

2018 IEEE International Conference on Manipulation, Manufacturing and Measurement on the Nanoscale (3M-NANO 2018)

**Hangzhou, China
13 – 17 August 2018**



**IEEE Catalog Number: CFP183MN-POD
ISBN: 978-1-5386-6215-1**

**Copyright © 2018 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP183MN-POD
ISBN (Print-On-Demand):	978-1-5386-6215-1
ISBN (Online):	978-1-5386-6214-4

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

Table of Contents

Session 2 Nanoscale Light Manipulation in Photonic Structures/Materials (ss)

<u>Plasmonic Manipulation and Applications in Nanostructures/Nanomaterials</u>	1
Hua Lu, Ruolan Wang, Zengqi Yue, Jianlin Zhao	

Session 4 FabSurfWAR (ss)

<u>Development of Laser Structured Silicon-based Anodes for Lithium-ion Batteries</u>	6
Yijing Zheng, Peter Smyrek, Hans Jürgen Seifert, Wilhelm Pfleging	

<u>Investigation of Wettability of Zirconia by Nanosecond Laser Treatment</u>	10
Xiubing Jing, Chengjuan Yang, Shuxian Zheng, Xinxiong Chen, Yuechao Zhao	

<u>Effects of Carbon Ion Implantation on Surface Performance of Modified NiTi Shape Memory Alloy</u>	14
Yanling Tian, Yuechao Zhao, Zhen Yang, Chengjuan Yang	

<u>Design of A Novel Piezoelectric Actuated Two-Degree-of-freedom Compliant Stage</u>	18
Sishuo Huang, Xiubing jing, Peng Shang, Fujun Wang	

Session 6 Nanomaterials and Nanofluidics

<u>Controllable Micro/nano-fluidic Channel Bonding Process Based on the Expansion Centerline and “Filling-Barrier” Structure</u>	23
Jian Jin, Si Di, Yu Hua, Jiadong Qi	

<u>Pressure Modulation of Ion Conductance and Selectivity in Nano-channels with Weakly Overlapping Electrical Double Layers</u>	28
Xingye Zhang, Xin Zhu, Zhen Cao, Yang Liu	

<u>A High Pressure Nanofluidic Micro-Pump Based on H2O Electrolysis</u>	32
---	----

Fupeng Liang, Yi Qiao, Mengqin Duan, Na Lu, Jing Tu, Zuhong Lu

[Research on Effect of Particle Size and Sintering Parameters on Porous Transducer](#) 37

Ruoyu Guo, Meiling Wang, Li Ming, Siyuan Cheng, Ke Ning

[Synthesis of Hollow Nano-Structured Cobalt Metal-Organic Framework for Supercapacitor Electrodes](#) 42

Wenlu Xuan, Rajendran Ramachandran, Changhui Zhao, Fei Wang

[Study on Elastic Modulus Enhancement in Particle Filled Polyethylene](#) 47

Yangjiang Wu, Dongyan Wu, Xiao Liu, Zhengzhong Zhang, Hao Liu, Xiaorong Cheng, Xiaohui Li, Zhijun Hu

[Structure, Topology, Vibrational Frequency, Frontier Molecular Orbital Gaps, Stability, Charge, NICS, and](#) 51

[Conductivity of Non-segregated Silicon Heterofullerenes: A DFT Approach](#)

Somayeh Soleimani-Amiri, Maryam Koohi

Session 8 Laser based Submicro and Nanoprocessing (ss)

[Modulating Photonic Crystal Structures to Generate Optical Frequency Combs](#) 55

Henry Francis, Si Chen, Kaijun Che, Yunran Wang, Chi-Hua Ho, Mark Hopkinson, Chaoyuan Jin

[Quality Factor Control in Laterally-Coupled Vertical Cavities](#) 60

Si Chen, Henry Francis, Chih-Hua Ho, Kaijun Che, YunRan, Wang, Mark Hopkinson, Shiyong Zhang, and

Chaoyuan Jin

Session 10 Micro/Nano Robotics for Single Cancer Cells (MNR4SCell) (ss)

[Design and Characteristics of a Novel Compliant Symmetric Microgripper Mechanism](#) 65

Beichao Shi, Fujun Wang, Zhichen Huo, Yanling Tian, Xingyu Zhao, Dawei Zhang

[A Novel Archimedes Planar Springs Flexure Structure for Microforce Actuator](#) 70

Chongkai Zhou, Yanling Tian, Fujun Wang, Mingxuan Yang, Dawei Zhang

Precisely Lateral Alignment of Gold Nanorods Array via Hydrophilic-Hydrophobic Pattern	74
--	----

Shuang Wang, Chang Liu, Yanyan Wang

Effects of Micro-structures on Growth Behaviors of Neurons	79
--	----

Xueying Yang, Caijun Liu, Xing Chen, Ying Wang, Xinyue Wang, Zhengxun Song, Zuobin Wang

Determination of Optimal Curing Conditions for Imaging Single Lung Cancer Cells by Atomic force Acoustic	83
--	----

[Microscope](#)

Xuan Wang, Yujing Zhao, Wenxiao Zhang, Ying Wang, Liguang Tian, Xinyue Wang, Zhengxun Song, Dayou Li, Zuobin Wang

Session 12 Nanoposition and Nanomanipulation

Identification of Nonlinear Time-delay System Using Multi-dimensional Taylor Network Model	87
--	----

Chenlong Li, Hongsen Yan

Rotation Error Suppression for a Doubly Decoupled MEMS Gyroscope	91
--	----

Hengzhi Hu, Xudong Zheng, Yiyu Lin

Design of a Precise Axial Adjusting Mechanism with Three Guiding Flexures for Optical Element	96
---	----

Kang Guo, Defu Zhang, Huanan Chen, Mingyang Ni, Yongxin Sui

Development of a Metal Micro-droplet Ejecting Equipment for Manipulation Jetting Trajectory	101
---	-----

Jieguang Huang, Jun Luo, Kang Zhang, Junxing Cui, Hao Yi, Lehua Qi

Radial Error Motion Measurements at Nanometer-level Precision Using Angle Encoder with Different Four-	105
--	-----

[scanning-heads Arrangements](#)

Yang Jiao, Jiasheng Li, Pinkuan Liu

Session 13 Functional Materials for Bottom up Nano-assembly (ss)

Interaction Forces on Nanoscale: Manipulator-Object-Surface	110
---	-----

Zhengxun Song, Zuobin Wang, Lanjiao Liu, Li Li, Victor Koledov, Peter Lega, Svetlana von Gratosky, Dmitry Kuchin

[Microtweezers on the Basis of Two-Way Shape Memory Alloy Ribbon](#) 114

Alexander Shelyakov, Nikolay Sitnikov, Kirill Borodako, Victor Koledov, Maxim Berezin

[Assembling Nanostructures from DNA Using a Composite Nanotweezers with a Shape Memory Effect](#) 118

Andrey P. Orlov, Anatoly M. Smolovich, Nikolay A. Barinov, Aleksei V. Frolov, Peter V. Lega, Dmitry V. Klinov, Victor V. Koledov

[Bottom up Nano-integration Technique for the Fabrication of Novel Superconducting Quantum Interference Devices](#) 122

[Based on Granular Superconducting Diamond](#)

Somnath Bhattacharyya, Victor Koledov, Svetlana von Gratoski, Christopher Coleman, Dmitry Churochkin, Alexander Zeigler, Farai Mazhandu, Artemy Irzhak

Session 16 Insect Flight and Bionic MAV Wings (ss)

[The Thin Solid Membrane Structure Design of Imitated Dragonfly Wing Adopting Different Transition Structure](#) 126

Chunxiang Pan, Jiyu Sun, Zhenpeng Chen

[Nanomechanical and Angle-dependence Optical Properties in Beetle Popillia Indigonacea Motsch \(Coleoptera\)](#) 130

Jiyu Sun, Wei Wu, Na Li, Xianping Liu, Zhijun Zhang

[Design of Bionic Deployable Wings](#) 134

Jiyu Sun, Chao Liu, Ruijuan Du, Zhijun Zhang

[Effects of Dragonfly Wing Vein Structure on the Flight Characteristics](#) 138

Jiyu Sun, Ruijuan Du, Chao Liu, Xianping Liu, Zhijun Zhang

[Analysis of Light-mass and High-strength Veins of Hind Wing from Asian Ladybird Beetle](#) 142

Jiyu Sun, Zelai Song, Chunxiang Pan, Zhuo Liu

Rheological Properties of Corn Starch Dispersions in Pregelatinized Starch Solution	146
---	-----

Yunhai Ma, Siyang Wu, Jin Tong, Xin Zhang, Jie Peng, Xianping Liu

Study on Preparation Technology of Self-healing Micro-nano Capsule based on Calcium Alginate	151
--	-----

Jiyu Sun, Yueming Wang, Limei Tian, Chunxiang Pan

Session 18 Manufacturing and Measurement of Micro/Nano-Scale Optical Waveguides (ss)

Waveguide Roughness Measuring Metrology with Confocal Laser Scanning Microscope (CLSM)	155
--	-----

Hongpeng Shang, DeGui Sun, Huilin Jiang

Investigation for the Thermal Conduction of Silicon Oxide Waveguide Optical Switch	159
--	-----

Qingyu Sun, DeGui Sun

Study on Polarization State Transition of Singlemode SOI Curved Optical Waveguide Using FDTD	163
--	-----

Yunjie Shi, Degui Sun

Session 20 Functional Materials for Bottom up Nano-assembly (ss)

Electrical Jointing at Micro- and Nanoscale by Electromigration and Mechanical Nano-Manipulation for Bottom-Up	167
--	-----

[Nano-Assembling](#)

Praveen Kumar, Victor Koledov, Svetlana von Gratowski, Rudra Pratap, Artemy Irzhak, Alexey Zhikharev, Andrey

Orlov, Peter Lega, Santanu Talukder, Sumit Kumar, Vijayendra Shashtri

Nano-Manipulation, Nano-Manufacturing, Nano-Measurements by New Smart Material-Based Mechanical	171
---	-----

[Nanotools](#)

Victor Koledov, Vladimir Shavrov, Peter Lega, Svetlana von Gratowski, Alexander Shelyakov, Andrey Orlov,

Artemy Irzhak, Vedamanickam Sampath, Alexey Mashirov

Bottom-Up Nanointegration Technique for Novel Functionalized Carbon Nanotube and Multi-layer Graphene	177
---	-----

[Device Fabrication](#)

Christopher Coleman, Siphephile Ncube, Ibwanga Sav Mosse, Artemy Irzhak, Victor Koledov, Svetlana Gratoski,
Alvaro de Sousa, Somnath Bhattacharyya

[Patterning Cr Film by Passing Electric Current through a Traversing Pointy Stylus: Introduction to
Electrolithography and Its Prospects](#) 181

Praveen Kumar, Rudra Pratap, Santanu Talukder, Sumit Kumar, Vijayendra Shastri, Raman Maurya, Mruthyunjaya
Swamy K B

Session 21 University of Shanghai Cooperation Organization Nanotechnology (ss)

[Large Stroke Tracking of a Nanomanipulator with Anticipatory Anti-windup Compensation of Time-varying Internal
Principle-based Control](#) 186

Mengjia Cui, Zhen Zhang

[Electrical Discharge Machining of SiCp/2024Al Composites](#) 192

Peng Yu, Jinkai Xu, Yiquan Li, Zhanjiang Yu, Zhongxu Lian, Huadong Yu

[Fabrication of Three-Dimensional Si-Au Hierarchical Nanostructures by Laser Interference Lithography](#) 197

Litong Dong, Lu Wang, Mengnan Liu, Miao Yu, Zuobin Wang, Ziang Zhang, Dayou Li

[Experimental Study on Surface Roughness and Surface Micro-morphology of SiCp/Al](#) 201

Xu Wang, Yiquan Li, Jinkai Xu, Huadong Yu, Qimeng Liu, Qiang Du

Session 22 NEMS and their Applications

[Free Modal Calculation of Cylinder Head of an Engine](#) 205

Qianyi Yu, Wen Cheng, Fengyu Xu, Huadong Yu, Jinkai Xu, Yonghua Wang

[Application of Adaptive Federated Filter Based on Innovation Covariance in Underwater Integrated Navigation
System](#) 209

Xiaoshuang Ma, Tongwei Zhang, Xixiang Liu

<u>Analysis of Vibration Noise of A Certain Type of Turbocharged Direct Jet Engine Complete Machine</u>	214
Fengyu Xu, Yonghua Wang, Qianyi Yu, Wen Cheng, Jinkai Xu, Huadong Yu	
<u>Sensing Characteristics of Fano Resonances in Y-shaped Gold Nanorods Array</u>	219
Li Wang, Yanbing Leng, Yanjun Sun, Lianhe Dong	
<u>Analysis of Temperature Field in Cylinder Head and Cylinder Block of Engine</u>	223
Haiquan Wu, Yonghua Wang, Zheming Liu, Jinkai Xu, Huadong Yu	
<u>Calculation and Optimization of the Cover Model of an Engine Valve Chamber</u>	228
Wen Cheng, Yonghua Wang, Qianyi Yu, Jinkai Xu, Huadong Yu	
<u>Graphene-based Tunable Terahertz Metamaterial Absorber with High Absorptivity</u>	232
Jianxun Song, Yongzhao Xu, Dongxiong Ling, Dongshan Wei, Chang Yang, Yun Shen	
<u>Enhancing Performance in Thin Film Transistors with Vacuum or Solution Processed Amorphous Oxide</u>	237
<u>Semiconductors Towards Display Applications</u>	
Changdong Chen, Gongtan Li, MinMin Li, Bo-Ru Yang, Chuan Liu, Chia-Yu Lee, Yuan-Chun Wu, Po-Yen Lu, Han-Ping D. Shieh	
Session 24 Nanofabrication and Nanocharacterization	
<u>Nanofabrication Techniques Used for Suppressing Multipactor in Space Applications</u>	241
Jing Yang, Wanzhao Cui, Guibai Xie, Yan Bao, Ming Ye, Qiangqiang Song	
<u>An Experimental Study of Ultrasonic Assisted Micro-Holes Drilling</u>	245
Huadong Yu, Guangjun Chen, Jinkai Xu, Jingdong Wang, Zhanjiang Yu, Xiang Tang	
<u>3D Printing of Micro Electrolyte Film by Using Micro-pen-writing</u>	249
Yufang Zhao, Jun Luo, Hongcheng Lian, Lehua Qi	

Study on Discharge Gap of Micro-EDM of the Micro Hole in Titanium Alloy	253
Guangsheng Ma, Peng Yu, Wanwu Hou, Liankai Wang, Jinkai Xu	
Study on Surface Integrity of Mn-Zn Ferrite in Ultraprecision Machining	258
Bingge Li, Huadong Yu, Jinkai Xu, Yiquan Li, Zhanjiang Yu, Qimeng Liu, Zhongxu Lian	
Experimental Study on Bionic Groove Structure by Nanosecond Laser	264
Yanling Wan, Chuanwen Xi, Lining Xu, Jinkai Xu	
A Method of Studying the Effect of Stress and Thermal-stress Coupling on the Thermal Conductivity of the Film	268
Zhibin Li, Hairong Wang, Huiying Zhao, Hanqing Gu, Jiuhong Wang, Yizhen Ding	
Session 28 Design and Application of Piezoelectric Actuators (ss)	
An Inertial Piezoelectric Hybrid Actuator With Large Angular Velocity and High Resolution	272
Huilu Bao, Jianming Wen, Kang Chen, Jijie Ma, Jiajia Zheng	
Session 29 Design, Analysis and Control of Micro-/nano-manipulating Systems (ss)	
A Novel Modified Auto-regressive Moving Average Hysteresis Model	278
Jiedong Li, Hui Tang, Boyu Zhan, Guixin Zhang, Zelong Wu, Jian Gao, Xin Chen, Zhijun Yang	
A Large Range X-Y Parallel Micro-motion System with Optical Encoder Displacement Feedback	283
Zhiming Zhang, Guangbo Hao, Peng Yan	
Development of a Compact XYZ Nanopositioner Supporting Optical Scanning	288
Yue Wang, Peng Yan	
The Hydrophobic Surface Prepared by Sandblasting-Electroplating on Carbon Steel	294
Jing Li, Yingluo Zhou, Lida Pan, YiJie Zhou, Xudong Wu, Nan Guo	
A Six-DOF Micro-/Nanopositioning System	298

Defu Zhang, Huanan Chen, Pengzhi Li, Mingyang Ni, Kang Guo, Dongping Wang, Zhihui Wu, Jianguo Zhang

[Topological Structure Synthesis of Three-Rotational-DOF Compliant Mechanisms](#) 304

Dachang Zhu, Chunliang Zhang, Yanping Feng

Session 30 Nanoelectronics and Nanophotonics

[Deposition and Alignment of Carbon Nanotubes with Dielectrophoresis for Fabrication of Carbon Nanotube Field-](#) 308

[Effect Transistors](#)

Joevonte Kimbrough, Sam Chance, Brandon Whitaker, Zackary Duncan, Kenneth Davis, Alandria Henderson,

Qunying Yuan, Zhigang Xiao, Fernando Camino

[Effects of Composition on Photoluminescence Properties of Organometal Halide Perovskites Quantum Dots](#) 312

Pengfei Wang, Jinhua Li, Yue Wang, Ke Feng, Xueying Chu, Yingjiao Zhai, Peng Zou, Wenhui Fang, Fangjun Jin

[Study on Adsorbing Dyes Property of Carbon Nanotubes Reinforced Sodium Alginate Nanocomposites](#) 316

Shan Ye, Chen Wang, Xuanlai Zong, Wei Shao

[Crosstalk Analysis and Optimization of Gaussian Networks-on-Chip](#) 321

Yingxue Du , Yiyuan Xie

[Exploring Plasmonic Logic Gates Based on PIT Effect](#) 326

Yun Wang, Yiyuan Xie

Session 31 Biological Applications

[Hybrid Core-shell Particles for Metabolite Detection by Laser Desorption/ionization Mass Spectrometry](#) 331

Md Sohel Rana, Chandrababu Rejeeth, Vadasundari Vedarethinam, Lin Huang, Ru Zhang, Deepanjali D. Gurav,

and Kun Qian

[Nanoparticles as Co-matrix for Sensitive Detection of Nucleic Acids by Mass Spectrometry](#) 336

Xiaomeng Hu, Lin Huang, Lin Wang, Ru Zhang, Qiaomei Guo, Kun Qian, Jiatao Lou

[A Label-Free Electrochemical Biosensor Based on Ligand-Receptor Interaction](#) 341

Xiyuan Liu, Ru Zhang, Chandrababu Rejeeth, Sohel Rana, Deepanjali D. Gurav, Kun Qian

[Biocompatible Protein \(IgG\) Modified Up-conversion Nanoparticles \(NaGdF₄: Yb³⁺, Er³⁺\) Deposited by Matrix Assisted Pulsed Laser Evaporation \(MAPLE\)](#) 345

Songlin Yang, Wai Hei Tse, Jin Zhang

[Size-selected Core-shell Nanoalloys for Laser Desorption/ionization Detection of Small Metabolites](#) 350

Jing Cao, Xuming Sun, Ru Zhang, Jingyi Huang, Kun Qian

Session 32 Nanofabrication and Nanocharacterization

[Development and Experiment of a Novel Vibration-assisted Cutting Apparatus](#) 354

Wanfei Ren, Jinkai Xu, Jieqiong Lin, Zhongxu Lian, Huadong Yu

[Experimental Optimization of Acoustic Properties of Polyurethane Foam](#) 360

Zheming Liu, Yonghua Wang, Haiquan Wu, Jinkai Xu, Huadong Yu

[Growth and Optical Properties of ZnSe Nanofilms Obtained from Modified Ammonia-free Chemical Bath Solution](#) 365

Liangyan Chen, Chao Fang, Weihua Liu, Xiqu Chen, Le Zhao

[Dewetting of Ni Thin Films and Formation of Ni Nanoparticle Arrays on Laser-interference Patterned Substrates](#) 369

Lu Wang, Litong Dong, Li Li, Zhankun Weng, Zuobin Wang

[A Full-swing Inverter Based on IGZO TFTs for Flexible Circuits](#) 373

Jiwen Zheng, Zhaogui Wang, Changdong Chen, Minmin Li, Chuan Liu

Session 34 Nanosensing and Microscopy

[Research on Physical Parameter Measurement System of Fiber Fabry-Perot Interferometer](#) 377

YanJun Li, Wenqi Wu

[Optimization of Phase Noise in Digital Holographic Microscopy](#)

382

Yanan Zeng, Junsheng Lu, Xinyu Chang, Yuan Liu, Xiaodong Hu, Fan Yang

[Image Analysis with the DMD in Convergent Path](#)

386

Yongqiang Sun, Yuan Hu, Yueqi Wang, Yu Zhao, Qi Wang, Yuegang Fu

[Thermal Stability of Bulk Heterojunction Photovoltaics Revealed by Electrical Scanning Probe Microscopy](#)

390

Denghua Li, Han Yan, Yanlian Yang, Zhemin Li, Shiwei Xu

[A Parallel Impedance Measurement System for Electrical Impedance Tomography System with Multi-](#)

397

[Microcontroller-Unit Architecture](#)

Qilong Deng, Yang Su, Siyi Hu, Xiaodong Xiong, Ruoyu Juan, Yan Zhang, Hanbin Ma