The 11th International Photonics and OptoElectronics Meetings (POEM 2018)
Wuhan · China  Oct. 31 - Nov. 3 2018
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Welcome to POEM 2018, Wuhan!

It is a great pleasure and privilege to have you join us at the 11th International Photonics and OptoElectronics Meetings (POEM 2018) to be held on Oct 31- Nov 3, 2018, Wuhan, China, organized by Wuhan National Laboratory for Optoelectronics (WNLO) and The Optical Society (OSA).

POEM 2018 features two OSA Topical Meetings: Optoelectronic Devices and Integration (OEDI) and Photonics for Energy (PFE). The meetings will address all the aspects of optoelectronic devices and integration, silicon photonic integrated devices, III-V photonic integrated devices, next generation photovoltaics, new type energy conversion materials and devices, next generation energy storage materials/technologies, etc. Hundreds of invited and contributed talks will be taken on through November 1 to 3. Parallel poster sessions will be presented on November 1, during which 10 best student paper awards are to be selected.

By bringing together the high-quality technical content, influential speakers worldwide, comprehensive topic categories and latest technologies, POEM 2018 is to serve as a platform on exchanging information of recent advances and future trends for researchers and their peers, and to boost brand for the enterprises.

POEM--OSA Topical Meetings

Optoelectronic Devices and Integration (OEDI)

Sponsors: IEEE China Council Sensors Council and Systems Council Joint Chapter

Topics may include, but are not limited to:

01. Optoelectronic devices and integration
02. Silicon photonic integrated devices
03. III-V photonic integrated devices
04. Monolithic and hybrid integration
05. Metamaterials and metasurfaces
06. Plasmonics beyond the diffraction limit
07. Optical microfiber or nanofiber
08. Fiber-optic communications
09. Structured light beams
10. Free-space optical communications
11. Optical interconnects
12. Optical signal processing
13. Microwave photonics
14. Quantum information processing
15. Quantum communications
16. Other emerging fields in information optoelectronics

Photonics for Energy (PFE)

Topics may include, but are not limited to:

1. Next generation photovoltaics
2. New type energy conversion materials and devices
3. Next generation energy storage materials/technologies
Supporters

Ministry of Education of China (MOE)

State Administration of Foreign Experts Affairs, P. R. China (SAFEA)

Host

Huazhong University of Science and Technology (HUST)

Organizers

Wuhan National Laboratory for Optoelectronics (WNLO)

The Optical Society (OSA)
Committees

Honorary Chairs

Chaohui Ye, Wuhan Institute of Physics and Mathematics, Chinese Academy of Sciences; Wuhan National Laboratory for Optoelectronics (China)
Bingkun Zhou, Tsinghua University (China)

General Chairs

Qihuang Gong, Peking University (China)
Qingming Luo, Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology (China)

Program Committee Chairs

Xinliang Zhang, Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology (China)
Jun Zhou, Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology (China)

Local Organizing Committee

Chair:
Song Xia, Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology (China)

Members:
Ling Xu, Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology (China)
Xiao Cheng, Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology (China)
Chengcheng Dong, Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology (China)
Weiwei Dong, Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology (China)
Ruyi Duan, Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology (China)
Xinli Li, Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology (China)

Optoelectronic Devices and Integration (OEDI)

Chairs:
Jian Wang, Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology (China)
Chengwei Qiu, National University of Singapore (Singapore)

Co-chairs:
Ming Tang, Huazhong University of Science and Technology (China)
Lianli Dong, Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology (China)

Program Committee Members:
Antonella Bogoni, Integrated Research Center for Photonic Networks Technologies, Photonic Networks National Laboratory - CNIT (Italy)
Xinlun Cai, Sun Yat-sen University (China)
Daoxin Dai, Zhejiang University (China)
Yunhong Ding, Technical University of Denmark (Denmark)
Po Dong, Nokia Bell Labs (USA)
Liang Feng, University of Pennsylvania (USA)
Xue Feng, Tsinghua University (China)
Chunqing Gao, Beijing Institute of Technology (China)
Weihua Guo, Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology (China)
Wei Jiang, Nanjing University (China)
Juhao Li, Peking University (China)
Ming Li, Institute of Semiconductors, Chinese Academy of Sciences (China)
Zeitan Mi, University of Michigan (USA)
Giovanni Milione, NEC Laboratories America, Inc. (USA)
Xuewen Shu, Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology (China)
Xingjun Wang, Peking University (China)
Ke Xu, Harbin Institute of Technology (Shenzhen) (China)
Lilin Yi, Shanghai Jiao Tong University (China)
Kyoungsk Yu, School of Electrical Engineering, KAIST (Korea)
Yu Yu, Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology (China)
Qiwen Zhan, University of Dayton (USA)
Guoxing Zheng, Wuhan University (China)
Linhie Zhou, Shanghai Jiao Tong University (China)

Photonics for Energy (PFE)

Chairs:
Jiang Tang, Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology (China)
Jang Wook Choi, Seoul National University & KAIST (Korea)

Co-chair:
Yongming Sun, Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology (China)

Program Committee Members:
Jang Wook Choi, Seoul National University & KAIST (Korea)
Yi Cui, Stanford University (USA)
Yury Gogotsi, Drexel University (USA)
Xiaojing Hao, The University of New South Wales (Australia)
Jianhui Hou, Institute of Chemistry, Chinese Academy of Sciences (China)
Liangbing Hu, University of Maryland (USA)
Zheng Hu, Nanjing University (China)
Jinsong Huang, University of North Carolina, Chapel Hill (USA)
Song Jin, University of Wisconsin-Madison (USA)
Edward H. Sargent, University of Toronto (Canada)
Jinbi You, Institute of Semiconductors, Chinese Academy of Sciences (China)
Shuhong Yu, University of Science and Technology of China (China)
Yue Zhang, University of Science and Technology Beijing (China)
General Information

Conference Venue
Ramada Plaza Optics Valley Hotel Wuhan
(No.726 Luoyu Road, Wuchang, Wuhan 430074, Hubei Province, China)

Accessibility
Ramada Plaza Optics Valley Hotel Wuhan (Wuhan) is conveniently located in the heart of Optics Valley district. It is about a 60-min drive from Wuhan Tianhe International Airport (47.8 km), a 30-min drive from Wuchang Railway Station (10 km), a 60-min drive from Hankou Railway Station (24.5 km), a 45-min drive from Wuhan Railway Station (18.5 km).

Transportation
From Wuhan Tianhe International Airport
By Metro: Take Metro Line 2 (toward Optics Valley Square direction) and get off at Optics Valley Square Station (Exit E), then walk about 2 minutes to Ramada Plaza Optics Valley Hotel Wuhan (7 RMB)
By Airport Line & Bus: Take airport bus line 1 to Fujiapo Bus Station and get off, transfer to Bus 703/728/518/510/401/101 and get off at Luxiang Bus Station, then walk about 4 minutes to Ramada Plaza Optics Valley Hotel Wuhan (34 RMB)
By Taxi: 60-min drive (~125 RMB)

From Wuhan Railway Station
By Metro: Take Metro Line 4 (toward Huangjinkou direction) and get off at Zhongnan Road, then take Metro Line 2 (toward Optics Valley Square direction) and get off at Optics Valley Square Station (Exit E), then walk about 2 minutes to Ramada Plaza Optics Valley Hotel Wuhan (5 RMB)
By Bus: Take Bus 513 to Lumo Road (Optics Valley Square Bus Station) and get off, then walk 12 minutes to Ramada Plaza Optics Valley Hotel Wuhan (2 RMB)
By Taxi: 45-min drive (~53 RMB)

From Hankou Railway Station
By Metro: Take Metro Line 2 (toward Optics Valley Square direction) and get off at Optics Valley Square Station (Exit E),
then walk about 2 minutes to Ramada Plaza Optics Valley Hotel Wuhan (5 RMB)

By Bus: Take Bus 703 to Luxiang Bus Station and get off, then walk about 4 minutes to Ramada Plaza Optics Valley Hotel Wuhan (2 RMB)
By Taxi: 60-min drive (~66 RMB)

From Wuchang Railway Station
By Metro: Take Metro Line 4 (toward Wuhan Railway Station direction) and get off at Zhongnan Road, then take Metro Line 2 (toward Optics Valley Square direction) and get off at Optics Valley Square Station (Exit E), then walk about 2 minutes to Ramada Plaza Optics Valley Hotel Wuhan (3 RMB)
By Bus: Take Bus 59/518 and get off at Luxiang Bus Station, then walk about 4 minutes to Ramada Plaza Optics Valley Hotel Wuhan (2 RMB)
By Taxi: 30-min drive (~23 RMB)

Registration
Registration will be served from Oct. 31-Nov. 3, 2018.
The registrants have the access to all conference sessions, plenaries, poster sessions and exhibition, coffee breaks, award banquet, three lunches, one dinner, etc.

<table>
<thead>
<tr>
<th>Time</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>14:00-20:00, Oct. 31, 2018</td>
<td>1st floor, Lobby</td>
</tr>
<tr>
<td>07:30-18:00, Nov. 1, 2018</td>
<td>5th floor, East Lake Hall Foyer</td>
</tr>
<tr>
<td>08:00-17:00, Nov. 2, 2018</td>
<td></td>
</tr>
<tr>
<td>08:30-11:00, Nov. 3, 2018</td>
<td></td>
</tr>
</tbody>
</table>

Speaker Preparation
All oral presenters should check in at the corresponding session room at least ten minutes prior to their scheduled session to upload and check their presentation. No shows of the oral presentation will be reported to conference management and these papers will not be published.
The projector dimension is 16:9.

Poster Preparation
Presenters should set up the posters before the poster session starts, and authors are required to stand by their posters to answer questions and further discuss their works with attendees. Presenters’ exact places will be indicated by Paper Code which will be posted on the poster boards.
No shows will be reported to conference management and these papers will not be published.
Generally, the poster should briefly state the research design and findings, illustrated by photos, charts, graphs or tables clearly. Poster’s dimensions of 80 cm (width) x 120 cm (height) are required.
Poster session is scheduled at 16:00-17:30, Nov. 1, 2018.

<table>
<thead>
<tr>
<th>Time</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>16:00-17:30, Nov. 1, 2018</td>
<td>OEDI 5th floor, East Lake Hall Foyer</td>
</tr>
<tr>
<td></td>
<td>PFE 5th floor, South Lake Ball Room I</td>
</tr>
</tbody>
</table>
Poster Area will be open from 8:30, Nov. 1, 2018, and presenters should set up at least 30 minutes prior to the poster session (16:00-17:30, Nov. 1, 2018) and tear down their papers before 9:00, Nov. 2, 2018.

Best Student Paper Award
Student paper competition is limited to full time students. To win the prize, the author must be the first author and the presenter of poster presentation, which will be evaluated by Program Committee Members of OEDI and PFE, based on not only the submitted abstract content, but also the quality of the presentation. The winners will be announced and awarded certificates with prize in cash (RMB 1000/recipient) at Award Banquet on Nov. 1, 2018.

Sponsored by YSL
**Exhibition**
The exhibition is open to all attendees.

<table>
<thead>
<tr>
<th>Time</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:30-18:00, Nov. 1, 2018</td>
<td>5th floor, East Lake Hall Foyer</td>
</tr>
<tr>
<td>09:00-17:00, Nov. 2, 2018</td>
<td></td>
</tr>
<tr>
<td>09:00-12:00, Nov. 3, 2018</td>
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</table>

**Coffee Breaks**

<table>
<thead>
<tr>
<th>Time</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:05-10:35, Nov. 1, 2018</td>
<td>5th floor, East Lake Hall Foyer</td>
</tr>
<tr>
<td>16:00-17:30, Nov. 1, 2018</td>
<td></td>
</tr>
<tr>
<td>10:40-11:10, Nov. 2, 2018</td>
<td></td>
</tr>
<tr>
<td>15:10-15:40, Nov. 2, 2018</td>
<td></td>
</tr>
<tr>
<td>10:30-11:00, Nov. 3, 2018</td>
<td>5th floor, East Lake Hall Foyer</td>
</tr>
<tr>
<td>15:10-15:40, Nov. 3, 2018</td>
<td></td>
</tr>
</tbody>
</table>

**Meals**

<table>
<thead>
<tr>
<th>Meal</th>
<th>Time</th>
<th>Location</th>
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</thead>
<tbody>
<tr>
<td>Lunches</td>
<td>12:00-13:30, Nov. 1-3, 2018</td>
<td>5th floor, West Lake Ball Room</td>
</tr>
<tr>
<td>Award Banquet</td>
<td>18:00-20:00, Nov. 1, 2018</td>
<td>5th floor, East Lake Ball Room</td>
</tr>
<tr>
<td>Dinner</td>
<td>18:00-20:00, Nov. 2, 2018</td>
<td>28th floor, Revolving Restaurant</td>
</tr>
</tbody>
</table>

**Map**

Conference Venue
Ramada Plaza Optics Valley Hotel Wuhan (No.726 Luoyu Road, Wuchang, Wuhan 430074, Hubei Province, China)
# General Schedule

## Oct. 31, 2018

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>14:00-20:00</td>
<td>Registration (1st floor, Lobby)</td>
</tr>
</tbody>
</table>

## Nov. 1, 2018

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>07:30-18:00</td>
<td>Registration (5th floor, East Lake Hall Foyer)</td>
</tr>
<tr>
<td>08:30-18:00</td>
<td>Exhibition (5th floor, East Lake Hall Foyer)</td>
</tr>
<tr>
<td>08:30-08:45</td>
<td>Opening Ceremony (5th floor, East Lake Ball Room)</td>
</tr>
<tr>
<td>08:45-10:05</td>
<td>Plenary Session 1 (5th floor, East Lake Ball Room)</td>
</tr>
<tr>
<td>10:05-10:35</td>
<td>Group Photo &amp; Coffee/Tea Break (5th floor, West Lake Ball Room &amp; 5th floor, East Lake Hall Foyer)</td>
</tr>
<tr>
<td>10:35-11:55</td>
<td>Plenary Session 2 (5th floor, East Lake Ball Room)</td>
</tr>
<tr>
<td>12:00-13:30</td>
<td>Lunch Break (5th floor, West Lake Ball Room)</td>
</tr>
<tr>
<td>13:30-16:00</td>
<td>OEDI Session 1 (5th floor, East Lake Ball Room II)</td>
</tr>
<tr>
<td>13:30-16:00</td>
<td>PFE Session 1 (5th floor, South Lake Ball Room II)</td>
</tr>
<tr>
<td>16:00-17:30</td>
<td>OEDI Poster Session (5th floor, East Lake Hall Foyer)</td>
</tr>
<tr>
<td>16:00-17:30</td>
<td>PFE Poster Session (5th floor, South Lake Ball Room I)</td>
</tr>
<tr>
<td>16:00-17:30</td>
<td>Coffee/Tea Break (5th floor, East Lake Hall Foyer)</td>
</tr>
<tr>
<td>18:00-20:00</td>
<td>Award Banquet (5th floor, East Lake Ball Room)</td>
</tr>
</tbody>
</table>

## Nov. 2, 2018

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>08:00-17:00</td>
<td>Registration (5th floor, East Lake Hall Foyer)</td>
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<tr>
<td>09:00-17:00</td>
<td>Exhibition (5th floor, East Lake Hall Foyer)</td>
</tr>
<tr>
<td>09:00-10:40</td>
<td>OEDI Session 2 (5th floor, East Lake Ball Room II)</td>
</tr>
<tr>
<td>10:40-11:10</td>
<td>Coffee/Tea Break (5th floor, East Lake Hall Foyer)</td>
</tr>
<tr>
<td>11:10-12:00</td>
<td>OEDI Session 3 (5th floor, East Lake Ball Room II)</td>
</tr>
<tr>
<td>12:00-13:30</td>
<td>Lunch Break (5th floor, West Lake Ball Room)</td>
</tr>
<tr>
<td>13:30-15:10</td>
<td>OEDI Session 4 (5th floor, East Lake Ball Room II)</td>
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<tr>
<td>15:10-15:40</td>
<td>Coffee/Tea Break (5th floor, East Lake Hall Foyer)</td>
</tr>
<tr>
<td>15:40-17:20</td>
<td>OEDI Session 5 (5th floor, East Lake Ball Room II)</td>
</tr>
<tr>
<td>18:00-20:00</td>
<td>Dinner Buffet (28th floor, Revolving Restaurant)</td>
</tr>
<tr>
<td>Time</td>
<td>Event</td>
</tr>
<tr>
<td>------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>08:30-11:00</td>
<td>Registration</td>
</tr>
<tr>
<td>09:00-12:00</td>
<td>Exhibition</td>
</tr>
<tr>
<td>09:00-9:40</td>
<td>Plenary Session 3</td>
</tr>
<tr>
<td>09:40-10:30</td>
<td>OEDI Session 6</td>
</tr>
<tr>
<td>10:30-11:00</td>
<td>Coffee/Tea Break                                                     (5th floor, East Lake Hall Foyer)</td>
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<tr>
<td>11:00-11:50</td>
<td>OEDI Session 7</td>
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<tr>
<td>12:00-13:30</td>
<td>Lunch Break                                                          (5th floor, West Lake Ball Room)</td>
</tr>
<tr>
<td>13:30-15:10</td>
<td>OEDI Session 8</td>
</tr>
<tr>
<td>15:10-15:40</td>
<td>Coffee/Tea Break                                                     (5th floor, East Lake Hall Foyer)</td>
</tr>
<tr>
<td>15:40-17:20</td>
<td>OEDI Session 9</td>
</tr>
</tbody>
</table>

**Optoelectronic Devices and Integration (OEDI)**

<table>
<thead>
<tr>
<th>Nov. 1, 2018</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Opening Ceremony</strong></td>
<td>(5th floor, East Lake Ball Room)</td>
</tr>
<tr>
<td>Presider: Ming Tang, Huazhong University of Science and Technology, China</td>
<td></td>
</tr>
<tr>
<td>08:30-08:45</td>
<td>Opening Address Xinfang Zhang, Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology, China</td>
</tr>
<tr>
<td></td>
<td>Plenary Session 1                                                                        (5th floor, East Lake Ball Room)</td>
</tr>
<tr>
<td>Presider: Jian Wang, Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology, China</td>
<td></td>
</tr>
<tr>
<td>08:45-09:25</td>
<td>Quantum mechanics with patterns of light Andrew Forbes, University of the Witwatersrand, South Africa</td>
</tr>
<tr>
<td>09:25-10:05</td>
<td>Optoelectronic properties of two-dimensional transition metal carbides (MXenes) Yury Gogotsi, Drexel University, USA</td>
</tr>
<tr>
<td>10:05-10:35</td>
<td>Group Photo &amp; Coffee/Tea Break                                                             (5th floor, West Lake Ball Room &amp; 5th floor, East Lake Hall Foyer)</td>
</tr>
<tr>
<td></td>
<td>Plenary Session 2                                                                        (5th floor, East Lake Ball Room)</td>
</tr>
<tr>
<td>Presider: Jiang Tang, Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology, China</td>
<td></td>
</tr>
<tr>
<td>10:35-11:15</td>
<td>Fano photonics for improving lasers, optical signal processing and quantum technology Jesper Mørk, Technical University of Denmark, Denmark</td>
</tr>
<tr>
<td>11:15-11:55</td>
<td>PerovLight: halide perovskite materials for nanophotonics and polaritonics Qihua Xiong, Nanyang Technological University, Singapore</td>
</tr>
<tr>
<td>12:00-13:30</td>
<td>Lunch Break                                                                             (5th floor, West Lake Ball Room)</td>
</tr>
</tbody>
</table>
### Session 1 (Optoelectronic Devices and Integration)

**Presider:** Jesper Mørk, Technical University of Denmark, Denmark

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Speaker</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>13:30-13:55</td>
<td>Energy efficient high port count InP based photonic switches</td>
<td>Richard Penty</td>
<td>University of Cambridge, UK</td>
</tr>
<tr>
<td>13:55-14:20</td>
<td>Photonic integrated circuits for beamforming in 5G wireless communications</td>
<td>Antonella Bogoni, Integrated Research Center for Photonic Networks Technologies, Photonic Networks National Laboratory – CNIT, Italy</td>
<td></td>
</tr>
<tr>
<td>14:20-14:45</td>
<td>Silicon nitride based photonic devices and PICs</td>
<td>Siyuan Yu, Sun Yat-sen University, China &amp; University of Bristol, UK</td>
<td></td>
</tr>
<tr>
<td>14:45-15:10</td>
<td>Nanobeam cavity engineering for the realization of active functions in integrated Si photonics</td>
<td>Eric Cassan, Université Paris-Sud, France</td>
<td></td>
</tr>
<tr>
<td>15:10-15:35</td>
<td>Novel integrated sources for short-reach transmission over dispersive channel</td>
<td>Christophe Peucheret, Université de Rennes 1, France</td>
<td></td>
</tr>
<tr>
<td>15:35-16:00</td>
<td>Functional two-dimensional optoelectronics devices</td>
<td>Baohua Jia, Swinburne University of Technology, Australia</td>
<td></td>
</tr>
<tr>
<td>16:00-17:30</td>
<td>Coffee/Tea Break</td>
<td>(5th floor, East Lake Hall Foyer)</td>
<td></td>
</tr>
<tr>
<td>16:00-17:30</td>
<td>Poster Session</td>
<td>(5th floor, East Lake Hall Foyer)</td>
<td></td>
</tr>
<tr>
<td>18:00-20:00</td>
<td>Award Banquet</td>
<td>(5th floor, East Lake Ball Room)</td>
<td></td>
</tr>
</tbody>
</table>

### Session 2 (Structured Light Beams and Their Applications)

**Presider:** Andrew Forbes, University of the Witwatersrand, South Africa

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Speaker</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00-09:25</td>
<td>Tailoring optical focus with complex light fields</td>
<td>Qiwen Zhan, University of Shanghai for Science and Technology, China &amp; University of Dayton, USA</td>
<td></td>
</tr>
<tr>
<td>09:25-09:50</td>
<td>Parallel processing OAM modes through liquid crystal photoalignment</td>
<td>Yanqing Lu, Nanjing University, China</td>
<td></td>
</tr>
<tr>
<td>09:50-10:15</td>
<td>Active sensing with light’s orbital angular momentum</td>
<td>Giovanni Milione, NEC Laboratories America, Inc., USA</td>
<td></td>
</tr>
<tr>
<td>10:15-10:40</td>
<td>Generating and measuring of structured beams</td>
<td>Yuanjie Yang, University of Electronic Science and Technology of China, China</td>
<td></td>
</tr>
<tr>
<td>10:40-11:10</td>
<td>Coffee/Tea Break</td>
<td>(5th floor, East Lake Hall Foyer)</td>
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### Session 3 (Nonlinear Optics & Quantum Communications)

**Presider:** Christophe Peucheret, Université de Rennes 1, France

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<tr>
<th>Time</th>
<th>Topic</th>
<th>Speaker</th>
<th>Institution</th>
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<tbody>
<tr>
<td>11:10-11:35</td>
<td>Nonlinear optics for optical communication systems and advanced multiplexing techniques for high-dimensional quantum communications</td>
<td>Leif Katsuo Oxenløwe, Technical University of Denmark, Denmark</td>
<td></td>
</tr>
<tr>
<td>11:35-12:00</td>
<td>Quantum key distribution: scenarios for application and co-existence in optical metro and IoT networks</td>
<td>George Kanellios, University of Bristol, UK</td>
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<tr>
<td>12:00-13:30</td>
<td>Lunch Break</td>
<td>(5th floor, West Lake Ball Room)</td>
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### Session 4 (Plasmonics, Metamaterials, 2D Materials)

**Presider:** Leif Katsuo Oxenløwe, Technical University of Denmark, Denmark

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<tr>
<th>Time</th>
<th>Topic</th>
<th>Speaker</th>
<th>Institution</th>
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<tbody>
<tr>
<td>13:30-13:55</td>
<td>Integrated localized plasmonics and applications</td>
<td>Beatrice Dagens, Université Paris-Sud, France</td>
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<tr>
<td>Time</td>
<td>Session</td>
<td>Speaker(s)</td>
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<tr>
<td>13:55-14:20</td>
<td>A dynamic plasmonic microscope</td>
<td>Xiaocong Yuan</td>
<td>Shenzhen University, China</td>
</tr>
<tr>
<td>14:20-14:45</td>
<td>Metasurface for third order nonlinear effect: new prospects for photonics and biology</td>
<td>Regis Barille</td>
<td>University of Angers, France</td>
</tr>
<tr>
<td>14:45-15:10</td>
<td>High-performance CVD graphene on silicon nitride waveguide photodetectors</td>
<td>Chester Shu</td>
<td>The Chinese University of Hong Kong, China</td>
</tr>
<tr>
<td>15:10-15:40</td>
<td>Coffee/Tea Break</td>
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<tr>
<td>15:40-16:05</td>
<td>Spectral energy redistribution enables full-field broadband invisibility cloaking</td>
<td>José Azaña</td>
<td>Énergie Matériaux Télécommunications Research Centre, Canada</td>
</tr>
<tr>
<td>16:05-16:30</td>
<td>Progress in distributed coherent imaging radar based on microwave photonics</td>
<td>Xiaoping Zheng</td>
<td>Tsinghua University, China</td>
</tr>
<tr>
<td>16:30-16:55</td>
<td>All-electrical microwave characterization of high-speed optoelectronic devices with self-reference and on-chip capability</td>
<td>Shangjian Zhang</td>
<td>University of Electronic Science and Technology of China, China</td>
</tr>
<tr>
<td>16:55-17:20</td>
<td>Ultrafast terahertz spintronic devices and their applications</td>
<td>Xiaojun Wu</td>
<td>Beihang University, China</td>
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<tr>
<td>18:00-20:00</td>
<td>Dinner Buffet</td>
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**Nov. 3, 2018**

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<tr>
<th>Time</th>
<th>Session</th>
<th>Speaker(s)</th>
<th>Institution(s)</th>
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<tbody>
<tr>
<td>09:00-09:40</td>
<td>Metasurfaces: from structured light to flat optics</td>
<td>Federico Capasso</td>
<td>Harvard University, USA</td>
</tr>
<tr>
<td>09:40-10:05</td>
<td>Digital optical frequency comb and potential applications</td>
<td>Zhaohui Li</td>
<td>Sun Yat-sen University, China</td>
</tr>
<tr>
<td>10:05-10:30</td>
<td>Advances in microresonator-based frequency comb generation</td>
<td>Wenfu Zhang</td>
<td>Xi'an Institute of Optics and Precision Mechanics, Chinese Academy of Sciences, China</td>
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<tr>
<td>10:30-11:00</td>
<td>Coffee/Tea Break</td>
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<tr>
<td>11:00-11:25</td>
<td>Chaos-the third state of laser besides continuous and pulses</td>
<td>Yuncai Wang</td>
<td>Taiyuan University of Technology, China</td>
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<tr>
<td>11:25-11:50</td>
<td>Light-matter interaction within extreme dimensions</td>
<td>Haomin Song</td>
<td>University at Buffalo, The State University of New York, USA</td>
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<tr>
<td>12:00-13:30</td>
<td>Lunch Break</td>
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<tr>
<td>13:30-13:55</td>
<td>Development of polymer optical waveguide for onboard high-speed optical interconnects</td>
<td>Zuyuan He</td>
<td>Shanghai Jiao Tong University, China</td>
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<tr>
<td>Time</td>
<td>Session 1</td>
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<tr>
<td>13:55-14:20</td>
<td>Towards the integration of micro muxer for multi mode-core-wavelength division multiplexing</td>
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<td>14:20-14:45</td>
<td>Channel modelling for underwater wireless optical communications</td>
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<td>14:45-15:10</td>
<td>Nonlinear fiber-optic communications using nonlinear fourier transform: progress and challenges</td>
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<td>15:10-15:40</td>
<td>Coffee/Tea Break</td>
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**Session 9 (Fiber, Nanofiber and Sensing Applications)**
(5th floor, East Lake Ball Room II)

**Presider:** Zuyuan He, Shanghai Jiao Tong University, China

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<tr>
<th>Time</th>
<th>Session 2</th>
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<tbody>
<tr>
<td>15:40-16:05</td>
<td>Optical fiber sensors and applications</td>
</tr>
<tr>
<td>16:05-16:30</td>
<td>Nanofiber optical sensors: challenges and opportunities</td>
</tr>
<tr>
<td>16:30-16:55</td>
<td>Spectral sensing with fiber optical frequency combs</td>
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<tr>
<td>16:55-17:20</td>
<td>Hollow silica capillary based microcavity and fiber sensors</td>
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**Photonics for Energy (PFE)**

Nov. 1, 2018

**Opening Ceremony**
(5th floor, East Lake Ball Room)

**Presider:** Ming Tang, Huazhong University of Science and Technology, China

<table>
<thead>
<tr>
<th>Time</th>
<th>Plenary Session 1</th>
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<tbody>
<tr>
<td>08:30-08:45</td>
<td>Opening Address</td>
</tr>
<tr>
<td>08:45-09:25</td>
<td>Quantum mechanics with patterns of light</td>
</tr>
<tr>
<td>09:25-10:05</td>
<td>Optoelectronic properties of two-dimensional transition metal carbides (MXenes)</td>
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<tr>
<td>10:05-10:35</td>
<td>Group Photo &amp; Coffee/Tea Break</td>
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**Plenary Session 2**
(5th floor, East Lake Ball Room)

**Presider:** Jiang Tang, Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology, China

<table>
<thead>
<tr>
<th>Time</th>
<th>Plenary Session 2</th>
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<tbody>
<tr>
<td>10:35-11:15</td>
<td>Fano photonics for improving lasers, optical signal processing and quantum technology</td>
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<tr>
<td>11:15-11:55</td>
<td>PerovLight: halide perovskite materials for nanophotonics and polaritronics</td>
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<td>12:00-13:30</td>
<td>Lunch Break</td>
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<thead>
<tr>
<th>Time</th>
<th>Session 1 (Next Generation Photovoltaics)</th>
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<tr>
<td>13:30-13:55</td>
<td>Presider: Jingbi You, Institute of Semiconductors, Chinese Academy of Sciences, China</td>
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<td>Luminescent solar concentrators using engineered quantum dots</td>
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<td>Kaifeng Wu, Dalian Institute of Chemical Physics, Chinese Academy of Sciences, China</td>
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<tr>
<td>13:55-14:20</td>
<td>Design strategies of photoactive materials for efficient organic solar cells</td>
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<td>Jianhui Hou, Institute of Chemistry, Chinese Academy of Sciences, China</td>
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<tr>
<td>14:20-14:45</td>
<td>Design rules for minimizing voltage losses in high-efficiency organic solar cells</td>
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<td>Feng Gao, Linköping University, Sweden</td>
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<td>14:45-15:10</td>
<td>Beyond 10% efficient earth-abundant and environmental-friendly pure sulphide kesterite solar cells</td>
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<td>Xiangming Hao, University of New South Wales, Australia</td>
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<td>15:10-15:35</td>
<td>Amorphous silicon as a hole-selective contact to CdTe solar cells</td>
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<td>Zachary Holman, Arizona State University, USA</td>
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<td>15:35-16:00</td>
<td>Solution processed Sb$_2$(S, Se)$_3$ solar cells</td>
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<td>Tao Chen, University of Science and Technology of China, China</td>
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<td>Coffee/Tea Break (5th floor, East Lake Hall Foyer)</td>
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<thead>
<tr>
<th>Time</th>
<th>Session 2 (Next Generation Photovoltaics)</th>
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<tbody>
<tr>
<td>09:00-09:25</td>
<td>Presider: Jianhui Hou, Institute of Chemistry, Chinese Academy of Sciences, China</td>
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<td>Material and interface innovations for efficient and stable perovskite solar cells</td>
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<td>Shihe Yang, Shenzhen Graduate School, Peking University &amp; The Hong Kong University of Science and Technology, China</td>
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<tr>
<td>09:25-09:50</td>
<td>Efficient and stable perovskite optoelectronic devices</td>
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<td>Jingbi You, Institute of Semiconductors, Chinese Academy of Sciences, China</td>
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<tr>
<td>09:50-10:15</td>
<td>High performance and colorful perovskite light-emitting diodes</td>
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<td>Zhanhua Wei, Huaqiao University, China</td>
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<td>Coffee/Tea Break (5th floor, East Lake Hall Foyer)</td>
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<tr>
<th>Time</th>
<th>Session 3 (New Type Energy Conversion Materials and Devices)</th>
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<tr>
<td>10:45-11:10</td>
<td>Presider: Shihe Yang, Shenzhen Graduate School, Peking University &amp; The Hong Kong University of Science and Technology, China</td>
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<td></td>
<td>Oxygen electrochemistry in aprotic Li$_2$O$_2$ batteries</td>
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<td>Zhangquan Peng, Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, China</td>
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<tr>
<td>11:10-11:35</td>
<td>Multifunctional materials for emerging solar technologies</td>
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<td>Fedelrico Roseli, Institut National de la Recherche Scientifique (INRS), Canada</td>
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<td>11:35-12:00</td>
<td>New insights into the design of conjugated polymers for intramolecular singlet fission</td>
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<td>Jianlong Xia, Wuhan University of Technology, China</td>
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<td>Lunch Break (5th floor, West Lake Ball Room)</td>
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<tr>
<th>Time</th>
<th>Session 4 (New Type Energy Conversion Materials and Devices)</th>
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<tbody>
<tr>
<td>13:30-13:55</td>
<td>Presider: Jianhua Hao, The Hong Kong Polytechnic University, China</td>
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<tr>
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<td>Engineering of colloidal semiconducting heteronanostructures for solar energy conversion and</td>
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<td>electroreduction of carbon dioxide</td>
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<td>Shuhong Yu, University of Science and Technology of China, China</td>
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<tr>
<td>13:55-14:20</td>
<td>From carbon-based nanotubes to nanocages for advanced energy conversion and storage</td>
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<td>Zheng Hu, Nanjing University, China</td>
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</table>
### Session 5 (New Type Energy Conversion Materials and Devices)

**Presider:** Zheng Hu, Nanjing University, China

**14:20-14:45**
Direct Z-scheme photocatalyst

**Jiaguo Yu,** Wuhan University of Technology, China

**14:45-15:10**
Nanostructured layered double hydroxide based photocatalysts for solar fuels and high-value chemicals

**Tieerui Zhang,** Technical Institute of Physics and Chemistry, Chinese Academy of Sciences, China

**15:10-15:40**
Coffee/Tea Break
(5th floor, East Lake Hall Foyer)

### Session 6 (Next Generation Photovoltaics)

**Presider:** Yan Yao, University of Houston, USA

**09:00-09:25**
Supramolecular binder designs for high capacity electrode materials

**Jang Wook Choi,** Seoul National University & KAIST, Korea

**09:25-09:50**
Strategies for improving the performance of electrode materials in rechargeable batteries

**Yunhui Huang,** Huazhong University of Science and Technology, China

**09:50-10:15**
One dimensional nanomaterials for emerging energy storage

**Liqiang Mai,** Wuhan University of Technology, China

**10:15-10:45**
Coffee/Tea Break
(5th floor, East Lake Hall Foyer)

### Session 7 (New Type Energy Conversion Materials and Devices)

**Presider:** Jang Wook Choi, Seoul National University & KAIST, Korea

**10:45-11:10**
Positioning organic electrode materials in the battery landscape

**Yan Yao,** University of Houston, USA

**11:10-11:35**
Interfacial solar vapor generations: materials, structures and applications

**Jia Zhu,** Nanjing University, China

**11:35-12:00**
Large scale production and application of nanofibers

**Hui Wu,** Tsinghua University, China

**12:00-13:30**
Lunch Break
(5th floor, West Lake Ball Room)
Metasurfaces: from Structured Light to Flat Optics

Federico Capasso
Harvard University, USA

ABSTRACT
Subwavelength structured surfaces known as metasurfaces are leading to a fundamental reassessment of optical design with the emergence of optical components that circumvent the limitations of standard ones and with entirely new functionalities such as the ability to shape wavefronts in unprecedented ways by means of flat optics. I will present recent advances on structured light: spin-to-total angular momentum converters (J-plates), which create complex helical beams with potential for applications in quantum optics and other fields, followed by resent research on polarization optics, broadband achromatic planar lenses and wavelength-controlled focusing and orbital angular momentum generation.

BIOGRAPHY
Federico Capasso is the Robert Wallace Professor of Applied Physics at Harvard University, which he joined in 2003 after 27 years at Bell Labs where his career advanced from postdoctoral fellow to Vice President for Physical Research. He has made wide ranging contributions to optics, photonics and nanotechnology, including pioneering the bandgap engineering technique, the invention of the quantum cascade laser, seminal research on metasurfaces, including the generalized Snell’s law and high performance metalenses, and fundamental research on the Casimir effect including the first measurement of the Casimir force. His awards include the Balzan Prize, the IEEE Edison Medal, the American Physical Society Arthur Schawlow Prize in Laser Science, the King Faisal Prize, the SPIE Gold Medal, the AAAS Rumford Prize, the IEEE Sarnoff Award, the Materials Research Society Medal, the Franklin Institute Wetherill Medal, the European Physical Society Quantum Electronics Prize, the Rank Prize in Optoelectronics, the Optical Society Wood Prize, the Berthold Leibinger Future Prize, the Julius Springer Prize in Applied Physics, the Institute of Physics Duddell Medal, the Jan Czochralski Award for lifetime achievements in Materials Science, and the Gold Medal of the President of Italy for meritorious achievement in science. He is a member of the National Academy of Sciences, the National Academy of Engineering, a fellow of the American Academy of Arts and Sciences (AAAS) and a foreign member of the Accademia dei Lincei.
**Fano Photonics for Improving Lasers, Optical Signal Processing and Quantum Technology**

**Jesper Mørk**
Technical University of Denmark, Denmark

**ABSTRACT**
In this talk I will describe the use of Fano resonances for improving the properties of integrated opto-electronic devices. A Fano resonance arises by the interaction of a continuum of modes and a discrete mode and can be implemented in photonic crystal membranes by coupling line-defect waveguides and point-defect cavities. The resonance can be exploited to realize self-pulsing and ultrafast Fano lasers, non-reciprocal elements, devices for all-optical signal processing, and pulse carvers. Within quantum technology, the Fano resonance may be exploited to suppress decoherence, e.g. with application in single-photon sources.

**BIOGRAPHY**
Jesper Mørk received the M.Sc., Ph.D., and Dr. Techn. degrees from the Technical University of Denmark (DTU), Lyngby, in 1986, 1988, and 2003, respectively. He became Professor in Nanophotonics at DTU in 2002 and is heading the Nanophotonics Section at DTU Fotonik since 2008. He is the author of more than 250 papers in refereed journals and around 350 contributions to international conferences, including more than 80 invited talks. His current research interests include semiconductor quantum photonics, active photonic crystals, nanolasers and integrated photonics. Jesper Mørk is a Fellow of OSA and serves as Associate Editor of Optica.
Quantum Mechanics with Patterns of Light

Andrew Forbes
University of the Witwatersrand, South Africa

ABSTRACT
In this talk I will provide an overview of recent advances in the field of high-dimensional quantum entanglement and its many applications. I will explore the use of spatial modes of light, patterns of light, as a new basis for encoding information at both the classical and quantum regimes, and show the power this brings for secure and fast communication networks. Finally, I will show how carefully engineered structured light can blur the classical-quantum divide, opening new avenues to explore in the future.

BIOGRAPHY
Andrew received his PhD (1998) from the University of Natal (South Africa), and subsequently spent several years working as an applied laser physicist, first for the South African Atomic Energy Corporation and then later in a private laser company where he was Technical Director. In 2004 he joined the CSIR National Laser Centre where he was Chief Researcher and Research Group Leader of the Mathematical Optics group. In March 2015 Andrew joined the U. Witwatersrand as a Distinguished Professor and has established a new laboratory for Structured Light. Andrew chairs or serves on the committees of several international conferences, OSA and SPIE committees, and serves on the editorial boards of Optics Express and J. Optics. He has published more than 300 scientific papers, several patents, and spends considerable time popularising photonics to the public through television, radio and the media. He is active in promoting photonics in Africa, a founding member of the Photonics Initiative of South Africa, a Fellow of both SPIE and the OSA, and an elected member of the Academy of Science of South Africa. In 2015 Andrew won a national award for his contribution to photonics in Africa. He spends his time having fun with the taxpayers’ money, exploring structured light in lasers, quantum optics and classical optics.
ABSTRACT
Two-dimensional (2D) materials with thicknesses of a few nanometers or less continue to be explored in optical, photonic, and plasmonic applications due to their diverse properties compared to their bulk counterparts. A large family of 2D materials, known as transition metal carbides and/or nitrides (MXenes), have a general formula of $M_{n+1}X_nT_x$, where $M$ represents a transition metal (Ti, Mo, Nb, V, Cr, etc.), $X$ is either carbon and/or nitrogen, and $T_x$ represents surface terminations. The first discovered and most studied MXene, titanium carbide ($\text{Ti}_3\text{C}_2\text{T}_x$), can be produced in large quantities (about 100 g per batch) and high concentrations (up to 100 g/L). In addition, $\text{Ti}_3\text{C}_2\text{T}_x$ has shown high conductivity at high transparency (10,000 S/cm, >97% transparency per-nanometer), an optical plasmonic peak in near-infrared range (750-800 nm), suggesting it suitable as a photothermal therapy agent, transparent conductor, SERS substrate, as a metamaterial, light to heat transforming material, etc.

With the family of materials containing about 30 different synthesized compositions so far (and millions possible), optimization and light-matter characterization of MXene compositions beyond $\text{Ti}_3\text{C}_2\text{T}_x$ remains critical. For example, thinner $M_2\text{XT}_x$ MXene structures, such as $\text{Ti}_2\text{C}_2\text{T}_x$, exhibit an optical absorbance peak shift to the visible range ($\approx$550 nm), demonstrating the optic/electronic differences from similar-but-thicker structures, such as $\text{Ti}_3\text{C}_2\text{T}_x$. This talk will provide insight into the optical properties and potential applications of MXenes as well as spectroscopic information which can be applied to designing next-generation photonic and optoelectronic devices, such as photodetectors, random or femtosecond lasers, electro-chromic devices, photonic diodes, metamaterials, and more.

BIOGRAPHY
Dr. Yury Gogotsi is Distinguished University Professor and Trustee Chair of Materials Science and Engineering at Drexel University. He also holds appointments in the Departments of Chemistry and Mechanical Engineering and Mechanics at Drexel University and serves as Director of the A.J. Drexel Nanotechnology Institute. He served as Associate Dean of the College of Engineering from 2003 to 2007. He received his MS (1984) and PhD (1986) degrees from Kiev Polytechnic and a DSc degree from the Ukrainian Academy of Sciences in 1995. His research group works on various nanostructured carbons and other nanomaterials. He has co-authored 2 books, edited 13 books, 16 book chapters, more than 550 papers in peer-reviewed journals including more than 20 papers in Nature family journals and Science, about 100 papers in conference proceedings, more than 55 patents filed (many licensed to industry), delivered more than 200 invited lectures and seminars. He has been cited over 70,000 times (Google Scholar) and currently has an H-index of 122 (Google Scholar) / 100 (Web of Science).

He has received several awards for his research including the International Nanotechnology Prize (RUSNANO Prize), NANOSMAT Prize, Nano Energy Award (Elsevier), The European Carbon Association Award, S. Somiya Award from the International Union of Materials Research Societies, G.C. Kuczynski Prize from the International Institute for the Science of Sintering, R. Snow Award from the American Ceramic Society (five times), I.N. Frantsevich Prize from the Ukrainian Academy of Science, R&D 100 Award from R&D Magazine (twice) and two NanoTM 50 Awards from NASA Nanotech Briefs. He has been elected a Fellow of the American Association for Advancement of Science (AAAS), International Society of Electrochemistry, Royal Society of Chemistry, Materials Research Society, American Ceramic Society, the NANOSMAT Society, the Electrochemical Society, as well as Academician of the World Academy of Ceramics and Full Member of the International Institute for the Science of Sintering.
PerovLight: Halide Perovskite Materials for Nanophotonics and Polaritonics

Qihua Xiong
Nanyang Technological University, Singapore

ABSTRACT
Halide perovskite materials have attracted considerable attention recently due to their excellent optical gain properties, balanced electron/hole diffusion, large exciton binding energy and facile synthesis. In this talk, I will discuss our recent effort in probing light-matter interactions in halide perovskite materials from weak coupling regime to strong coupling regime at room temperature towards high performance nanophotonics and polaritonics. I will first introduce vapor-phase grown high quality perovskite crystals for optically pumped photonic lasing based on the intrinsic whispering gallery mode cavity. The lasing quality factor can be as high as 5000 in all-inorganic perovskite crystals. Next, I will present our recent experimental realization of room-temperature polariton lasing in all-inorganic perovskite crystals embedded in two distributed Bragg reflectors. The polariton lasing is evidenced by a superlinear power dependence, macroscopic ground state occupation, and increase of the temporal coherence. Such polariton condensate propagation at room temperature can be further manipulated in 1D perovskite microwires. An ultrafast polariton propagation velocity of > 10 µm/ps was observed at room temperature. Finally, in will introduce our recent breakthrough in perovskite LED devices. Our work advocates the considerable promise of perovskite materials for room temperature nanophotonics and ultrafast polaritonics.

BIOGRAPHY
Qihua Xiong received his B.S. degree in physics from Wuhan University in 1997, and then finished three years graduate studies at the Shanghai Institute of Applied Physics, Chinese Academy of Sciences. He went to the United States in 2000 and received Ph.D. degree under the supervision of Prof. Peter C. Eklund from The Pennsylvania State University in 2006. After three years postdoctoral experience in Prof. Charles M. Lieber’s group at Harvard University, he joined Nanyang Technological University as an assistant professor in 2009 and promoted to Nanyang Associate Professor in 2014. He was promoted to full Professor in 2016 recently. He is a Fellow of Singapore National Research Foundation awarded in 2009 and the inaugural NRF Investigatorship Award by Singapore National Research Foundation in 2014. He is the recipient of IPS Nanotechnology Physics Award (2015) and Nanyang Award for Research Excellence of NTU (2014). Dr. Qihua Xiong’s research is motivated by the understanding of the light-matter interactions in quantum matter by steady-state and transient optical spectroscopy. His group is notable for recent breakthrough discovery of laser cooling of semiconductors and sideband Raman cooling of optical phonons, as well as the low-frequency shear and breathing modes, and the correlated fluorescence blinking in 2D layered semiconductor materials and heterostructures. Most recently, Dr. Xiong has ventured into the field of strong light-matter interactions in 2D semiconductors and perovskite crystals, with the recent demonstration of room temperature exciton polariton Bose Einstein condensate and lasing in perovskite crystals. Dr. Xiong has published more than 190 papers, which attracted more than 8300 times citation with an H-index of 54. His outstanding achievement has been recognized by a few prestigious awards, such as IPS Nanotechnology Physics Award (2015), Singapore National Research Foundation Inaugural Investigatorship (NRFI) Award (2014) and Nanyang Award for Research Excellence by NTU (2014). Since April 2018, he was appointed as the Associate Editor for Optics Express, the flagship open-access journal by Optical Society of America. He was elected Fellow of American Physical Society in September 2018.
**Explanation of Session Codes**

The first letter of the code designates the meeting (for instance, O = OEDI, P = PFE, J = Joint). The second element denotes the day of the week (T = Thursday, F = Friday, S = Saturday). The third element indicates the session series in that day (1 would denote the first parallel sessions in that day). Each day begins with the letter A in the fourth element and continues alphabetically through a series of parallel sessions. The lettering then restarts with each new series. The number on the end of the code (separated from the session code with a period) signals the position of the talk within the session (first, second, third, etc.). For example, a presentation coded OT3A.4 indicates that this paper is part of the OEDI meeting (O) and is being presented on Thursday (T) in the third series of sessions (3), and is the first parallel session (A) in that series and the fourth paper (4) presented in that session.
Technical Program

Optoelectronic Devices and Integration (OEDI)

Nov. 1, 2018

East Lake Ball Room | 08:45 - 10:05
JT1A • Joint OEDI/PFE Plenary Session 1
Presider: Jian Wang; Wuhan National Lab for Optoelectronics, Huazhong Univ. of Science and Technology, China

JT1A.1 • 08:45 (Plenary)
Quantum Mechanics with Patterns of Light, Andrew Forbes; †Univ. of Witwatersrand, South Africa. In this talk I will provide an overview of recent advances in the field of high-dimensional quantum entanglement and its many applications. I will explore the use of spatial modes of light, patterns of light, as a new basis for encoding information at both the classical and quantum regimes, and show the power this brings for secure and fast communication networks. Finally, I will show how carefully engineered structured light can blur the classical-quantum divide, opening new avenues to explore in the future.

JT1A.2 • 09:25 (Plenary)
Optoelectronic Properties of Two-Dimensional Transition Metal Carbides (MXenes), Yury Gogotsi; †Drexel Univ., USA. This talk will provide insight into the optical properties and potential applications of MXenes as well as spectroscopic information which can be applied to designing next-generation photonic and optoelectronic devices, such as photodetectors, random or femtosecond lasers, electro-chromic devices, photonic diodes, metamaterials, and more.

East Lake Ball Room | 10:35 - 11:55
JT2A • Joint OEDI/PFE Plenary Session 2
Presider: Jiang Tang; Wuhan National Lab for Optoelectronics, Huazhong Univ. of Science and Technology, China

JT2A.1 • 10:35 (Plenary)
Fano Photonics for Improving Lasers, Optical Signal Processing and Quantum Technology, Jesper Mørk; †Technical University of Denmark, Denmark. In this talk I will describe the use of Fano resonances for improving the properties of integrated opto-electronic devices. A Fano resonance arises by the interaction of a continuum of modes and a discrete mode and can be implemented in photonic crystal membranes by coupling line-defect waveguides and point-defect cavities. The resonance can be exploited to realize self-pulsing and ultrafast Fano lasers, non-reciprocal elements, devices for all-optical signal processing, and pulse carvers. Within quantum technology, the Fano resonance may be exploited to suppress de-coherence, e.g. with application in single-photon sources.

JT2A.2 • 11:15 (Plenary)
PerovLight: Halide Perovskite Materials for Nanophotonics and Polaritonics, Qihua Xiong; †Nanyang Technological Univ., Singapore. Halide perovskite materials have attracted considerable attention recently due to their excellent optical gain properties, balanced electron/hole diffusion, large exciton binding energy and facile synthesis. In this talk, I will discuss our recent effort in probing light-matter interactions in halide perovskite materials from weak coupling regime to strong coupling regime at room temperature towards high performance nanophotonics and polaritonics. I will first introduce vapor-phase grown high quality perovskite crystals for optically pumped photonic lasing based on the intrinsic whispering gallery mode cavity. The lasing quality factor can be as high as 5000 in all-inorganic perovskite crystals. Next, I will present our recent experimental realization of room-temperature polariton lasing in all-inorganic perovskite crystals embedded in two distributed Bragg reflectors. The polariton lasing is evidenced by a superlinear power dependence, macroscopic ground state occupation, and increase of the temporal coherence. Such polariton condensate propagation at room temperature can be further manipulated in 1D perovskite microwires. An ultrafast polariton propagation velocity of > 10 μm/ps was observed at room temperature. Finally, in will introduce our recent breakthrough in perovskite LED devices. Our work advocates the considerable promise of perovskite materials for room temperature nanophotonics and ultrafast polaritonics.
OT3A.1 • 13:30 (Invited)
Energy Efficient High Port Count InP Based Photonic Switches, Richard V. Penty; 'Univ. of Cambridge, UK. TBD

OT3A.2 • 13:55 (Invited)
Photonic Integrated Circuits for Beamforming in 5G Wireless Communications, Giovanni Serafino1, Francesco Amato1, Claudio Porzi1, Bilal Hussain2, Veronica Toccafondo2, Marco Chiesa1, Filippo Scotti2, Antonella Bogoni1, Paolo Ghelfi2; 1Scuola Superiore Sant'Anna, Italy; 2PNT Lab, CNIT, Italy. We demonstrate the high performance of a photonic beam-forming network based on packaged integrated photonic circuits emulating a 4-element phased-array antenna. The experimental results show wide and linear phase shift above 360° and ultrafast reconfiguration.

OT3A.3 • 14:20 (Invited)
Silicon Nitride Based Photonic Devices and PICs, Siyuan Yu; 'Sun Yat-sen Univ., China. TBD

OT3A.4 • 14:45 (Invited)
Nanobeam Cavity Engineering for the Realization of Active Functions In Integrated Si Photonics, Jianhao Zhang1,2, Weiwei Zhang1,2, Elena Duran-Valdeiglesias1, Carlos Alonso-Ramos1, Xavier Le Roux1, Laurent Vivien1, Eric Cassan1; 1Centre de Nanosciences et de Nanotechnologies (C2N), CNRS, Univ. Paris-Sud, Université Paris-Saclay, France; 2Optoelectronics Research Center, Univ. of Southampton, UK. We report the design, fabrication, and characterization of silicon optical cavities for light emission based on the use of carbon nanotube emitters and ultra-fast optical modulation, respectively.

OT3A.5 • 15:10 (Invited)
Novel Integrated Sources for Short-reach Transmission over Dispersive Channel, Christophe Peucheret1, Mohamed Chaibi2,3, Laurent Braemer1, Karim Hassan2, Mathilde Gay1, Didier Erasme4; 1FOTON, Univ. of Rennes, France; 2Centre de Nanosciences et de Nanotechnologies, Paris-Saclay Univ., France; 3CEA, LETI, Univ. Grenoble Alpes, France; 4Telecom ParisTech, Paris-Saclay Univ., France. We review our recent results on Si or III-V integrated devices in novel transmitter architectures for IM-DD dispersion-uncompensated links. Methods relying on chirp engineering or SSB generation are demonstrated for multi- and single-carrier modulation formats.

OT3A.6 • 15:35 (Invited)
Functional Two-dimensional Optoelectronics Devices, Baohua Jia; 'Swinburne Univ. of Technology, Australia. TBD

OT4A • OEDI Poster Session

Nov. 2, 2018

OT4A • Session 2 (Structured Light Beams and Their Applications)
Presider: Andrew Forbes; Univ. of Witwatersrand, South Africa

OF1A.1 • 09:00 (Invited)
Tailoring Optical Focus with Complex Light Fields, Qiwen Zhan1; ‘Univ. of Dayton, USA. TBD

OF1A.2 • 09:25 (Invited)
Parallel Processing OAM Modes through Liquid Crystal Photoalignment, Peng Chen1, Ling-ling Ma1, Wei Hu1, Yanqing Lu2; 1Nanjing Univ., China. Digitalized chiral superstructures is achieved via photoaligning cholesteric liquid crystals (CLCs). The parallel generation, detection and demultiplexing of optical vortices with different OAM modes are demonstrated in a Dammann vortex grating encoded CLC superstructure.

OF1A.3 • 09:50 (Invited)
Active Sensing with Light's Orbital Angular Momentum, Giovanni Milione1; 'NEC Laboratories America Inc, USA. TBD
Generating and Measuring of Structured Beams, Yuanjie Yang\textsuperscript{1,2}; \textsuperscript{1}Univ. of Electronic Science and Technology of China, China; \textsuperscript{2}National Univ. of Singapore, Singapore. In this talk, I will present the generation of novel structured beams, including anomalous optical vortex beams and compound electron vortex beam. Besides, I will discuss how to measure mode indices of partially coherent vortex beams.

Nonlinear Optics for Optical Communication Systems and Advanced Multiplexing Techniques for High-dimensional Quantum Communications, Leif K. Oxenløwe\textsuperscript{1}; \textsuperscript{1}DTU Fotonik, SPOC Centre, Denmark. This talk reviews our recent work in Research Centre SPOC (Silicon-Photonics-for-Optical-Communications) on harnessing optical nonlinearities for ultra-broadband advanced signal processing and for sources of broadband light, and on high-dimensional quantum communications.

Quantum Key Distribution: Scenarios for Application and Co-existence in Optical Metro and IoT Networks, George T. Kanellos\textsuperscript{1}, Foteini Ntavou\textsuperscript{1}, Alex Mavromatis\textsuperscript{1}, Rui Wang\textsuperscript{1}, Emilio Hugues Salas\textsuperscript{1}, Shuangyi Yan\textsuperscript{1}, Reza Nejabati\textsuperscript{1}, Dimitra Simeonidou\textsuperscript{1}; \textsuperscript{1}Univ. of Bristol, UK. We review recent advancements in QKD networking when applying machine learning techniques to optimize transmission of co-existing quantum and classical channels in metro networks, while we explore potential application in IoT to enhance device autonomy.

Integrated Localized Plasmonics and Applications, Giovanni Magno\textsuperscript{1}, Aurore Ecarnot\textsuperscript{1}, Benjamin Leroy\textsuperscript{1}, Robert Mégy\textsuperscript{1}, Philippe Gogol\textsuperscript{1}, Vy Yam\textsuperscript{1}, Beatrice Dagens\textsuperscript{1}; \textsuperscript{1}C2N, CNRS, Université Paris-Sud, Université Paris-Saclay, France. Integrated localized plasmonics provides miniaturized and enhanced functions in photonic circuits. We describe firstly the efficient coupling of photonic and plasmonic modes, and then enabled integrated devices for biophotonic detection, optical nanotweezing or beam steering.

Spectral Energy Redistribution Enables Full-field Broadband Invisibility Cloaking, Jose Azana\textsuperscript{1}, Luis Romero Cortes\textsuperscript{1}, Mohamed Seghilani\textsuperscript{1}, Reza Maram\textsuperscript{1}; \textsuperscript{1}INRS-Energie Matériaux et Télécom, Canada. We review recent research work on the proposal and experimental demonstration of the first invisibility-cloaking principle capable of
preserving the full-field of a broadband illumination wave. This is accomplished by reversible wave frequency-spectrum manipulations.

**OF4A.2 • 16:05 (Invited)**
Progress in Distributed Coherent Imaging Radar Based on Microwave Photonics, Xiaoping Zheng'; 'Tsinghua Univ., China. Under the support of NSFC, China is researching distributed coherent imaging radar based on microwave photonics. This talk will present its current progress with respect to key modules and system experiments.

**OF4A.3 • 16:30 (Invited)**
All-electrical Microwave Characterization of High-speed Optoelectronic Devices with Self-reference and On-chip Capability, Mengke Wang'; Xinhai Zou', Heng Wang', Yali Zhang', Zhiyao Zhang', Shang Jian Zhang', Yong Liu'; 'Univ. of Electron. Sci&Tech of China, China. We demonstrate a damage-free, self-calibrated RF characterization of integrated optoelectronic devices. Fiber-coupling-free operation can be achieved while extracting the frequency responses of wideband modulator and photodetector chips, with no requirement of electro-optical or opto-electrical calibration.

**OF4A.4 • 16:55 (Invited)**
Ultrafast Terahertz Spintronic Devices and Their Applications, Xiaojun Wu'; 'Beihang Univ., China. We employ ultrafast terahertz emission spectroscopy to systematically investigate femtosecond spintronics and highly-efficient, cost-effective, ultrabroadband, functional on-chip terahertz emitters providing further deep understanding of the spin-charge conversion physics and ultrafast terahertz opto-spintronics.

Nov. 3, 2018

**East Lake Ball Room B • 09:00 - 09:40**
OS1A • OEDI Plenary Session 3
Presider: Ming Tang; Huazhong Univ. of Science and Technology, China

**OS1A.1 • 09:00 (Plenary)**
Metasurfaces: from Structured Light to Flat Optics, Federico Capasso'; 'Harvard Univ., USA. Subwavelength structured surfaces known as metasurfaces are leading to a fundamental reassessment of optical design with the emergence of optical components that circumvent the limitations of standard ones and with entirely new functionalities such as the ability to shape wavefronts in unprecedented ways by means of flat optics. I will present recent advances on structured light: spin-to-total angular momentum converters (J-plates), which create complex helical beams with potential for applications in quantum optics and other fields, followed by resent research on polarization optics, broad band achromatic planar lenses and wavelength-controlled focusing and orbital angular momentum generation.

**East Lake Ball Room B • 09:40 - 10:30**
OS2A • Session 6 (Optical Frequency Comb)
Presider: Yuncai Wang; Taiyuan Univ. of Technology, China

**OS2A.1 • 09:40 (Invited)**
Digital Optical Frequency Comb and Potential Applications, Zhaohui Li'; 'Sun Yat-sen Univ., China. TBD

**OS2A.2 • 10:05 (Invited)**
Advances in Microresonator-based Frequency Comb Generation, Wenfu Zhang'; Weiqiang Wang'; 'State Key Laboratory of Transient Optics and Photonics, Xi'an Inst. of Optics and Precision Mechanics, Chinese Academy of Sciences, China. Microresonator-based frequency combs have attracted intense interests recently for their promising applications in optical clocks, low-noise microwave sources, and femtosecond pulse generators. Here we introduce our latest research progresses on Kerr frequency comb techniques and present an outlook of their future developments & applications.

**East Lake Ball Room B • 11:00 - 11:50**
OS3A • Session 7 (Chaos and Light-Matter Interactions)
Presider: Zhaohui Li; Sun Yat-sen Univ., China

**OS3A.1 • 11:00 (Invited)**
Chaos-the Third State of Laser besides Continous and Pulses, Yuncai Wang'; 'Taiyuan Univ. of Technology, China. TBD
OS3A.2 • 11:25 (Invited)
Light-Matter Interaction within Extreme Dimensions, Haomin Song¹, Qiaoqiang Gan¹; ¹State Univ. of New York at Buffalo, USA. In this talk, we present an overview of potential strategies to enhance light-matter interaction within extremely small vertical and lateral dimensions, which paves the way towards new applications.

East Lake Ball Room II | 13:30 - 15:10
OS4A • Session 8 (Optical Interconnects and Communications)
Presider: Perry Ping Shum; Nanyang Technological Univ., Singapore

OS4A.1 • 13:30 (Invited)
Development of Polymer Optical Waveguide for On-board High-Speed Optical Interconnects, Zuyuan He¹, Xiao Xu¹, Lin Ma¹; ¹Shanghai Jiao Tong Univ., China. We demonstrate polymer optical waveguides and devices for on-board high-speed optical interconnects applications. High-speed performances of meter-scale multimode waveguides operating at 850 nm and single-mode waveguides and functional devices operating at 1550 nm are reported.

OS4A.2 • 13:55 (Invited)
Towards the Integration of Micro Muxer for Multi Mode-core-wavelength Division Multiplexing, Filippo Romano-to¹, ¹Univ. of Padova, Italy; ¹LaNN, Italy. Diffractive optics and metalenses represent of the nanostructured micro-optics. An efficient design and nanofabrication technology allowed to integrate micro optics that efficiently can perform injection and sorting of multi-mode beams in single or multi core fibers.

OS4A.3 • 14:20 (Invited)
Channel Modelling for Underwater Wireless Optical Communications, Jing Xu¹; ¹Zhejiang Univ., China. TBD

OS4A.4 • 14:45 (Invited)
Nonlinear Fiber-Optic Communications Using Nonlinear Fourier Transform: Progress and Challenges, Gai Zhou¹, Tao Gui¹, Chao Lu¹, Alan Pak Tao Lau¹, P.K.A. Wai¹; ¹Hong Kong Polytechnic Univ., China. Nonlinear Frequency Division Multiplexing (NFDM) based on Nonlinear Fourier Transform (NFT) continue to be investigated as a new strategy for nonlinear optical communications. In this paper, we review recent developments and discuss key challenges in NFDM research.

East Lake Ball Room II | 15:40 - 17:20
OS5A • Session 9 (Fiber, Nanofiber and Sensing Applications)
Presider: Zuyuan He; Shanghai Jiao Tong Univ., China

OS5A.1 • 15:40 (Invited)
Optical Fiber Sensors and Applications, Perry Ping Shum¹; ¹Nanyang Technological Univ., Singapore. TBD

OS5A.2 • 16:05 (Invited)
Nanofiber Optical Sensors: Challenges and Opportunities, Limin Tong¹; ¹Zhejiang Univ., China. TBD

OS5A.3 • 16:30 (Invited)
Spectral Sensing with Fiber Optical Frequency Combs, Heping Zeng¹, Ming Yan¹, Xuling Shen¹, Qiang Hao²; ¹East China Normal Univ., China; ²Univ. of Shanghai for Science and Technology, China. Adaptive dual-comb spectroscopy for spectroscopically monitoring methane gas and a phase shift fiber Bragg grating over 1200 hours is demonstrated. Ultra-sensitive nonlinear dual-comb coherent Raman spectroscopy with 100-nm-thin nanoporous gold films is also reported.

OS5A.4 • 16:55 (Invited)
Hollow Silica Capillary Based Microcavity and Fiber Sensors, Xiaobei Zhang¹; ¹Shanghai Univ., China. Silica capillary based whispering gallery mode microcavities and functional fiber devices are proposed and demonstrated with Fano resonances caused by the end face, while the temperature, refractive index and strain sensing are also investigated.
Photonics for Energy (PFE)

Nov. 1, 2018

East Lake Ball Room | 08:45 - 10:05
JT1A • Joint OEDI/PFE Plenary Session 1
Presider: Jian Wang; Wuhan National Lab for Optoelectronics, Huazhong Univ. of Science and Technology, China

JT1A.1 • 08:45 (Plenary)
Quantum Mechanics with Patterns of Light, Andrew Forbes; Univ. of Witwatersrand, South Africa. In this talk I will provide an overview of recent advances in the field of high-dimensional quantum entanglement and its many applications. I will explore the use of spatial modes of light, patterns of light, as a new basis for encoding information at both the classical and quantum regimes, and show the power this brings for secure and fast communication networks. Finally, I will show how carefully engineered structured light can blur the classical-quantum divide, opening new avenues to explore in the future.

JT1A.2 • 09:25 (Plenary)
Optoelectronic Properties of Two-Dimensional Transition Metal Carbides (MXenes), Yury Gogotsi; Drexel Univ., USA. This talk will provide insight into the optical properties and potential applications of MXenes as well as spectroscopic information which can be applied to designing next-generation photonic and optoelectronic devices, such as photodetectors, random or femtosecond lasers, electro-chromic devices, photonic diodes, metamaterials, and more.

East Lake Ball Room | 10:35 - 11:55
JT2A • Joint OEDI/PFE Plenary Session 2
Presider: Jiang Tang; Wuhan National Lab for Optoelectronics, Huazhong Univ. of Science and Technology, China

JT2A.1 • 10:35 (Plenary)
Fano Photonics for Improving Lasers, Optical Signal Processing and Quantum Technology, Jesper Mørk; Technical University of Denmark, Denmark. In this talk I will describe the use of Fano resonances for improving the properties of integrated opto-electronic devices. A Fano resonance arises by the interaction of a continuum of modes and a discrete mode and can be implemented in photonic crystal membranes by coupling line-defect waveguides and point-defect cavities. The resonance can be exploited to realize self-pulsing and ultrafast Fano lasers, non-reciprocal elements, devices for all-optical signal processing, and pulse carvers. Within quantum technology, the Fano resonance may be exploited to suppress de-coherence, e.g. with application in single-photon sources.

JT2A.2 • 11:15 (Plenary)
PerovLight: Halide Perovskite Materials for Nanophotonics and Polaritonics, Qihua Xiong; Nanyang Technological Univ., Singapore. Halide perovskite materials have attracted considerable attention recently due to their excellent optical gain properties, balanced electron/hole diffusion, large exciton binding energy and facile synthesis. In this talk, I will discuss our recent effort in probing light-matter interactions in halide perovskite materials from weak coupling regime to strong coupling regime at room temperature towards high performance nanophotonics and polaritonics. I will first introduce vapor-phase grown high quality perovskite crystals for optically pumped photonic lasing based on the intrinsic whispering gallery mode cavity. The lasing quality factor can be as high as 5000 in all-inorganic perovskite crystals. Next, I will present our recent experimental realization of room-temperature polariton lasing in all-inorganic perovskite crystals embedded in two distributed Bragg reflectors. The polariton lasing is evidenced by a superlinear power dependence, macroscopic ground state occupation, and increase of the temporal coherence. Such polariton condensate propagation at room temperature can be further manipulated in 1D perovskite microwires. An ultrafast polariton propagation velocity of > 10 µm/ps was observed at room temperature. Finally, I will introduce our recent breakthrough in perovskite LED devices. Our work advocates the considerable promise of perovskite materials for room temperature nanophotonics and ultrafast polaritonics.

South Lake Ball Room R | 13:30 – 16:00
PT3B • Session 1 (Next Generation Photovoltaics)
Presider: Jingbi You; Inst. of Semiconductors, CAS, China

PT3B.1 • 13:30 (Invited)
Luminescent Solar Concentrators Using Engineered Quantum Dots, Kaifeng Wu; Dalian Inst. of Chemical Physics, China. Luminescent solar concentrators (LSCs) are envisioned to reduce the cost of solar electricity by decreasing the usage of more expensive photovoltaic (PV) materials and diminishing the complexity of multi-cell PV modules. The
LSC concept can also enable unconventional solar-energy conversion devices such as PV windows that can be especially useful in highly populated urban areas. Due to their high emission efficiencies and readily tuneable emission and absorption spectra, colloidal quantum dots (QDs) have emerged as a new type of promising LSC fluorophores. Here we develop a technique for the fabrication of low-scattering-loss, large-area (up to about 90 × 30 cm$^2$) LSCs by doctor-blade deposition of core/shell QDs onto standard window glasses. We also demonstrate that the spectral tunability of the QDs can be leveraged for stacked multi-layered LSCs wherein the enhanced performance is obtained through spectral splitting of incident sunlight, as in multi-junction PVs. We fabricate the first large-area tandem LSC based on two types of nearly reabsorption-free QDs spectrally tuned for optimal solar-spectrum splitting. This prototype device exhibits a high optical quantum efficiency of 6.4% for sunlight illumination and solar-to-electrical power conversion efficiency of 3.1%. The efficiency gains due to tandem architecture over single-layer devices quickly increase with increasing LSC size and can reach more than 100% in >2,500 cm$^2$ window-size structures.

**PT3B.2 • 13:55 (Invited)**

*Design Strategies of Photoactive Materials for Efficient Organic Solar Cells*, Jianhui Hou$^1$; $^1$Inst. of Chemistry, Chinese Academy of Sciences, China. In our work, we explored some general molecular design strategies to enhance the photovoltaic performance of resulting organic materials. At present, we have achieved PCEs around 15% for organic solar cells.

**PT3B.3 • 14:20 (Invited)**

*Design Rules for Minimizing Voltage Losses in High-Efficiency Organic Solar Cells*, Feng Gao$^1$; $^1$Linkoping University, Sweden. Energy losses during charge separation at the donor (D) : acceptor (A) interface and non-radiative recombination are among the main causes of voltage losses in organic solar cells (OSCs). We provide a rationale to explain and further improve the performance of recently demonstrated high-$V_{oc}$ OSCs.

**PT3B.4 • 14:45 (Invited)**

*Beyond 10% Efficient Earth-abundant and Environmental-friendly Pure sulphide Kesterite Solar Cells*, Xiaojing Hao$^1$; $^1$Univ. of New South Wales, Australia. Kesterite is an excellent photovoltaic candidate due to its non-toxicity, high-efficiency and stability, as well as low-cost potential. Reducing the heterojunction recombination, one of major causes limiting voltage output and device performance, and demonstrating beyond 10% efficiency kesterite Cu2ZnSnS4 solar cells will be presented in this work.

**PT3B.5 • 15:10 (Invited)**

*Amorphous Silicon as A Hole-selective Contact to CdTe Solar Cells*, Zachary Holman$^1$; $^1$Arizona State Univ., USA. CdTe solar cells have a larger $V_{oc}$ deficit than all other similarly mature cells, mainly due to their poor back (hole) contact. We introduce a p-type a-Si:H carrier-selective layer, paired with a CdMgTe or Al$_2$O$_3$ passivation layer, that yields $V_{oc}$ > 1.1 V for a monocrystalline CdTe absorber and nearly as promising $V_{oc}$ for a polycrystalline absorber.

**PT3B.6 • 15:35 (Invited)**

*Solution Processed Sb$_2$(S,Se)$_3$ Solar Cells*, Tao Chen$^1$; $^1$Univ. Sci & Technol. China, China. This paper summarizes our recent research in solution processed Sb$_2$(S,Se)$_3$ thin films. With that, power conversion efficiency of ~8% was obtained.

**South Lake Ball Room I | 16:00 - 17:30**

**PT4B • PFE Poster Session**

**Nov. 2, 2018**

**South Lake Ball Room I | 09:00 - 10:15**

**PF1B • Session 2 (Next Generation Photovoltaics)**

*Presider: Jianhui Hou; Chinese Academy of Sciences, China*

**PF1B.1 • 09:00 (Invited)**

*Material and Interface Innovations for Efficient and Stable Perovskite Solar Cells*, Shihui Yang$^1$; $^1$Shenzhen Graduate School, Peking Univ., The Hong Kong Univ. of Science and Technology, China. Hybrid organic/inorganic halide perovskite solar cells have emerged as among the most competitive photovoltaic technologies of the future thanks to their superb and rapidly improving power conversion efficiencies (PCEs). For realistic deployment of the perovskite photovoltaic technology in large scale, however, device stability has become more and more important issue of the
This presentation will update our recent efforts in the material and interface innovations to develop high-efficiency and high-stability perovskite solar cells. Specifically, I shall present the latest results from our laboratory on (1) the relationship between device stability and ion migration of the perovskite layer; 2) the use of NiO and carbon nanostructures for efficient hole extraction and enhanced device stability; and 3) the development of perovskite and interface engineering techniques for improving both efficiency and stability. The prospects of our work on the perovskite solar cells will be discussed.

PF1B.2 • 09:25 (Invited)
Efficient and Stable Perovskite Optoelectronic Devices, Jingbi You1; 'Inst. of Semiconductors, CAS, China. I will talk about how we achieve high performance and stable of perovskite based optoelectronic devices according to perovskite film growth control, interface engineering and surface passivation.

PF1B.3 • 09:50 (Invited)
High Performance Perovskite Light-Emitting Diodes with External Quantum Efficiency Exceeding 20%
Achieved via Compositional Distribution Management, Zhanhua Wei1; 'Huaqiao Univ., China. We have achieved high performance perovskite LED with EQE over 20% via developing a new strategy termed compositional distribution management.

South Lake Ball Room II | 10:45 - 12:00
PF2B • Session 3 (New Type Energy Conversion Materials and Devices)
Presider: Shihe Yang; Peking Univ., The Hong Kong Univ. of Science and Technology, China

PF2B.1 • 10:45 (Invited)
Oxygen Electrochemistry in Aprotic Li-O2 Batteries, Zhangquan Peng1; 'Changchun Inst. of Applied Chemistry, CAS, China. As a promising candidate for next generation energy storage system, Li-air battery has generated a great deal of interest over the past decade. However, realization of the practical Li-air battery is a formidable challenge, and is impeded by some fundamental key issues including the degraded capacity, limited cycle life, notoriously low roundtrip efficiency and limited stability of battery components, which are currently being tackled by numerous approaches. From the viewpoint of fundamental study, a better understanding of the oxygen electrode reactions in aprotic electrolyte will be beneficial to the realization of Li-air batteries with improved electrochemical performances. Here, a mechanistic study of oxygen electrochemistry in aprotic Li+ electrolyte has been conducted using Raman spectroelectrochemistry coupled with density functional theory calculations. By spectroscopic identification of oxygen intermediates under various operating conditions, different routes for Li2O2 formation have been revealed.

PF2B.2 • 11:10 (Invited)
Multifunctional Materials for Emerging Solar Technologies, Federico Rosei1; 'EMT-INRS, Canada. As the age of fossil fuels is coming to an end, there is an urgent need for more efficient and sustainable renewable energy technologies. We aim at optimizing the performance of new solar technologies.

PF2B.3 • 11:35 (Invited)
New Insights into the Design of Conjugated Polymers for Intramolecular Singlet Fission, Jianlong Xia1; 'Wuhan Univ. of Technology, China. Using transient spectroscopy, we demonstrate a new, highly efficient (triplet yield of 160–200%) isoindigo-based donor–acceptor polymer.

South Lake Ball Room II | 13:30 - 15:10
PF3B • Session 4 (New Type Energy Conversion Materials and Devices)
Presider: Jianhua Hao; Hong Kong Polytechnic Univ., China

PF3B.1 • 13:30 (Invited)
Engineering of Colloidal Semiconducting Heteronanostructures for Solar Energy Conversion and Electrocatalysis of Carbon Dioxide, Shuhong Yu1; 'Univ. of Science and Tech Beijing, China. TBD

PF3B.2 • 13:55 (Invited)
From Carbon-based Nanotubes to Nanocages for Advanced Energy Conversion and Storage, Zheng Hu1; 'Nanjing Univ., China. A brief introduction to the progressive advancements in our group from carbon-based nanotubes to nanocages, about their synthesis, performance and mechanism. Special attention will be paid to their applications for advanced energy conversion and storage.
Nanostructured Layered Double Hydroxide Based Photocatalysts for Solar Fuels and High-value Chemicals, Tierui Zhang1; 1Technical Inst. of Physics and Chemistry, CAS, China. In this presentation, some very recent research progress in my group will be reported on the rational design of nanostructured layered double hydroxides (LDHs) based photocatalysts with heterointerface active sites for photoreduction of CO2 or CO into high value-added hydrocarbons with high selectivity, originating from the adjusted reaction pathway of intermediates.

Direct Z-scheme Photocatalyst, Jiaguo Yu1; 1Wuhan Univ. of Technology, China. In 2013, we first proposed the concept of direct Z-scheme photocatalyst to interpret the activity enhancement of TiO2/C3N4 composite photocatalyst for formaldehyde decomposition in air. Direct Z-scheme photocatalyst is similar to Type-II heterojunction photocatalyst. However, the transfer mechanism of charge carriers is completely different from that of Type II heterojunction. As for TiO2/C3N4 direct Z-scheme photocatalyst, a built-in electric field is formed between TiO2 and C3N4 and their band edge bending occurs, and the redox power of the photocatalysts can be maximized. The useless electrons from TiO2 and useless holes from C3N4 are recombined under internal electric field and Coulomb force. Contrarily, the useful holes in TiO2 valence band (VB) and useful electrons in C3N4 conduction band (CB) will be preserved. Since 2013, many related results have been reported.

Applications of ZnO Nanostructures in the Fields of Energy and Sensing, Yue Zhang1; 1Beijing Univ. of Technology, China. Energy and sensing technology are two important scientific research fields, their development have substantially reduced human’s dependence and consumption on energy and resources, and promoted the progress of human society. Especially with the rapid development of Internet of Things (IoT), the requirements of low energy consumption, high performance and long service life are proposed for sensors in the perceptual layer of IoT, thus the development of zero energy consumption self-powered sensor system has become an important research direction. ZnO, as a unique piezoelectric semiconductor coupling material, its nanostructure is an important candidate for the construction of high performance micro-nano functional devices, which has broad application prospects in the field of energy and sensing system. This report presents a systematic review of ZnO nanostructure applications in the field of energy and sensing system, summarizes a series of research results in structure design, performance optimization, system integration and application of ZnO nanostructure functional devices. For applications in the energy field, we mainly introduce the research results of ZnO nanostructure in building energy conversion devices such as light emitting diodes, solar cells, and photochemical water splitting systems. For applications in sensing system field, the investigations of ZnO nanostructure in building sensor devices such as self-powered photodetector, biosensor, and stress / strain sensor will be mainly introduced.

Ferroelectric and Piezoelectric Effects on Light-emissions and Their Applications in Energy Harvesting and Sensors, Jianhua Hao1; 1Hong Kong Polytechnic Univ., China. Here, I will introduce the tuning strategies of optical process based on ferroelectric and piezoelectric effects. In my group, we have made progress on modulating the light-emissions for energy harvesting light sources and sensors.

Mapping Strain/Pressure with ZnO Nanowire Arrays by Piezotronic and Piezo-Phototronic Effect, Caofeng Peng1; 1Beijing Inst. of Nanoenergy and Nanosystems, Chinese Academy of Sciences, China. Emulation of human senses via electronic means has long been a grand challenge in research of artificial intelligence as well as prosthetics, and is of pivotal importance for developing intelligently accessible and natural interfaces between human/environment and machine. In this talk, we present a novel design of ZnO nanowire arrays, which can be used to directly record the strain distribution by piezotronic and piezo-phototronic effect. First, we demonstrated how the piezo-phototronic effect can be effectively utilized to enhance the emission intensity of an n-ZnO/p-GaN NW LED. The emission light intensity and injection current at a fixed applied voltage has been enhanced by a factor of 17 and 4 after applying a 0.083% compressive strain, respectively. Then, we extend the single NW device to NW LEDs array, for pressure/force sensor arrays for mapping strain with a resolution as high as 2.7 μm. Such sensors are capable of recording spatial profiles of pressure distribution, and the tactile pixel area density of our device array is 6250000/cm2, which is much higher than the number of tactile sensors in recent reports (~ 6-27/cm2) and mechanoreceptors embedded in the human fingertip skins (~ 240/cm2). Lastly, the piezo-phototronic effect was achieved on Si wafer based on a n-ZnO nanofilm/p-Si micropillar heterostruc-
ture (ZSH) LEDs array. By applying a strain onto the top of the ZSH LEDs, the light emission intensity of ZSH LEDs array was enhanced as well by 120% under -0.05% compressive strains. A pressure map can be created by reading out in parallel the change of the electroluminescent intensities from all the pixels in the near future. This research not only introduce a novel approach to fabricate Si-based light-emitting components with high performances, but also may be a great step toward digital imaging of mechanical signals using optical means, having potential applications in artificial skin, touch pad technology, personalized signatures, bio-imaging and optical MEMS, and even and smart skin.

PF4B.4 • 16:55 (Invited)
Intelligently Building Low Dimensional Inorganic Semiconductor Materials for Flexible Piezoelectric Sensor, Weiqing Yang1; 1Southeast Jiaotong Univ., China. TBD

Nov. 3, 2018

South Lake Ball Room B • 09:00 - 10:15
PS1B • Session 6 (Next Generation Photovoltaics)
Presider: Yan Yao; Univ. of Houston, USA

PS1B.1 • 09:00 (Invited)
Supramolecular Chemistries for Polymeric Binders of High Capacity Lithium-Ion Batteries, Jang Wook Choi1, Sunghun Choi1, Yunshik Cho1, Jaemin Kim1; 1Seoul National Univ., Korea. Binders are critical for stable operation of high capacity silicon anodes. I will present new concepts to maintain the silicon electrodes for prolonged cycles. They are mostly represented by supramolecular interactions that engage self-healing interactions.

PS1B.2 • 09:25 (Invited)
Strategies for Improving the Performance of Electrode Materials in Rechargeable Batteries, Yunhui Huang1; 1Huazhong Univ of Science & Technology, China. TBD

PS1B.3 • 09:50 (Invited)
One Dimensional Nanomaterials for Emerging Energy Storage, Liqiang Mai1; 1Wuhan Univ. of Technology, China. One-dimensional nanomaterials can offer many advantages to achieve high electrochemical performance. We designed the single nanowire electrochemical device to understand reason of capacity fading. We have developed a facile strategy for the oriented formation of CNTs. We also identified the superior sodium storage performance of CaV4O9 nanowires.

South Lake Ball Room B • 10:45 - 12:00
PS2B • Session 7 (New Type Energy Conversion Materials and Devices)
Presider: Jang Wook Choi; Seoul National Univ., Korea

PS2B.1 • 10:45 (Invited)
Positioning Organic electrode Materials in the Battery Landscape, Yan Yao1; 1Univ. of Houston, USA. The quest for cheaper, safer, higher-density, and more resource-abundant energy storage has driven significant battery innovations. Existing lithium-ion batteries (LIBs) use cobalt-heavy active electrode materials that are predicted to see supply constraints going down the path and can be too expensive to meet long-term capital cost goals for grid storage and electric vehicle systems ($100 kWh^-1). On the other hand, the safety issues with commercial LIBs mainly originate from the flammable and volatile nonaqueous electrolytes. Safer systems with solid-state and aqueous electrolytes are being actively developed, but today’s active electrode materials are not optimized for these electrolytes in terms of chemical and electrochemical compatibility. In the course of overcoming the above limitations, considerable innovations are taking place in the development of active materials featuring sufficiently high energy, Earth-abundant elements, and unique electrolyte-dictated properties. A notable family of such materials is organic battery electrode materials (OBEMs), which comprise electrochemically redox-active organic compounds including molecules, polymers, and organometallics where the organic components contribute to redox activity. In this talk, I will compare head-to-head OBEMs with dominating/competing inorganic materials through analyses of charge storage mechanism, working potential, specific capacity, resource availability, and more. We show that from high-energy lithium batteries to aqueous and all-solid-state batteries, OBEMs can be designed to be sufficiently capable and offer unique feature sets unmatched by other materials. Future research directions toward practical application of OBEMs are discussed.

PS2B.2 • 11:10 (Invited)
Interfacial Solar Steam Generations: Materials, Structures and Applications, Jia Zhu1; 1Nanjing Univ., China. Water scarcity is one of the most pressing global challenges. Nanomaterials with carefully tailored properties can
be used to manipulate the flow of phonons, electrons and photons, to enable unconventional solution to addressing this issue. In this talk, I will present our recent progress in solar steam generation for water treatment.

**PS2B.3 • 11:35 (Invited)**
Large Scale Production and Application of Nanofibers, Hui Wu¹; °Tsinghua Univ., China. TBD

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**Poster Session**

**Nov. 1, 2018**

**East Lake Hall Foyer | 16:00 - 17:30**
**OT4A • OEDI Poster Session**

**OT4A.1**
A New Evaluation Method for the Detecting Ability of a Telescope, Bitao Tan¹; °Space Engineering Univ., China. Based on the Strehl ratio, combined with the detecting SNR and the system MTF, a new evaluating method for the detecting ability of the telescope is proposed.

**OT4A.2**
Micro-machining for TE/TM mode Phase Matching In High-birefringence Planar Waveguide And Implementation in Continuously-tunable Fractional Hilbert Transform, Zijing Zhang²,¹, Chaotan Sima²,¹, Bolan Liu²,¹, Binchen Cai¹, Yuan Gao¹, Matthew Posner¹, Lewis Carpenter³, James C. Gates³, Peter G. Smith³, Deming Liu¹; °School of Optical and Electronic Information, Huazhong Univ of Science and Technology, China; †Center for Science and Technology Research Inst., Univ. of Southampton, UK. A continuously-tunable fractional Hilbert transformer based on a high-birefringence planar silica waveguide is demonstrated. The fractional transform order is precisely controlled, with TE/TM phase-matching via a precision dicing technique.

**OT4A.3**
A Derivative System Calibration Method for Fiber-optic Interferometer Fringe Projection Profilometry, Tingting Huang¹, Fajie Duan¹, Xiao Fu¹, Jiajia Jiang¹; °Tianjin Univ., China. Considering fringes generated by a fiber-optic fringe projector as isometric lines will cause notable errors in the phase-height conversion step for 3D shape measurement. We proved that by replacing the constant spatial frequency with partial derivative of the interference phase this error can be substantially reduced by an order of magnitude.

**OT4A.4**
Optical Coupler Using Diffractive Optical Elements, Weidong Qu², Gao Qiong¹, Xue Jianguo¹; °Luoyang Electronic Equipment Test Center, China. Diffractive optical element (DOE) is employed as optical coupler used in optical interconnection. A modified GS algorithm using smaller sampling size with high intensity uniformity and well suppressed side lobes is proposed to design DOE.

**OT4A.5**
Multiband Bandpass Microwave Photonic Filter with Selectable Passbands, Mengmeng Peng¹, Fei Wang², Lun Shi², Jingxin Huang³, Wen Kang²; °Inst. of Science, Chongqing Univ. of Technology, China; †Inst. of Electrical and Electronic Engineering, Chongqing Univ. of Technology, China. A multiband bandpass microwave photonic filter based on a broadband optical source and a cascaded optical comb filter is proposed and experimentally demonstrated, whose passband number can be flexibly selected with a maximum of four.

**OT4A.6**
Harnessing Topology of Non-Hermitian Photonics, Han Zhao¹, Liang Feng²; °Department of Electrical and Systems Engineering, Univ. of Pennsylvania, USA; †Department of Materials Science and Engineering, Univ. of Pennsylvania, USA. The emergence of quantum-inspired topological photonics and non-Hermitian optics propels contemporary explorations of synthetic photonic materials. We exploit their synergy on an active platform where non-Hermiticity enhances the topological state via the charge-conjugation symmetry.

**OT4A.7**
Generation of Lattice of Dark C-points, Sushanta K. Pal¹; °Physics, Indian Inst. of Technology Delhi, India. Six azimuthally polarized plane beams are used to realize the lattice of dark C-points. Occurrence of these dark C-points is due to the overlapping of singularities. The destructive interference of two right (left) handed bright C points can result in a left (right) handed dark C point.
OT4A.8
Ultra-narrow-band and Highly Efficient Near-infrared Absorption of A Graphene-based Tamm Plasmon Polari-
tons Structure, Kun Zhou¹, Lu Lu², Jinlin Song³, Qiang Cheng¹; ¹State Key Laboratory of Coal Combustion, Huazhong
Univ. of Science and Technology, China. An ultra-narrow-band and highly efficient absorption can be realized by TPP
critical coupling with guide resonances based on the GTPP structure. The absorption of graphene and GTPP
structure can reach 75% and 99%, respectively.

OT4A.9
Tunable THz Beat Signal Generation from an Single-Section Chirped Multiple InAs/InP Quantum Dot Mode-
Locked Laser, Yunyun Ding¹,², Feng Gao¹,², Huihong Yuan¹,², Zunren Lv¹,², Tao Yang¹,²; ¹Inst. of Semiconductors,CAS,
China; ²College of Materials Sciences and Opto-Electronic Technology, Univ. of Chinese Academy of Sciences,
China. We report on tunable terahertz beat signal generation based on a single-section chirped multiple InAs/InP quan-
tum dot (QD) mode-locked laser (MLL). Beat signals from 1 to 2.9 THz are demonstrated between the two extracted
modes.

OT4A.10
Experimental Demonstration of Single-wavelength, Single-polarization 102-Gb/s DMT Signal Transmission
over 105-km Single-span SMF in an IM-DD System, Shaohua An¹, Qingming Zhu¹, Jingchi Li¹, Hongxin Pang¹, Yikai
Su¹; ¹Shanghai Jiao Tong Univ., China. We experimentally demonstrate a 102-Gb/s DMT signal transmission over
105-km single-span SMF in an IM-DD system. This work reports the highest single-wavelength and single-polarization
net data rate × single span length product in IM-DD systems.

OT4A.11
Dynamic Tunable Phase-Shift Mechanism Based on Plasmon Induced Transparency in Two Ring Resona-
tors Side-Coupled with a Waveguide System, Boyun Wang¹, Shuyuan Xiao², Chen Xu³, Liangbin Xiong¹, Hao Lv¹,
Jun Du¹, Zhili Lu¹, Dongwei Wang¹, Liu Wang¹, Feiyu Yao¹, Qingdong Zeng¹, Huaying Yu¹; ¹Hubei Engineering Univ.,
China; ²Huazhong Univ. of Science and Technology, Wuhan National Laboratory for Optoelectronics, China; ³New
Mexico State Univ., Department of Physics, USA. We theoretically and numerically investigate a dynamic tunable
phase-shift mechanism based on plasmon induced transparency (PIT) in two ring resonators side coupled with a
metal-dielectric-metal plasmonic waveguide system through the optical Kerr effect modulation method.

OT4A.12
Ultra-fast Laser Induced Morphology and Structure of Ge²Sb²Te⁵ Phase Change Materials, J.C. Guo¹, Fu-
rong Liu¹, W.N. Han¹; ¹Inst. of Laser Engineering, Beijing Univ. of Technology, China. The phase-change behavior
of amorphous Ge²Sb²Te⁵ (GST) films induced by picosecond pulsed laser was investigated. By controlling the film
thickness, laser fluence and substrate type, GST exhibited obviously different morphology and structure.

OT4A.13
Phase Modulation with Broadband Metasurfaces for Controlling Light Propagation, Jing Ma¹, Ci Song¹, Jicheng
Wang¹; ¹Jiangnan Univ., China. Based on the complementary square split ring antennas structure and phase modulation
principles, ultra-thin phase plate has been proposed to achieve the terahertz (THz) optical multi-dimensional and multi-
focal metalens.

OT4A.14
Plasmonic Metamaterial Ultra-broadband Absorber from Visible to Near-infrared, Libin Wu¹, Qing Shen¹, Sit-
ing Yang¹, Lei Lei¹, Ping Xu¹; ¹College of Electronic Science and Technology, Shenzhen Univ., China. The proposed
metamaterial broadband absorber enables a nearly perfect absorption with an average absorbance of 95% spanning
from visible to near-infrared, achieving a 90% absorption bandwidth over 928 nm.

OT4A.15
Ultra-fast Optical Switch based on VO₂ Subwavelength Metasurface, Yong Li¹, Xiongyuanyue Xiao¹, Qilu He¹,
Ying Huang¹; ¹Wuhan National Laboratory for Optoelectronics, Huazhong Univ. of Science & Technology, China. A
vanadium dioxide planar focusing lens with a high switching efficiency was proposed. The performance of the micro-
lenses was evaluated by FDTD simulations and has shown that the optical switching rate is 88.7%.

OT4A.16
Optical Multiple-image Encryption Using Compressive Sensing based on Orthogonal Encoding, Dongming
Huo¹, Yi Shaoliang¹, Xing Bai¹, Jinchao Wang¹, Jing Wang¹, Xin Zhou¹; ¹Sichuan Univ., China. Each image is sampled
by compressed sensing, then the sampled data is synthesized into a synthesized cipher image by orthogonal
encoding. Finally, the synthetic cipher image is re-encrypted by DRPE to form a cipher image.
OT4A.17
On the Capacity of the Coherent MIMO Optical Wireless Communication System in Gamma-Gamma Turbulence, Yiming Li1, Chao Gao1, Haodong Liang1, Maoke Miao1, Xiaofeng Li1; 1UESTC, China. This paper considered the capacity of the coherent Multiple-Input Multiple-Output optical wireless communication systems in Gamma-Gamma turbulence. Numerical results of the ergodic capacity and the distribution of instantaneous capacity were discussed respectively.

OT4A.18
Multi-photon Interference between A Two-Photon State and A Weak Coherent State, Yun Zhang1, Lirong Wang2, Masayoshi Watanabe3; 1The Univ. of Electro-Communications, Japan; 2Shanxi Univ., China. Multi-photon interference between a two-photon state and a weak coherent state is presented. The results show that the interference depended on not only the relative phase but also the amplitude between the two interference fields.

OT4A.19
Towards Next-generation Laser Illumination: A White Random Laser, Yu-Ming Liao1, Wei-Cheng Liao1, Shu-Wei Chang1, Cheng-Fu Hou2, Chia-Tse Tai1, Yun-Tzu Hsu1, Min-Hsuan Wu1, Rou-Jun Chou1, Tai-Yuan Lin2, Yang-Fang Chen1; 1Physics, National Taiwan Univ., Taiwan; 2Inst. of Optoelectronic Sciences, National Taiwan Ocean Univ., Taiwan. The hope of next-generation illuminants goes on random laser. Random laser is naturally endowed with two key superiorities, namely, laser-level intensity and broad-angular emissions, which are mutually exclusive in thermal light sources, light-emitting-diodes, and lasers.

OT4A.20
Doping Order Effects on the Er3+/Yb3+ Doped Silica Glasses Contained ITO Nanocrystals, Ping Chen1, Shaodong Hou1, Lvyun Yang1, Jinyan Li1, Haqing Li1, Jingang Peng1, Nengli Dai1; Huazhong Univ. of Science and Technology, China. Abstract: Er3+/Yb3+ ions and indium tin oxide nanocrystals (ITO NCS) codoped silica glasses were synthesized via the impregnation and decomposition method. The effects of doping order on the crystallization and optical properties have been studied.

OT4A.21
Low-crosstalk Multifunctional Metasurface Component for Visible Region, Shaowu Wang1, Jianjun Lai1,2, Changhong Chen1, Junqiang Sun1; 1Wuhan National Lab. for Optoelectronics, China; 2State Key Laboratory of Applied Optics, Changchun Inst. of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences, China. We present a method to construct multifunctional optical components to achieve low-crosstalk multiwavelength control. The component with focusing and deflecting functions for the electromagnetic wave at two wavelengths is presented to verify our method.

OT4A.22
Coupled Photonic Crystal Cavity-waveguide Structures Incorporating Site-controlled Semiconductor Quantum Dots, Yi Yu1,2, Antoine M. Delgoffe2, Bruno Rigal2, Alexey Lyasota2, Benjamin Dwir2, Alok Rudra2, Eli Kapon2; 1Danmarks Teknishe Universitet, Denmark; 2École Polytechnique Fédérale de Lausanne, Switzerland. We investigate a photonic crystal structure where distant, identical nanocavities incorporating site-controlled semiconductor quantum dots are coupled with a bus waveguide. We show that the cavities can be resonant frequency matched even upon fabrication imperfection.

OT4A.23
Enhancing the Quality and Stability of Reconstructed Section of Optical Scanning Holography System, Jinx Li1; Sichuan Univ., China. In this paper, an algorithm, image fusion based on wavelet transform combined with connected component labeling, is proposed to eliminate the defocus noise and to improve the quality and stability of reconstructed images.

OT4A.24
Polarization Changes in Partially Coherent Optical Transmission over Atmospheric Turbulence, Ziyang Li1, Zhan Gao1, Anhong Dang1; Peking Univ., China. We study the polarization changes of partially coherent beams under Tatarskii spectrum model and the effect of turbulent inner scaler on the polarization property. Simulation results show strong correlations between polarization states and inner scaler.

OT4A.25
An Artificial Neural Networks based Method for Intelligent Design of Plasmonic Waveguide System, Jinzhan Zhou1, Qi Liu1, Tian Zhang1, Jian Dai1, Yue Zhou1, Kun Xu1; State Key Laboratory of Information Photon, Beijing Univ. of Posts and Telecommunication, China. We propose a novel method using artificial neural networks to achieve high
OT4A.26
Tunable Plasmonic Resonance Absorption Characteristics And Good Angle Polarization Insensitive based on Periodic H-shaped Graphene Arrays, Chunlian Cen1, Zao Yi1, Zigang Zhou1, Yongjian Tang1, Shuyuan Xiao2; 1Southwest Univ. of Science and Technology, China; 2Huaizhong Univ. of Science and Technology, China. We use the FDTD simulation to investigate the tunable plasmonic resonance absorption characteristics and good angle polarization insensitivity based on periodic H-shaped graphene arrays in the infrared regime.

OT4A.27
Fast Thermal Regeneration of Weak Fiber Bragg gratings, Fufa Shang1, Jianguang Tang1; 1Wuhan Univ. of Technology, China. Regenerated fiber Bragg gratings (FBGs) could be fast obtained and suitable for temperature of about 1000°C by using high germanium-doped and germanium-boron-doped photosensitive fiber from seed FBGs with reflectivity of 2%-2.5% and hydrogen loading.

OT4A.28
Tunable Mid-infrared Optical Vortex Parametric Oscillator, Sujian Niu1, Palidan Aierken1, Yusufu Taximaiti1; Xinjiang Normal Univ., China. We propose a novel experimental scheme to generate high energy, broad tunable optical vortices across a mid-infrared wavelength range. The wavelength tunability of the vortex output is realized, with the tuning range of 2.8-4.8 μm.

OT4A.29
The Synthesis And The Properties of the ZnS Nanoparticles, Rui Jiang1, Zhimou Xu1, Xiaopeng Qu1; Huazhong Univ. of Science & Technology, China. Extremely diffused ZnS nanoparticles have been successfully compounded by using a simple wet-chemical approach and it was characterized by powder XRD, UV-vis absorption spectra, and Fluorescence spectra.

OT4A.30
Ultra-compact Dual-mode Waveguide Bend based on an Inverse Design, Hucheng Xie1, Yingjie Liu1, Zhipeng Chu1, Ke Xu1, Jiangbing Du1, Qinghai Song1; Harbin Inst. of Technology (Shenzhen), China; State Key Laboratory of Advanced Optical Communication Systems and Networks, Shanghai Jiao Tong Univ., China. A dual-mode micro-bend with radius of 3.6 μm is inversely designed based on digital metastructure. The losses of the two modes are less than 1 dB for both TE0 and TE1 and the inter-mode crosstalk is below -25 dB.

OT4A.31
The Impact of Width of Metal Arm on U-shape SRRs Toroidal Dipole Terahertz Metamaterials, Shuang Wang1, Jianyu Zhu1, Xiaoli Zhao1, Song Wang1, Gati Nashon1, Quan Li1; TUTE, China. We proposed and fabricated a planar terahertz metamaterials composed of four U-shape split rings resonators. Simulation and experimental results show that a toroidal dipolar resonance and quality factor was determined by the width of metal bar.

OT4A.32
Giant Third-harmonic Generation in A Strong Fano-resonant Silicon Metasurface, Chaobiao Zhou1,2, Cheng Gong2, Guoxun Ban1, Shiyu Li1, Yi Wang1, Xiaojun Liu2, Mingsheng Zhan1,2; Wuhan National Laboratory for Optoelectronics, China; Wuhan Inst. of Physics and Mathematics, Chinese Academy of Sciences, China. We experimentally achieve a strong Fano-resonant asymmetric silicon metasurface, and observe the third-harmonic generation with enhancement factor of ~600 with respect to unstructured bulk silicon.

OT4A.33
Plasmonic Absorption Enhancement in Elliptical Graphene Arrays, Jiajia Chen1, Hang Lin1, Jing Huang1, Cuiping Liang1, Xifang Chen1, Zigang Zhou1, Zao Yi1, Shuyuan Xiao2; Southwest Univ. of Science and Technology, China; Huaizhong Univ. of Science and Technology, China. We study the tunable plasmonic resonance absorption characteristics and good angle polarization insensitivity based on periodic elliptical graphene arrays in the mid infrared.

OT4A.34
System Study of In-fiber Laser-induced Dynamical Instability for Microstructure Fabrication, Jing Zhang1, Lei Wei1; EEE, Nanyang Technological Univ., Singapore. We systematically studied the in-fiber laser-induced dynamical instability phenomenon and demonstrated an in-fiber microstructure fabrication method with high precision and controllability based on this phenomenon.
OT4A.35
Research on Adaptive Demodulation Algorithm for Dual-comb Absolute Ranging Signals, Shuyi Li; 1National Key Laboratory of Science and Technology on Metrology & Calibration, Changcheng Inst. of Metrology & Measurement, Aviation Industry Corporation of China, China. To solve the problem of dual-comb ranging signals interfered by irregular peaks, an adaptive demodulation algorithm based on high-speed digital acquisition system is proposed. The standard deviation of ranging results is ~10μm.

OT4A.36
Completeness and Divergence-free Behavior of the Quasi-normal Modes Using Causality Principle, Boris Gral-ak1, Mohamed Abdelrahman1; 1CNRS - Institut fresnel, France. Taking into consideration the frequency dispersion and the causality principle, the solution of Maxwell’s equations is expressed using modal expansion and complex analysis which ensure the expansion completeness and prevents from any divergence of the field profile.

OT4A.37
Wavelength Selection Filtering Characteristics in Coupled Resonators, Jing Zhang1, Yi Hong1, Zhenghua Li1, Lijiao Guo2, Zhiqing Feng2; 1Dalian Nationalities Univ., China. We investigate filtering effects based on coupled microring resonator. The ultra-narrow band filtering properties are decided by strong absorption due to strong dispersion at anti-resonant frequency. Multi-wavelength filtering properties at the same time could be realized by means of adjusting the length ratio of coupled microring resonator.

OT4A.38
A Novel Optical Wavelength Division Multiplexing Device in Silicon-based Nanometer Photonic Integrated circuits, Tong Song1, Yungang Du1, jie su1; 1Inner Mongolia Univ. of Technology, China. Based on Mach-Zehnder interferometer and grating, the proposed OADM structure has low insertion loss, strong flexibility, low crosstalk and easy to cascaded with waveguide-based mode multiplexing devices to achieve multimode on-chip optical multiplexing.

OT4A.39
Active Control of Radiative-Radiative-Coupling in Terahertz Metamaterials, GuanQi Wang1; 1Xi’an Univ. of Technology, China. The radiative-radiative-coupling in terahertz metamaterials can be actively modulated by manipulating the graphene conductivity via shifting its Fermi energy. This work provides theoretical references in potential applications for graphene metamaterials.

OT4A.40
First-order and Second-order Whispering-gallery Modes Switching in Connected Coupled Microdisk Lasers, TaoJie Zhou1, Zhaoyu Zhang1; 1The Chinese Univ. of Hong Kong, Shenzhen, China. Selectively control lasing spectra of a photonic molecular laser formed with connected coupled microdisks was demonstrated. Both first- and second-order whispering-gallery modes were selectively optically pumped by aligning pumping spots.

OT4A.41
Coherent Perfect Absorption in Ultra-thin Films, Jingian Zou1, Feng Xiong1, Zhihong Zhu1, Xiaodong Yuan1, Jianfa Zhang1, Shiqiao Qin1; 1National Univ. of Defense Technolog, China. We theoretically and numerically study visible to near-infrared coherent perfect absorption of ultra-thin materials with a thickness of one-atom to about ten nanometers such as graphene and meta-films.

OT4A.42
FPGA-based Multichannel Photon Correlator for Dynamic Light Scattering, Akhmarzhan Islambek1; 1Huazhong Univ. of Science and Techn, China. By using dynamic light scattering technique we calculate auto correlation function of the detected intensity. Executed in real time multiple-tau correlator implemented by Field Programmable Gate Array (FPGA) makes possible to get accurate results with small sampling time (10ns) and large scale dynamic range (107).

OT4A.43
All-fiber Multi-channel Tunable Loss Filter, Xiaokang Lian1, Wei Han1, Qiang Wu1, Gerald Farrell1, Yuliya Semeno-va1; 1Dublin Inst. of Technology, Ireland; 2Department of Mathematics, Physics and Electrical Engineering, Northumbria Univ., UK. An all-fiber optical filter based on a polymer coated fiber heterostructure (SMF28-small-core-SMF28 fiber) has been demonstrated experimentally. The heterostructure’s transmission spectrum exhibits periodic pass/stop bands, whose loss can be tuned over 50 dB by bending.

OT4A.44
Strong and Anisotropic Plasmonic Resonances in Nanostructured Graphene-Black Phosphorus Bilayer, Qilin Hong1, Feng Xiong1, Wei Xu1, Zhihong Zhu1, Jianfa Zhang1, Shiqiao Qin1; 1College of Advanced Interdisciplinary Studies, National Univ. of Defense Technology, China. We study the optical properties of nanostructured graphene-black
phosphorus bilayer. It exhibits both strong and highly anisotropic plasmonic responses. This type of hybrid architecture opens a new door for high performance plasmonic devices.

OT4A.45
Two Broadband Absorption in Mid-wave Infrared and Long-wave Infrared, Yulian Li¹; ¹Shanghai Maritime Univ., China. A metamaterial absorber with two broadband high absorption simultaneously in the MWIR and LWIR was proposed. The absorption higher than 0.8 is from 3.5 µm to 4.8 µm in MWIR, and from 7 to 14.3 µm in LWIR. This may greatly promote the practical application of absorbers in double-color IR imaging, detecting, infrared stealth and thermal emitting.

OT4A.46
RF Self-interference Cancellation for Full-duplex Communication by Using Photonic Technique, Xiuyou Han¹, Xinxin Su¹, Shuo Wang¹, Hanqiao Wang¹, Yuchen Shao¹, Chao Wang¹, Mingshan Zhao¹; ¹Dalian Univ. of Technology, China; ²Univ. of Kent, UK. A photonic approach based on phase modulation and optical sideband filtering for cancelling the RF self-interference in full-duplex communication system is proposed and experimentally demonstrated with good cancellation performance.

OT4A.47
Purcell Effect in GaN-Based Photonic-Crystal Light-Emitting Diode, Huamao Huang¹, Wei Shi¹, Cheng Huang¹, Haocheng Wu¹, Hong Wang¹; ¹Engineering Research Center for Optoelectronics of Guangdong Province, School of Physics and Optoelectronics, South China Univ. of Technology, China. Photonic-crystal structure was fabricated in GaN-based light-emitting diode and the recombination lifetime was estimated by time-resolved photoluminescence measurement. It is demonstrated that Purcell effect can reduce the recombination lifetime and enhance the carrier-limited modulation bandwidth.

OT4A.48
Lattice of Dark C-points, Sushanta K. Pal¹, P Senthilkumaran¹; ¹Indian Inst. of Technology, Delhi, India. Six vector beam interference is used to realize lattice of dark C-points. Occurrence of these dark C-points is due to the overlapping of singularities. It is shown that destructive interference of two right (left) handed bright C points can result in a left (right) handed dark C point.

OT4A.49
Simulation on Direct Sampling of Wideband Millimeter-wave Signals Using Optoelectronic Switch, Zhenjie Song¹, Chun Yang¹, Shaopeng Jia¹; ¹Southeast Univ., China. A direct sampling of wideband millimeter-wave signals scheme using an optoelectronic switch is reported. The influence of the microwave insertion loss of the optoelectronic switch on the Effective Number of Bits (ENOB) was studied.

OT4A.50
Laser Irradiation System for n-GaAs Stealth Dicing, Hyun-Woo Song¹, Jongdeog Kim¹; ¹Electronics and Telecom Research Inst, Korea (the Republic of). We report a laser reaction system providing back-side damages from front-side irradiation for n++ GaAs stealth dicing. High energy laser pulses of 10 µJ at 1030 nm were used in a low pressure reaction chamber.

OT4A.51
Research On Temperature Compensation Technology For Planar Flow Cytometric Microimaging System, Hongfeng Qu¹,²; ¹Changchun Univ. of Science and Technology, China; ²Dirui Industrial CO.,LTD, China. A new image compensation method is proposed for temperature compensation in the planar flow cytometric microimaging system. The imaging clarity of the system meets the imaging quality requirements from -10 to 40 degrees Celsius.

OT4A.52
Multi-beam Laser Heterodyne Measurement with Ultra-precision for the Young Modulus based on Oscillating Mirror Sinusoidal Modulation, Li Yanchao¹, Shengqian Wang¹, Yong Liu¹; ¹Heilongjiang Univ., China. This paper proposes a novel method of multi-beam laser heterodyne measurement for the Young modulus.

OT4A.53
Influence of Idler Light on the Shot-to-shot Energy Stability of Third Harmonic Generation, Liu Jun¹,², Ouyang Xiaoping¹,², Wei Kun², Peng Bodong², Tan Xinjian², Xu Qing², Sun Bin²; ¹National Univ. of Defense Tech., China; ²Northwest Inst. of Nuclear Technology, China. We report on the shot to shot energy stability of second and third harmonic generation by using sub-100-fs idler laser pulses. A maximum energy conversion as high as 25% from the fundamental to the third harmonic generation (THG) is achieved. The THG stability varies from 0.135%~2.94% by changing the idler pulse energy in the experiments.
OT4A.54
Long-wave Infrared Quantum Cascade Detectors, Kun Li1,2, Fei Ren1,2, Shu-Man Liu1,2, Ning Zhuo1, Jun-Qi Liu1,2, Shen-Qiang Zhai1, Jin-Chuan Zhang1,2, Li-Jun Wang1,2, Feng-Qi Liu1,2, Zhan-Guo Wang1,2, 1Inst. of Semiconductors, Chinese Academy of Sciences, China; 2College of Materials Science and Opto-Electronic Technology, Univ. of Chinese Academy of Sciences, China. We inserted a miniband in long wavelength diagonal-transition quantum cascade detectors as the final state. High responsivities of 91.2 mAW/10-µm and 81.4 mAW/9-µm at 80 K have been achieved by this new bound-to-miniband design.

OT4A.55
Vortex Lattices with Transverse-Mode-Locking States Switching in Large-Aperture-Pumped Yb:CALGO Laser, Yijie Shen1, Zhensong Wan1, Xing Fu2, Mali Gong1, 1Tsinghua Univ., China. We demonstrate the vortex lattices (VL) generated from a large-aperture-pumped Yb:CALGO laser with distinct transverse-mode-locking state switching effects. A new theoretical model with closed-form expressions is proposed for interpreting the exotic VL evolutions.

OT4A.56
Ultrahigh Numerical Aperture Metalenses and Imaging at Visible Wavelengths, Haowen Liang1, Qiaoling Lin1, Qian Sun1, Juntao Li1, 1Sun Yat-sen Univ., China. We present a c-Si based metalens with effectively low loss and high-NA in air and immersion oil. The metalens can be front-immersed in high index liquids, presenting much higher NA and diffraction-limited focusing.

OT4A.57
Research on Humidity Detection Technology based on Tunable Diode Laser Absorption Spectroscopy, Keke Zhang1,2, Shizhe Chen1,2, Qiang Zhao1,2, Bo Wang1,2, Shixuan Liu1,2, Xingkui Yan1,2, 1Inst. of Oceanographic Instrumentation, Qilu Univ. of Technology (Shandong Academy of Sciences), China; 2Shandong Provincial Key Laboratory of Marine Monitoring Instrument and Equipment Technology, China. The sinusoidal root mean square(RMS) normalization method based on tunable diode laser absorption spectroscopy is proposed to measure humidity, and the ratio of the second harmonic peak-peak value and the sinusoidal RMS value is used as the system output, which can effectively eliminate the influence such as windows pollution.

OT4A.58
Vanadium Oxide Infrared Detector with TiN/SiO2/VOx Absorption Structure, Bin Wang1, Ning Li1, Jianjun Lai2, Wanfeng Xie1, Zhao Yao1, Suzhen Wang1, Shuying Wang1, Jie Su1, Enlin Cai1, Zongtao Chi1, 1Qingdao Univ., China; 2Huazhong Univ. of Science and Technology, China. TiN/SiO2/VOx, novel absorption structure for long-wave infrared wavelengths is proposed and simulated. This new structure shows as average high absorbance as more than 81% between 8µm and 14µm wavelengths.

OT4A.59
Short-Wavelength Metasurface Hologram, Kun Huang1, 1Univ. of Science and Technology of China, China. High-performance metasurface holograms at ultra-violet, visible and near-infrared wavelengths will be introduced by using various platforms such as nanosieves and metasurfaces made of metals and low-loss dielectrics, followed by the discussions about their potential applications.

OT4A.60
Single-shot Phase-shifting in-line Digital Holography with Photon Sieve Array, Simin Zhang1,2, Junyong Zhang1, Wei Fan1, Shenlei Zhou1, Jianqiang Zhu1, 1Shanghai Inst. of Optics and Fine Me, China; 2Univ. of Chinese Academy of Sciences, China. In this paper, a kind of single-shot phase-shifting interferometry based on photon sieve array is proposed and verified. Due to amplitude-only diffractive lenses, it will have great potential in X-ray holography or biochemical microscopy.

OT4A.61
A Practical Design Method for Off-axis Optical Antenna, Shengqiam Mao1, Ping Jiang1, Junyi Wang1, Huajun Yang1, 1School of Physics, Univ. of Electronic Science and Technology of China, China. A practical design method is demonstrated to construct off-axis optical antenna when direction of incident rays, shape of secondary mirror and transmission direction of emergent light are given. A non-conicoid antenna is designed by this method.

OT4A.62
A Stable Multi-wavelength Fiber Linear Cavity Laser Based on Cascaded Four-wave Mixing in Highly Non-linear Fiber, Fei Wang1, Mengmeng Peng2, Lun Shi1, Wen Kang1, Jingxin Huang1, 1Inst. of Electrical and Electronic Engineering, Chongqing Univ. of Technology, China; 2Inst. of Science, Chongqing Univ. of Technology, China. A stable multi-wavelength fiber linear cavity laser based on cascaded four-wave mixing in highly nonlinear fiber is proposed and experimentally demonstrated, 15 stable laser lines within 3-dB flatness is achieved at pump power of 550 mW.
OT4A.63
Effects of the Bandwidth-limited Orbital Angular Momentum Mode of Bessel Gaussian Beams in Weak-to-strong Non-Kolmogorov Turbulence, Ying Xu1, Lin Yu1, Yun Zhu1, YiXin Zhang1; 1Jiangnan Univ., China. We investigate the weak-to-strong non-Kolmogorov turbulence effects on the propagation of the bandwidth-limited orbital angular momentum mode carried by Bessel Gaussian beams.

OT4A.64
Evaluation of Nonlinear Propagation in 64-GBaud Coherent Optical Communication System, Yuekun Pei1, Yanchao Jiang1; 1Dalian Univ., China. We investigate the EGN model on evaluating the accumulated nonlinear propagation along a 3000-km link in a WDM system with fifteen 64-GBaud PM-64QAM channels, which shows very good accuracy with/without nonlinear phase-noise mitigation.

OT4A.65
In-situ Nanodynamics in Metal Oxides, He Zheng1, Jianbo Wang1; 1Wuhan Univ., China. Applying the advanced transmission electron microscopy and theoretical calculations, the atomistic and electronic structures in metal oxides are investigated in detail.

OT4A.66
Electro-optically Tunable Photonic Devices in Micro and Nanoscale Lithium Niobate, Huihui Lu1,2; 1Jinan Univ., China; 2Femto-ST Institute, CNRS, France. We report the micro and nanostructured lithium niobate (MNLN) as a robust and versatile platform for realizing the enhanced electro-optic effect and photonic devices, especially for the tunable photonic devices. The design is to combine high electro-optic coefficient and MNLN to boost and enhance the light-mater interaction.

OT4A.67
Wavelength-tunable Mode-locking Fiber Laser based on SMS Fiber Structure, Yunxiu Ma1,2, Xiushan Zhu2, Luyun Yang1, Yongguang Liu1, Yingbo Chu1, Haiqing Li1, Jinggang Peng1, Nengli Dai1, Jinyan Li1, Nasser Peyghambarian1; 1Wuhan National Laboratory for Optoelectronics, Huazhong Univ. of Science and Technology, China; 2College of Optical Sciences, Univ. of Arizona, USA. Wavelength-tunable mode-locking fiber laser using nonlinear Kerr effect of a single-mode-multimode-single-mode (SMS) fiber structure as saturable absorber was demonstrated. With polarization controller (PC), the 18.86MHz repetition rate mode-locking laser can be tuned to 42 nm.

OT4A.68
Impact of Spectral Filtering on Energy Distributions along Fast and Slow Axes in Mode-locked Fiber Lasers, Zengrun Wen1, Baole Lu2, Xinyuan Qi2, Kaile Wang1, Haowei Chen1, Chun Wang1, Jintao Bai1,2; 1Inst. of Photonics and Photon-technology, Northwest Univ., China; 2School of physics, Northwest Univ., China. A spectral filter was induced in polarization-insensitive mode-locked fiber laser. We find that narrowing the filter bandwidth can change the polarization state of output pulse which leads to appearance of vector solitons.

OT4A.69
Highly Sensitive Surface Plasmon Resonance based Chemical Sensor Using Double Cladded Fiber, Vinod K. Singh1, Akhillesh K. Pathak1; 1Indian Institute of Technology, Dhanbad, India. In present work, a surface plasmon resonance (SPR) based liquid infiltrated D-shape fiber sensor is designed for refractive index (RI) sensing and maximum sensitivity of 10000 nm/RIU is obtained.

OT4A.70
Multilayer Thin-film Metasurface Thermal Emitter for Radiation Cooling in High-temperature Devices, Wenbing Liu1, Shuang Li1, Jing Luan1, Wei Wu1, Chunfa Ba1, Yonghong Ling1, Lirong Huang1; 1Huazhong Univ. of Science and Technology, China. We propose a thermal emitter for the purpose of cooling in a high-temperature optoelectronic device. It consists of ITO/AIN/TiO2/Si3N4/SiO2 thin-film metasurface and the calculation results show the necessity of improving emissivity for radiation cooling.

OT4A.71
Thin Film RGB Magnetooptical Spatial Light Modulators, Soheila Kharratian1, Mehmet C. Onbasli1, Hakan Urey1; 1Koc Univ., Turkey. We demonstrated using finite-difference time-domain simulations that Bi:YIG films are promising for MOSLM device in the visible band. Next, we designed a high-contrast and large figure-of-merit MOSLM capable of full modulation, using RGB magnetophotonic crystals.

OT4A.72
638 nm Wide Stripe Semiconductor Laser with 2W Output Power, Martin H. HU1,3, Wei Xia2, Zhen Zhu2, Weimin Wang1, Wenbin Liu1, James Ho1,3, Hangyu Peng4; 1Shenzhen Raybow Optoelectronics Inc., China; 2Shandong
OT4A.73
Effects of the Laser And Coupling Lens Parameters on the Fiber Coupling Efficiency of A Partially Coherent Beam in the Link of the Marine-atmosphere Turbulence to Fiber, Beibei Hu1, Ying Xu1, YiXin Zhang2, Jiangnan Univ., China. We propose a model of the fiber coupling efficiency for a partially coherent laser beam propagating through the anisotropy and non-Kolmogorov turbulence of the marine-atmosphere.

OT4A.74
Laser-induced Ag Nanoparticles Deposition on Optical Fiber Probes for TERS, Xiaoxia Meng1, Zhanfeng Bi1, Guangyi Shang1, Beihang Univ., China. Attaching Ag nanoparticles on the optical fiber probe can improve detection sensitivity and spatial resolution in TERS. Base on laser-induced reaction, discreteley multiple Ag nanoparticles with controllable size and distribution are reproducibly fabricated in this work.

OT4A.75
An Optical System for Measuring the Pitch of a Fiber Array, Yuheng Zhang1, Siyang Liu1, Linsheng Zhong1, Shenzhan Zhang1, Xiaofang Wu1, Zhusun Wan1, 2, Huazhong Univ. of Science & Tech., China; Shenzhen Research Inst. of Huazhong Univ. of Science and Technology, China; Shanghai Huijue Communication Equipment Co. Ltd., China. An optical system for measuring the pitch of a fiber array is presented. With a sampled grating introduced, a reference scale is obtained for precise measurement. The operation of the system is Simulated.

OT4A.76
Applicability of the Caustic Method in Designing Various Accelerating Beams, Zhibin Liu1, Shuqing Lin1, Yuanhui Wen1, Yujie Chen1, Yanfeng Zhang1, Suyuan Yu1, 2, Sun Yat-sen Univ., China; Univ. of Bristol, UK. We discuss the applicability of the caustic method in designing accelerating beams, revealing its limitation and criteria for designing various accelerating beams, to clarify some confusion about the scope of application of the caustic method.

OT4A.77
Polarization Property of Gaussian-Schell Model Beam Propagating through Hypersonic Atmosphere Turbulence, Ziyang Li1, Zixuan Xu1, Anhong Dang1, 2, Peking Univ., China. We investigate the polarization property of Gaussian-Schell model beams propagating in hypersonic turbulence. Results show that we can increase the wavelength to weaken the effects of hypersonic turbulence and improve the performance of communication systems.

OT4A.78
Scintillation Index of Partially Coherent Flat-topped Beams Propagating on A Slant Path through Atmospheric Turbulence, Xiaoxin Zhou1, XiuHua Yuan1, Huazhong Univ. of Science & Technology, China. We study the scintillation index for partially coherent flat-topped beams propagating through atmospheric turbulence along a slant path. The effects of beam order, zenith angle and the coherence length on scintillation index are studied.

OT4A.79
Mode-locking Fiber Laser Using SMS Fiber Structure as a Saturable Absorber, Yunxiu Ma1, 2, XiuShan Zhu2, Luyun Yang1, Yongguang Liu1, Yingbo Chu1, Shi Wei1, Jinyan Li1, Haiqing Li1, Nengli Dai1, Jinggang Peng1, Nasser Peyghambarian2, Wuhan National Laboratory for Optoelectronics, HuaZhong Univ. of Science and Technology, China; College of Optical Sciences, Univ. of Arizona, USA; College of Precision Instrument and Optoelectronics Engineering, Tianjin Univ., China. Mode-locking fiber laser by nonlinear Kerr effect of a single-mode-multimode-single-mode (SMS) fiber structure as saturable absorber was demonstrated. A 13.01 MHz mode-locking Tm3+ -doped fiber laser operating at 1941.37 nm was obtained.

PT4B.1
Porous Carbon Fluidtronics for Electricity Generation and Self-powered Sensing, Jia Li1, Jun Zhou1, Wuhan National Laboratory for Optoelectronics, China. This work demonstrates that a piece of porous carbon film with water droplets as «fuel» can function as a cost-effective electricity generator for harvesting energy from natural resources and a self-powered droplet sensor.
PT4B.2
Enhancement of Photovoltaic Performance of Perovskite Solar Cells by Introducing ZnO Quantum Dots in the Mesoporous TiO₂ Layer, Mei Wang¹, Qiuyun Fu²; ¹HUST, China. ZnO quantum dots were loaded into the mesoporous TiO₂ layer via a simple spin-coating method. As a result, the power conversion efficiency of perovskite solar cells was remarkably improved from 14.54% to 17.2%.

PT4B.3
Free-standing and Flexible Heterojunction Net as Highly Efficient and Easily Recycled Photocatalyst, Jing Li¹, Zhen Su¹, Dandan Zhang¹, Heping Li¹; ¹Huazhong Univ. of Science & Technology, China. Free-standing and flexible Cu/Cu₂O/CuO heterojunction net is fabricated, which can serve as a highly efficient and easily recycled visible-light photocatalyst. The mixing narrow band gaps of the Cu/Cu₂O/CuO heterojunction ensure its wide absorption band in visible region and effective electron/hole separation.

PT4B.4
Radiation Cooling Effect of Different Materials, Zhongquan Yu¹, Zhenfei Zhang¹, Dengwu Liu¹, Zhilin Xia¹; ¹Wuhan Univ. of Technology, China. Passive radiation cooling utilizes the atmospheric transparency window for releasing heat and minimizes absorption of incoming atmospheric radiation. In this paper, we compared the radiation cooling effects of several kinds of radiation particles during 24 hours, and obtained the best radiation cooling effect of SiO₂ during the daytime.

PT4B.5
Growth of High Quality AlN Films on Sputtered AlN/Sapphire with Temperature and V/III Ratio Gradient AlN Interlayer, Jiahui Hu¹, Jun Zhang¹, Bo Tan¹, Yi Zhang¹, Jiangnan Dai¹, Hanling Long¹, Shuai Wang¹, Changqing Chen¹; ¹Huazhong Univ of Science & Technology, China. In this work, we proposed a novel method to grow high quality AlN films on sputtered AlN/sapphire substrates with a temperature and V/III ratio gradient AlN interlayer at the initial growth stage.

PT4B.6
Effects of Preheating Treatments on Performance of Perovskite Solar Cells, Shuanghong Wu¹, Haoyu Wang¹, Junjie Yang¹, Zhonguan Li¹, Xiangru Wang¹; ¹Univ of Electronic Science & Tech China, China. The performance of perovskite solar cells were studied by different preheating treatments. The results show that the power conversion efficiency is enhanced to 15.89% by simultaneously preheating the substrate and the perovskite precursor solution.

PT4B.7
First-principles study of LO-TO Splitting and Raman Scattering of GaP Crystal under High Pressure, Wen J. Wu¹; ¹Department of applied physics, Xi’an Univ. of Technology, China. Based on generalized gradient approximation and OTFG norm conserving of the density functional theory, Bonn effective charge, optical frequency dielectric constant, LO-TO splitting and Raman scattering spectra under high pressure were studied.

PT4B.8
Scattering of A₁(TO₁) Phonon-Polaritons in Terahertz Range for LiNbO₃, Xu Y. Wei¹; ¹Department of applied physics, Xi’an Univ. of technology, China. In this work, we investigate the scattering threshold range of transverse optical phonon-polaritons in terahertz range for the A₁(TO₁) phonon vibrational mode in LiNbO₃ and its the issue of scattering angle.

PT4B.9
The Investigations of Electronic Structure and Optical Properties of ZnTe, Kang N. Deng¹; ¹Xi’an Univ. of technology, China. In this work, the electronic structure and optical properties of ZnTe with increasing pressure are investigated based on the first principles, which can be applied to the terahertz spectroscopy.

PT4B.10
Photonic Synapses Based on Organic Molecular Photoswitches for Neuromorphic Computing, Ming-Qiang Zhu¹; ¹Wuhan National Lab for Optoelectronics, China. All-optical synapses based on organic molecular photoswitches have been introduced in which the synaptic weight can be arbitrarily formulated simply by varying the number, amplitude and duration of optical pulses, enabling the variable synaptic plasticity mimicking the analog nature of biological synapses.

PT4B.11
Effect of Raman Scattering Based on the Number of Graphene Layers, Jia M. Cao¹; ¹Xi’an Univ. of Technology, China. In this paper, the relationship between G-bands of graphene Raman spectra and the number of G-bands and graphene layers in different layers is studied.
PT4B.13
Versatile Conjugated Polymers for Energy Conversion and Storage, Zhang Feng-Ling; 1Physics, Chemistry and Biology, Linköping Univ., Sweden. Electricity powers our society. Energy conversion and storage is a big challenge. We will present our effort on organic solar cells, integrated photo-capacitor and hybrid super-capacitors for energy storage and low power consumption electronics.

PT4B.14
Efficiency Improvement of Sb2Se3 Cell Via Grain Boundary Inversion, Chao Chen1, Jiang Tang1; 1WNLO, China. Sb2Se3 is a promising material. Recombination losses limited the device efficiency. Grain boundary inversion is used to alleviate recombination. Finally, we obtained 7.04% efficiency, which is the highest efficiency of RTE-based Sb2Se3.

PT4B.15
Lead Halide Perovskites for Direct X-ray Detection, Shrestha Shrestha1,2; 1FAU Erlangen Nuremberg, Germany; 2Erlangen Graduate School of Advanced Optical Technologies, Germany. We present a technique to fabricate thick lead halide perovskite wafers by sintering perovskite micro-particles. X-ray detectors based on these wafers show X-ray conversion efficiencies comparable to the commercial state-of-the-art CdTe based devices.

PT4B.16
Angle-Selection with Sub-Unity Index in Solar Cells, Ken Xingze Wang1; 1Huazhong Univ of Science and Technology, China. Angle selection/restriction modifies the emission cone of and can improve the limiting efficiency and reduce the material cost for solar cells. This can be realized using a material with an effective sub-unity refractive index.

PT4B.17
Efficient and Stable Antimony Sulfide Planar Thin Film Solar Cells, Haisheng Song1, Shengjie Yuan1, Hui Deng1, Ishaq Muhammad1, Jiang Tang1; 1Huazhong Univ. of Science and Technology, China. Antimony sulfide has attracted great research interest very recently as a promising absorber material for thin film photovoltaics because of their unique optical and electrical properties, binary compound and easy synthesis. The above novelties promise high potential application in wide-bandgap solar cells.

PT4B.18
Highly Efficient Lead Selenide (PbSe) Colloidal Quantum Dot Solar Cells via Solution Phase-transfer Exchange, Jungang He1, Jiang Tang1; 1Huazhong Univ. of Science and Technology, China. In this study, cation exchange and solution phase exchange are used for PbSe CQDs ink synthesis. By using the ink for intrinsic layer preparation, a champion solar cell achieved power conversion efficiency of 9.88%.

PT4B.19
Super-flexible Sb2Se3 Solar Cell, Kang h. Li1; 1Huazhong Univ. of Science and Techn, China. We constructed the first flexible Sb2Se3 solar cells with power conversion efficiency (PCE) of 5.95% on ultra-thin polyimide (PI) substrate. The flexible devices also demonstrate superb stability against bending deformation.

PT4B.20
High-performance Single CdS Nanobelt Ultraviolet Photodetector, Meng Peng1,2, Bo Tan1, Zhen Wang2, Jiangnan Dai1, Weida Hu2, Feng Wu1, Changqing Chen1; 1Huazhong Univ. of Science and Technology, Wuhan National Laboratory for Optoelectronics, China; 2Chinese Academy of Sciences, National Laboratory for Infrared Physics, Shanghai Inst. of Technical Physics, China. In this work, we have synthesized single crystal CdS nanobelts(NBs) on SiO2/Si substrate via the chemical vapor deposition method. High-performance single CdS NB UV photodetector was fabricated by using electron beam lithography.

PT4B.21
Improved Optical Anisotropy of Nonpolar a-plane AlGaN Epilayers by Introducing SiN interlayers, Zhang Yi1, Jun Zhang1, Hanling Long1, Jiangnan Dai1, Changqing Chen1; 1Huazhong Univ of Science and Technology, China. In this work, we proposed a novel method to improve the optical anisotropy of nonpolar a-plane Al0.1Ga0.9N by manipulating the anisotropic in-plane strains through SiNx interlayers engineering.

PT4B.22
Rear Interface Modification for Efficient Cu(In,Ga)Se2 Solar Cells Processed with Metallic Precursors and Low-cost Se Vapor, Jianjun Li1; 1Jinan Univ., China. In this work, we suppressed the formation of detrimental ordered vacancy compounds (OVC) phase at the CIGS/Mo rear interface, which is induced by the drastic out-diffusion of Cu during the selenization. By controlling the out-diffusion of Cu, we significantly improved the device efficiency.
Graphene Oxide Wrapped CH$_3$NH$_3$PbBr$_3$ Perovskite Quantum Dots Hybrid for Photoelectrochemical CO$_2$ Reduction in Organic Solvents, Qinglong Wang$^1$, Yan Shen$^1$; $^1$Huazhong Univ. of Science and Tech, China. GO wrapped MAPbBr$_3$ QDs were designed for the photoelectrochemical CO$_2$ reduction. GO functions as an electron transfer medium to separate photoinduced electrons and holes, and protects MAPbBr$_3$ QDs from erosion by solvent as well.

The Design of Ultra-thin FeMoO$_4$ Nanosheet Structure for Enhancing the Electrochemical Performance, Ming-gyue Chen$^1$, Qian Huang$^1$, Yiwen Tang$^1$; $^1$Central China Normal Univ., China. In this work, we demonstrate that developing an ultra-thin FeMoO$_4$ nanosheet array changing the hydrothermal reaction, and exhibit potential electrochemical performance.

Single-mode, High-NA Pedestal Fiber, Shuang Liu$^{2,1}$, Weiwei Ke$^1$, Huan Zhan$^1$, Kun Peng$^1$, Jianjun Wang$^1$, Feng Jing$^1$, Aoxiang Lin$^1$; $^1$Laser Fusion Research Center, China; $^2$Nanjing Univ. of Science and Technology, China; $^3$Inst. of Applied Physics and Computational Mathematics, China. We designed and numerically calculated a pedestal fiber featuring high NA core of ~0.16. With core NA of 0.054 compared to pedestal layers and bending diameter of 46.8mm, the fiber can maintain single-mode laser operation.

A Band-Gap-Graded (Ag$_{x}$Cu$_{1-x}$)$_2$ZnSn(S,Se)$_4$ Solar Cell with 7.9% Efficiency, Junjie Fu Fu$^1$; $^1$Key Lab For Special Functional Materials, China. We prepare the ACZTSSe thin film solar cells by replacing Cu in CZTSSe with Ag, the density of I–II antisite defects and absorber band tailing is predicted to drop.

Spin-Coating Zn-Sn-O Buffer Layer for Thin Films Solar Cells, Zhenghua Su$^1$, Zhigao Xie$^1$, Guangxing Liang$^1$, Ping Fan$^1$; $^1$Shenzhen Univ., China. Zn-Sn-O (ZTO) films are deposited by spin-coating method and the bandgap varies from 3.30 to 3.44eV with the Zn/Sn ratio from 11 to 1.2 and transmittance beyond 90%, which are suitable for the buffer layer in thin film solar cells.

Lead-free Inorganic Perovskite CsBi$_3$I$_{10}$ Thin Film Solar Cell, Xingye Chen$^1$, Huabin Lan$^1$, Guangxing Liang$^1$, Ping Fan$^1$; $^1$Shenzhen Univ., China. In this work, lead-free inorganic perovskite CsBi$_3$I$_{10}$ thin film can be obtained by one-step spin-coating method and the solar cell shows an interesting efficiency of 0.32%.

12.5% Flexible Nonfullerene Solar Cells based on the Protonation Tuning of Polymer Interfacial Layer, Sixing Xiong$^1$, Lin Hu$^1$, Lu Hu$^1$, Yinhua Zhou$^1$; $^1$Huazhong Univ. of Science and Tech, China. We report the chemical interaction between the nonfullerene active layer and the polymer surface modifier polyethyleneimine ethoxylated (PEIE) is inhibited by protonating the PEIE with polar processing solvent or acids treatment. With the low temperature processed interface, we achieved 12.5% flexible organic solar cells.
Key to Authors and Presiders

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