Linyu, 0Z
Chen, Wen, 1U
Chen, Wenhong, 0W
Chen, Xi, 10
Chen, Zhe, 1B
Cheng, Feiyan, 17
Cheng, Haijuan, 1I
Cui, Bin, 06, 13
Cui, Hong-Liang, 1H
Cui, Shaohui, 1Y
Dai, Liqun, 0M
Dai, Zijie, 1J
Dong, Xiao, 10, 12
Dong, Zuoren, 0R
Du, Zhenhua, 17, 1B
E, Y., 03
Fan, Fei, 0D
Fan, Li, 1K
Fan, S., 04
Fang, Jie, 0W
Fang, Zhaoji, 1L
Feng, Jie, 1T
Feng, Shuai, 06
Gao, Zeliang, 0T
Ge, Chunfeng, 0P
Geng, Zhaoxin, 13
Grebenschukov, Alexander N., 1D
Gu, You-lin, 10
Guo, Chun-yan, 1X, 1Z
Guo, Liren, 12
Guo, Yanlong, 0W
Guo, Yixin, 0Y
Guo, Zhaoxiang, 1B
Han, Xi, 1Z
Hao, Hong-Yue, 1X
Hattori, Toshiaki, 0K
He, Yixin, 0Z
Hou, Xingwei, 18, 19
Hu, Guoqing, 0U
Hu, Jie, 0S
Hu, Yi-hua, 10, 12
Huang, Baokun, 10
Huang, Guojun, 0W
Huang, Xiaoqiao, 17
Huang, Yuan, 1L
Ishaq, Z., 0G
Jia, Mingyang, 0H
Jia, Qing-xuan, 1Z
Jiang, Dong-wei, 1X, 1Z
Jiang, Feng, 1R
Jiang, Guangtong, 1G
Jiang, Hu, 1U
Jiang, Jie, 1I
Jiang, Wei, 1R
Jiang, Xiaosu, 20
Jiang, Yuesheng, 1U
Jiang, Zhenkun, 0P
Jiang, Zhi, 1X, 1Z
Jie, Chen, 0U
Jin, Jinhua, 1B
Jin, Weiqi, 0Y
Kang, Kai, 1F
Kato, Kosaku, 0C
Khan, M. T. A., 0G
Khodzifsky, Mikhail K., 1D
Kovalska, Evgeniya O., 1D
Kozlov, S. A., 03
Li, Bin, 1C
Li, Changzhao, 0Z
Li, Gang, 18, 19
Li, Ge, 1P, 1Q
Li, Jinlun, 1Y
Li, Kai, 1F
Li, Li, 0Y
Li, Maozhong, 1I
Li, Shuai, 1J
Li, Xinting, 1T
Li, Yizhang, 1H
Li, Yutong, 1M
Li, Zheng, 1L
Liang, Wanlin, 1P, 1Q
Lin, Ling, 18, 19
Liu, Dengwu, 20
Liu, Hailing, 06
Liu, Haishun, 14, 15
Liu, Lingyu, 1H
Liu, Minghui, 0R
Liu, Weiwei, 1J
Liu, Xudong, 0H
Liu, Yang, 0T

Lu, Dan, 1J
 Lu, Ja-Yu, 0K
 Lu, Li, 1R
 Lu, Xingxing, 07, 0N
 Lu, Yimin, 0W
 Luo, Wenzhen, 15
 Lv, Wei-Tao, 0S
 Lv, Yue-xi, 1Z
 Ma, Jinglong, 1M
 Maqsood, B., 0G
 Melnik, M. V., 03
 Meng, Xianyang, 0Q
 Mizuguchi, Tatsuya, 0U
 Mu, Qian-Yi, 0D
 Nakajima, Makoto, 0C
 Ni, Haiqiao, 1Y
 Nitta, Kazuki, 0U
 Niu, Zhi-chuan, 1X, 1Y, 1Z
 Novoselov, Mikhail G., 1D
 Ouyang, Yanrong, 0W
 Peng, Bo, 1F
 Ponomareva, E. A., 03
 Putilin, S. E., 03
 Qi, Pengfei, 1J
 Qian, Z., 04
 Qiao, Hongzhan, 0T
 Qin, Jiaqi, 0P
 Qiu, Hongsong, 0C
 Qiu, Jiang, 0D
 Qiu, Su, 0Y
 Qu, Qingshan, 06
 Qu, Ronghui, 0R
 Ren, Yuchen, 0Z
 Rong, Lu, 16, 1C
 Sheng, Wen, 1R
 Shi, Jia, 0Z
 Shi, Jie, 0T
 Shi, Junsheng, 17
 Shi, Sheng-Cai, 0S
 Shtumpf, S. A., 03
 Smirnov, S. V., 03
 Su, Qiang, 1J
 Sun, Qiushuo, 0H
 Sun, Qiyang, 0L
 Sun, Yanguang, 0R
 Sun, Yao-yao, 1X, 1Z
 Sun, Yiwen, 07, 0H, 0N
 Tang, Longhuang, 0Z
 Tao, Xutang, 0T
 Tcypkin, A. N., 03
 Wallace, V. P., 04
 Wang, Bo, 1L
 Wang, Dayong, 16, 1C
 Wang, Fushi, 0H
 Wang, Guo-wei, 1X, 1Z
 Wang, Li, 1L
 Wang, Wei, 1B
 Wang, Xia, 0Y
 Wang, Xinye, 1T
 Wang, Yunxin, 16, 1C
 Wang, Yuye, 0Z
 Wang, Zhaoying, 0P
 Wang, Zheng, 0S
 Wei, Chaoyang, 20
 Wu, Jiangtao, 0Q
 Wu, Shaohua, 1I
 Wu, Tong, 0B, 1F
 Wu, Xiaojun, 1L, 1M
 Wu, Zheng-Mao, 1K
 Xia, Chenyi, 1L
 Xia, Guang-Qiong, 1K
 Xia, Zhilin, 20
 Xie, Pengfei, 07, 0N
 Xin, Guofeng, 0R
 Xu, Degang, 0T, 0Z
 Xu, Jianxing, 1Y
 Xu, Lin, 17
 Xu, Lina, 0M
 Xu, Shilong, 12
 Xu, Xiao-Qin, 1K
 Xu, Ying-Qiang, 1X
 Xu, Zhihao, 16, 1C
 Yan, Chao, 0T
 Yang, Xiuwei, 1H
 Yang, Cheng-ao, 1Z
 Yang, Jing, 1J
 Yang, Jing-Pin, 0S
 Yang, Menghan, 06
 Yang, Tao, 1V, 1W
 Yang, Wenming, 1I
 Yang, Yujing, 1V
 Yang, Yuping, 06, 13
 Yao, Jianquan, 0T, 0Z
 Yasui, Takeshi, 0U
 You, Borwen, 0K
 Yu, Chin-Ping, 0K
 Yu, Jinpei, 1U
 Yuan, Quan, 0P
 Zaitsev, Anton D., 1D
 Zhai, Dongwei, 13
 Zhang, Cunlin, 0B, 14, 15, 1F, 1G, 1P, 1Q
 Zhang, Baolong, 1M
 Zhang, Chao, 0Z
 Zhang, Guanyu, 0Q
 Zhang, Liangliang, 0B, 1F, 1G
 Zhang, Mengqiu, 18, 19
 Zhang, Shan, 0W
 Zhang, Shijing, 1G
 Zhang, X.-C., 03
 Zhang, Xi, 0W
 Zhang, Xiansheng, 1H
 Zhang, Xu, 0M
 Zhang, Yong, 0W
 Zhang, Yuan, 0Q
 Zhang, Zhenwei, 14, 15, 1Y
 Zhao, Jie, 16, 1C
 Zhao, Jinsong, 1I
 Zhao, Rong, 13
 Zhao, Xin-ying, 10
 Zhao, Yanlin, 16, 1C

Zhao, YueJin, 1I
Zheng, Da-nong, 1Z
Zheng, Zheng, 0U
Zhong, Kai, 0T
Zhou, Jianyong, 0M
Zhou, Langfeng, 1J
Zhou, Qingli, 1P, 1Q
Zhu, Di, 06
Zhu, Xiaojie, 0Y

Symposium Committees

General Chairs

Maryellen Giger, *President*, SPIE and The University of Chicago
(United States)

Qihuang Gong, *President*, Chinese Optical Society and Peking
University (China)

General Co-chairs

Arthur Chiou, National Yang-Ming University (Taiwan, China)

Guangcan Guo, *Past President*, Chinese Optical Society and
University of Science and Technology of China (China)

Zejin Liu, *Vice President*, Chinese Optical Society and National
University of Defense Technology (China)

Technical Program Chairs

Ruxin Li, *Vice President*, Chinese Optical Society and Shanghai
Institute of Optics and Fine Mechanics (China)

Xingde Li, Johns Hopkins University (United States)

Technical Program Co-chairs

Tianchu Li, National Institute of Metrology (China)

Wei Huang, Northwestern Polytechnical University (China)

Ying Gu, *Vice President*, Chinese Optical Society and PLA General
Hospital (China)

Huilin Jiang, Changchun University of Science and Technology
(China)

Local Organizing Committee Chair

Xu Liu, *Secretary General*, Chinese Optical Society and Zhejiang
University (China)

Local Organizing Committee Co-chairs

Wenqing Liu, *Vice President*, Chinese Optical Society and Anhui Institute of Optics and Fine Mechanics (China)

Guobin Fan, China Academy of Engineering Physics (China)

Local Organizing Committee

Xiaomin Ren, *Vice President*, Chinese Optical Society and Beijing University of Posts and Telecommunications (China)

Suotang Jia, *Vice President*, Chinese Optical Society and Shanxi University (China)

Wenjie Wang, *Vice President*, Chinese Optical Society and Sunny Group Company, Ltd. (China)

Qingming Luo, Huazhong University of Science and Technology (China)

Ping Jia, Changchun Institute of Optics, Fine Mechanics and Physics (China)

Wei Zhao, Xi'an Institute of Optics and Precision Mechanics (China)

Yudong Zhang, Chengdu Branch, Chinese Academy of Sciences (China)

Ninghua Zhu, Institute of Semiconductors (China)

Yongtian Wang, Beijing Institute of Technology (China)

Xiacong Yuan, Shenzhen University (China)

Limin Tong, Zhejiang University (China)

Weimin Chen, Chongqing University (China)

Yidong Huang, Tsinghua University (China)

Tiegen Liu, Tianjin University (China)

Zhiping Zhou, Peking University (China)

Changhe Zhou, Jinan University (China)

Yiping Cui, Southeast University (China)

Zhongwei Fan, Academy of Optoelectronics, CAS (China)

Xiaoying Li, Tianjin University (China)

Yan Li, *Deputy Secretary General*, Chinese Optical Society and Peking University (China)

Caiwen Ma, Xi'an Institute of Optics and Precision Mechanics (China)

Xinliang Zhang, Huazhong University of Science and Technology (China)

Jianxin Chen, Fujian Normal University (China)

Yihua Hu, College of Electronic Engineering, National Univ. of Defense Technology (China)

Secretaries-General

Bo Gu, Deputy Secretary General, Chinese Optical Society (China)
Hong Yang, Deputy Secretary General, Chinese Optical Society and
Peking University (China)

Executive Organizing Committee

David J. Bergman, Tel Aviv University (Israel)
Qionghai Dai, Tsinghua University (China)
Keisuke Goda, The University of Tokyo (Japan)
Qihuang Gong, Peking University (China)
Ying Gu, Chinese PLA General Hospital (China)
Guang-Can Guo, University of Science and Technology of China
(China)
Byoung S. Ham, Gwangju Institute of Science and Technology
(Korea, Republic of)
Sen Han, University of Shanghai for Science and Technology (China)
and Suzhou H&L Instruments LLC (China)
Werner H. Hofmann, Technische Universität Berlin (Germany)
Minghui Hong, National University of Singapore (Singapore)
Bahram Jalali, University of California, Los Angeles (United States)
Shibin Jiang, AdValue Photonics, Inc. (United States)
Satoshi Kawata, Osaka University (Japan)
Tina E. Kidger, Kidger Optics Associates (United Kingdom)
Baojun Li, Jinan University (China)
Ming Li, Institute of Semiconductors (China)
Ruxin Li, Shanghai Institute of Optics and Fine Mechanics (China)
Xingde Li, Johns Hopkins University (United States)
Jian Liu, PolarOnyx, Inc. (United States)
Tiegen Liu, Tianjin University (China)
Yongfeng Lu, University of Nebraska-Lincoln (United States)
Qingming Luo, Huazhong University of Science and Technology
(China)
Yuji Sano, ImpACT (Japan)
Yunlong Sheng, Université Laval (Canada)
Kebin Shi, Peking University (China)
Tsutomu Shimura, The University of Tokyo (Japan)
Upendra N. Singh, NASA Langley Research Center (United States)
Michael G. Somekh, The Hong Kong Polytechnic University
(Hong Kong, China)
Yuguo Tang, Suzhou Institute of Biomedical Engineering and
Technology (China)
Masahiko Tani, University of Fukui (Japan)
Kimio Tatsuno, Koga Research Institute, Ltd. (Japan)
Kevin K. Tsia, The University of Hong Kong (Hong Kong, China)
Kazumi Wada, Massachusetts Institute of Technology (United States)

Yongtian Wang, Beijing Institute of Technology (China)
Rongshi Xiao, Beijing University of Technology (China)
Hongxing Xu, Wuhan University (China)
Toru Yoshizawa, Tokyo University of Agriculture and Technology
(Japan) and 3D Associates (Japan)
Changyuan Yu, The Hong Kong Polytechnic University
(Hong Kong, China)
Chongxiu Yu, Beijing University of Posts and Telecommunications
(China)
Xiao-Cong Yuan, Shenzhen University (China)
Xiaoyan Zeng, Huazhong University of Science and Technology
(China)
Cunlin Zhang, Capital Normal University (China)
Song Zhang, Purdue University (United States)
Xi-Cheng Zhang, University of Rochester (United States)
Xinliang Zhang, Wuhan National Laboratory for Optoelectronics
(China)
Xuping Zhang, Nanjing University (China)
Changhe Zhou, Shanghai Institute of Optics and Fine Mechanics
(China)
Zhiping Zhou, Peking University (China)
Dan Zhu, Huazhong University of Science and Technology (China)
Ning Hua Zhu, Institute of Semiconductors (China)

Conference Committee

Conference Chairs

Cunlin Zhang, Capital Normal University (China)
Xi-Cheng Zhang, University of Rochester (United States)
Masahiko Tani, University of Fukui (Japan)

Conference Program Committee

Peter A. R. Ade, Cardiff University (United Kingdom)
Yi Cai, Kunming Institute of Physics (China)
Jun-Cheng Cao, Shanghai Institute of Microsystem and Information Technology (China)
Hou-Tong Chen, The Center for Integrated Nanotechnologies (United States)
Jian Chen, Nanjing University (China)
Yuping Cui, Tianjin Jinhang Institute of Technology Physics (China)
Jianming Dai, Tianjin University (United States)
Haewook Han, Pohang University of Science and Technology (Korea, Republic of)
Jiaguang Han, Center for Terahertz Waves of Tianjin University (China)
Zhi Hong, China Jiliang University (China)
Biaobing Jin, Nanjing University (China)
Weiqi Jin, Beijing Institute of Technology (China)
Sergei Ark Kozlov, ITMO University (Russian Federation)
He Li, Shanghai Institute of Technical Physics (China)
Jinsong Liu, Wuhan National Laboratory for Optoelectronics (China)
Makoto Nakajima, Osaka University (Japan)
Chiko Otani, RIKEN (Japan)
Ci-Ling Pan, National Tsing Hua University (Taiwan)
Jiancheng Shi, Institute of Remote Sensing and Digital Earth (China)
Sheng-Cai Shi, Purple Mountain Observatory (China)
Alexander Pavlovich Shkurinov, M.V. Lomonosov Moscow State University (Russian Federation)
Fei-jun Song, Daheng New Epoch Technology, Inc. (China)
Xiaojun Wu, Beihang University (China)
Jianmin Yuan, National University of Defense Technology (China)
Chao Zhang, University of Wollongong (Australia)
Weili Zhang, Oklahoma State University (United States)
Yan Zhang, Capital Normal University (China)
Zhuoyong Zhang, Capital Normal University (China)
Kun Zhao, China University of Petroleum (China)
Zengxiu Zhao, National University of Defense Technology (China)
YiMing Zhu, University of Shanghai for Science and Technology (China)

Session Chairs

- 1 Infrared, Millimeter-Wave, and Terahertz Technologies I
Cunlin Zhang, Capital Normal University (China)
- 2 Infrared, Millimeter-Wave, and Terahertz Technologies II
Chao Zhang, University of Wollongong (Australia)
- 3 Infrared, Millimeter-Wave, and Terahertz Technologies III
Xi-Cheng Zhang, University of Rochester (United States)
- 4 Infrared, Millimeter-Wave, and Terahertz Technologies IV
Yan Zhang, Capital Normal University (China)