



SEMI-THERM® Thermal Technologies Workshop

December 7-9, 2021

In-Person Workshop: Microsoft Corporate Conference Center, Redmond WA USA

Announcement and Call for Abstracts

Abstracts for presentations may be submitted to:

Dave Saums, DS&A LLC, General Chair • Email: dsaums@dsa-thermal.com

Vadim Gektin, Qualcomm Technologies, Inc., Program Chair • Email: atwprogramchair@gmail.com

ABSTRACT DEADLINE: September 24, 2021

Abstracts are solicited for technical presentations on electronics thermal management topics for presentation at this annual advanced technology workshop (see reverse for more detail):

- Advanced thermal interface materials developments, testing, and characterization
- Developments in CTE-matched thermal composites, graphite, and related heat spreader materials
- Applications for vapor chambers and heat pipe assemblies
- Single- and two-phase liquid cooling systems developments
- Commercial and military/aerospace thermal solutions
- Developments in power semiconductor thermal solutions
- Innovations in CFD thermal modeling and characterization tools

Keynote Presentations: 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, HPE/Hewlett Packard Laboratories, HP Systems Research Labs, IBM Corporation, Intel Corporation, Microsoft, Qualcomm Technologies, Samsung (Korea), and other organizations. In 2019, this Workshop moved to the Microsoft Corporation Conference Center on the Microsoft headquarters campus, near Seattle WA. We set a new attendance record, added more technical exhibits, and had outstanding response from everyone.

Conference Venue: Each year, authors and attendees find this workshop format to be a highly effective forum for announcement of new developments and new challenges, *and an excellent networking opportunity* between all participants. We are returning to the Microsoft Conference Center in Redmond for 2021, an exceptional facility with excellent presentation facilities. The very large conference room allows all seating to be arranged classroom style with tables and power ports for notebook PCs, tablets, and phones.

Exhibits: Tabletop exhibits are set up around the periphery of the conference room. This allows all exhibitor personnel to also view and listen to the technical session presentations. Break times for breakfast, lunch, and dinner each day are established to allow attendees to visit and discuss topics with exhibit personnel. *We have doubled the presentation room space for 2021 and this will allow room for additional tabletop exhibits and for all lunches and dinners to be set up at separate tables, with the buffet service, in the adjoining space to the presentation room.*

Headquarters Hotel: We will encourage all attendees to register at the TTW headquarters hotel, the Seattle Marriott Redmond; this full-service Marriott is four miles from the Microsoft headquarters campus and we are anticipating organizing evening activities at the hotel.

Pandemic Restrictions: Microsoft will require all visitors to company facilities to upload an image of proof of vaccination, before entry can be granted. We have a back-up plan for use of the Seattle Marriott Redmond conference facilities, if the Covid-19 Delta variant upsurge results in more restrictions. We must be prepared to be flexible and will advise all registrants of any change and any new procedures, as we know of them.

Additional information and registration will be available at a later date at: www.semi-therm.org.

ABSTRACTS ARE SOLICITED IN THE FOLLOWING AREAS:

- **Market drivers:** Understanding thermal challenges and business/economic drivers that influence change in electronic systems design and manufacturing – and how these impact thermal design requirements. Developing market trends, market segmentation, cost drivers and reliability factors are examples of topics that set the framework for where and what types of new technical solutions are viable.
- **Stacked-die packaging:** Advanced packaging technologies, such as System-In-Package, Multi-chip modules, Multi-package modules, and stacked-die packaging provide significant opportunities for miniaturization and performance enhancements. These technologies introduce significant thermal and interconnect challenges that must be balanced against those benefits and require continuing new developments in materials and solutions.
- **Mobile and handheld devices:** Wearables, mobile, medical devices, small displays, tablets, notebooks, AR headsets, and other consumer and mobile devices introduce unique component- and system-level thermal challenges that require novel design approaches and materials.
- **Wireless and telecom infrastructure:** High performance telecom hardware have challenging component and system level requirements that require technical advances to meet the evolving needs for routers, networked systems, and base stations.
- **Power semiconductor thermal components, systems, and solutions:** Developments in IGBT thermal management and packaging strongly influence advances in electronic and electrical drive systems, especially important in the EV/HEV and renewable energy markets.
- **Mil/Aerospace:** Avionics, RF, energy, and microwave components and modules for phased array radar, countermeasures, communications, and other systems, requiring advanced thermal management as well as high-temperature materials and packaging.
- **System-level cooling:** The thermal design of complex systems, such as high-performance computing systems, relies on extensive component- and system-level thermal management analysis to address the broad spectrum of issues that entail a comprehensive system design.
- **Data center cooling:** Data center cooling includes a variety of design optimization activities including cooling provisioning, airflow control, temperature distribution and migration paths that range from forced air convection to system liquid cooling.
- **Liquid cooling, phase-change, and refrigeration:** Advanced cooling methods that use liquid, latent heat and/or active cooling provide opportunities for enhanced performance and design flexibility. Effective designs must balance these advantages against factors including life-cycle cost, reliability and serviceability impact.
- **Thermal interface materials (TIMs) and testing:** Advanced thermal interface materials that may include organic, metallic, graphitic materials in bulk form as well as nanoscale are enabling significant advances in the thermal management of high-performance processors, memory, telecom, IGBT, RF, and microwave components and systems. Effective testing is critical in determining the suitability of a TIM for a given application.
- **CTE-matching and high thermal conductivity materials:** Metallic, ceramic, and composite materials have been engineered to exhibit excellent thermal conductivity with controlled coefficient of thermal expansion (CTE) properties to allow for better matching with GaN, SiC, silicon, or ceramic materials to reduce thermal stresses in component packaging.

Preparation of Abstract

Speakers should submit one copy of a two-paragraph abstract that describes their proposed 25-minute presentation no later than **September 18, 2021**. NOTE: No formal technical manuscript is required. A post-conference download that includes presentation materials, as provided by the authors, will be sent to all attendees approximately two weeks after the event. Speakers will be asked to sign a permission to publish statement. Abstracts may be submitted to the general and program chairs. An abstract submittal page will also be available at a later date on the SEMI-THERM Educational Foundation website (www.semi-therm.org). Accepted presentations may be considered for subsequent publication with a full manuscript in the annual SEMI-THERM Symposium and can be accessed after the Workshop on the SEMI-THERM Engineering Library archived website, with a passcode.

Student Abstract Competition

We anticipate holding a student abstract competition again for 2021, as we have since 2004. This will include cash stipends for winning graduate and undergraduate science and engineering student presentations. Stipends are funded by sponsor companies, accompanied by waiver of registration fees.

Organizing Committee

Herman Chu

Vadim Gektin, Principal Engineer, Qualcomm Technologies, Inc.

Katie Kirsch, Senior Research Engineer, Raytheon Technologies Research Center

Bill Maltz, President, Electronic Cooling Solutions, Inc.

Nader Nikfar, Director of Engineering - Thermal, Qualcomm Technologies, Inc.

Devin Pellicone, Lead Engineer – Product Development, Advanced Cooling 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, Technical Fellow, Collins Aerospace, Inc.

Any questions may be addressed to:

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