

2014 International Symposium on Optomechatronic Technologies (ISOT 2014)

**Seattle, Washington, USA
5-7 November 2014**



**IEEE Catalog Number: CFP1484G-POD
ISBN: 978-1-4799-7141-1**

2014 International Symposium on Optomechatronic Technologies

ISOT 2014

Table of Contents

Organizing Committee.....	xiv
Reviewers.....	xvii
Sponsors.....	xix
Keynote and Plenary Speakers.....	xx

Special Session 2: Acoustic Metamaterials & Phononic Crystals

Nonlinear Wave Dynamics of Origami-Based Mechanical Metamaterials	1
<i>Hiromi Yasuda and Jinkyu Yang</i>	
Tunable Wave Dispersion in 3D Woodpile Mechanical Metamaterials	4
<i>Eunho Kim, Yong Han, Noel Kim, and Jinkyu Yang</i>	
Nonlinear Energy Transmission in a Finite Dissipative Periodic Structure	7
<i>Behrooz Yousefzadeh and A. Srikantha Phani</i>	
Wave Propagation in Woodpile Mechanical Metamaterials	12
<i>Eunho Kim, Yong Han, Noel Kim, and Jinkyu Yang</i>	
Discrete Breathers in a One-Dimensional Granular Metamaterial: Linear Lattice with Nonlinear Local Resonators	15
<i>S. Wallen, C. Chong, P.G. Kevrekidis, and N. Boechler</i>	

Optical and Vision-Based Monitoring/Control and Optomechatronics for Manufacturing Applications

Optimal Spatial Resolution in Catadioptric Sensors for Pipe Inspection Applications	18
<i>Abbasali D. Tezerjani, Mehran Mehrandezh, and Raman Paranjape</i>	

Automatic Safety Video Surveillance-Tracking System to Avoid Vehicle-Workers Interaction for Mining Applications	23
<i>Claudio A. Perez, Carlos M. Aravena, Daniel Schulz, Leonardo Cament, Luis Castillo, Felipe Smith, and Pablo A. Estevez</i>	
Performance Prediction of Visual Algorithms on Different Hardware Architectures	28
<i>Nicolas Soucies and Nizar Ouarti</i>	
Advanced Methods for High-Speed Template Matching Targeting FPGAs	33
<i>Patrick Elfert, Tobias Tiemerding, Claas Diederichs, and Sergej Fatikow</i>	
Oblique Angle Artifact Reduction Using Wavelet-Based Filtering in Off-Centered Circular Geometry of Cone Beam Computed Tomography	38
<i>Kyung-Chan Jin and Yoon-Ho Song</i>	

Special Session 13: Optomechatronic Sensing and Perception

An Iterative Actuator Calibration Method for Accurate N-Bucket Phase-Shifting in Phase Measuring Profilometry: Experiments	42
<i>Deok Hwa Hong and Min Young Kim</i>	
A Reflectometry Approach for Rippling Defect Measurement on High Glossy Surface	47
<i>Jehhoon Bhang, Youngjun Roh, and Daehwa Jeong</i>	
Applications of Functional Near Infrared Spectroscopy as a Brain Optical Imaging Modality for Rehabilitation	50
<i>Jinung An, Seung Hyun Lee, Yoo Jung Lee, Sang Hyeon Jin, and Gwanghee Jang</i>	
A Visual Measurement System for Coil Shipping Automation	57
<i>Tae-Gyoon Lim, Yonghun Kim, Pyungkang Kim, Soohyun Kim, Young-Keun Kim, and Sung Joon Ahn</i>	
Active LOS Stabilization of Pan-Tilt Motion Control System Using an Adaptive Notch Filtering Based on Gyro Sensing and FFT Analysis	61
<i>Byeong-Hak Kim and Min Young Kim</i>	
Circle Fitting to Overcome Vignetting Effect of Afocal Tracking System	66
<i>You Seong Chae, Jong Kyu Hong, and Min Young Kim</i>	

Special Session 2: Acoustic Metamaterials & Phononic Crystals/Special Session 4: Plasmonic Nano Opto Mechanics

Effects of Aspect Ratio and Orientation Angle of Rectangular Inclusion on Self-Collimation Performance of Two-Dimensional Phononic Crystals	69
<i>Chia-Nien Tsai and Lien-Wen Chen</i>	
Plane Wave Propagation in Two Dimensional Auxetic Periodic Structures	73
<i>Mohamed Ghanem and Jinkyu Yang</i>	
Interaction of Acoustic Solitons with Inhomogeneous Media Containing a Spherical Shape Defect	77
<i>Ehsan Nasr Esfahani, Tae-Yeon Kim, and Jinkyu Yang</i>	

Special Session 12: Biomedical and Industrial Applications of Terahertz Spectroscopy and Imaging Technology

Terahertz Non-destructive Evaluation of Layered Media with the Maximum Likelihood Estimator	81
<i>Scott Schecklman, Gabriel P. Kniffin, and Lisa M. Zurk</i>	
Terahertz Non-destructive Evaluation of Textile Ropes and Slings	86
<i>Scott Schecklman, Gabriel P. Kniffin, and Lisa M. Zurk</i>	

Special Session 5: Novel Optical System in Measurements

Recent Development of Using Optical Methods to Measure the Mechanical Properties of Thin Films	91
<i>Chi-Jia Tong, Ming-Tzer Lin, Chung Lin Wu, and Ya-Chi Cheng</i>	
Measuring Spectroscopic Stokes Parameters Using Fourier Transform Spectrometer	95
<i>Yeng-Cheng Liu, Yu-Lung Lo, Chang-Ye Li, and Chia-Chi Liao</i>	
Back-Scattering Properties in the Total Reflection Prisms (TRP) Ring Resonators	98
<i>Dong Li, Jianlin Zhao, Chao Bi, Tao Peng, and Yajun Jiang</i>	
Optoelectrokinetically-Enabled Signal Enhancement for a Bead-Based FRET Fluorescence Immunoassay	101
<i>Han-Sheng Chuang, Kuan-Chih Wang, Dar-Bin Hsieh, and Yong Qing Fu</i>	

Special Session 11: Structure and Machinery Condition Monitoring Using Optomechatronics Sensors

Development of Monitoring and Diagnosis Technologies for Steel-Making Process in CSC	105
<i>Chih Chung Wang, Chung Ho Ko, Jia Shyan Shiau, and Way Long</i>	
Orientation Map and Birefringence Detection of CNC Fibers Using Image Processing Techniques	110
<i>Chao-Shih Liu, Edward A. Le, Chih-Wei Wang, Wei-Chih Wang, and Jin-Jia Hu</i>	
Performance Optimizations of Two-Legged Infrared Bolometer Sensor	115
<i>Zheng Yuan Wu, Jia-Yu Tsai, Shiang-Feng Tang, Chi-Shih Yang, Tzu-Chiang Chen, Wen-Jen Lin, Ping-Kuo Weng, Francis Picard, Hassane Oulachgar, Timothy Pope, and Samir Ilias</i>	

Special Session 7: THz Devices and Applications

Paper Parameter Estimation Using Terahertz Time-Domain Spectroscopy	119
<i>J. Steven Dodge, Payam Mousavi, Ian Bushfield, Stéphane Savard, David Jez, and Frank Haran</i>	
Wrinkled SiGe Nanofilms as a Source of Terahertz Radiation	121
<i>Alexander I. Fedorchenko, Henry H. Cheng, Anastasia Koroleva, and Wei-Chih Wang</i>	
Energy Dissipation of Electromagnetic Absorber in Terahertz Gap	125
<i>Hong-Ren Lin and Wei-Chih Wang</i>	

Special Session 3: Optical Micro-Electro-Mechanical Systems for Imaging

A Compact, Large-Aperture Tunable Lens with Adaptive Spherical Correction	130
<i>Matthias C. Wapler, Moritz Stürmer, and Ulrike Wallrabe</i>	
CubeSat Deformable Mirror Demonstration Mission	134
<i>Anne Marinan and Kerri Cahoy</i>	
A Scanning Micro-Mirror with an Adjustable Focal Length for Endoscope Applications	139
<i>Lih Y. Lin, Matthew Strathman, Yunbo Liu, and Ethan Keeler</i>	
Design of a PZT Actuated Cantilever Waveguide Scanner Using an Aerosol Deposition Process	142
<i>David R. Schipf, Chi-Leung Tsui, Chun-Liang Kuo, Yin-Jie Wang, Wen-Jong Wu, and Wei-Chih Wang</i>	

Optomechatronics for Bio-medical Applications/Bio-medical Imaging

Modulated Alignment Dual-Axis (MAD) Confocal Microscopy for Deep Optical Sectioning in Tissues	146
<i>Steven Y. Leigh, Ye Chen, and Jonathan T.C. Liu</i>	
Rapid Multiplexed Imaging of Cell-Surface Cancer Biomarkers in Fresh Tissues with Targeted SERS Nanoparticles	149
<i>Yu Winston Wang, Altaz Khan, Steven Y. Leigh, and Jonathan T.C. Liu</i>	
Multi-cell Analysis Using In-Line Holographic Approach	153
<i>Hyun Min Moon, Sangjun Moon, and HyungSuk Cho</i>	

Special Session 1: Design, Control, and Applications of MOEMS

SQUIPABOT: A Mesoscale Parallel Robot for a Laser Phonosurgery	158
<i>K. Rabenoroosa, B. Tasca, A. Zerbib, T.E. Pengwang, P. Rougeot, and N. Andreff</i>	
Characterization of Model-Based Visual Tracking Techniques for MOEMS Using a New Block Set for MATLAB/Simulink	163
<i>Andrey V. Kudryavtsev, Guillaume J. Laurent, Cédric Clévy, Brahim Tamadazte, and Philippe Lutz</i>	
Characterization of an Optical Switch Based on a Four Discrete Position Digital Actuator for Telecommunication Applications	169
<i>Hani Al Hajjar, Laurent Petit, Frédéric Lamarque, and Bruno Fracasso</i>	
Impact of Overlapping Trajectories in Laser Micro-Polishing	174
<i>Michael T.C. Chow, George K. Knopf, and Evgueni V. Bordatchev</i>	
Micro-Pressure Sensors Based on Photonic Crystal Waveguide Couplers	179
<i>Jayshri Sabarinathan, Michael Zylstra, and Aref Bakhtazad</i>	
Actuated MOEMS Micro-Mirror Based on PMN PT Piezoelectric Material	182
<i>Dragos Adrian Ciubotariu, Cédric Clévy, Philippe Lutz, and Ioan Alexandru Iva</i>	

Special Session 14: Optical Inspection for Industry

Measurement of In-Plane Strain with Shearography and Electronic Speckle Pattern Interferometry for Composite Materials	187
<i>Amalia Martínez-García, Juan-Antonio Rayas-Álvarez, and Raúl Cordero</i>	
Simultaneous In-Plane and Out-of-Plane Speckle Deformation Measurement by Multi-recording Method on One Camera	192
<i>Yasuhiko Arai</i>	

Small Bone Loading Method for Verification of Axial Load Using a Carrier	
Method of In-Plane Speckle Pattern Interferometry	196
<i>Abundio Dávila, Zuleima Vázquez, Sergio Márquez, Enrique Landgrave, Karla Vera, and Cipriana Caudillo</i>	
Total Angle Resolved Scattering Characterization for Ultra-fine Finished	
Surface Areal-Topography	200
<i>Yasuhiro Takaya, Masaki Michihata, and Terutake Hayashi</i>	

Optomechatronics for Bio-medical Applications/Bio-medical Imaging and Special Session 6: Optical Pattern & Optical Fiber Probing for Micro-Scale Thermo-physics & Fluid Characterization

Wireless Photoplethysmograph Knuckle Sensor System for Measuring Finger	
Motions	205
<i>Shu Zhao, Yusuf Ozturk, and Kee S. Moon</i>	
Design and Development of a Task Specific Robot for Endoscopic	
Submucosal Dissection of Early Gastrointestinal Cancers	210
<i>K.C. Lau, Y. Hu, Y.Y. Leung, C.C.Y. Poon, P.W.Y. Chiu, J.Y.W. Lau, and Y. Yam</i>	
Interferometric Focusing of Excitation Light onto a Guide-Star	215
<i>Xiaodong Tao, Christopher Chien, Oscar Azucena, Joel Kubby, and Ziah Dean</i>	
Design and Characteristics of Dual-Core Photonic Crystal Fiber Doppler	
Differential Velocimeter	218
<i>Xuefeng Huang, Guanghua Zheng, Guanjun Zhao, Jiangrong Xu, Weichih Wang, and Shengji Li</i>	

Optical Metrology

Measurement of Axial Position of a Microsphere Using Chromatic Confocal	
System for Probe System Based on the Laser Trapping with the Standing	
Wave Scale	223
<i>Shin-Ichi Ueda, Masaki Michihata, Terutake Hayashi, and Yasuhiro Takaya</i>	
Axial-Stereo 3D Optical Metrology of Internally Machined Parts Using	
High-Quality Imaging from a Scanning Laser Endoscope	228
<i>Yuanzheng Gong, Richard S. Johnston, C. David Melville, and Eric J. Seibel</i>	
Holographic Position Measurements of an Optically-Trapped Gold	
Nanoparticle Using Twilight-Field Microscope	232
<i>Kazufumi Goto and Yoshio Hayasaki</i>	
Detecting Discontinuous and Occluded Boundaries from Point Clouds	
of Building Interiors	234
<i>Kuldeep K. Sareen, George K. Knopf, and Roberto Canas</i>	

Measurement Setup to Determine Thermal Expansions from 100 K to 300 K of Ultra Stable Materials Used in Space Applications	239
<i>Ruven Spannagel, Thilo Schuld, Jose Sanjuan, Martin Gohlke, Rick Burow, Ewan Fitzsimons, Ulrich Johann, Dennis Weise, and Claus Braxmaier</i>	
Simulation of Augmented Telerobotic Operation	242
<i>Young Soo Park, Xiaorui Zhao, and Scott Korthals</i>	

Special Session 14: Optical Inspection for Industry

Imaging Stokes Polarimeter Using a Six-Axis Robot Arm	247
<i>Hiroshi Hasegawa and Yukitoshi Otani</i>	
3D Interferometric Microscope for Topography and Real Color Imaging in Industrial Applications	250
<i>Joanna Schmit</i>	
Simultaneous Spectroscopic and Elastographic Measurement by Multifunctional Optical Coherence Tomography	253
<i>Yiheng Lim and Yukitoshi Otani</i>	
The Novel Approach for Multi-layered Thin Film Inspection Based on 3D Surface Reconstruction	256
<i>Han Kyun Choi, Hyunsuk Kim, Youngjun Roh, Seonghoon Kim, Heegu Yang, and Daehwa Jeong</i>	
Robust Wavelength-Scanning Interferometer Based on Channeled Spectropolarimetry	260
<i>Kazuhiko Oka</i>	

Poster Session

Analysis of Automatic Teaching Position Error to Optimize OLP (Off Line Programming) for Grinding/Lapping Robot System Using Laser Tracker	264
<i>Hyun Jin Choi, Chul Woo Park, Kee Jin Park, and Sung Dae Choi</i>	
Development of Heat Treatment Robot System for Car Body Mold Using Diode Laser Optics	268
<i>Kee-Jin Park, Jong-Su Yun, Hae-Jin Ro, and Sung-Ho Yoon</i>	
Ignition and Combustion of Single Micro-Sized Graphite Particle at the Micro-Scale	272
<i>Shengji Li, Xuefeng Huang, and Donghui Zhou</i>	
Visual Inspection of Paper Carrier Tape Pothole	277
<i>Kyuwon Jeong and Sukhee Park</i>	
Highly Sensitive LPFG-Based Bending Sensor in W-Type Optical Fiber	280
<i>Ata Taghipour, Farrokh Taghipour Janabi-Sharifi, and Ali Rostami</i>	

Interferometry and Atomic Force Microscopy of Substrates for Optoelectronics Proceeded by Dry Plasma Etching	283
<i>Dinara Dallaeva, Elena Prokopyeva, Pavel Tománek, Lubomír Grmela, and Shikhgasan Ramazanov</i>	
Multi-focusing Microlens Array with Different Numerical Aperture by Thermal Reflow Method	287
<i>Min-Kyu Park, Hak-Rin Kim, and Ki-Beom Son</i>	
Holographic Femtosecond Laser Processing with Full Control of Phase Distributions and Polarization States of Light	291
<i>Satoshi Hasegawa and Yoshio Hayasaki</i>	
An Investigation on the Effect of Curvatures and Corners along Path	295
<i>Yunpeng Feng, Haobo Cheng, and Hon-Yuen Tam</i>	
Effect of Fiber Alignment on Optical Properties of Cellulose Nanocrystal Films	305
<i>Edward A. Le, Wei-Chih Wang, Chao Shih Liu, and Chih-Wei Wang</i>	

Optical-Based Sensors and Actuators

Photonic-Crystal-to-Multilayer Transformation for Designing and Measuring 3-D Photonic Crystal	310
<i>Fu-Cheng Tsai, Cheng-Hsi Weng, Chien-Chun Chen, Jen-Chieh Li, Pei-Zen Chang, and Wen-Pin Shih</i>	
Viscosity Measurement Using Microcantilever Sensor	315
<i>Alexander I. Fedorchenko, Anastasia Koroleva, Miroslav Pavelka, Zdenek Travnicek, and Wei-Chih Wang</i>	
Acoustic Research and Control of Piezoelectric Speakers Using a Spatially Modulated TiOPc/Piezo Buzzer Actuator	320
<i>Pei Wen Wang, Te Chieh Chang, and Chih Kung Lee</i>	
Development of a 3D Controller Using LEDs and Sensors	326
<i>Jonathan Leang, Geonwoo Kim, Matthew Park, and Wei-Chih Wang</i>	

Special Session 9: Cellulose Nanocrystals: Green, Renewable Materials for Optical and Electrical Applications

Cellulose Nanocrystals and Nanofibers for Smart Optics Materials	330
<i>Jaehwan Kim, Kishor Kumar Sadasivuni, Lindong Zhai, Xiaoyuan Gao, and Eun Byul Jo</i>	
Polarized Light in the Contact Free Determination of Thermal Expansion of Organized Cellulose Nanocrystal Materials	333
<i>Jairo A. Diaz, Jeffrey P. Youngblood, and Robert J. Moon</i>	

Electro-optic Effect in Polydimethylsiloxane-Cellulose Nanocrystal Composite for Reconfigurable Lens	335
<i>Kishor Kumar Sadasivuni, Xiaoyuan Gao, Abdullahil Kafi, Seongcheol Mun, and Jaehwan Kim</i>	
Improved Processing and Methods for Manufacturing Cellulose Nanocrystal Films	337
<i>Edward A. Le and Wei-Chih Wang</i>	
Author Index	342