Thermal Technologies Workshop

SEMI-THERM® Thermal Technologies Workshop 2020

FINAL PROGRAM

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November 10-12, 2020

www.semi-therm.org

Message from the Organizing Committee

Welcome to the SEMI-THERM Thermal Technologies Workshop 2020. This workshop has been held for more than twenty-five years and has gained industry attention for the excellence of keynote presentations and first announcements of important technology developments. Keynote presentations in the last five years have been given by speakers from AMD, Collins Aerospace, Georgia Institute of Technology, HPE/Hewlett Packard Laboratories, HP Systems Research Labs, IBM Corporation, Intel Corporation, Microsoft, Qualcomm Technologies, Samsung (Korea), Santa Clara University, The Citadel, and University of Colorado. In 2019, the workshop moved to the Microsoft Corporation Conference Center on the Microsoft headquarters campus near Seattle WA. This move allowed us to set a new attendance record and expand the number of technical exhibits, with outstanding response from speakers and attendees alike. Each year, authors and attendees find this workshop format to be a highly effective forum for announcement of new developments and new challenges, as well as for excellent networking between all participants.

Thank you for attending this virtual workshop and we look forward to seeing you in person in December 2021.

Dave Saums
Principal, DS&A LLC
General Chair

Vadim Gektin
Member Technical Staff
Nuvia, Inc.
Program Chair

Organizing Committee

Vadim Gektin, Member Technical Staff, Nuvia, Inc.

Bill Maltz, President, Electronic Cooling Solutions, Inc.

Nader Nikfar, Principal Thermal Engineer, Qualcomm Technologies, Inc.

Adriana Rangel, Mechanical Engineer, Cisco Systems Inc.

Dave Saums, Principal, DS&A LLC

Tejas Shah, Senior Thermal Architect, Intel Corporation

Guy Wagner, Director, Electronic Cooling Solutions, Inc.

Ross Wilcoxon, Associate Director, Mechanical Engineering, Mission Systems, Collins Aerospace, Inc.

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Keynote Speaker – Tahir Cader, Hewlett Packard Enterprise

"Applying AI and Machine Learning to Improve HPC Datacenter Resiliency and Energy Efficiency"

Dr. Tahir Cader is a Distinguished Technologist within HP Enterprise's HPC and AI organization. He has demonstrated success in defining Power & Cooling strategies and architectures from the product through to the data center for HPE's Hyperscale, HPC, and Enterprise market segments. In particular, his emphasis is on issues relating to system packaging, thermal management (air and liquid), energy efficiency, sustainability, and lowest TCO of data centers. More recently, he has been leading an effort to use AI/Machine Learning to improve data center resiliency, energy efficiency, and sustainability. With over 26 years of experience in the IT and data center industries, Dr. Cader is both a sole inventor as well as a co-inventor for 75 granted and 101 pending patents, and is a co-author for more than 50 peer-reviewed journal, conference, and trade journal technical articles. Dr. Cader is also active with external standards bodies and public policy organizations.

(all times US EST)	DAY ONE Tuesday, November 10
1:00 PM	**Workshop Welcome & Keynote 1** **Tahir Cader, Hewlett Packard Enterprise** ***"Applying AI and Machine Learning to Improve HPC Datacenter Resiliency and Energy Efficiency"***
2:00 PM	**Dave Saums, DS&A LLC** ***"Metallic TIMs for Liquid Immersion Cooling and Cryogenic Temperatures for Quantum Computing"***
2:30 PM	**Rajath Kantharaj, Purdue University (PhD Student)** ***"Combined Experimental and Numerical Investigation of Microstructure of Squeezed Thermal Interface Materials (TIMs)"***
3:00 PM	**BREAK**
3:30 PM	**Elizabeth Langer & Andres Abraham, CPC** ***"How a Triangulation of Collaboration, Flow Requirements and a Need for Flexible Supercomputing Led to Industry Innovation"***
4:00 PM	**Major Sponsor Presentation: Tim Jensen, Indium Corporation** ***"Overview of the 5 Types of Metal TIM Technology"***
4:20 PM	**Vendor Sponsor Presentation: Joe Boswell, ThermAvant Technologies LLC**
4:30 PM	**Guy Wagner, Electronic Cooling Solutions, Inc.** ***"Method of Generating PQ Curves for an Air Mover"***
5:00 PM	**ADJOURN**

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(all times US EST)	DAY TWO Wednesday, November 11
12:30 PM	Reshmaa Selvakumar, Diabatix nv *“Comparative Study of Generative Thermal Design and Conventional Design”*
1:00 PM	Peter George & Vivian Lee, Oxford NanoSystems Ltd. *"Boiling Enhancement Coating Pushes Electronics Cooling Capabilities"*
1:30 PM	Mohamad Abo Ras, Berliner Nanotest und Design GmbH *"Three Omega Rapid Characterization Methodology and System for Measurement of Thermal Conductivity and Diffusivity for Different Thermal Material Classes"*
2:00 PM	Corey Wilson, ThermAvant Technologies LLC *"Limits of Operation Model Validation for Cryogenic Oscillating Heat Pipes"*
2:30 PM	Paul Hayes, Quantum Focus Instruments, Inc. *"Practical Application of Measurement Techniques Towards Thermal Characterization of Power HEMT Devices"*
3:00 PM	BREAK
3:30 PM	George Damoulakis, University of Illinois at Chicago (PhD Student) *"Vapor Chamber with a Wickless Condenser – Thermal Diode"*
4:00 PM	Major Sponsor Presentation: Dave DeWire, Hermetic Solutions Group
4:20 PM	Vendor Sponsor Presentation: Erin Swanbeck Product Manager - Thermal Materials, Laird Performance Materials
4:30 PM	Ron Demcko, AVX Corporation *"Impact of High Temperature Exposure on Capacitor Reliability and Performance"*
5:00 PM	ADJOURN

Major Sponsors

Indium Corporation is a premier materials manufacturer and supplier to the global electronics, semiconductor, thin-film, and thermal management markets. Products include solders and fluxes; brazes; thermal interface materials; sputtering targets; indium, gallium, germanium, and tin metals and inorganic compounds; and NanoFoil®. Founded in 1934, Indium has global technical support and factories located in China, Malaysia, Singapore, South Korea, the United Kingdom, and the USA.

For more information about Indium Corporation, visit www.indium.com or email abrown@indium.com. You can also follow our experts, From One Engineer To Another® (#FOETA), at www.facebook.com/indium or @IndiumCorp.

HERMETIC SOLUTIONS GROUP

Enabling Technology

At Hermetic Solutions Group, we solve problems. We were formed in 2016 specifically to provide a comprehensive offering that houses and protects microelectronics in the world’s most extreme environments to maximize performance and life. With a common focus of putting our customers at the center of everything we do, our four companies employ proprietary technologies, best practices engineering and specialized manufacturing to get it right for you the first time, every time and on-time.

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Electronics Cooling magazine has been providing a technical data column since 1997 with the intent of providing you, the readers, with pertinent material properties for use in thermal analyses. We have largely covered the most common materials and their associated thermal properties used in electronics packaging.

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(all times US EST)	DAY THREE Thursday, November 12
1:00 PM	Panel Discussion: “*What will Thermal Design Look Like in 2030?*” Advances in digital technologies, such as additive manufacturing, digital twins, and artificial intelligence for design optimization, advanced material development, etc., are changing the landscapes of, and blurring the boundaries between, the activities of designing, manufacturing, testing and integrating new systems. Thermal design is often at the forefront of applying these developing technologies into new products. This panel discussion will explore how advances in these technologies may change how engineers of the next decade develop and implement new designs. Moderated by: Ross Wilcoxon, Collins Aerospace Panelists include: Peter de Bock, Advanced Research Projects Agency–Energy (ARPA-E) Katie Kirsch, Raytheon Technologies Research Center (RTRC) Lieven Vervecken, Diabatix nv
2:00 PM	Azita Soleymani, Electronic Cooling Solutions, Inc. *"A Digital Twin Model of a Li-ion Battery Pack in Electric Cars as a Reliable and Cost-efficient Tool to Monitor Real-time Temperature"*
2:30 PM	Byron Blackmore, Mentor, A Siemens Business *"Reduced Order Modeling to Integrate 3D Models in 1D Tools"*
3:00 PM	BREAK
3:30 PM	Tejas Shah, Devdatta Kulkarni, Intel Corporation *“Innovative Liquid Cold Plate for Cooling High-powered and Highly Non-uniform Microprocessors”*
4:00 PM	Husam Alissa, Microsoft Corporation *"Liquid Cooling in the Cloud"*
4:30 PM	Kourosh Nemati, Future Facilities *"Integrated 1D/3D Co-Simulation for Liquid Cooled Systems: A Requirement for Accurate Modeling from Chip to Chiller"*
5:00 PM	ADJOURN

Vendor Sponsors

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Alpha Novatech, Inc. is your partner for Thermal Solutions.

We offer a wide variety of standard heat sinks and accessories. Our product line includes natural convection, forced convection, and active heat sinks. We also offer various attachment methods and hardware for almost any application. In addition, we can offer free heat sink thermal simulations. Standard or custom heat sinks in prototype to production quantities Quick and easy customization without NRE fees, while featuring short lead times Standard parts are carried in stock Lead time for custom parts of 1-2 weeks is possible for initial quantities.

ThermAvant Technologies, LLC designs, develops and delivers custom thermal solutions to improve size, weight, performance and/or costs of advanced energy and technology platforms. The leading provider of Oscillating Heat Pipe products, ThermAvant also offers custom Cold Plates, Ejector Refrigerators, and Design & Engineering services.

Laird™

Laird Performance Materials enables high-performance electronics. We create advanced protection solutions for electronic components and systems. World-leading technology brands rely on us for improved protection, higher performance and reliability, custom structural designs and faster time-to-market. We solve design issues through innovative products such as EMI suppression or absorption materials, thermal interface materials, structural and precision metals, magnetic ceramic products, and multi-functional solutions. This latter product family solves multiple EMI, thermal, and structural design issues simultaneously using a single process solution.