PROCEEDINGS OF SPIE

Optical Trapping and Optical Micromanipulation XV

Kishan Dholakia
Gabriel C. Spalding
Editors

19–23 August 2018
San Diego, California, United States

Sponsored by
SPIE

Cosponsored by
Laser Quantum (United Kingdom)

Published by
SPIE

Volume 10723

Proceedings of SPIE 0277-786X, V. 10723

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

The papers 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. Additional papers and presentation recordings may be available online in the SPIE Digital Library at SPIEDigitalLibrary.org.

The papers 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 these proceedings:
Author(s), "Title of Paper," in *Optical Trapping and Optical Micromanipulation XV*, edited by Kishan Dholakia, Gabriel C. Spalding, Proceedings of SPIE Vol. 10723 (SPIE, Bellingham, WA, 2018) Seven-digit Article CID Number.

ISSN: 0277-786X
ISSN: 1996-756X (electronic)

ISBN: 9781510620179
ISBN: 9781510620186 (electronic)

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

Printed in the United States of America by Curran Associates, Inc., under license from SPIE.

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

SPIEDigitalLibrary.org

Paper Numbering: *Proceedings of SPIE* follow an e-First publication model. A unique citation identifier (CID) number is assigned to each article at the time of 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 and print versions of the publication. SPIE uses a seven-digit CID article numbering system structured as follows:

- The first five 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.

Contents

vii *Authors*
ix *Conference Committee*

HOLOGRAPHIC OPTICAL SYSTEMS: FROM SPECKLE TO STUDIES OF NEURONS

10723 02 **Volumetric display by movement of particles trapped in a laser via photophoresis (Invited Paper)** [10723-1]

10723 03 **Stiff traps using super-oscillating optical beams** [10723-2]

10723 06 **Spatio-temporal modulation of light for stimulating and recording neuronal activity** [10723-5]

STATISTICAL MECHANICS OF SMALL SYSTEMS

10723 0A **Fluctuation-dissipation of an active Brownian particle under confinement** [10723-10]

SPECIAL SESSION HONORING HALINA RUBINSZTEIN-DUNLOP

10723 0E **Optical trapping of individual magnetic nanoparticles (Invited Paper)** [10723-15]

HIGH-SENSITIVITY DETECTORS I

10723 0H **Tests of fundamental physics with optically levitated microspheres in high vacuum (Invited Paper)** [10723-18]

10723 0J **MEMS gravity sensors for imaging density anomalies (Invited Paper)** [10723-20]

10723 0L **Interaction of acoustic waves with optomechanical resonators and oscillators** [10723-22]

MEASUREMENT OF FLUCTUATION-INDUCED EFFECTS

10723 0O **Control over phase separation and nucleation using an optical-tweezing potential (Invited Paper)** [10723-25]

RADIATION PRESSURE, TRACTOR BEAMS, AND SOLAR SAILS

10723 0Q **The Abraham-Minkowski momentum controversy for a linear magneto-dielectric medium** [10723-27]

10723 0R **Energy, linear momentum, and angular momentum exchange between an electromagnetic wave-packet and a small particle** [10723-28]

10723 0U **Verification of radiation pressure on a diffraction grating** [10723-31]

10723 0V **Mechanical characterization of planar springs for compact radiation pressure power meters (Invited Paper)** [10723-32]

REACTIVE OPTICAL MATTER

10723 0Y **Analysis of the dynamics of electric dipoles in fluctuating electromagnetic fields** [10723-35]

HIGH-SENSITIVITY DETECTORS II

10723 11 **Solid state laser cooling of optically levitated particles** [10723-39]

10723 13 **Infrared induced photo-dynamics of NV centres in optically trapped nanodiamond** [10723-41]

10723 14 **An apparatus for optical levitation of microspheres in high vacuum with rotational control** [10723-42]

MICRORHEOLOGICAL PROBES AND STUDIES

10723 1D **Active microrheology using a two-particle system coupled by hydrodynamic interactions in optical tweezers** [10723-51]

USING THE PHOTONIC TOOLBOX TO STUDY CELLS AND THEIR ORGANELLES

10723 1H **Studies of biflagellated microalgae adhesion using an optical trap system** [10723-55]

NEAR-FIELD MANIPULATION, PLASMONIC TRAPS, AND AUXILIARY TOOLS

10723 1J **Holographic plasmonic tweezing for dynamic trapping and manipulation (Invited Paper)** [10723-57]

TRAPPING AT EXTREMES ("GONZO TRAPPING")

10723 1N **Deposition of levitated charged nanoparticles on a substrate using an electrostatic lens** [10723-62]

10723 1O **Investigation of mechanical torque applied by electron vortex beams in a liquid cell** [10723-63]

OPTICAL MANIPULATION OF MATTER THROUGH GASEOUS MEDIA

10723 1S **Morphology and motion of single optically trapped aerosol particles from digital holography** [10723-67]

PICK-AND-PLACE AND HYBRID TECHNOLOGIES

10723 1W **Assembly of mesoscopic to macroscopic particles with optoelectronic tweezers (OET) (Invited Paper)** [10723-71]

10723 1X **Hopping mechanism of particles and cells escaping from optoelectronic tweezer traps** [10723-72]

NOVEL MANIPULATION AND SORTING AND ACTIVE MATTER

10723 1Y **Controllable particle hopping in optofluidic lattice for antibody screening and binding efficiency measurement** [10723-73]

MICRO-MECHANICS: STRETCHING AND COMPRESSION

10723 22 **Study for cell deformability by optical manipulation** [10723-78]

10723 23 **Atomic force microscopy combined with optical tweezers (AFM/OT): characterization of micro and nanomaterial interactions** [10723-79]

POSTER SESSION

10723 2B **Optical tweezers toolbox: full dynamics simulations for particles of all sizes** [10723-89]

10723 2C **Measuring the motility and drag forces acting on biological particles using optical tweezers** [10723-90]

10723 2D **Using single-beam optical tweezers for the passive microrheology of complex fluids** [10723-91]

10723 2F **Sensor-side Brownian noise reduction in optically trapped probe microscopy** [10723-93]

10723 2I **Computational toolbox to calculate the dynamics of nanometer-size particles interacting with structured light beams** [10723-96]

10723 2J **Optical feedback tweezers** [10723-98]

10723 2K **Spirally polarized OAM beam generation in few-mode fiber** [10723-99]

10723 2O **Assembly and 2D manipulation of colloidal crystal by temperature gradient** [10723-103]

10723 2P **3D trapping of thermally generated microbubbles** [10723-104]

10723 2Q **Assembly and manipulation of mesoscopic particles using micro bubbles in thermo-optical tweezers** [10723-105]

10723 2R **Manipulation of photothermally generated microbubbles** [10723-106]

10723 2Y **Comparison of the orbital and spin rotation of a dielectric particle** [10723-113]

10723 30 **Integrated nanoaperture optical fiber tweezer** [10723-115]

10723 34 **Analysis of the mechanism of the vertical spin formation for the evanescent wave in the near-surface layer of biological tissue fluid** [10723-119]

10723 35 **Experimental demonstration of nanoparticles motion by the vertical spin of the evanescent wave action in biological media** [10723-120]

10723 3A **Direct measurement of negative light pressure by means of PTBs nanonewton force facility** [10723-127]