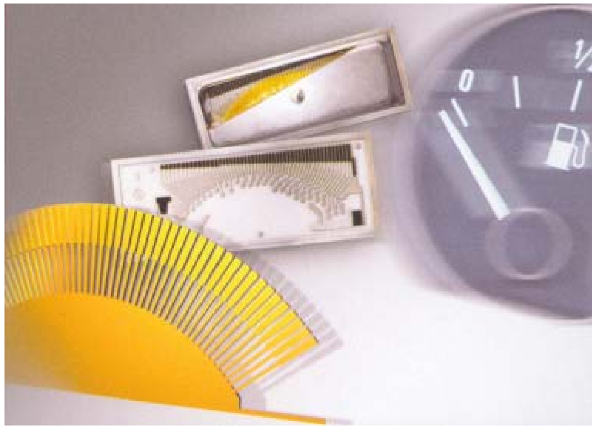
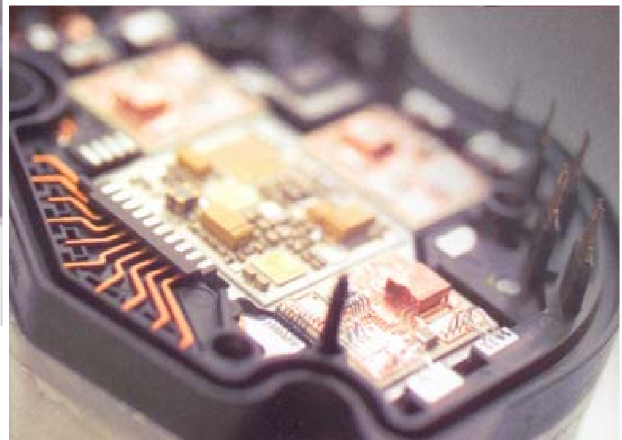
Advance Program and Registration On-Line at www.imaps.org/automotive

# IMAPS Advanced Technology Workshop on
# Automotive Microelectronics and Packaging

## Hyatt Regency Dearborn
## Dearborn, Michigan - USA
## April 9 - 12, 2007

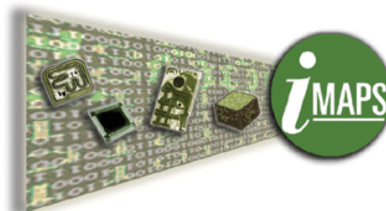




**All photos courtesy of Heraeus**


**General Chair:**
**Larry Rexing**
Heraeus, Inc. - TFD
larry.rexing@heraeus.com

**Technical Program Chair:**
**Adam Schubring**
Kyocera America, Inc.
adam.schubring@kyocera.com


Sponsored by:

The International Microelectronics And Packaging Society (IMAPS)
*Bringing Together the Entire Microelectronics Supply Chain!*

Early Registration Deadline: March 9, 2007

Hotel Cut-off: March 9, 2007

## Workshop Overview

Automotive electronic content continues to rise in vehicles every year. As content rises, microelectronic packaging will continue to play a larger role, as the automobile industry drives for electronics that are smaller in size, lower in cost, higher in content, and more reliable in harsh environments. This Advanced Technology Workshop (ATW) is focused on advanced developments in automotive microelectronic packaging and has been scheduled as a technical forum to bring together scientists, engineers, and academia who have been working in the area of advanced microelectronic packaging and electronic device reliability for the automotive environment.

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## Monday, April 9th

Registration: 5:00 pm - 7:00 pm

Opening Reception: 6:00 pm - 7:00 pm

## Tuesday, April 10th

Registration: 7:00 am - 8:00 pm

Continental Breakfast: 7:00 - 8:00 am

### Session 1: Sensor Materials and Packaging

**8:00 am - Noon**

Session Chair: Gary Johnson, Wabash Technologies

Low Cost Packaging of Pressure Sensors for TPMS
Robert Hunter, Gary Casey, Calin Miclaus, Omar Abed, Vincentiu Grosu, Dan Rodriguez, Avag Avagyan, Kavlico

Small Leadless Packages for Sensors in Automotive Applications
Martin Holzmann, Christoph Gahn, Michael Knauß, Lutz Rauscher, Christian Solf, Robert Bosch GmbH

Miniaturization of Automotive Electronics via Wafer-Level Chip-Size Packaging
Yehudit Dagan, Jeff Demmin, Tessera Israel, Ltd.

Plate Level Packaging / Calibration Alternative for Silicon Based for Automotive MAP Sensor
Eddie R. Borzabadi, Steven P. Long, Delphi

Break: 10:00 am - 10:30 am

Development of an Aluminum Wirebondable Lead and Cadmium Free Thick Film Gold Conductor for Extreme Applications
David J. Malanga, Samson Shahbazi, Meg Tredinnick, Heraeus Inc. - TFD

A Load Cell Utilizing Novel Cermet Construction for Automotive Applications
Terry R. Bloom, CTS Automotive Products

*All photos courtesy of Heraeus*

Material Selection and Application for Contacting Based Encoders Submerged in Automatic Transmission Fluid
Richard Cooper, Tom Martin, Wabash Technologies

Lunch: Noon - 1:00 pm

**Tuesday's Lunch Sponsored by:**

BOSCH

Invented for life

**Lunch Speaker: 1:00 pm - 2:00 pm**

**Title:** Trends in Automotive Technology: Combined Active & Passive Safety *(CAPS)*

**Speaker:** Mr. Rob Lyons, Robert Bosch LLC

**Mr. Rob Lyons,** Manager, is responsible for ***CAPS*** - Combined Active & Passive Safety in North America. In this role, he is responsible for advanced safety functions that are enabled through the integration of systems such as Electronic Stability Control (ESC), airbag crash and rollover sensing, driver assistance functions and telematics.

Since joining Bosch in 1994, Rob has held various positions in airbag electronics, driver assistance and advanced technology marketing. Rob graduated in 1992 with a degree in electrical engineering from GMI Engineering & Management Institute.

## Session 2: LTCC Substrates and Packaging

**2:15 pm - 5:30 pm**

Session Chairs: M. Ray Fairchild, Delphi Electronics and Safety; Matthew Walsh, Delphi

LTCC Design Techniques for Microwave Integrated Circuits in Radar Sensor Applications
Timothy P. Mobley, Glenn Oliver, DuPont Electronic Technologies

20 to 90GHz Broadband Characterization of LTCC Materials for Transceiver Modules and Integrated Antennas
Matthew R. Walsh, David W. Zimmerman, Michael E. Miller, Deepukumar M. Nair, Bruce W. Butler, Charles I. Delheimer, Ben E. Haffke, Delphi

Packaging of Radar Sensors for Comfort and Safety Applications - Requirements and Challenges
Dieter Hoetzer, Juergen Hildebandt, Bernhard Lucas, Robert Bosch Corporation

Break: 3:45 pm - 4:00 pm

High Value Passive Component Integration and Mixed Material Systems for Multi Chip Module Design
Eric E. Hoppenjans, William J. Chappell, Purdue University

The Challenge of High Reliability Resistors for LTCC Circuits
Christina Modes, Quentin Reynolds, Michael Neidert, Frank Herbert, W.C. Heraeus GmbH

State-of-the-Art Test Procedures for Hybrid and LTCC Multilayers
Stefan Flick, W.C. Heraeus GmbH

Welcome Reception: 5:30 pm - 6:00 pm

Dinner: 6:00 pm - 7:00 pm

## Dinner Speaker: 7:00 pm - 8:00 pm

**Title:** Emerging Trends in Automotive Electronics

**Speaker:** Dr. Robert W. Schumacher, Delphi Electronics & Safety

**Dr. Robert W. Schumacher** is the general director, Advanced Product & Business Development for Delphi Electronics & Safety and has been in this position since September 2005. He is a member of the division's Executive Committee, and reports to Jeff Owens, president of Delphi Electronics & Safety.

Dr. Schumacher has more than 30 years experience in product development and business management in automotive and aerospace electronics at Delphi Corporation and the former Hughes Aircraft Company. Most recently he was the Business Line Executive for the Delphi Integrated Media Systems (IMS) business.

Dr. Schumacher earned a Bachelor of Science degree in 1973, a Master of Science degree in 1974, and a Ph.D. in 1979, all in Physics, from UCLA. From 1977 to 1982 at UCLA, he developed the Dodecapole-Surmac plasma confinement facility at UCLA, which was sponsored by a research contract from the U.S. Department of Energy.

Dr. Schumacher holds 13 patents and has more than 40 publications in the areas of plasma science and automotive technology.

## Wednesday, April 11th

Registration: 7:30 am - 5:15 pm

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

### Session 3: Power Substrates and Packaging

**8:30 am - Noon**

Session Chair: Lizhi Zhu, Ballard Power Systems (now Siemens VDO)

FreedomCAR Plan, Requirements, and Technology Needs
Laura D. Marlino, Oak Ridge National Laboratory

Direct-Bond Copper Substrates with Zr Doped Alumina Ceramics for Use in Automotive Power Modules
Alexander Roth, Juergen Schulz-Harder, Electrovac Curamik

A New Alumina Multi-Layer Substrate for Power Control Unit
Masamitsu Onitani, Kyocera Corporation

Break: 10:00 am - 10:30 am

The Use of Thick Film Ceramic Hybrid Circuits in Automotive Power Modules
Ken Henderson, C-MAC Microtechnology

*All photos courtesy of Heraeus*

Die Casting of Microelectronic Packaging Components from Low-Cost Aluminum Metal Matrix Composites
Stephen P. Midson, David M. Schuster, Michael D. Skibo, The Midson Group, Inc.

Engineered Metal Matrix Composites and Fabrication Methods for Automotive Applications
Birol Sonuparlak, Mike St. Lawrence, Cliff Roseen, Murali Sethumadhavan, Rogers Corporation

Lunch: Noon - 1:00 pm

## Lunch Speaker: 1:00 pm - 1:45 pm

## **Title:** Robustness Validation - Why Are We Here and What Do We Get Out of It?

## **Speaker:** Mr. Roger Rickey, R. E. Rickey and Associates

**Roger E. Rickey** is President of R.E. Rickey & Associates, Inc. and has over 30 years experience in the automotive and electronics industries, including 4 years experience as Plant Manager, Chrysler Huntsville Electronics Division, a leading electronics manufacturer. He is currently an international Management Consultant and has several Fortune 500 clients, including major automotive OEMs.

Mr. Rickey began his career in engineering with Ford Motor Co., was Chief Engineer and Director of Engineering with United Technologies Automotive Products Division. He holds degrees from Eastern Michigan University and Southern Illinois University, and served as an Officer with the U.S. Army in Vietnam. He holds two Bronze Star Medals and an Army Commendation Medal.

## Session 4: Interconnects and Materials

**2:00 pm - 5:15 pm**

Session Chair: Michael McKeown, Orthodyne Electronics

PowerRibbon™ Bonding - An Alternative Interconnect Process for Present & Future Automotive Electronics Applications
Michael McKeown, Siegbert Haumann, Christoph Luechinger, Orthodyne Electronics

Evaluation of Wire Bond Systems for Manufacturability
Lichun Leigh Chen, B. Njoes, P. F. Lynch, J. G. Kaiser, Technical Materials, Inc.; M. McKeown, Orthodyne Electronics; R. Wenkitaswmy, Farmingdale State University

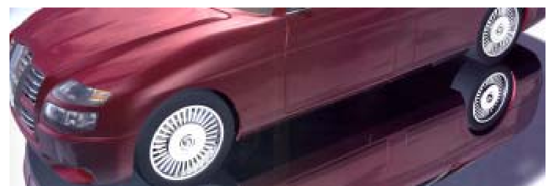
Interconnect Solutions for High Performance Automotive Applications
Roger E. Weiss, Joel Urban, Paricon Technologies Corp.

Break: 3:30 pm - 3:45 pm

The Role of Natural Graphite in the Thermal Management of Automotive Packaging
Julian Norley, Andy Reynolds, Matt Getz, GrafTech International Ltd.

Electrically and Thermally Conductive Adhesives for Automotive Electronics
Gunther Dreezen, Michel Ruyters, Geert Luyckx, Scott Harry, Emerson & Cuming

Proper Application of Silicone Conformal Coatings will Eliminate Premature Device Failures in Harsh Automotive Environments
Jason D. Clark, Dow Corning Corporation



## Thursday, April 12th

Registration: 7:15 am - 11:00 am

Continental Breakfast: 7:15 am - 8:15 am

### Session 5: Packaging and Assembly

**8:15 am - 11:00 am**

Session Chair: Bill Hopfe, Visteon

Effects of Thermal Aging on the Reliability of Lead Free Solder Joints
Jeffrey C. Suhling, Hongtao Ma, Yifei Zhang, Pradeep Lall, Michael J. Bozack, Auburn University

Assessment of Factors Influencing Thermomechanical Fatigue Behavior of Sn-Based Solder Joints Under Severe Service Environments
Andre Lee, K. N. Subramanian, Michigan State University

Statistical Models for Area-Array Component Selection, Component Obsolescence, and Design Trade-Offs
Pradeep Lall, Ganesh Hariharan, Jeff Suhling, Mark Strickland, Jim Blanche, Auburn University

Break: 9:45 am - 10:00 am

The What, When and Why of Laser Reflow
John Vivari, EFD, Inc. Solder Paste Group

The Issues Connecting Pb-Free Solders, Microelectronic Device Moisture/Reflow Sensitivity, Tin Whiskers and False Exemptions
Steven R. Martell, Sonoscan, Inc.

Closing Remarks: 11:00 am

**A Special Thanks**

**to the**

**Automotive Workshop Speakers and Organizers!**

**Your Commitment is Greatly Appreciated!**

*All photos courtesy of Heraeus*

## *Upcoming* *Events...Mark Your Calendar!*

**Advanced Technology Workshop on**
**Reliability of Advanced Electronic Packages and Devices**
**in *Extreme Cold Environments***
**Embassy Suites Hotel**
**Arcadia, California - USA**
**February 27 - March 1, 2007**
Visit www.imaps.org/extremecold for more information

**Global Business Council (GBC) Spring Conference**
*Co-located with Device Packaging Conference and Exhibition*
**Doubletree Paradise Valley Resort**
**Scottsdale, Arizona - USA**
**March 18 & 19, 2007**
Visit www.imaps.org/gbc for more information

**International Conference and Exhibition on**
**Device Packaging**
**Doubletree Paradise Valley Resort**
**Scottsdale, Arizona - USA**
**March 19 - 22, 2007**
Visit www.imaps.org/devicepackaging for more information

**IMAPS/ACerS 3rd International Conference and Exhibition on**
**Ceramic Interconnect and Ceramic Microsystems Technologies (CICMT)**
**Grand Hyatt Hotel**
**Denver, Colorado - USA**
**April 23 - 26, 2007**
Visit www.cicmt.org for more information

**Topical Workshop and Tabletop Exhibition on**
**Military, Aerospace, Space and Homeland Security (MASH):**
***Packaging Issues and Applications***
**Radisson Plaza Lord Baltimore Hotel**
**Baltimore, Maryland - USA**
**May 8 - 10, 2007**
Visit www.imaps.org/mash for more information

**40th International Symposium on Microelectronics (IMAPS 2007)**
**San Jose Convention Center**
**San Jose, California - USA**
**November 11 - 15, 2007**
Visit www.imaps40th.org for more information

**Advanced Technology Workshop on**
**Integrated/Embedded Passives**
*Co-located with the IMAPS 2007 Symposium*
**San Jose Convention Center/Fairmont Hotel**
**San Jose, California - USA**
**November 15 - 17, 2007**
Visit www.imaps.org/passives for more information

# Registration Form

## Register On-Line at www.imaps.org/automotive

## Automotive Workshop: April 9 - 12, 2007

❑ Dr. ❑ Mr. ❑ Ms. Member ID# ______________

First Name______________________________M.I.____________Last Name_____________________________

Company/Affiliation__________________________________________Job Position______________________

Address______________________________________________________________________________

City_________________________ State______ Zip___________ Country___________________________

Phone______________________ Fax_______________________ Email_________________________________

### Registration Fees: Early Registration Ends 3/9/07

### Workshop Fees

| | (On or before 3/9) | (After 3/9) |
|---|---|---|
| ❑ Member (IMAPS) | $500 | $600 |
| ❑ Non-member* | $600 | $700 |

*Includes one-year individual membership in IMAPS

| | | |
|---|---|---|
| ❑ Speaker ❑ Chair ❑ Chapter Officer | $350 | $400 |
| ❑ Student | $200 | $250 |

*Workshop Fee includes Abstract Book; all meals listed and a CD of Presentations. CD of Presentations will be mailed 10 business days after the event.*

### How did you hear about this event?

❑ Direct Mail ❑ Website ❑ E-Mail
❑ Advancing Microelectronics ❑ Colleague
❑ IMAPS Weekly Bulletin ❑ Personal Call
❑ Industry/Trade Magazine ❑ Other __________

### Additional Purchases

| | | |
|---|---|---|
| ❑ Guest/Family Member *(meals only)* | $160 | $160 |
| ❑ CD of Presentations *(Member Rate)* | $150 | $150 |
| ❑ CD of Presentations *(Non-Member Rate)* | $275 | $275 |
| ❑ Add to Ship in the US | $7 | $7 |
| ❑ Add to Ship Overseas | $25 | $25 |

### Hotel Reservation *(Hotel Cut-off is March 9, 2007)*

Reservation **must** be made directly with:

**Hyatt Regency Dearborn**
600 Town Center Drive
Dearborn, MI 48126
P: 800-233-1234 or 313-593-1234
www.dearborn.hyatt.com

To reserve room on-line, visit:
http://dearborn.hyatt.com/groupbooking/imap

Single/Double: $165

Please reference IMAPS when making reservations.

The Hyatt Regency Dearborn requires a deposit for the first night's room and tax to hold your room. Deposit refunded if reservation is cancelled fourteen (14) working days prior to arrival.

### Payment

**AUTO07PROG**

Workshop Fees: $_____________________

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 ❑ Diners Club

Card #___________________________Exp._______

Signature______________________________________

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

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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; or register by phone with your credit card by calling 202-548-4001; Fax: 202-548-6115. Additional information? E-mail: IMAPS@imaps.org, or visit our web site: http://www.imaps.org. Workshop Cancellations will be refunded (less a $50 processing fee) only if written notice is postmarked on or before **Friday, March 23, 2007**. No refunds will be issued after that date.

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