

*ADVANCE PROGRAM AND REGISTRATION*

# IMAPS Advanced Technology Workshop on **Thermal Management**

**SHERATON PALO ALTO HOTEL**  
**PALO ALTO, CA 94301**  
**OCTOBER 25 - 27, 2004**

**General Chair:**

**Dave Saums, DS&A**

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TECHNICAL PROGRAM & REGISTRATION ON-LINE:

[WWW.IMAPS.ORG/THERMAL](http://WWW.IMAPS.ORG/THERMAL)



Sponsored by:

The International Microelectronics And Packaging Society (IMAPS)

*"Everything in electronics between the chip and the system"*

in conjunction with the System Packaging ATW • October 27-29\*

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Early Registration and Hotel Deadline: September 24, 2004

## Monday, October 25

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Registration: 8 am - 9 pm

Continental Breakfast: 8 am - 9 am

### SESSION 1: MARKET DRIVERS

9 am - 12:30 pm

Chair: [Dave Saums, DS&A](#)

Sustainability: A Key Market Driver of the Future Information Technology Industry

[Chandrakant D. Patel, Hewlett Packard Laboratories](#)

Bringing Together the Microelectronics / Packaging and Building Cooling Industries

[Donald L. Beatty, DLB Associates, Consulting Engineers, P.C.](#); [Roger Schmidt, IBM](#)

64-bit Server Cooling Requirements

[David Copeland, Fujitsu Laboratories of America](#)

Break: 10:30 am - 11 am

Challenges and Development Areas for Thermal Management of Next Generation Microprocessors

[Thomas P. Dolbear, Sridhar Sundaram, Advanced Micro Devices](#)

Market Drivers and Applications for Engineered Thermal Materials

[Dave Saums, DS&A](#)

Thermal Management of Graphics Processors

[Joe Walters, nVidia](#)

Lunch: 12:30 pm - 1:30 pm

### SESSION 2: REFRIGERATION AND LIQUID COOLING

1:30 pm - 5 pm

Chair: [John Peeples, The Citadel](#)

High Performance Heat Spreader for High Power Electronics

[Jon Zuo, Chanwoo Park, David Sarraf, Advanced Cooling Technologies, Inc.](#)

Thermal Performance of Fluorinated Fluids in Pool Boiling with Application to Thermosyphons

[Phillip E. Tuma, 3M](#)

Miniature Loop Heat Pipes – A Promising Means for Cooling Electronics

[Jay M. Ochterbeck, Yury F. Maydanik, Sergey V. Vershinin, Mikhail A. Korukov, Clemson University](#)

Break: 3 pm - 3:30 pm

High Performance, Reliable Liquid Cooling Components and Systems for Computing and Electronics Devices Utilizing Standard Materials and Manufacturing Processes

[William Ott, PAR Technologies](#)

New Efficient Liquid Cooling Technologies for Computer Systems

[Peter Precht, HTP Microsystems GmbH; Olaf Kurtz, Atotech Deutschland GmbH](#)

Liquid Metal Cooling Loops for Mobile Applications

[Bob Mayer, nanoCoolers](#)

Reception: 5:30 pm - 6 pm

Dinner: 6 pm - 7 pm

### SESSION 3: SOLID STATE REFRIGERATION AND POWER-AWARE DESIGN

7:00 pm - 9:00 pm

Chair: [Guy Wagner, RM Laboratories](#)

Integration of Thermoelectric and Phase Change (Liquid/vapor) Devices with Application to CPU Cooling

[Ioan Sauciuc, Hakan Erturk, Jim Williams, Greg Chrysler, Ravi Mahajan, Intel Corporation](#)

Leakage and Variations Aware Thermal Management of Nanometer Scale ICs

[Kaustav Banerjee, Sheng-Chih Lin, Vineet Wason, University of California at Santa Barbara](#)

Development of a High-Efficiency, Solid-State Cooling Chip

[Rodney T. Cox, Avto Tavkheldidze, Isaiah W. Cox, Cool Chips plc](#)

MicroPelt®: Leading Edge Thermoelectric Micro Devices - Technology and Applications

[Karl-Heinz Schlereth, Infineon Technologies AG; Bernhard Loibl, Inheco GmbH](#)

## Tuesday, October 26

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Registration: 8 am - 9 pm

Continental Breakfast: 8 am - 9 am

### SESSION 4: METALLIC INTERFACE MATERIALS

9 am - 12:30 pm

Chair: [Herman Chu, Cisco Systems](#)

Advancements in Heat Transfer Via Direct Soldering of Copper to Aluminum

[Bryce Watson, Bill Avery, Kester](#)

Enhanced Thermal Performance by Direct Solder Attach of Silicon Dies

[Jai S. Subramanian, T. Rude, J. Newson, J. He, T. P. Weihs, RNT](#)

Active Metal Brazing Copper to Ceramic Substrates Solving Thermal Challenges of Power Devices

[Keith Easler, Kyocera America](#)

Break: 10:30 am - 11 am

Development of Die Attach Solder with Improved Thermal

[Mitch Holtzer, John Laughlin, Brian Lewis, Tony Ingham, Cookson Electronics](#)

Thermal Properties of Active Solder Bonds

[Randall Redd, Ronald W. Smith, S-Bond Technologies LLC](#)

Reliability and Performance of a Low Melt Alloy-based Thermal Interface System

[Chris G. Macris, Thomas R. Sanderson, Robert R. Ebel, Christopher B. Leyerle, Enerdyne Solutions](#)

Lunch: 12:30 pm - 1:30 pm

### **SESSION 5: NONMETALLIC INTERFACE MATERIALS**

1:30 pm - 2:30 pm

**Chair: Dave Saums, DS&A**

Thermally Conductive Materials: How Material Properties Relate to Application Performance

Jim Bacorn, Sanjay Misra, Kasyap Seethamraju, The Bergquist Company

Carbon Black Thermal Pastes that Surpass Solder and Best Commercial Thermal Pastes in providing High Thermal Contact Conductance

Chia-Ken Leong, D. D. L. Chung, University at Buffalo, State University of New York

### **SESSION 6: FAN OPTIMIZATION**

2:30 pm - 4 pm

**Chair: Cullen Bash, Hewlett-Packard Laboratories**

A Practical Engineering Approach to Extract Fan Curves Based on Skin-to-Skin Distance, Plenum Size and Fan Speed from a Single Fan Curve Data

M. Baris Dogruoz, Attila Aranyosi, Juan Cruz, William Maltz, Electronic Cooling Solutions Inc.; Andre Ali, Apple Computer

Break: 3 pm - 3:30 pm

Pushing Fan Performance to the Limit - Integration of Fan Electronics and Thermal Controller Electronics

Glenn Warren, Cisco Systems Inc.

### **SESSION 7A: HIGH CONDUCTIVITY, LOW EXPANSION MATERIALS**

4 pm - 5 pm

**Chair: David Copeland, Fujitsu Laboratories**

Performance of High Conductivity Heat Spreaders in Flip Chip Thermal Packages

Martin W. Weiser, Nancy F. Dean, Honeywell Electronic Materials

Fabrication of CuSiC Metal Matrix Composites: Thermal Management Materials for the Next Generation Power Electronics

Pradeep Paul, Changmo Sung, Glenn Sundberg, Thomas Vasilos, University of Massachusetts at Lowell

Reception: 5:30 pm - 6 pm

Dinner: 6 pm - 7 pm

### **SESSION 7B: HIGH CONDUCTIVITY, LOW EXPANSION MATERIALS**

7 pm - 9 pm

**Chair: David Copeland, Fujitsu Laboratories**

Ultrahigh-Thermal-Conductivity Packaging Materials

Carl Zweben, Independent Consultant

Thermal Performance of Experimental Hybrid Graphite Reinforced Al and Cu Matrix Composite Heat Sinks

James A. Cornie, Stephen S. Cornie, Shiyu Zhang, Eugene Chen, Larry Ballard, Metal Matrix Cast Composites, LLC

New Generation of Thermal Management Materials  
Arndt Luedtke, Plansee AG; Frank Polese, Polese Company

Natural Graphite Based Materials for Electronics Cooling  
Julian Norley, GrafTech

## **Wednesday, October 27**

Registration: 7:30 am - 12:30 pm

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

### **SESSION 8: TELECOMMUNICATIONS AND COMPUTING SYSTEMS**

8:30 am - 10:30 am

**Chair: William Maltz, Electronic Cooling Solutions**

Thermal Characterization of the Advanced Graphics Card in a Real Operating Environment

Yean-Der Kuan, Kuang Wu Institute of Technology; Tsong-Dih Yuan, Hsin-Yu Pan, Taiwan Semiconductor Company

Case Study of a Thermal Compromise on a Crowded PC Board

Marc Weideman, CoFan USA

An Open-System, Exergy-Based Analysis of Data Center Thermal Management Components

Amip Shah, Van Carey, University of California at Berkeley; Cullen Bash, Chandrakant Patel, Hewlett-Packard Laboratories

Scalable and Adaptive Cooling Solutions for Data Centers

Izuh Obinelo, Degree Controls Inc.

Break 10:30 am - 11 am

### **SESSION 9: HEATSINK DESIGN AND MANUFACTURING**

11 am - 12:30 pm

**Chair: Cullen Bash, Hewlett-Packard Laboratories**

Advances in High Watt Density (HWD) Thermoelectrics and Implications for CPU Cooling

Jim Bierschenk, Dwight Johnson, Marlow Industries

Thermal Modeling of the Press-on-Fin Heat Sink for IC Cooling

Guy R Wagner, RM Laboratories

Novel Manufacturing Process for Heatsinks using Powder Injection Molding Technology

Lye-King Tan, Advanced Materials Technologies

Lunch: 12:30 pm - 1:30 pm

IMAPS Advanced Technology Workshop on  
High-Speed Interconnect, EMC and Power Aspects  
of System Packaging for High Performance Computing,  
Telecom and Semiconductor Capital Equipment

Sheraton Palo Alto Hotel

Palo Alto, CA

**October 27 - 29, 2004**

Visit [www.imaps.org/systemspack](http://www.imaps.org/systemspack)

# REGISTRATION FORM

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

THERMAL MANAGEMENT ATW - OCTOBER 25 - 27, 2004

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## REGISTRATION FEES: EARLY REGISTRATION ENDS 9/24/04

### WORKSHOP FEES

(On or before 9/24) (After 9/24)

- |   |       |       |
|---|-------|-------|
| <input type="checkbox"/> Member (IMAPS)           | \$615 | \$715 |
| <input type="checkbox"/> Non-member*              | \$715 | \$815 |
| *Includes one-year individual membership in IMAPS |       |       |
| <input type="checkbox"/> Speaker/Chair            | \$350 | \$450 |

*Workshop Fees include an Abstract Book and a CD of Presentations. CD of Presentations will be mailed 10 business days after the event.*

### ADDITIONAL PURCHASES

- |  |       |       |
|--|-------|-------|
| <input type="checkbox"/> Spouse/Guest (meals only)             | \$150 | \$150 |
| <input type="checkbox"/> CD of Presentations (Member Rate)     | \$100 | \$100 |
| <input type="checkbox"/> CD of Presentations (Non-Member Rate) | \$175 | \$175 |
| <input type="checkbox"/> Add to Ship in the US                 | \$7   | \$7   |
| <input type="checkbox"/> Add to Ship Overseas                  | \$25  | \$25  |

## Housing (Hotel Cut-off is September 24, 2004)

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

### Sheraton Palo Alto Hotel

625 El Camino Real

Palo Alto, CA 94301

P: 800-874-3516 or 650-328-2800

E: [SheratonReservation@pahotel.com](mailto:SheratonReservation@pahotel.com)

When making reservation, please reference IMAPS.

**Single/Double: \$179**

Sheraton Palo Alto Hotel requires a deposit for the first night's room and tax to hold your room. Deposit refunded if reservation is cancelled fourteen (14) days prior to arrival. After which time, deposit is non-refundable.

## Register for both ATWs and Save!

Thermal Management  
[www.imaps.org/thermal](http://www.imaps.org/thermal)  
October 25 - 27, 2004

System Packaging  
[www.imaps.org/systemspack](http://www.imaps.org/systemspack)  
October 27 - 29, 2004

## PAYMENT

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

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

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

**A \$25 fee must be added to all Wire Transfers.**

- Enclosed is a check payable in US funds to IMAPS
- Charge my fees to:
- Visa  MasterCard  Discover  Amex  Diners Club
- Card# \_\_\_\_\_ Exp. \_\_\_\_\_

Signature \_\_\_\_\_

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

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 **October 8, 2004**. No refunds will be issued after that date.

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