

# **SPIE. | PLD & TFPA** **SIOM | 2019**

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International Conference on  
Pacific Rim Laser Damage &  
Thin Film Physics and Applications

**May 19-22 Qingdao, China**

## **| Hosts**

Society of Photo-Optical Instrumentation Engineers (SPIE)

Shanghai Institute of Optics and Fine Mechanics (SIOM)

Chinese Physical Society (CPS)

Shanghai Physical Society (SPS)

**SPIE.**



## Opening Ceremony & Plenary Session

**Monday 20 May Location: Regency Ballroom, 3F**

8:00 - 8:15 Opening Ceremony

Chair: **Jiandao Shao**, Shanghai Institute of Optics and Fine Mechanics, CAS (China)

**Plenary Session 1. . . . . Monday 8:15 to 9:45**

**The 8th Pacific Rim Laser Damage: Optical Materials for High Power Lasers Symposium (PLD 2019)**

Session Chair: **Takahisa Jitsuno**, Osaka Univ. (Japan)

**08:15 Dielectric films near their optical breakdown threshold - viable elements for nonlinear optics? (Plenary)**, Wolfgang Rudolph (Luke Emmert), The Univ. of New Mexico, United States. . . . . P24

**09:00 Materials, Structure and Designs for femtosecond optics (Plenary)**, Marco Jupé, Laser Zentrum Hannover, Germany. . . . . P25

**09:45 – 10:15 Coffee Break & Group Photo**

**Plenary Session 2. . . . . Monday 10:15 to 12:30**

**The 10th International Conference on Thin Film Physics and Applications (TFPA 2019)**

Session Chair: **Jiandao Shao**, Shanghai Institute of Optics and Fine Mechanics, CAS (China)

**10:15 Laser patterning in thin nanomaterials for nanophotonics (Plenary)**, Min Gu, Univ. of Shanghai for Science and Technology, China . . . . . P26

**11:00 New design for highly durable infrared-reflective coatings (Plenary)**, Sam Zhang, Southwest Univ., China . . . . . P27

**11:45 TBA (Plenary)**, Andrea C. Ferrari, Univ. of Cambridge, United Kingdom. . . . . P28

**12:30 – 13:40 Lunch Break**

## Topic Meeting 1: The 8th Pacific Rim Laser Damage: Optical Materials for High Power Lasers Symposium (PLD 2019)

Monday 20 May Location: Regency Ballroom 1, 3F

PLD Session 1. . . . .Monday 13:40 to 15:40

### High Laser Damage Resistant Coatings

Session Chairs: **Jiandao Shao**, Shanghai Institute of Optics and Fine Mechanics, CAS (China); **Luke Emmert**, The Univ. of New Mexico (United States);

- 13:40 Few cycle pulse damage of multi-layer thin film systems (Invited)**, Enam A. Chowdhury, The Ohio State Univ., United States. . . . . P29
- 14:10 Nanocomposite  $\text{Hf}_x\text{Si}_{1-x}\text{O}_2$  coatings for laser cavity applications (Invited)**, Zhanshan Wang, Tongji Univ., China. . . . . P30
- 14:40 Dramatical improvement of surface damage threshold in laser Ceramics (Invited)**, Takunori Taira, RIKEN / IMS, Japan. . . . . P31
- 15:10 Contrasted fatigue behavior of laser-induced damage mechanisms in single layer zirconia optical coating (PLDTFPA2019-2019-000018)**, Linas Smalakys, Laser Research Center, Lithuania. . . . . P32
- 15:25 Influence of substrate on the laser-induced damage of indium tin oxide film and polyimide film (PLDTFPA2019-2019-000032)**, Liping Peng, Shanghai Institute of Optics and Fine Mechanics, CAS; University of Chinese Academy of Sciences; Key Laboratory of Materials for High Power Laser, CAS, China. . . . . P32

15:40 – 16:00 Coffee Break

PLD Session 2. . . . .Monday 16:00 to 18:00

### High Power Laser Damage, UV through IR (I)

Session Chairs: **Takahisa Jitsuno**, Osaka Univ. (Japan); **Lili Hu** Shanghai Institute of Optics and Fine Mechanics, CAS (China)

- 16:00 Laser-induced damage studies in ultrafast regimes for Ti:Sa PW class laser development (Invited)**, Marc Sentis, CNRS - Institut de Physique, France. . . . . P33
- 16:30 Compression after compressor approach (CafCA): threefold shortening of 200-TW laser pulses (Invited)**, Efim Khazanov, Institute of Applied Physics, Russian Academy of Sciences, Russia. . . . . P34
- 17:00 High speed detection of microscopic absorption defects that limit the laser damage threshold of an optical component (Invited)**, Zhouling Wu, ZC Optoelectronic Technologies, Ltd., China. . . . . P35
- 17:30 Investigations on single and multiple pulse femtosecond laser induced damages in multilayer high reflectors at different repetition rate (PLDTFPA2019-2019-000021)**, Hao Ma, Shanghai Institute of Optics and Fine Mechanics, CAS, China. . . . . P36
- 17:45 Analysis of laser induced damage characteristics in KDP crystals by spectroscopic techniques under high-power laser excitation (PLDTFPA2019-2019-000002)**, Yao Wang, Shanghai Institute of Optics and Fine Mechanics, China. . . . . P36

18:30 – 20:00 Banquet

## Topic Meeting 1: The 8th Pacific Rim Laser Damage: Optical Materials for High Power Lasers Symposium (PLD 2019)

Tuesday 21 May Location: Regency Ballroom 1, 3F

PLD Session 3. . . . . Tuesday 08:20 to 10:05

### High Power Laser Damage, UV through IR (II)

Session Chairs: **Marc Sentis**, CNRS - Institut de Physique (France); **Efim Khazanov**, Institute of Applied Physics, Russian Academy of Sciences (Russia)

- 08:20 Time-dependence of laser-induced absorption and LIDT of silica glasses in deep UV (Invited)**, Takahisa Jitsuno, Osaka Univ., Japan. . . . . P37
- 08:50 High power laser system and laser induced damage tests strategy at ELI-NP (Invited)**, Ioan Dancus, Horia Hulubei National Institute of Physics and Nuclear Engineering, Romania . . . . . P38
- 09:20 Femtosecond laser-induced pre-damage dynamics in optical coatings (Invited)**, Yuxin Leng, Shanghai Institute of Optics and Fine Mechanics, CAS, China. . . . . P39
- 09:50 Investigation of laser induced air breakdown thresholds at 1064, 532, 355, 266 and 248nm (PLDTFPA2019-2019-000116)**, Zhixing Gao, China Institute of Atomic Energy, China. . . . . P40
- 10:05 Interference testing methods of wide-aperture spherical optics (PLDTFPA2019-2019-000218)**, Iliya E. Kozhevator, Dmitri E. Silin, Federal Research Center Institute of Applied Physics of the Russian Academy of Sciences, Russia. . . . . P40
- 10:20 A patented homogenization process to optimize fused silica for laser application (Industry Talk)**, Max MAO, Heraeus (China) Investment Co., Ltd., China. . . . . P41
- 10:30 Introduction to some technologies on surface and bulk test regarding laser induced damage (Industry Talk)**, Honggang Gao, Beijing Opturn Company Co., Ltd, China. . . . . P41

10:05 – 11:30 Poster Session  
11:30 – 13:20 Lunch Break

PLD Session 4. . . . . Tuesday 13:20 to 15:20

### Characterization Techniques and Measurement Protocols (I)

Session Chairs: **Zhouling Wu**, ZC Optoelectronic Technologies, LTD. (China); **Hümbet Nasibli**, TÜBİTAK National Metrology Institute (Turkey)

- 13:20 Applications of stabilized lasers in metrology (Invited)**, Ramiz Hamid, TÜBİTAK National Metrology Institute, Turkey . . . . . P42
- 13:50 Spectral light scattering characterization and laser damage testing of optical materials and coatings (Invited)**, Marcus Trost, Fraunhofer Institute Applied Optics and Precision Engineering IOF, Germany. . . . . P43
- 14:20 Measurement methods of damage growth threshold from the saturated damage site for picosecond laser damage (PLDTFPA2019-2019-000045)**, Mingying Sun, Shanghai Institute of Optics and Fine Mechanics, CAS, China; National Laboratory on High Power Laser and Physics, China. . . . . P44
- 14:35 Molecular dynamics simulation of the laser-induced ablation property on iron surface (PLDTFPA2019-2019-000112)**, Qingshun Bai, Harbin Institute of Technology, China. . . . . P44
- 14:50 A Method for Classification and Recognition of Crystal Surface Defects Based on Deep Learning (PLD TFPA2019-2019-000139)**, Daoming Wan, Research Center of Laser Fusion, CAEP, China. . . . . P45
- 15:05 Study on absorption defects in fracture zone of laser-induced of fused silica (PLDTFPA2019-2019-000075)**, Chunyan Yan, University of Science and Technology Beijing, China. . . . . P45

## 15:20 – 15:40 Coffee Break

PLD Session 5. . . . . Tuesday 15:40 to 18:10

## Laser Ablation and Laser Machining

Session Chairs: **Enam A. Chowdhury**, The Ohio State Univ. (United States); **Yuxin Leng**, Shanghai Institute of Optics and Fine Mechanics, CAS (China)

- 15:40 Laser ablation induced micro-damage: issues and applications in precision Engineering (Invited)**, Minghui Hong, National Univ. of Singapore, Singapore . . . . .P46
- 16:10 Micromachining of transparent materials by high repetition rate femtosecond pulses using two different approaches: direct ablation in water and laser-assisted chemical etching (Invited)**, Valdas Sirutkaitis Vilnius Univ., Lithuania. . . . .P47
- 16:40 Advances in femtosecond laser writing of nonlinear crystalline waveguides (Invited)**, Feng Chen, Shandong Univ., China. . . . .P48
- 17:10 Polarization-insensitive selective chemical etching induced by picosecond laser irradiation in glass (PLDTFPA2019-2019-000073)**, Xiaolong Li, East China Normal University, China . . . . . P49
- 17:25 Study on surface roughness change of modified silicon carbide in ion beam polishing(PLDTFPA2019-2019-000076)**, Wenqing Li, Beijing Institute of Space Mechanics and Electricity, China . . . . .P49
- 17:40 Dry Removal of Sol-gel Anti-reflective SiO<sub>2</sub> film based on Ion beam etching (PLDTFPA2019-2019-000102)**, Xiaolong Jiang, Research Center of Laser Fusion, CAEP, China . . . . . P50
- 17:55 Effect of pad polishing on the polishing induced subsurface damages distribution and laser induced damage performance of fused silica optics (PLDTFPA2019-2019-000103)**, Xiang He, Chengdu Fine Optical Engineering Research Center, China . . . . . P50

## Topic Meeting 1: The 8th Pacific Rim Laser Damage: Optical Materials for High Power Lasers Symposium (PLD 2019)

Wednesday 22 May Location: Regency Ballroom 1, 3F

PLD Session 6. ....Wednesday 08:20 to 10:05

### Nonlinear Laser Crystals

Session Chairs: **Marco Jupé**, Laser Zentrum Hannover (Germany); **Dingyuan Tang**, Nanyang Technological Univ. (Singapore)

- 08:20 Laser-induced damage of nonlinear crystals in ultrafast, high-repetition-rate, mid-infrared optical parametric amplifiers pumped at 1  $\mu\text{m}$  (Invited)**, Mark Mero, Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy, Germany . . . . . P51
- 08:50 Research on the Langasite crystals with high damage threshold for the application in mid-infrared range (Invited)**, Haohai Yu, Shandong Univ., China. . . . . P52
- 09:20 Growth and characterization of ReCOB and langasite-type crystals for high peak power non-linear optical applications (PLDTFPA2019-2019-000036)**, Yanqing Zheng, Shanghai Institute of Ceramics, CAS, China. . . . . P53
- 09:35 Structures of retired components and KDP crystals irradiated by high fluence using synchrotron  $\mu$ -XRF and  $\mu$ -XRD (PLDTFPA2019-2019-000059)**, Xiangcao Li, University of Science and Technology Beijing, China. . . . . P53
- 09:50 The research progress of sub-nanosecond laser conditioning on DKDP crystal (PLDTFPA2019-2019-000065)**, Zhichao Liu, Fine Optics Engineering Research Center, China. . . . . P54
- 10:05 Optimizing the flow conditions of the horizontally oriented DKDP crystal by adding a stirring paddle (PLDTFPA2019-2019-000093)**, Duanyang Chen, Shanghai Institute of Optics and Fine Mechanics, CAS, China; University of Chinese Academy of Sciences, China. . . . . P54

10:20 – 10:40 Coffee Break

PLD Session 7. ....Wednesday 10:40 to 12:10

### Laser Ceramics

Session Chairs: **Mark Mero**, Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy (Germany); **Ioan Dancus**, Horia Hulubei National Institute of Physics and Nuclear Engineering (Romania)

- 10:40 Rare-earth doped sesquioxide laser ceramics for high power large energy laser applications (Invited)**, Dingyuan Tang, Nanyang Technological Univ., Singapore . . . . . P55
- 11:10 Research progress of new optical ceramics for solid state lasers (Invited)**, Jiang Li, Shanghai Institute of Ceramics, CAS, China; University of Chinese Academy of Sciences, China . . . . . P56
- 11:40 Fabrication and properties of Yb:CaF<sub>2</sub> transparent ceramics from co-precipitated nano-powders (PLDTFPA2019-2019-000047)**, Jiabei Wei, Shanghai Institute of Ceramics, CAS, China; University of Chinese Academy of Sciences, China. . . . . P57
- 11:55 Fabrication, microstructure and optical properties of Yb:Y<sub>3</sub>S<sub>c</sub>Al<sub>4</sub>O<sub>12</sub> transparent ceramics with different doping concentrations (PLDTFPA2019-2019-000048)**, Yagang Feng, Shanghai Institute of Ceramics, CAS, China; University of Chinese Academy of Sciences, China. . . . . P57

12:10 – 13:20 Coffee Break

PLD Session 8. . . . . Wednesday 13:20 to 15:20

Characterization Techniques and Measurement Protocols (II)

Session Chairs: **Marcus Trost**, Fraunhofer Institute Applied Optics and Precision Engineering IOF (Germany);  
**Ramiz Hamid**, TÜBİTAK National Metrology Institute (Turkey)

- 13:20 Laser-induced damage of high power systems: Phenomenology and mechanisms (Invited)**, Laurent Lamaignère, Commissariat à l'Énergie Atomique et aux Énergies Alternatives, France . . . . . P58
- 13:50 Photothermal measurements of thin films: a roadmap and the metrological platform at UME (Invited)**, Hümbet Nasibli, TÜBİTAK National Metrology Institute, Turkey . . . . . P59
- 14:20 Absolute absorption measurements: From bulk to coatings to optical fibers (Invited)**, Christian Mühlig, Leibniz Institute of Photonic Technology, Germany . . . . . P60
- 14:50 Analysis of optical damage in the final optics assembly induced by transport mirror defects (PLDTFPA2019-2019-000040)**, Zhaoyang Jiao, Shanghai Institute of Optics and Fine Mechanics, CAS, China. . . . . P61
- 15:05 Removal of particle contaminations on dielectric pulse-compressor gratings by laser cleaning and the effect on laser-damage threshold (PLDTFPA2019-2019-000063)**, Jingxuan Wang, Research Center of Laser Fusion, CAEP, China. . . . . P61

15:20 – 15:40 Coffee Break

PLD Session 9. . . . . Wednesday 15:40 to 17:25

Optical Glasses and Fibers

Session Chairs: **Valdas Sirutkaitis**, Vilnius Univ. (Lithuania); **Jiang Li**, Shanghai Institute of Ceramics, CAS, China;  
 University of Chinese Academy of Sciences, China

- 15:40 The mechanism of radiation-induced darkening in Yb<sup>3+</sup> doped silica fibers (Invited)**, LiLi Hu, Shanghai Institute of Optics and Fine Mechanics, CAS, China . . . . . P62
- 16:10 Multicomponent glasses and fibers (Invited)**, Shifeng Zhou, South China Univ. of Technology, China. . . . P63
- 16:40 An all solid soft glass microstructured fiber for coherent supercontinuum generation in sub-picosecond regime (Invited)**, Meisong Liao, Shanghai Institute of Optics and Fine Mechanics, CAS, China. . . . . P64
- 17:10 Temperature dependence of laser-induced damage by multiple pulses irradiation for silica glasses (PLDTFPA2019-2019-000035)**, Ogawa Haruka, Grad. Sch. of Eng., Osaka Univ., Japan; ILE Osaka Univ., Japan. . . P65
- 17:25 Advanced process for improving laser damage threshold of fused silica optics (PLDTFPA2019-2019-0000126)**, Xin Ye, Research Center of Laser Fusion, CAEP, China. . . . . P65

Wednesday 22 May Location: Regency Ballroom 2, 3F

PLD Session 10. . . . . Wednesday 15:40 to 16:40

Characterization Techniques and Measurement Protocols (III)

Session Chair: **Laurent Lamaignère**, Commissariat à l'Énergie Atomique et aux Énergies Alternatives (France)

- 15:40 Fabrication and properties of Tb<sub>3</sub>Al<sub>5</sub>O<sub>12</sub> magneto-optical ceramics for Faraday isolators (PLDTFPA2019-2019-000049)**, Xiaoying Li, Shanghai Institute of Ceramics, CAS, China. . . . . P66
- 15:55 Design of transmission mirror online damage detection system based on wavefront coding technology (PLDTFPA2019-2019-000130)**, Fang Wang, Research Center of Laser Fusion, CAEP, China. . . . . P66
- 16:10 Fabrication and laser operation of Yb:Lu<sub>2</sub>O<sub>3</sub> transparent ceramics from co-precipitated nano-powders (PLDTFPA2019-2019-000050)**, Liu Ziyu, Shanghai Institute of Ceramics, CAS, China. . . . . P67
- 16:25 Structural Defects in Ultra-low Laser Absorption Vitreous Silica (PLDTFPA2019-2019-000062)**, Yuancheng Sun, China Building Materials Academy, China. . . . . P68

## Topic Meeting 1: The 8th Pacific Rim Laser Damage: Optical Materials for High Power Lasers Symposium (PLD 2019)

10:05 to 11:30, Tuesday 21 May Location: Terrace, 3F

PLD Poster Session.....P69

PLDTFPA2019-2019-000003

**Research on the multiple-pulse laser damage performance of UV anti-reflection coatings for applications in aerospace** Kesheng, Guo, Yanzhi Wang, Ruiyi Chen, Meiping Zhu, Kui Yi, Hongbo He, Jianda Shao, Shanghai Institute of Optics and Fine Mechanics, China

PLDTFPA2019-2019-000004

**Polarization dependence of propagation features modeling for optical micro/nano fiber in circularly bent shape** Longjiang Zhao<sup>1</sup>, Jin Cheng<sup>2</sup>, 1.Qufu Normal University, China; 2.Beijing Information Science and Technology University, China

PLDTFPA2019-2019-000007

**Design, Fabrication and Laser Damage Comparisons of Low-Dispersive Mirrors** Ruiyi Chen<sup>1,2,3</sup>, Yanzhi Wang<sup>1,3\*</sup>, Kesheng Guo<sup>1,2,3</sup>, Meiping Zhu<sup>1,3</sup>, Kui Yi<sup>1,3</sup>, Jianda Shao<sup>1,3</sup>, 1.Laboratory of Thin Film Optics, Shanghai institute of Optics and Fine Mechanics; 2.Center of Materials Science and Optoelectronics Engineering, UCAS; 3.Key Laboratory of Material for High Power Laser, Shanghai institute of Optics and Fine Mechanics, China

PLDTFPA2019-2019-000008

**Research on precision space linear rolling guide dynamics** Penghui Cheng<sup>1,2</sup>, Mengyuan Wu<sup>1\*</sup>, Chuang Li<sup>1</sup>, Xiaozhe Ma<sup>1,2</sup>, 1.Xi'an Institute of Optics and Precision Mechanic, Chinese Academy of Sciences, China; 2.University of Chinese Academy of Sciences, China

PLDTFPA2019-2019-000009

**Processing strategy of aspherical mirror with Modified silicon by using Magnetorheological Finishing Polishing Machines based on Robot Arm** Longxiang Li<sup>1</sup>, Jianwei Zhang<sup>2</sup>, Chi Song<sup>1</sup>, Xin Zhang<sup>1</sup>, Xiaolin Yin<sup>1</sup>, Donglin Xue<sup>1</sup>, 1.Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences, China; 2.University of California, Los Angeles, USA

PLDTFPA2019-2019-000010

**Effect of acoustic wave field distribution on fused silica surface etched by HF with mega-sonic agitation** Zhao Heng, Chengdu Fine Optical Engineering Research Center, China

PLDTFPA2019-2019-000013

**A Focusing Mechanism Based on Flexible Hinges for Space Telescope** Xiaozhe MA<sup>1,2</sup>, Chuang LI<sup>1</sup>, Penghui CHENG<sup>1,2</sup>, Bin HU<sup>1</sup>, 1.Xi'an Institute of Optics and Precision Mechanics, Chinese Academy of Sciences, China; 2.University of Chinese Academy of Sciences, China

PLDTFPA2019-2019-000014

**Study on damage of polyimide target irradiated by 10.6um CO<sub>2</sub> laser** Jiacheng Wu, Anhui University of Chinese Medicine, China; State Key Laboratory of Pulsed Power Laser Technology, National University of Defense Technology, China



PLDTFPA2019-2019-000016

**Study on damage of CaF<sub>2</sub> windows irradiated by 248nm ultraviolet excimer laser** Xi Wang, State Key Laboratory of Pulsed Power Laser Technology, National University of Defense Technology, China

PLDTFPA2019-2019-000019

**Research on rapid repair methods of the surface damage of fused silica optical components** Yaofei Zhang, National University of Defense Technology, China

PLDTFPA2019-2019-000022

**Pulsed lasers at 1.2 μm based on Ho<sup>3+</sup>-doped ZBLAN fiber** Xuezhong Yang<sup>1\*</sup>, Zhang Lei<sup>1</sup>, Zhu Xiusha<sup>2</sup>, Feng Yan<sup>1\*</sup>  
1.Shanghai Institute of Optics and Fine Mechanics, CAS, China; 2.The University of Arizona, USA

PLDTFPA2019-2019-000023

**Ablation characteristics of aluminum alloy and stainless steel induced by picosecond laser pulses** Wenfeng Liu<sup>1, 2, 3</sup>, Mingying Sun<sup>1, 2\*</sup>, Yajing Guo<sup>1, 2</sup>, Zhaoyang Jiao<sup>1, 2</sup>, Rong Wu<sup>1, 2</sup>, Xue Pan<sup>1, 2</sup> 1.Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, China; 2.National Laboratory on High Power Laser and Physics, 3.University of Chinese Academy of Sciences, China

PLDTFPA2019-2019-000024

**Study on thermal effect and thermal stress effect of multilayer thin films induced by pulsed laser** Qiankun Cao, Junhong Su, Xi'an Technological University, China

PLDTFPA2019-2019-000025

**Transient dynamic behavior during nanosecond laser-induced damage initiated by surface defects on KDP crystals with simulation and experimental method** Hao Yang<sup>1, 2</sup>, Jian Cheng<sup>1\*</sup>, Zhichao Liu<sup>2</sup>, Qi Liu<sup>1</sup>, Linjie Zhao<sup>1</sup>, Jian Wang<sup>2</sup>, Mingjun Chen<sup>1\*</sup> 1.Harbin Institute of Technology, China; 2.China Academy of Engineering Physics, China

PLDTFPA2019-2019-000027

**Identification of surface damage of fused silica optics based on neural network** XiaoDong-Zhang, Feng-Shi, ZhiFan-Lin, College of Intelligent Science, National University of Defense Technology, China

PLDTFPA2019-2019-000028

**Analysis of stray light reflected from multi-beam laser focusing surface** Anqi Jiang, State Key Laboratory of Modern Optical Instrumentation, Zhejiang University, China

PLDTFPA2019-2019-000033

**Study on the Influence of Laser Output Parameters on the Damage Threshold of Thin Films** Rongrong Yan, Junhong Su, Lihong Yang, Institute of Photoelectric Engineering, Xi'an Technology University, China

PLDTFPA2019-2019-000034

**laser damage and damage performance caused by near-field of final optics assembles for high power laser system** Yajing Guo, Mingying Sun, Zhaoyang Jiao, Chong Liu, Xiuqing Jiang, Baoqiang Zhu, Jianqiang Zhu, Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, China

PLDTFPA2019-2019-000039

**Laser Damage on Large Aperture Triple Frequency Crystal Optics in High Power Laser System** Xiuqing Jiang<sup>1\*</sup>, Mingying Sun<sup>1</sup>, Lailin Ji<sup>2</sup>, Yajing Guo<sup>1</sup>, Shunxing Tang<sup>1</sup>, Chong Liu<sup>1</sup>, Dong Liu<sup>2</sup>, Baoqiang Zhu<sup>1</sup>, Jianqiang Zhu<sup>1</sup>  
1.Shanghai Institute of Optics and Fine Mechanics, China; 2.Shanghai institute of laser plasma, China

PLDTFPA2019-2019-000041

**Thermal deformation evaluation of  $\text{Al}_2\text{O}_3$  ceramic substrate based on radial basis function** Linlin Wang, Shenyang Aerospace University, China

PLDTFPA2019-2019-000051

**Radiation Pressure Induced Photoluminescence Enhancement of All-inorganic Perovskite  $\text{CsPbBr}_3$  Quantum Dots** Zhang Ying<sup>1\*</sup>, Song Zongpeng<sup>1</sup>, Wang Meng<sup>2</sup> 1.Shenzhen University, China; 2.Shenzhen Technology University, China

PLDTFPA2019-2019-000052

**High power all-fiber laser with switchable pulsed and continuous operation modes** Yinchao Zhang, Xunbao Rui, Pan Guo, He Chen, Siying Chen, Ting Li, Baowei Li, Beijing Institute of Technology, China

PLDTFPA2019-2019-000055

**Assessment of high-purity quartz glass by laser induced fluorescence technique** Yinchao Zhang, Ting Li, He Chen, Siying Chen, Pan Guo, Xunbao Rui, Baowei Li, Beijing Institute of Technology, China

PLDTFPA2019-2019-000056

**Numerical investigation of growth model for laser-induced damage in optics under high power laser irradiation** Li Sensen<sup>1\*</sup>, Wu Fan<sup>2</sup>, Liu Qianghu<sup>1</sup>, Zhou Guanjun<sup>1</sup>, Bi Xiangli<sup>1</sup>, An Chaowei<sup>1</sup>, Yan Xiusheng<sup>1</sup> 1.Science and Technology on Electro-Optical Information Security Control Laboratory, China; 2.Academy of Opto-Electronics, China Electronics Technology Group Corporation, China

PLDTFPA2019-2019-000057

**Study on laser processing characteristics of fused silica glass** Xiurong Du, Yuancheng Sun, China Building Materials Academy, China

PLDTFPA2019-2019-000058

**A new method for air quality observation based on ultraviolet laser** Li Ting, Rui Xunbao, Guo Pan, Zhang Yinchao, Chen He, Li Baowei, Chen Siying, Beijing Institute of Technology, China

PLDTFPA2019-2019-000061

**Research on high precision combined processing technology of meter-level optical glass guideway** Hanqiang Zhang<sup>1,2</sup>, Yifan Dai<sup>1,2\*</sup>, Ci Song<sup>1,2</sup>, Guipeng Tie<sup>1,2</sup> 1.College of Intelligence Science, National University of Defense Technology, China; 2.Hu'nan Key Laboratory of Ultra-precision Machining Technology, China

PLDTFPA2019-2019-000064

**Picosecond Laser Textured Stainless Steel Superhydrophobic Surface with Reduced Bacterial Adhesion Property** Wenwen Liu, Wenzhou University, China

PLDTFPA2019-2019-000067

**Role of Antireflective Surface Structures on Laser Induced Damage Threshold of Fused Silica** Yuhang Zhao, Yunjie Mo, Ruihao Li, Shaoji Jiang, Sun Yat-Sen University, China

PLDTFPA2019-2019-000068

**Observation of diverse passive harmonic mode-locking in an long-cavity all-normal-dispersion fiber laser** Meng Cao, Chinhua Wang, Soochow University, China

PLDTFPA2019-2019-000069

**The mechanism of solid-state single crystal growth method for planar waveguide laser materials** Ge Zhang, Benxue Jiang, SIOM, CAS, China

PLDTFPA2019-2019-000071

**Study on the variation of thin film optical constants with temperature at high temperature** Xiaoyan Wang, Kui Yi, Guohang Hu, Yuanan Zhao, Jianda Shao, Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, China

PLDTFPA2019-2019-000072

**Fast measurement technique for obtaining the low damage threshold defects in a large aperture fused silica glass** Wang Shenghao<sup>1</sup>, Shao Jianda<sup>1,2\*</sup>, Li Lingqiao<sup>1</sup>, Liu Shijie<sup>1\*</sup>, Sui Zhan<sup>3</sup>, Wu Zhouling<sup>4,2</sup>, Chen Jian<sup>4,2</sup>, Huang Ming<sup>4,2</sup> 1.Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, China; 2.Anhui Province Key Laboratory of Non-Destructive Evaluation, China; 3.Shanghai Institute of Laser Plasma, China Academy of Engineering Physics, China; 4.ZC Optoelectronic Technologies, China

PLDTFPA2019-2019-000074

**Influences of pulse spatial density on femtosecond laser induced selective etching of fused silica** Jia Qi, SIOM, China

PLDTFPA2019-2019-000080

**Research on autonomous landing of UAV based on vision sequence image** wenkai Suo, Army Engineering University Shijiazhuang Campus, China

PLDTFPA2019-2019-000084

**Experimentation on Ablation of Polymer Plastics by CW Laser for High Voltage Transmission Lines** feng gao, State grid shaanxi electric power research institute, China

PLDTFPA2019-2019-000086

**2.0  $\mu\text{m}$  spectroscopic properties and energy transfer mechanism in  $\text{Tm}^{3+}/\text{Ho}^{3+}$  codoped germanate glass** Dan Wang, Yanyan Guo, Tao Zheng, Jinglong Diao, Jingwen Lv, Changchun University of Science and Technology, China

PLDTFPA2019-2019-000088

**Weak surface defects detection method for large aperture optical element based on microscopic scattering imaging** Jian Zhang, Research Center of Laser Fusion, China Academy of Engineering Physics, China

PLDTFPA2019-2019-000091

**Lightweight design of rectangular mirror supported in center using topology optimization** Huang Tuo<sup>1,2</sup>, Chu Chang-bo<sup>1</sup>, Chen Rong-li<sup>1\*</sup> 1.Xi'an Institute of Optics and Precision Mechanics of CAS, China 2.University of Chinese Academy of Sciences, China

PLDTFPA2019-2019-000095

**Local Structural and Dynamic Inhomogeneity of Solid Surface Revealed by Spectral Line Shape of Nonlinear Vibrational Probe** Shun-Li Chen<sup>1</sup>, Wei Gan<sup>1</sup>, Hong-Fei Wang<sup>2\*</sup> 1.Harbin Institute of Technology (Shenzhen), China; 2.Fudan University, China

PLDTFPA2019-2019-000097

**Preliminary Application Research of Regression Analysis in Camouflage Color Matching** Liu Ge, Xu Hao, liu Heng, Army Engineering University, China

PLDTFPA2019-2019-000101

**Temperature-insensitive frequency generation achieved by compensating thermally-induced phase mismatch** Lv Jichao, Liu Xun, He Lei, Army Engineering University, China

PLDTFPA2019-2019-000106

**Morphology evolution of phosphate glass in Ion Beam Figuring** Gang Zhou, Ye Tian, Feng Shi, Ci Song, Yaoyu Zhong, College of Intelligent Science, National University of Defense Technology, China

PLDTFPA2019-2019-000107

**Investigation of the high repetition rate picosecond laser induced damage properties of dielectric reflective optical coatings** Zhang Mingxiao, Chengdu Fine Optical Engineering Research Center, China

PLDTFPA2019-2019-000108

**3D Topography Measurement of Surface Defects on Large-aperture Optics with Transient Interferometry** Kaizao Ni<sup>1</sup>, Baoming Huang<sup>1,2</sup>, Shijie Liu<sup>1\*</sup>, Jianda Shao<sup>1</sup>, Zhouling Wu<sup>3,4</sup>, Jian Chen<sup>3,4</sup>, Ming Huang<sup>3,4</sup> 1. Shanghai Institute of Optics and Fine Mechanics, China; 2. Shanghai University, China; 3.ZC Optoelectronic Technologies, Ltd, China; 4.Anhui Province Key Laboratory of Non-Destructive Evaluation, China

PLDTFPA2019-2019-000111

**Ultrafast third-order nonlinear optical response of enzothiazole derivative doped Polymethyl methacrylate C18H15N3S** Jie Zong, Tianjin Jinhang Technical Physics Institute, China

PLDTFPA2019-2019-000114

**Design and fabrication all-dielectric broadband reflection phase shifting mirror at near-infrared wavelengths for high intensity lasers** Liang Lv, Chengdu Fine Optical Engineering Research Center, China

PLDTFPA2019-2019-000119

**Generation of high quality OAM beams by vortex volume gratings** Jingyin Zhao<sup>1,2,3</sup>, Yunxia Jin<sup>1,3\*</sup>, He Dongbing<sup>1,3</sup>, Kong Fanyu<sup>1,3</sup>, Peng Chen<sup>1,2,3</sup> 1.Laboratory of Thin Film Optics, Shanghai Institute of Optics and Fine Mechanics, China; 2.University of Chinese Academy of Sciences, China; 3.Key Laboratory of Materials for High Power Laser, Chinese Academy of Sciences, China

PLDTFPA2019-2019-000121

**Laser damage characteristics of the YAG ceramics** Xiaofeng Liu, Zhao Yuanan, Li Dawei, Shao Jianda, Guohang Hu, Shanghai Institute of Optics and Fine Mechanics, China

PLDTFPA2019-2019-000122

**Research on the interaction of 46.9nm laser with large bandgap dielectrics** Cui Huaiyu<sup>1,2</sup>, Zhao Yongpeng<sup>1\*</sup>, Muhammad Usman Khan<sup>1</sup> 1.National Key Laboratory of Science and Technology on Tunable Laser, Harbin Institute of Technology, China; 2.Research Center for Space Optics Engineering, Harbin Institute of Technology, China

PLDTFPA2019-2019-000123

**Study on CO<sub>2</sub> laser smoothing of the grinding surface on fused silica** Zhigang Yuan, Research Center of Laser Fusion, China

PLDTFPA2019-2019-000128

**Mitigation of laser induced damage on dielectric mirrors in a robust way** Li Zhou<sup>1</sup>, Youen Jiang<sup>1\*</sup>, Simin Zhang<sup>1,2</sup>, Hui Wei<sup>1</sup>, Wei Fan<sup>1</sup>, Xuechun Li<sup>1</sup> 1.Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, China; 2.University of Chinese Academy of Sciences, China

PLDTFPA2019-2019-000131

**Equivalent explosion simulation model for studying the laser-induced damage process of KDP crystal** Sheng Fei Wang, Xiang Yang Lei, Jian Wang, Zhang Jian Feng, Xu Qiao, Research Center of Laser Fusion, China Academy of Engineering Physics, China

PLDTFPA2019-2019-000132

**Light modulation of radial crack and parabolic crack with contaminant in fused silica** Zhi Chen<sup>1,2</sup>, Huapan Xiao<sup>1,3</sup>, Hairong Wang<sup>1,2\*</sup>, Yu Na<sup>1,2</sup>, Rongguang Liang<sup>3</sup> 1.State Key Laboratory for Manufacturing Systems Engineering, Xi'an Jiaotong University, China; 2.School of Mechanical Engineering, Xi'an Jiaotong University, China; 3.College of Optical Sciences, University of Arizona, Tucson, Arizona, USA

PLDTFPA2019-2019-000138

**Removal of Defect Bound Excitons in Aged Monolayer WS<sub>2</sub> by Laser Processing** Yuxiang Tang, Yizhen Sui, Tian Jiang, National University of Defense Technology, China

PLDTFPA2019-2019-000143

**Simulation of heat distribution and thermal damage patterns of pulse laser for uterus using finite element analysis** Yongping Lin<sup>1</sup>, Yehui Chen<sup>2\*</sup> 1.Xiamen University of Technology, China; 2.Anhui Xinhua University, China

PLDTFPA2019-2019-000147

**Optics subsurface defects nondestructively detected by fluorescence image technique** Hongjie Liu, Research Center of Laser Fusion, China Academy of Engineering Physics, China

PLDTFPA2019-2019-000153

**Low weight KW-class direct diode laser** Xu Dan, BWT, China

PLDTFPA2019-2019-000154

**Designing of Converging Stray Light Focal Spot Absorber in High Power Laser System** Tian-ran Zheng, Wang Fang, De-en Wang, Xi-bo Sun, Hong-jie Liu, Liang-ming Chen, Dong-xia Hu, Laser Fusion Research Center, China Academy of Engineering Physics, China

PLDTFPA2019-2019-000160

**The time-resolved investigation of nanosecond laser-induced damage in fused silica** Zhen Cao, Hongbo He, Guohang Hu, Yuanan Zhao, Xiangyu Zhu, Jianda Shao, Shanghai Institute of Optics and Fine Mechanics, China

PLDTFPA2019-2019-000161

**Analysis of Morphology and Magnetic Properties of Ultrashort Pulse Laser Scribing Oriented Silicon Steel** Zongwang Chen, Wenzhou university, China

PLDTFPA2019-2019-000207

**Heat accumulation during CO<sub>2</sub> laser figuring of fused silica** Chaoyang Wei, Shanghai Institute of Optics and Fine Mechanics, CAS, China

PLDTFPA2019-2019-000210

**Research Status and Analysis of Fifth-harmonic-generation for ~1 $\mu$ m** Yuanyuan Fan, Institute of microelectronics, CAS, China; 2.The State Key Laboratory of Applied Optics, China

PLDTFPA2019-2019-000211

**High speed detection of defects at 100-nanometer scale for large aperture ultraviolet optics** Lin Zhang, Research Center of Laser Fusion, CAEP, China

PLDTFPA2019-2019-000216

**The study on damage threshold of CCD's black and white screen** Wang Yanbin, Chen Qianrong, Zhou Xuanfeng, Li Hua, Ren Guangsen and Zhu Rongzhen, Luoyang Electronic Equipment Test Center of China, China

PLDTFPA2019-2019-000217

**Thermodynamic analysis of laser damage in HR coatings induced by nano-defects** Cheng Li<sup>1,2,3</sup>, Yuan'an Zhao<sup>1,2,3,5</sup>, Yun Cui<sup>1,3</sup>, Xiaocong Peng<sup>1,2,3</sup>, Chong Shan<sup>1,4</sup>, Meiping Zhu<sup>1,3</sup>, Jianguo Wang<sup>1,3</sup>, Jianda Shao<sup>1,3,6</sup>, 1.Laboratory of Thin Film Optics, Shanghai Institute of Optics and Fine Mechanics, Shanghai 201800, China; 2.Center of Materials Science and Optoelectronics Engineering, University of Chinese Academy of Sciences, Beijing 100049, China; 3.Key Laboratory of Materials for High Power Laser, Chinese Academy of Sciences, Shanghai 201800, China; 4.Changchun University of Science and Technology; Changchun 130022, China; 5.Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences

## Topic Meeting 2: The 10th International Conference on Thin Film Physics and Applications (TFPA 2019)

Monday 20 May Location: Regency Ballroom 2, 3F

TFPA Session 1. . . . . Monday 13:40 to 15:40

### Thin Film Materials (I)

Session Chairs: **Sam Zhang**, Southwest Univ. (China), **Aimin Chang**, Xinjiang Technical Institute of Physics and Chemistry, CAS (China)

- 13:40 Interfacial solar vapor generations: materials, structures and applications (Invited)**, Jia Zhu, Nanjing Univ., China. . . . . P99
- 14:20 Nonlinear optical studies of 2D nanostructures in organic suspensions and polymer composites for high-power laser applications (Invited)**, Ivan Kislyakov, Shanghai Institute of Optics and Fine Mechanics, CAS, China. . . . . P100
- 14:50 Influence of interlayer on surface scattering of non-modified silicon carbide (PLDTFPA2019-2019-0000077)**, Yunli Bai, Beijing Institute of Space Mechanics & Electricity, China. . . . . P101
- 15:05 CoSb<sub>3</sub> based thin film thermoelectric materials and devices (PLDTFPA2019-2019-0000141)**, Tianbao Chen, Shenzhen University, China. . . . . P101
- 15:25 Surface affected optical nonlinearities and carrier recombination in 2D non-layered PtS (PLDTFPA2019-2019-0000212)**, Jiawei Huang, Shanghai Institute of Optics and Fine Mechanics, CAS, China. . . . . P101
- 15:25 Nonlinear Optical Signatures of Transition from Semiconductor to Semimetal in PtSe<sub>2</sub> (PLDTFPA2019-2019-0000213)**, Lei Wang Shanghai Institute of Optics and Fine Mechanics, CAS, China. . . . . P102

15:40 – 16:00 Coffee Break

TFPA Session 2. . . . . Monday 16:00 to 17:30

### Technology of Thin Films (I)

Session Chairs: **Qing (Chin) Peng**, The Univ. of Alabama (United States), **Rong Chen**, Huazhong Univ. of Science and Technology (China)

- 16:00 Precise and Smooth Optical Surfaces by IBF (Invited)**, Steffen Gurtler, Buhler Leybold Optics, Germany. . . . . P103
- 16:30 Some Kinds of Optical Thin Films by Ion Beam Sputtering Deposition and Band-pass Filters in Near Infrared Wavelength of 1.0~2.5 μm (Invited)**, Dingquan Liu, Shanghai Institute of Technical Physics, CAS, China. . . . . P104
- 17:00 Advances in IBS processes and achievements in broad-band optical monitoring (PLDTFPA2019-2019-0000134)**, Kai Starke, Cutting Edge Coatings GmbH, Germany. . . . . P105
- 17:15 Thickness dependence of Cr-doped VO<sub>2</sub> thin films deposition by reactive pulsed magnetron sputtering (PLDTFPA2019-2019-0000089)**, Huan Guan, College of Physics and Optoelectronic Engineering, China. . . . . P105

18:30 – 20:00 Banquet

## Topic Meeting 2: The 10th International Conference on Thin Film Physics and Applications (TFPA 2019)

Tuesday 21 May Location: Regency Ballroom 2, 3F

TFPA Session 3. . . . . Tuesday 08:20 to 10:05

### Physics of Thin Films (I)

Session Chair: **Vladimir Pervak**, Ludwig Maximilians Univ. (Germany)

- 08:20 Nanogap engineering for enhanced transmission of wire grid polarizers in the infrared wavelength (*Invited*)**, Chang Kwon Hwangbo, Inha Univ., South Korea. . . . . P106
- 08:50 Study of the high efficiency of photon-to-heat conversion in the wavelength region of 250-1200 nm based on a thermoelectric Bi<sub>2</sub>Te<sub>3</sub> film structure (*Invited*)**, Liangyao Chen, Fudan Univ., China. . . . . P107
- 09:20 Defects induced the tunability of nonlinear optical property in transparent conductive thin films (*Invited*)**, Ruijin Hong, University of Shanghai for Science and Technology, China. . . . . P108
- 09:50 Optical loss of GaAs/AlGaAs crystalline coatings (*PLDTFPA2019-2019-0000029*)**, Jinlong Zhang Tongji University, China. . . . . P109

10:05 – 11:30 Poster Session

11:30 – 13:20 Lunch Break

TFPA Session 4. . . . . Tuesday 13:20 to 15:20

### Technology of Thin Films (II)

Session Chairs: **Min Gu**, Univ. of Shanghai for Science and Technology (China), **Maria Luisa Grilli**, ENEA Casaccia Research Centre (Italy)

- 13:20 What happens when vapors meet halide perovskites? (*Invited*)**, Qing (Chin) Peng, The Univ. of Alabama, United States. . . . . P110
- 13:50 The development of atomic layer deposition stabilization approaches for quantum dots flexible displays (*Invited*)**, Rong Chen, Huazhong Univ. of Science and Technology, China. . . . . P111
- 14:20 Influence of process parameters on properties of SiO<sub>2</sub>, HfO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub> monolayers by plasma-enhanced atomic layer deposition (*PLDTFPA2019-2019-0000006*)**, Chaoyi Yin, Shanghai Institute of Optics and Fine Mechanics, CAS, China, University of Chinese Academy of Sciences, China. . . . . P112
- 14:35 Preparation of silica thin film by hot pressing process for passive radiative cooling (*PLDTFPA2019-2019-0000054*)**, Dengwu Liu, Wuhan University of Technology, China. . . . . P112
- 14:50 Preparation of Nb<sub>2</sub>O<sub>5</sub> thin films with high laser damage resistance and exploration of laser damage mechanism (*PLDTFPA2019-2019-0000090*)**, Wenzhe Cai, China University of Mining and Technology, China. . . . . P113
- 15:05 Enhanced nonlinear optical performances in monolayer MoS<sub>2</sub> and WS<sub>2</sub> by defect repairing (*PLDTFPA2019-2019-0000118*)**, Xuran Dai, Shanghai Institute of Optics and Fine Mechanics, CAS, China. . . . . P113

15:20 – 15:40 Coffee Break



TFPA Session 5.....Tuesday 15:40 to 17:55

**Thin Film Materials (II)**

Session Chairs: **Ivan Kislyakov**, Shanghai Institute of Optics and Fine Mechanics, CAS (China), **Xiujian Zhao**, Wuhan Univ. of Technology (China)

- 15:40 Characteristics of radio frequency sputtered In-free transparent conductors (*Invited*)**, Maria Luisa Grilli, ENEA Casaccia Research Centre, Italy. ....P114
- 16:10 The preparation of Mn-Co-Ni-O thin films for NTC thermistor application (*Invited*)**, Aimin Chang, Xinjiang Technical Institute of Physics and Chemistry, CAS, China. .... P115
- 16:40 Optical properties of fishnet metamaterial embedded in dielectric medium or coatings (*PLDTFPA2019-2019-0000142*)**, Guohang Hu, Shanghai Institute of Optics and Fine Mechanics, CAS, China. ....P116
- 16:55 Comparison of room temperature and in-situ high temperature laser induced damage of sol-gel Ta<sub>2</sub>O<sub>5</sub> films with different dual additives (*PLDTFPA2019-2019-0000066*)**, Pu Zhang, China University of Mining and Technology, China. ....P116
- 17:10 Investigation on tuning of WS<sub>2</sub>/SiC band gap with an external electric field (*PLDTFPA2019-2019-0000085*)**, Yuke Ma, Shan Dong University, China. ....P117
- 17:25 Enhance anti-water ability of high transmittance film in mid-infrared band (*PLDTFPA2019-2019-0000117*)**, Gong Zhang, Changchun University of Science and Technology, China. ....P117
- 17:40 Performance of a spectral beam combining grating with YAG substrate (*PLDTFPA2019-2019-0000001*)**, Jiao Xu, Shanghai Institute of Optics and Fine Mechanics, CAS, China. .... P118
- 17:55 Broadband femtosecond transient absorption spectroscopy of CVD monolayer transition metal dichalcogenides (*PLDTFPA2019-2019-0000215*)**, Tianju Zhang, Shanghai Institute of Optics and Fine Mechanics, CAS, China. ....P118

## Topic Meeting 2: The 10th International Conference on Thin Film Physics and Applications (TFPA 2019)

Wednesday 22 May Location: Regency Ballroom 2, 3F

TFPA Session 6. . . . .Wednesday 08:20 to 10:20

### Application of Thin Films (I)

Session Chairs: **Shigeng Song**, Univ. of the West of Scotland (United Kingdom), **Liangyao Chen**, Fudan Univ. (China)

**08:20 Prospects for further progress in challenging thin film applications (Invited)**, Alexander V. Tikhonravov, M.V. Lomonosov Moscow State Univ., Russia. . . . .P119

**08:50 Surface Protection Technology for Aerospace Materials (Invited)**, Pengfei Ju, Shanghai Aerospace Equipment Manufacturer, China. . . . .P120

**09:20 Thin Films based Fluorescent solar concentrator (Invited)**, Xiujian Zhao, Wuhan Univ. of Technology, China. . . . .P121

**09:50 Efficient broadband light absorption enhancement in InP/ZnO core-shell nanocone arrays for photovoltaic application (PLDTFPA2019-2019-0000083)**, Zongyi Zhang, Tongji University, China. . . . .P122

**10:05 An effective method of fabricating high performance material for above ambient radiative cooling (PLDTFPA2019-2019-0000098)**, Mengyu Gao, Fudan University, China, Qinghai University, China. . . . .P122

10:20 – 10:40 Coffee Break

TFPA Session 7. . . . .Wednesday 10:40 to 12:10

### Physics of Thin Films (II)

Session Chair: **Chang Kwon Hwangbo**, Inha Univ. (South Korea)

**10:40 Efficient and stable Sb<sub>2</sub>Se<sub>3</sub> thin film solar cells (Invited)**, Ping Fan, Shenzhen Univ., China. . . . .P123

**11:10 Energy flow difference structure design based on micro hemisphere structure (PLDTFPA2019-2019-0000060)**, Kailiang Shi, WuHan University of Technology, China. . . . . P124

**11:25 Influence of annealing on the structure, optical properties and residual stress of Ta<sub>2</sub>O<sub>5</sub>/SiO<sub>2</sub> multilayer reflective coatings (PLDTFPA2019-2019-0000104)**, Baojian Liu, Shanghai Institute of Technical Physics, CAS, China. . . . . P124

**11:40 A lift-off of pattern structures on the heat-mode resists (PLDTFPA2019-2019-0000135)**, Zhengwei Wang, Shanghai Institute of Optics and Fine Mechanics, CAS, China. . . . . P125

**11:55 Positive and negative properties of GeSbTe photoresists (PLDTFPA2019-2019-0000149)**, Guodong Chen, Shanghai Institute of Optics and Fine Mechanics, CAS, China. . . . . P125

11:55 – 13:20 Lunch Break

## TFPA Session 8. . . . .Wednesday 13:20 to 15:20

**Application of Thin Films (II)**

Session Chairs: **Alexander V. Tikhonravov**, M.V. Lomonosov Moscow State Univ. (Russia), **Dingquan Liu**, Shanghai Institute of Technical Physics, CAS (China)

- 13:20 Linear variable bandpass filter and its applications (Invited)**, Shigeng Song, Univ. of the West of Scotland, United Kingdom. . . . . P126
- 13:50 Dispersive mirror – a key component for femtosecond laser (Invited)**, Vladimir Pervak, Ludwig Maximilians University, Germany. . . . . P127
- 14:20 Design of dual-band-pass optical filter with one wide pass band and small pass band distance (PLDTFPA2019-2019-0000159)**, Yuan Cai, Shanghai Institute of Technical Physics, CAS, China. . . . . P128
- 14:35 Design and fabrication of superior depolarized beam splitter applied in laser beam combining technology (PLDTFPA2019-2019-0000030)**, Xinshang Niu, Tongji University, China. . . . . P128
- 14:50 Wide-incident angle and low polarization aberration edge filter (PLDTFPA2019-2019-0000115)**, Shikun He, Beijing Institute of Space Mechanics & Electricity, China. . . . . P129
- 15:05 Subwavelength periodic nanostructures fabricated on metal, dielectric and metal-dielectric coatings by femtosecond laser (PLDTFPA2019-2019-0000144)**, Kaixin Zhang, Shanghai Institute of Optics and Fine Mechanics, CAS, China. . . . . P129

**15:20 – 15:40 Coffee Break**

## Topic Meeting 2: The 10th International Conference on Thin Film Physics and Applications (TFPA 2019)

10:05 to 11:30, Tuesday 21 May Location: Terrace, 3F

TFPA Poster Session..... P130

PLDTFPA2019-2018-000002

**Effect of Temperature on Optical Properties of CeO<sub>x</sub> Film Being Irradiated By Co<sub>60</sub> Prepared by RF Magnetron Sputtering** Wang Hui, Fu Bo, Xiang Zaikui, China Building Material Academy, China

PLDTFPA2019-2019-000005

**Mechanical properties of 1064nm high-reflective coatings with co-evaporated interfaces** Nuo Xu<sup>1,2,3</sup>, Meiping Zhu<sup>1,2\*</sup>, Tingting Zeng<sup>1,2,3</sup>, Chaoyi Yin<sup>1,2,3</sup>, Yuanan Zhao<sup>1,2</sup>, Kui Yi<sup>1,2</sup>, Jianda Shao<sup>2\*</sup> 1.Laboratory of Thin Film Optics, Shanghai Institute of Optics and Fine Mechanics, CAS, China; 2.Key Laboratory of Materials for High Power Laser, Shanghai Institute of Optics and Fine Mechanics, CAS, China; 3.Center of Materials Science and Optoelectronics Engineering, UCAS, China

PLDTFPA2019-2019-000015

**Effect of MgF<sub>2</sub> deposition temperature on Al mirrors in vacuum ultraviolet** Fengli Wang<sup>1\*</sup>, Shuangying Li<sup>1</sup>, Zhuangzhuang Zhang<sup>1</sup>, Zhanshan Wang<sup>1</sup>, Hongjun Zhou<sup>2</sup>, Tonglin Huo<sup>2</sup> 1.School of Physics Science and Engineering, Tongji University, China; 2.NSRL, University of Science and Technology of China, China

PLDTFPA2019-2019-000017

**Experimental observation and numerical analysis for dynamical output in free-running multi-longitudinal mode erbium doped fiber ring laser** Tang Kai, Xiao Yanping, Academy of Military Science, China

PLDTFPA2019-2019-000020

**Improvement on Fluorescent Properties of Photonic Crystals Filled by Quantum Dots Based on Multi-layer Films** Qingfei Meng, Lu Huang, Weimin Shi, Yubin Zhu, Linjun Wang, Shanghai University, China

PLDTFPA2019-2019-000026

**Preparation and physical properties of germanium thin films** Meng Guo<sup>1,2</sup>, Hongbo He<sup>1</sup>, Kui Yi<sup>1</sup>, Shuying Shao<sup>1</sup>, Jianda Shao<sup>1</sup> 1.Laboratory of Thin Film Optics, Shanghai Institute of Optics and Fine Mechanics, China; 2.University of Chinese Academy of Sciences, China

PLDTFPA2019-2019-000031

**Study on Preparation Process and Shielding effectiveness of Graphene Films** Jianle Zhao, Junhong Su, Kai Shi, Xi'an Technological University, China

PLDTFPA2019-2019-000037

**All-optical control of light functionality in WS<sub>2</sub>-coated microfiber knot resonator with high sensitivity** Xiaoli Wang, Heyuan Guan, Guowei Chen, Zijian Zhang, Hanguang Li, Mengjiang Jiang, Yuwei Lang, Wenguo Zhu, Jianhui Yu, Huihui Lu, Wentao Qiu, Jiangli Dong, Yunhan Luo, JUN Zhang, Zhe Chen, Jinan University, China

PLDTFPA2019-2019-000038

**Research on the Time and Mechanism of Laser-Induced Air Plasmas Ignition** Wang Guixia, Su Junhong, Xi'an Technological University, China

PLDTFPA2019-2019-000053

**Optical property of perovskite/c-silicon tandem solar cell with Ag grating back reflectors** Yawei Kuang, Changshu Institute of Technology, China

PLDTFPA2019-2019-000070

**Comparison of Mechanical Properties Evolution of Polyimide Films in Space Radiation Environment** Xiao Li<sup>1</sup>, Shijie Liu<sup>2</sup>, Zicai Shen<sup>3\*</sup> 1.School of Science, Beijing Technology and Business University, China; 2.Shanghai Institute of Optical Precision Machinery, Chinese Academy of Sciences, China; 3.Beijing Institute of Spacecraft Environment Engineering, China

PLDTFPA2019-2019-000078

**Broadband chirped volume Bragg grating for one-hundred-femtosecond pulse compression** Huifang Dai<sup>1,2,3</sup>, Yunxia Jin<sup>1,3\*</sup>, Peng Chen<sup>1,2,3</sup>, Xu Jiao<sup>1,2,3</sup>, Yibin Zhang<sup>1,3</sup>, Kong Fanyu<sup>1,3</sup>, He Dongbing<sup>3,4</sup> 1.Laboratory of Thin Film Optics, Shanghai Institute of Optics and Fine Mechanics, China; 2.Center of Materials Science and Optoelectronics Engineering, UCAS, China; 3.Key Laboratory of Materials for High Power Laser, Chinese Academy of Sciences, China; 4.High Power Laser Unit Technology Center, Shanghai Institute of Optics and Fine Mechanics, China

PLDTFPA2019-2019-000079

**Broadband Polarization Beam Splitter Based on Subwavelength Grating in Terahertz** Zhang yelan, Cheng yuyang, Zhang kun, Li caiyu, Kong weijin, Qingdao University, China

PLDTFPA2019-2019-000081

**Annealing effects on the optical and structural properties of Y<sub>2</sub>O<sub>3</sub> thin films deposited by thermal evaporation technique** Shida Li<sup>1,2</sup>, Huasong Liu<sup>1,2\*</sup>, Yugang Jiang<sup>1,2</sup>, Meiping Zhu<sup>3</sup>, Yang Xiao<sup>1,2</sup>, Peng Shang<sup>1,2</sup>, Lishuan Wang<sup>1,2</sup>, Yiqin Ji<sup>1,2</sup> 1.Tianjin Key Laboratory of Optical Thin Film, China; 2.Joint Laboratory of optoelectronic materials and intelligent surface structures, China; 3.Shanghai Institute of Optics and Fine Mechanics, China

PLDTFPA2019-2019-000082

**Stress evolution with volume ratio of Ta<sub>2</sub>O<sub>5</sub> in Ta<sub>2</sub>O<sub>5</sub>-SiO<sub>2</sub> monolayer film** Pengfei Kong<sup>1,2</sup>, Yunti Pu<sup>1\*</sup>, Ping Ma<sup>1</sup>, Jiliang Zhu<sup>2</sup> 1.Fine Optical Engineering Research Center, China; 2.College of Materials Science and Engineering, Sichuan University, China

PLDTFPA2019-2019-000087

**Effects of different oxygen flow rates on refractive index and absorption characteristics of Ta<sub>2</sub>O<sub>5</sub> film** Chenghui Jiang, Lishuan Wang, Tianjin Key Laboratory of Optical Thin Film, Tianjin Jinhang Technical Physics Institute, China

PLDTFPA2019-2019-000092

**Effect of heat treatment on properties of TiO<sub>2</sub> thin films deposited by ion-beam sputtering** Yugang Jiang, Tianjin Jinhang Technical Physics Institute, China

PLDTFPA2019-2019-000094

**Study on the full spectral dispersion mode of Al<sub>2</sub>O<sub>3</sub> thin films with different oxygen flow rates deposited by ion-beam sputtering** Jiahuan He, Chen Dan, Tianjin Jinhang Technical Physics Institute, China

PLDTFPA2019-2019-000099

**VO<sub>2</sub> films with low transition temperature prepared by reactive pulsed magnetron sputtering with Ni-Cr co-doping** Qicong He, Dongping Zhang, Ying Huang, Yu Yang, huan Guan, Jingcheng Jin, Ping Fan, College of Physics and Optoelectronic Engineering, China

PLDTFPA2019-2019-000100

**Large-range wavelength tunable filter based on dielectric grating** Caiyu Li, Kun Zhang, Weijin Kong, Qingdao University, China

PLDTFPA2019-2019-000109

**Two-Photon Absorption towards Pulse Modulation in Mechanically Exfoliated and CVD Monolayer Cascaded MoS<sub>2</sub> Structures** Yafeng Xie<sup>1,2</sup>, Saifeng Zhang<sup>1</sup>, Xiaoyan Zhang<sup>1</sup>, Ningning Dong<sup>1</sup>, Ivan Kislyakov<sup>1</sup>, Jun Wang<sup>1\*</sup> 1.SIOM, CAS, China; 2.University of Chinese Academy of Sciences, China

PLDTFPA2019-2019-000110

**Defining of the point evaporation source and the surface evaporation source in the thermal evaporation vacuum coating** Xiao Yang<sup>1,2</sup>, Lishuan Wang<sup>1,2</sup>, Dongbai Xue<sup>2</sup>, Yiqin Ji<sup>2</sup>, Huasong Liu<sup>2\*</sup> 1.Harbin Institute of Technology, China; 2.Tianjin Jinhang Technical Physics Institute, China

PLDTFPA2019-2019-000113

**Wear-Resistant AR Films for Chalcogenide Glasses** Jian Leng, Yiqin Ji, Huasong Liu, Luchen Yuan, Kewen Zhuang, Dandan Liu, Tianjin Jinhang Institute of Technical Physics, China

PLDTFPA2019-2019-000120

**Oblique incidence reflectance of resonators based on suspended two-dimensional membranes** Wenjing Mao, Chen Yang, Heng Lu, Fengnan Chen, Jun Lu, Joel Moser, Ying Yan, Lin Wan, Soochow University, China

PLDTFPA2019-2019-000124

**Transparent Oxide Based Thin Film Transistors for Flexible Sensors** Yuanjie Li, Wenci Sun, Jie Wang, Xi'an Jiaotong University, China

PLDTFPA2019-2019-000125

**Design of linear polarizer in 3-13 $\mu$ m broad infrared region with multilayer nanostructures** Jie Xia, Zhihao Yuan, Chinhua Wang, Soochow University, China

PLDTFPA2019-2019-000127

**Efficient method for determination of laser conditions adopted in laser-induced micro-lithology based on laser polymerization size analysis** Yuchen Shao, Shanghai Institute of Optics and Fine Mechanic, Chinese Academy of Science, China

PLDTFPA2019-2019-000129

**The thickness and the degree of order of the ultrafast laser deposited carbon film** Han Wu, School of Mechanical Science and Engineering, Huazhong University of Science and Technology, China

PLDTFPA2019-2019-000133

**Green vegetables derived simultaneously carbon dots as sensitizer and carbon particles as counter electrode for dye-sensitized solar cells** Ping Huang<sup>1,2</sup>, Shunjian Xu<sup>2\*</sup>, Meng Zhang<sup>1\*</sup>, Wei Zhong<sup>2</sup>, Zonghu Xiao<sup>2</sup>, Yongping Luo<sup>2</sup> 1.Nanchang University, China; 2.Xinyu University, China

PLDTFPA2019-2019-000136

**Design and Fabrication of Antireflective Microstructure Surfaces on Lithium Triborate** Yong Sun, Shanghai Institute of Optics and Fine Mechanics, China

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**Effects of annealing parameters on the thermochromic properties of VO<sub>2</sub> films prepared by magnetron sputtering** Maodong Zhu<sup>1</sup>, Hu Wang<sup>1</sup>, Hongji Qi<sup>1</sup>, Dongping Zhang<sup>2\*</sup> 1.Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, China; 2.Shenzhen University, China

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**Optimization of morphology and electrochemical characteristics of nickel film by sputtering pressure** Yongping Luo, Xinyu University, China

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**Evolution of absorbed water molecules in e-beam HfO<sub>2</sub>, SiO<sub>2</sub> coatings** Tingting Zeng<sup>1,2,3</sup>, Meiping Zhu<sup>1,2,4\*</sup>, Chaoyi Yin<sup>5,2,4</sup>, Nuo Xu<sup>1,2,4</sup>, Yanzhi Wang<sup>1,2</sup>, Yuanan Zhao<sup>1,2</sup>, Kui Yi<sup>1,2</sup>, Jianda Shao<sup>1,2,6</sup> 1.Laboratory of Thin Film Optics, Shanghai Institute of Optics and Fine Mechanics, China; 2.Key Laboratory of Materials for High Power Laser, Shanghai Institute of Optics and Fine Mechanics, China; 3.Center of Materials Science and Optoelectronics Engineering, UCAS, China; 4.Center of Materials Science and Optoelectronics Engineering, UCAS, Beijing, China; 5.Laboratory of Thin Film Optics, Shanghai Institute of Optics and Fine Mechanics, China; 6.CAS Center for Excellence in Ultra-intense Laser Science, China

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**Measuring Residual Reflectivity Uniformity of Large Aperture Optics by Laser Photometry** Gao Bo, Laser Fusion Research Center, China Academy of Engineering Physics, China

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**Thermal Matching Design and Preparation of 2.66 μm~2.89 μm Infrared Band-pass Filter Based on Silicon** Xiaoxi Tian<sup>1,2\*</sup>, Shengming Xiong<sup>1</sup>, Kepeng Zhang<sup>1,2</sup>, Wanjun Ai<sup>1,2</sup>, Yinhua Zhang<sup>1,2</sup> 1.Institute of Optics and Electronics Chinese Academy of Sciences, China; 2.University of Chinese Academy of Science, China

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**Properties of Nb<sub>2</sub>O<sub>5</sub> thin films fabricated by dual ion assisted deposition** Wanjun Ai<sup>1,2\*</sup>, Shengming Xiong<sup>1</sup>, Xiaoxi Tian<sup>1,2</sup>, Yinhua Zhang<sup>1,2</sup> 1.Institute of Optics and Electronics Chinese Academy of Sciences, China, 2.University of Chinese Academy of Science, China

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**Influence of interfacial correlation properties on light scattering in optical thin films** Kepeng Zhang, Xiaoxi Tian, Wei Huang, Yinhua Zhang, Institute of Optics and Electronics, Chinese Academy of Science, China

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**Continuum model for overhanging morphologies and the application in the GALD growth** Yunjie Mo, He Yingyou, Shaoji Jiang, Sun Yat-Sen University, China

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**Structure, Properties and Stability Studies of CsPbI<sub>x</sub>Br<sub>3-x</sub> in All-inorganic Perovskite Solar Cells** Wei Zhong, Jiangxi Key Laboratory of Advanced Materials and Applications for Solar Cells, China

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**Wave propagation control in three-layered slab waveguide with periodic structures** Aysha Bibi, Harbin Engineering University, China

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**Correlation between the structure and laser damage properties of ion assisted HfO<sub>2</sub> thin films** Feng Pan, Fine Optical Engineering Research Centre, China

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**Influence and correction of infrared polarizer on FTIR polarization spectroscopy measurements** Xiaofeng Ma, Shanghai Institute of Physical Technology, Chinese Academy of Sciences, China

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**Electrical property of OSR second surface mirror in space radiation environments** Zicai Shen<sup>1</sup>, Xiaofeng Ma<sup>2</sup>  
1.Beijing Institute of Spacecraft Environment Engineering, China; 2.Shanghai Institute of Technical Physics, CAS, China

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**Photoelectric Properties of Transparent Conductive Metal Mesh Films Based on Crack Template and Its Application in Perovskite Solar Cells** Zonghu Xiao, Jiangxi Key Laboratory of Advanced Materials and Applications for Solar Cells, Xinyu University, China

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**Study of Reflection Phase Shift's Effect on the optical performance of a tunable Fabry–Perot Filter for hyperspectral imaging application** Rui Cong, Shanghai Institute of Technical Physics, CAS, China





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