

Ultrasonic Industry Association

2011 Symposium: We're Going to Glasgow, Scotland, UK

The 2011 UIA Symposium will be held at the University of Glasgow, Scotland, UK.

Professor Margaret Lucas, Head of Research Division, School of Engineering, University of Glasgow, is the Symposium Chair.

Industrial Session Co-Chairs are **Tony Gachagan**, Director, Centre for Ultrasonic Engineering, and a Senior Lecturer in the Electronic and Electrical Engi-

neering Department, at the University of Strathclyde, and **Leo Klinstein**, Dukane Corporation.

Medical Session Co-Chairs are **Professor Sandy Cochran**, Deputy Director and Team Leader (Medical Ultrasound), Institute for Medical Science and Technology, University of Dundee, and **Daniel J. Cotter**, Principal Ultrasonics Engineer, Integra Neuro Sciences.

Jay Sheehan, JFS Engineering Systems is Workshop Chair. **Sunita Chauhan**, Nanyang Technological University, Singapore, is Poster Chair.



40th Symposium Invited Speakers

Professor Damien Walmsley, BDS MSc PhD (VU Manchester)



FDS RCPS (Glasgow), Professor of Restorative Dentistry, School of Dentistry, The University of Birmingham

will be the invited speaker for the Medical Session. I started off studying dentistry but very soon after finishing my clinical training, I commenced my PhD studies on the topic of "Biological effects of ultrasound in dentistry". One of my supervisors was Roy Williams, Reader in Medical Biophysics at Manchester University who was interested in potential research collaborations into the use of dental ultrasound. It was his enthusiasm for the subject that stimulated my interest in this area of research.

Ultrasound in Dentistry is primarily used for cleaning teeth by means of an oscillating probe working at kHz frequencies (around 25 to 40kHz). The chipping action of the tip removes the attached deposits and is partially assisted by the cavitation activity in the cooling water supply. My early research looked at cavitation and its ability to remove material from the tooth surface. However it quickly became apparent that dental ultrasonic instruments had not been properly calibrated in spite of their widespread use. Also whilst it was accepted that cavitation might occur during the scaling process little was known about its occurrence and effectiveness. My early research not only covered these aspects but also investigated the use of

continued on page 8

Juan A. Gallego-Juárez, is



a Research Professor at the Spanish Council for Scientific Research (CSIC) where he founded the group of Ultrasonics and is Former Director of the Institute of Acoustics and of the Center for Physics Technologies. His research work has always been related to ultrasonics, particularly high-power ultrasonics, transducers and applications.

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Monday 23 May 2011: Medical Presentations

Sandy Cochran and Dan Cotter, Co-Chairs

***This is a preliminary
schedule, subject to
change***

- 8.00 *Registration and Coffee*
- 8.20 Welcome by *Mark Hodnett*, President
- 8.30 Design and realization of a simple, rapid beam plotting system for medical ultrasound fields, *C. Baker, J. Barrie, A. Shaw, M. Hodnett, B. Zeqiri*
- 9.00 Design and construction of an angled ultrasonic transducer applied to blood flow measurement, *P. Acevedo, I. Sanchez*
- 9.30 Modelling and fabrication of high frequency ultrasonic transducer arrays for medical applications, *R. Ssekitoleko, C. Demore, G. Harvey, S. Cochran*
- 10.00 High frequency (20 MHz and above) therapeutic transducers based on piezoelectric film, *W. Wolny, R. Lou-Moellor, A. Nowicki, M. Lethiecq, J. Ketterling, F. Levassort*
- 10.30 *Coffee/Tea in Exhibition*
- 11.00 An in vitro set-up to study low-frequency ultrasound effects on dental cells, *U. Patel, D. Walmsley, B. Scheven*
- 11.30 Surface characterisation using combined ultrasound and low coherence interferometry, *C. Li, S. Li, Z. Huang, R. Wang*
- 12.00 Transducer arrays for ultrasonic particle manipulation, *C. Demore, P. Glynne-Jones, C. Ye, Y. Qiu, S. Cochran, M. Hill*
- 12.30-13.30 *Luncheon/Exhibition*
- 13.30 Keynote speaker: Professor *Damien Walmsley*, University of Birmingham, UK
- 14.30 Assessment of the performance of pre-clinical ultrasound scanners using the resolution integral, *C. Moran, B. Ellis, A. Janeczko, S. Pye*
- 15.00 Modeling and monitoring cerebral perfusion in predicting G-LOC, *S. Chauhan, Y. Li, A.C. Ritchie, M. Skote*
- 15.30 *Coffee/Tea in Exhibition*
- 16.00 High resolution ultrasound transducers and arrays for medical imaging applications, *T. Button*
- 16.30 Ultrasonic radiation forces for cell sorting and characterisation, *P. Glynne-Jones, P. Mishra, D. Ankrett, R. Boltryk, M. Hill Process*
- 17:00 Characterisation of an ultrasonic transducer connected to quarter and full wavelength rod horns, *A. Mathieson, A. Cardoni, N. Cerisola*
- 18-19.30 Reception and Whisky Tasting, Ferguson Room, University of Glasgow

Schedule subject to change

Tuesday 24 May: Workshops, Poster Session and Laboratory

Workshop Chair Jay Sheehan Poster Chair Sunita Chauhan

8.00	Coffee
8.30	Jay Sheehan, Fundamentals of Transduction
9.10	Victor Humphrey, Fundamentals of Ultrasonic Wave Propagation
9.50	Coffee/Tea in Exhibition
10.30	Precision Acoustics, UK, Measurement of Ultrasound Fields (with hands-on measurements and demos)
11.30	Peter Wells, A biopic of Lord Rayleigh
12.00-14.00	Lunch and Poster Session, Sunita Chauhan, Chair
14.00-14.30	Travel by Underground to Strathclyde University
14.30-17.00	Lab Tour/Demonstrations, Centre for Ultrasonic Engineering, University of Strathclyde
18:30	Buses Leave from outside the Wolfson Building
19.30	Dinner at Ross Priory, Loch Lomond
22:30	Buses depart Ross Priory

*Find Detailed
Workshop Information
Page 4*

*Student Posters are still
being accepted. Go to
www.ultrasonics.org for
more information*

Tuesday Lab Demonstration Information

Strathclyde University, Centre for Ultrasonic Engineering: (Tony Gachagan)

1. Multi-frequency high power ultrasonic reactor
2. Phased array applications in NDE and process control
3. Biologically inspired acoustic systems
4. Autonomous NDE using remote sensing agents

University of Glasgow, Power Ultrasonics Group: (Margaret Lucas)

5. Ultrasonic drilling/coring for planetary sample retrieval
6. Experimental characterisation of ultrasonic surgical cutting tools.

University of Dundee, Medical Ultrasonics Group: (Sandy Cochran, Zhihong Huang)

7. High resolution ultrasound imaging with a piezocomposite transducer made with micromoulded ceramic
8. Ultrasound devices for high precision cell and particle manipulation
9. HIFU field mapping and visible phantom hyperthermia with high power ultrasound

University of the West of Scotland, Sensors Group: (David Hutson)

10. Adaptive optics with miniature piezos.

Three workshops
will be presented

Tuesday Workshop Descriptions

Workshop session:

1. Jay Sheehan, Fundamentals of transduction (40mins)
 2. Victor Humphrey, University of Southampton, UK, Fundamentals of ultrasonic wave propagation (40 mins)
 3. Break
 4. Precision Acoustics, UK, Measurement of ultrasound (with hands-on measurements and demos) (60 mins)
- Peter Wells, A biopic of Lord Rayleigh (30 mins)

Jay Sheehan, Fundamentals of Transduction

The Fundamentals of Transduction Workshop reviews the basic techniques of power transducer design and analysis. Workshop concepts introduced are spring/mass system and equivalent circuit analysis, parallel and series resonance, and transducer materials. A converter design process is introduced for transducer electrical and mechanical design. Finite element analysis and techniques are presented for a typical half wave resonator. Transducer electrical and mechanical limitations are also discussed.

Precision Acoustics, UK, Measurement of Ultrasound

The Measurement of Ultrasound Workshop offers an interactive demonstration on measurements involving hydrophones and transducers. Hydrophone measurements include an introduction to hydrophone frequency, directional response, and field characterization. Measurements on planar and focused thickness mode transducers are offered as well as ultra short pulsed transducers for high resolution NDT. Differences in acoustic field measurements between pulsed and continuous wave applications are also presented.



2011 Symposium Chair
Margaret Lucas
University of Glasgow
Scotland, UK

2011 Symposium Committee

Industrial Session Co-Chairs

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Dukane Inc.
St. Charles, IL, USA

Tony Gaughan
CUE, University of Strathclyde
Glasgow, Scotland

Medical Session Co-Chairs

Dan Cotter
Integra LifeSciences
Burlington, MA, USA

Sandy Cochran
University of Dundee
Nethergate, Dundee

Poster Chair

Sunita Chauhan
Nanyang Technological University,
Singapore

Workshop Chair

Jay Sheehan
JFS Engineering
Wilmington, MA, USA

Wednesday 25 May 2011: Industrial Session

Tony Gachagan and Leo Klinstein, Co-Chairs

- 8.00 *Coffee*
- 8.30 Keynote speaker: Juan Gallego-Juárez
- 9:30 Advanced Bode plot technique for ultrasonic transducers, *D. DeAngelis, G. Schulze*
- 10.00 Optimisation of an ultrasonic drill horn for planetary subsurface sample retrieval, *P. Harkness, M. Lucas*
- 10.30 *Refreshments and Break*
- 11.00 Ultrasonic-assisted dissolution of biomass using ionic liquid for enzymatic hydrolysis, *M. Montalbo-Lomboy, D. Grewell*
- 11.30 Design and characterisation of a multi-frequency reference vessel for acoustical cavitation, *G. Memoli, L. Wang, M. Hodnett, P. Gelat, B. Zeqiri*
- 12.00 A novel commercial system to break foams using power ultrasound, *A. Cardoni*
- 12.30-13.00 *Lunch/Exhibition*
- 13.00 Design, characterisation and evaluation of a multi-frequency high power ultrasonic reactor, *A. Gachagan, T. Mutasa, A. Nordon*
- 13.30 Effect of high-power ultrasonication on extraction and activity of soybean isoflavones, *T. Pananun, M. Montalbo-Lomboy, A. Noomhorm, D. Grewell, B. Lamsal*
- 14.00 A strategy for delivering high torsionality in longitudinal-torsional ultrasonic devices, *H. Al-Budairi, P. Harkness, M. Lucas*
- 14.30 New advanced GUI and other innovations in the iQ family ultrasonic welders, *L. Klinstein*
- 15.00 Energy efficient depolymerisation of post consumer poly-lactic acid with ultrasonics induced implosions, *G. Srinivasan, D. Grewell*
- 15.30 Comparing acoustic emission and erosive measures of cavitation *I. Butterworth, M. Hodnett, P. Birkin*
- 16.00 *Coffee/Tea - Symposium Ends*

In Memoriam



John Perkins

Regretfully, John Perkins passed away on Sunday 28th November 2010, following a dignified battle against cancer. Many UIA members will have known John, through his work in high power ultrasonics, initially for Mullard in the UK in the 1950's, where he worked alongside Ernie Neppiras, through to his founding of Sonic Systems in 1982, developing it as a high-level manufacturer of OEM ultrasonic processing systems with a worldwide reach in a wide range of medical, pharmaceutical and industrial applications. John was also a member of the

International Advisory board of the journal Ultrasonics. He was a pioneer in his field; Sonic Systems being among the very first to successfully scale up laboratory cavitation processes to viable industrial reality. Following his retirement in 2009, the reins at Sonic Systems were passed to Mike Draper, as Managing Director, supported by Rob Perkins who continues as a Director, and Simon Denley as Technical Manager. The company continues to grow strongly.

I had the great pleasure of meeting John on many occasions, and worked with him in testing new transduction and measurement technolo-

gies, and his boundless experience, enthusiasm, friendliness and keenness to advance his technical field were inspirational.

He will be very sadly missed by all those that knew him, and in particular, those whom he worked with.

-Mark Hodnett

Lou Katz

In the 1970s founded Sonometrics which pioneered ophthalmic ultrasonic measurements of the eye and went on to form and run Sonomed in the 1980s, died after a long battle with Lymphoma on August 25, 2010. Lou followed on research at Columbia University's Electronic Research Laboratory, which was spun off as Riverside Research Institute where some of the first A-Scan ophthalmic equipment was developed.

With the permission of the Institute he formed Sonometrics to commercialize the technology. The company became a leader in ophthalmic diagnostic ultrasound and was eventually sold to Rorer Corporation. Lou went on to form Sonomed where he continued developed of ophthalmic equipment, including ultrasonic Pachymeters, and supported the development of the first ultrasonic device for the ultrasonic endoscopic resec-

tion of the prostate which was acquired by the Valleylab |Division of Pfizer. Sonomed is now a division of the Escalon Corporation. In Lawrence, NY Lou leaves a wife, three sons and a daughter.

Is your ultrasound applied effectively?

As a fluids processing technology, high power ultrasound has been applied to effect material changes for many years: the scientific literature tells us that the term 'sonochemistry' is perhaps first attributable to Woods and Loomis in 1927. The intervening years have seen a steady progression in the breadth of applications, and the convergence of materials processing and medical therapies, with groups of wildly varying ultimate objectives finding support and solutions within networks such as UIA.

An aspect close to my heart in all of this is measurement – how do we go about quantifying the manner in which ultrasound, and the resulting cavitation, instigates processes, and moreover, do so

in such a way that others can replicate and extend our work? Of course, measuring cavitation *per se* is perhaps of limited value, because different aspects of the cavitation process may be responsible for a particular application (shear stresses through bubble wall motion in liquids, free radical species initiating chemical reactions, mechanical stresses due to jetting, to name but three) – it is instead these process-specific secondary effects which provide opportunities for measurement.

So, how do you measure the driving force for your particular application, and how might others take that technique on for their work? I would love

to see a round table discussion at next year's Symposium of how measurements are done, and so I invite you to contact me with your thoughts and experiences.

An eminent British professor once remarked that attempting to establish a traceable baseline for cavitation measurement in any way would be like "trying to standardise fire". A challenging task it thus may be, but one which is essential to take on, in order that the processes which work so beautifully on the test bench may be scaled up to efficacious industrial reality, so generating the revenue for the next generation of applications.

Mark Hodnett



Mark Hodnett
UIA President

2010 - 2011 UIA Board of Directors

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Damien Walmsley, continued

ultrasound in wound healing and the potential thrombolytic effect on platelets contained in the blood system.

After finishing my PhD, I joined the University of Birmingham where my work in ultrasonics in dentistry increased. Whilst continuing my work on the use of the ultrasonic scaler, I also moved into the area of endosonics. This is where a thin metal file is introduced into the root canal of teeth with the aim of removing infected debris. This enables the interior of the tooth to be cleaned prior to the filling of the space with a suitable filling material. The use of both types of ultrasonic instruments is widespread in dentistry and the majority of patients will come into contact with an ultrasonic instrument of one sort or another when visiting the dentist.

My work has attracted industry interest especially in the standardisation of the tip oscillation. Over the last ten years I have built up interdisciplinary collaborations most notably with the Wolfson Engineering Unit at Cardiff University and the Chemistry Department at University of Bath. Furthermore funding from the EPSRC has allowed our group to purchase a scanning laser vibrometer, which has increased our ability to measure the output from commercially available ultrasonic instruments and look to new instrument designs. We are very interested in where cavitation occurs and whether it is possible to harness such energy to remove bacterial biofilm. Why is the biofilm such an important structure to disrupt and remove?

A biofilm is a tenacious adherent bacterial commune which if left will lead to disease such as inflammation of the gum around the tooth. This may be followed by bone resorption and subsequent tooth loss. Part of our work is to use cavitation and acoustic streaming to disrupt the biofilm and leave a cleaner root surface allowing tissue resolution to take place. The main outcome will be improved patient treatment with the aim of assisting in promoting oral health. Understanding how cavitation may be optimised in order to remove such bacterial biofilms will enhance the present range of dental instruments, leading to new opportunities for instrument design.

The future direction of ultrasonic instruments includes their use as a bone-cutting device and also as an alternative tool to clean metallic implants of which the latter is increasingly being used as a replacement for lost teeth. Interest in the use of ultrasound is also extended to powered electric toothbrushes where manufacturers attempt to mimic the action of ultrasonic instruments in the slower speed designs used for brushing teeth. When I started off researching into ultrasound, I was interested in the potential biological effects and this has been rekindled as we investigate the use of ultrasound in stimulating pulp cells inside the tooth with a view to repairing any damage caused by decay. So there are still a lot of good vibrations in dentistry, which I will be able to tell you about in my lecture to the forthcoming conference!!

Integra LifeSciences Holdings Corporation, a world leader in regenerative medicine, is a global medical device company dedicated to improving the quality of life for millions of patients every year. Our products are used primarily in orthopedics, neurosurgery and general surgery. We are a leader in applying the principles of biotechnology to medical devices, particularly for neurosurgery and extremity reconstruction, and are one of the largest surgical instrument companies in the United States. We currently have the following opening at our Burlington, Massachusetts facility, which is conveniently located near the great city of Boston.

The Senior Ultrasonics Engineer contributes to research and new product development of medical ultrasonic systems, advancing the standard of care and ensuring existing platforms support new clinical solutions via continued realization of enabling technologies. Responsibilities include senior technical contribution with knowledge of applied first principles of the physics of ultrasound, utilization of advanced design, analysis, and simulation tools, and multidiscipline practical engineering of ultrasonic surgical instruments. Work in laboratory with biologic tissue and observations in clinical settings and the operating room are necessary.

Please see full job description and requirements, and apply to **Job IRC3865** on company website: www.integralife.com

Juan Gallego-Juárez, continued

particularly high-power ultrasonics, transducers and applications. He is the author of over 200 publications and 40 patents and holds an honorary doctorate from the University of Santiago de Chile. He was a member of the Board of the International Com-

mission on Acoustics and Chairman of the 19th International Congress on Acoustics. He is a member of the Steering Committee of the World Congress on Ultrasound and of the Board of the Spanish Acoustical Society. He is a Fellow of the Acoustical Society of

America and of the British Institute of Acoustics. He is Associate Editor for Ultrasonics of the European Journal Acta Acustica/Acustica.

Tuesday evening at Ross Priory

Please join us Tuesday evening 24 May for wonderful cuisine, great conversation and spectacular vistas!

Ross Priory is the University of Strathclyde Glasgow's Recreational and Conference Centre, situated in 200 acres of parkland on the south east shoreline of Loch Lomond. The restaurant offers a selection of Scottish menus, buffet menus and set menus.



Ross Priory was originally one of several homes of the Buchanan family but had been owned more latterly by a Major Christie (1927 - 1969). It was from his estate that the University made its first attempt to purchase the property in 1969, but lost out to the family of Teachers whisky who had been close friends of Major Christie. However they eventually sold it to the University in 1971. A dwelling has been known to be on the site from as early as 1693 but the house as it is seen today was built in 1812. Designed by the architect James Gillespie (1776-1855), it features his Scottish Gothic style which gives the house its present look.

The house comprises a bar, bar lounge, dining room, reception room, two meeting rooms, twelve en suite bedrooms and a games room. There are extensive grounds and gardens which include a cottage, a picnic/barbecue area, a play park, and a nine hole golf course. There is even a Victorian Walled Garden complete with greenhouses and the estate also contains a 600 year old Yew Walk and a remarkable collection of rhododendrons and azaleas. Other features include putting, croquet, boating and fishing as well as ideal countryside for walking and rambling.



University of Glasgow, Scotland, UK

23 – 25 May 2011

2011 UIA SYMPOSIUM CALL FOR STUDENT POSTERS

The Ultrasonic Industry Association invites you to submit a 200 word abstract for consideration of poster on 23 – 25 May at its 40th Annual Symposium in **Glasgow, Scotland, UK**, at the University of Glasgow Wolfson Medical School. Plan now to join UIA for this international conference featuring the best of ultrasound from around the world. For more information, please go to <http://www.ultrasonics.org>

Please note the appropriate category and preferred format of your proposed poster:

- Industrial Applications:** NDE, Measurements, Cleaning, Atomization, Materials Processing, Effluent Processing, Joining and Fastening, Welding and Cutting, Sonochemistry, Underwater Applications, Remote Sensing, Transducer Design/ Materials.
- Medical:** Surgical, Therapeutic, HIFU/LIFU, Bioeffects, Tissue Characterization, Bio-Acoustic Microscopy, Transducer Design/Materials

Deadline: 15 April 2011

Important Information:

Biosketches and poster suitable for inclusion in electronic proceedings must be submitted to the UIA office no later than **15 April 2011**. **Accepted student presenters receive a discounted registration fee of only \$75 for the Tuesday workshops and poster session.** A cash prize will be presented to the top poster.

Please type or print your information below

Presentation Title _____
 Authors _____
 Presenters _____
 Main Contact Name _____
 Address _____
 City _____ State/Prov _____ Country _____
 Phone _____ Email _____

Symposium Chairs:

Symposium: Prof. Margaret Lucas ▶ Margaret.Lucas@glasgow.ac.uk
 Industrial: Dr Tony Gachagan ▶ a.gachagan@eee.strath.ac.uk; Leo Klinstein ▶ lklinstein@dukcorp.com
 Medical: Dr. Sandy Cochran ▶ S.Cochran@dundee.ac.uk; Daniel Cotter ▶ daniel.cotter@integra-ls.com
 Workshop: Jay Sheehan ▶ james_sheehan@comcast.net
 Poster: Sunita Chauhan ▶ MCSunita@ntu.edu.sg

Please submit this form to uia@ultrasonics.org

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Ultrasonic Industry Association

23 - 25 May 2011

Glasgow, Scotland, UK

Exhibit and Sponsor Information

University of Glasgow

UIA offers companies access to key influencers in the international ultrasonic community at their annual symposium. This year, we offer both exhibit and sponsorship opportunities:

Sponsorship Levels

Level One - Refreshment sponsorship - \$1,500
includes recognition in symposium literature, logo on refreshment table, and one symposium registration;

Level Two - Breakfast sponsorship - \$1,995
includes recognition in symposium literature, logo on buffet table, and one symposium registration;

Level Three - Lunch sponsorship - \$2,750
includes recognition in symposium literature, signage at lunch, and one symposium registration;

Exhibit Opportunities

Level One Exhibitor – UIA Corporate or Sustaining Member \$1,450 - includes recognition in symposium literature, 6' x 3' table and one full symposium registration;

Level One Exhibitor – Non Member \$1,795 - includes recognition in symposium literature, 6' x 3' table and one full symposium registration;

Level Two Exhibitor – UIA Corporate or Sustaining Member \$1,845 - includes recognition in symposium literature, 6' x 3' table and two full symposium registrations.

Level Two Exhibitor – Non Member \$2,545 - includes recognition in symposium literature, 6' x 3' table and two full symposium registrations.

Please use the form attached or contact [UIA](#) for more information



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40TH Annual UIA Symposium 23 – 25 May 2011

**University of Glasgow
Glasgow, Scotland, UK**

Please complete the contact information below. This person will receive all exhibitor correspondence.

Company Name: _____
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Second Registrant: _____

EXHIBIT SCHEDULE

Monday, 23 May 2011

8:00 am Exhibit Set-up
9:00 am – 5:00 pm Exhibits Open

Tuesday, 24 May

8:00 am – 2:00 pm Exhibits Open
Exhibits close

Wednesday, 24 May

8:00 am – 3:30 pm
3:30 pm

PAYMENT INFORMATION

Sponsor *please indicate the sponsorship level* PLEASE SPECIFY THE EVENT YOU WISH TO SPONSOR

Exhibit I – includes one registration <input type="checkbox"/> Member - \$1,450 <input type="checkbox"/> Non-Member - \$1,795	\$ _____
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TOTAL	\$ _____

* *Table Top Exhibit includes 6' table and company identification sign* PLUS REGISTRATION(S)

* *Additional fees will apply for electric, internet connections and telephone lines*

METHOD OF PAYMENT: Check Enclosed (Make checks payable to UIA)
 Purchase Order number or attach copy _____
 Please charge my credit card: MasterCard VISA

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 Exp

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We agree to comply with all the Rules and Regulations as provided and to the conditions under which displays in University of Glasgow may be held. We understand that space is available on a first-come, paid-in-full basis.

Authorized Signature

Date

Return completed contract to: UIA + PO Box 2307 + Dayton, OH + 45401-2307
 Phone: 937.586.3725 + Fax: 937.586.3699



40th Annual UIA Symposium Registration
23 - 25 May 2011
University of Glasgow, Scotland, UK

First Name

Last Name, Designation

Nickname for badge

Position/Title

Employer

Employer City/State

For mailing purposes, I prefer my
 Home address as follows:
 Work address as follows:

Address

City, State, Zip, Country

Phone

E-mail

Please register me in the following manner:

Full Registration includes, Tuesday evening event - please check boxes to confirm your participation

- Full conference registration
 YES, I will attend Tuesday Evening

Select for which category you are registering:

- Member Nonmember Exhibitor
 Speaker Student Sponsor

Daily Registration

Tuesday does NOT include Tuesday Evening Event

Select which day: Select your category:

- Monday Member
 Tuesday Nonmember
 Wednesday Speaker
 Student

Special Events

- Lab Tour Tuesday 14:00 - 17:00 (no charge)
 Tuesday Evening Event # of Tickets _____

Payment Summary FIN for voucher use only: 13-6130371

Fee Schedule

Full conference (Monday - Wednesday)

Full conference - Member	\$875
Full conference - Nonmember	\$995
Speaker - Full conference	\$750
Student - Full conference	\$495

Daily fees (Monday, Tuesday or Wednesday)

Daily Rate - Member	\$295
Daily Rate - Nonmember	\$400
Speaker - Daily	\$295
Student - Daily	\$195
Student - Poster Presenter	\$75

Exhibit Levels - Members

I - 1 table, 1 full registration	\$1,395
II - 1 table, 2 full registrations	\$2,095

Exhibit Levels - Non members

I - 1 table, 1 full registration	\$1,775
II - 1 table, 2 full registrations	\$2,475

Sponsorship Levels

I - Refreshment Sponsor	\$1,500
II - Breakfast Sponsor	\$1,995
III - Lunch Sponsor	\$2,750

Special Events

Tuesday Evening Event	\$225
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NOTE: Tuesday evening is included in the FULL conference registration fee. Additional tickets may be purchased for companions.

Conference Registration \$ _____
 Tuesday Evening Event \$ _____
TOTAL DUE \$ _____

Method of Payment

- Payment enclosed. Make check payable to UIA.
 Charge Credit Card: MasterCard Visa
 UIA accepts only these two credit cards!

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You may register on-line at www.ultrasonics.org

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Glasgow Welcomes

Glasgow is brimming with confidence and style and is the host city for the 2014 Commonwealth Games.



University of Glasgow,
site of UIA Symposium

Glasgow is one of Europe's most vibrant and cosmopolitan cities, home to the art nouveau architectural treasures of Charles Rennie Mackintosh, and on the doorstep of Scotland's glorious countryside.

The former ship-building powerhouse has undergone an economic and cultural renaissance and in 2004 it was re-branded as **Glasgow: Scotland with style**. The editor of US travel magazine Frommer's voted Glasgow one of

the top ten, 'must-see' destinations for 2006.

Glasgow is a shopper's paradise and was voted Britain's top retail destination in 2007. The main shopping thoroughfare, Buchanan Street, has been voted one of the world's top retail destinations.

Scotland is the home of golf, and some of the world's finest Open championship courses such as Royal Troon and Turnberry are just an hour away

from the city. Sample a dram in some of Scotland's celebrated whisky distilleries, or visit some of our hauntingly beautiful castles – all within easy access of Glasgow.

Glasgow International Airport, serving more than 100 destinations, is 8 miles from the city centre. There are 17,000 rooms to suit all budgets and the Scottish Exhibition and Conference Centre is the UK's largest integrated meeting venue and is located near the city centre.

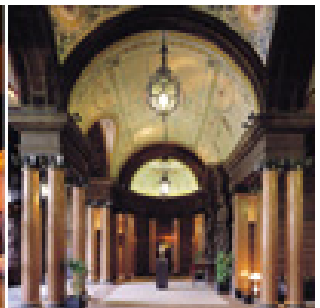
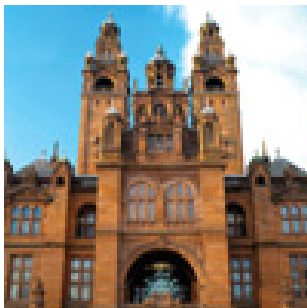
BOOK NOW - Hotel Reservations Must be Made by April 21st

www.gla.ac.uk/services/cvso/accomodation/hotelbookingservice/

Reserve your hotel room now by going to the above link. Once there, hotels will be listed under their star rating. The Grosvenor Hilton will be the UIA Headquarters Hotel. However, you may book any of the hotels on the list.

Fill in the form by clicking on the "make an enquiry" button at the foot of the hotel stars list. In the reference code box, you need to write "UIA Symposium". The university events staff will then e-mail a request to you for card details and to make the booking.

Please remember that all reservations must be made by April 21, 2011. If you have questions contact the UIA office by calling 1.937.586.3725 or email uia@ultrasonics.org.



L-R: Art Gallery & Museum Kelvingrove, Glasgow School of Art, Eating out in Glasgow, Glasgow City Chambers interior