

PROCEEDINGS OF SPIE

Optical Trapping and Optical Micromanipulation IX

Kishan Dholakia
Gabriel C. Spalding
Editors

12–16 August 2012
San Diego, California, United States

Sponsored and Published by
SPIE

Volume 8458

Proceedings of SPIE 0277-786X, V.8458

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

Optical Trapping and Optical Micromanipulation IX, edited by Kishan Dholakia, Gabriel C. Spalding, Proc. of SPIE Vol. 8458, 845801 · © 2012 SPIE · CCC code: 0277-7866/12/\$18 · doi: 10.1117/12.2009129

Proc. of SPIE Vol. 8458 845801-1

The papers included in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. The papers published in these proceedings reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from this book:

Author(s), "Title of Paper," in *Optical Trapping and Optical Micromanipulation IX*, edited by Kishan Dholakia, Gabriel C. Spalding, Proceedings of SPIE Vol. 8458 (SPIE, Bellingham, WA, 2012) Article CID Number.

ISSN: 0277-786X

ISBN: 9780819491756

Published by

SPIE

P.O. Box 10, Bellingham, Washington 98227-0010 USA

Telephone +1 360 676 3290 (Pacific Time) · Fax +1 360 647 1445

SPIE.org

Copyright © 2012, Society of Photo-Optical Instrumentation Engineers.

Copying of material in this book for internal or personal use, or for the internal or personal use of specific clients, beyond the fair use provisions granted by the U.S. Copyright Law is authorized by SPIE subject to payment of copying fees. The Transactional Reporting Service base fee for this volume is \$18.00 per article (or portion thereof), which should be paid directly to the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923. Payment may also be made electronically through CCC Online at copyright.com. Other copying for republication, resale, advertising or promotion, or any form of systematic or multiple reproduction of any material in this book is prohibited except with permission in writing from the publisher. The CCC fee code is 0277-786X/12/\$18.00.

Printed in the United States of America.

Publication of record for individual papers is online in the SPIE Digital Library.



SPIDigitalLibrary.org

Paper Numbering: Proceedings of SPIE follow an e-First publication model, with papers published first online and then in print and on CD-ROM. Papers are published as they are submitted and meet publication criteria. A unique, consistent, permanent citation identifier (CID) number is assigned to each article at the time of the first publication. Utilization of CIDs allows articles to be fully citable as soon as they are published online, and connects the same identifier to all online, print, and electronic versions of the publication. SPIE uses a six-digit CID article numbering system in which:

- The first four digits correspond to the SPIE volume number.
- The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B ... 0Z, followed by 10-1Z, 20-2Z, etc.

The CID Number appears on each page of the manuscript. The complete citation is used on the first page,

and an abbreviated version on subsequent pages. Numbers in the index correspond to the last two digits of the six-digit CID Number.

Contents

xi *Conference Committee*

SESSION 1 FOUNDATIONS OF THE ELECTROMAGNETIC THEORY OF FORCE AND MOMENTUM

- 8458 03 **Subsystem approach to the electrodynamics in dielectric fluids (Invited Paper)** [8458-2]
B. A. Kemp, Arkansas State Univ. (United States)
- 8458 04 **Electromagnetic momentum in a dielectric and the energy-momentum tensor (Invited Paper)** [8458-3]
M. E. Crenshaw, U.S. Army Aviation and Missile Command (United States)
- 8458 05 **Angular momentum exchange between light and material media deduced from the Doppler shift** [8458-4]
M. Mansuripur, College of Optical Sciences, The Univ. of Arizona (United States)

SESSION 2 TOWARD (OR IN) THE QUANTUM LIMIT OF OPTO-MECHANICS

- 8458 07 **Cavity optomechanics with low-noise crystalline mirrors (Invited Paper)** [8458-6]
G. D. Cole, Univ. of Vienna (Austria)
- 8458 08 **Cooling optically trapped particles (Invited Paper)** [8458-7]
P. F. Barker, J. Millen, Y. Lia Li, M. Trivedi, T. S. Monteiro, Univ. College London (United Kingdom)
- 8458 09 **Resonance enhanced optical manipulation: the push and pull of light** [8458-8]
M. Mazilu, K. Dholakia, Univ. of St. Andrews (United Kingdom)
- 8458 0A **Theory and simulation of an optical spring mirror (Invited Paper)** [8458-9]
E. M. Wright, College of Optical Sciences, The Univ. of Arizona (United States) and Univ. of St. Andrews (United Kingdom); M. Mazilu, S. Singh, The Univ. of Arizona (United States); K. Dholakia, Univ. of St. Andrews (United Kingdom) and College of Optical Sciences, The Univ. of Arizona (United States); P. Meystre, College of Optical Sciences, The Univ. of Arizona (United States)

SESSION 3 STATISTICAL MECHANICS

- 8458 0B **Optical trapping and cooling of glass microspheres (Invited Paper)** [8458-10]
M. G. Raizen, S. Kheifets, T. Li, The Univ. of Texas at Austin (United States)

SESSION 4 APPLICATION OF EXQUISITE OPTICAL MEASUREMENTS

- 8458 OE **Optical mass sensing with coupled nanomechanical resonator systems (Invited Paper)**
[8458-13]
K.-D. Zhu, J.-J. Li, Shanghai Jiao Tong Univ. (China)
- 8458 OF **Forces and torques on the nanoscale: from measurement to applications (Invited Paper)**
[8458-14]
G. Volpe, Bilkent Univ. (Turkey)
- 8458 OG **Correlation function analysis of optically trapped paramagnetic microparticles in external magnetic field** [8458-15]
M. N. Skryabina, E. V. Lyubin, M. D. Khokhlova, A. A. Fedyanin, Lomonosov Moscow State Univ. (Russian Federation)
- 8458 OH **Power spectral density integration analysis and its application to large bandwidth, high precision position measurements** [8458-16]
M. D. Kochanczyk, T. F. Bartsch, The Univ. of Texas at Austin (United States); K. M. Taute, FOM Institute for Atomic and Molecular Physics (Netherlands); E.-L. Florin, The Univ. of Texas at Austin (United States)

SESSION 5 SPECIAL SESSION IN HONOR OF MICHAEL W. BERNIS

- 8458 OM **The influence of femtosecond laser pulse wavelength on embryonic stem cell differentiation** [8458-22]
P. Mthunzi, Council for Scientific and Industrial Research (South Africa)
- 8458 ON **Analysis of cell poration by femtosecond laser for particle insertion by optical manipulation**
[8458-23]
W. Muhammad, J.-D. Kim, Y.-G. Lee, Gwangju Institute of Science and Technology (Korea, Republic of)
- 8458 OP **Directing growth cones of optic axons growing with laser scissors and laser tweezers (Invited Paper)** [8458-25]
T. Wu, Beckman Laser Institute and Medical Clinic, Univ. of California, Irvine (United States) and Harvard Medical School and Wellman Ctr. for Photomedicine (United States); T. A. Nieminen, The Univ. of Queensland (Australia); S. Mohanty, Beckman Laser Institute and Medical Clinic, Univ. of California, Irvine (United States); J. Miotke, R. L. Meyer, Univ. of California, Irvine (United States); H. Rubinsztein-Dunlop, The Univ. of Queensland (Australia); M. W. Berns, Beckman Laser Institute and Medical Clinic, Univ. of California, Irvine (United States) and Univ. of California, Irvine (United States)

SESSION 6 OPTICAL STUDIES OF CELLULAR MECHANICS

- 8458 OT **RBC elastic properties studied by means of active rheology approach** [8458-29]
M. D. Khokhlova, E. V. Lyubin, M. N. Skryabina, A. A. Fedyanin, Lomonosov Moscow State Univ. (Russian Federation)

- 8458 0X **Photothermal heating of optically trapped gold nanoparticles quantified using controlled vesicle cargo release** [8458-33]
A. Kyrsting, P. M. Bendix, L. B. Oddershede, Niels Bohr Institute (Denmark)
- 8458 0Y **Induction of sustained glycolytic oscillations in single yeast cells using microfluidics and optical tweezers** [8458-34]
A.-K. Gustavsson, C. B. Adiels, M. Goksör, Univ. of Gothenburg (Sweden)

SESSION 7 OPTICAL MICRORHEOLOGY FOR BIOLOGICAL SYSTEMS

- 8458 0Z **Transverse force profiles of individual dielectric particles in an optical trap** [8458-35]
M.-T. Wei, Lehigh Univ. (United States); J. Ng, C. T. Chan, Hong Kong Univ. of Science and Technology (Hong Kong, China); A. Chiou, National Yang-Ming Univ. (Taiwan); H. D. Ou-Yang, Lehigh Univ. (United States)

SESSION 8 OPTICAL MANIPULATION OF SINGLE MOLECULES

- 8458 16 **Using DNA looping to measure sequence dependent DNA elasticity** [8458-43]
A. Kandinov, K. Raghunathan, J.-C. Meiners, Univ. of Michigan (United States)
- 8458 17 **Force spectroscopy of DNA: there is still a lot to learn (Invited Paper)** [8458-44]
D. H. Paik, JILA (United States); T. T. Perkins, JILA (United States) and Univ. of Colorado at Boulder (United States)
- 8458 18 **Single-molecule studies of the effect of spermidine on DNA mechanics and viral DNA packaging** [8458-45]
N. Keller, D. E. Smith, Univ. of California, San Diego (United States)

SESSION 9 APPROACHES WITH ADVANCED STRUCTURES

- 8458 1C **Geometry optimization for optical micromanipulation** [8458-129]
S. H. Simpson, D. B. Phillips, Univ. of Bristol (United Kingdom); G. A. Swartzlander Jr., Rochester Institute of Technology (United States); S. Hanna, Univ. of Bristol (United Kingdom)

SESSION 10 COMBINING OPTICAL TRAPS WITH ACOUSTICS

- 8458 1E **Optical stretching on chip with acoustophoretic prefocusing** [8458-50]
M. Khoury, R. Barnkob, L. Laub Busk, P. Tidemand-Lichtenberg, H. Bruus, K. Berg-Sørensen, Technical Univ. of Denmark (Denmark)
- 8458 1F **Optical squeezing of microbubbles: ray optics and Mie scattering calculations** [8458-51]
S. E. Skelton, M. Sergides, Univ. College London (United Kingdom); G. Memoli, National Physical Lab. (United Kingdom); O. M. Maragó, Istituto per i Processi Chimico-Fisici, CNR (Italy); P. H. Jones, Univ. College London (United Kingdom)

SESSION 11 SELF-ASSEMBLY OF DRIVEN SYSTEMS

- 8458 1I **Dynamics of self-driven and flocking particles on periodic arrays** [8458-54]
J. Drocco, L. M. Lopatina, C. Reichhardt, C. J. Olson Reichhardt, Los Alamos National Lab.
(United States)
- 8458 1J **Statics and dynamics of wetting-dewetting transitions for particles with attractive interactions on periodic substrates** [8458-56]
J. Drocco, C. Reichhardt, C. Olson Reichhardt, A. R. Bishop, Los Alamos National Lab.
(United States)
- 8458 1K **Faster optical delivery of self-arranged multi-particle cluster** [8458-57]
M. Šiler, Institute of Scientific Instruments of the ASCR, v.v.i. (Czech Republic); T. Čížmár, Univ. of St. Andrews (United Kingdom); P. Zemánek, Institute of Scientific Instruments of the ASCR, v.v.i. (Czech Republic)
- 8458 1L **Optical sorting of gold nanoparticles based on the red-shift of plasmon resonance** [8458-58]
M. Ploschner, T. Čížmar, M. Mazilu, A. Di Falco, K. Dholakia, Univ. of St. Andrews (United Kingdom)

SESSION 12 TRAPPING NANOSCALE DIELECTRICS

- 8458 1P **Optical trapping of an encapsulated quantum dot using a double nanohole aperture in a metal film** [8458-62]
A. ZehetabiOskuie, J. Bergeron, Y. Pang, M. Moffitt, R. Gordon, Univ. of Victoria (Canada)

SESSION 13 PLASMONIC TRAPPING AND GOLD NANOPARTICLES

- 8458 1R **Measurements of extreme orientation-dependent temperature increase around an irradiated gold nanorod** [8458-64]
H. Ma, P. M. Bendix, L. B. Oddershede, Univ. of Copenhagen (Denmark)
- 8458 1U **Manipulating forces in optical vortex using plasmonic bumps** [8458-67]
E. H. Khoo, I. Ahmed, M. T. W. Ang, E. P. Li, A*STAR Institute of High Performance Computing (Singapore)

SESSION 14 OPTICALLY MANIPULATED ROBOTICS

- 8458 1V **Micromanipulation and microfabrication for optical microrobotics (Invited Paper)** [8458-69]
D. Palima, A. R. Bañas, Technical Univ. of Denmark (Denmark); G. Vizsnyiczai, L. Kelemen, Biological Research Ctr. (Hungary); T. Aabo, Technical Univ. of Denmark (Denmark); P. Ormos, Biological Research Ctr. (Hungary); J. Glückstad, Technical Univ. of Denmark (Denmark)
- 8458 1W **WOW: light print, light propel, light point** [8458-70]
J. Glückstad, A. Bañas, T. Aabo, D. Palima, Technical Univ. of Denmark (Denmark)

- 8458 1X **Alkaline niobate nanowires as opto-mechanical probes** [8458-71]
F. Dutto, A. Radenovic, École Polytechnique Fédérale de Lausanne (Switzerland)
- 8458 1Y **Non-spherical optically trapped probes: design, control, and applications** [8458-72]
J. A. Grieve, D. B. Phillips, S. Hanna, Univ. of Bristol (United Kingdom); R. W. Bowman, G. M. Gibson, M. J. Padgett, Univ. of Glasgow (United Kingdom); M. J. Miles, Univ. of Bristol (United Kingdom); D. M. Carberry, Univ. of Bristol (United Kingdom) and Univ. of Queensland (Australia); S. H. Simpson, Univ. of Bristol (United Kingdom)
- 8458 1Z **Self-consistent optomechanical trapping, strain and deformation of elastic dielectrics** [8458-128]
M. Sonleitner, Univ. Innsbruck (Austria) and Innsbruck Medical Univ. (Austria); M. Ritsch-Marte, Innsbruck Medical Univ. (Austria); H. Ritsch, Univ. Innsbruck (Austria)

SESSION 15 ADAPTIVE OPTICS FOR OPTICAL MICROMANIPULATION

- 8458 20 **Multimode fibre as a light mode convertor: principles and applications** [8458-73]
T. Čížmár, K. Dholakia, Univ. of St. Andrews (United Kingdom)
- 8458 21 **Phase corrected three-dimensional optical assembly** [8458-75]
G. Wang, Indiana Univ.-Purdue Univ. Fort Wayne (United States)
- 8458 22 **Mapping optical process in semiconductor nanowires using dynamic optical tweezers** [8458-112]
F. Wang, W. J. Toe, A. Harstone, W. M. Lee, The Univ. of New South Wales (Australia); D. McGloin, Univ. of Dundee (United Kingdom); Q. Gao, H. H. Tan, C. Jagadish, The Australian National Univ. (Australia); P. J. Reece, The Univ. of New South Wales (Australia)

SESSION 16 NOVEL BEAMS FOR OPTICAL MICROMANIPULATION

- 8458 24 **Flexible particle manipulation techniques with conical refraction-based optical tweezers** [8458-77]
C. McDougall, R. Henderson, D. J. Carnegie, Univ. of Dundee (United Kingdom); G. S. Sokolovskii, Univ. of Dundee (United Kingdom) and Ioffe Physical-Technical Institute (Russian Federation); E. U. Rafailov, D. McGloin, Univ. of Dundee (United Kingdom)
- 8458 25 **Optical trapping with photorefractive electric fields** [8458-87]
S. A. Torres-Hurtado, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); B. M. Villegas-Vargas, Univ. Veracruzana (Mexico); N. Korneev, J. C. Ramirez-San-Juan, R. Ramos-García, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico)

SESSION 17 OPTO-ELECTRONIC TWEEZERS

- 8458 27 **Optoelectronic tweezers for the measurement of the relative stiffness of erythrocytes** [8458-80]
S. L. Neale, Univ. of Glasgow (United Kingdom); N. Mody, C. Selman, Univ. of Aberdeen (United Kingdom); J. M. Cooper, Univ. of Glasgow (United Kingdom)

SESSION 18 CHEMISTRY AND RHEOLOGY IN OPTICAL TRAPS

- 8458 29 **Probing the bulk viscosity of particles using aerosol optical tweezers** [8458-82]
R. Power, D. L. Bones, J. P. Reid, Univ. of Bristol (United Kingdom)
- 8458 2B **Analysis of optical trap mediated aerosol coalescence** [8458-84]
N. S. Mistry, Univ. of Leicester (United Kingdom); R. Power, Univ. of Bristol (United Kingdom);
S. Anand, D. McGloin, Univ. of Dundee (United Kingdom); A. Almohamedi, M. Downie,
Univ. of Leicester (United Kingdom); J. P. Reid, Univ. of Bristol (United Kingdom);
A. J. Hudson, Univ. of Leicester (United Kingdom)
- 8458 2C **Optical manipulation of airborne particles using flexible dual-beam trap** [8458-85]
O. Brzobohatý, M. Šiler, P. Zemánek, Institute of Scientific Instruments of the ASCR, v.v.i.
(Czech Republic)
- 8458 2D **Laser trapping dynamics of L-alanine depending on the laser polarization** [8458-86]
K. Yuyama, National Chiao Tung Univ. (Taiwan); K. Ishiguro, Nara Institute of Science and
Technology (Japan); T. Sugiyama, Instrument Technology Research Ctr. (Taiwan);
H. Masuhara, National Chiao Tung Univ. (Taiwan) and Nara Institute of Science and
Technology (Japan)

SESSION 19 THE FINAL SESSION

- 8458 2E **Optical tweezers toolbox: better, faster, cheaper; choose all three** [8458-88]
A. B. Stilgoe, M. J. Mallon, The Univ. of Queensland (Australia); Y. Cao, Harbin Institute of
Technology (China); T. A. Nieminen, H. Rubinsztein-Dunlop, The Univ. of Queensland
(Australia)

POSTER SESSION

- 8458 2H **Acoustic Bessel beam with combined optical trapping** [8458-91]
G. W. J. Brodie, D. A. Hughes, C. E. M. Demore, Univ. of Dundee (United Kingdom);
G. C. Spalding, Illinois Wesleyan Univ. (United States); M. P. MacDonald, Univ. of Dundee
(United Kingdom)
- 8458 2I **OET meets acoustic tweezing** [8458-92]
C. Witte, R. Wilson, J. M. Cooper, S. L. Neale, Univ. of Glasgow (United Kingdom)
- 8458 2K **Design and evaluation of a microfluidic system for inhibition studies of yeast cell signaling**
[8458-94]
C. Hamngren, Univ. of Gothenburg (Sweden) and Chalmers Univ. of Technology (Sweden);
P. Dinér, Uppsala Univ. (Sweden) and Univ. of Gothenburg (Sweden); M. Grøtli, M. Goksör,
C. B. Adiels, Univ. of Gothenburg (Sweden)
- 8458 2N **Experimental and computational studies on the DNA translocation mechanism of the T4
viral packaging motor** [8458-97]
A. Migliori, G. Arya, D. E. Smith, Univ. of California, San Diego (United States)

- 8458 2O **Mechanism of termination of bacteriophage DNA packaging investigated with optical tweezers** [8458-98]
D. J. delToro, D. E. Smith, Univ. of California, San Diego (United States)
- 8458 2P **The gene *ten-1* contributes to axon regeneration accuracy following femtosecond laser axotomy in *C. elegans*** [8458-100]
D. T. Stevens, M. Mathew, M. Goksör, M. Pilon, Univ. of Gothenburg (Sweden)
- 8458 2U **Rotation of microscopic discs by the angular momentum of light** [8458-105]
A. V. Arzola, M. Šiler, O. Brzobohatý, P. Jákl, P. Zemánek, Institute of Scientific Instruments of the ASCR, v.v.i. (Czech Republic)
- 8458 2V **Computational modelling of optical tweezers with many degrees of freedom using dynamic simulation: cylinders, nanowires, and multiple particles** [8458-106]
Y. Cao, Harbin Institute of Technology (China) and The Univ. of Queensland (Australia); A. B. Stilgoe, M. Stroet, V. L. Loke, The Univ. of Queensland (Australia); L. Chen, Harbin Institute of Technology (China); T. A. Nieminen, H. Rubinsztein-Dunlop, The Univ. of Queensland (Australia)
- 8458 2W **An algorithm for improved control of trap intensities in holographic optical tweezers** [8458-107]
M. Persson, D. Engström, M. Goksör, Univ. of Gothenburg (Sweden)
- 8458 2X **HoloHands: games console interface for controlling holographic optical manipulation** [8458-108]
C. McDonald, M. McPherson, C. McDougall, D. McGloin, Univ. of Dundee (United Kingdom)
- 8458 2Y **Fast trapping force calculation by utilizing graphic processing unit** [8458-109]
S.-Y. Tseng, A.-T. Chang, C.-W. Luo, L. Hsu, National Chiao Tung Univ. (Taiwan); T. Kobayashi, National Chiao Tung Univ. (Taiwan), ICORP, JST (Japan), The Univ. of Electro-Communications (Japan), and Osaka Univ. (Japan)
- 8458 2Z **Shaping of the trapping volume in optical tweezers using cylindrical vector beams** [8458-110]
S. E. Skelton, M. Sergides, Univ. College London (United Kingdom); M. G. Donato, S. Vasi, R. Sayed, P. G. Gucciardi, Istituto per i Processi Chimico-Fisici, CNR (Italy); R. Saija, Univ. degli Studi di Messina (Italy); M. A. Iatì, O. M. Maragó, Istituto per i Processi Chimico-Fisici, CNR (Italy); P. H. Jones, Univ. College London (United Kingdom)
- 8458 32 **Generation of coherence vortex networks from systems of several Mie-scattering particles** [8458-114]
M. L. Marasinghe, M. Premaratne, D. M. Paganin, Monash Univ. (Australia)
- 8458 33 **Femtosecond trapping efficiency enhanced for nano-sized silica spheres** [8458-115]
A. Usman, W.-Y. Chiang, H. Masuhara, National Chiao Tung Univ. (Taiwan)
- 8458 38 **Using pico-LCoS SLMs for high speed cell sorting** [8458-120]
A. Bañas, T. Aabo, D. Palima, J. Glückstad, Technical Univ. of Denmark (Denmark)

- 8458 39 **Optical trapping of metallic and core-shell particles in a 1D standing wave** [8458-121]
L. Chvátal, M. Šiler, P. Zemánek, Institute of Scientific Instruments of the ASCR, v.v.i. (Czech Republic)
- 8458 3A **Plasmonic optical trapping of metal nanoparticles for SERS by utilizing gold nano-ring structure** [8458-122]
Z. Kang, H.-P. Ho, The Chinese Univ. of Hong Kong (Hong Kong, China)
- 8458 3B **Two-dimensional freeform optical trapping by surface plasmon enhancement and patterned excitation** [8458-123]
H.-W. Su, C.-Y. Lin, S.-J. Chen, National Cheng Kung Univ. (Taiwan)
- 8458 3C **Optically bound particle structures in evanescent wave traps** [8458-124]
M. Sergides, S. E. Skelton, E. Karczewska, K. Thorneycroft, Univ. College London (United Kingdom); O. M. Maragó, Istituto per i Processi Chimico-Fisici, CNR (Italy); P. H. Jones, Univ. College London (United Kingdom)
- 8458 3D **The role of spectral bandwidth in transverse optical binding** [8458-125]
M. Mazilu, A. P. Rudhall, Univ. of St. Andrews (United Kingdom); E. M. Wright, College of Optical Sciences, The Univ. of Arizona (United States) and Univ. of St. Andrews (United Kingdom); K. Dholakia, Univ. of St. Andrews (United Kingdom) and College of Optical Sciences, The Univ. of Arizona (United States)

Author Index

Conference Committee

Symposium Chairs

David L. Andrews, University of East Anglia Norwich (United Kingdom)
James G. Grote, Air Force Research Laboratory (United States)

Symposium Cochairs

Satoshi Kawata, Osaka University (Japan)
Manijeh Razeghi, Northwestern University (United States)

Conference Chairs

Kishan Dholakia, University of St. Andrews (United Kingdom)
Gabriel C. Spalding, Illinois Wesleyan University (United States)

Conference Program Committee

Clemens Bechinger, Universität Stuttgart (Germany)
Yann R. Chemla, University of Illinois at Urbana-Champaign (United States)
Arthur E. T. Chiou, National Yang-Ming University (Taiwan)
Roberto Di Leonardo, Università degli Studi di Roma La Sapienza (Italy)
Jesper Glückstad, Technical University of Denmark (Denmark)
Min Gu, Swinburne University of Technology (Australia)
Sean J. Hart, U.S. Naval Research Laboratory (United States)
Carlos Lenz Cesar, Universidade Estadual de Campinas (Brazil)
Carlos López-Mariscal, U.S. Naval Research Laboratory (United States)
Masud Mansuripur, College of Optical Sciences, The University of Arizona (United States)
Jens-Christian D. Meiners, University of Michigan (United States)
H. Daniel Ou-Yang, Lehigh University (United States)
Thomas T. Perkins, University of Colorado at Boulder (United States)
Rubén Ramos-García, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico)
Halina Rubinsztein-Dunlop, The University of Queensland (Australia)
Christopher C. Schmidt, University of Wisconsin-Madison (United States)
Ming Hsien Wu, Hamamatsu Corporation (United States)
Pavel Zemanek, Institute of Scientific Instruments of the ASCR, v.v.i. (Czech Republic)

Session Chairs

- 1 Foundations of the Electromagnetic Theory of Force and Momentum
Michael Mazilu, University of St. Andrews (United Kingdom)
- 2 Toward (or in) the Quantum Limit of Opto-Mechanics
Oskar J. Painter, California Institute of Technology (United States)
- 3 Statistical Mechanics
Halina Rubinsztein-Dunlop, The University of Queensland (Australia)
- 4 Application of Exquisite Optical Measurements
H. Daniel Ou-Yang, Lehigh University (United States)
- 5 Special Session in Honor of Michael W. Berns
Josef A. Käs, The University of Texas at Austin (United States)
- 6 Optical Studies of Cellular Mechanics
Michael W. Berns, Beckman Laser Institute and Medical Clinic (United States)
- 7 Optical Microrheology for Biological Systems
Josef A. Käs, Universität Leipzig (Germany)
- 8 Optical Manipulation of Single Molecules
Thomas T. Perkins, JILA (United States)
- 9 Approaches with Advanced Structures
Jesper Glückstad, Technical University of Denmark (Denmark)
- 10 Combining Optical Traps with Acoustics
Graham W. J. Brodie, University of Dundee (United Kingdom)
- 11 Self-Assembly of Driven Systems
Michael P. MacDonald, Institute for Medical Science & Technology (United Kingdom)
- 12 Trapping Nanoscale Dielectrics
Masud Mansuripur, College of Optical Sciences, The University of Arizona (United States)
- 13 Plasmonic Trapping and Gold Nanoparticles
Reuven Gordon, University of Victoria (Canada)
- 14 Optically Manipulated Robotics
Carlos Lenz Cesar, Universidade Estadual de Campinas (Brazil)

- 15 Adaptive Optics for Optical Micromanipulation
Gabriel C. Spalding, Illinois Wesleyan University (United States)
- 16 Novel Beams for Optical Micromanipulation
Kishan Dholakia, University of St. Andrews (United Kingdom)
- 17 Opto-Electronic Tweezers
Rubén Ramos-García, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico)
- 18 Chemistry and Rheology in Optical Traps
Tomáš Čížmár, University of St. Andrews (United Kingdom)
- 19 The Final Session
David L. Andrews, University of East Anglia Norwich (United Kingdom)

