

# SEMI-THERM® 34

## Panel Discussion

Thursday March 22, 2018 2:00p.m - 4:00p.m.

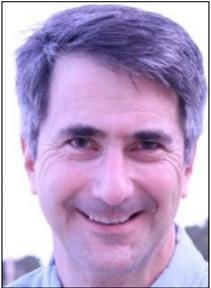
### Challenges in Consumer Electronics Cooling

"Challenges in Consumer Electronics Cooling" will address how current challenges are being met and will emphasize future challenges, how they are framed, and what approaches and technologies might be applied to overcome them. Each panelist will give a 10 minute presentation from their perspective, with 30 minutes for audience questions.

#### Moderator: Mark Carbone, Intel

Co-Topic Champions: Consumer Electronics

William Maltz, President, Electronic Cooling Solutions, [wmaltz@ecooling.com](mailto:wmaltz@ecooling.com)  
and Mark Carbone, Senior Thermal Engineer, Intel, [mark.carbone@intel.com](mailto:mark.carbone@intel.com)



**Mark Carbone**, is a member of Client Research & Development at Intel.

His heat transfer work spans 35 years as both a manager and a design engineer. It includes electronics cooling and temperature control designs for everything from phones and tablets to mainframes and one supercomputer. Highlights include jet impingement liquid cooling for high power multi-chip modules, cooling and control system responsibility for all Macintosh computers at Apple, heat sink design and manufacture, and architecture of the industry's first single touch full wafer tester. His qualifications include a BS in Mechanical Engineering, 2nd concentration in Physics at the University of Hartford, an MS in Mechanical Engineering from the Rensselaer Polytechnic Institute and an MBA in Management from New York University.

He has 13 issued patents.



**William Maltz** is the president and founder of Electronic Cooling Solutions, and has over 30 years of experience in thermal management of electronic systems. Mr. Maltz has worked on the design of thermal solutions for products that range from low power consumer products to high performance multiprocessor computer systems and high-end core routers. His technical responsibilities include managing multiple projects and working closely with engineering management at a number of companies.

Mr. Maltz has been an active organizer for SEMI-THERM and the IMAPS Advanced Technical Workshop on Thermal Management. He is also a co-author for a number of technical papers.

#### Panelists:



**Andy Delano** leads the Microsoft surface team's thermal architectural efforts primarily focusing on the Pro product line. Prior to joining Microsoft in 2012, Andy managed an r&d team within Honeywell's specialty materials division developing and launching highly successful products for the electronics packaging industry. Andy started his career in 1998 as a thermal engineer at Hewlett-Packard working on enterprise server and workstation thermal design. While at HP, Andy was also an adjunct professor at CU and taught heat transfer, thermodynamics, and thermal systems design between 1999 and 2005. Andy obtained his Ph.D. In mechanical engineering from Georgia tech in 1998 and his thesis was on a single pressure absorption refrigerator originally patented by Albert Einstein. During the first part of his graduate studies, Andy also worked on the design and production of the 1996 Olympic Torch and spent 6 weeks traveling with the torch relay.

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Panelists (continued):



**Jie Yang** is a Staff Thermal Engineer with Huawei.

He holds a Ph.D. from Huazhong University of Science and Technology in Wuhan, with an undergraduate degree from University of Science and Technology Beijing.

Specializations include:

- Software & hardware thermal management and coupling design
- Thermal modeling methodology and model extraction for dynamic compact thermal model in both chip and system levels
- Thermal behavior for phase-changing material and its application for electronic devices



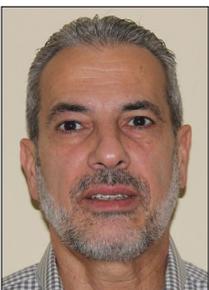
**Emil Rahim** is a senior thermal engineer at Google, leading the thermal architecture of multiple consumer devices. Prior to joining Google, Emil worked as a thermal engineer,

with focus on consumer electronics, at Electronics Cooling Solutions, Qualcomm, Amazon's Lab126, and GoPro. Emil holds a PhD degree in mechanical engineering from the University of Maryland, he authored and co-authored five journal articles, thirteen conference publications, and four published US patents.



**Guy Wagner** is a Director at ECS in their Rocky Mountain Office, and has 45 years of experience in the electronics industry. His experience includes: IC and system cooling and packaging technology, disk drive design, computer system design, and design of telephone switching systems. He is an expert in cooling of electronics systems and IC packages. Guy has authored and presented 40 papers at international technical conferences and has 29 patents.

Prior to joining ECS, Mr. Wagner was Chief Scientist at HP in Fort Collins and a Member of the Technical Staff as Bell Laboratories. Mr. Wagner received his MS in Mechanical Engineering at Iowa State University.



**Gabriel Khouri** is a Director of Engineering - Drone Development at Intel. He has led thermal mechanical engineering for over 25 years. In the last five years, he led teams in product design exploration, feasibility, and innovation in various electronics industries such as mobility/ converged computing, ambient compute, virtual reality, and drone technology. Prior to Intel, Mr. Khouri led the product development of high volume consumer electronics at Motorola where he played a major role in the introduction of a multitude of products to the global market.

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