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Front Matter: Volume 9710

, "Front Matter: Volume 9710," Proc. SPIE 9710, Optical Elastography and Tissue Biomechanics III, 971001 (24 June 2016); doi: 10.1117/12.2239750

SPIE.

Event: SPIE BiOS, 2016, San Francisco, California, United States

PROGRESS IN BIOMEDICAL OPTICS AND IMAGING

Vol. 17 No. 22

Optical Elastography and Tissue Biomechanics III

Kirill V. Larin
David D. Sampson
Editors

13–15 February 2016
San Francisco, California, United States

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SPIE

Volume 9710

Proceedings of SPIE, 1605-7422, V. 9710

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

Optical Elastography and Tissue Biomechanics III, edited by Kirill V. Larin, David D. Sampson, Proc. of SPIE
Vol. 9710, 971001 · © 2016 SPIE · CCC code: 1605-7422/16/\$18 · doi: 10.1117/12.2239750

Proc. of SPIE Vol. 9710 971001-1

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Author(s), "Title of Paper," in *Optical Elastography and Tissue Biomechanics III*, edited by Kirill V. Larin, David D. Sampson, Proceedings of SPIE Vol. 9710 (SPIE, Bellingham, WA, 2016) Six-digit Article CID Number.

ISSN: 1605-7422

ISSN: 2410-9045 (electronic)

ISBN: 9781628419443

Published by

SPIE

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

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

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Introduction

Optical elastography is the use of optics to characterize cells and tissues based on their mechanical properties. In utilizing the high-resolution capability of optics, this rapidly emerging field builds on and complements the related fields of ultrasound and MR elastography, as well as existing biomechanics methods, such as atomic force microscopy, cell indentation, micropipette aspiration, and particle rheology.

Mechanical forces play an important role in biological behavior and development at all spatial scales, from cells and their constituents to tissues and organs, and influence health, structural integrity, and normal function. High-resolution optical methods could help further the understanding of such mechanical interactions and properties in the cell mechanics and clinical diagnosis of a wide range of diseases. An important part of this contribution is expected to be the accurate determination of cell and tissue biomechanical properties, such as Young's or shear modulus.

This third annual conference continued the vibrant intellectual ambience of the first two conferences and displayed a strongly multidisciplinary character, bringing together technology and applications experts in bioengineering, biophysics, cell biology, clinical sciences, medical imaging, optics and photonics, and tissue engineering. This year, 49 contributed papers were built around 2.5 days of invited and contributed talks and posters. Exceptional keynote and invited speakers headlined the program:

Keynote:

Dennis E. Discher, University of Pennsylvania (United States), "Cells might not see where they are but they certainly feel the mechanics of their microenvironment!"

Invited:

Zhongping Chen, Beckman Laser Institute and Medical Clinic (United States), "Acoustic radiation force optical coherence elastography"

Brendan F. Kennedy, The University of Western Australia (Australia), "Compression optical coherence elastography for improved diagnosis of disease"

Seemantini K. Nadkarni, Harvard School of Medicine (United States), "Laser speckle rheology"

Assad A. Oberai, Rensselaer Polytechnic Institute (United States), "Inverse problems in biomechanical imaging"

This year's keynote speaker, Dennis E. Discher, provided insight on biomechanics at the cellular level. He provided a comprehensive overview of the role of mechanical forces during everyday cellular activity. Special acknowledgement goes to Thorlabs, Inc., whose sponsorship supported this keynote session. Highlights of this year's contributed program include the progress and impact made in Brillouin microscopy, and in both the shear wave and compression-based optical coherence elastography approaches. Applications in the anterior eye continued to grow, with some important progress in breast cancer and interesting new approaches to imaging skin and scar mechanical properties.

Optical Elastography and Tissue Biomechanics has confirmed its important place in supporting this emerging area – we look forward with excitement and anticipation to see what the next twelve months will bring. In the meantime, please enjoy reading the papers submitted for this volume.

Kirill V. Larin
David D. Sampson