# Proceedings of International Symposium on Biophotonics, Nanophotonics and Metamaterials

Hangzhou, China October 16th ~ 18th, 2006

### **Co-chairs of the Organizing Committee:**

Sailing He, Zhejiang University (China) Chinlon Lin, Chinese University of Hong Kong Lars Thylén, Royal Institute of Technology (Sweden) Hans Ågren, Royal Institute of Technology (Sweden)

> IEEE Catalog Number: 06EX1462 ISBN: 0-7803-9773-8

Copyright and Reprint Permission: 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 Operations Center, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331. All rights reserved. Copyright ©2006 by the Institute of Electrical and Electronics Engineers

IEEE Catalog Number: 06EX1462

ISBN: 0-7803-9773-8

Library of Congress: 2006928205

Highly Sensitive Photonic Biosensors Based on Interferometric Detection of Surface Plasmon Waves	2
Multiple Photonic Responses in Organic Magnetic Semiconductor V(TCNE)x (x ~ 2)	3
Detection of epithelial structure and biochemistry based on time-resolved confocal autofluorescence	4
Improvement of Spatial Resolution in Two-Photon Stereolithography	8
Silicon Microphotonic Waveguides for Biological Sensing	15
Polymerized Crystalline Colloidal Array Photonic Crystals for Chemical Sensing and Optoelectronics	19
<b>DNA, nanoparticles and photons - new approaches for clinical diagnostics</b> <i>T. Melvin, L. Dyadshuka, A. Weld, H. Yin, A Adam, T. Brown, S. Jaiswal, K. Boudakos, D.C. Smith, J.J.Baumberg, F. Booy</i>	20
Introduction to Nanobiophotonics	22
Optical Fluorescence Imaging of Breast Cancer	23
Modeling of multi-photon-induced photoluminescence from organic fluorophores and metal-coated semiconductor nanoparticles	26
Photobiomodulation of Diagnostic Monochromatic Light or Laser Irradiation	27
Intramolecular energy transfer in a two-photon absorbing naphtahlimide-triphenylamine dyad	31
Noninvasive and Real-time Monitoring of the Regulation of Plant Growth and Development Using  Delayed Fluorescence Technique	34
Characterization of Target effect of Nano-hydrogel by Near-infrared Fluorescent Quantum Dots	38
Studies of Free Gas in Scattering Media at Micro- and Macroscopic Scales	42
Layer Structures Localization in Optical Coherence Tomography Images	46
Infrared Spectrum Visualizing Human Acupoints and Meridian-like Structure	50
On-spot Evaluation of Maturity Stage of Fruits Based on 655 nm Laser-induced Photoluminescence of Chlorophyll-a  Chao Liu, Yi Song, Dongxian Zhang, Haijun Zhang	53
A critical examination of two-photon absorption cross-sections of some reference dyes	56
A Fiber Based Interferometer with Discrete Tunable Laser for Fourier Domain Optical Coherence Tomography  Luo Wei, Ma Xiaohong, Zhao Huafeng	60

Identification and location of the pigment granules in the retinal pigment epithelium cells using fluorescence technology	64
Gaixia Xu, Junle Qu, Yiwen Sun, Lingling Zhao, Zhihua Ding, Hanben Niu	
Technique for False Image Correction in Second Harmonic Generation Microscopy by Modulating Laser Polarization	68
L. Jin, L. Gao, L. Huo, W. Yuan, Y.H. Luo, A. H. P. Ho, C. Lin	
Gold nanoshell-based photoacoustic imaging application in biomedicine	72
Non-ablative collagen remodeling initiated by two different laser effects: comparative study on mouse	7.0
model	/0
Using Optical Coherence Tomography to Monitor Process of Wound Healing: a Preliminary Study	80
Human Sinus Studies using Monte Carlo Simulations and Diode Laser Gas Absorption Spectroscopy	84
Investigation of the Optical Properties of Human Meridian by Reflectance Measurement	88
Biosensor Arrays based on Surface Plasmon Resonance Phase Imaging	91
The influence of green-sensitive cyanine dye adsorption on the surface structure of cubic AgCl micro-crystal	95
Li Xiaowei, Zhang Jixian, Zhang Rongxian, Lai Weidong, Jiang Xiaoli, Li Li, Dai Xiuhuong	
A Novel LRSPP Based Refractive Index Sensor	99
XUV radiation for novel investigations of the matter in the temporal domain of fewfemtoseconds and below	102
Characterization of clustered microcalcifications in mammograms based on support vector machines with	
genetic algorithms	106
The Analysis on the Signals Denoising and Single Base Pair Resolution of DNA Sequencing	110
Design and Realization of Micro Fiber Spectrometers for Bioluminescence Detecting Systems' Stray Light	
<b>Detection</b> Cheng Liang, Chen Yan-ping, Zhu Ruo-bo, Ye Zi, Yu Fei-hong	114
An Analysis of Signal Intensity Affected by The Light Spot With Laser Induced Fluorescence Detection Wang Jie, Wang Li-qiang, Shi Yan, Zheng Hua, Lu Zu-kang	118
Scattering Light Noise Research on Laser-Induced Fluorescence detection for capillary electrophoresis	121
A Study of Polarized Light Propagation in Turbid Medium by Monte Carlo Simulations and Experiments Fanxing Meng, Xiaohong Ma, Huafeng Zhao, Xin Wan, Feifei Yin	124
Analyzing the dynamic range of fluorescent detection in microarray scanner	128
On the Early Diagnosis of Cancer Using Ultrafast Laser Spectrum Technique	131
Micro-stimulator Design for Visual Prosthesis based on Optic Nerve Stimulation	135

Image Acquisition System for Visual Prosthesis	139
Image Processing Strategies Dedicated To the Optic Nerve Stimulation	143
A Novel Masses Detection Algorithm Using Model-based Location and ANFIS-based Segmentation	147
The Research on the Relationship Between the Reduced Scattering Coefficient and Temperature of the Tissue by NIRS Light Scattering	151
Noninvasive monitoring adult hemodynamic and oxygenation variables' changes in response to sensory stimulation by near-infrared spectroscopy	155
An Optimization Algorithm to Inverse Problem in 2-D Optical Computed Tomography by BP Neural Network	159
Qiong Wu, Zhiyu Qian, Yueqing Gu  Design of optical pumping noble gas MRI Phantom  Kun Yang, Zhiping Yao, Qiushi Ren	163
Spatial and Temporal Changes in Bid and Bax Subcellular Localization During Cisplatin-Induced  Apoptosis	167
Near-infrared Fluorescent Labeling of L-Asparaginase	171
AFM Imaging of biological sample surfaces	175
Introduction of an implantable MOMES used in visual prosthesis	179
Development of a Simultaneously Time- and Spectrum-Resolved Multifocal Multiphoton Microscopy  System Using a Streak Camera  L. Liu, J. Qu, L. Wang, Z. Fu, Z. Lin, B. Guo, H. Niu	182
Single- and Two-photon Excitation Autofluorescence Spectroscopy of Diabetic Rat Artery	186
The interaction of Chlorophyll derivative photosensitizer CPD3 with mouse lung cancer DNA	190
<b>Autofluorescence Lifetime Imaging of Retinal Pigment Epithelium Cells Using Two-photon Excitation</b> Yiwen Sun, Junle Qu, Gaixia Xu, Lingling Zhao, Hanben Niu	194
Sensitivity enhancement of phase-sensitive surface plasmon resonance biosensor using multi-pass interferometry.  W. Yuan, H. P. Ho, C. L. Wong, S.Y. Wu, Y. K. Suen, S. K. Kong, Chinlon Lin	198
Measuring Dynamics of Bax Translocation in Living Cells during UV-induced Apoptosis	202
A study of the stability of AflatoxinB1 to several solutions through fluorescence spectral experiment	206
Effect of Low Intensity He-Ne Laser on Ultrastructure of Human Erythrocyte Membrane by Atomic Force Microscope	210
Study on potential of structured illumination microscopy utilizing digital micromirror device for endoscopy purpose	214

Spectral-Domain Optical Coherence Tomography and Applications for Biological Imaging  Peng Li, Yonghong He, Hui Ma	218
Unbinding strength between C-terminal segment of AtMAP65-1 and microtubule studied with dual-	
optical tweezers	222
Nanophotonics Session	225
Biosensing and -imaging with enantiomeric luminescent conjugated polythiophenes using single- and	
multiphoton excitation	226
Mikael Lindgren, Frantz Stabo-Eeg, K. Peter R. Nilsson, Per Hammarström, Olle Inganäs, Trondheim Norway	
Photonic Crystal-/Quantum Dot-Based Nanophotonics for Ultra-Fast All-Optical Digital Signal Processors  Control Pulse Signal Pulse Photonic Crystal	227
Photonic crystals for lighting applications	228
Negative refraction and sub-wavelength focusing in the visible range using transparent metal-dielectric	220
stacks	229
Spiral microdisk resonator- filters on a silicon chip: probing the out-of-plane scattering spectra	230
Nanoplasmonic Platforms for Bioassays	236
Silicon Photonics: Recent Development on Silicon Based Laser Amplifier and Wavelength Converter	237
Wavelength Tunable Light Emitting Nanostructures and Devices.  Wallace C.H. Choy, C.J. Liang, Y.P. Leung	239
<b>Technology for High Density Optical Integration on Silicon</b> <i>Lech Wosinski, Liu Liu, Matteo Dainese, Daoxin Dai, Ziyang Zhang, Lars Thylén, Min Qui, Sailing He</i>	245
Microwave Engineering Approach to Metallic Based Photonic Waveguides and Waveguide Components	247
A Moores law for photonics	252
Multi-Photon Materials, Techniques and Applications	260
Sensing Applications on Refractive Index Based on Metal Gratings	263
Novel ultrasmall arrayed-waveguide grating interleaver based on Si-nanowires with spirals	268
Q-modulated semiconductor laser using deep etched subwavelength trenches	270
High-Quality-Factor EH Modes in Microcylinder Resonators Predicted by 3D FDTD Simulation	271
Synthesis and Characterization of Thiol-Stabilized CdTe, CdSe Nanocrystals by a Modified  Hydrothermal Method	275

Two-dimensional Photonic Crystal Microcavity with Germanium Self-assembled Quantum Dots	279
Microcavity Light Emitting Devices Based on Colloidal Semiconductor Nanocrystal Quantum Dots	282
Growth mechanism of InGaAlAs waveguides by narrow stripe selective MOVPE	284
Optical nonlinearity enhancement in compositionally graded films of nonspherical nanoparticles	288
Discussion of the mechanism of extraordinary optical transmission in metallic gratings	292
Wavelength Combiner based on Silicon Platform	296
Fabrication of Non-close-packed Colloidal Crystals by using a Sequential Growth Method	298
Anomalous Temperature-Dependent Bimodal Size Evolution of InAs Quantum Dots on Vicinal GaAs(100) Substrates S. Liang, H. L. Zhu, J. T. Zhou, Y. B. Cheng, J. Q. Pan, L. J. Zhao, W. Wang	302
A Novel Design of Distributed Surface Plasmon Sensors Based on Nanoparticles Composite Layers	306
3D Microstructure Manufacture based on laser-induced thermoplastic expansion	310
The preparation of magnetic nanoparticles and their decoration towards bifunctional nanoparticles	314
A Longwave Infrared (LWIR) Photodetector Based on Nonlinear Absorption in InAs/GaAs Quantum  Dots	318
Xuejun La, Craig Armiento, Jin Li, William Goodhue	
Analysis of effect factors for second harmonic generation in the centro-symmetric materials photonic crystals	322
Jianping Shi, Hongguang Xu, Zhifeng Cui, Qizheng Wei, Xunan Chen  Goos-Hächen shifts for a one-dimensional photonic crystal with a nonlinear defect	324
Two-mode-interference switching in photonic crystal waveguides	328
The Fabrication and Transportation Characteristic of Silica Submicrometer or Nanometer One  Dimension Optical Waveguide	331
Optimal design for monopole-mode photonic-crystal-slab microcavity	335
Preparation of the gold infiltrated silica opals by electroplating method	338
A facile way to fabricate CdSe quantum dots coated with silica and the fluorescence property	342
Influence of CATB on Stability of Copper Nano-Suspensions	346
Analysis and experimentation of novel bi-directional photo-thermal micro-actuators	350

Broad omnidirectional total reflectors by using the combination of Thus-Morse photonic crystal	354
Nanostructured Photonic Crystal Fiber with Ultra-high Birefringence	358
A Comparative Study of Spectral Characteristics of CdSe and CdSe/ZnS Quantum Dots	362
The interaction between functionalized ZnS nanofluorescence probe and DNA	366
Extraordinary Transmission through Elliptical Gold Nanowire Grating under s-polarization Excitation Guang-Hui Yuan, Pei Wang, Dou-Guo Zhang, Xiao-Jin Jiao, Hai Ming	370
Nonlinear optical properties of Ag/PMMA nanocomposite polymer film	373
XUV monochromator for novel application of ultrafast pulses	377
Photonic band gap structures in 2D tunable magnetic photonic crystals	380
Goos-Hänchen-like Displacement of Light Beams Transmitting through Periodical Multiple Layered	
Structures	384
Omnidirectional Photonic Band Gap Broadening in One dimensional Photonic Crystals Li Changhong, Tian Huiping, Ji Yuefeng, Liu Hai	388
Numerical Simulation on a Novel Setup for Sensing Application Based on Metal Gratings Rui Hu, Yoichi Okuno	392
Modified spontaneous emission of an electric dipole in two-dimensional photonic crystals slab Jingjuan Li, Zhi-Yuan Li, Bingying Cheng, Daozhong Zhang	395
Channel drop filters in 3D photonic crystal	398
Femtosecond optical switching effect In two-dimensional organic photonic crystal	402
Negative refraction and imaging using plasmonic slabs and layers	406
Eigenmodes of metallic ring systems: a rigorous approach	407
Designed Negative Refraction in Photonic Crystals	408
Veselago lens and plasmonic nanostructures at optical frequencies	409
Recent Advances in Metamaterial Research	410
Nano-Dispersed Liquid Crystalline Structures for Tunable Negative-, Zero-, and Positive Index Materials in the Optical-Terahertz Regimes	412
Experimental Verification of Evanescent-Wave Amplification and Transmission Using Metamaterial Structures	417
Tie Jun Cui, Ruopeng Liu, Xian Oi Lin, Bo Zhao, Oiang Cheng	

<b>Fabrication of Optical Meta-structure at Infrared Rang using Nanoimprint Lithography</b>	418
Nano metamaterials and photonic gratings by nanoimprint and hot embossing	420
Nanoscale excitonic-plasmonic optical waveguiding by metal-coated quantum dots	426
Metamaterials Realized by Novel Compact Structures	432
Effective index of refraction in guide wave mode for ferrite based layered composites under different boundary conditions	435
Numerical simulation of a new kind of metamaterial with negative refraction property	438
Experimental Verification of Sub-diffraction Imaging by Compensated Bilayer of Transmission Line Metamaterials	443
Junming Zhao, Xiaohua Teng, Yan Chen, Tian Jiang, Yijun Feng	
Realization of Left-Handed Transmission Structures Using the Substrate Integrated Waveguide Technology	447
Non-Periodic Symmetric Metallic Waveguide Arrays for Near-Field Focusing	451
Omni-Directional Microstrip Ring Antenna Based On a Simplified Left-Handed Transmission Line Structure	455
On Target Detection and Imaging Sensitivity by Using LHM Flat Lens	459
Tunable negative refraction and subwavelength imaging in the metal-dielectric composites of nonspherical particles	463
A Photonic Crystal Slab Lens for Three-dimensional Negative Refraction	467
Propagation of electromagnetic solitons in nonlinear negative-index materials	471
The Realization of Super Waveguide Using Left-Handed Transmission - Line Circuits	475
An Equivalent Circuit for the Complementary Split Ring Resonators (CSRRs) With Application to Highpass Filters  Chao Li, Kaiyu Liu, Fang Li	478
Influence of the layer thickness on the magnetic response in perforated metal/dielectric/metal trilayer metamaterial A. Simulation models	480
Investigation on Transparency Phenomenon Induced by Metamaterials	485
Low-pass Spatial Filtering Using Optically Thinner Left-handed Photonic Crystals	488
Guided Modes in a Planar Air Waveguide with Anisotropic Metamaterial Cladding  Tian Jiang, Yijun Feng	492

Circuit Representation of Isotropic Chiral Medium	496
TE and TM bandgap in the metamaterial slab waveguide	500
Pat-shape Left-handed Material and Relative Band-width of Analogous Metamaterials	502
Propagation of ultroshort electromagnetic pulse in nonlinear metamaterials	506
Analysis of the bandgap of negative refractive index photonic crystal fiber	510
The properties of photon tunneling through the asymmetry structure with left-handed materials	514
Novel characteristics of guided modes in chiral negative refraction waveguides	517
Omnidirectional Reflection from Thue-morse Aperiodic One-dimensional Photonic Crystal With Dispersive Negative Materials  Xin-hua Deng, Nian-hua Lliu	521
Electromagnetic Characterized Parameters of Negative Refractive Index Metamaterial	525
A novel dual-band balun based on the dual structure of composite right/left handed transmission line	529
<b>Zeroth-Order Resonators Using Novel Compact Meta-Structures</b> <i>Hui Feng Ma, Xian Qi Lin, Di Bao, Tie Jun Cui</i>	533
New differential phase shifters using novel right-handed metamaterial structures	536
The analyses of negative refraction in finite one-dimensional photonic crystals	539
Vectorial Properties of Paraxial Beams Propagating in Anisotropic Metamaterials	543
The Study of Composite Right/Left Handed Structure in Substrate Integrated Waveguide	547
Negative Permeability in Atomic and Molecular Systems at Microwave Frequency	550