

Powering Sound Ideas

UIA 44: 2015 Symposium in Washington DC USA

The 2015 Symposium will be held at the Georgetown University Hotel and Conference Center 20 - 22 April. *The symposium that UIA last held in Washington DC in 2008 drew the largest number of participants we have had in the past decade, as Dan Cotter, UIA President noted in announcing the symposium plans.*

UIA 44 features both medical and industrial sessions. There will be workshops on ultrasonics, and a poster session featuring the work of researchers in the field.

A tour of the FDA Laboratories will also be part of the symposium. With FDA's involvement in the approval of ultrasonic medical devices, this tour will help companies preparing to get

their newest ultrasonic products to market.

Presentation
Schedule
starts on
page 2

Ron Manna is the Symposium Chair, with **Alan Winder** and **Robert Muratore** as Medical Session Co-Chairs, **Dominick DeAngelis** as Industrial Session Chair.

Keynote speakers include:

- **Laurence Needleman, MD**, Director, Ultrasound Division, Co-Director, Vascular Center, Thomas Jefferson University

- **Levon Nazarian, MD** Professor of Radiology, Program Director, Diagnostic Radiology Residency, Vice Chair for Education, Thomas Jefferson University
- **Kenji Uchino, Ph. D., MS, MBA**, Professor, Electrical Engineering, Director, International Center for Actuators and Transducers, The Pennsylvania State University

The medical session includes invited papers from many leading researchers in clinical medical ultrasound, namely, Flemming Forsberg (Thomas Jefferson U), Denise Hocking (U Rochester), Sunita Chauhan (Monash U, Australia), and Claudio Zanelli (Onda Corporation).

Exhibits by companies that offer products and services to the ultrasound industry will be also be showcased.

Inside...

Industrial Sessions	2
Workshop	3
Medical Sessions	4
Power Ultrasonics	5
President's Message	8
Floyd Dunn	9
UIA 44 Registration	10
UIA 44 Exhibit Info	13



To register, go to
<http://tiny.cc/UIA44Reg>

UIA 44 Symposium Schedule: Industrial Sessions

Monday, 20 April 2015

8:15 am	Welcome and Introduction to Monday Session
8:30 am	Feasibility of Integrating Ultrasound into High Temperature Short Time Processing for Extended Milk Shelf Life, <i>Cindu Annandarajah, David Grewell, Stephanie Clark</i>
8:55 am	Progress in Fundamental Understanding of Microstructure Evolution at Interfaces of Metals and Alloys during Ultrasonic Additive Manufacturing, <i>S.S. Babu, N. Sridharan, M. Norfolk</i>
9:20 am	Good Vibrations: Usage of Ultrasonic Acoustically Assisted Heat and Mass Transfer Drying for UV Waterborne Wood Coatings, <i>Tony Carignano</i>
9:45 am	Understanding Process and Material Improvements when applying Ultrasonic Energy to Conventional Machining Operations, <i>Matt Short</i>
10:40 am	Development and Application of the Ultrasonic Stir Welding Process, <i>Karl Graff, John Seaman, Robert J. Ding</i>
11:05 am	Can Power Ultrasonic Devices be Printed?, <i>Andrew Mathieson, Margaret Lucas</i>
11:30 am	Predicting the Displacement Gain from the Mechanical Quality Factor in Ultrasonic Transducers, <i>Dominick A. DeAngelis, Gary W. Schulze</i>
1:05 pm	Friction and Wear Reduction using Ultrasonic Lubrication, <i>Sheng Dong, Marcelo Dapino</i>
1:30 pm	A Precision Wire Drawing System: Development and Results, <i>Tim Frech, Matt Short</i>
1:55 pm	A Miniaturized Class IV Flexensional Ultrasonic Transducer, <i>Andrew Feeney, Andrew Tweedie, Andrew Mathieson, Margaret Lucas</i>
2:20 pm	A Multi-Stepped Ultrasonic Horn for Industrial Scale Processes, <i>Zongsu Wei, James A Kosterman, Ruiyang Xiao, Gim-Yang Pee, Meiqiang Cai, Linda K Weavers</i>
3:15 pm	High-Power Piezoelectric Heating with Admittance-Locked Frequency Tracking, <i>Matthew Taubman, Kayte Denslow</i>
3:40 pm	Airborne Power Ultrasonic Technologies for Intensification, <i>Enrique Riera, Victor M Acosta, José Bon, Alfonso Blanco, Roque R Andrés, J A Gallego-Juárez, Andrea Cardoni</i>
4:05 pm	Correlating Inertial Acoustic Cavitation Emissions with Material Erosion Resistance, <i>I Banez, Mark Hodnett, Bajram Zeqiri, M. Frota</i>
4:30 pm	Cell Disruption by High-Intensity Ultrasound: A Potential Industrial Technique, <i>Alexey S. Peshkovsky, Rasa Santockyte, Simon Bystryak</i>
4:55 pm	Directional Receiver for Biomimetic Sonar System, <i>F. Guarato, H. Andrews, J. Windmill, J. Jackson, A. Gachagan</i>
5:30 pm	<i>Wine and Cheese Reception</i>

Turn to page 4 for Tuesday and Wednesday's schedule

This schedule is tentative and is subject to change.

UIA 44: Tuesday 21 April 2015

Tuesday morning, 21 April, will feature a workshop presented by Eberhard Hennig from PI Ceramic, Germany, on **Designing with Piezoceramics Workshop**.

This workshop will present an overview of PI's rule-of-thumb design guidelines for piezoceramics with specific application examples tailored to power ultrasonic transducers and sensors. It will also include an update on PI's latest lead-free piezoceramic materials with detailed com-

parisons versus leaded materials on their performance and application differences. The workshop will include step-by-step examples



Eberhard Hennig

on applying the technology along with applications information such as material selection, preload, heat treatments, electrodes, surface finish/flatness, power handling, au-

toclave cycling and vibrational life.

Other presentations on Tuesday include invited speaker Kenji Uchino (see below), Active Needle Technology for Safe Needle Intervention, Intellectual Property Considerations; Sonic and Ultrasonic Measurements in Oil and Gas Well Logging and A Genesis of Commercial Low Frequency High Power Ultrasonics.

Invited Paper: Loss Mechanism and High Power Characterization

With accelerating the commercialization of piezoelectric actuators and transducers, the main research focus seems to be gradually shifting from the "real parameters" such as larger polarization and displacement, to the "imaginary parameters" such as polarization/displacement hysteresis, heat generation, and mechanical quality factor which is originated from three loss factors (dielectric, elastic and piezoelectric losses). Reducing hysteresis and heat generation, and increasing the mechanical quality factor to amplify the resonance displacement are the primary target. Our group has been working on the loss characterization of piezoelectrics for 30 years. In 1980s, we primarily worked on the hysteresis measurement by using a pseudo-DC technique. Loss could be measured under high

voltage and stress level, but the experimental set-up was bulky and expensive. In 90s, we proposed a simple method with a pulse drive. Though the set-up was inexpensive and could be used for high voltage level, elastic loss could only be measured with low accuracy. In recent several years we are focusing on a new resonance AC drive method. This technique is basically a precise admittance measurement around both the resonance and antiresonance peaks, from which we obtain the mechanical quality factors for the resonance (Q_A) and the antiresonance (Q_B). From the values of Q_A , Q_B , and the electromechanical coupling factor k , we can obtain all three dielectric, elastic and piezoelectric loss factors precisely. The measurement simplicity and accuracy of this methodology are very attrac-

tive, and our proposal will be widely accepted as a standard method in the piezoelectric actuator community. In this paper, a novel method for determining the piezoelectric losses is proposed; (1) method how to realizing symmetrical admittance/impedance curves for obtaining the mechanical quality factors Q_A and Q_B around the resonance and antiresonance frequencies, and (2) process how to calculate the piezoelectric three losses from the values of Q_A and Q_B . Our discussion in this paper is limited for samples of k_{31} , k_{33} , and k_{15} modes.

We will also discuss the differences between the fundamental phenomenology of piezoelectric and magneto-strictive materials, including the loss mechanisms, and also discusses the composite effect between these two materials. From a long experience in teaching

A tour of the FDA labs will be on Tuesday afternoon



Kenji Uchino
ONR Global-Asia, Office of Naval Research, Tokyo, Japan; & Int'l Center for Actuators & Transducers, The Penn State University, USA

smart materials, the author discovered that many of the junior professors in materials, electrical engineers and mechanical engineers misunderstand the basic concepts/definitions of professional terminologies in smart materials. This presentation is not focused on providing up-to-date developments, but on re-learning the basics correctly.

UIA 44: 2015 Symposium Schedule, continued

Tuesday, 21 April 2015

8:00 am	Introduction to Sessions
8:15 am	Loss Mechanism and High Power Characterization in Piezoelectric and Magnstriction Materials, <i>Kenji Uchino</i>
9:15 am	Designing with Piezoceramics, <i>Eberhard Hennig</i>
10:45 am	IP Considerations: A Perspective on U.S. Patent Law, Trends, and Strategies <i>David Carter</i>
11:10 am	Sonic and Ultrasonic Measurements in Oil and Gas Well Logging <i>Eric Moltz</i>
11:35 am	A Genesis of Commercial Low Frequency High Power Ultrasonics, <i>David Wuchinich</i>
12:00 pm	Active Needle Technology for Safe Needle Intervention, <i>Muhammad Sadiq, Graeme McLeod, George Corner, Sandy Cochran, Zhihong Huang</i>
1:30 pm	FDA Tour
6:00 pm	Dinner and Moonlight Tour

Wednesday, 22 April 2015: Medical Sessions

8:00 am	Keynote Speaker Dr. Laurence Needleman, Vascular Ultrasound: Current State, Current Needs, Future Directions
9:00 am	Ultrasound Technologies for the Fabrication of Artificial Microvascular Networks, <i>Denise C. Hocking, Diane Dalecki</i>
9:30 am	A Framework for Constructing Critical Ultrasonic Neuro-Modulation Experiments, <i>Robert Muratore</i>
10:45 am	Physiological Movement Registration and Compensation of Targets during Robotic Focused Ultrasound Surgery, <i>Sunita Chauhan</i>
11:15 am	Ultrasound-enhanced Delivery of Anti-inflammatory Ophthalmic Drugs, <i>Marjan Nabili, Sankara Mahesh, Craig Geist, Vesna Zderic</i>
11:40 am	Ultrasound-enhanced Drug Delivery for Treatment of Parasitic Diseases, <i>Abel Rodriguez, Marjan Nabil, Sankara Mahesh, Craig Geist, Vesna Zderic</i>
12:05 pm	Combining light and ultrasound to treat bacterial biofilms, <i>Mark Schafer, Tessie McNeely</i>
1:35 pm	Keynote Speaker Dr. Levon Nazarian, Interventional Musculoskeletal Ultrasound (IMUS)
2:35 pm	Quantitative Subharmonic Pressure Estimation In Vivo, <i>Flemming Forsberg</i>
3:05 pm	Characterization of HITU or HIFU Fields, <i>C. I. Zanelli, Samuel Howard</i>
4:05 pm	Phase-Insensitive Ultrasound Computed Tomography for Breast Disease Diagnosis, <i>Bajram Zeqiri, Christian Baker, Mark Hodnett, Srinath Rajagopal</i>
4:35 pm	A Unified Streaming and Processing Architecture for Ultrasound Systems, <i>Marcin Lewandowski, Mateusz Walczak, Beata Witek</i>
5:05 pm	Ultrasound Stimulation of Insulin Release from Pancreatic Beta Cells, <i>Ivan M. Suarez Castellanos, Aleksandar Jeremic, Vesna Zderic</i>

Power Ultrasonics Just Published

Ultrasonics is the branch of acoustics that considers the generation and applications of inaudible high frequency acoustic waves. Power ultrasonics is the study of high-intensity waves and their effects in different media. The technology has the basic purpose of altering the physical, chemical, or biological properties of materials or systems to which it is applied. This book reviews the technology involved in power ultrasonics and considers state-of-the-art applications across a wide range of industries. Part One covers the fundamentals of nonlinear propagation of ultrasonic waves in fluids and solids and discusses the materials and designs of power ultrasonic transducers and

devices. Parts Two to Five address the broad range of power ultrasonic applications. Specific uses are described in the fields of materials engineering and mechanical engineering, medicine and biotechnology, food processing technology, pharmaceuticals, environmental abatement and bioremediation.

Power Ultrasonics will be an invaluable reference work for graduate students and researchers working on the physics of acoustics, sound and ultrasound, sonochemistry, acoustic engineering and industrial process technology, and

R&D managers, production and biomedical engineers.

Professor Juan A. Gallego-Juárez is a research professor at the Higher Council for Scientific Research of Spain (CSIC), author of over 300 publications and holds 43 patents in the field of ultrasonics. Dr Karl Graff is a senior engineer at EWI and Professor Emeritus, The Ohio State University, USA.



Click [here](#) to purchase
this book

President's Message

I have come to expect abstracts of high technical quality as we have enjoyed watching the growth of UIA Industrial, Workshop, and Medical sessions, but the volume of submissions has become remarkable; consequently, I begin my message by thanking all the researchers and developers that have responded to our call for papers for Symposium 2015 in Washington DC.

Symposium proceedings currently being published by UIA in Physics Proceedings, cover page below, derived from more than 50 presentations and poster participants at CSIC Madrid, Spain including representation from Brazil, Chile, Mexico, Spain, Uruguay, Australia, Denmark, England, Scotland, Taiwan, and United States. The scope of participants and technologies has consistently grown with more recent conferences in London, Vancouver, Boston, Glasgow, San Francisco, Orlando, and Madrid.



Applications for presenting in Washington DC have now rivaled Madrid, and our typical 2 and 1/2 day symposium is boiling over, such that we are considering plenary or parallel sessions for future meetings.

At UIA 44th Symposium in Washington DC planned presentations are across the field of ultrasonics in fundamental systems research in loss mechanisms, damping, stability, design with piezoelectric ceramics, improved quality and speed in processing of industrial materials, foods, green and environmental technologies, and pharmaceuticals. The use of ultrasound in life sciences to be presented includes helping cure people via emergent applications in vascular therapies, more effective delivery of drugs, diagnostics well beyond imaging, and improved targeting and path control in neurosurgical and general surgical approaches.

I have had the opportunity to work in the operating room with tumor and diseased tissue removal with

ultrasonic aspiration near critical anatomy in the brain and in preserving liver function, and can readily envision the usage of these emerging technologies in improving standards of care.

Please begin your planning to join us in Washington DC on Monday-Wednesday, April 20-22, as we enjoy the remarkable scope of presentations the Conference Chair and Session Chairs have organized.



I have had the opportunity to work in the operating room with tumor and diseased tissue removal with ultrasonic aspiration near critical anatomy in the brain and in preserving liver function, and can readily envision the usage of these emerging technologies in improving standards of care.


43rd Annual UIA Symposium
 23-25 April 2014
 CSIC
 Madrid, Spain

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In Memory of Floyd Dunn



On January 24, 2015 we lost one of the giants of therapeutic ultrasound. Professor Floyd Dunn passed away at his home in Tucson at age 90. His daughter and son, Andi and Roo, were present at his bedside. Floyd's death was 30 days after the death of his wife,

Elsa. They were married for over 64 years.

Professor Dunn was the first recipient of the ISTU William and Francis Fry Award after it was so named in 1998. This was very fitting given that Floyd was Bill Fry's PhD student and later the Director of the Bioacoustics Research Laboratory (BRL) at Illinois. He wrote outstanding papers on the characterization of HIFU lesions in brain tissues or the comprehensive compilation of acoustic properties of mammalian tissues. Go to <http://www.brl.uiuc.edu/Publications> to get a sense of Floyd's vast contributions to our field. Also the [attached eulogy](#) by Roo Dunn gives an idea about Floyd's life and character.

Floyd will be remembered for his many contributions in medical ultrasound, as an educator, mentor, and friend who genuinely cared about the field and the next generation. He continues to be an inspiration for continuing to be active in serving the community long after his official retirement.

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**44th Annual UIA Symposium Registration
20 - 22 April 2015
Georgetown University Conference Center
Washington, DC, USA**

First Name

Last Name, Designation

Nickname for badge

Position/Title

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Employer City/State

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Tuesday does NOT include Tuesday Evening Event

Select which day: Select your category:

Monday Member
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Special Events

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Fee Schedule	By 12/31	1/1/15 & after
Full conference (Monday-Wednesday)		
Full conference - Member	\$790	\$950
Full conference - Nonmember	\$910	\$1,050
Student - Full conference	\$475	\$475
Daily fees (Monday, Tuesday or Wednesday)		
Daily Rate - Member	\$295	\$325
Daily Rate - Nonmember	\$335	\$370
Student - Daily	\$175	\$175
Student - Poster Presenter	\$75	\$75
Exhibit Levels - Members		
I - 1 table, 1 full registration	\$1,795	\$1,975
II - 1 table, 2 full registrations	\$2,470	\$2,670
Exhibit Levels - Non members		
I - 1 table, 1 full registration	\$1,995	\$2,195
II - 1 table, 2 full registrations	\$2,790	\$3,070
Sponsorship Levels		
I - Refreshment Sponsor	\$1,500	\$1,500
II - Reception Sponsor	\$1,995	\$1,995
III - Lunch Sponsor	\$2,750	\$2,750
IV - Proceedings Sponsor	\$2,000	\$2,000
Special Event		
Tuesday Evening Event	\$235	\$245
<i>NOTE: Tuesday evening is included in the FULL conference registration fee. Additional tickets may be purchased for companions.</i>		

Payment Summary FIN for voucher use only: 13-6130371

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- Payment enclosed. Make check payable to UIA.
 Charge: MasterCard Visa Amex

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Students presenting posters on Tuesday may also attend either the Monday or Wednesday session at no additional charge. Please select which additional day.

You may register on-line at <http://tiny.cc/UIA44Reg>

MAIL registration form and payments to UIA, 11 W Monument Avenue, Ste 510, Dayton, OH USA 45402

FAX registration form to +1.937.586.3699

UIA 44: Washington, DC USA

The Georgetown University Hotel and Conference Center, the location for UIA 44, is nestled among the historic streets of Georgetown. The serene location, away from the clamor of downtown, coupled with its comfort and elegance will allow our participants the opportunity to indulge in the history and culture of this charming corner of Washington, DC.

As the preferred hotel for Georgetown University, our location offers 146 guest rooms with outstanding amenities and services expected by today's traveler.

Easily accessible from the area airports, Union Station and major highways, our hotel offers proximity to fine restaurants and upscale boutiques. Plan to arrive early or to stay after UIA 44 to visit Washington's many museums and historical locations. You can travel using the Georgetown University Transportation Shuttle



to go to the Rosslyn and Dupont Circle Metro stations.

Traveling to Washington

When planning your flight to DC, here are estimated taxi fares:

- Regan National (DCA) \$20/one way
- Dulles International (IAD) \$51/one way
- Baltimore Washington (BWI) \$65/one way - or take the MARTA train to Union Station (\$6/one way)

- The Georgetown University Hotel and Conference Center is located at the heart of the Georgetown University campus inside the Thomas and Dorothy Leavey Center.

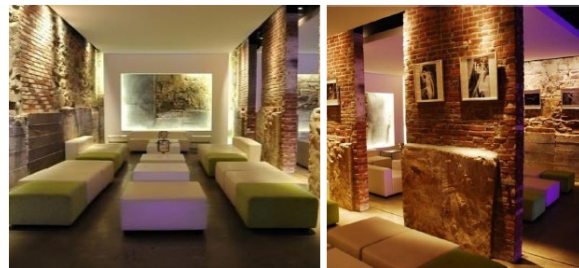
To make your reservation, go to <http://tiny.cc/UIA44Hotel>

Tuesday Evening: L2 Lounge & Monument Tour

One favorite feature on the UIA Symposium is our Tuesday evening event which provides a relaxed atmosphere for networking in a unique location.

This year we will visit the L2 Lounge, an elegant venue in the heart of Georgetown. Designed by Lehman, Smith, McLeish, the lounge inserts an

elegant modern aesthetic into a 100 year old commercial space. The result is a loft-like gallery effect where attendees will be able to enjoy conversations, dinner and the unique ambiance that is not open to the public. After dinner, we will view Washington monuments by moonlight. This evening is included in full registration.



Additional tickets may be purchased for guests at the time of registration.

Ultrasonic Industry Association

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How can ultrasonics enhance the value of your business?

UIA is the international business forum for users, manufacturers, and researchers of ultrasonics. Our members use acoustic vibrations to improve materials, industrial processes, and medical technology. We call this "powering sound ideas."

Let's work together to power your sound ideas. Contact a member consultant or company through our Referral Network, learn about ultrasonics with our online primer, or meet industry leaders at our next symposium.



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