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Session 1A: Welcome Remarks and Tutorials
Chair: Dr. William O’Brien, University of Illinois, Urbana-Champaign
8:00 am – 9:30 am

8:00 am – 8:20 am
1A-1 Welcome Remarks and Introduction to the NIH Resource on Medical Ultrasonic Transducer Technology
K. K. Shung, Department of Biomedical Engineering, University of Southern California, Los Angeles, CA

8:20 am – 8:40 am
1A-2 Tutorial Clinical Applications of Ultrasound: Present and Future
C. Deurdulian, Department of Radiology, University of Southern California, Los Angeles, CA

8:40 am – 9:00 am
1A-3 Tutorial Transducer Fabrication: Challenges and Opportunities
L. S. Smith, GE Global Research, Niskayuna, NY

9:00 am – 9:15 am
1A-4 Invited Ultrafast Compound Coherent Plane Wave Imaging of the Eye
R. H. Silverman1,2, R. Urs3, and J. A. Ketterling2
1Department of Ophthalmology, Columbia University Medical Center, New York, NY, 2F.L. Lizzi Center for Biomedical Engineering, Riverside Research, New York, NY

9:15 – 9:30 am
1A-5 Invited Special Purpose Microfluidics Generated Microbubbles for Accelerated Blood Clot Erosion
J. A. Hossack, Department of Biomedical Engineering, University of Virginia, Charlottesville, VA

9:30 am – 10:00 am
Coffee Break

NIH Resource Center for Medical Ultrasonic Transducer Technology

The NIH Resource on Medical Ultrasonic Transducer Technology first took shape in 1993 at the Pennsylvania State University through a Biomedical Engineering Special Opportunity Award Grant from the Whitaker Foundation, Washington, D.C. The Resource Center then gained funding in 1997 through a National Institutes of Health (NIH) Technology Resource Grant given by the NIH National Center for Research Resources (NCRR) and supported by the National Institute of Biomedical Imaging and Bioengineering (NIBIB). The grant was used to expand the mission of the Resource Center and help it provide support to academic and research institutions. In August 2002, the Resource Center moved to the University of Southern California and set up laboratories in Denney Research Center (DRB) at the University Park Campus in Los Angeles. Additional support from leading ultrasound equipment manufacturers, industrial and laboratory equipment manufacturers, and the University of Southern California has helped to build the Resource Center into a state-of-the-art facility.

Contact Information
Dr. K. Kirk Shung
Dean's Professor, Department of Biomedical Engineering
Director, Resource Center for Medical Ultrasonic Transducer Technology
University of Southern California
1042 Downey Way, DRB 136
Los Angeles, CA 90089-1111

Phone: 213-821-2653
Fax: 213-821-3897
Email: kkshung@usc.edu
Session 1B: Ultrasound Applications
Chair: Dr. Scott I. Simon, University of California, Davis
10:00 am – 11:50 am

10:00 am – 10:15 am
1B-1 Invited Photoacoustic Imaging of Atherosclerosis
A. F. W. van der Steen, M. Wu, V. Daeichin, K. Jansen, M. Visscher, P. Kruizinga, G. van Soest
Biomedical Engineering, Thorax Center, Erasmus University Medical Centre Rotterdam, Rotterdam, The Netherlands

10:15 am – 10:30 am
1B-2 Invited Ultrafast and Super-Resolution Vascular Imaging using Ultrasound and Microbubbles
M. -X. Tang, Ultrasound Laboratory for Imaging and Sensing (ULIS), Department of Bioengineering, Imperial College London, London, United Kingdom

10:30 am – 10:45 am
1B-3 Invited Characterization of Nano Gas Vesicle for Ultrasound Theranostics
L. Sun, Interdisciplinary Division of Biomedical Engineering, The Hong Kong Polytechnic University, Hong Kong, China

10:45 am – 11:00 am
1B-4 Invited A Novel Adhesion Index for Verifying the Extent of Adhesion for the Extensor Digitorum Communis in Patients with Metacarpal Fractures
T. -Y. Lai¹, H. -I. Chen², C. -C. Shih³, L. -C. Kuo³, H. -Y. Hsu³, and C. -C. Huang³
¹Department of Biomedical Engineering, National Cheng Kung University, Tainan, Taiwan, ²Department of Occupational Therapy, National Cheng Kung University, Tainan, Taiwan, ³Department of Physical Medicine and Rehabilitation, National Cheng Kung University Hospital, College of Medicine, National Cheng Kung University, Tainan, Taiwan

11:00 am – 11:15 am
1B-5 Invited High-Frequency Single-Beam Acoustic Trapping: Potential for Cell Characterizations
J. Y. Hwang, Daegu Gyeongbuk Institute of Science and Technology, Daegu, South Korea
Session 1B (Continued)

11:15 am – 11:30 am  
1B-6 Invited  Mechanism of Ultrasound Mechanotransduction by Invasive Cancer Cells  
N. S. Lee¹, C. W. Yoon², K. S. Goo³, A. C. Weitz³, R. H. Chow¹, and K. K. Shung¹  
¹Department of Physiology & Biophysics, University of Southern California, Los Angeles, CA, ²Department of Biomedical Engineering, University of Southern California, Los Angeles, CA, ³Department of Ophthalmology, University of Southern California, Los Angeles, CA

11:30 am – 11:40 am  
1B-7 Acoustic-Transfection Technique for Gene and Protein Delivery  
S. Yoon¹, M. G. Kim², Y. Wang², and K. K. Shung¹  
¹Department of Biomedical Engineering, University of Southern California, Los Angeles, CA, ²Department of Bioengineering, University of California, San Diego, La Jolla, CA

11:40 am – 11:50 am  
1B-8 Intravascular Elastography for Atherosclerosis Artery Vulnerability Assessment  
T. Ma, X. Qian, M. Yu, K. K. Shung, and Q. Zhou  
Department of Biomedical Engineering, University of Southern California, Los Angeles, CA

11:50 am – 1:00 pm  
Lunch

Session 1C: Poster Session  
Chair: Dr. Jonathan Rubin, University of Michigan  
1:00 pm – 2:00 pm

1C-1 Design and Fabrication of Lead-free BNT Film High Frequency Ultrasound Transducers  
J. Zhang¹, W. Ren², Y. Liu³, P. Shi³, Q. Zhou³, and K. K. Shung¹  
¹Electronic Materials Research Laboratory, Key Laboratory of the Ministry of Education and International Center for Dielectric Research, Xi’an Jiaotong University, Xi’an, China, ²Department of Biomedical Engineering, University of Southern California, Los Angeles, CA

Location and Time  
Oral sessions: Salon D; M, 8am-6pm, T, 8am-12pm  
Poster session: Foyer surrounding Salons D, E; M, 1pm-2pm  
Breakfast: Salon C; M, 7am-8am, T, 7am-8am  
Reception: Zen Garden, M, 6pm-8pm  

See hotel map in Page 14.

Conference Chair  
Dr. K. Kirk Shung  
Dean’s Professor, Department of Biomedical Engineering  
Director, NIH Resource Center for Medical Ultrasonic Transducer Technology  
University of Southern California  
kkshung@usc.edu

Conference Committee  
Dr. Qifa Zhou (Committee Chair)  
Professor, Departments of Ophthalmology & Biomedical Engineering  
University of Southern California  
qifazhou@usc.edu

Dr. Ruimin Chen  
Resource Manager, NIH Resource Center for Medical Ultrasonic Transducer Technology  
Research Associate, Department of Biomedical Engineering  
University of Southern California  
ruiminch@usc.edu

Tanisha Hughes  
Budget/Business Analyst, Department of Biomedical Engineering  
University of Southern California  
tanishah@usc.edu
Session 1C (Continued)

1C-2 Activation of Intracellular Ca\(^{2+}\) Oscillation by High-Frequency Ultrasound Micro-Beam Stimulation in HIT-T15 Pancreatic Beta Cell
C. W. Yoon\(^1\), C. Yoon\(^3\), N. Lee\(^3\), K. Goo\(^2\), and K. K. Shung\(^2\)
\(^1\)Department of Biomedical Engineering, University of Southern California, Los Angeles, CA, \(^2\)School of Electrical and Computer Engineering, Georgia Institute of Technology, Atlanta, GA

1C-3 An Accurate Method Based on Micropipette Aspiration for Calibrating the Trapping Force of Single Beam Acoustic Tweezer at Ultra-High Frequencies
Department of Biomedical Engineering, University of Southern California, Los Angeles, CA

1C-4 Design of High Voltage 1 to 64 Mux/De-Mux for High Frequency Synthetic Aperture Imaging System
H. Jung and K. K. Shung
Department of Biomedical Engineering, University of Southern California, Los Angeles, CA

1C-5 Development of Ultrahigh Frequency Needle Ultrasound Transducer (300-MHz to 500-MHz) using Thin LiNbO\(_3\) Crystal
X. Chen\(^3\), R. Chen\(^3\), Z. Chen\(^2\), X. Liu\(^3\), Z. Chen\(^3\), K. K. Shung\(^3\), and Q. Zhou\(^3\)
\(^1\)Beckman Laser Institute, Department of Biomedical Engineering, University of California - Irvine, Irvine, CA, \(^2\)Department of Biomedical Engineering, University of Southern California, Los Angeles, CA, \(^3\)College of Material Science and Engineering, Sichuan University, Chengdu, China

1C-6 One-Dimensional Piezoelectric (K, Na)NbO\(_3\) Nanotube Arrays
W. H. Liew\(^4\), Y. Wang\(^4\), M. S. Mirshekarloo\(^2\), K. Yao\(^4\), and E. H. Tay\(^4\)
\(^1\)Department of Mechanical Engineering, National University of Singapore, Singapore, \(^2\)Institute of Materials Research and Engineering, Singapore

1C-7 Optimized Cytoplasmic Delivery of Macromolecules using Acoustic Transfection with High Frequency Ultrasound
M. G. Kim, S. Yoon, and K. K. Shung
Department of Biomedical Engineering, University of Southern California, Los Angeles, CA
Session 1C (Continued)

1C-8 An In Vitro Test to Study the Effect of Ultrasound on Proliferation of Neuronal Stem Cells
Department of Biomedical Engineering, University of Southern California, Los Angeles, CA

1C-9 Evaluation of Myocardium Function for Adult Zebrafish during Heart Regeneration by High Frequency Echocardiography
H. -C. Chen and C. -C. Huang
Department of Biomedical Engineering, National Cheng Kung University, Tainan, Taiwan

1C-10 Multiscale High-Frequency Ultrasound Biomicroscopic (UBM) System Based on ARFI Imaging for Measurement of Elasticity of Living Cells and Tissues
J. Kim and J. Y. Hwang
Daegu Gyeongbuk Institute of Science and Technology, Daegu, S. Korea

1C-11 High Resolution Ultrasound Elasticity Imaging System
X. Qian1,2, T. Ma1,2, M. Yu1, K. K. Shung1, and Q. Zhou1,2
1Department of Biomedical Engineering, University of Southern California, Los Angeles, CA, 2Department of Ophthalmology, University of Southern California, Los Angeles, CA

1C-12 3D Printing of Piezoelectric Element for Energy Focusing and Ultrasonic Sensing
Z. Chen1, X. Song1, X. Chen5,6, C. T. Chiu1, X. Qian1, T. Ma1, L. Lei3, C. Fei4, Y. Yang2, Y. Chen2, K. K. Shung3, and Q. Zhou1
1Department of Biomedical Engineering, University of Southern California, Los Angeles, CA, 2Daniel J. Epstein Department of Industrial and Systems Engineering, University of Southern California, Los Angeles, CA, 3School of Material Science and Engineering, Wuhan University of Technology, Wuhan, China, 4Key Laboratory of Artificial Micro- and Nano-structures of Ministry of Education, School of Physics and Technology, Wuhan University, Wuhan, China, 5Beckman Laser Institute, Department of Biomedical Engineering, University of California - Irvine, Irvine, CA, 6College of Material Science and Engineering, Sichuan University, Chengdu, China

Session 2A (Continued)

9:15 am – 9:30 am
Y. Tung, S. Li, P. Kaczkowski, and R. Daigle
Verasonics Inc., Kirkland, WA

9:30 am – 9:40 am
2A-7 Dual Hybrid Ultrasound Transducers - Designs and Simulations
T. Manh1, L. Hoff1, T. F. Johansen2, T. Eggen3, F. Lanteri4, and J.-F. Gelly4
1Department of Micro and Nano Systems Technology, University College of Southeast Norway, Norway, 2Department of Acoustics, SINTEF ICT, Norway, 3GE Vingmed Ultrasound AS, Norway, 4GE Parallel Design SAS, France

9:40 am – 9:50 am
2A-8 Miniature Linear Phased Array for Colorectal Robotic Surgery
N. E. Cabrera-Munoz, J. A. Williams, H. H. Kim, and K. K. Shung
Department of Biomedical Engineering, University of Southern California, Los Angeles, CA

9:50 am – 10:30 am
Coffee Break

Session 2B: Piezoelectric Single Crystal Chair: Dr. L. Scott Smith, GE Global Research
10:30 am – 11:40 am

10:30 am – 10:45 am
2B-1 Invited Innovative Methods for the Characterization of Relaxor-PT based and Lead-Free KNN-Based Single Crystals
W. Cao1,2
1NIH Resource Center for Medical Ultrasonic Transducer Technology, University of Southern California, Los Angeles, CA, 2Department of Mathematics and Materials Research Institute, The Pennsylvania State University, University Park, PA
Tuesday, May 17, 2016

Session 2A: High Frequency Array Transducers
Chair: Dr. F. Stuart Foster, University of Toronto
8:00 am – 9:50 am

8:00 am – 8:15 am
2A-1 Invited CMUT-on-CMOS Single Chip Front-End Design for Catheter Based Ultrasound Imaging
F. L. Degertekin, George W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology, Atlanta, GA

8:15 am – 8:30 am
2A-2 Invited A High Frequency CMUT Probe for Medical Ultrasound Imaging
S. Zhuang, D. Zhao, and J. Zhao
Kolo Medical Inc., San Jose, CA

8:30 am – 8:45 am
2A-3 Invited 15-MHz Ultrasound Array Transducers for Eye Imaging
J. H. Chang, Sogang Institute of Advanced Technology, Department of Biomedical Engineering, Department of Electronic Engineering, Sogang University, Seoul, Korea

8:45 am – 9:00 am
2A-4 Invited A Versatile Single Beam Acoustic Tweezer for Biomedical Applications
K. H. Lam\textsuperscript{1}, Y. Li\textsuperscript{1}, Y. Li\textsuperscript{2}, Q. Zhou\textsuperscript{1}, and K. K. Shung\textsuperscript{2}
\textsuperscript{1}Department of Electrical Engineering, The Hong Kong Polytechnic University, Hong Kong, China, \textsuperscript{2}Department of Biomedical Engineering, University of Southern California, Los Angeles, CA

9:00 am – 9:15 am
2A-5 Invited Design and Fabrication of an Ultrasound 2D Array Transducers for Transcranial Deep Brain Stimulation
M. Qian, Y. Li, and H. Zheng
Paul C. Lauterbur Research Center for Biomedical Imaging, Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, Shenzhen, China

Session 1D: High-Frequency Transducers and Materials
Chair: Dr. Ronald H. Silverman, Columbia University
2:00 pm – 3:25 pm

2:00 pm – 2:15 pm
1D-1 Invited Advances in Pb-Free Piezoelectric Ceramics
A. Safari, Department of Materials Science and Engineering and Glenn Howatt Electroceramic Laboratory, Rutgers University, Piscataway, NJ

2:15 pm – 2:30 pm
1D-2 Invited Performance Characterization of a 50 MHz, 64 Element Forward Looking Phased Array
J. Brown, Departments of Biomedical Engineering and Electrical Engineering, Dalhousie University, Halifax, Canada

2:30 pm – 2:45 pm
1D-3 Invited Array Design for Ultrasound Capsule Endoscopy
H. Lay\textsuperscript{1}, Y. Qiu\textsuperscript{1}, B. Cox\textsuperscript{1}, V. Seetohul\textsuperscript{1}, C. Démoré\textsuperscript{2}, S. Cochran\textsuperscript{1}
\textsuperscript{1}School of Engineering, University of Glasgow, Glasgow, United Kingdom, \textsuperscript{2}Ninewells Hospital and Medical School, Dundee, United Kingdom
Session 1E: Transducers, Systems, and Applications
Chair: Dr. Matthew O’Donnell, University of Washington
4:00 pm – 5:55 pm

4:00 pm – 4:15 pm
1E-1 Invited Gas Flow Sputtered PZT Thick Films for Silicon Wafer Based Manufacturing of High Frequency Arrays
A. Jakob1, D. Kaden2, F. Tiefensee1, S. Tretbar1, and Th. Jung3
1Fraunhofer IBMT, Sulzbach, Germany, 2Fraunhofer ISIT, Itzehoe, Germany, 3Fraunhofer IST, Braunschweig, Germany

4:15 pm – 4:30 pm
1E-2 Invited Anti-Cavitation Hydrophone with Hydrothermal Lead Zirconate Titanate Poly-Crystalline film, Titanium Front Plate and Backing
S. Takeuchi, Department of Clinical Engineering, Toin University of Yokohama, Yokohama, Japan

Session 1E (Continued)

4:30 pm – 4:45 pm
1E-3 Invited Progress in High-Frequency Materials and Technology
Q. Zhou, Department of Biomedical Engineering, University of Southern California, Los Angeles, CA

4:45 pm – 5:00 pm
1E-4 Invited Frequency Dependence of the Acoustic Field Generated from a Spherical Cavity Transducer with Open Ends
J. Tu and D. Zhang
Institute of Acoustics, Key Laboratory of Modern Acoustics, MOE, Nanjing University, Nanjing, China

5:00 pm – 5:15 pm
1E-5 Invited Progress in System and Beamforming
B. J. Kang and J. Yen
Department of Biomedical Engineering, University of Southern California, Los Angeles, CA

5:15 pm – 5:30 pm
1E-6 Invited Multi-Foci Beamforming of a Commercial Linear Array Transducer for Multi-Modality Imaging
K. Kim, Multi-modality Biomedical Imaging Laboratory/Center for Ultrasound Molecular Imaging and Therapeutics, University of Pittsburgh School of Medicine and University of Pittsburgh Medical Center; Department of Bioengineering, School of Engineering, University of Pittsburgh, Pittsburgh, PA

5:30 pm – 5:45 pm
1E-7 Invited Highly Integrated Semiconductor Solutions for Ultrasound System
X. Xu, Texas Instruments Inc., Dallas, TX

5:45 pm – 5:55 pm
1E-8 Implementation an Ultrasound Device for Measuring of Dynamic Tongue Base Thickness in Patients with Obstructive Sleep Apnea
C. -K. Weng1, J. -W. Chen1, and C. -C. Huang1
1Department of Biomedical Engineering, National Cheng Kung University, Tainan, Taiwan, 2Department of Otolaryngology Head and Neck Surgery, Cardinal Tien Hospital, New Taipei City, Taiwan

6:00 pm – 8:00 pm
Reception
Zen Garden
Session 1E: Transducers, Systems, and Applications
Chair: Dr. Matthew O’Donnell, University of Washington
4:00 pm – 5:55 pm

4:00 pm – 4:15 pm
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A. Jakob¹, D. Kaden², F. Tiefensee¹, S. Tretbar¹, and Th. Jung³
¹Fraunhofer IBMT, Sulzbach, Germany, ²Fraunhofer ISiT, Itzehoe, Germany, ³Fraunhofer IST, Braunschweig, Germany

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5:15 pm – 5:30 pm
1E-6 Invited Multi-Foci Beamforming of a Commercial Linear Array Transducer for Multi-Modality Imaging
K. Kim, Multi-modality Biomedical Imaging Laboratory/Center for Ultrasound Molecular Imaging and Therapeutics, University of Pittsburgh School of Medicine and University of Pittsburgh Medical Center; Department of Bioengineering, School of Engineering, University of Pittsburgh, Pittsburgh, PA

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X. Xu, Texas Instruments Inc., Dallas, TX

5:45 pm – 5:55 pm
1E-8 Implementation an Ultrasound Device for Measuring of Dynamic Tongue Base Thickness in Patients with Obstructive Sleep Apnea
C.-K. Weng¹, J. -W. Chen², and C.-C. Huang³
¹Department of Biomedical Engineering, National Cheng Kung University, Tainan, Taiwan, ²Department of Otolaryngology Head and Neck Surgery, Cardinal Tien Hospital, New Taipei City, Taiwan

6:00 pm – 8:00 pm
Reception
Zen Garden
Tuesday, May 17, 2016

Session 2A: High Frequency Array Transducers
Chair: Dr. F. Stuart Foster, University of Toronto
8:00 am – 9:50 am

8:00 am – 8:15 am
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F. L. Degertekin, George W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology, Atlanta, GA

8:15 am – 8:30 am
2A-2 Invited A High Frequency CMUT Probe for Medical Ultrasound Imaging
S. Zhuang, D. Zhao, and J. Zhao
Kolo Medical Inc., San Jose, CA

8:30 am – 8:45 am
2A-3 Invited 15-MHz Ultrasound Array Transducers for Eye Imaging
J. H. Chang, Sogang Institute of Advanced Technology, Department of Biomedical Engineering, Department of Electronic Engineering, Sogang University, Seoul, Korea

8:45 am – 9:00 am
2A-4 Invited A Versatile Single Beam Acoustic Tweezer for Biomedical Applications
K. H. Lam¹, Y. Li², Y. Li², Q. Zhou², and K. K. Shung²
¹Department of Electrical Engineering, The Hong Kong Polytechnic University, Hong Kong, China, ²Department of Biomedical Engineering, University of Southern California, Los Angeles, CA

9:00 am – 9:15 am
2A-5 Invited Design and Fabrication of an Ultrasound 2D Array Transducers for Transcranial Deep Brain Stimulation
M. Qian, Y. Li, and H. Zheng
Paul C. Lauterbur Research Center for Biomedical Imaging, Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, Shenzhen, China

Session 1D (Continued)

1D-13 An Open System for Super-Harmonic Contrast-Enhanced Ultrasound Imaging
Y. Li¹, B. J. Kang¹, K. H. Martin¹, X. Jiang¹, P. A. Dayton¹, K. K. Shung¹, and Q. Zhou¹
¹Department of Biomedical Engineering, University of Southern California, Los Angeles, CA, ²Joint Department of Biomedical Engineering, University of North Carolina/North Carolina State University, Chapel Hill, NC, ³Department of Mechanical and Aerospace Engineering, North Carolina State University, Raleigh, NC

1C-14 Miniature Probe for Imaging Mechanical Properties of Vascular Lesions using Acoustic Radiation Force Optical Coherence Elastography
M. Yu¹, T. Ma¹, Y. Qu²,³, Y. He²,³, K. K. Shung¹, Q. Zhou¹, and Z. Chen²,³
¹Department of Biomedical Engineering, University of Southern California, Los Angeles, CA, ²Beckman Laser Institute, University of California, Irvine, Irvine, CA, ³Department of Biomedical Engineering, University of California, Irvine, Irvine, CA

Session 1D: High-Frequency Transducers and Materials
Chair: Dr. Ronald H. Silverman, Columbia University
2:00 pm – 3:25 pm

2:00 pm – 2:15 pm
1D-1 Invited Advances in Pb-Free Piezoelectric Ceramics
A. Safari, Department of Materials Science and Engineering and Glenn Howatt Electroceramic Laboratory, Rutgers University, Piscataway, NJ

2:15 pm – 2:30 pm
1D-2 Invited Performance Characterization of a 50 MHz, 64 Element Forward Looking Phased Array
J. Brown, Departments of Biomedical Engineering and Electrical Engineering, Dalhousie University, Halifax, Canada

2:30 pm – 2:45 pm
1D-3 Invited Array Design for Ultrasound Capsule Endoscopy
H. Lay⁴, Y. Qiu⁴, B. Cox⁴, V. Seetohul⁴, C. Démoré⁵, S. Cochrane⁴
⁴School of Engineering, University of Glasgow, Glasgow, United Kingdom, ⁵Ninewells Hospital and Medical School, Dundee, United Kingdom
Session 1C (Continued)

1C-8 An In Vitro Test to Study the Effect of Ultrasound on Proliferation of Neuronal Stem Cells
Department of Biomedical Engineering, University of Southern California, Los Angeles, CA

1C-9 Evaluation of Myocardium Function for Adult Zebrafish during Heart Regeneration by High Frequency Echocardiography
H. -C. Chen and C.-C. Huang
Department of Biomedical Engineering, National Cheng Kung University, Tainan, Taiwan

1C-10 Multiscale High-Frequency Ultrasound Biomicroscopic (UBM) System Based on ARFI Imaging for Measurement of Elasticity of Living Cells and Tissues
J. Kim and J. Y. Hwang
Daegu Gyeongbuk Institute of Science and Technology, Daegu, S. Korea

1C-11 High Resolution Ultrasound Elasticity Imaging System
X. Qian1, T. Ma1, M. Yu1, K. K. Shung1, and Q. Zhou1,2
1Department of Biomedical Engineering, University of Southern California, Los Angeles, CA, 2Department of Ophthalmology, University of Southern California, Los Angeles, CA

1C-12 3D Printing of Piezoelectric Element for Energy Focusing and Ultrasonic Sensing
Z. Chen1, X. Song2, X. Chen5,6, C. T. Chiu7, X. Qian7, T. Ma7, L. Lei3, C. Fei4, Y. Yang4, Y. Chen2, K. K. Shung1, and Q. Zhou1
1Department of Biomedical Engineering, University of Southern California, Los Angeles, CA, 2Daniel J. Epstein Department of Industrial and Systems Engineering, University of Southern California, Los Angeles, CA, 3School of Material Science and Engineering, Wuhan University of Technology, Wuhan, China, 4Key Laboratory of Artificial Micro- and Nano-structures of Ministry of Education, School of Physics and Technology, Wuhan University, Wuhan, China, 5Beckman Laser Institute, Department of Biomedical Engineering, University of California - Irvine, Irvine, CA, 6College of Material Science and Engineering, Sichuan University, Chengdu, China

Session 2A (Continued)

9:15 am – 9:30 am
Y. Tung, S. Li, P. Kaczkowski, and R. Daigle
Verasonics Inc., Kirkland, WA

9:30 am – 9:40 am
2A-7 Dual Hybrid Ultrasound Transducers - Designs and Simulations
T. Manh1, L. Hoff1, T. F. Johansen2, T. Eggen1, F. Lanteri4, and J. F. Gelly4
1Department of Micro and Nano Systems Technology, University College of Southeast Norway, Norway, 2Department of Acoustics, SINTEF ICT, Norway, 3GE Vingmed Ultrasound AS, Norway, 4GE Parallel Design SAS, France

9:40 am – 9:50 am
2A-8 Miniature Linear Phased Array for Colorectal Robotic Surgery
N. E. Cabrera-Munoz, J. A. Williams, H. H. Kim, and K. K. Shung
Department of Biomedical Engineering, University of Southern California, Los Angeles, CA

9:50 am – 10:30 am
Coffee Break

Session 2B: Piezoelectric Single Crystal
Chair: Dr. L. Scott Smith, GE Global Research
10:30 am – 11:40 am

10:30 am – 10:45 am
2B-1 Invited Innovative Methods for the Characterization of Relaxor-PT based and Lead-Free KNN-Based Single Crystals
W. Cao1,3
1NIH Resource Center for Medical Ultrasonic Transducer Technology, University of Southern California, Los Angeles, CA, 2Department of Mathematics and Materials Research Institute, The Pennsylvania State University, University Park, PA
Session 2B (Continued)

10:45 am – 11:00 am
2B-2 Invited Orientated PIN-PMN-PT Crystal with Ultrahigh Dielectric Permittivity for High-Frequency Ultrasonic Arrays
F. Li1,2, S. Zhang1,3, J. Luo1, X. Geng1, and T. R. Shrout1
1Materials Research Institute, Pennsylvania State University, University Park, PA, 2Electronic Materials Research Laboratory, Key Laboratory of the Ministry of Education and International Center for Dielectric Research, Xi’an Jiaotong University, Xi’an, China, 3Institute for Superconducting and Electronic Materials, Australian Institute of Innovative Materials, University of Wollongong, Wollongong, Australia, 4TRS Technologies, Inc., State College, PA, 5Blatek Inc., State College, PA

11:00 am – 11:15 am
2B-3 Invited Single Crystals for Ultrasound Imaging Application
J. Tian and P. Han
CTG Advanced Materials, Bolingbrook, IL

11:15 am – 11:30 am
2B-4 Invited 2.8MHz PMN-32%PT Single Crystal Piezocomposite Ultrasonic Phased Arrays for Medical Imaging
X. Ji, S. Long, and Y. Deng
Guangzhou Doppler Electronic Technologies Co., Ltd., Guangzhou, China

11:30 am – 11:40 am
2B-5 Growth and Medical Applications of Relaxor Ferroelectric Single Crystals PIN-PMN-PT
X. Wang, H. Xu, O. Yue, D. Lin, S. Wang, X. Li, X. Zhao, and H. Luo
Shanghai Institute of Ceramics, Chinese Academy of Sciences, Shanghai, China

Session 1C (Continued)

1C-2 Activation of Intracellular Ca2+ Oscillation by High-Frequency Ultrasound Micro-Beam Stimulation in HIT-T15 Pancreatic Beta Cell
C. W. Yoon1, C. Yoon2, N. Lee1, K. Goo1, and K. K. Shung1
1Department of Biomedical Engineering, University of Southern California, Los Angeles, CA, 2School of Electrical and Computer Engineering, Georgia Institute of Technology, Atlanta, GA

1C-3 An Accurate Method Based on Micropipette Aspiration for Calibrating the Trapping Force of Single Beam Acoustic Tweezer at Ultra-High Frequencies
Department of Biomedical Engineering, University of Southern California, Los Angeles, CA

1C-4 Design of High Voltage 1 to 64 Mux/De-Mux for High Frequency Synthetic Aperture Imaging System
H. Jung and K. K. Shung
Department of Biomedical Engineering, University of Southern California, Los Angeles, CA

1C-5 Development of Ultrahigh Frequency Needle Ultrasonic Transducer (300-MHz to 500-MHz) using Thin LiNbO3 Crystal
X. Chen1,2,3, R. Chen1, Z. Chen2, X. Liu3, Z. Chen1, K. K. Shung1, and Q. Zhou4
1Beckman Laser Institute, Department of Biomedical Engineering, University of California - Irvine, Irvine, CA, 2Department of Biomedical Engineering, University of Southern California, Los Angeles, CA, 3College of Material Science and Engineering, Sichuan University, Chengdu, China

1C-6 One-Dimensional Piezoelectric (K, Na)NbO3 Nanotube Arrays
W. H. Liew1,2, Y. Wang1,3, M. S. Mirshekarloo1, K. Yao1, and E. H. Tay1
1Department of Mechanical Engineering, National University of Singapore, Singapore, 2Institute of Materials Research and Engineering, Singapore

1C-7 Optimized Cytoplasmic Delivery of Macromolecules using Acoustic Transfection with High Frequency Ultrasound
M. G. Kim, S. Yoon, and K. K. Shung
Department of Biomedical Engineering, University of Southern California, Los Angeles, CA
Session 1B (Continued)

11:15 am – 11:30 am
**1B-6 Invited** Mechanism of Ultrasound Mechanotransduction by Invasive Cancer Cells
N. S. Lee¹, C. W. Yoon², K. S. Goo², A. C. Weitz³, R. H. Chow¹, and K. K. Shung³
¹Department of Physiology & Biophysics, University of Southern California, Los Angeles, CA, ²Department of Biomedical Engineering, University of Southern California, Los Angeles, CA, ³Department of Ophthalmology, University of Southern California, Los Angeles, CA

11:30 am – 11:40 am
**1B-7 Acoustic-Transfection Technique for Gene and Protein Delivery**
S. Yoon³, M. G. Kim², Y. Wang³, and K. K. Shung³
²Department of Biomedical Engineering, University of Southern California, Los Angeles, CA, ³Department of Bioengineering, University of California, San Diego, La Jolla, CA

11:40 am – 11:50 am
**1B-8 Intravascular Elastography for Atherosclerosis Artery Vulnerability Assessment**
T. Ma, X. Qian, M. Yu, K. K. Shung, and Q. Zhou
Department of Biomedical Engineering, University of Southern California, Los Angeles, CA

11:50 am – 1:00 pm
Lunch

Session 1C: Poster Session
Chair: Dr. Jonathan Rubin, University of Michigan
1:00 pm – 2:00 pm

**1C-1 Design and Fabrication of Lead-free BNT Film High Frequency Ultrasound Transducers**
J. Zhang¹, W. Ren¹, Y. Liu¹, P. Shi¹, Q. Zhou¹, and K. K. Shung³
¹Electronic Materials Research Laboratory, Key Laboratory of the Ministry of Education and International Center for Dielectric Research, Xi'an Jiaotong University, Xi'an, China, ³Department of Biomedical Engineering, University of Southern California, Los Angeles, CA

**Location and Time**
Oral sessions: Salon D; M, 8am-6pm, T, 8am-12pm
Poster session: Foyer surrounding Salons D, E; M, 1pm-2pm
Breakfast: Salon C; M, 7am-8am, T, 7am-8am
Reception: Zen Garden, M, 6pm-8pm
See hotel map in Page 14.

**Conference Chair**
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Tanisha Hughes
Budget/Business Analyst, Department of Biomedical Engineering
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tanishah@usc.edu
Session 1B: Ultrasound Applications
Chair: Dr. Scott I. Simon, University of California, Davis
10:00 am – 11:50 am

10:00 am – 10:15 am
1B-1 Invited Photoacoustic Imaging of Atherosclerosis
A. F. W. van der Steen, M. Wu, V. Daeichin, K. Jansen, M. Visscher, P. Kruizinga, G. van Soest
Biomedical Engineering, Thorax Center, Erasmus University Medical Centre Rotterdam, Rotterdam, The Netherlands

10:15 am – 10:30 am
1B-2 Invited Ultrafast and Super-Resolution Vascular Imaging using Ultrasound and Microbubbles
M. -X. Tang, Ultrasound Laboratory for Imaging and Sensing (ULIS), Department of Bioengineering, Imperial College London, London, United Kingdom

10:30 am – 10:45 am
1B-3 Invited Characterization of Nano Gas Vesicle for Ultrasound Theranostics
L. Sun, Interdisciplinary Division of Biomedical Engineering, The Hong Kong Polytechnic University, Hong Kong, China

10:45 am – 11:00 am
1B-4 Invited A Novel Adhesion Index for Verifying the Extent of Adhesion for the Extensor Digitorum Communis in Patients with Metacarpal Fractures
T. -Y. Lai, H. -I. Chen, C. -C. Shih, L. -C. Kuo, H. -Y. Hsu, and C. -C. Huang
1Department of Biomedical Engineering, National Cheng Kung University, Tainan, Taiwan, 2Department of Occupational Therapy, National Cheng Kung University, Tainan, Taiwan, 3Department of Physical Medicine and Rehabilitation, National Cheng Kung University Hospital, College of Medicine, National Cheng Kung University, Tainan, Taiwan

11:00 am – 11:15 am
1B-5 Invited High-Frequency Single-Beam Acoustic Trapping: Potential for Cell Characterizations
J. Y. Hwang, Daegu Gyeongbuk Institute of Science and Technology, Daegu, South Korea
Monday, May 16, 2016

Session 1A: Welcome Remarks and Tutorials
Chair: Dr. William O'Brien, University of Illinois, Urbana-Champaign
8:00 am – 9:30 am

8:00 am – 8:20 am
1A-1 Welcome Remarks and Introduction to the NIH Resource on Medical Ultrasonic Transducer Technology
K. K. Shung, Department of Biomedical Engineering, University of Southern California, Los Angeles, CA

8:20 am – 8:40 am
1A-2 Tutorial Clinical Applications of Ultrasound: Present and Future
C. Deurdulian, Department of Radiology, University of Southern California, Los Angeles, CA

8:40 am – 9:00 am
1A-3 Tutorial Transducer Fabrication: Challenges and Opportunities
L. S. Smith, GE Global Research, Niskayuna, NY

9:00 am – 9:15 am
1A-4 Invited Ultrafast Compound Coherent Plane Wave Imaging of the Eye
R. H. Silverman1,2, R. Urs3, and J. A. Ketterling2
1Department of Ophthalmology, Columbia University Medical Center, New York, NY, 2F.L. Lizzi Center for Biomedical Engineering, Riverside Research, New York, NY

9:15 – 9:30 am
1A-5 Invited Special Purpose Microfluidics Generated Microbubbles for Accelerated Blood Clot Erosion
J. A. Hossack, Department of Biomedical Engineering, University of Virginia, Charlottesville, VA

9:30 am – 10:00 am
Coffee Break

NIH Resource Center for Medical Ultrasonic Transducer Technology

The NIH Resource on Medical Ultrasonic Transducer Technology first took shape in 1993 at the Pennsylvania State University through a Biomedical Engineering Special Opportunity Award Grant from the Whitaker Foundation, Washington, D.C. The Resource Center then gained funding in 1997 through a National Institutes of Health (NIH) Technology Resource Grant given by the NIH National Center for Research Resources (NCRR) and supported by the National Institute of Biomedical Imaging and Bioengineering (NIBIB). The grant was used to expand the mission of the Resource Center and help it provide support to academic and research institutions. In August 2002, the Resource Center moved to the University of Southern California and set up laboratories in Denney Research Center (DRB) at the University Park Campus in Los Angeles. Additional support from leading ultrasound equipment manufacturers, industrial and laboratory equipment manufacturers, and the University of Southern California has helped to build the Resource Center into a state-of-the-art facility.

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