

Big Sur Room Bio-Optics: Design and Application (BODA)	Regency 1 & 2 Novel Techniques in Microscopy (NTM)	Regency 3 Optical Molecular Probes, Imaging and Drug Delivery (OMP)	Cypress Room Optical Trapping Applications (OTA)
--	--	---	--

BWB • Two-Photon Imaging

Wednesday, 6 April

10.30–11.30

Presider to Be Announced
BWB1 • 10.30 Invited
Technology Development for

Multiphoton Imaging, *Chris Xu¹; ¹Applied and Engineering Physics, Cornell Univ., USA*. We present our research effort in improving the penetration depth of multiphoton microscopy and the development of a multiphoton endoscope for imaging intrinsic tissue fluorescence and harmonic generation *in vivo*.

BWB2 • 11.00 Invited

Title to Be Announced, *James V. Jester; Univ. of California Irvine, USA*. Abstract not available.

BWB3 • 11.30 Invited
Nonlinear Optical Probes of Ovarian

Cancer, *Paul J. Campagnola¹, Molly Brewer², Ronald LaComb², Oleg Nadiarnykh², Xiyi Chen¹, Reui-Yu He²; ¹Dept. of Biomedical Engineering, Univ. of Wisconsin, USA; ²Univ. of Connecticut Health Ctr., USA*. Nonlinear optics are used to study human ovarian cancer. SHG imaging elucidates structural differences in normal and malignant tissues. Cell adhesion/migration dynamics are examined with ECM models fabricated by multiphoton excited photochemistry.

NWB • New Techniques

Wednesday, 6 April

10.30–11.30

Presider to Be Announced
NWB1 • 10.30 Invited

Invasive Micro-optics for *in vivo* Imaging in Mouse Brain, *Michael J. Levene; Biomedical Engineering, Yale Univ. USA*. Invasive micro-optics, including both gradient index lenses and micro-prisms, enable multiphoton microscopy of deep brain structures *in vivo* that would otherwise be impossible to observe. We present the latest developments in use of micro-optics.

NWB2 • 11.00 Invited

Lensfree Microscopy On a Chip, *Aydogan Ozcan; Electrical Engineering Dept., UCLA, USA*. We review the recent progress on lensfree on-chip microscopy techniques that are aimed at telemedicine as well as high-throughput biomedical imaging and screening applications.

NWB3 • 11.30

Optically Sectioned Fluorescence Imaging with HiLo, *Tim N. Ford¹, Daryl Lim¹, Kengyeh K. Chu¹, Eladio Rodriguez-Diaz², Satish K. Singh², Jerome Mertz¹; ¹Biomedical Engineering, Boston Univ., USA; ²Gastroenterology, Boston Univ. School of Medicine, USA*. HiLo is a wide-field fluorescence imaging technique that provides optical sectioning by processing two images acquired sequentially using illumination with and without high contrast structure. We present the latest implementations of the technique.

NWB4 • 11.45

4-D Image Mapping Spectrometer (IMS) with Structured Illumination, *Liang Gao^{1,3}, Noah Bedard¹, Robert Kester¹, Nathan Hagen¹, Tomasz Tkaczyk^{1,2}; ¹Bioengineering, Rice Univ., USA; ²Electrical and Computer Engineering, Rice Univ. USA; ³Rice Quantum Inst., Rice Univ., USA*. We present a 4-D (x, y, z, λ) Image Mapping Spectrometer with structured illumination. Depth resolved fluorescence spectral channel images of thick biological tissues were acquired with axial resolution of $\sim 1 \mu\text{m}$.

NOTES

Big Sur Room Bio-Optics: Design and Application (BODA)	Regency 1 & 2 Novel Techniques in Microscopy (NTM)	Regency 3 Optical Molecular Probes, Imaging and Drug Delivery (OMP)	Cypress Room Optical Trapping Applications (OTA)
--	--	---	--

BWB4 • 11.00

Effects of Ultrashort Femtosecond Laser Pulses Upon Embryogenesis of Eukaryotic Organisms, *Sergey Arkhipov*¹; ¹*Chemistry, Michigan State Univ., USA*. Using scoring of survival of irradiated *Drosophila* embryos the moderate effects of fs-laser irradiation on embryogenesis and indirect evidence of possible induction of DNA repair mechanisms are demonstrated.

BWB5 • 11.15

Particle pushing via Liquid Gradient Refractive Index (L-GRIN) Lens, *Ahmad A. Nawaz*¹, *Xiaole Mao*¹, *Yanhui Zhao*¹, *Sz-Chin Steven Lin*¹, *Tony J. Huang*²; ¹*Pennsylvania State Univ., USA*. We report an onchip particle manipulator that utilizes a tunable Liquid gradient Refractive Index optofluidic microlens to optically control the pushing the particles. Utilizing the argon laser, particle velocity is controlled via laser input power.

NWB5 • 11.00

Practical Implementation of Log-Scale Active Illumination Microscopy, *Kengyeh K. Chu*¹, *Daryl Lim*¹, *Jerome Mertz*²; ¹*Biomedical Engineering, Boston Univ., USA*. Active illumination microscopy is a method of redistributing dynamic range in scanning microscopes using feedback for real-time control of illumination power. Images are reconstructed on a logarithmic scale to preserve dynamic range benefits.

NWB6 • 11.15

Direct Aberrations Correction in Two Photon Microscopy by a Single On-Axis Measurement, *Rodrigo Aviles-Espinosa*¹, *Jordi Andilla*², *Rafael Porcar-Guezenc*², *Omar Olarte*¹, *Xavier Levecq*², *David Artigas*^{1,3}, *Pablo Loza-Alvarez*¹; ¹*Biophotonics, ICFO – Inst.de Ciències Fotòniques, Spain*; ²*Imagine Optic, France*; ³*Dept. of Signal Theory and Communications, Univ. Politècnica de Catalunya, Spain*. The use of the nonlinear guide-star concept is proposed. This principle is used to directly measure sample aberrations employing a wave front sensor and correcting them in a single step by shaping a deformable mirror.

11.30–13.30 Lunch Break (*on your own*)

BWC • Spectroscopic Imaging

Wednesday, 6 April

13.30–15:45 p.m.

Presider to Be Announced

BWC1 • 13.30 Invited

Title to be Announced, *Jonas Korlach* *Pacific Biosciences, USA*. Abstract not available.

BWC2 • 14.00 Invited

Title to be Announced, *Jeeseong Huang*; *Biophysics Group, NIST, USA*. Abstract not available.

BWC3 • 14.30 Invited

Multiplexed Fluorescence Lifetime Image with Fourier Excitation-Emission Spectroscopy, *Ming Zhao*, *Leilei Peng*; *College of Optical Sciences, Univ. of Arizona, USA*. We report a Fourier lifetime microscopic method that measures fluorescence lifetime and intensity excitation-emission matrices in 23 microseconds. The technique will allow fast multiplexed imaging study of Förster resonance energy transfer.

Big Sur Room Bio-Optics: Design and Application (BODA)	Regency 1 & 2 Novel Techniques in Microscopy (NTM)	Regency 3 Optical Molecular Probes, Imaging and Drug Delivery (OMP)	Cypress Room Optical Trapping Applications (OTA)
--	--	---	--

BWC • Spectroscopic Imaging-Continued

BWC4 • 15.00
Real-Time Hyperspectral Imaging of Pancreatic β -cell Dynamics with Image Mapping Spectrometer (IMS), *Liang Gao¹, Amicia Elliott², Robert Kester¹, Nathan Hagen¹, David Piston², Tomasz Tkaczyk¹; ¹Bioengineering, Rice Univ., USA; ²Department of Molecular Physiology and Biophysics, USA.* Real-time hyperspectral imaging of pancreatic β -cell dynamics is achieved by utilizing an Image Mapping Spectrometer (IMS). The calcium signal was successfully monitored during caspase-3 mediated FRET in cellular apoptosis.

BWC5 • 15.15
Study of Cationic Polymer/DNA Complex (Polyplex) Formation by Time-Resolved Fluorescence Spectroscopy, *Cosimo D'Andrea¹, Andrea Bassi¹, Paola Taroni¹, Daniele Pezzoli², Alessandro Volonteri², Gabriele Candiani²; ¹Physics, IFN-CNR, IIT, Politecnico di Milano, Italy; ²Dipartimento di Chimica, Materiali e Ingegneria Chimica, Politecnico di Milano, Italy.* Time-resolved fluorescence spectroscopy of SYBR Green is carried out to characterize cationic polymer/DNA complex (polyplex) formation in solution. Both fluorescence amplitude and lifetime prove to be very sensitive to the Charge Ratio polymer/DNA.

BWC6 • 15.30
Fluorescence Lifetime Imaging Microscopy (FLIM) for Intraoperative Tumor Delineation: A Study in Patients, *Yinghua Sun¹, Jeremy Meier², Nisa Hatami¹, Jennifer Phipps¹, Rudolph J. Schro², Brian Poirier², Gregory Farwell², Daniel Elson³, Laura Marcu¹; ¹Dept. of Biomedical Engineering, Univ. of California at Davis, USA; ²School of Medicine, Univ. of California at Davis, USA; ³Inst. of Biomedical Engineering, Imperial College London, UK.* This work demonstrates a novel application of an endoscopic fluorescence lifetime imaging microscopy system to the intraoperative diagnosis of brain tumor glioblastoma multiforme (GBM) and head&neck tumor squamous cell carcinoma (SCC) in patients.

NOTES