

Instrument and Measurement Science

FEBRUARY 2012

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<http://units.aps.org/units/gims>

The Topical Group on Instrument and Measurement Science (IMSTG/GIMS) of the American Physical Society was formed in 1984 to encourage precision in measurements, to encourage development of instrument and measurement science, to provide a forum for discussions of these topics, and to provide professional recognition of the importance of instrument and measurement science.

The articles in this issue represent the views of the GIMS publication committee and are not necessarily those of individual GIMS members or the APS.

I. APS Keithley Award for 2012

Andreas Mandelis from the University of Toronto is the recipient of the 2012 Joseph F. Keithley Award for seminal contributions to the development of new experimental techniques based on photothermal science and the application of these techniques to a variety of real-world problems. Andreas, a native of Greece, graduated in 1974 from Yale University, and obtained his PhD from Princeton in Applied Physics and Materials Science in 1979. He worked for two years in industry before he joined the University of Toronto in 1982. Culminating his work on the foundations of the field of diffusion waves in matter, his scientific and technical research interests are focused on fundamental physical processes as they impact instrumentation science and signal generation in the fields of thermophysics, non-radiative and radiative phenomena in electronic, optical and biomedical materials, thermal-wave and diffusion-wave phenomena in electronic and photonic media. More recent interests include building the foundations of biotermophotonic and biophotoacoustic transport phenomena in hard (dental and bone) and soft tissues. Dr. Mandelis is the 2007 (inaugural) recipient of the Discovery Award in Science and Engineering, one of the Ontario Premier's Innovation Awards. In 2008 he was awarded a Canada Research Chair (Tier 1) in Diffusion-Wave Sciences and Technologies and he became the recipient of the ASME 2009 Yeram Touloukian Award (and Medal) in Thermophysics. In 2009 he was awarded the Senior Prize of the International Photoacoustic and Photothermal Association and the Canadian Association of Physicists (CAP) Medal for Outstanding Achievement in

Industrial and Applied Physics. In 2010 he was awarded a Killam Research Fellowship from the Canada Council for the Arts.



Dr. Andreas Mandelis

Dr. Mandelis will receive the award at the March meeting in Boston (session E1: 5:45 on Monday February 27). At the March meeting in Boston, GIMS is

organizing an invited symposium to honor Dr. Mandelis on Wednesday February 29 (session T46: Room 160AB: 2:30-5:30). More information is provided below.

II. APS/GIMS Fellows for 2012

Every year APS elects several of its distinguished members to Fellowship. Each nomination is evaluated by the Fellowship committee of the appropriate APS division, topical group, or forum. This year GIMS elected the following two scientists to Fellowship:

Chris Jacobsen

Northwestern University
Citation: *For seminal contributions to x-ray microscopy.*

Jonathon H. Mamin

IBM Almaden Research
Citation: *For development of advanced force detection techniques, including their application to magnetic force microscopy, single electron spin detection and nanoscale magnetic resonance imaging.*

— continues on page 2

Note that John Mamin was also a co-recipient of the 2011 Gunther Laukien Prize for his contributions to development of Magnetic Resonance Force Microscopy Technique.

GIMS is asking its members to make nominations to APS Fellowship for 2013. Nominations are due on May 1st. Details on the nomination process can be found at: <http://www.aps.org/programs/honors/fellowships/index.cfm>.

III. GIMS Selection Committees

APS KEITHLEY AWARD

For awarding at the 2012 March Meeting: Joseph A. Stroschio (chair), Philip First, Terrence Jack, Vladimir Shvarts, and Ian Walmsley (2011 Keithley awardee).

For awarding at the 2013 March Meeting: Eric Hudson (Pennsylvania State University)

APS/GIMS FELLOWSHIP

For awarding at the 2012 March Meeting: Albert Migliori (chair)

IV. GIMS Sessions at March 2012 Meeting in Boston, MA

LUNCH WITH THE EXPERTS:

GIMS is co-sponsoring with the National High Magnetic Field Laboratory a table at the Lunch with the Experts event on Tuesday February 28, 1:00-2:30, Ballroom east: Graduate students may sign up to enjoy a complimentary box-lunch while participating in an informal discussion with an expert on

a topic of interest to them. The GIMS table will be manned by Dr. Albert Migliori (LANL). He will lead discussions on "Experiments on Topological Insulators, Graphene, Pnictides and Cuprates in Extreme Magnetic Fields". The table is co-sponsored by the National High Magnetic Field Laboratory in Tallahassee.

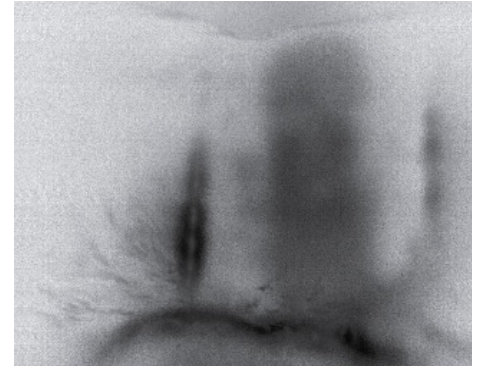
INVITED SYMPOSIA:

GIMS is organizing two symposia at the March Meeting in Boston. The Keithley award symposium on Wednesday afternoon (2:30 PM) brings together five experts on Photoacoustic and Photothermal Measurements Science. For more details on the 2012 Keithley award see the article on Andreas Mandelis elsewhere in this newsletter and the lists with invited speakers provided below. The second symposium is on instrumentation and measurement science for Energy Research and takes place on Thursday morning (11:15AM). By bringing together expertise on innovative instrumentation development GIMS hopes to spark interest within the measurement science community for the development of new instruments suitable to solve some of the materials science issues that currently limit the wide scale economic application of various PV and battery technologies. Invited speakers include the inventor of deep level transient spectroscopy and several other international recognized experts in the field. Details on the sessions and invited speakers of both symposia are provided below.

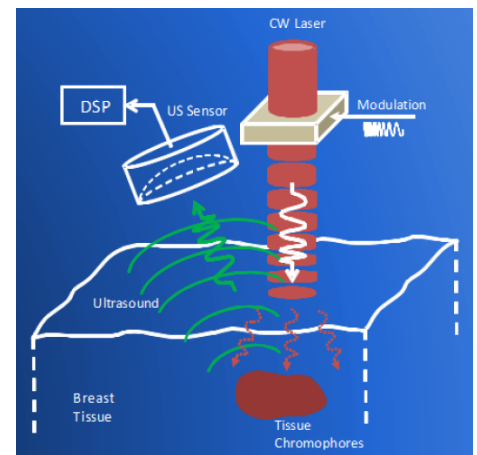
Session T46 Keithley Award Session: Photoacoustic and Photothermal Measurement Science: Wednesday February 29, 2:30 AM, Room 160AB
Sponsor: GIMS, Chair: Terrence Jach, NIST

2:30-3:06 PM:

T46.01: Joseph F. Keithley Award For Advances in Measurement Science Lecture: Thermophotonic and Photoacoustic Radar Imaging Methods for Biomedical and Dental Imaging, Keithley Award Winner: Andreas Mandelis.



IR Thermophotonic lock-in imaging in dentistry



Photoacoustic imaging with chirped signals

3:06-3:42 PM:

T46.02: Photoacoustics and Photothermal instrumentation in the study of thermal properties of liquids and semisolids, Invited Speaker: Juan Jose Alvarado-Gil

3:42-4:18 PM:

T46.03: Photoacoustic and Photothermal Effects in Periodic Structures and Acoustic Resonators, Invited Speaker: Gerald Diebold.

4:18-4:54 PM:

T46.04: Linear and Nonlinear Laser-Based Guided Acoustic Waves Propagating at Surfaces (2D) and Edges (1D), Invited Speaker: Peter Hess.

4:54-5:30 PM:

T46.05: Understanding climate: the role of photoacoustic spectroscopy at NIST, Invited Speaker: Keith Gillis

Session W2 Invited Session: Instrumentation and Measurement Science for Energy Research: PV and Batteries:

Thursday March 1, 11:15 AM, Room 204AB
Sponsor: GIMS, GERA, Chairs: Daniel Johnstone (Semetrol), Wilhelmus J. Geerts (Texas State University San Marcos).

11:15-11:51 AM:

W2.01: Using Deep Level Transient Spectroscopy (DLTS) to characterize defects in semiconductor devices, Invited Speaker: David Lang

11:51-12:27 PM:

W2.02: Role of Defects and Their Analysis in Photovoltaics, Invited Speaker: Robert Opila

12:27-1:03 PM:

W2.03: The Integration of Scanning Electron Microscopy, Scanning Probe Microscopy, and Luminescence Spectroscopy in one Platform: New Opportunities and Applications in Photovoltaics, Invited Speaker: Manuel Romero

1:03-1:39 PM:

W2.04: Li ion nanowire batteries and their in situ characterization in the TEM, Invited Speaker: Dmitry Ruzmetov

1:39-2:15 PM:

W2.05: In-Situ TEM Electrochemistry of Individual Nanowire and Nanoparticle Electrodes in a Li-Ion Cell, Invited Speaker: Jianyu Huang

Focus and Contributed Sessions (102 talks):

GIMS is organizing 9 focus sessions, one contributed session, and a poster session. Note that all focus sessions will be in room 203 except for the X-ray sessions which will take place in room 106.

Session A1: Novel instrumentation and measurements for Biomedical Research:

Monday February 27, 8:00 AM Room 203
Sponsor: GIMS; Chair: Larry Nagahara, National Cancer Institute; Invited speaker: Rong Fang; 13 talks.

Session D1: High Magnetic Fields, THz Spectroscopy, MRI:

Monday February 27, 2:30 PM, Room 203
Sponsor: GIMS, GMAG; Chair: Charles Mielke, NMFML Los Alamos National Laboratory; Invited speaker: Marcelo Jaime; 13 talks.

Session H1: Focus Session: Advances in Scanned Probe Microscopy I: Novel Approaches to Complex Systems:

Tuesday February 28, 8:00 AM, Room 203
Sponsor: GIMS; Chair: Andreas Heinrich, IBM Almaden; Invited speaker: Julie A. Bert; 13 talks.

Session J1: Focus Session: Advances in Scanned Probe Microscopy II: High Frequencies & Optical Techniques:

Tuesday February 28, 11:15 AM, Room 203
Sponsor: GIMS; Chair: David Goldhaber-Gordon, Stanford University; Invited speaker: John Nichol; 13 talks.

Session L1: Focus Session: Imaging and Modifying Materials at the Limits of Space and Time Resolution:

Tuesday February 28, 2:30 PM, Room 203
Sponsors: GIMS, DMP; Chair: Bernd Kabius, Pacific Northwest National Laboratory; Invited speakers: Nigel Browning, Andreas Menzel; 11 talks.

Session Q33: Focus Session: X-ray and Neutron Instruments and Measurement Science:

Wednesday February 29, 11:15 AM, Room 106.
Sponsor: GIMS; Chair: Albert Macrander, Argonne National Laboratory; Invited Speakers: G. Brian Stephenson, Jeffrey Lynn, 11 talks.

Session V1: Focus Session: Advances in Scanned Probe Microscopy III: SPM of Single Atoms & Molecules:

Thursday March 1, 8:00 AM, Room 203
Sponsor: GIMS; Chair: Frances NiSTEMSKI, Stanford University; Invited speaker: Jascha Repp, 13 talks.

Session X1: Focus Session: Advances in Scanned Probe Microscopy IV: New Instrumentation & Techniques:

Thursday March 1, 2:30 AM, Room 203
Sponsor: GIMS; Chair: Alex de Lozanne, University of Texas at Austin; Invited speaker: 16 talks.

Session X33: Focus Session: X-ray, Gamma Ray, and Electron Diffraction:

Thursday March 1, 2:30 PM, Room 106.
Sponsor: GIMS; Chair: Zahir Islam, Argonne National Laboratory; 14 talks.

Session Y1: Measurement Science from Optics through Thermodynamics:

Friday March 2, 8:00 AM, Room 203.
Sponsor: GIMS; Chair: Albert Migliori, Los Alamos National Laboratory, 15 talks.

EMERGENT PHYSICS AT THE MESOSCALE

A special session on Mesoscale physics is organized on Wednesday afternoon (Ballroom east, 2:30 PM). The Kavli foundation session features 5 distinguished speakers including Nobel Laureates, Robert Laughlin (1998, Fractional Quantum Hall effect) and William Philips (1997, development of methods to cool and trap atoms with laser light). The Kavli foundation special session is followed by a Town Hall on Mesoscopic Materials and Chemistry (5:45 PM room 253C) organized by The Basic Energy Sciences Advisory Committee (BESAC). A good introduction to the session is the 1999 paper of Robert Laughlin, "The middle way", which can be accessed on line at: <ftp://large.stanford.edu/publications/1999/p01aug99/p01aug99.pdf>.

More information about the study of the basic energy sciences and advisory committee on mesoscale materials and chemistry can be found at: <http://meso2012.com/>.

V. GIMS Business Meeting

Tuesday, February 28, 5:45-6:45 Session M1
GIMS Business Meeting, Sponsor: GIMS Room: 203.

VI. Student Travel Awards

Reimbursement of travel expenses to the March meeting are available for student presenters at any GIMS sponsored session. The GIMS secretary-treasurer, Rachael Floyd, RFloyd@janis.com, should be contacted before the meeting to give advance notice, and all travel receipts should be saved for subsequent submission to the APS for reimbursement.

2011 Student Travel Award

The 2011 GIMS Student Travel Award was granted to Wonhee Ko from Stanford University for his presentation entitled "Topological properties of artificial graphene assembled by atom manipulation".

VII. Next GIMS Election

An election for Vice-chair, and a Member at large is being planned.

VIII. Treasurer's Report

As of 11/30/11

Revenue	
Dues-APS	\$2720.00
March meeting share	\$4098.00
Allocated Investment Income	\$2145.61
Total Revenue	\$8963.61

Expenses	
Reception at business meeting	\$1764.84
Overnight mail	\$48.76
Travel and Grants (GIMS officers & invited speakers)	\$3255.34
Total Expenses	\$5068.94

Revenue-Expenses **\$3894.67**

IX. Results of GIMS Election Held March 2011

For Vice-Chair: Albert Migliori (Los Alamos National Laboratory)

For Secretary-Treasurer: Rachael Floyd (Janis Research Company, LLC)

For Member-at-large:
Barry Zink (University of Denver)
Daniel Johnstone (Semetrol, LLC)
Janos Kirz (LBNL)
Terrence Jach (NIST)

X. Current GIMS Governance

Past Chair: Joseph Stroschio (3/11 -3/12), *NIST*

Chair: Eric Hudson (3/11-3/12),
Pennsylvania State University

Chair-Elect: Wilhelmus Geerts (3/11-3/12),
Texas State University San Marcos

Vice-Chair: Albert Migliori (3/11-3/12),
Los Alamos National Laboratory

Secretary-Treasurer: Rachael Floyd (3/11-3/14),
Janis Research Company

Member-at-Large: Barry Zink (03/11-02/14),
University of Denver

Member-at-Large: Janos Kirz (3/11-02/14),
Lawrence Berkeley Nat. Lab

Member-at-Large: Terrence Jach (03/11-02/14), *NIST*

Member-at-Large: Dan Johnstone (03/11-02/14), *Semetrol, LLC*

Member-at-Large: Susan Mini (3/09-3/12),
Northern Illinois Univ.

GIMS
NEWSLETTER

AMERICAN PHYSICAL SOCIETY

Topical Group on Instrument and Measurement Science

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