

# ***Optical Elastography and Tissue Biomechanics II***

**Kirill V. Larin**  
**David D. Sampson**  
*Editors*

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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.

# Contents

vii	<i>Authors</i>
ix	<i>Conference Committee</i>
xi	<i>Introduction</i>

---

## SESSION 1 KEYNOTE SESSION

---

9327 02	<b>MRI and mechanobiology: new science at the intersection of engineering and medicine (Keynote Paper)</b> [9327-1]
9327 03	<b>Noninvasive 3D elasticity mapping using phase-stabilized optical coherence elastography</b> [9327-2]

---

## SESSION 2 PERSPECTIVES IN ELASTOGRAPHY

---

9327 05	<b>Amplitude-modulated ultrasound radiation force combined with phase-sensitive optical coherence tomography for shear wave elastography</b> [9327-4]
---------	---

---

## SESSION 3 RHEOLOGY AND SPECKLE METHODS

---

9327 0A	<b><i>In vivo</i> monitoring of external pressure induced hemodynamics in skin tissue using optical coherence tomography angiography</b> [9327-9]
9327 0B	<b>An endoscopic multi-exposure laser speckle contrast analysis system for blood flow and microcirculation measurements</b> [9327-10]

---

## SESSION 4 ELASTOGRAPHY AND BIOMECHANICS APPLICATIONS

---

9327 0C	<b><i>In vivo</i> optical elastography: stress and strain imaging of human skin lesions</b> [9327-11]
9327 0D	<b>Estimation of elastic parameters of ovarian tissue using phase stabilized swept source optical-coherence tomography</b> [9327-12]
9327 0E	<b>Vascular wall stress during intravascular optical coherence tomography imaging</b> [9327-13]
9327 0F	<b>Quantitative shear wave imaging optical coherence tomography for noncontact mechanical characterization of myocardium</b> [9327-14]

---

**SESSION 5 CELL MECHANICS**

---

- 9327 0I **Simultaneous optical and mechanical probes to investigate complex cellular responses to physical cues (Invited Paper)** [9327-17]
- 9327 0L **Mapping dynamic mechanical remodeling in 3D tumor models via particle tracking microrheology** [9327-20]

---

**SESSION 6 COMPRESSION ELASTOGRAPHY AND BRILLOUIN MICROSCOPY**

---

- 9327 0P **High-speed assessment of liquid viscoelasticity in flow cytometry using nonlinear Brillouin spectroscopy** [9327-24]

---

**SESSION 7 ELASTOGRAPHY OF THE CORNEA**

---

- 9327 0R **Fluorescence spectroscopy of collagen crosslinking: non-invasive and in-situ evaluation of corneal stiffness** [9327-26]
- 9327 0S **Spatial mapping of the biomechanical properties of rabbit cornea after cross-linking using optical coherence elastography** [9327-27]

---

**SESSION 8 LOADING AND MEASUREMENT METHODS**

---

- 9327 0U **Quantitative shear wave optical coherence elastography (SW-OCE) with acoustic radiation force impulses (ARFI) induced by phase array transducer** [9327-29]
- 9327 0V **Acoustic radiation force optical coherence elastography using vibro-acoustography** [9327-30]
- 9327 0W **Combined correlation estimation of axial displacement in optical coherence elastography: assessment of axial displacement sensitivity performance relative to existing methods** [9327-31]

---

**POSTER SESSION**

---

- 9327 0Y **Mapping tissue shear modulus on Thiel soft-embalmed mouse skin with shear wave optical coherence elastography** [9327-33]
- 9327 0Z **Assessment of the biomechanical properties of porcine cornea after UV cross-linking at different intraocular pressures** [9327-34]
- 9327 10 **Quantitative assessment of the mechanical properties of tissue-mimicking agar phantoms by optical coherence elastography and numerical analyses** [9327-35]
- 9327 13 **Brillouin spectroscopy reveals changes in muscular viscoelasticity in Drosophila POMT mutants** [9327-38]

- 9327 14 **Elasticity measurement of nasal cartilage as a function of temperature using optical coherence elastography [9327-39]**
- 9327 16 **Noncontact depth-resolved micro-scale corneal elastography [9327-41]**
- 9327 17 **A study on the properties of contact pressure induced by manually operated diffuse reflectance fiber optic probes [9327-42]**
- 9327 18 **Fast low-noise Brillouin spectroscopy measurements of elasticity for corneal crosslinking [9327-51]**



## Authors

Numbers in the index correspond to the last two digits of the six-digit citation identifier (CID) article numbering system used in Proceedings of SPIE. The first four digits reflect the volume number. Base 36 numbering is employed for the last two digits and indicates the order of articles within the volume. Numbers start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B...0Z, followed by 10-1Z, 20-2Z, etc.

Aglyamov, Salavat R., 10  
Al-Rekabi, Zeinab, 0I  
Arnal, Bastien, 05  
Baker, Ryan, 13  
Bamber, J. C., 0W  
Bregar, Maksimilijan, 17  
Brewer, Molly, 0D  
Bukshab, Michael, 18  
Bürmen, Miran, 17  
Celli, Jonathan P., 0L  
Chen, Zhongping, 0V  
Choi, Woo June, 0A  
Cugmas, Blaž, 17  
Ehman, Richard L., 02  
Elson, D. S., 0B  
Es'haghian, Shaghayegh, 0C  
Franco, Walfre, 0R  
Friedman, Marc, 18  
Gong, Peijun, 0C  
Grimwood, A., 0W  
Guolla, Louise, 0I  
Haase, Kristina, 0I  
Han, Zhaolong, 0S, 0Z, 10  
Hanna, William, 0L  
He, Youmin, 0V  
Hickey, Ryan, 0I  
Huang, Zhihong, 0U, 0Y  
Idugboe, Rita, 10  
Jones, Dustin P., 0L  
Joy, Joyce, 0Y  
Kennedy, Brendan F., 0C  
Kennedy, Kelsey M., 0C  
Kochevar, Irene E., 0R  
Larin, Kirill V., 03, 0F, 0S, 0Z, 10, 14, 16  
Larina, Irina V., 0F  
Le, Nhan Minh, 0U  
Li, Jiasong, 03, 0F, 0S, 0Z, 10, 14  
Li, Rui, 0V  
Likar, Boštjan, 17  
Liu, Chih-Hao, 0Z, 10, 14  
Lopez, Andrew L., III, 0F  
Ma, Teng, 0V  
Martin, James F., 0F  
McLaughlin, Robert A., 0C  
Meng, Zhaokai, 0P, 13  
Messa, A., 0W  
Morikawa, Yuka, 0F  
Muller, David, 18  
Nandy, Sreyankar, 0D  
Nguyen, Thu-Mai, 05  
O'Donnell, Matthew, 05  
Ortega-Martinez, Antonio, 0R  
Panin, Vladislav M., 13  
Paranjape, Amit, 18  
Pelling, Andrew E., 0I  
Pernuš, Franjo, 17  
Petrov, Georgi I., 0P  
Qi, Wenjuan, 0V  
Qu, Yueqiao (Rachel), 0V  
Raghunathan, Raksha, 10  
Salehi, Hassan, 0D  
Sampson, David D., 0C  
Sanders, Melinda, 0D  
Shen, Tueng T., 05  
Shung, K. Kirk, 0V  
Singh, Manmohan, 03, 0S, 0Z, 10, 14  
Skryabina, M.N., 14  
Sobol, E., 14  
Song, L., 0B  
Song, Shaozhen, 05, 0U, 0Y  
Sudheendran, Narendran, 10  
Sun, Cuiru, 0E  
Tao, Ge, 0F  
Tremblay, Dominique, 0I  
Twa, Michael D., 03, 0S, 0Z, 10  
Tziraki, M., 0B  
Vantipalli, Srilatha, 0S, 0Z  
Wang, Hequn, 0A  
Wang, Ruikang K., 05, 0A, 0U, 0Y  
Wang, Ruisheng, 0R  
Wang, Shang, 03, 0F, 10, 16  
Wang, Tianheng, 0D  
Wijesinghe, Philip, 0C  
Wong, Emily Y., 05  
Wu, Chen, 10, 14  
Yakovlev, Vladislav V., 0P, 13  
Yang, Victor, 0E  
Zhou, Qifa, 0V  
Zhu, Hong, 0R  
Zhu, Jiang, 0V  
Zhu, Quing, 0D



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- 5 Cell Mechanics  
**Gabriel Popescu**, University of Illinois at Urbana-Champaign  
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**Brendan F. Kennedy**, The University of Western Australia (Australia)  
**Giuliano Scarcelli**, Harvard Medical School (United States)
- 7 Elastography of the Cornea  
**Ruikang K. Wang**, University of Washington (United States)  
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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 the behavior and development of cells at all spatial scales, from cells and their constituents, to tissues and organs. Such forces profoundly influence the health, structural integrity, and normal function of cells and organs. Accurate determination of cell and tissue biomechanical properties, such as Young's or shear modulus, is a vitally important area. High-resolution optical methods could help further the understanding of mechanical interactions and mechanical properties, with application to cell mechanics, clinical diagnosis, and the understanding of a wide range of diseases.

This second annual conference maintained the vibrant intellectual ambience of the first. It continued to display a strong 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, more than 42 contributed papers enhanced two days of invited presentations and posters (a 20% increase over last year). An exceptional keynote and invited speakers headlined the program:

### **Keynote:**

Richard L. Ehman M.D., Mayo Clinic (United States), *MRI & mechanobiology: new science at the intersection of engineering and medicine*

### **Invited:**

Jeffrey C. Bamber, The Institute of Cancer Research (United Kingdom), *Ultrasound elastography: current systems, ongoing research and future potential*

Claude Boccara, Institut Langevin (France), *Full field OCT and tissue elasticity measurements: a critical view*

Andrew E. Pelling, Univ. of Ottawa (Canada), *Simultaneous optical and mechanical probes to investigate complex cellular responses to physical cues*

Peter Török, Imperial College London (United Kingdom), *High numerical aperture Brillouin microscopy*

A highlight of this year's meeting was the insight provided by Richard Ehman and Jeff Bamber on magnetic resonance and ultrasound elastography, respectively. The insight that these allied but more mature fields provide into our own field is profound. Special acknowledgement goes to Thorlabs Inc., who sponsored and supported the Keynote Session. Other highlights included 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 made in breast cancer and interesting new approaches to imaging skin and scar mechanical properties. Optical Elastography and Tissue Biomechanics has confirmed its important role 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**