Nanophotonics, Nanoelectronics and Nanosensor

24 - 27 May 2013 Wuhan National Laboratory for Optoelectronics (WNLO), Wuhan, China

Nanophotonics, Nanoelectronics and Nanosensor (N3) is part of International Photonics and OptoElectronics Meetings (POEM), launched by Wuhan National Laboratory for Optoelectronics (WNLO). POEM is a large-scale multi-disciplinary international conference in the field of photonics and optoelectronics. It aims to focus on the key techniques of scientific frontier and industry in the field of optoelectronics, grip trend in the future as well as give full play to the industrial advantage of Wuhan - Optics Valley of China.

Extensive research on nanotechnology has unveiled many interesting and promising applications in photonics, electronics and sensors. The aim of this N3 conference will provide a forum for information exchange among international academics, researchers, and students who are working in the areas of nanophotonics, nanoelectronics and nanosensors. This conference will provide a platform for discussing and promoting new developments, concepts and practices, and identifying future research needs so that nanotechnology can be brought closer to its immense potential and industrial applications.

1. Micro-Nanofabrication and characterization Technologies

1.1 Simulation, Modeling and Design of Functional Nanostructure/nanomaterial
1.2 Nano-imprint and Nano-print
1.3 Laser Micro/nano Fabrication
1.4 Electron beam (E-beam) Micro/nano Fabrication
1.5 Ion beam Micro/nano Fabrication
1.6 Biomimetic technique
1.7 In-situ structural and properties (optical, electrical, mechanical, etc) characterization
1.8 Micro-Nanomaterials under extreme conditions (high magnetic field, high vacuum, high intensity laser, etc)

2. Nanophotonics and energy sciences
2.1 Plasmonics, Metamaterials and THz nano-photonics
2.2 Biophotonics
2.3 Nanomaterials for imaging and diagnostics and therapy
2.4 Biosafety and Biocompatibility
2.5 Biosensors
2.6 Biointerfacing
2.7 Nanomaterials and technologies for energy harvesting and storage
2.8 Nanogeneraotrs and self-powered nanodevices and nanosystems

3. Nanosensors and flexible electronics
3.1 Electronic and optoelectronic devices: nanowaveguides, nanolasers, etc
3.2 Sensors and actuators: chemical, optical, microfluidic, etc
3.3 Flexible electronics
3.4 Pizeotronics and piezo-phototronics
3.5 Smart MEMS/NEMS

Committee Chairs

Zhong-Lin Wang, Georgia Institute of Technology, United States, **Chair**
Zhen-li Huang, Wuhan National Lab for Optoelectronics, China, **Local Organizing Chair**
Jun Zhou, Wuhan National Lab for Optoelectronics, China, **Local Organizing Chair**

Committee Members

Xuedong Bai, Chinese Academy of Sciences (CAS), China
yoshio Bando, National Institute for Materials Science,
Ruiping Gao, Ntl Natural Science Foundation of China, China
Baojun Li, Sun Yat-Sen University, China
Charles Lieber, Harvard University, United States
Shuming Nie, Emory University, United States
Daiwen Pang, Wuhan University, China
Xiao Wei Sun, Nanyang Technological University, Singapore
Limin Tong, Zhejiang University, China
Dapeng Yu, Peking University, China
Yue Zhang, , China
Ze Zhang, Zhejiang University, China

Sponsors

International Photonics and OptoElectronics (POEM) Congress 2013

The 6th International Photonics and OptoElectronics Meetings (POEM 2013) are sponsored by Huazhong University of Science and Technology (HUST), China Hubei Provincial Science & Technology Department (HBSTD), Wuhan East Lake National Innovation Demonstration Zone (Optics Valley of China, OVC), Hubei Association For Science & Technology and Hubei Administration of Foreign Expert Affairs, and are organized by Wuhan National Laboratory for Optoelectronics (WNLO) and The Optical Society (OSA).

POEM will be held on 24-27 May 2013, and brings together a wide range of research, technologies and perspectives in the fields of photonics and optoelectronics. It not only welcomes all your participation in this important international forum, but also has features open to all the individuals and entities worldwide that have interest in joining us by programming and organizing the activities under four technical areas of Biomedical Photonics, Industrial Photonics, Information Photonics and Photonics for Energy.

By combining different disciplines and comprehensive meeting types, POEM 2013 is to serve as a platform on exchanging information on recent advances and future trends for researchers and to boost brand for the enterprises.

Nanophotonics, Nanoelectronics and Nanosensor (N3)
Agenda of Sessions

Saturday, 25 May 2013

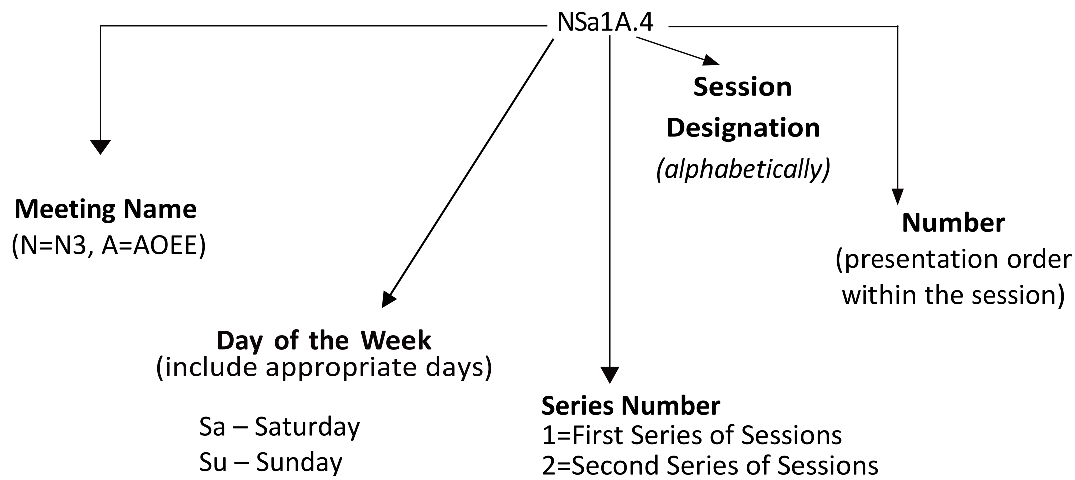
	Registration All Day		
08:00-08:15	Opening Ceremony		
08:15-12:00	JSa1A • Joint N3/AOEE Plenary (with coffee/tea break & group photo)		
	N3 Room A101	N3 Room A201	N3 Room A202
12:30-13:30	Lunch Break		
13:30-15:00	NSa2A • Nanomaterials: Design, Synthesis and Characterization I	NSa2B • Nanophotonics I: Waveguide	NSa2C • Nanoprobe and Nanoimaging I
15:00-16:00	NSa3A • Poster Session (with Coffee Break)		
16:00-18:00	NSa4A • Nanomaterials: Design, Synthesis and Characterization II	NSa4B • Nanophotonics II	NSa4C• Nanoprobe and Nanoimaging II (ends at 18:15)
18:00-21:00	Welcome Banquet and Poster Award		

Sunday, 26 May 2013

	N3 Room A101	N3 Room A201	N3 Room A202
08:00-10:00	NSu1A • Nanosensors	NSu1B • Nanophotonics III：Plasmonics	NSu1C • Nanoprobe and Nanoimaging III
10:00-10:30	Coffee Break		
10:30-12:30	NSu2A • Piezotronics and Nanogenerator (ends at 12:15)	NSu2B • Nanophotonics IV: Nanolasers (ends at 12:00)	NSu2C • Nanoprobe and Nanoimaging IV
12:30-13:30	Lunch Break		
13:30-16:00	NSu3A • Nanoelectronics (ends at 15:45)	NSu3B • Nanophotonics V: Metamaterials	NSu3C • Nanoprobe and Nanoimaging V (ends at 16:05)

Nanophotonics, Nanoelectronics and Nanosensor (N3) Program

Explanation of Session Codes



The first letter of the code designates the meeting (For instance, A=AOEE, N=N3). The second element denotes the day of the week (Saturday=Sa, Sunday=Su). The third element indicates the session series in that day (for instance, 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 ASa1A.4 indicates that this paper is part of the AOEE meeting (A) and is being presented on Saturday (Sa) in the first series of sessions (1), and is the first parallel session (A) in that series and the fourth paper (4) presented in that session.

Nanophotonics, Nanoelectronics and Nanosensor (N3) Abstracts

Saturday, 25 May 2013

Room A101 (Plenary)
08:00 -- 12:00
JSa1A • Joint Plenary Session
Presiders: Yi-Bing Cheng; Monash Univ., Australia; and Zhong-Lin Wang; Georgia Inst. of Technology, USA

JSa1A.1 • 08:15 (Plenary)
Nanomaterials for Photovoltaics, Martin Green[1]; [1]*Univ. of New South Wales, Australia.* A realistic appraisal is given of the most promising potential nanomaterial applications in increasing photovoltaic performance, either by enabling implementation of advanced device concepts or by improving existing devices, such as by plasmonics.

JSa1A.2 • 09:00 (Plenary)
Silicon Nanostructures for Energy Applications, S.T. Lee[1]; [1]*Soochow Univ., China.* Si nanostructures in various forms can be controllably synthesized using metal-assisted vapor-liquid-solid growth, oxide-assisted growth, chemical or electrochemical etching methods. Si nanostructures (nanowires, quantum dots) exhibit unique and interesting structural, optical, electronic and chemical properties, which are being exploited for myriad exciting applications. For example, energy devices based on Si nanowire arrays can achieve efficiencies as high as 12% for solar energy conversion. Additionally, Si nanodots and nanowires can serve as efficient photo-catalysts for the redox reactions of organics. This presentation will discuss and highlight our recent works in developing silicon nanostructures for green, high-efficiency, and low-cost solar energy harvesting and catalysis applications.

09:45 – 10:30, Coffee/Tea Break and Group Photo

JSa1A.3 • 10:30 (OSA Plenary Speaker)
Nano Etching via Metal-assisted Chemical Etching (MaCE) for Through Silicon Via (TSV) Stacked Chips Application, C. Wong[1,2], Liyi Li[1], Owen Hildreth[3]; [1]*Materials Science and Engineering, George Inst. of Technology, USA;* [2]*Dept. of Electronic Engineering, Chinese Univ. of Hong Kong, Hong Kong;* [3]*NIST, USA.* Metal assisted chemical etching (MaCE) is a promising technology for next generation micro- and nano-semiconductor fabrication, where noble metals are used as catalyst to anisotropically etch into bulk materials in solution. In this study, we report the first silicon vias (SV) with sub-100 nm diameter etched by MaCE. The distinct structure of thus fabricated SVs enables the successful copper filling from the bottom of the vias, which is manifested by scanning electron microscope (SEM) and energy dispersive X-ray spectroscope (EDS). The report demonstrates the applicability of nano-scale interconnection in 3D package from the view of fabrication. Also, this novel approach marks the significance in functional filling of semiconductor for nano-photonic devices as well as template-based synthesis of functional nanomaterials.

JSa1A.4 • 11:15 (Plenary)
Engineering Solar Cells using Colloidal Quantum Dots, Andre Labelle[1], **Edward H. Sargent**[1]; [1]*Department of Electrical and Computer Engineering, Univ. of Toronto, Canada.* We present a review of colloidal quantum dot photovoltaics, emphasizing advancements in the development of device architectures, materials engineering, and mutli-junction configurations in pursuit of high-efficiency, low-cost solar cells for eventual deployment in commercial applications.

12:00 – 13:30, Lunch Break

N3 Room A101 (WNLO)
13:30 -- 15:00
NSa2A • Nanomaterials: Design, Synthesis and Characterization I
Presider: Yu-Lun Chueh; National Tsing Hua Univ., Taiwan

NSa2A.1 • 13:30 (Invited)
Infrared light active photocatalysts and its TiO2 nanobelt heterostructures: towards full spectrum of sunlight photocatalysis, Hong Liu[1]; [1]*State Key Laboratory of Crystal Materials, Shandong Univ., China.* Full spectrum of sunlight photocatalyst is difficult to be realized, because there is no infrared light active photocatalystsavailable. Bismuth tungstatehas just been proved to possess high infrared photocatalytic activity by our group. To utilize the solar light to the utmost extent is the main direction and object of photocatalysis, hydrogen production by water splitting, and solar photo-voltage power generation. Although UV and visible active photocatalysts have been extensively investigated in the past several tens of years, the near-infrared wave band of solar light is still a blank area for photocatalyst, except for the application of upconversion material based hybrid photocatalyst with a narrow infrared light absorption band. Here we report infrared active photocatalytic property of Bi2WO6 nanosheets owing to the oxygen vacancies of the Bi2WO6 nanosheets. The wide spectral range photocatalyst, Bi2WO6-TiO2 nanobelt heterostructures, were obtained by assembling Bi2WO6 nanocrystals on TiO2 nanobelts. The active light band of the novel hybrid photocatalyst with high photocatalytic activity covers full-spectrum solar light including UV, visible and near-infrared ranges.

NSa2A.2 • 14:00 (OSA Invited)
One Dimensional Inorganic Nanomaterials for Energy Storage and Production, Sanjay Mathur[1]; [1]*Chair, Inorganic and Materials Chemistry, Univ. of Cologne, Germany.* Electrode structures based on the assembly of nanofibers are superior electrode architectures because the nanonets offer; (i) improved ionic (Li+) transport (ii) higher mechanical stability against volume-expansion caused by insertion of Li-ions (iii) increased kinetics of charging and discharging cycles and (iv) high electronic conduction in one-dimensional channels.

NSa2A.3 • 14:30
Engineering surface of anatase TiO2 nanocrystals toward enhanced catalytic activity in photochemistry, Chang Liu[1], Xiguang Han[1], Shuifen Xie[1], **Qin Kuang**[1], Xie Zhaoxiong[1], Zheng Lansun[1]; [1]*Chemistry, Xiamen Univ., China.* Herein we reported our systematic works how to selectively expose the highly active facets of TiO2 NCs, by which the catalytic activities of TiO2 NCs in the photochemical processes have been markedly enhanced.

NSa2A.4 • 14:45
Optimizing the photocatalytic activity of anatase TiO2 by improving the separation efficiency between photogenerated electrons and holes, Chang Liu[1], Qin Kuang[1]; [1]*Department of Chemistry, Xiamen Univ., China.* Recently, it has been proven that directional flow of photogenerated charge carriers occurs on specific facets of TiO2 nanocrystals. Herein, we demonstrate that the photocatalytic activity of anatase TiO2 nanocrystals can be enhanced by selectively depositing Pt nanoparticles on the {101} facets.

N3 Room A201 (WNLO)
13:30 -- 15:00
NSa2B • Nanophotonics I: Waveguide
Presider: Limin Tong; Zhejiang Univ., China

NSa2B.1 • 13:30 (Invited)
Optical Nanowires and Applications in Optofluidics, Baojun Li[1]; *[1]State Key Laboratory of Optoelectronic Materials and Technologies, School of Physics and Engineering, Sun Yat-Sen Univ., China.* Flexible and elastic polymer nanowires were fabricated and a number of photonic devices were assembled by the PTT nanowires. Some applications of the nanowire in optical trapping and manipulation of particles have been demonstrated.

NSa2B.2 • 14:00 (Invited)
Comb Slow Wave Slot Photonic Crystal Waveguides for reinforcing nonlinear effects in silicon photonics, Charles Caer[1], Xavier Leroux[1], Laurent Vivien[1], **Eric Cassan**[1]; *[1]Institut d'Electronique Fondamentale (UMR 8622), Université PARIS-SUD/CNRS, France.* Slow light measurements in Comb silicon Photonic Crystal Waveguides optimized for filling by organic materials are reported. Group indices around 40 are measured in a 3.5nm bandwidth and nonlinear effective areas below 0.015µm2 are predicted.

NSa2B.3 • 14:30
Polymer active nanowire waveguide and their applications, Xiaobo Xing[1], Haiyan Wang[2]; *[1]South China Normal Univ., China; [2]Guangzhou Inst. of Measurement & Testing, China.* Polymer micro/nanofibers (MNFs) represent a new class of polymer materials for all-optical signal processing, nanofiber laser and detection. This article reviews Polymer MNFs as active nanowire waveguide, different kinds of polymer nanofiber laser and optical sensors.

NSa2B.4 • 14:45
Lasing oscillation condition in plasmon-induced transparency waveguide, Zi-Lan Deng[1], Jian-Wen Dong[1]; *[1]State Key Laboratory of Optoelectronic Materials and Technologies, Sun Yat-Sen Univ., China.* Plasmonic waveguide with detuned resonators is studied in plasmon-induced transparency window. Gain coefficient is quadratic with detuning in lasing oscillation condition. Spectra in amplification regime below lasing threshold have large group delay, high transmittance and narrow linewidth. A straight-forward biosensing application is demonstrated.

N3 Room A202 (WNLO)
13:30 -- 15:00
NSa2C • Nanoprobe and Nanoimaging I
Presider: Shu Wang; Inst. of Chemistry, The Chinese Academy of Sciences, China

NSa2C.1 • 13:30 (OSA Invited)
Spectrally Encoded SERS Nanoparticles for Multiplexed Optical Detection and Image-Guided Surgery, Shuming Nie[1], Ximei Qian[1]; *[1]Biomedical Engineering, Emory Univ., USA.* We report the development of biocompatible, nontoxic, and spectrally encoded nanoparticles for in-vivo tumor detection and image-guided surgery based on the use of colloidal gold and surface-enhanced Raman scattering (SERS).

NSa2C.2 • 14:15 (OSA Invited)
Molecular Imaging of Cancer**, Weihong** Tan[1]; *[1]Univ. of Florida, USA.* Not available.

N3 Poster Area (WNLO)
15:00 -- 16:00
NSa3A • N3 Poster Session (*including coffee/tea break*)

NSa3A.01
Resolution Performance of the Extra Ultraviolet Telescopes, Fu Huaiyang[1]; [1]*The Photoelectric Measurement and Control Technology Research Department, Xi'an Inst. of Optics and Precision Mechanics of China Academy of Sciences, China.* The Extreme Ultraviolet Telescopes resolution tests were carried out at visible wavelength. At working wavelength, an upper limit estimate of telescope's resolution was obtained about 0.4705 arcsec.

NSa3A.02
New nuclear-spin-induced Cotton-Mouton effect at high dc magnetic field of porphyrins, guo-hua yao[1]; [1]*Department of Chemical Physics, Univ. of Science and Technology of China, China.* Quantum chemistry method is employed to calculate the new Cotton-Mouton effect. New effect provides structure information. New rotation of Porphyrins is strong, could be dramatic enhanced by resonance effect.

NSa3A.03
Effective Photoelectrocatalysis Degradation of microcystin-LR on Ag/AgCl/TiO2 Nanotube Array Electrode under Visible Light Irradiation, Wenjuan Liao[1]; [1]*Environmental Science Research Inst., Huazhong Univ. of Science & Technology, China.* Ag/AgCl/TiO2 is used as an effective visible-light-driven (VLD) photoelectrocatalytic (PEC) electrode for the degradation of microcystin-LR (MC-LR). The mechanism of the PEC degradation of MC-LR is investigated using different reactive oxidative species scavengers.

NSa3A.04
Influence of annealing temperature on the properties of Ga2O3:Cu films, cheng yi[1,2], Hongwei Liang[1]; [1]*School of Physics and Optoelectronic Engineering, Dalian Univ. of Technology, China;* [2]*Department of Physics, Dalian Maritime Univ., China.* Four different post thermal annealing temperatures were applied to Ga2O3:Cu films, prepared using electron beam method. The structure, optical properties, and chemical states of dopant Cu of the Ga2O3:Cu film were investigated experimentally.

NSa3A.05
Preparation and Properties of Fluorescent CdTe/ poly (1, 4-butanediol-citrate) Bioelastomer Nanocomposite, Li Jiang[1], aimiao qin[1,3], Kunpeng Jiang[1], Lei Liao[2], Chaojian Wu[1], Xiulan Wu[1]; [1]*College of Materials science & engineering, Guilin Univ. of Technology, China;* [2]*College of Environmental science & engineering, Guilin Univ. of Technology, China;* [3]*Fujian Inst. of Research on the Structure of Matter, Chinese Academy of Sciences, China.* Hydrophilic photoluminescent CdTe/ poly (1, 4-butanediol-citrate) (PBC) bioelastomer nanocomposite was successfully synthesized by a two-step method. CdTe nanoparticles were first synthesized in aqueous, then transferred into PBC to form CdTe/PBC composite by physical mixing.

NSa3A.06
Nanoscale Silver Ethynide Clusters: Molecular Structures and Chemical Properties, Xuan Liu[1], Yunpeng Xie[1], Xing Lu[1]; [1]*School of Materials Science and Engineering, Huazhong Univ. of Science and Technology, China.* A series of neutral and anionic high-nuclearity silver(I) ethynide clusters based on oxovanadium(V) phosphonate building blocksare synthesized, and the molecular structures and chemical properties of these nanoscale silver ethynide complexes are intensively discussed.

NSa3A.07
Resonant Mode Splitting in Non-Isosceles Bowtie Nanoantennas, Ji Chen[1], Fangwang Gou[1], Kebo He[1], Zhaoyu Zhang[1]; [1]*Peking Univ. Shenzhen Grad School, China.* A new class of non-isosceles bowtie antenna is proposed. The structure offers two main resonant modes and controllable gap intensity with the influence of bow angles. It shows wonderful performance in broadband sensors and controller.

NSa3A.08
Controllable Growth of Core-Shell Carbon Nanofiber Arrays for Highly Sensitive Electrochemical Sensors, Chen Rongsheng[1], Huo Kai fu[2]; [1]*College of Chemical Engineering and Technology, Wuhan Univ. of Science and Technology, China;* [2]*Wuhan National Laboratory for Optoelectronics, Huazhong Univ. of Science & Technology, China.* Conical and cylindrical core-shell TiO2/C and TiC/C nanofiber arrays have been fabricated. The electrochemical measures suggest that conical nanofibers are more electroactive than cylindrical nanofibers for the more effective exposure edge plane. The conical TiC/C shows better electrochemical property than TiO2/C as result of inner conductive core.

NSa3A.09
Work function engineering of MoS2 nanoflakes with different layers, Yang LI[1], Chengyan Xu[1], Liang Zhen[1]; [1]*Harbin Inst. of Technology, China.* Surface potential of MoS2 nanoflakes has been systematically studied by Kelvin Probe Microscopy. Potential decreases with increasing thicknesses. The obvious interlayer screening effect was found, and the screening length is about 10 layers.

NSa3A.10
Research on dot percentage detection of Nano Green Plate, Yi Yaohua[1], li shuai[1], Su Hai[1], Liu Juhua[1]; [1]*Wuhan Univ., China.* In this paper, a new method of detecting dot percentage on Nano Green Plate is proposed. This method has two main part, first part is finding the best segmentation value based on HSI color space automatically; Second part is segmenting the detecting image into two sections using the value in the first step and get the dot percentage.

NSa3A.11
Porous Pr(OH)3 Nanostructures as High-Efficient Adsorbents for Dye Removal, teng zhai[1], Xihong Lu[1], Minghao Yu[1], Shilei Xie[1], Yexiang Tong[1]; [1]*School of Chemistry and Chemical Engineering, Sun Yat-sen Univ., China.* Herein, we report the electrochemical synthesis of porous Pr(OH)3 nanobelt arrays (NBAs), nanowire arrays (NWAs), nanowire bundles (NWBs), nanowires (NWs) and their applications as dye absorbents in water treatment.

NSa3A.12
Design of Nanophotonic Optical Interconnection Network for Ultrahigh Communication, Yani Zhang[1]; [1]*yanizhang1@163.com, China.* An architecture for an integrated low-power, high-bandwidth optical interconnection network based on microring resonator technology is presented. The layout of the non-blocking network is described and a simulation-based performance evaluation is conducted.

NSa3A.13
FEA study on the temperature field by laser micromachining metal in the liquid, Yuhong Long[1], Dengfeng Zou[2]; [1]*Guilin Univ. of Electronic Technolo, China;* [2]*Guilin Medical Univ., China.* Laser; Etching; Explosive boiling; Finite element analysis; Simulation

NSa3A.14
A Microscopic Explanation for Picosecond Amorphization of Chalcogenides Material, Chen Ju[1,2], P. Wang[1,3], X. Cheng[1,2], X. Miao[1,2]; [1]*Wuhan National Laboratory for Optoelectronics, , China;* [2]*School of Optical and Electronic Information, Huazhong Univ. of Science and Technology, China;* [3]*Wuhu Inst. of Technology, China.* Phase change memory cells with chalcogenides material of different thicknesses were fabricated to study the picosecond amorphization process. A two-step model was proposed to describe the non-thermal process. And first principle calculations and Ridley luck-drift model confirmed the explanation.

NSa3A.15
Efficient source mask optimization with Zernike polynomial function-based source representation, Xiaofei Wu[1], Shiyuan Liu[2], Jia Li[1], Edmund Y. Lam[1]; [1]*Dept. of Electrical and Electronic Engineering, The Univ. of Hong Kong, Hong Kong;* [2]*State Key Laboratory of Digital Manufacturing Equipment and Technology, Huazhong Univ. of Science and Technology, China.* This paper introduces a Zernike polynomial function-based

source representation method for the aerial image calculation of optical lithography. It is shown that this representation enables computation reduction for both mask optimization and source optimization.

NSa3A.16
Simulation and Analysis of Thin Film Bulk Ultrasonic Transducers and Optimization Acousto-optical Coupling, Yujin Li[1]; *[1]School of Optical and electronic Information, HUST, China.* A finite element method (FEM) formulation is presented for the acousto-optical integrated modulators, the periodic structure of ZnO piezoelectric thin films ultrasonic transducers on waveguide overcome the degradation of the piezoresponse and improve acousto-optical coupling.

NSa3A.17
Flexible Triboelectric Nanogenerator for Energy Harvesting and Self-powered Pressure Sensor, Fengru Fan[1,2], Zhongqun Tian[2], Zhong Lin Wang[1]; *[1]Georgia Inst. of Technology, USA; [2]Xiamen Univ., China.* We demonstrate a simple and effective approach of using the charging process in friction to convert mechanical energy into electric power. It can be applied as a self-powered pressure sensor for measuring the subtle pressure.

NSa3A.18
Flexible low-power light detectors based on organic FETs, yunlong guo[1]; *[1]key laboratary of organic solids, Inst. of chemistry, China.* we fabricated a flexible organic FETs light-detectors. The FETs showed good ability of detecting low power light (such as λ=254 nm, 7 μW/cm2).

NSa3A.19
Study on resonance characteristic of photonic crystal ring resonator, Xiaoyuan Ren[1,2]; *[1]Beihang Univ., China; [2]Beihang Univ., China.* The characteristics of the photonic crystal ring resonator is simulated by 2D-FDTD method. Different size of PCRR corresponding to different transmission loss, quality factor, free space spectra (FSR) and resonance depth.

NSa3A.20
Study on Fabrication and Experimental Imaging for Optical Coherence Tomography, Hai Ye[1,2], Yingjun Gao[2,1]; *[1]Department of Electronic Engineering, DongGuan Univ. of Technology, China; [2]Department of Optoelectronic Engineering, Jinan Univ., China.* The framework of Optical coherence tomography (OCT) is fabricated and experiment is performed. Results demonstrate that the longitudinal resolution of the OCT is equal to 14.1 μm.The maximum penetration depth is discussed and the relation between penetration depth and lateral resolution is also illustrated.

NSa3A.21
Electro-optical properties of polymer dispersed liquid crystal doped with polymerization inhibitor, Liu Feng[1], Gao Feng[1], Jun Qian[1], Tang Chaoqun[2]; *[1]Wuhan Univ., China; [2]Huazhong Univ. of science and technology, China.* The effects of the inhibitor on the morphology and the electro-optical properties of PDLC films were studied. The results show that the inhibitors can efficiently enhance the optical-electro-optical porperties of the PDLC films.

NSa3A.22
Online Monitoring of Escaped Ammonia Based on TDLAS, Zengfu Zhang[1], Debao Zou[1], Wenliang Chen[1], Huijuan Zhao[1], Kexin Xu[1]; *[1]State Key Laboratory of Precision Measuring Technology and Instruments, Tianjin Univ., China.* The escaping ammonia concentration was detected with the TDLAS system and their second harmonic spectrum were collected. The detection limit of NH3 concentration is 1.21× 10-6. It's suitable for on-line monitoring.

NSa3A.23
Trace Detection of Ammonia using Multi-pass Cells with TDLAS, Zengfu Zhang[1], Debao Zou[1], Wenliang Chen[1], Huijuan Zhao[1], Kexin Xu[1]; *[1]State Key Laboratory of Precision Measuring Technology and Instruments,*

Tianjin Univ., China. Trace detection of ammonia was studied with tunable diode laser absorption spectroscopy (TDLAS) techniques using the White cell and Herriot cell. The detection limit of NH3 concentration is 1.21×10-6 and 2.88×10-6.

NSa3A.24
Biofilm thickness sensor based on non-uniform etched fiber Bragg grating, Bin-bin Luo[1]; [1]*Department of Electronic Engineering, Chongqing Inst. of Technology, China.* A non-uniform etched fiber Bragg grating was realized for online measurements of biofilm thickness and temperature. The resolution of the biofilm thickness and temperature of the sensor is 15.36±0.85 μm, and temperature variation 0.120C.

NSa3A.25
Strain-sensitive Devices Based on Phase Transition of VO2 Nanobeam, Bin Hu[1]; [1]*Huazhong Univ. of Science & Technology, China.* Two types strain-sensitive devices were fabricated utilizing different phase transition mechanisms

NSa3A.26
Flexible solid-state electrochromic devices based on amorphous WO3 thin films, Jianyi Luo[1,2], Runming Chen[1,2], Yangyang Zhou[1,2], Li Li[1,2], Weiyang Deng[1,2], Rimei Chen[1,2]; [1]*School of Applied Physics and Materials, Wuyi Univ., China;* [2]*School of Applied Physics and Materials, Wuyi Univ., China.* The solid-state electrochromic (EC) devices based on amorphous WO3 thin film have been fabricated by using a solid electrolyte in the devices, and demonstrated the potential application of the amorphous WO3 thin films in the flexible solid-state EC devices.

NSa3A.27
Rapid synthesis of Cu2ZnSnS4 particles using microwave irradiation, Wei Wang[1], Honglie Shen[1]; [1]*College of Materials Science and Technology, Nanjing Univ. of Aeronautics and Astronautics, China.* Cu2ZnSnS4 particles were successfully and rapidly fabricated by microwave irradiation. The effects of different surfactants on the size and morphology of the Cu2ZnSnS4 particles were investigated. Ball cactus-like, sphere-like and peanut-like CZTS particles were synthesized.

NSa3A.28
Supersensitive, Ultrafast, and Broad-Band Light-Harvesting Scheme Employing Carbon Nanotube/TiO2 CoreShell Nanowire Geometry, Chia-Yang Hsu[1], Der-Hsien Lien[1], Jr-Hau He[1]; [1]*Department of Electrical Engineering, National Taiwan Univ., Taiwan.* A novel scheme for practical application of one-dimensional photodetectors is demonstrated by integrating a carbon nanotube and TiO2 in a coreshell fashion for breaking the compromise between the photogain and the response/recovery speed.

NSa3A.29
A large NA structured lens with different substrate, su chen[1]; [1]*Anhui Inst. Of Optics and Fine Mechanics, Chinese Academy Of Sciences, China.* A dielectric structured lens formed by varying the high-refractive-index square dielectric holes is proposed. This lens overcomes the limitation of feature size of the large numerical aperture (NA) lens, and the energy efficiency has achieved 44%.

NSa3A.30
Characteristic analysis of optical sensors by integrating a circular-hole defect with on-chip spectrometer, Z xiang[1], Li Y. Zhou[1], S. Jun[1]; [1]*Inst. of Optoelectronics, Key Lab of Optoelectronics Devices and Systems of Ministry of Education, Shen zhen Univ., China.* We proposed a sensitive sensor by integrating circular-hole defects with etched diffraction grating spectrometer based on amorphous silicon photonic platforms. With appropriate defect diameters, the chip can contribute to ~ 10000 nm/RIU sensitivity and acceptable fabrication tolerance

NSa3A.31
Definition of Time and Measurement of Time, Jian Yin[1], YE YIN[2]; *[1]Department of Foundation Courses, Wuxi Inst. of Technology, China; [2]College of Information, Mechanical and Electrical Engineering, Shanghai Normal Univ., China.* Time plays a key role in optical measurement, communication, GPS, etc., but so far, there is not a unified definition. This paper attempts to give time an operational definition, and prove its correctness by experiments.

NSa3A.32
Asymmetric Heterostructure with Broad Waveguide for 1.06µm Range High-Power Laser Diodes, yue zhang[1]; *[1]changchun Univ. of Science and Tech, China.* The confinement factor, maximum output power, threshold current and the far-field vertical beam divergence of asymmetric waveguide for high power 1.06µm laser diode are calculated by Lastip simulation software and compared to the symmetric one.

NSa3A.33
Copper Zinc Tin Sulfide Selenium Counter Electrodes for Dye-Sensitized Solar Cells, lei zhu[1], Yinghuai Qiang[1], Xiuquan Gu[1]; *[1]China Univ. of Mining and Techonlogy, China.* Cu2ZnSnS4 and Cu2ZnSnSe4 NPs have been synthesized as counter electrode for Dye-Sensitized Solar Cells by solvothermal routes. SEM,XRD and XPS confirms that both of the samples exhibited a pure kesterite phase.

NSa3A.34
Nonreciprocal Transmission through Grating with Magneto-Optical Substrate, Haibin Zhu[1,2], Feng Li[1], Yajie Liu[1], Chun Jiang[2], Bin Tang[3], Xiaofei Zang[4]; *[1]College of Mathematics, Physics and Information Engineering, Jiaxing Univ., China; [2]State Key Laboratory of Advanced Optical Communication System and Networks, Shanghai Jiao Tong Univ., China; [3]School of Mathematics & Physics, Changzhou Univ., China; [4]Engineering Research Center of Optical Instrument and System, Ministry of Education and Shanghai Key Lab of Modern Optical System, Univ. of Shanghai for Science and Technology, China.* A double-layer grating structure is proposed, which can show nonreciprocal transmission in near-IR frequency range. The structure is composed of metallic grating with magneto-optical substrate. The nonreciprocity depends on both incidence angle and thickness of the substrate. With proper conditions, the nonreciprocity is as high as 57.6%.

NSa3A.35
Electronic/electrochemical alternation of a novel acceptor molecule Yb@C80 via simple chemical transformation, Wenting Cai[1], Yunpeng Xie[1], Xing Lu[1]; *[1]School of Materials Science and Engineering, HUST, China.* We present the first chemical modification of a divalent metallofullerene Yb@C80 by carbene addition. Spectroscopic and crystallographic data suggest that its electronic and electrochemical properties have been effectively altered upon chemical functionalization.

NSa3A.36
Preparation, characterization and photoelectrochemical property of ultrathin MoS2 nanosheets via hydrothermal intercalation and exfoliation route, Liwen Yang[1]; *[1]Faculty of Materials and Optoelectronic Physics, Xiangtan Univ., China.* A simple but effective hydrothermal intercalation and exfoliation route is developed to prepare ultrathin MoS2 nanosheets in high yield.The obtained ultrathin MoS2 nanosheets exhibit preferable photoelectrochemical and photoresponse activity under the illumination of simulated sunlight compared to bulk MoS2.

NSa3A.37
V_2O_5 Modified TiO_2 Nanotube Array Catalysts for Degradation of Crystal Violet Using Solar Energy, Chunxia Zhao[1], Caixia Li[1], Junshen Li[1], Wen Chen[1], Xiaofang Wu[1]; *[1]School of Materials Science and Engineering, Wuhan Univ. of Technology, China.* TiO_2 nanotube arrays modified by V_2O_5 nanoparticles were synthesized by the electrophoresis deposition method, showing significant enhancement on sunlight photodegradation of crystal violet due to the role of interface and electronic transitions between V_2O_5 and TiO_2.

NSa3A.38

Visible-Light Responsive Photocatalytic Fuel Cell Based on Ag/TiO2-NTs Photoanode and Cu2O/TiO2 Photocathode for Simultaneous Wastewater Treatment and Electricity Generation, Wenjuan Liao[1]; [1]*Environmental Science Research Inst., Huazhong Univ. of Science & Technology, China.* A visible-light driven photocatalytic fuel cell (PFC) system comprised of Ag/TiO2-NTs photoanode and Cu2O/TiO2/Ti photocathode was established for providing a self-sustained and energy-saving way for simultaneous wastewater treatment and energy recovery

NSa3A.39

Effective Photocatalytic Disinfection of Pathogenic Bacteria with Ag/SiO2/TiO2 under Visible Light Irradiation, Zhimi Hu[1], Wenjuan Liao[1], Yanrong Zhang[1]; [1]*Environmental Science Research Inst., Huazhong Univ. of Science&Technolog, China.* A ternary Ag/SiO2/TiO2 nanotube array film was synthesized by a two-step approach. The dramatically enhanced photocatalytic activity of the film was evaluated via the inactivation of pathogenic bacteria under visible light irradiation.

NSa3A.40

Optimization studies of single transverse mode 1.55µm ridge-waveguide lasers, Yuzhi Wang[1], Te Li[1], Erjuan Hao[2], Yue Zhang[1], Zhiyuan Sun[3], Chengwu Shen[3]; [1]*National Key Lab on High Power Semiconductor Lasers, Changchun Univ. of Science and Technology, China;* [2]*JiLin Univ., China;* [3]*Changchun Inst. of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences, China.* 1.55µm InP-based quantum well lasers have been optimized for high power and single transverse mode into an optical system. The maximum output power is more than exceeding 100mW in single transverse mode operation, with 55% slope efficiency.

NSa3A.41

Influence of annealing time on the conversion-light properties of YbF3:Er film, Ying Zhang[1], Ruzhi Wang[1]; [1]*College of Materials Science & Engineering, Beijing Univ. of Technology, China.* The conversion-light YbF3:Er films have been prepared with different annealing time, which emit strong 656 nm red light upon excitation by both 378 nm and 980 nm light with high transmittances above 95%.

NSa3A.42

Codoping Li+ to enhance photoluminescence intensity in Y2O3: Bi3+, Yb3+, Kaiyu Li[1], Ruzhi Wang[1]; [1]*College of Materials Science &Engineering, Beijing Univ. of Technology, China.* Codoping with Li+ is an efficient method to enhance the photoluminescence of Bi3+-Yb3+ doped Y2O3 phosphors. It suggests a kind of potential method which may be used to improve the solar cell efficiency.

NSa3A.43

Photocatalytic Degradation of Gaseous Benzene with CdS/TiO2 Prepared by Water in Oil Method, Wen Chen[1], Min Wen[1], Jingjing Du[1], Yueli Liu[1], Chao Zhang[1]; [1]*State Key Laboratory of Advanced Technology for Materials Synthesis and Processing, and School of Materials Science and Engineering, China.* CdS/TiO2 composites were successfully prepared by water in oil method, consisted of uniform anatase TiO2 of 15 nm with highly dispersed cubic phase CdS nanocrystals and exhibit strong visible light absorption at about 550 nm.

NSa3A.44

Design and synthesis of composite nanomaterials for electrochemical energy conversion and storage, Gaoren Li[1]; [1]*Sun Yat-Sen Univ., China.* Based on the facile electrodeposition method, the novel composite nanomaterials are easily designed and synthesized, and they show much enhanced electrochemical performance and long-term cycle stability for electrochemical energy conversion and storage.

NSa3A.45

The preparation of superfine Fe3O4 with high specific surface area and improved capacitance for supercapacitor, Gang Yang[1,2], Lu Wang[2], Shasha Wang[2], Xuefan Jiang[2], João Pinto[1]; [1]*Department of Physics & I3N, Univ. of Aveiro, Portugal;* [2]*Jiangsu Laboratory of Advanced Functional Material, Changshu Inst. of*

Technology, China. Superfine Fe3O4 with high specific surface area synthesized via ultrasonication and hydrolysis in ethanol amine. Fe3O4 delivered remarkable pseudocapacitive activity including high specific capacitance, good rate capability, and excellent cycling stability as supercapacitors.

NSa3A.46
Mitigating Scattering Effects in THz Absorption Spectra, Fang Yan[1,2], Zhaohui Zhang[1], Xiaoyan Zhao[1], Haixia Su[1], Zhi Li[1], Han Zhang[1]; *[1]Univ. of Science & Technology Beijing, China; [2]Inner Mongolia Univ. of science and Technology, China.* The baseline of THz absorption spectrum caused by particle scattering is critical to quantitative analysis.By mitigating scattering effects using Kaushik's approach,the accuracy of calculated component concentrations of a mixture sample was improved.

NSa3A.47
High-efficiency continuous wave YVO4/Nd:GdVO4 laser at 671 nm, Erjuan Hao[1], Li Te[2]; *[1]JiLin Univ., China; [2]Changchun Univ. of Science and Technology, China.* We report on a diode-pumped composite YVO4/Nd: GdVO4 continuous wave (CW) laser, intracavity doubled for highly efficient generation of red light. We obtained as much as 5.2 W of power at 671 nm with small amplitude noise.

NSa3A.48
Light Trapping and Carrier Lifetime Improvements of Si Solar Cells by Pyramid / Groove Hierarchical Structures, Tzu-Yin Lin[1], Hsin-Ping Wang[1], An-Cheng Li[1], Jr-Hau He[1]; *[1]Inst. of Photonics and Optoelectronics & Department of Electronics Engineering, National Taiwan Univ., Taiwan.* A hierarchical structure consisting of groove and pyramids was fabricated on the single crystalline Si by combining the isotropic and anisotropic wet etching. This texured silicon enhances conversion efficiency of Si-based solar cells.

NSa3A.49
Nanoscale Materials for optical communication Networks, Dun Qiao[2], Yani Zhang[1]; *[1]Department of Physics and Information Technology, Baoji Univ. of Ats & Science, China; [2]Department of Physics, Northwest Univ., China.* New discoveries in nano-materials are expected to play an important role in the field of communication. This article presents some exciting recent developments in nano-materials that have the potential to play a critical role in the development and transformation of future intelligent communication networks.

NSa3A.50
On the Wave Propagation through Twisted Clad Optical Fibers Under Slow Wave Approximation, M. A. Baqir[1], Pankaj K. Choudhury[1]; *[1]Inst. of Microengineering and Nanoelectronics, Universiti Kebangsaan Malaysia, Malaysia.* Propagation of energy flux density through twisted clad optical fibers is studied under slow wave approximation. Twists are introduced in the form of conducting helical windings, and dominance of helix pitch angle is detected.

NSa3A.51
Simulation and Experiment of Light Trapping Ability of Periodic Si Nanowires, Hsin-Ping Wang[1], Kun-Tong Tsai[1,2], Yi-Ruei Lin[1], Yuh-Lin Wang[2], Jr-Hau He[1]; *[1]Inst. of Photonics and Optoelectronics, Taiwan; [2]Inst. of Atomic and Molecular Sciences, Taiwan.* We demonstrate three methods for the fabrication of large scale ordered silicon nanorwires arrays using reactive ion etching (RIE) or metal-assisted chemical etching though colloidal lithography or anodic aluminum oxide (AAO) templates. The reflection can be eliminated effectively over broadband regions.

NSa3A.52
Silicon Electro-Optic Modulator based on the Theory of Gate-controlled Diode, Kaikai Xu[1,2], Guann-pyng Li[1,2]; *[1]UC Irvine, USA; [2]California Inst. for Telecommunications and Information Technology, USA.* Visible light emission from the reverse-biased silicon p-n junction is the prerequisite. For the first time ever, the theory of gate-diode is used to investigate the electroluminescence observed in the silicon electro-optic modulator.

NSa3A.53

Fabrication and Photoelechemical Performance of Nb2O5 Nanobelts, gao biao[1], Huo Kai fu[2]; [1]*School of Materials and Metallurgy, Wuhan Univ. of Science and Technology, China;* [2]*Wuhan National Laboratory for Optoelectronics, Huazhong Univ. of Science & Technology, China.* Nb2O5 nanobelts are fabricated by a hydrothermal reaction, protonation and annealing. The UV detector of individual Nb2O5 nanobelt shows high selectivity and quantum-efficiency. Ag-Nb2O5 heterojunction synthesized via AgNO3 solution immersion and UV illumination exhibits enhanced photocatalytic activity and perfect antibacterial performance.

NSa3A.54

A Hollow Beam Supercontinuum Generation in A GeO2 Doped Triangular-core Photonic Crystal Fiber, Xinben Zhang[1,2], Huifeng Wei[1,2], Xian Zhu[1], Weijun Tong[2], Nengli Dai[1], Jinyan Li[1]; [1]*Wuhan National Laboratory of Optoelectronics, China;* [2]*State Key Laboratory of Optical Fiber and Cable Manufacture Technology, Yangtze Optical Fiber and Cable Company Ltd. R&D center,, China.* We report a GeO2 doped triangular-core photonic crystal fiber which is allow the generation of a hollow beam supercontinuum ranging from 540 to 1540 nm through a nonlinear-optical transformation by femtosecond pulses at 1038 nm.

NSa3A.55

Growth behaviors of graphene on Cu foil by APCVD using methane, Huang Kui[1], Zhang Jin Cun[2], Zhong Hai Jian[2], Cao Bing[1], Xu Ke[2]; [1]*Inst. of Modern Optical Technologies, Soochow Univ., China;* [2]*Suzhou Inst. of Nano-Tech and Nano-Bionics, Chinese Academy of Sciences, China.* Graphene was synthesized on copper foils by atmospheric pressure CVD.The coverage rate and layer thickness of graphene were found to be limited kinetically by the ad-atom diffusion and source concentration on surface, respectively.

NSa3A.56

A Novel Optical Beam Splitter Based on Photonic Crystals, Qingyi Zhu, Yongqi Fu; *School of Physical Electronics, Univ. of Electronic Sciences and Technology of China, China.* Square-lattice PCs are used to divide the incident light into several beams. Triangular-lattice graded- index PCs are combined to focus each branch. Thus, the beam splitter has functions of both beam splitting and focusing.

NSa3A.57

High Performance Flexible Supercapacitors Based on Multilayer PANI/Au Electrodes, Xu Xiao, Tianpeng Ding, Longyan Yuan, Tianqi Li, Xianghui Zhang, Yuanzhi Cao, Jun Zhou; *Wuhan National Laboratory for Optoelectronics (WNLO), and School of Optical and Electronic Information, Huazhong University of Science and Technology (HUST), China*. Enhanced electrochemical performance was achieved through a multilayer PANI/Au electrodes. An all-solid-state supercapacitor was fabricated using a polyvinyl alcohol /H3PO4 electrolyte, which was lightweight and exhibited a high areal capacitance of 117 mF/cm2 with great rate capability.

NSa3A.58

High Ultraviolet Photoresponse from ZnO Nanorod Arrays, Fang Yi[1], Yunhua Huang[1], Xiaoqin Yan[1], Zhiming Bai[1], Zengze Wang[1], Xiang Chen[1], Qi Zhang[1], and Yue Zhang[1,2]; [1]*State Key Laboratory for Advanced Metals and Materials, School of Materials Science and Engineering,University of Science and Technology Beijing, China;* [2]*Key Laboratory of New Energy Materials and Technologies, University of Science and Technology Beijing, China*. A novel and simple method was created to fabricate the UV photodetectors based on ZnO nanorod (NR) arrays. The ZnO NRs device showed much better performance than the conventional ZnO film device.

NSa3A.59

Tachometer based on photovoltaic cell consisting of ZnO MNW/GaN film p-n heterojunction, *Xin Li[1], Junjie Qi[1], Qi Zhang[1], Xiaofeng Hu[1], Yue Zhang[1,2]; [1]State Key Laboratory for Advanced Metals and Materials, School of Materials Science and Engineering, University of Science and Technology Beijing, China; [2]Key Laboratory of New Energy Materials and Technologies, University of Science and Technology Beijing, China*. An ultraviolet(UV) photoelectric tachometer was fabricated using photovoltaic cell as the detector component, which could detect rotating speed as high as 120rpm without external power supply. The on/off ratio increases as the rotation speed increases.

N3 Room A101 (WNLO)
16:00 -- 18:00
NSa4A • Nanomaterials: Design, Synthesis and Characterization II
Presider: Hong Liu; Shandong Univ., China

NSa4A.1 • 16:00 (Invited)
Large scale Single-crystal Cu(In,Ga)Se2 Nanotip Arrays For High Efficiency Solar Cell, Yu-Lun Chueh[1]; *[1]MSE, National Tsing Univ., Taiwan.* In this paper, we demonstrated direct formation of large area Cu(In,Ga)Se2 nanotip arrays (CIGS NTRs) by using one step Ar+ milling process without template.

NSa4A.2 • 16:30
Photoluminescence properties of gallium nitride nanowires grown by plasma-enhanced hot filament chemical vapor deposition, Yuqing Wang[1], Ruzhi Wang[1]; *[1]College of Materials Science& Engineering, Beijing Univ. of Technology, China.* Gallium nitride nanowires (GaN NWs) were synthesized by plasma-enhanced hot filament chemical vapor deposition. The structures and photoluminescence properties were measured and analyzed.

NSa4A.3 • 16:45
Size-tunable synthesis of ferroelectric KNbO3 nanowires, Chengyan Xu[1,2], Su Ding[1], Kai He[3], Yang Li[1], Liang Zhen[1,2]; *[1]School of Materials Science and Engineering, Harbin Inst. of Technology, China; [2]MOE Key Laboratory of Micro-system and Micro-structures Manufacturing, Harbin Inst. of Technology, China; [3]Department of Materials Science and Engineering, Univ. of Maryland, USA.* We report a simple and time-saving hydrothermal approach for the synthesis of single-crystalline KNbO3 nanowires with tunable widths, starting from KNb3O8 nanobelts, and the ferroelectric properties of individual nanowire were measured by scanning probe microscope.

NSa4A.4 • 17:00
Multiple-shelled Hollow Microspheres Integrated by ZnO Nanodots as UV Photodetectors for Use in Space with Omnidirectional Supersensitivity, Der-Hsien Lien[1], Jr-Hau He[1], Zhenghong Dong[2], Dan Wang[2]; *[1]Department of Electrical Engineering, National Taiwan Univ., Taiwan; [2]Inst. of Process Engineering, Chinese Academy of Sciences, China.* We demonstrate a feasible strategy on practical application of UV photodetectors using multiple-shelled hollow ZnO microspheres integrated by nanodots for space application with photogain of G ~ 10 and omnidirectional sensitivity.

NSa4A.5 • 17:15
Size effect on the photoluminescence of single-crystal pre-perovskite nanofibers, zhaohui ren[1]; *[1]Materials Science and Engineering, Zhejiang Univ., China.* Size-controlled synthesis of pre-perovskite (PP) PbTiO3 nanofibers has been achieved, and no obvious size effect on the green and near infrared photoluminescence (PL) emission of the nanofibers was observed.

NSa4A.6 • 17:30
Ab initio study of advanced functional materials, Li-Min Liu[1]; [1]*Beijing Computioanl Science Research Center, China.* Ab initio total energy calculations and molecular dynamics calculations have been used to examine the functional materials, such as TiO2 and graphene in order to advance our understanding and prediction of novel structures and properties.

N3 Room A201 (WNLO)
16:00 -- 18:00
NSa4B • Nanophotonics II
Presider: Jun He, National Center for Nanoscience and Technology, China

NSa4B.1 • 16:00 (Invited)
Manipulating Light with a Single Nanowire, Limin Tong[1]; [1]*Dept of Optical Engineering, Zhejiang Univ., China.* As typical one-dimensional nanostructures, photonic nanowires (e.g., semiconductor nanowires, glass nanowires, polymer nanowires and metallic nanowires) offer unique properties for manipulating light on nanoscale with tight optical confinement, strong near-field interaction, field enhancement and abnormal dispersion, which opens new opportunities for exploring light-matter interaction on the nanoscale, as well as for intriguing nanoscale photonic circuits and devices that is superior to their conventional counterparts. This talk introduces our recent work on the generation (e.g., nanowire light emission and lasing), wavelength conversion (e.g., second-harmonic and supercontinuum generation in single nanowires), propagation (e.g., nanowire waveguides), modulation (e.g., single nanowire ultrafast optical modulators) and detection (e.g., single nanowire photodetector and sensors) of light with single nanowires.

NSa4B.2 • 16:30 (Invited)
Near-Field Optical Modification of individual nano-objects, Regis Barille[1]; [1]*Moltech Univ. of Angers, France.* We show that by applying the local near-field optical excitation on a photoinduced material, we control step-by-step the reshape of individual doughnut-shaped nano-objects, and demonstrate its perfect new performance as functional nano-objects.

NSa4B.3 • 17:00 (Invited)
Light-harvesting scheme employing the nanoscale photon management in optoelectronic devices, Jr-Hau He[1]; [1]*National Taiwan Univ., Taiwan.* This report paves the way to optimize the nanostructured optoelectronic devices with efficient light management by controlling structure profile of nanostructures.

NSa4B.4 • 17:30
A Light-emitting-device (LED) with Monolithic Integration on Bulk Silicon in a Standard CMOS technology, Kaikai Xu[1,2], Guann-pyng Li[2,3]; [1]*Electrical Engineering and Computer Science, Univ. of California, Irvine, USA;* [2]*Integrated Nanosystems Research Facility, USA;* [3]*California Inst. for Telecommunications and Information Technology, USA.* We have succeeded in realizing a silicon light emitting device in a standard 3-µm CMOS process with no change to the CMOS design and processing procedures. This device has obvious applications in the electro-optical interconnect.

NSa4B.5 • 17:45
Hydrothermal Synthesis of Porous SiO2@TiO2 Microspheres and Their Photocatalytic Degradation of Gaseous Benzene, Chao Zhang[1], Yueli Liu[1], Jie Yang[1], Zhuoyin Peng[1], Zhou Jing[1], Wen Chen[1]; [1]*Wuhan Univ. of Technology, China.* A novel kind of porous SiO2@TiO2 microspheres have been synthesized by a convenient hydrothermal method with SiO2 spheres as the core strcuture, which exhibits an enhanced degradation rate towards gaseous benzene than that of P25.

N3 Room A202 (WNLO)
16:00 -- 18:00
NSa4C • Nanoprobe and Nanoimaging II
Presider: Shuming Nie; Emory Univ., USA

NSa4C.1 • 16:00 (Invited)
Design of Multi-Functional Conjugated Polymers for Sensing, Imaging and Biomedical Applications, Shu Wang[1]; [1]*Inst. of Chemistry, The Chinese Academy of Sciences, China.* Water-soluble conjugated polymers (CPs) provide a unique platform for chemical and biological sensors in view of their optical signal amplification effect. Our recent studies showed that these polymers could be used for detecting gene modifications, such as single nucleotide polymorphisms (SNPs) and DNA methylation. Genotyping of SNPs will take a deep insight into understanding and clinically diagnosing the complex diseases. The DNA methylation plays a key role in control of gene expression, genomic integrity maintenance and cancer origin. We use CPs/DNA complexes combing with fluorescence resonance energy transfer (FRET) processes to assay SNP genotyping and DNA methylation, thus offering new assay strategies based on conjugated polymers. In recent years, the drugs integrating recognition, imaging and therapeutic functions have attracted more and more attention. They are expected to become a new strategy for the treatment of major diseases. We developed a new technique for preparing multicolor microparticles based on the self-assembly of bacteria and conjugated polymer nanoparticles (CPNs). They can be successfully applied for cell imaging and optical barcoding. A polythiophene unctional porphyrin dyad was material that simultaneously provides therapeutic action and image the results provide new strategies for the treatment of various diseases. A cationic poly(p-phenylene vinylene) derivate bearing polyethylene glycol (PEG) side chains was also synthesized and used for selective recognition, imaging and killing of bacteria over mammalian cells. This material exerts a far-reaching impact on the future development of antimicrobial materials. These results exhibit that the multi-functional conjugated polymers are ideal platforms for recognition, imaging and disease therapy.

NSa4C.2 • 16:45 (Invited)
Nanoprobes for imaging cells at the nanoscale, Chunhai Fan[1]; [1]*Shanghai Inst. of Applied Physics, Chinese Academy of Sciences, China.* There has been increasing demands to image cells at the nanoscale, which nevertheless is hampered by the optical limit of 200-300 nm. With the raid advances of super-resolution optical imaging, it has been possible to break such a barrier and realize a high resolution of tens of nanometers. While the majority of super-resolution techniques rely on the modification of light field, we herein propose an alternative approach that relies on the design of fluorescent probes. By using a DNA nanostructure-enabled FRET pair that can likewise self-quench the outskirt of the focal spot, we have developed an easy-to-implement way to sub-diffraction limit imaging of cells. Parallel to our efforts on optical imaging, we have also been devoted to develop metal nanoparticle-based nanoprobes for synchrotron-based X-ray imaging of cells, which can realize high resolutions of sub-100 nm..

NSa4C.3 • 17:30
Molecular Photoswitches for Super-Resolution Optical Imaging, Ming-Qiang Zhu[1]; [1]*Huazhong Univeristy of Sci and Tech, China.* We report a series of fluorescence molecular switches including spiropyrans (SPs), dithienylethenes (DTEs) and hexaarylbiimidazoles (HABIs) and investigate their optical properties such as photochromism and photoswitchable aggregation-induced emission (condensed-state).

18:00 – 21:00, Welcome Banquet and Poster Award

Sunday, 26 May 2013

N3 Room A101 (WNLO)
08:00 -- 10:00
NSu1A • Nanosensors
Presider: To Be Announced

NSu1A.1 • 08:00 (Invited)
One-dimensional ZnO Nanomaterials Based Electronics and Sensing Devices, Yue Zhang[1,2]; *[1]State key laboratory for advanced metals and materials, Univ. of Science and Technology Beijing, China; [2]School of materials science and engineering, Univ. of Science and Technology Beijing, China.* One-dimensional ZnO nanomaterials are envisioned as promising building blocks of future nano-electronics due to its semiconducting and piezoelectric properties. Design and fabrication of novel electromechanical, piezotronic and optoelectronic devices will be presented in this report.

NSu1A.2 • 08:30 (Invited)
Design and Synthesis of Kinked Nanowire Structures for Nanoelectronic Bioprobes, Liqiang Mai[1]; *[1]Wuhan Univ. of Technology, China.* We present design and synthesis of diverse functional kinked nanowire structures for nanoelectronic bioprobes, including (1) U-shaped KNWs with a nanoFET at the tip of the "U," (2) V-shaped KNWs with series multi-nanoFETs along the arm and at the tip of the "V," and (3) W-shaped multiplexed KNWs integrating nanoFETs at the two tips of "W."

NSu1A.3 • 09:00
Thermal driving and electric driving of metal Ga/In in nanotubes aiming at NTMs and NEMs, Yihua Gao[1], Yoshio Bando[2]; *[1]Wuhan National Lab for Optoelectronics, School of physics, Huazhong Univ. of Science and Technology, China; [2]International Center for Materials Nanoarchitectonics (MANA), National Inst. for Materials Science (NIMS), Japan.* Ga filled carbon nanotubes (CNTs) and oxide nanotubes were fabricated. It is demonstrated that the Ga filled CNTs can serve as nanothermometers or thermal driving units for nanoscale thermally mechanical systems (NTMs) and nanoscale electrically mechanical systems (NEMs).

NSu1A.4 • 09:15
Tin oxide based gas sensor for in-door air quality monitoring, Lianfeng Zhu[1], Guosheng Gai[1], Changyue Zhang[2], Xuewen Ji[3], Youwei Yao[2]; *[1]Department of Materials Science and Engineering, Tsinghua Univ., China; [2]Graduated School at Shenzhen, Tsinghua Univ., China; [3]Shenzhen Dovelet Sensors Technology Co. LTD, China.* Tin oxide nanograins doped with 0.1 at% of antimony have shown highly sensitivity towards tail gas, carbon monoxide and second-hand smoke. Such sensors are very useful for air quality monitoring.

NSu1A.5 • 09:30
In-situ measurement with fiber Bragg sensors in lithium batteries for safety usage, Gang Yang[1,2], Catia Leitão[1], Yuhong Li[2], João Pinto[1], Xuefan Jiang[2]; *[1]Department of Physics & I3N, Univ. of Aveiro, Portugal; [2]Jiangsu Laboratory of Advanced Functional Material, Changshu Inst. of Technology, China.* Fiber Bragg grating sensors are integrated in lithium batteries to measure temperature variations during batteries operated under normal and abnormal conditions. The thermal stabilities of four kinds of cathode materials are estimated using FBGs.

NSu1A.6 • 09:45
Special Immunoassay for Ampicillin Detection in Milk Using a SPR Biosensor, Zengfu Zhang[1], Wenliang Chen[1], Huijuan Zhao[1], Kexin Xu[1]; *[1]State Key Laboratory of Precision Measuring Technology and Instruments, Tianjin Univ., China.* An immunoassay was developed using a miniature surface plasmon resonance (SPR) biosensor. The limit of detection of ampicillin was 2.5ng mL-1 and the assay is suitable for routine use within 15min.

N3 Room A201 (WNLO)
08:00 -- 10:00
NSu1B • Nanophotonics III: Plasmonics
Presider: Baojun Li; Sun Yat-Sen Univ., China

NSu1B.1 • 08:00 (Invited)
Plasmon Coupling between Colloidal Gold Nanorods, Jianfang Wang[1]; [1]*Department of Physics, The Chinese Univ. of Hong Kong, Hong Kong.* The plasmon coupling between colloidal Au nanorods is studied. It is strongly dependent on the spacing, angle, and position of Au nanorods. Our results are useful for designing functional Au nanostructures for various technological applications.

NSu1B.2 • 08:30
Surface Plasmon sensor based on bilayer metallic nanowire grating, yi she[1,2]; [1]*National Engineering Laboratory for TFT, Shanghai Jiao Tong Univ., China;* [2]*Department of Electronic Engineer, Shanghai Jiao Tong Univ., China.* A bilayer metallic grating was fabricated by laser interfere lithography and E-beam evaporation. The lateral-guiding mode resonances excite a sharp peak in the reflection spectrum, which is red shifted with increase of reflective index and incident angles for sensors.

NSu1B.3 • 08:45
Multiplex plasmonic nanosensor for selective detection of different metal ions based on single type of gold nanorod, Haowen Huang[1], Qian Zhao[1], Shenna Chen[1], Fang Liu[1]; [1]*School of Chemistry and Chemical Engineering, Hunan Univ. of Science and Technology, China.* A novel concept was introduced to selectively determine different metal ions based on single type of gold nanorod. The sensitive GNR-based multiplex throughput sensor is based on the variations of nanostructure induced by different metal ions, in which the analyses are readily implemented with longitudinal plasmon wavelength changes of nanorods.

NSu1B.4 • 09:00
Proposal for phase regeneration of phase-shift keying signals in nonlinear hybrid plasmonic waveguides, JiHua Zhang[2,1], Ping Zhao[2], Eric Cassan[1], XinLiang Zhang[1]; [1]*Universite de Paris-Sud XI, France;* [2]*Wuhan National Laboratory for Optoelectonics, Huazhong Univ. of Science and Technology, China.* Phase regeneration of PSK signals is proposed based on the efficient optical parametric amplification process in a highly-nonlinear symmetric hybrid plasmonic waveguide with a nonlinear polymer as the active material in a 150µm long device.

NSu1B.5 • 09:15
Tunable terahertz isolator based on metal-magneto-optic plasmonic lens, Fei Fan[1], Sheng-Jiang Chang[1]; [1]*Nankai Univ., Inst. of Modern Optics, Nankai Univ., China.* A tunable metal-magneto-optic plasmonic lens for terahertz isolator is demonstrated, which has not only the focusing feature but also nonreciprocal transmission property with an isolation bandwidth of larger than 0.4THz and maximum isolation of 110dB.

NSu1B.6 • 09:30
Electrical modulation of surface plasmon polariton based on graphene-nanowire hybrid structure, Haoliang Qian[1], Yaoguang Ma[2], Qing Yang[1], Zhong Lin Wang[3,4]; [1]*Optical Engineering, Zhejiang Univ., China;* [2]*Physics, Peking Univ., China;* [3]*School of Material Science and Engineering, Georgia Inst. of Technology, USA;* [4]*Beijing Inst. of Nanoenergy and Nanosystems, Chinese Academy of Sciences, China.* We demonstrate a dynamic surface plasmonic modulation based on graphene-nanowire hybrid structures at optical frequency, on the basis of the tunable optical absorption between SPPs and graphene through an applied external voltage.

NSu1B.7 • 09:45
Symmetry Breaking in Perforated Bowtie Nanoantennas, Ji Chen[1], Fangwang Gou[1], Lei Li[1], Zhaoyu Zhang[1]; [1]*Peking Univ. Shenzhen Grad School, China.* The type of asymmetric perforated bowtie nanoantennas

are studied numerically. The asymmetry structure leads to mode splitting and gap intensity changing and it shows wonderful sensitivity as the nanosensors to the local dielectric environment.

N3 Room A202 (WNLO)
08:00 -- 10:00
NSu1C • Nanoprobe and Nanoimaging III
Presider: Xiao-cong Yuan; Nankai Univ., China

NSu1C.1 • 08:00 (Invited)
Development of Novel Fluorescent Proteins for Superresolution Imaging, Tao Xu[1]; *[1]Inst. of Biophysics, Chinese Academy of Sciences, China.* We developed several novel probes, mGeos, with various switching rates and two truly monomeric RSFPs, mEos3.1 and mEos3.2, with the good photochemical properties and high labeling density. These are suitable for (F)PALM/STORM imaging.

NSu1C.2 • 08:45 (Invited)
Far-field Optical Nanoscopy via Visible Light, Xu Liu[1], Xiang Hao[1], Cuifang Kuang[1]; *[1]Zhejiang Univ., China.* Several newly proposed methods that can realize optical super-resolution imaging in the far-field are discussed in this paper, including their corresponding physical mechanisms, application scales, advantages, and limitations.

NSu1C.3 • 09:30 (Invited)
Stimulated emission depletion point spread function generation with vector solution, Hao Xie[1], Yujia Liu[1,2], Dayong Jin[2], Peng Xi[1]; *[1]Dept. of Biomedical Engineering, Peking Univ., China; [2]Advanced Cytometry Labs, MQphotonics Research Centre, Macquarie Univ., Australia.* The excitation and depletion point spread functions of stimulated emission depletion optical microscopy have been derived, based on the vectorial diffraction theory. The performance of STED with high numerical aperture objective can be simulated with this method.

10:00 – 10:30, Coffee/tea break

N3 Room A101 (WNLO)
10:30 -- 12:15
NSu2A • Piezotronics and Nanogenerator
Presider: To Be Announced

NSu2A.1 • 10:30 (Invited)
Piezotronics and Piezo-phototronics, Zhong L. Wang[1,2]; *[1]Georgia Inst. of Technology, USA; [2]Beijing Inst. of Nanoenergy and Nanosystems, China.* Electronics fabricated by using inner-crystal piezopotential as a "gate" voltage to tune/control the charge transport behavior is named piezotronics, with applications in strain/force/pressure triggered/controlled electronic devices, sensors and logic units. Piezo-phototronic effect is a result of three-way coupling among piezoelectricity, photonic excitation and semiconductor transport, which allows tuning and controlling of electro-optical processes by strain induced piezopotential.

NSu2A.2 • 11:15 (OSA Invited)
Piezotronics and Piezo-phototronics effect on photovoltaic devices, Yan Zhang[1,2], Zhong Lin Wang[2,1]; [1]*Beijing Inst of Nanoenergy/Nanosystem, China;* [2]*School of Material Science and Engineering, Georgia Inst. of Technology, USA.* Piezotronics and piezo-phototronics effect: the piezopotential in piezoelectric semiconductor materials can effectively tunes/control the carrier separations and transport, which can improve the photovoltaic devices performances, especially for flexible and printed organic/inorganic piezoelectric semiconductor solar cell.

NSu2A.3 • 11:45 (Invited)
Enhanced Cu2S/CdS Coaxial Nanowire Solar Cells by Piezo-Phototronic Effect, Caofeng Pan[2,1]; [1]*Georgia Inst. of Technology, USA;* [2]*Beijing Inst. of nanoenergy and nanosystems, China.* we report the enhanced performance of the piezoelectric core-shell NW PV devices by a factor of 70% using the piezo-phototronic effect, which could control the electron-hole pair transport, separation and/or recombination at pn junction via applied strain.

N3 Room A201 (WNLO)
10:30 -- 12:00
NSu2B • Nanophotonics IV:Nanolasers
Presider: Jianfang Wang; Chinese Univ. of Hong Kong, Hong Kong

NSu2B.1 • 10:30 (OSA Invited)
Lasing from flexible microcavities and their Applications, Van Duong Ta[1], Rui Chen[1], Handong Sun[1]; [1]*Division of Physics and Applied Physics, Nanyang Technological Univ., Singapore.* Microcavities with various configurations including microfibers, hemispheres, and spheres are fabricated in a flexible way. By loading dye molecules in these structures, high Q optically pumped lasing is obtained and their sensing applications are demonstrated.

NSu2B.2 • 11:00 (Invited)
"Seeing" the resonant modes confined in metal nanocavities via cathodoluminescence spectroscopy, Dapeng Yu[1]; [1]*Peking Univ., China.* Template stripping method was proposed to fabricate full metal nanocavity with ultrasmooth surface. Cathodoluminescence spectroscopy was employed to study the resonant modes of the SPPs) confined in the nanocavities.

NSu2B.3 • 11:30
Tunable Mode-Locked External-Cavity Quantum-Dot Laser, Jian Wu[1], Peng Jin[1], Xin-Kun Li[1], Heng Wei[1], Ju Wu[1], Zhan-Guo Wang[1]; [1]*Inst. of Semiconductors, China.* Wavelength tuning of 35.7 nm is demonstrated in a prism-coupled mode-locked external-cavity quantum-dot laser. Fundamental mode locking of 520 MHz is achieved. The maximal average power of 16 mW is measured at 1183.5-nm wavelength.

NSu2B.4 • 11:45
Modulating the Quantum Dot Light Emission by Ordered Anodic Alumina Oxide Template, Zhangkai Zhou[1], Huanjun Chen[1], Xuehua Wang[1]; [1]*Sun Yat-Sen Univ., China.* We here report that the emission spectrum as well as the lifetime of the photoluminescence of the semiconductor quantum dots can be strongly modulated by depositing them onto the anodic alumina oxide (AAO) template.

N3 Room A202 (WNLO)
10:30 -- 12:40
NSu2C • Nanoprobe and Nanoimaging IV
Presider: To Be Announced

NSu2C.1 • 10:30 (Invited)
Using Multi-focal Structure Illumination to Study Cell Structure, Liangyi Chen[1]; [1]*Peking Univ., China.* Multifocal structured illumination microscopy (MSIM) is an imaging technique that combines structure illumination microscopy (SIM) with laser confocal scanning microscopy (LCSM). It has the advantage of both techniques: two-fold increase in lateral resolution as SIM does and perfect optical section ability as LCSM does. Therefore, MSIM is suitable for observing fine structure in thick biological samples. Taking advantage of such characteristics, we have built up a super-resolution system including both hardware and software. It integrates the conventional SIM with novel MISM, and can be easily switched between different modes. Using this system, we did some preliminary bioresearch, such as observing the tubulin in Hela cells and the actin in thicker cells such as insulinoma INS-1 cells. We show a increase in optical resolution as observing both samples.

NSu2C.2 • 11:00 (Invited)
Multi-molecule parallel tracking in three dimensions, Danny Chen; *Shenzhen Univ., China.* Not available

NSu2C.3 • 11:30 (Invited)
Lysosome-Targetable Molecular Probes for Fluorescence Imaging in Live Cells, Yi Xiao[1]; [1]*Dalian Univ. of Technology, China.* I would like to present our recent works on the development of new molecular probes specifically localizing in subcelluar organelles, especially lysosomes and their applications for monitoring the local changes through fluorescence microscopy.

NSu2C.4 • 12:00 (Invited)
Globally tracking single virions using quantum dots, Daiwen Pang[1]; [1]*Wuhan Univ., China.* Exploring the viral infection mechanism is important for preventing and controlling viral diseases and rationally designing antiviral drugs. Single-particle tracking (SPT) is a powerful technique for revealing real-time and in-situ dynamics of single-virus events in live cells. However, most of previously reported tags for single-virus tracking have low labeling efficiency and photoinstability, unfavorable to imaging. We have developed a single-virion labeling strategy based on quantum dots (QDs), which possess exceptional photostability and high fluorescence brightness, allowing to track biomolecules over unprecedented durations with a high signal-to-noise ratio. This strategy could achieve nearly total labeling of all influenza virions with QDs. Accordingly, we developed a QDs-based SPT technique to efficiently and globally investigate virus infection behaviors in individual cells. The technique can be used to unravel virus infection and solve some pending problems, such as how influenza viruses move and interact with late endosomes in host cells. For better understanding of virus infection, we developed a new single-particle localization algorithm for QDs-based tracking of individual virions in three dimensions (3D). A rapid and subpixel-accuracy algorithm for 3D localization has been proposed. The computing speed is as fast as that of the centroid method, and the computing accuracy is as good as that of Gaussian fitting method. These are very meaningful for accurately and rapidly processing massive 3D image data. The mechanism of virus infection is being studied by 3D imaging using QDs with excellent optical properties. Overall, the techniques developed in our lab are expected to be widely used for globally studying the transport behaviors of viruses at the molecular level to unravel their infection mechanism..

12:00 – 13:30, Lunch Break

N3 Room A101 (WNLO)
13:30 -- 15:45
NSu3A • Nanoelectronics
Presider: Yue Zhang; Univ. of Science and Technology Beijing, China

NSu3A.1 • 13:30 (OSA Invited)
Flexible Inorganic Self-Powered Electronic Systems, Keon Jae Lee[1]; [1]*KAIST, Republic of Korea.* This seminar introduces three recent progresses that can extend the application of high performance flexible inorganic electronics.

NSu3A.2 • 14:00 (Invited)
One-Dimension Al4O4C Ceramics: a New Type of Blue Light Emitter, Cairong Ding[1], Chengxin Wang[1], Yong Sun[1]; [1]*Sun Yat-sen Univ., China.* As a kind of ceramics materials, Al4O4C hardly any active functions have been found except for used as additive in carbon-containing refractories to improve oxidation resistance and thermal properties. Here, we developed a method to synthesize Al4O4C micro-nano needle and expose its potential application as photoelectric material.

NSu3A.3 • 14:30 (Invited)
Flexible and tunable nanowire photonic devices, Qing Yang[1]; [1]*State Key Laboratory of Modern Optical Instrumentation, Department of Optical Engineering, Zhejiang Univ., China.* We review our work on NW photonic devices from fabrication, characteristics to tuning/modulation/enhancement of NW devices, including ultraviolet photodectors, light emitting diodes surface plasmon modulators, and nanoscale lasers.

NSu3A.4 • 15:00
Preparation and Characterization of Ca(Zn1/3Nb2/3)O3/CaTiO3 MultilayerHeterogeneous Thin Films by Sol-gel Method, Qu Xiao ling[1], Zhou Jing[1], Wen Chen[1]; [1]*State Key Laboratory of Advanced Technology for Materials Synthesis and Progressing, and School of Materials Science and Engineering, China.* Ca(Zn1/3Nb2/3)O3/CaTiO3 multilayer heterogeneous thin films have been prepared by sol-gel method. The films are confirmed to be perovskite phase with dense, uniform surface, which possess higher dielectric constant, extraordinary low dielectric loss.

NSu3A.5 • 15:15
Electrospinning of copper oxide nanofibers, Hui Wu1; 1Tsinghua Univ., China. We fabricated CuO nanofibers through a novel electrospinning method. The nanofiber crystalline structure and morphology have been studied.

NSu3A.6 • 15:30
Technology Advancement for Beijing Technology Science Co.,Ltd

NSu3A.7 • 15:40
Technology Advancement for Agilent Technologies, Inc

N3 Room A201 (WNLO)
13:30 -- 16:00
NSu3B • Nanophotonics V: Metamaterials
Presider: Handong Sun; Nanyang Technological Univ., Singapore

NSu3B.1 • 13:30 (Invited)
Trapping Light by Mimicking Gravitational Lensing, Sheng Chong[1], Hui Liu[1], Yi Wang[1], Shining Zhu[1], Dentcho Genov[2]; [1]*School of Physics, Nanjing Univ., China;* [2]*College of Engineering and Science, Louisiana Tech Univ., USA.* ABSTRACT We propose a distorted optical waveguide around a microsphere to mimic

curved spacetimes caused by the "gravitational fields". Gravitational lensing effects analogues are experimentally demonstrated and this can be used to prospective light harvesting.

NSu3B.2 • 14:00 (Invited)
Self-assembly of nanoparticle monolayer for surface enhanced Raman scattering, Lihua Qian[1]; [1]*Huazhong Univ. of Sci. and Tech., China.* Solvent evaporation at nanoscale space induces nanoparticle assembly into the monolayered array

NSu3B.3 • 14:30
Sensing Applications Based on Metamaterials, Xinlong Xu[1,2]; [1]*Inst. of Photonics & Photon-Technology, Northwest Univ., China;* [2]*Inst. of Physics, Chinese Academy of Sciences, China.* A label-free and specific sensor for streptavidin-agarose (SA) was fabricated based on functionlized terahertz metamaterial. Both low and high frequency resonant modes from the metamaterials are found applicable for the detection of SA.

NSu3B.4 • 14:45
The optimization of SRR arrays on optically controlled terahertz metamaterials, Feng Lishuang[1], Sui Jiawei[1]; [1]*Beihang Univ., China.* We theoretically present optically controlled tuned terahertz metamaterials.The simulation results revealed that the modulation depth could reach to 97%.The short photocarrier lifetimes in GaAs lead to rapid modulation speed.

NSu3B.5 • 15:00
Large electromagnetic field enhancement in Au triangle for optical kerr effect, Zhangkai Zhou[1]; [1]*School of Physics and Engineering, Sun Yat-Sen (Zhongshan) Univ., China.* Using UV-vis-NIR spectroscopy and Finite Difference Time Domain (FDTD) method, we experimentally and theoretically investigated the dipole and quadrupole plasmon mode in Au triangles, and found large electromagnetic field enhancement, which makes the Au triangle be good optical kerr effect material.

NSu3B.6 • 15:15
Optical properties and biosensor applications of gold nanorods, Xuefeng Yu[1,2], Paul K. Chu[1]; [1]*Department of Physics and Materials Science, City Univ. of Hong Kong, China;* [2]*Department of Physics, Wuhan Univ., China.* In this talk, I present our recent work in the area of gold nanorods. Examples include localized surface plasmon resonance properties, two-photon luminescence, synthesis of gold nanorod-based nanocomposites, and corresponding biosensor applications.

NSu3B.7 • 15:30
Surface-enhanced Raman Scattering Substrates Prepared by Magnetron Sputtering Using Anodized Titanium Oxide Nanotube Ends as Template, Wenjun Zhang[2,1], Ming Xu[2], Xuming Zhang[3], Paul K. Chu[3]; [1]*Department of Microelectronics, Fudan Univ., China;* [2]*College of Materials Science and Engineering, Huazhong Univ. of Science and Technology, China;* [3]*Department of Physics and Materials Science, City Univ. of Hong Kong, Hong Kong.* A convenient process is introduced to prepare silver nanoarrays templated by the ends of anodized titanium oxide nanotubes as surface-enhanced Raman scattering substrate. The topography could be tuned by adjusting anode voltage and sputtering time.

NSu3B.8 • 15:45
Plasmonics on metal nanoparticle arrays on metal films, Jiwon Lee[1], Seungyoung Park[1], Hyunhyub Ko[1]; [1]*Nano-Bioscience and Chemcial Engineering, Ulsan National Inst. of Science and Technology (UNIST), Republic of Korea.* We investigated surface-enhanced Raman scattering (SERS) effects on high-density gold nanostar arrays on various metal and dielectric substrates and demonstrated how the interparticle separations affect the E-field enhancements from the interparticle and particle-film plasmon couplings.

N3 Room A202 (WNLO)
13:30 -- 16:05
NSu3C • Nanoprobe and Nanoimaging V
Presider: Xu Liu; Zhejiang Univ., China

NSu3C.1 • 13:30 (Invited)
A Novel Method for Accurately Mapping Surface Plasmons, Xiao-cong Yuan[1], Luping Du[2], Changjun Min[1], Hui Fang[1]; [1]*Inst. of Modern Optics, Nankai Univ., China;* [2]*School of Electrical & Electronic Engineering, Nanyang Technological Univ., Singapore.* We present a novel method, based on single nanosphere SERS with the coupling effect between surface plasmon polaritons (SPPs) and localized surface plasmon (LSP), to accurately map the near-field distribution of SPPs.

NSu3C.2 • 14:15 (Invited)
Super-resolution microscopy with DMD-based LED-illumination, Ming Lei[1]; [1]*Xi'an Inst. of Optics and Precision Mechanics, China.* we present a novel structured illumination microscopy (SIM) based on digital micromirror device (DMD) fringe projection with the low-coherence LED light as illumination source. A 90nm in-plane resolution was achieved with gold nano-particles and BPAE cells.

NSu3C.3 • 14:45 (Invited)
Optical Resolution Limit Based on Dielectric Microsphere, Hanmin Guo, Xiaoyu Weng ; *Univ. of Shanghai for Science and Technology, China.* On the basis of the concept of spherical aberration and the phenomena of focal shift, the lateral resolution limitation and the corresponding conditions are demonstrated for the focusing of the dielectric microsphere.

NSu3C.4 • 15:15 (Invited)
Super-resolution Localization Microscopy with sCMOS Camera: the Challenges of Massive Data Handling and Our Solutions, Hongqiang Ma[1], Yina Wang[1], Zhe Hu[1], Shaoqun Zeng[1], Zhen-li Huang[1]; [1]*Britton Chance Center for Biomedical Photonics, Wuhan National Lab for Optoelectronics, China.* Massive data handling is the major challenge in super-resolution localization microscopy. Here we present a data reduction approach to solve this challenge. This approach enables the advantageous use of sCMOS cameras in super-resolution localization microscopy.

NSu3C.5 • 15:35
An Innovative Mode to Capture Clear Image Based on sCMOS ORCA Flash 4.0 for Light Sheet Microscopy, Ji-Ze Zhang, Hamamatsu, China. To enable the best speeds and synchronization for light sheet microscopy, the ORCA-Flash4.0 V2 configured with the Camera Link interface can be read out using the Lightsheet Readout Mode™ feature. In this mode, the camera's Gen II sCMOS sensor is read out in one sweep across the sensor from top to bottom or bottom to top.

NSu3C.6 • 15:50
New synchronised multicolor TIRFM system, Lianfeng Guo; *Senior Engineer, Olympus China Corp., China*. In this topic we will introduce a new auto-motorised TIRFM system--Xcellence,which based on olympus new inverted microscope IX83. Olympus is experienced in providing advanced TIRFM solutions and cell^tirf takes this to the next level with a series of peerless features such as highly advanced optics, unique independent laser control and exceptional accuracy. The cell^tirf system is easy to use for TIRFM, HILO

microscopy and point FRAP for a range of experimental protocols.Olympus cell^tirf enables ultra-sensitive simultaneous multicolour TIRFM using four laser channels with independent beam paths. Individual motorised angle control for each laser ensures equal evanescent penetration (±1 nm) to provide high-contrast images with minimal background noise for cell membrane, surface and single molecule studies, superresolution microscope image. Since the angle of each laser source is independently motorised, their penetration depths can be synchronised across each wavelength within the system using xcellence software. This also provides key data about the penetration depths possible with each laser/objective pair.

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