



CALL FOR PAPERS

Track 5: Electronics and Photonics Packaging

Authors and presenters are invited to participate in this event to expand international cooperation, understanding, and promotion of efforts in the area of Electronics and Photonics Packaging. The conference program will focus on the dissemination of knowledge related to the application of engineering approaches, analysis, design, manufacturing, testing and reliability of microelectronics and photonics components, devices, equipment and systems. Technical publications in a broad range of relevant areas are invited, listed as follows:

- 5-1 Symposium on Quality and Reliability of Electronic/Photonic Packaging
- 5-2 Symposium on Modeling and Simulation in Electronic/Photonic Packaging
- 5-3 Symposium on Manufacturing, Materials & Processes
- 5-4 Symposium on Reliability/Durability of Defense, Aerospace, and Military Electronics
- 5-5 Symposium on Advanced Packaging, Power Electronics & Photonics
- 5-6 Symposium on Emerging Technologies
- 5-7 General
- 5-8 Workshop on Careers in Industry and Academia (presentation only)
- 5-9 Workshop on Lead Free Electronics Impact on DoD Programs (presentation only)
- 5-10 Student Posters (presentation only)
- 5-11 Symposium on Photovoltaic Packaging
- 5-12 Symposium on Heat Transfer in Electronic Equipment
- 5-13 Symposium on Modeling at Atomic Scale with Quantum Mechanics and Molecular Dynamic Simulations

Prospective authors should submit a 400-word (max) abstract **by March 1** via the web tool at the Congress 2010 website. <http://www.asmeconferences.org/congress2010>. Final papers will be available on CD-ROM at the meeting. See Conference website for the detailed publication schedule. See below for details on individual topics/symposia.

Track Chair:	Dr. Kaustubh Nagarkar: nagarkar@research.ge.com
Track Co-Chair:	Dr. Cemal Basaran: cjb@buffalo.edu



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Track 5: Electronics and Photonics

2010 ASME International Mechanical Engineering Congress and Exposition

Vancouver, BC, Canada

November 12-18, 2010

5-1. Symposium on Quality and Reliability of Electronic/Photonic Packaging

Quality and reliability are critical performance characteristics of electronic, photonic and MEMS packaging. Characterizing the fundamental failure mechanisms and developing models to predict product life is critical to the long-term reliability of these devices. This symposium focuses on the development of new and innovative engineering sciences and practices for quality control and reliability analysis and testing. Topics include, but are not limited to, reliability issues and failure analysis under thermal and power cycling, vibration, shock/drop, moisture, harsh chemical contaminants and combined loading, in

- Lead-Free Electronic Assemblies
- MCM/SiP/SoP Technologies
- 3-D Interconnects and Packaging
- Underfill, Dielectric, and other polymer Applications in Advanced Packages
- Embedded Actives/Passives
- MEMS Devices
- Nano/Micro Composite Coatings

Papers are also invited on such quality and reliability activities as:

- Reliability Assessment and Accelerated Product Qualification Testing
- Material Characterization and Characterization Techniques
- Predictive Modeling for Product Performance and Design
- Advanced Modeling Techniques for Product Reliability

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See Conference website for detailed Publication Schedule.

Sponsoring Division: EPPD

Technical Committees:

Suresh Sitaraman: suresh.sitaraman@me.gatech.edu

Hua Ye: huaye@microsoft.com

I. Charles Ume: charles.ume@me.gatech.edu

Jeff Suhling: jsuhling@eng.auburn.edu

Ahsan Mian: amian@me.montana.edu

Jianmin Qu: [jq@gatech.edu](mailto:jqu@gatech.edu)

Topic Chair:	Dr. Suresh Sitaraman: suresh.sitaraman@me.gatech.edu
Topic Co-Chair(s):	Dr. Hua Ye: huaye@microsoft.com



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5-2. Symposium on Modeling and Simulation in Electronic/Photonic Packaging

Modeling and simulation are critical activities in the design and development of complex electronic and photonic systems. Modeling aids in key activities such design for performance, manufacturability, quality, reliability, testability, maintainability, and affordability. Modeling in electronic/photonic systems requires multi-physics, multi-scale techniques. This symposium focuses on the development of new and innovative engineering sciences and practices for modeling and simulation in electronic systems. Topics include, but are not limited to:

- Modeling of complex properties of materials used in electronic/photonic assemblies
- Modeling of complex life cycle loading encountered in electromagnetic compatibility, thermal and power cycling, vibration, shock/drop, moisture, harsh chemical contaminants, and combined loading
- Modeling of complex architectures encountered in advanced packaging technologies
- Modeling of complex failure mechanisms encountered in advanced packaging
- Modeling tools commercially available in the electronics/photonics industry
- Modeling challenges at the microscale and nanoscale for electronic/photonic systems

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Sponsoring Division: EPPD

Technical Committees:

Satish Chaparala: ChaparalSC@corning.com

Gayatri Cuddalorepatta: gayatric@gmail.com

Mahesh Shah: Mahesh.Shah@freescale.com

Ganesh Subbarayan: ganeshs@purdue.edu

Greg Kowalski: gkowal@coe.neu.edu

Cemal Basaran: cjb@buffalo.edu

Bicheng Chen: bchen4@buffalo.edu

Topic Chair:	Dr. Satish Chaparala: ChaparalSC@corning.com
Topic Co-Chair(s):	Gayatri Cuddalorepatta: gayatric@gmail.com



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5-3. Symposium on Manufacturing, Materials & Processes

Packaging technology continues to increase in its complexity and integration while requiring lower cost, lighter weight, and importantly increased reliability. As application conditions become harsher, such as for portables, military, sensing, automotive and biomedical applications, packaging needs to be improved to a great extent from current stage. Advance in packaging manufacturing, materials & processes would offer innovative and disruptive solutions to the challenges in such needs. Further, without better understanding of materials and their microstructural developments, it is difficult to keep up with the most advanced concepts in electronics, MEMS, photonics and organic electronics. This symposium focuses on manufacturing and materials issues encountered in the assembly and packaging. Additionally, materials issues in low-k dielectrics will be included in this symposium due to its interface and interaction with the flip-chip and wire-bond packaging. Topics of special interests in this symposium include, but are not limited to manufacturing and materials issues in:

- low-k dielectrics
- electronic, MEMS, and photonic packaging
- OLED
- flexible substrates.
- Thin films, coatings and adhesives
- Interfacial phenomena
- microstructure-property relationships of packaging materials
- Integration of passive components and smart materials into packaging
- Nanoscale phenomena and its relation to packaging reliability
- Combined approaches through modeling and experimental work

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Sponsoring Division: EPPD

Technical Committees:

Girish Wable: Girish_Wable@Jabil.com

Ruijun Chen: RChen@kaydon.com

Jun Wei: jwei@SIMTech.a-star.edu.sg

Amip Shah: amip.shah@hp.com

Topic Chair:	Girish Wable: Girish_Wable@Jabil.com
Topic Co-Chair(s):	Ruijun Chen: RChen@kaydon.com



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5-4. Symposium on Reliability/Durability of Defense, Aerospace, and Military Electronics

Compared to consumer products, electronics for defense, aerospace, and military applications require longer years of service. During service, they may subject to very extreme thermal cycling and harsh vibration/shock environment. Coupling with COTS parts with lead-free solder, their reliability/durability become an important issue. This symposium dedicates to simulations and experiments of electronics for defense, aerospace, and military applications. Topic of interests may include, but not limited to,

- Durability/reliability of electronic products in electronic packaging for defense, aerospace, and military applications;
- Mitigation of lead free solder impact including mixed assembly;
- Correlation of solder joint durability and reliability;
- Low temperature fatigue;
- Failure mechanism and modeling and testing of solder interconnects under vibration/shock environment;
- Combination of vibration and temperature cycling.

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Sponsoring Division: EPPD

Technical Committees:

Tse Eric Wong: tse_e_wong@raytheon.com

Gregory J Kowalski: gkowal@coe.neu.edu

Robert "Scott" Downing: scott.downing@hs.utc.com

Anthony J. Rafanelli: Anthony_J_Rafanelli@raytheon.com

Charles R Lide : charles.r.lide@lmco.com

Michael Y Feng, mfeng@draper.com

Xiaoling He: xiaoling.he@mse.gatech.edu

Jason J-C Lee: jungchuan.lee@boeing.com

Karl J.L. Geisler: karl.geisler@gd-ais.com

Topic Chair:	Tse Eric Wong: tse_e_wong@raytheon.com
Topic Co-Chair(s):	Gregory J Kowalski: gkowal@coe.neu.edu



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5-5. Symposium on Advanced Packaging, Power Electronics & Photonics

The fabrication, assembly and testing of advanced electronic and photonic device or packaging can involve complex interactions between physical phenomena such as temperature, moisture, fluid flow, electromagnetics, optics and stress. Characterizing these multiphysics phenomena can have significant impact on the business profitability of electronics and photonics industries. This symposium is dedicated to multiphysics simulations and experiments in microelectronics, photonics, microsystems and power electronics. Topic of interests include:

- Coupled Electro-thermal-mechanical issues
- Coupled Thermo-Fluid-Structure Issues
- Coupled Thermo-Hygro-Mechanical Issues

This topic area will also host a *Mini-symposium on Power Electronics*, relevant in alternative energy sources and energy conservation, eg. in efficient conversion of the raw output of renewable sources like wind, solar, geothermal, into a form useful to the grid, as well as to conserve energy in hybrid or plug-in electric vehicles, HVAC, and commercial appliances. Operating reliably in such applications requires the latest materials & design solutions to manage electrical, thermal, mechanical & chemical stresses for better reliability. Areas of interest include:

- Packaging of SiC and GaN power devices
- Planar interconnection technologies for power electronic modules
- Advanced cooling technologies for high power devices and modules
- High temperature, lead-free attach technologies for power electronics
- Failure mechanisms in power electronic devices and packaging.

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Final papers will be available on CD-ROM at the meeting.

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Sponsoring Division: EPPD, K-16

Technical Committees:

Patrick McCluskey: mcclupa@umd.edu

Luu Nguyen: Luu.Nguyen@nsc.com

Shirish Mulay: mulay@lexmark.com (K-16)

Rich Beaupre: beaupre@ge.com

Avram Bar-Cohen: abc@umd.edu

Ricky Lee: [rickyleey@ust.hk](mailto:rickleey@ust.hk)

Topic Chair:	Patrick McCluskey: mcclupa@umd.edu
Topic Co-Chair(s):	Shirish Mulay: mulay@lexmark.com Luu Nguyen: Luu.Nguyen@nsc.com



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5-6. Symposium on Emerging Technologies

This topic will span the design, process, and reliability issues in the research on developing eco-friendly electronics. Topics on emerging technologies that result in reduced impact on the environment will be covered. This may include but will not be limited to materials/processes/challenges in electronics used in energy harvesting, photovoltaic or other renewable energy applications, printable electronic approaches, 3 dimensional Integrated Circuits, stretchable and flexible electronics, RF switches, Micro/Nano-electro-mechanical systems (M/NEMS), GaN and GaAs based devices and energy efficient electronics. This symposium consists of the following topics:

- Novel Materials and Processes for Eco-electronics
- Minisymposium on “Quality and Reliability of Electronic Packages, Devices and Materials for Emerging Technologies” (co-sponsored with Materials and MEMS Divisions)
- Minisymposium on “Flexible and Stretchable Electronics” (co-sponsored with Applied Mechanics Div)

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Sponsoring Divisions: EPPD, AMD, MD

Technical Committees:

George Nnanna: nnanna@calumet.purdue.edu

Dr. Abhijit Dasgupta: dasgupta@umd.edu

Leila Ladani: ladani@engineering.usu.edu (liaison with Materials Div)

Ying Sun: ysun@binghamton.edu

Teng Li: LiT@umd.edu (liaison with Applied Mech Div)

Topic Chair:	George Nnanna: nnanna@calumet.purdue.edu
Topic Co-Chair(s):	Dr. Abhijit Dasgupta: dasgupta@umd.edu Leila Ladani: ladani@engineering.usu.edu



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5-7. General

Authors and presenters are invited to participate in this event to expand international cooperation, understanding and promotion of efforts and disciplines in the area of Electronics and Photonics focus. Dissemination of knowledge by presenting research results of a broad range of investigations related to the application of methods and engineering approaches to the analysis, design, manufacturing, and testing of microelectronics and photonics components, devices, equipment and systems will serve as the foundation upon which the conference program of this area will be developed.

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Sponsoring Division: EPPD

Technical Committees:

Abhijit Dasgupta, dasgupta@umd.edu

Cemal Besaran, cjb@buffalo.edu

Kaustubh Nagarkar, nagarkar@ge.com

Tieyu Zheng, tieyu.zheng@intel.com

Topic Chair:	Abhijit Dasgupta: dasgupta@umd.edu
Topic Co-Chair(s):	Cemal Besaran, cjb@buffalo.edu



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5-8. Workshop on Careers in Industry and Academia

The session will provide new and upcoming graduates with an insight to the careers in the Industry and Academia. Early career and established researchers will be invited to share their experience.

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Sponsoring Division: EPPD

Technical Committees:

Kaustubh R. Nagarkar: nagarkar@ge.com

Dereje Agonafer: agonafer@mit.edu

Sandeep Tonapi: sandeep.tonapi@anveshak.com

Topic Chair:	Dereje Agonafer: agonafer@mit.edu
Topic Co-Chair(s):	Kaustubh R. Nagarkar: nagarkar@ge.com



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5-9. Workshop on Lead Free Electronics Impact on DoD Programs

The implementation of lead-free electronics in industry has resulted in a number of challenges focused at addressing concerns with performance of new materials under harsh operating and other environmental conditions. DoD (and Aerospace/High Performance) systems have unique requirements which include: 1) High reliability and critical systems, 2) VERY long service life, 3) Extended temperature ranges, and 4) Repairable systems. DoD acquisition programs are increasingly dependent on *commercial* electronic parts and assemblies (COTS) and therefore, the influx of lead-free assemblies is imminent and real.

Primary lead-free impacts include

- Lead-free solder issues
- Tin whisker failures
- Availability of leaded solder and components
- Configuration control
- Repair/Rework

This workshop will provide insight and training on specific issues, typical failures, risk mitigation strategies, available resources, and a summary of the present state of readiness. Specific topics for discussion include: typical failures, mitigation strategies, resources needed to manage the transition to Pb-free electronics, summary of the defense/aerospace industry readiness to adapt to lead-free technology.

Sponsoring Division: EPPD

Technical Committees:

Anthony J. Rafanelli: Anthony_J_Rafanelli@raytheon.com

Abhijit Dasgupta: dasgupta@umd.edu

Tse Eric Wong: tse_e_wong@raytheon.com

Topic Chair:	Anthony J. Rafanelli: Anthony_J_Rafanelli@raytheon.com
Topic Co-Chair(s):	Abhijit Dasgupta: dasgupta@umd.edu



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5-10. Student Posters

Papers with students as the lead authors are invited to be presented at the Electronic and Photonic Packaging Davison Student Poster session. Papers in all areas of electronic and photonic packaging are welcome. A committee of three experts will be formed to judge the posters. Three winners will be selected to receive the EPPD Best Students Poster Award at the EPPD Wine and Cheese Reception

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Sponsoring Division: EPPD, K-16

Technical Committees:

Fatemeh Hassanipour: fatemeh@utdallas.edu

Abhijit Dasgupta: dasgupta@umd.edu

Sandeep Tonapi: sandeep.tonapi@anveshak.com

Shirish Mulay: mulay@lexmark.com (K-16 joint EPPD-HTD committee)

Kaustubh R. Nagarkar: nagarkar@ge.com

Pradeep Lall: lallpra@eng.auburn.edu

Topic Chair:	Fatemeh Hassanipour: fatemeh@utdallas.edu
Topic Co-Chair(s):	Abhijit Dasgupta, dasgupta@umd.edu Sandeep Tonapi: sandeep.tonapi@anveshak.com Shirish Mulay: mulay@lexmark.com



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5-11. Symposium on Photovoltaic Packaging

Solar photovoltaic (SPV) technology, a key part of the renewable energy portfolio, is receiving renewed attention in the recent years. The penetration of SPV technology is dependent on its cost, driven by materials, fabrication processes, performance, and reliability. This symposium focuses on the development of new and innovative engineering sciences and practices for quality control, reliability analysis and testing of SPV components and systems, especially the flexible SPV systems. Topics include, but are not limited to, reliability issues and failure analysis under thermal cycling, vibration, shock/drop, moisture, combined loading and packaging of SPV systems. Topics in the following areas are invited:

- Thermal issues in SPV modules and balance of systems
- Thermomechanical reliability of SPV modules
- Thin film flexible SPV module application specific packaging
- Reliability assessment and accelerated testing of SPV modules, inverters, storage systems etc
- Advancements in packaging of inverters, storage, etc.
- Predictive modeling for solar cell modules performance and design
- Advanced modeling techniques for SPV system reliability

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Sponsoring Division: EPPD

Technical Committees:

Dr. Alok Rastogi: arastogi@binghamton.edu

Dr. Kaustubh Nagarkar: nagarkar@ge.com

Topic Chair:	Dr. Alok Rastogi: arastogi@binghamton.edu
Topic Co-Chair(s):	Dr. Kaustubh Nagarkar : nagarkar@ge.com



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5-12. Symposium on Heat Transfer in Electronic Equipment

The ASME K-16 Committee is a joint committee of the Heat Transfer Division (HTD) and the Electrical and Electronic Packaging Division (EPPD). It is the focal point for ASME activities in the area of Thermal Management of Electronics. The committee strives to provide leadership in the dissemination of technical information, the transfer of technology, and the interchange of ideas between industrial, academic and government institutions involved in the science and the pedagogy of heat transfer and thermal management in electronics packaging. Technical publications in the following areas are invited:

- Novel Materials: Thermal Vias, Heat Spreaders and Thermal Interface Materials
- Natural and Forced Convection Air Cooling; advances in Compact Air Movers
- Single Phase Liquid Cooling; Novel Phase Change Cooling Techniques: Boiling, Heat Pipes, Thermosyphon, Spray and Jet Impingement
- Microfabricated Thermal Management Devices and Systems
- Sub-Ambient Cooling: Solid State, Vapor Compression, Absorption, Adsorption, Thermo-acoustic, Magnetocaloric
- Thermal Management in Wireless, Networking, Computing, Lighting, Harsh Environments, and Peripheral Hardware.
- Thermal and Energy Management in Data Centers
- Three-Dimensional Electronics, Advances in Experimental Characterization
- Advances in Computational Characterization: Multi-Scale Modeling, Compact Modeling, Multi-Physics Modeling, Multi-Objective Design

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Sponsoring Division: EPPD, K-16

Technical Committees:

Shirish Mulay: mulay@lexmark.com

Mark Kimber: mlk53@pitt.edu

Gamal Refai-Ahmed: Gamal.Refai-Ahmed@amd.com

Amy Fleischer: amy.fleischer@villanova.edu

Sam Graham: sam.graham@me.gatech.edu

Topic Chair:	Shirish Mulay: mulay@lexmark.com
Topic Co-Chair(s):	Mark Kimber: mlk53@pitt.edu



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5-13. Symposium on Modeling at Atomic Scale with Quantum Mechanics and Molecular Dynamic Simulations

This symposium will be organized by EPPD and joint committee of Constitutive Modeling for Materials and Advanced Materials Divisions. Papers are invited on quantum mechanics and molecular dynamics modeling and simulations for emerging technology applications. Loadings of interest include but not limited to electrical, thermal, mechanical and chemical.

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Technical Committees:

Dr. Cemal Basaran: cjb@buffalo.edu

George Voyiadjis: voyiadjis@eng.lsu.edu

Topic Chair:	Dr. Cemal Basaran: cjb@buffalo.edu
Topic Co-Chair(s):	Dr. George Voyiadjis : voyiadjis@eng.lsu.edu