



# Vibrations

*Powering Sound Ideas*

## UIA46: Dresden Germany 24–26 April 2017

The 46th Annual UIA Symposium will offer a global focus on the latest advances in ultrasonics in Europe, US and beyond.

The Symposium is chaired by Leo Klinstein, Dukane, USA and Thomas Daue, Smart Material Corporation/Smart Material GmbH, Germany.

The Monday Medical session chairs are Jay Sheehan, Integra Life Sciences, US and Klaus Van Jenderka, Physik, Sensorik und Ultraschalltechnik, Germany.

The Tuesday Workshop chair is Dominick DeAngelis, Kulicke & Soffa Industries, Inc., US. Poster session chair is Margaret Lucas, University of Glasgow.

The Wednesday Industrial session chairs are Leo Klinstein, and Rasmus Lou-Moeller, Meggitt, Denmark.

### Invited Keynote Speakers

George Schmitz, Professor for Electrical Engineering and Chair, Medical Engineering at Ruhr-University Bochum, Germany will present **Detection and tracking of microbubbles for super-resolution vascular imaging** (see page 3 for more information).

Thomas Daue, President, Smart Material, USA and German, will present **Something Industrial about Ultrasound** (see page 4 for more information).

### Tuesday Workshops

Thomas Daue will discuss his company's cutting-edge, "Smart" piezoelectric materials used for energy harvesting, actuation, active-dampening, sensing and ultrasound, which

have wide commercial application to many consumer products that most everyone is familiar with.

Back by popular demand, the entrepreneur section will focus on product licensing from various global government agencies.

### Poster Session

The poster session provides the opportunity for graduate students to showcase their results to the academic and industry delegates from both the medical and industrial areas of ultrasonics.

### Hotel Reservations

UIA46 will be held at the Dresden Hilton Hotel see page 6 for reservation information.

**Register prior to 31 December** for earlybird savings. See page X.

### Special Points of Interest

- [Hiking Tour of Schrammesteine Page 5](#)
- [UIA46 FAQ Page 6](#)
- [Call for Posters Page 8](#)
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## 2016 Sound Solutions: Content Rich

### Tony Crandall, UIA President

The 2016 Sound Solutions was held at Iowa State University in Ames, Iowa on 21 - 22 September. The workshop was co-hosted by Iowa State and the Ultrasonic Industry Association.

The Center for Industrial Research and Service

(CIRAS) sponsored the meeting and it was chaired by David Grewell, director of the Center for Bioplastics and Biocomposites and affiliate of the Center for Crops Utilization Research (CCUR).

The meeting began on Wednesday just before 1:00 pm.. Peter Nadolny from CIRAS opened the meeting

by welcoming the participants and giving an overview of CIRAS. Dr. Leonard Bond, Professor of Aerospace Engineering and Director of Center for Nondestructive Evaluation, Iowa State University, also addressed the group and opened the meeting.

Timothy Bigelow of Iowa State gave a very informative talk on the

## Sound Solutions 2016, continued



Fundamentals of Lower Power Ultrasonics. The talk was a great review for those familiar with the field with great material for those new to it

Dr. Bond followed with an interesting talk on Ultrasonic Characterization of Process Streams, which showed various uses of ultrasound in the food processing industry.

Dr. Viksit Kumar gave a talk on Meat Grading and Tissue Characterization. The novel idea is to characterize the quality of meat on live animals rather than after they are slaughtered..

The last talk of the day was again given by Dr. Bond on Process Measurements and Other Food industry Examples. Ultrasound has been used for an incredible range of tasks in the food industry, from gauging the ripeness of fruit, to detecting when a blade breaks in a processing plant. Following these great talks the group toured the NDT labs and then proceeded to a very nice dinner at the Center for Non Destructive Evaluation.

Thursday morning's meeting was opened by Dr. Kevin Keener and David J. Freeman from Iowa States' CCUR. David Grewell then gave a great presentation on the Fundamentals of High Power Ultrasonics that covered theory, practice and effects. This was followed by talks by Hans Neisser of Branson Ultrasonics on Ultrasonic Sealing and Packaging, and Ultrasonic Food Processing. Both talks were very interesting and he had some great physical examples of actual products for the group to examine. The final talk of the meeting was presented by Dr. Stephanie Clark, Associate Professor of Food Science and Human Nutrition. This was a very interesting talk on the use of thermosonication for extending shelf life of unpasteurized milk. The meeting concluded with a tour of the Food Sciences Lab. The UIA would like to extend our sincere thanks to David Grewell for all the hard work he put into this program. The talks were very interesting and because of the intimate setting, there was much conversation and discussion of all the topics in the presentations. For those who haven't attended one of these mid-year meetings, I heartily suggest you do so.

UIA members may view the presentations at [www.ultrasonics.org/MY16](http://www.ultrasonics.org/MY16)

## No Heat Needed: Ultrasonic Clothes Dryer

Not only is the ultrasonic clothes dryer effective in removing water quickly from clothing, with a significantly reduced energy demand, but it also does it at room temperature, and releases "cool mist" instead of warm humid air as conventional dryers do (and that can cause additional dampness and mold issues in homes). Obviously, even a cool mist is still airborne water, so the new technology would still need to be vented outside, but who knows, perhaps the next phase of this laundry re-invention would be developing a way to re-condense the mist back into water, which could then be used for washing another load of laundry.

According to the [US Department of Energy website](http://www.energy.gov), the ORNL and GE are working on the development of a commercialized product, and [plan to have a full-scale prototype](#) built by this fall. Assuming this would be a cost-effective upgrade for commercial laundry facilities as well as home laundry rooms, this ultrasonic clothes dryer really could be a game-changer.



## Detection and tracking of Microbubbles for super-resolution vascular imaging

**Georg Schmitz**

Ultrasound imaging using microbubble as contrast agents is an established clinical methodology. Although it was observed from the beginning that even single microbubbles lead to echo signals that can be detected, only recently this was used for the localization and tracking of microbubbles. These microbubbles have diameters of typically 1-2 $\mu\text{m}$  so that they can pass the smallest capillaries. As resolution of ultrasound imaging is in the order of 100 $\mu\text{m}$ -500 $\mu\text{m}$ , microbubbles separated by distances which are lower cannot be resolved. However, when single microbubbles pass the capillaries they can be detected and localized with an accuracy an order of magnitude higher than the imaging resolution. Tracking the microbubble positions allows to generate super-resolution images of the vasculature together with the estimated flow velocities. Flow velocities below 1 mm/s can be measured, which is much lower than the velocities that can be measured by Doppler ultrasound.

With dense flow patterns and up to hundreds of microbubbles detected in a single frame of a video sequence, tracking microbubbles can become a complex combinatorial task that we address using multiple target tracking algorithms as

Multiple Hypothesis Testing and Markov Chain Monte Carlo Data Association [1]. We demonstrated the reliability of the algorithms in simulations, phantom measurements and in vivo measurement of different tumor xenografts.

Results of super-resolution in in-vivo images of murine tumor xenografts are presented for different tumors. They show the potential of the method to image small capillaries with super-resolution and characterize the tumor types and their aggressiveness by their different vessel morphology and flow characteristics.

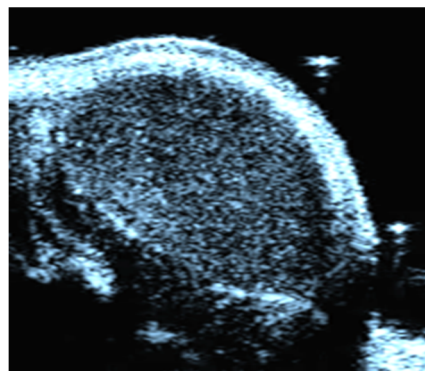
[1] Ackermann D, Schmitz G. Detection and Tracking of Multiple Microbubbles in Ultrasound B-Mode Images. IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control 2016; 63:72-82.



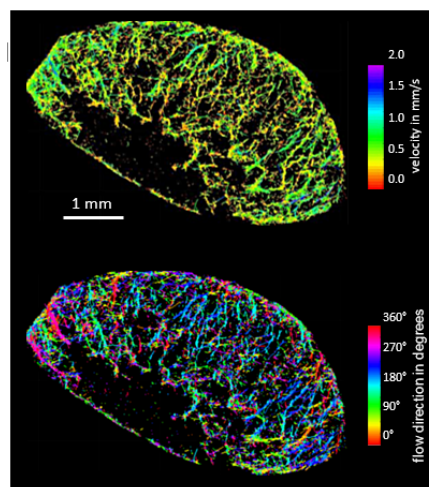
**Georg Schmitz** received the Dipl.-Ing. degree in 1990 and the Dr.-Ing. degree in 1995 in electrical engineering from Ruhr-Universität Bochum, Germany.

From 1995 to 2001 he was with Philips Research Laboratories of Royal Philips Electronics, in Hamburg and Aachen as a Principal Scientist. From 2001 to 2004 he was appointed Professor for Medical Engineering at the University of Applied Science Koblenz. Since 2004 he has been Professor for electrical engineering and holds the chair for medical engineering at Ruhr-University Bochum, Germany. From 2009 to 2012 he was Dean of the Faculty for Electrical Engineering and Information Technology.

His research interests are mainly in the field of ultrasonic imaging with current research projects on ultrasound contrast media detection and characterization, novel beamforming and nonlinear reconstruction methods, and photoacoustic imaging.



A431 tumor xenograft in a nude mouse imaged with the Vevo2100 (Visualsonics) at 40MHz



Superresolution vessel tracking images of flow velocities and flow directions for the tumor shown above

## Piezoelectric Vibration Energy Harvester— State of the Art System Implementations and Economics



Thomas Daue, Smart-Materials Corporation, Industrial Keynote Speaker

Harvesting electric energy from vibrations with piezoelectric devices has been thoroughly investigated in the past and actively used in many devices for decades. Normally implemented using PZT based piezoceramics, these devices feature a much longer lifetime compared with batteries, but were always second choice to an electromagnetic vibration harvester due to the mechanically and electronically more complicated and restricting design, and higher costs.

Energy harvesting systems, which are using “waste” vibration energy present in the environment, have become the focus of interest during the past years. The increasing use of portable electronics, sensor controlled systems and the growing requirement for structural health monitoring systems (SHM) for the worldwide aging building infrastructure, and the new generation of composite “blackbody” aircrafts, has renewed interest in designing energy autonomous sensor.

The renewed interest in piezoelectric vibration energy harvesting is a combination of the movement into renewable and sustainable energy sources, recent electronic developments for ultra low-power circuits as required for cell phones, and the commercial availability of improved piezocomposite materials.

At the cross-section of these new materials, advanced electronics and new market demands, a new generation of the piezoelectric vibration energy

harvester has become reality, overcoming many of the restrictions and drawbacks of its predecessor devices.

This presentation gives an overview about the current state of the art of the piezoelectric vibration harvester with a special focus on the economics, efficiency, features and benefits, in comparison with other competitive technologies available.

The presentation concludes with case studies of recent applications which are using the latest generation of piezoelectric vibration harvesting systems, including a critical view on the

### Fact 1: Are we using optimal Structures & Materials?

**Interesting energy sources:**

- human footsteps
- breathing
- ocean waves
- traffic vibrations

**Nature of typical excitations:**

- around 1-3 Hz
- unevenly
- small forces

But cantilever beams are everywhere

### Fact 2: How efficiently do we transfer the energy?

**AC excitation**

**DC excitation**

before closing S2:  $Q = C_1 \cdot U_0$ ,  $E = \frac{1}{2} \cdot C_1 \cdot U_0^2$

after closing S2:  $Q = C_1 \cdot \frac{1}{2} \cdot U_0 + C_2 \cdot \frac{1}{2} \cdot U_0$ ,  $E = \frac{1}{2} \cdot C_1 \cdot \left(\frac{U_0}{2}\right)^2 + \frac{1}{2} \cdot C_2 \cdot \left(\frac{U_0}{2}\right)^2$

Where are the other 50% going? Only 25% are being transferred

### Fact 3: Energy management and power hungry apps

Where is the energy really coming from? (Law of conservation of energy???)

Example: (Charging cell phone battery due to human footsteps)

typical cell phone battery: 3.7V\*1600mAh=5892Wh

typical piezo generator: 2mV / step

177'500 steps = 90km = 2x Marathon distance

Go to [www.Ultrasonics.org/UIA46Reg](http://www.Ultrasonics.org/UIA46Reg) to register

Register by 31 December 2016 for Earlybird Savings!

## Pre-Symposium Hiking Tour

Plan to arrive in Dresden to join Klaus-Vitold Jenderka for a hiking tour to Saxon Switzerland on Sunday, 23 April.

The group will meet at the Dresden Main Station, Ticket Counter at 8:45 am.

You will depart on the suburban railway Line S1 at 8:59 am for a 45 minute trip to Bad Schandau/Krippen.

Next is a 15 minute walk to the ferry port, where you will take the ferry from Krippen over the river Elbe (a 5 minute ride).

The hiking will begin by hiking to the Schrammstein look-out, elevation 417m (optional via the Schrammsteinbaude" for lunch) and the Falkenstein to the Kirnitzsctal. Duration is approximately 4 hours.

A certain level of fitness is required. Hikers should also be free of giddiness, since you will have to climb steep stairs and ladders along the path.

Depending on weather conditions and/or endurance of the group, the tour can be extended to the Kirnitzsctal vial the Carolafelsen and Wilde Hölle.

You will then ride the Kirnitzsctal tramway (also known as the Kirnitzsctalbahn or

Kirnitzsch Valley Tramway to Bad Schandau, the gate to the Saxon Switzerland National Park. You will walk through the city to the ferry port (15 minutes). This will also provide you with the opportunity to buy some souvenirs and/or dinner.

To return to the railway station you can take the ferry or bus. You will ride back to the Dresden Main Station on the suburban railway, arriving at approximately 6 pm.

You will be responsible for the cost of the transportation (approximately 15€) and any food you purchase.

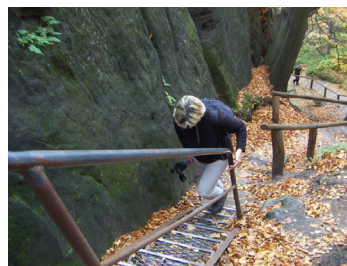
For more information about these points of interest, please use these links:

[https://en.wikipedia.org/wiki/Saxon\\_Switzerland](https://en.wikipedia.org/wiki/Saxon_Switzerland)

[https://en.wikipedia.org/wiki/Kirnitzsctal\\_tramway](https://en.wikipedia.org/wiki/Kirnitzsctal_tramway)

You may indicate your interest in participating in this tour on your registration for UIA46.

### Path with stairs and ladder



### Views from Schrammesteine



## Everything you need to know about registering for and attending UIA46

### Schedule Overview

The symposium formally begins on Monday, 24 April at 8:30 am and concludes on Wednesday, 26 April at 5 pm.

There is a pre-symposium hike that departs at 8:45 from the Dresden Main Railway stations on Sunday, 23 April. For more information, please see page 5.

### Monday, 24 April

- Medical Sessions
- Ultrasound Solution Center
- Evening Opening Reception

### Tuesday, 25 April

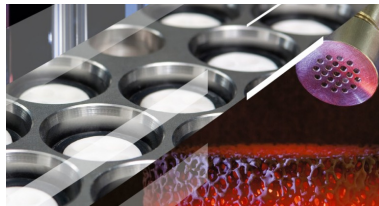
- Workshops
- Poster Sessions
- Ultrasound Solution Center
- Fraunhofer IKTS Tour
- Evening Event (companions welcome)

### Wednesday, 26 April

- Industrial Sessions
- Ultrasound Solution Center
- Symposium concludes

### Tour of Fraunhofer IKTS

The Fraunhofer Institute for Ceramic Technologies and Systems IKTS conducts applied research on high-performance ceramics. The institute's three sites in Dresden and Hermsdorf (Thuringia), Germany, collectively represent Europe's largest R&D institute dedicated to the study of ceramics.



This guided tour will include a general presentation and tours of five different labs.

### Tuesday Evening Event

The highlight of UIA Symposia is an evening in a unique venue. We're finalizing this event and will announce it shortly.

### Headquarters Hotel

The Dresden Hilton Hotel will be the headquarters for UIA46. Guestrooms are available for 127€/ single and 152€ double, which includes breakfast. Reservations need to be made **prior to 24 February 2017**. You may book online here:

<http://group.hilton.com/ABR-UIA46Symposium>

Rooms may be reserved between 21—27 April at this rate. The group name is **ABR UIA 46 Symposium**.



Registration Fees	Before 31 Dec	January 1 and after
Member	\$790	\$948
Nonmember	\$910	\$1,092

Go to [www.Ultrasonics.org/UIA46Reg](http://www.Ultrasonics.org/UIA46Reg) to register

Register by 31 December 2016 for Earlybird Savings of 20%!

## From the President...



Tony Crandall, UIA President

If you've read the articles in this issue of *Vibrations* you know that we've got a great symposium planned for next spring in Dresden. The chairs have done a fantastic job of planning this event. We have two great keynote talks by George Schmitz and Thomas Daue planned and a full slate of talks for both the medical and the industrial sessions on Monday and Wednesday. Tuesday will include great workshops, talks, posters, a tour of the Fraunhofer Institute and our evening event. Klaus-Vitold Jenderka is planning an exciting hike prior to the symposium that should be a great time.

I'm really excited about this symposium and hope you are too. We can hold these great symposia because of participation from our members. In particular, sponsorship by companies makes this all possible. In return, companies get exposure to a broad variety of potential customers while ensuring their engineers and scientists are up to date on the latest topics in ultrasonics. Check out the information on pages 10 and 11 for the range of sponsorship packages and more.

The UIA looks forward to seeing you in Dresden!

This small, casual venue is the best ultrasonics conference ever for networking, and the diverse array of presentations is unparalleled for leaning new ideas outside your area of interest.

## UIA Board

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# UIA46: Call for Posters

Submission of poster abstracts for consideration for UIA46 presentations or posters is now electronic.

Use the link at the right to go to the UIA46 Symposium Poster Submission site.

Please follow the instructions below to complete your submission(s). Should you have any questions, please email [uia@ultrasonics.org](mailto:uia@ultrasonics.org) or call +1.937+586.3725.

The UIA invites abstract submissions for posters for the 46th Annual UIA Symposium, 24 – 26 April 2017, in Dresden, Germany. We particularly encourage poster abstract submissions from graduate students. This is an opportunity to showcase your research results to academic and industry delegates in any area of medical or industrial ultrasonics. We would be delighted to receive poster abstracts from graduate students in Dresden and the surrounding area, to bring a strong 'local research' flavour to the UIA Symposium. You can submit your abstract here. We look forward to seeing you in Dresden.

*Margaret Lucas, University of Glasgow, Poster Chair*

Go to <http://tinyurl.com/UIA46Paper> to submit your abstract

**Step 1**

**Deadline for Poster Abstracts is 1 February 2017**

UIA46 Symposium Presentation Submission

Email:  Password:

[Login help](#) [New user? Register now!](#)

You must create a new profile, even if you submitted an abstract last year.

The Ultrasonic Industry Association invites you to submit a 200 word abstract for consideration of presentation or poster on 24-26 April at its 46th Annual Symposium in Dresden, Germany at the Dresden Hilton Hotel. Plan now to join UIA for this international conference featuring the best of ultrasound from around the world.

**Step 2**

First Name

Last Name

E-mail address

cc email

Password

Confirm Password

Phone

Country

**Step 3**

Home Edit profile

Submitter: Dashboard Submissions

Pending Accepted Declined

You have no Submissions in this status

**Important Information:** Presentations will be no longer than 25 minutes; 1

**Step 4**

Submission Group

Applicant type

Type of application presentation  Paper (no longer than 25 minutes)  Poster (displayed during symposium with opportunity to discuss)  Workshop (at least 60 minutes on technical aspect of ultrasound)

Preferred Presentation Method  Yes  No  Uncertain at this time

I intend to submit a written paper for the proceedings \*

Presenter Name

Presentation Title

Authors of Paper

Institution(s) of Author(s)

Abstract

You may upload your abstract here

Once you have completed your submission, you may cancel, save to continue later or submit. Once you have created your profile, just go to Step 3 to add another submission.

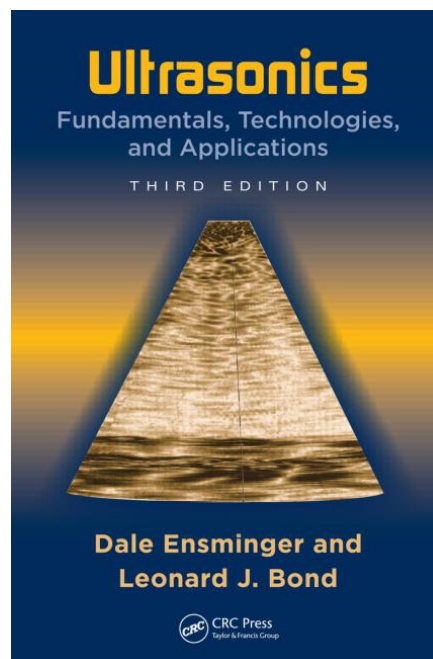


## Dale Ensminger

Dale Ensminger, age 93, passed away Friday, October 21, 2016. He was born in Mt. Perry, Ohio. He graduated from Somerset High School in the spring of 1941 and went to work in the coal mines. In January 1943, he was drafted into the United States Army where he served for 3 years and earned a bronze star. He was the fourth of four brothers who served in the Army or Army Air Force during World War II, all serving in combat service. Two younger brothers also served in the United States military services. Dale attended the Ohio State University and graduated with bachelors degrees in both Mechanical and Electrical Engineering in 1950. He also did some post-graduate studies at OSU between 1950 and 1953. Dale began working at Battelle Memorial Institute in 1948 while still a student at OSU and worked there until his retirement in January, 1988. During his time at Battelle he did active research in ultrasonics and was involved in about 1,000 different projects relating to ultrasonics, acoustics and related areas. He also holds many patents related to these projects. He was a member of the Acoustical Society of America, Ultrasonics Industry

Association and the Society for Nondestructive Testing. He was a Registered Professional Engineer in the State of Ohio. He was the author of two books, contributed to several more, and published numerous articles on the subject of ultrasonics. He was a long-standing member of Calvary Bible Church where he served many terms as an elder. He was also an active member of the Columbus Prison Association, preaching and ministering in local prisons; the dean and a teacher of the Columbus Bible Institute, a weekly Bible institute held at Calvary Bible Church for more than 40 years; a member of the board of the Fundamental Baptist Mission of Trinidad and Tobago for many years. He was preceded in death by his parents Charles and Mary Ensminger, four brothers Frederick, Glenn, Clarence and Neil, his first wife Lois Hamilton and his second wife Patricia Curtis and daughter Joyce Hope. He is survived by brothers, Phillip and Lee; and by sisters, Fern Hunt, Juanita Rader and Shirley King; and by children, Martha Taylor, Laura Lee Francis, Charles (Bob), Jonathan, Mary Ann Miller and Daniel; by 30 grandchildren and 36 great-grandchildren; as well as many nieces and nephews.

Dale literally wrote the book on Ultrasonics.



Recent advances in power electronics greatly benefit the multidisciplinary field of modern ultrasonics. More powerful, compact, and versatile electronic chips and software enable new computer-based devices for real-time data capture, storage, analysis, and display and advance the science and technology employed in commercial systems and applications of ultrasound. Reviewing the scientific basis behind these improvements, **Ultrasonics: Fundamentals, Technologies, and Applications, Third Edition** discusses them in detail, with new and additional figures and references, offering a completely revised and expanded examination of the state of modern ultrasonics.

# Here's how YOUR company can reach key ultrasonic users



UIA offers companies access to key influencers in the international ultrasonic community through four key avenues: new website, *Vibrations* newsletter, Sound Solutions one-day meeting and UIA46 International Symposium.

## UIA46 Annual Symposium

The three day annual symposium will be held in Dresden, Germany 24—26 April 2017. Sponsorships include table top exhibits.

## Website Banners

There are two positions available that will appear on every page of the site that will click through to the URL of your choice. See page two for more information about sizes, location, and costs.

## *Vibrations* Newsletter

Display ads are available in this newsletter that is distributed electronically every quarter. Ads include a link to the URL of your choice.

## Sound Solutions

This one-day midyear meeting is held each fall with an emphasis on practical answers to ultrasound problems that companies have. Sponsorships and tabletop exhibits are available for this meeting.

## Sponsorship Packages

Each package is for 12 months from date of payment. Go to page 4 to see details and pricing.

**Titanium** Includes two ad positions on website, full page ad in *Vibrations* newsletter and sponsor recognition/tabletop exhibit at Sound Solutions midyear meeting and Annual Symposium and more.

**Gold** Includes masthead banner ad position on ultrasonics.org, half page ad in *Vibrations* newsletter and sponsor recognition/exhibit at Sound Solutions and Symposium.

**Silver** Includes vertical ad position on ultrasonics.org, 1/3 page ad in quarterly *Vibrations* newsletter and tabletop exhibit at Sound Solutions and Annual Symposium.

**Bronze** Includes 1/2 column page ad in quarterly *Vibrations* newsletter and tabletop exhibit at Symposium.

Select the level of exposure best for your company. Go to [www.Ultrasonics.org/UIA46Reg](http://www.Ultrasonics.org/UIA46Reg)



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# 2017 SPONSORSHIP PACKAGES

	Titanium	Gold	Silver	Bronze
	\$5,000	\$4,000	\$3,000	\$1,500

## Website

Masthead banner with URL link	X	X		
Vertical banner with URL link	X		X	
Career Center Ad	unlimited	4 per year	3 per year	1 per year

## Vibrations

Ad in 4 quarterly issues with URL Link	Full	1/2 page	1/3 page	1/2 column
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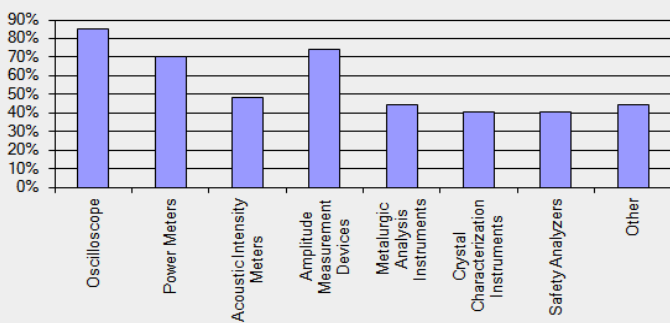
## Sound Solutions

Sponsor Recognition	X	X		
Tabletop exhibit	X	X	X	X
Complimentary Registration	2	2	1	1

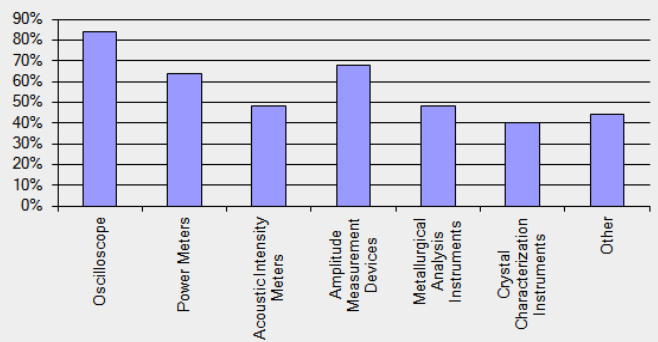
## UIA46 Symposium

Sponsor Recognition	X	X		
Tabletop exhibit	X	X	X	X
Complimentary Registration	3	2	1	
Proceedings Sponsorship	X	X		
Sponsor Badge Ribbon Recognition	X			
Onsite Program Recognition	X	X	X	X
Exhibitor Badge Ribbon Recognition	X	X	X	X

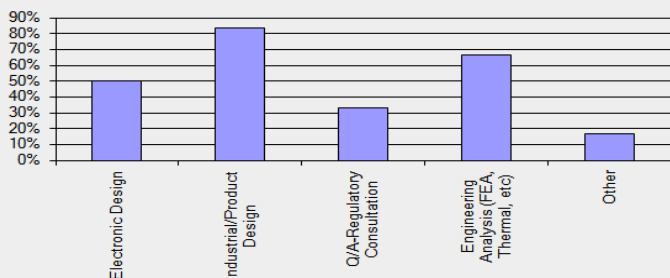
### Instruments used in R&D and Production



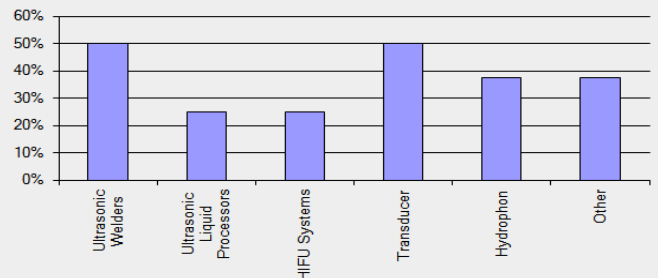
### Instruments used for products and services



### Types of Design Service Companies used by UIA members



### Types of Ultrasound Companies used by UIA members



Ultrasonic Industry Association  
11 W Monument Ave, Ste 510  
Dayton OH USA

Phone: +1.937.586.3725  
uia@ultrasonics.org



VISIT US AT  
[ULTRASONICS.ORG](http://ULTRASONICS.ORG)

## 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 online Referral Network, learn about ultrasonics with our online primer, or meet industry leaders at our next symposium.

## Important Dates →

**31 December:** Earlybird registration deadline for **UIA46**

**1 February 2017:** Deadline for Poster abstracts

**24 February 2017:** Deadline for reservations at the Dresden Hilton

**24-26 April 2017:** **UIA46** in Dresden, Germany

