ultrasonic industry association
UIA

# Vibrations

News from the Ultrasonic Industry Association

Tom Kirkland, Editor

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## Second Annual UIA Medical Workshop in Atlantic City, NJ Precedes the Leading Edge

On May 20, 2002, the UIA is going to offer a medical workshop for the second consecutive year as a prelude to the Leading Edge of Diagnostic Ultrasound Symposium at The Trump Taj Mahal Casino·Resort in Atlantic City, NJ (May 21—24, 2002). The Leading Edge symposium is an annual four-day conference devoted to state-of-the-art practice and recent advances in the field of diagnostic ultrasound (US). The UIA medical workshop will focus on state-of-the-art practice and recent advances in therapeutic applications of medical US and will emphasize areas of overlap between the two fields. An example of this overlap is the diagnostic US mode of color flow imaging, with and without US contrast agents, which has been used successfully to gain insight into the mechanisms associated with therapeutic US treatment. Together, both conferences will present a unique opportunity for those scientists, physicists, and engineers who wish to come up to speed on the activities of the medical community in both therapeutic and diagnostic US. The co-chairpersons for the workshop are Dr. Foster Stulen, Manager of External Ventures at Ethicon Endo-Surgery (Cincinnati, Ohio), for the morning session and Alan Winder, President and Chief Scientist of Acoustic Sciences Associates (Westport, CT), for the afternoon session.

Getting down to basics, US wave propagation in tissue exerts a unidirectional radiation force on all absorbing and reflecting obstacles in its path, even at the microstructural level. This produces direct measurable biological effects, sufficient to invoke biological healing processes. For the past 50 years, most notably since 1970, US has been demonstrated to stimulate transdermal delivery of drugs; promote and accelerate the repair of soft tissue wounds, bone fractures, and a variety of musculoskeletal syndromes; and relieve accompanying pain.

The therapeutic biological effects of US may be characterized into two major areas: thermal and nonthermal. The nonthermal effects can include acoustic streaming, cavitation, and other mechanical effects over the broad range of ultrasonic frequencies from about 10 kHz to 5 MHz. The papers to be presented at this workshop will primarily address those applications for which the spatial average-temporal average (SATA) intensity levels are generally considered to be in the diagnostic range and would produce primarily nonthermal therapeutic effects.

A breakthrough application of medical US is in the delivery and potentiation of drugs. Developments include transdermal drug delivery, potentiation of thromobolytic agents, sono-dynamic therapies in which a drug is activated or its action is enhanced with US, and targeted release by ultrasonic disruption of vesicles containing drugs. Currently, there is advanced research underway that uses ultrasound for both gene expression and gene delivery into cells. Advances in these areas promise to improve the health of millions of patients by lowering dosages and increasing efficacy. The morning session will have a number of presentations in these areas.

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The exact cellular processes for biological tissue repair are still unknown. However, we do know that angiogenesis is a key initial component in the healing process. This brings us to the guest lecturer in the afternoon session, Dr. Flemming Forsberg, Technical Director of the Diagnostic Ultrasound Division and Associate Professor of Radiology at Thomas Jefferson University Hospital (Philadelphia, PA). Dr. Forsberg will present a paper on "Evaluating Angiogenesis with Implications for Ultrasound Imaging."

This will be (tentatively) followed by papers on musculoskeletal 3-D US applications; the use of pulsed, low intensity SATAs less than 150 mW/cm$^2$ for articular cartilage repair; and the use of osteogenic frequencies from 10 to 100 Hz and less than 10 microstrain mechanical stimuli for augmenting bone mass and morphology.

The next set of papers will involve novel piezoceramic materials that can be used for broadband therapeutic and diagnostic applications, with emphasis on high frequency US. The latter includes biomicroscopes for dermatological, cardiovascular, endoluminal, and ocular imaging. High frequency (above 20 MHz) in vivo measurement of skin thickness may assist in the diagnosis of osteoporosis and the control of therapeutic treatment of skin diseases, such as psoriasis. In addition, needle-based probes may assist in the diagnosis and management of diseased tissue. The ability to biopsy tissue under US guidance has long been established for making pathologic diagnosis of lesions located within the organs. However, the added ability of the biopsy needle to provide detailed information about the absorption, elastic properties, and density of tissue cells should improve the clinical assessment of consistent patterns of cellular malignancy.

The registration fee for the UIA medical workshop is $300 if you are a UIA member, $385 if you are a non-member (optionally includes one year of individual UIA membership), and $195 if you are a student. Anyone registered for any part of the Leading Edge Conference may attend at the student rate of $195. As a further incentive to attend the workshop, Dr. Goldberg (Program Director of the Leading Edge) has agreed that all those who attend the UIA workshop can also attend the Leading Edge symposia scheduled the next day, Tuesday, May 21, at *half-price or $125*. The symposia scheduled for Tuesday are Contrast Agent Symposium, co-directed by Drs. Flemming Forsberg and Barry B. Goldberg and the Ultrasound Physics Refresher given by Dr. Frederick W. Kremkau. Both Dr. Goldberg and Dr. Kremkau are Past Presidents of the American Institute of Ultrasound in Medicine.

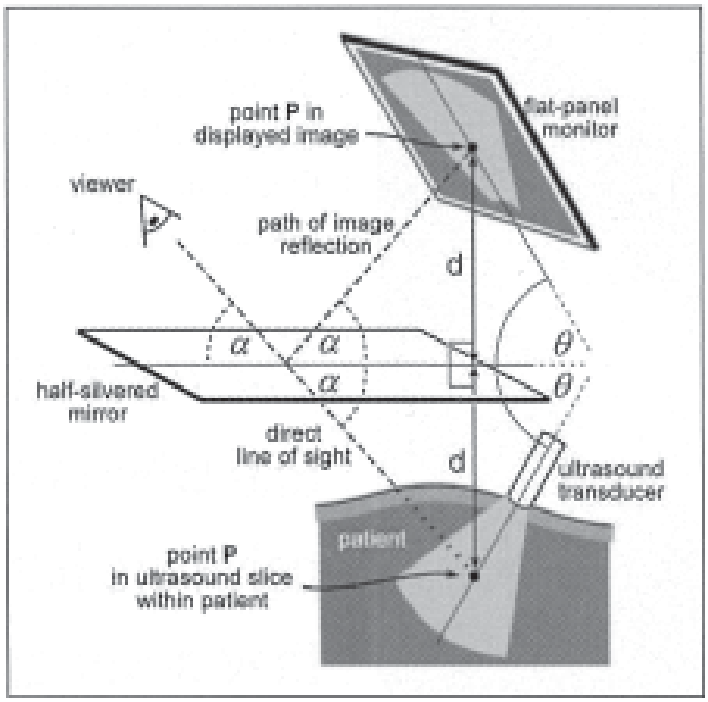
Located on the Boardwalk, the Taj offers it guests luxurious and spacious rooms, convenient parking, a variety of restaurants, and an exciting casino. A block of rooms has been set aside at the Taj at a reduced rate for the UIA Medical Workshop/Leading Edge conference participants ($130 per night single/double plus tax).

If you are interested in presenting your work in these areas, please contact either chairperson (Dr. Foster Stulen, fstulen@eesus.jnj.com, or Mr. Alan Winder, aawinder@aol.com).

# "Sonic Flashlight" Makes Human Body Appear Translucent

## from January 2002 Medical Device & Diagnostic Industry

Physicians have continued to use traditional film or screen images to assess the condition of a patient. For example, invasive procedures such as needle biopsies are guided by ultrasound images. Because the doctor must look away from the patient at a display screen, his or her hand-eye coordination can be affected. Now, a prototype device developed by a biomedical engineer at the University of Pittsburgh enables a physician to remain focused on the patient during an ultrasound-guided procedure. Called a "sonic flashlight," the device makes the human body seem translucent, says George Stetten, MD, PhD, assistant professor of bioengineering at the university and a research scientist at the Carnegie Mellon University Robotics Institute. The view provided by the device essentially combines the visual outer surface of a patient's skin with a real-time ultrasound scan of the tissues within. The result is a 3-D translucent ultrasound image of blood vessels, muscle tissue, and other structures that appears to float in its actual location within the patient. There have been previous attempts to combine ultrasound and x-ray images with a physician's direct view of a patient. Most have been quite complex or limited by the amount of additional hardware the physician had to contend with, such as 5 head-mounted video cameras. Other approaches, while similar to Stetten's, required the use a tracking device to monitor the viewer's location. The biomedical engineer claims that his method eliminates the need for tracking devices and transmitters. Stetten explains that the system functions much like the way a translucent mirror superimposes images from opposite sides of the glass. In Stetten's sonic flashlight, an ultrasound scanner and the ultrasound display are positioned on opposite sides of a half-silvered, translucent mirror. The patient and the ultrasound scanner positioned on the patient's skin can be viewed through the mirror. The ultrasound image is simultaneously projected on the viewer's side of the mirror in alignment with the corresponding location within the patient's body. This makes the ultrasound image appear to occupy the same physical space as the body part that is being imaged. The system enables the combined view to remain accurate as the viewing angle is changed. The researcher calls the process "tomographic reflection," and explains that the method relies on maintaining the precise geometric relationships between the ultrasound slice being scanned, the monitor displaying the slice, and the mirror. "We are actually merging the virtual image in 3-D with the interior of the patient," Stetten says. "The reflected image is optically indistinguishable from the corresponding space within the patient." The resulting image appears within the natural field of view. This enables the physician to perform such invasive procedures as amniocentesis, catheterization, or minimally invasive surgery while looking directly at the patient and not looking away toward a monitor. Stetten has also built a prototype of a portable sonic flashlight that would be suitable for routine use in a physician's office. He explains that both the stationary and portable devices will need to be refined and tested in the laboratory before being tested in a clinical setting, however. Stetten received a research grant from The Whitaker Foundation for the project in 1994.




*The technique used in the "sonic flashlight" uses a translucent mirror to merge an ultrasound-based image with the physician's view of the patient.*

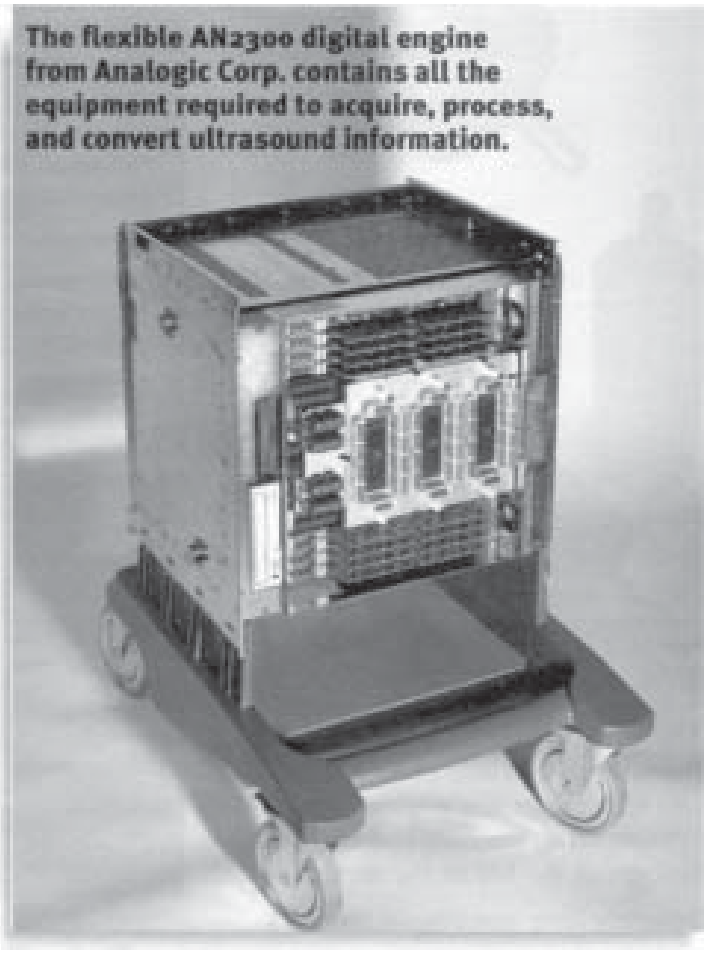
# Ultrasound Engine Speeds Time to Market

## Integrated system reduces development requirements for medical OEMs.

A flexible ultrasound engine combines several components into a single unit that can be integrated into OEM machines. Marketed by **Analogic Corp.** (Peabody, MA), the AN2300 streamlines product design by incorporating all the equipment necessary to acquire, process, and convert ultrasound information. "This engine helps OEMs get their products to market quickly by providing 90% of the equipment needed to make any ultrasound system," explains Analogic's OEM sales and marketing manager Axel Wirth. It also facilitates the integration of the remaining 10% of materials that define the end-user device, he adds.

Adaptation to specific applications is achieved through the addition of transducers, clinical software applications, displays, user interfaces, and other elements. "The system is particularly useful for companies that can't afford to develop a complete digital ultrasound unit on their own," says Wirth.

The PC-based AN2300 engine is suited for cardiology, general radiology, and breast imaging, among other applications. Special beam formers use a broadband spline-interpolation filter capable of synthesizing up to 256 receiving channels. Compatible imaging methods include parallel-beam processing, harmonic receiving, beam steering, spectral Doppler, color flow, and triplex modes. A software interface allows developers to program the system in a Windows NT environment without detailed knowledge of the engine's hardware.



The flexible AN2300 digital engine from Analogic Corp. contains all the equipment required to acquire, process, and convert ultrasound information.

Dr. Mark Schafer, former President of the Ultrasonic Industry Association, announces the formation of a new design services and contract engineering company, Sonic Tech, Inc. The company's mission is to accelerate the development and commercialization of new products that involve acoustics or ultrasonics, including both medical and non-medical applications. Sonic Tech will leverage Dr. Schafer's extensive experience in ultrasound product development to assist customers in areas such as: research, innovation, concept formation, design, development, manufacturing and product release.

Dr. Schafer brings clients 20 years of experience as an engineer and entrepreneur in both acoustics and product development. He is a recognized industry expert in both ultrasound measurement technology and the regulatory approval process. His work experience has included a broad range of applied acoustics: ultrasonic wound healing, medical imaging system development, fat measurement and pregnancy detection in livestock, and high-speed automated ultrasound scanning of wood and lumber. These experiences have not only provided Dr. Schafer with a unique background in nearly every type of ultrasound modality, but with intensive "hands-on" project management and business development expertise as well. Sonic Tech's resources also include experienced software engineering capabilities, from architecture design, to firmware implementation, to real-time user interfaces.

The company can be reached at (215)-654-9511, or by email at sales@sonictech.com.

# UIA Presidents Message

## Jeff Vaitekunas

As you read this, your UIA Board of Directors is finalizing plans for the 2002 UIA Symposium. This year the annual meeting will be held in mid-town New York City. It's shaping up to be a great opportunity to both broaden your understanding of the various uses of ultrasonics in industry, as well as deepen your technical understanding of your area of specialization. Mark your calendar for October 21 and 22 for the meeting, plus mark the 23rd if you want to attend a special Plastics Welding technical session. The meetings will be at the NY Helmsley Hotel, on 42nd Street across from Grand Central Terminal. Watch www.ultrasonics.org for updates, registration materials, and other pertinent information.

You should also note with interest the Medical focus meeting publicized in this issue to be held in May immediately preceding the Leading Edge Conference in Atlantic City. Last year's meeting was a tremendous success, and we decided we would try to establish the tradition of offering this program to our constituency in the medical ultrasound community.

With regard to last year's symposium, I can declare great success, and unfortunate failure. The UIA is continuing to generate interest internationally, and we had some great presentations on generator technology, transducer development, and pharmaceutical manufacturing from outside the USA. Unfortunately, conditions at the time caused the number of attendees to be much lower than anticipated. This resulted in a significant financial loss to the UIA, and is causing the Board of Directors to make changes to our day-to-day operations to keep the organization alive and well. You may have noticed recent increases in requests for advertising in Vibrations and the Directory, and this is the result of some of our efforts. Our main focus, however, is to make the 2002 symposium an event not to be missed! I'll see you in New York.

Jeff

# Possible Sound-Induced Nuclear Fusion Posited Additional Experiments Are Needed

TROY, N.Y. - A team of researchers at Oak Ridge National Laboratory (ORNL) and Rensselaer Polytechnic Institute has reported the observation of phenomena that could point to the possibility of nuclear fusion using a novel technique for plasma confinement. The approach, called "bubble fusion," is reported in the March 8 issue of *Science* magazine.

Attempts to confirm these results by looking for the telltale neutron signature of the deuterium fusion reaction have yielded mixed results. Additional experiments are needed to verify neutron emission.

The research team reported that ultrasonic waves were used to implode small cavitation bubbles of deuterated-acetone vapor. The team further reported that, during bubble implosion, evidence pointing to nuclear emissions and sonoluminescence light flashes was observed, as well as evidence of tritium which could suggest the fusion of deuterium atoms in the highly compressed bubbles.

"It's hard to know at this point what the ultimate importance of this discovery will be. However at this time, it looks promising," said Professor Richard T. Lahey Jr., the Edward E. Hood Professor of Engineering at Rensselaer, one of the authors of the published research.

The cavitation experiments were conducted at ORNL by Rusi Taleyarkhan, Colin West, and Jae Seon-Cho. Lahey and Robert Nigmatulin, a visiting scholar at Rensselaer and a member of the Russian Academy of Sciences, performed the theoretical analysis of the bubble dynamics and the shock-induced pressures, temperatures, and densities in the imploding bubbles. Robert Block, professor emeritus of nuclear engineering at Rensselaer, helped to set up and calibrate a neutron and gamma detection system.

Rensselaer Polytechnic Institute, founded in 1824, is the nation's oldest technological university. The school offers degrees in engineering, the sciences, information technology, architecture, management, and the humanities and social sciences. Institute programs serve undergraduates, graduate students, and working professionals around the world. Rensselaer faculty are known for pre-eminence in research conducted in a wide range of research centers that are characterized by strong industry partnerships. The Institute is especially well known for its success in the transfer of technology from the laboratory to the marketplace so that new discoveries and inventions benefit human life, protect the environment, and strengthen economic development.

# INTRODUCTION TO ULTRASONIC PLASTICS ASSEMBLY

The "third day" of the 2002 UIA Symposium in New York City will consist of a special seminar presented by the plastics joining manufacturers who are members of the UIA. This seminar will be a complete introduction to the principles and practices of ultrasonic plastics assembly.

Some topics that will be covered are:

- Basic equipment components and function
- Acoustical tooling and fixturing
- Discussion of various frequencies
- Materials, additives, colorants, etc.
- Basic part and joint design considerations
- Principles of equipment operation and process control
- Open discussion on attendee questions

The various manufacturers are coming together to present a complete seminar utilizing the talents of speakers from several companies discussing topics in their particular areas of expertise. This will not be a commercial presentation, but a technical presentation that will present the basic principles that apply to all makes of equipment.

The UIA is very excited to be bringing this program to you, the first of its kind that we are aware of in the ultrasonic plastics joining industry. It should prove to be a unique opportunity to interact with the best minds in this field. Watch carefully for further details.



## Send future newsletter information to:

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# UIA Membership Benefits

Sometimes we take for granted the wealth of industry information and contacts which UIA membership provides. Here is a reminder of the benefits to which you are entitled as a member.

**1. Symposia**

- ✓ SPRING MEETING IN ATLANTIC CITY, NJ will focus on ***Therapeutic Applications of Medical Ultrasound.*** This is the second year we are holding this meeting. .
- ✓ FALL MEETING IN NEW YORK CITY, NY. Our ***Annual Meeting,*** which gives you the opportunity to learn about four different areas of Ultrasonic applications and research. This gives our members an unequaled opportunity to cross fertilize your knowledge base from high power transducer design to sonochemical reactions to medical and industrial applications.

**2. Publications**

- ✓ THE DIRECTORY & REFERRAL NETWORK is a source of member information listed in an easy, user-friendly format. Available ONLY to members.
- ✓ VIBRATIONS is a Quarterly Newsletter keeping the membership current on association, member, and product news. Reprints of cutting edge articles are also found here. The subscription is part of your annual dues.
- ✓ PATENT REVIEW A monthly listing of all US and European patents pertaining to ultrasonics . Each entry has vital information to anyone in the field including the abstract of the patent. Available ONLY to members

**3. Advertising**

- ✓ Exhibit your products during our Symposia, put an ad in our Membership Directory and Newsletter or place a link to your company on our Web site. UIA offers an inexpensive way to get your company name in front of a select group of highly qualified users.

**4. Professional Development**

- ✓ Ultrasonic Industry Standards & Regulations
- ✓ Committee Activities
- ✓ Networking

The UIA is starting a major membership drive this year so that YOU can benefit from the increased opportunities to interact with and learn from your colleagues and so that our organization can reach the critical mass needed to enhance and expand our activities. *IF YOU ARE NOT ALREADY A MEMBER, PLEASE CONTACT US AND ASK FOR INFORMATION ABOUT HOW EASY IT IS TO JOIN. IF YOU KNOW OF SOMEONE WHO COULD BENEFIT FROM THE UIA, LET US KNOW.*

The UIA Board of Directors

## CALL FOR STUDENT PAPERS - CASH AWARD

The UIA is actively seeking graduate student research papers to be evaluated for a cash award and plaque to be presented at the 2002 Symposium. As in past years, the graduate student with the winning paper will be invited to present the paper in person at the 2002 symposium. Interested parties may use the Call for Papers form provided elsewhere in this issue of Vibrations. Clearly mark "Graduate Award Paper" on the form so the paper will be passed to the award committee and not to the session chairs for review. Watch carefully for further details.



**Would you like to gain recognition in the Ultrasonics Industry? Find out how to appear in Vibrations.**

**Contact Seth Hettinger, UIA**
**phone: (217) 356-3182**
**e-mail: sethh@assochq.org**

# 32nd Annual UIA Symposium

**October 21 & 22, 2002**
**The Helmsley Hotel, NewYork, NY**

# Call for Papers

*Deadline for submission: May 1, 2002*

The Ultrasonic Industry Association, Inc. invites you to submit a 200 word abstract for consideration of presentation at the UIA's 32nd Annual Symposium.

Please check the appropriate category of your proposed presentation:

( ) Industrial Applications
- NDE
- Cleaning
- Measurement
- Components
- Underwater
- Pulp/Paper
- Sensing
- Atomization

( ) High Power
- Metal and plastic joining & fastening
- Welding Films, Fabrics, Metals, Plastics
- Cutting
- Power Supplies/Generators

( ) Sonically Enhanced Processing
- Sonochemistry
- Cleaning
- Agglomeration
- Separation
- Environmental
- Pharmaceutical
- Sonoluminescence
- Defoaming
- Degassing
- Compaction

( ) Medical
- Surgical/Theraputic
- Cavitation
- High Intensity Focused Ultrasound
- Biological Cell Disruption

( ) Lead a Workshop: _____

**Please print clearly:**

Presentation Title: _____

_____

Authors: _____

_____

Presenter(s): _____

Main Contact Name (Person to receive correspondence): _____

Address: _____

City/State/Zip: _____

Phone #: _____ Fax #: _____

Email: _____

## Deadline: May 1, 2002 for submitting *Call for Papers* Form

Important Information: Presentations will be no longer than 25-30 minutes; final abstracts (diskette or Email) and bio-sketches must be submitted to UIA Headquarters no later than August 1, 2002. The session chair will contact you directly to discuss your proposed presentation. *Accepted presenters receive a discounted registration fee.*

Chairpersons: Ron Staut, APC International, Phone: (570)726-6961, Fax: (570) 726-7466, Email: ronstaut@aol.com
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