

ADVANCE PROGRAM AND REGISTRATION ON-LINE: [WWW.IMAPS.ORG/THERMAL](http://WWW.IMAPS.ORG/THERMAL)

IMAPS Advanced Technology Workshop  
and Tabletop Exhibition on  
**Thermal Management**

Dinah's Garden Hotel  
Palo Alto, California - USA  
**SEPTEMBER 28 - 30, 2010**

**General Chair:**

**David Saums, DS&A LLC**  
P: 978-499-4990  
[dsaums@dsa-thermal.com](mailto:dsaums@dsa-thermal.com)

**Technical Program Chair:**

**Vadim Gektin, Oracle**  
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**Program Committee:**

David Copeland, Oracle  
Marlin Vogel, Electronic Cooling Solutions  
George A. Meyer IV, Celsia Technologies  
John Peeples, The Citadel  
Guy R. Wagner, Electronic Cooling Solutions  
Ross Wilcoxon, Rockwell Collins, Inc.

**Corporate Sponsor:**



Organized by:

International Microelectronics And Packaging Society (**IMAPS**)  
Bringing together the entire microelectronics supply chain!™

**Early Registration Deadline & Hotel Cut-off: September 13, 2010**

## Tuesday, September 28

Registration: 7:30 am - 8:00 pm

Continental Breakfast: 7:30 am - 8:30 am

Opening Remarks: 8:25 am - 8:30 am

**Exhibit Opens: During Breaks & Lunch**

### SESSION 1: MARKET DRIVERS

Chair: Dave Saums, DS&A LLC

8:30 am - 10:00 am

Market Trends and Developments for Coolants for Electronic Systems

David L. Saums, DS&A LLC

Extending the Life of Air Cooling Through Architecture

Roger Dickinson, Bergquist Torrington Company

Passive 2-Phase Immersion Cooling of Commercial and Developmental IGBT Modules

Phillip Tuma, 3M Company; Gilbert Moreno, Sreekant Narumanchi, National Renewable Energy Lab; Scott Brandenburg, Delphi; Mitchell Olszewski, Timothy Burress, Oak Ridge National Laboratory

Break: 10:00 am - 10:30 am

### SESSION 2: THERMAL PACKAGING MATERIALS

Chair: George A. Meyer IV, Celsia Technologies

10:30 am - 12:00 pm

High Heat Flux, Low CTE Vapor Chamber Development  
Evan Fleming, Pete Dussinger, Advanced Cooling Technologies, Inc.

Trends and Developments for IGBT Module Packaging and Thermal Materials

David L. Saums, DS&A LLC

Thermal Management for LED Lighting

Richard Hill, Laird Technologies

Lunch: 12:00 pm - 1:30 pm

**(Lunch served 12:00 pm - 1:00 pm)**

Nano-Bond Assembly: A Rapid Room Temperature and Fluxless Soldering Process

Jacques Matteau, Indium Corporation of America

→ Student Papers

## Student Competition Funding

provided by



### SESSION 3: THERMAL ANALYSIS AND MODELING

Chair: Guy R. Wagner, Electronic Cooling Solutions

2:00 pm - 5:00 pm

→ Adaptive Power Blurring Techniques to Calculate IC Temperature Profile under Large Temperature Variations  
Amirkoushyar Ziabari, Zhixi Bian, Ali Shakouri, University of California - Santa Cruz

Simultaneous Thermal Imaging of Peltier and Joule Effects  
Bjorn Vermeersch, Ali Shakouri, University of California - Santa Cruz

Break: 3:00 pm - 3:30 pm

Thermal Analysis and Testing of a Radio Frequency Pin Diode Switch for Avionics Applications

Robert Meikle, Rockwell Collins, Inc.

Design Optimization Framework for Integrated Cooling Systems

Brian St. Rock, Scott Kaslusky, United Technologies Research Center

Simulation of a Concentrating Solar Electric Generator

Guy Wagner, Electronic Cooling Solutions

Dinner: 5:00 pm - 6:30 pm

### SESSION 3: THERMAL ANALYSIS AND MODELING

*(continues)*

Chair: Guy R. Wagner, Electronic Cooling Solutions

6:30 pm - 8:00 pm

Thermal Management of a Novel iUHD-Technology Based MCM

William Roy, Peter Kwok, Livia Racz, Chung-Jen Chen, Draper Laboratory

Thermal Load Boards Improve Product Development Process

Bernie Siegal, Thermal Engineering Associates, Inc.

Thermoelectric Waste Heat Recovery in Notebook Computers - Optimization and Limitation

Kazuaki Yazawa, Ali Shakouri, University of California - Santa Cruz

## A SPECIAL THANK YOU

TO ALL THE MEMBERS OF THE PROGRAM COMMITTEE,  
THE CHAIRS, SPEAKERS,  
STUDENT COMPETITION PROVIDERS AND EXHIBITORS.

**YOUR PARTICIPATION IS GREATLY APPRECIATED!**

## Wednesday, September 29

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Registration: 7:30 am - 8:30 pm

Continental Breakfast: 7:30 am - 8:30 am

**Exhibit Opens: During Breaks & Lunch**

### **SESSION 4: THERMAL INTERFACE MATERIALS AND TESTING**

Chair: Dave Saums, DS&A LLC  
8:30 am - 12:00 pm

→ The Use of Infrared Imaging Microscope in the Measurement of Total Thermal Resistance of Vertically Aligned Carbon Nanotube Arrays  
Andrew J. McNamara, Vivek Sahu, Yogendra Joshi, Zhuomin M. Zhang, Georgia Institute of Technology

Thermal Stress Management for Large IC Packages  
M. Shane Thompson, LORD Corporation

Comparative Test Data for TIM Materials for Silicon and Silicon Carbide IGBT Modules  
Victor Papanu, John Ziemski, AOS Thermal Compounds LLC

Break: 10:00 am - 10:30 am

Development of a New Type Thermal Interface Material (TIM1) for High Power Microprocessors  
My Nguyen, Jason Brandi, Henkel Corporation

Thermal Transient Based TIM Material Characterization  
Andras Vass-Varnai, Zoltan Sarkany, Gabor Farkas, Andras Poppe, Marta Rencz, Mentor Graphics

Reliability and Failure Mechanisms of Thermal Interface Materials in Electronic Assemblies  
Ryan Verhulst, Radesh Jewram, Bergquist Company

Lunch: 12:00 pm - 1:30 pm  
**(Lunch served 12:00 pm - 1:00 pm)**

### **SESSION 5: LIQUID, PHASE-CHANGE, AND REFRIGERATION COOLING**

Chair: John Peeples, The Citadel  
1:30 pm - 5:30 pm

The Water Cooled Power7 IH Supercomputing Node/ System - Part I  
Michael J. Ellsworth, Jr., IBM Corporation

The Water Cooled Power7 IH Supercomputing Node/ System - Part II  
Michael J. Ellsworth, Jr., IBM Corporation

CPU Spray Cooling Analysis  
Charles Ortloff, CFD Consultants International; Marlin Vogel, Electronic Cooling Solutions

Break: 3:00 pm - 3:30 pm

Loop Vapor Chambers for Consumer Applications  
George A. Meyer IV, Celsia Technologies

→ Superlattice Coolers for Dynamic Thermal Management of Microprocessor Hotspots  
Vivek Sahu, Yogendra Joshi, Andrei Fedorov, Georgia Institute of Technology

Thermoelectric Cooling Modules Constructed using Thermally Conductive PCBs  
Jeff Hershberger, Robert Smythe, Richard Hill, Laird Technologies

Performance of Passive 2-Phase Immersion Cooling of Server Hardware  
Phillip Tuma, 3M Company; Benson Chan, How Lin, Endicott Interconnect; Stephen Polzer, Nathan Harff, Erik Daniel, Barry Gilbert, Mayo Clinic

Dinner: 5:30 pm - 7:00 pm

### **SESSION 6: MILITARY AND AEROSPACE APPLICATIONS**

Chair: Ross Wilcoxon, Rockwell Collins, Inc.  
7:00 pm - 8:30 pm

An Integrated Centrifugal Blower Design for High Performance Air-Cooled Heat Sinks  
Scott Kaslusky, Brian St. Rock, United Technologies Research Center

Thermoelectric Energy Harvesting - A Comparison of Flight Test Data to Test Bench and CFD Simulations  
John Langley, Steve Morris, Marshall Taylor, Ambient Micro; Guy Wagner, Electronic Cooling Solutions

High Efficiency Compact Air to Air Heat Exchanger with Integrated Fan  
Nicholas Herrick-Kaiser, AMETEK Rotron

## Thursday, September 30

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Registration: 7:30 am - 12:00 pm

Continental Breakfast: 7:30 am - 8:30 am

### **SESSION 7: SYSTEM COOLING**

Chair: Marlin Vogel, Electronic Cooling Solutions  
8:30 am - 10:30 am

Micro Deformation Technology - A New Manufacturing Process to Create High Surface Area Cold Plates and Base Plates for Liquid Cooling of Power Electronics  
Matt Reeves, Peter J. Beucher, Wolverine Tube, Inc. - MicroCool Division

Liquid Cooling with MicroChannel Enhanced Base Plates are Making In-Roads into the High-End Server Market  
Peter Beucher, Jesus Moreno, Sy-Jenq Loong, Wolverine Tube, Inc. - MicroCool Division

Using Flow Optimizers to Save Cooling Fan Power  
Howard Harrison, Distributed Thermal Systems

Break: 10:00 am - 10:30 am

## SESSION 8: DATA CENTER COOLING

Chair: David Copeland, Oracle

10:30 am - 12:00 pm

Room-Level Energy and Thermal Management in Data Centers  
Magnus Herrlin, ANCIS

Real-Time Data Center Transient Analysis  
Xuanhang (Simon) Zhang, James W. VanGilder, APC by Schneider Electric

Experimental Study of Rack Level Cooling in a Data Center  
Susheela Narasimhan, Cisco Systems Inc.

Closing Remarks: 12:00 pm

### Thermal ATW Speaker Information

Extended Abstract or Presentation Material due: **August 27, 2010**. Send your extended abstract or presentation material via email to [jmorris@imaps.org](mailto:jmorris@imaps.org), in PDF format only (PDF can be in color).

Powerpoint/Presentation file used during session: **Speaker's responsibility to bring to session on USB and/or CD** (recommended to have back-up on personal laptop, CD-ROM, or memory stick). Laptop will be provided by IMAPS in the session room.

**Speakers must register for the workshop at the reduced speaker rate.** Advance registration deadline is September 13, 2010. Visit [www.imaps.org/thermal](http://www.imaps.org/thermal) for more information.

## 2010 Thermal Exhibitors

### Exhibition Information – A new perk!

The exhibit tables will be located around the session rooms.  
Therefore, not only will the booths be more noticeable, but booth personnel can hear the presentations.  
All installation and dismantling must be done when sessions are not going.

### Exhibit Hours - During Breaks and Lunch

Tuesday, September 28

Wednesday, September 29

CPS Technologies Corporation

Epoxy Technology

The Bergquist Company

Utz Technologies

Wolverine Tube, Inc.

**Limited space still available, email or call today!**

Ann Bell - [abell@imaps.org](mailto:abell@imaps.org) or 202-548-8717

OR see details online at:

<http://www.imaps.org/thermal/exhibits10.htm>

**IMAPS Corporate Members: \$575 on or before September 13<sup>th</sup>; \$675 after September 13<sup>th</sup>.**

**Non-Members: \$675 on or before September 13<sup>th</sup>; \$775 after September 13<sup>th</sup>.**

## Mark Your Calendar. You Don't Want to Miss These Upcoming IMAPS Events!!!

### Topical Workshop on Nano-Integrated Microsystems Packaging: Design, Materials, Processes and Applications

Marriott Raleigh City Center  
Raleigh, North Carolina - USA

**November 4 - 5, 2010**

[www.imaps.org/nano](http://www.imaps.org/nano)

Co-located with and immediately following IMAPS 2010

### Global Business Council (GBC) Spring Conference

Radisson Fort McDowell Resort and Casino  
Scottsdale/Fountain Hills, Arizona - USA

**March 6 - 7, 2011**

[www.imaps.org/gbc](http://www.imaps.org/gbc)

Co-located with Device Packaging Conference and Exhibition

### International Conference and Exhibition on Device Packaging (DPC 2011)

Radisson Fort McDowell Resort and Casino  
Scottsdale/Fountain Hills, Arizona - USA

**March 7 - 10, 2011**

[www.imaps.org/devicepackaging](http://www.imaps.org/devicepackaging)

### Advanced Technology Workshop on Electronics Packaging of Solar Cells and Fuel Cells

Hilton Garden Inn Cleveland Airport  
Cleveland, Ohio - USA

**March 29 - 30, 2011**

[www.imaps.org/energy](http://www.imaps.org/energy)

### IMAPS/ACerS 7<sup>th</sup> International Conference and Exhibition on Ceramic Interconnect and Ceramic Microsystems Technologies (CICMT 2011)

The Westgate Hotel  
San Diego, California - USA

**April 5 - 7, 2011**

[www.cicmt.org](http://www.cicmt.org)

### IMAPS International Conference on High Temperature Electronics Network (HiTEN 2011)

St. Catherine's College Oxford  
Oxford, United Kingdom

**July 18 - 20, 2011**

[www.imaps.org/hiten](http://www.imaps.org/hiten)

### Advanced Technology Workshop on RF and Microwave Packaging

The Crowne Plaza San Diego  
San Diego, California - USA

**September 20 - 22, 2011**

[www.imaps.org/rf](http://www.imaps.org/rf)

### 44<sup>th</sup> International Symposium on Microelectronics (IMAPS 2011)

Long Beach Convention Center  
Long Beach, California - USA

**October 9 - 13, 2011**

[www.imaps2011.org](http://www.imaps2011.org)

Made plans for October 31<sup>st</sup> - November 4<sup>th</sup> yet?

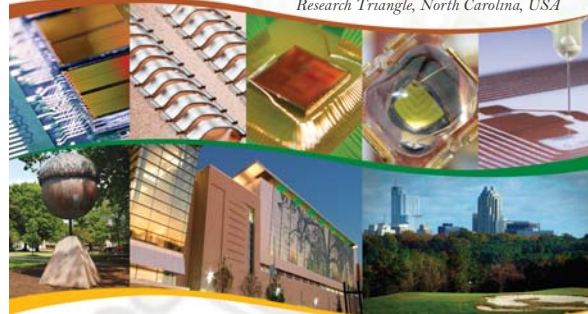
**NO!**

You must not have heard about the 43<sup>rd</sup> International Symposium on Microelectronics!  
Well, go to [www.imaps2010.org](http://www.imaps2010.org) to learn about it and we hope to see you in Raleigh!



## 43<sup>rd</sup> International Symposium on Microelectronics

Raleigh Convention Center • October 31 - November 4, 2010  
Research Triangle, North Carolina, USA



#### FEATURING:

- NEW! 3D Packaging and Integration Track including five 3D Sessions and Panel
- Two Keynote Presentations:
  - Dr. John Edmond  
Co-Founder, CREE Research, Inc.
  - Dr. Rao Tummala  
Professor and Director,  
Georgia Institute of Technology
- 18 Professional Development Courses
- 25 Technical Sessions
- Interactive Poster Session
- More than 190 Papers
- State-of-the-Art Exhibition and Technology Showcase
- Global Business Fall Marketing Forum

Premier Sponsors:



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Organized by the International Microelectronics And Packaging Society  
Bringing together the entire microelectronics supply chain!

# REGISTRATION FORM

REGISTER ON-LINE AT [WWW.IMAPS.ORG/THERMAL](http://WWW.IMAPS.ORG/THERMAL)

IMAPS THERMAL MANAGEMENT ATW: SEPTEMBER 28 - 30, 2010

Dr.  Mr.  Ms.

Member ID# \_\_\_\_\_

First Name \_\_\_\_\_ M.I. \_\_\_\_\_ Last Name \_\_\_\_\_

Company/Affiliation \_\_\_\_\_ Job Position \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_ Country \_\_\_\_\_

Phone \_\_\_\_\_ Fax \_\_\_\_\_ Email \_\_\_\_\_

## PAYMENT

## THERMAL10PROG

Thermal Workshop Fee: \$ \_\_\_\_\_

Additional Purchases: \$ \_\_\_\_\_

Total Payment Due: \$ \_\_\_\_\_

**For Wire Transfer information call 202-548-4001**

Enclosed is a check payable in US funds to IMAPS

Charge my fees to:

Visa  MasterCard  Discover  Amex

Card# \_\_\_\_\_ Exp. \_\_\_\_\_

Signature \_\_\_\_\_

Card billing address, if different from above: (required)

\_\_\_\_\_

### Email address required to receive confirmation of registration.

Mail this form with payment to: IMAPS \* 611 2nd Street, NE \* Washington, DC 20002-4909. For credit card transactions, register on-line: [www.imaps.org](http://www.imaps.org); or register by phone with your credit card by calling 202-548-4001; Fax: 202-548-6115. Additional information? E-mail: [IMAPS@imaps.org](mailto:IMAPS@imaps.org), or visit our web site: <http://www.imaps.org>. Cancellations will be refunded (less a \$50 processing fee) only if written notice is postmarked on or before **Monday, September 13, 2010**. No refunds will be issued after that date.

REGISTRATION FEES: ADVANCE REGISTRATION ENDS 9/13/10

## THERMAL WORKSHOP FEES

(On or before 9/13) (After 9/13)

<input type="checkbox"/> Member (IMAPS)	\$650	\$750
<input type="checkbox"/> Non-member*	\$775	\$875
<input type="checkbox"/> Speaker <input type="checkbox"/> Chair <input type="checkbox"/> Chapter Officers	\$425	\$525
<input type="checkbox"/> Student	\$225	\$325

Exhibits Only/Additional Booth Personnel - Complimentary Hall Pass (**meals not included, you must purchase a meal ticket**)

<input type="checkbox"/> Lunch Tickets (#of tickets____)	\$35/day	\$35/day
<input type="checkbox"/> All meals	\$100/day	\$100/day

\*Includes one-year IMAPS individual membership. Does not apply to corporate or affiliate memberships. Workshop Fee includes: access to all technical sessions, meals, refreshment breaks, an Abstract Book and one (1) CD-Rom of the presentations. CD will be mailed 15 business days after the event.

## ADDITIONAL PURCHASES

<input type="checkbox"/> CD of Presentations (Member Rate)	\$200	\$200
<input type="checkbox"/> CD of Presentations (Non-Member Rate)	\$300	\$300
<input type="checkbox"/> Add to Ship in the US	\$7	\$7
<input type="checkbox"/> Add to Ship Overseas	\$25	\$25

## HOW DID YOU HEAR ABOUT THIS EVENT?

- Direct Mail  Website  E-Mail  
 Advancing Microelectronics  Colleague  
 IMAPS Weekly E-mail Bulletin  Personal Phone Call  
 Industry/Trade Magazine  Other \_\_\_\_\_

## HOUSING (Hotel Cut-off is September 13, 2010)

Housing Accommodations **must** be made directly to:

### Dinah's Garden Hotel

[www.dinahshotel.com](http://www.dinahshotel.com)

4261 El Camino Real

Palo Alto, CA 94306

P: +1-800-227-8220 or +1-650-493-2844

Please reference **IMAPS October Meeting** when making reservations by phone.

On-line: [https://reservations.ihotelier.com/crs/g\\_login.cfm?hotelID=4793](https://reservations.ihotelier.com/crs/g_login.cfm?hotelID=4793) and enter **IMAPS2010**

### Room Rate: \$120/night plus tax (Single/Double)

IMAPS cannot guarantee room availability or pricing after the September 13<sup>th</sup> deadline.

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First-Class Mail  
U.S. Postage  
**PAID**  
Merrifield, VA  
Permit No. 6418

IMAPS Registration  
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Washington, DC 20002-4909  
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