



## WELCOME TO 70<sup>th</sup> ELECTRONIC COMPONENTS & TECHNOLOGY CONFERENCE (ECTC)

### Special Sessions

Program Chair

*Rozalia Beica*

AT&S Austria

Special Session Sponsors:



## INNOVATIVE HETEROGENEOUS INTEGRATION TECHNOLOGIES INITIATE A NEW SEMICONDUCTOR ERA



Douglas Yu  
TSMC

**Presented by: Douglas Yu**

**Taiwan Semiconductor Manufacturing Company  
(TSMC)**



### **About:**

In the supply chain for IC, which follows the path of Moore's Law with system-on-chip, packaging technology used to play mainly a protection role. Chip scaling is becoming more challenging and, at the same time, integration of more functions such as memory, sensors and passives, as well as other components for new applications such as AI and 5G, etc. is required. Innovative heterogeneous integration technologies are being proposed for system-on-package to provide critical Performance, Power and Area (PPA) values for the micro-systems. New, far-reaching changes are being made, which initiate an exciting new semiconductor era and create a new industry landscape.

## BRIDGE TO QUANTUM COMPUTING



**Nicholas Bronn**  
IBM Research



**Pavel Roy Paladhi**  
IBM Systems

### About:

Quantum computers can provide a platform to solve hard problems which are computationally intractable with traditional computer architecture. Research on quantum computing over the past few decades has led to many breakthroughs and as a result, the field of quantum computing has come to a stage where implementing quantum computers to solve real life problems on a large scale is drawing nearer and nearer. However, to exploit the full potential of this emerging field, quantum computing needs to seamlessly integrate with traditional computer hardware and architecture.

This session will focus on quantum computer systems and how they relate to traditional computing systems. Areas that need to be researched and tailored to prepare for large scale quantum computation implementation of higher time complexity algorithms will be identified. Aspects of both hardware and software development will be explored. Experts from the industry and academia will present and discuss some of the key challenges and directions that the research should be focused on. It is anticipated that this topic will become very significant to the computer packaging industry as well as the quantum computing world and this panel gives an opportunity for the ECTC community to be informed and ready to contribute.

### Chairs:

Nicholas Bronn – IBM Research  
Pavel Roy Paladhi – IBM Systems

### Panelists:

Nicholas Bronn – IBM Research Yorktown Heights  
Paul Franzon – North Carolina State University  
Amir Jafari-Salim – SeeQC  
Rabindra Das – MIT Lincoln Laboratory

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## CUTTING-EDGE TECHNOLOGY ON INTEGRATED PHOTONICS & PACKAGING



**Rena Huang**  
Rensselaer  
Polytechnic Institute



**Harry Kellzi**  
Micropac Industries

### About:

The special session aims to capture the latest technology advancements in the fast evolving photonics areas that have wide interest to industry, academia and government laboratories worldwide. The session will comprise of two sub-sections focused on photonic integrated circuits and wideband RF over fiber circuits:

- *Photonic Integrated Circuits (PICs)* will focus on the integration of photonic integrated functions of both active and passive functions developed both in Indium Phosphide (InP) and Silicon wafer technologies for information signals transmission applications, such as tunable lasers, modulated lasers and transmitters and integrated receivers.
- *Wideband RF over Fiber Circuits* will address the conversion of electronics and electromagnetics traditional copper to light over wideband Fiber transmission with maximum BW, Low Noise Figure and High dynamic range of various applications, such as Microwave links, SATCOM, Wireless communications and others.

Invited speakers will discuss various photonic related topics, sharing their visions on the technology advancement and future trends.

### Chairs:

Harry Kellzi – Micropac Industries  
Rena Huang – Rensselaer Polytechnic Institute

### Panelists:

Daniel Egger - IBM  
Milan Mashanovitch – Freedom Photonics  
*Additional Speakers to be announced*

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**Kitty Pearsall**  
Boss Precision, Inc.



**Cristina Amon**  
University of Toronto

## DIVERSITY AND INCLUSION DRIVES INNOVATION AND PRODUCTIVITY

### About:

Diversity in today's workplace and academia must be more inclusive than just race, gender, and ethnicity. There are religious, political, educational, and cultural differences. Adding to this mix are varied socioeconomic backgrounds, sexual orientation, and people with disabilities. The GDP (Global Diversity Practice) Consultancy Group puts forth the following: "Openness to diversity widens our access to the best talent. Inclusion allows us to engage talent effectively. Together, this leads to enhanced innovation, creativity, productivity, reputation, engagement and results." The panel will discuss their experiences, challenges and best practices that have delivered positive outcomes.

### Chairs:

Kitty Pearsall (ECTC) – Boss Precision  
Cristina Amon (ITHERM) – University of Toronto

### Panelists:

Adeel Bajwa – Kulicke and Soffa Industries  
Allyson Hardzell – Veryst Engineering, LLC.  
Amy S. Fleisher – California Polytechnic State University  
Ivan Ndip – Fraunhofer IZM

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## 3DIC: PAST, PRESENT AND FUTURE



**Michael Mayer**  
University of Waterloo

### About:

Driven by the ever increasing degree of miniaturization and the need for lower cost, researchers and visionaries in the manufacturing of microelectronics hardware have thought of extending planar integrated circuits (ICs) into the third dimension. Such 3D IC have been the source of inspiration for technologies such as stacked die and through-silicon-via (TSV). Challenges include process economics and the power/ cooling tradeoff. This plenary session explores the evolution and state of the art of semiconductor 3D technology and discusses details of its current challenges and future promise.

### Chairs:

Michael Mayer – University of Waterloo

### Panelists:

Douglas Yu – TSMC

Eric Beyne – IMEC

Mitsumasa Koyanagi – Tohoku University

Paul Franzon – North Carolina State University

Peter Ramm – Fraunhofer Research Institute for Microsystems and Solid State Technologies (EMFT)

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## FUTURE SEMICONDUCTOR PACKAGES FOR ARTIFICIAL INTELLIGENCE HARDWARE



**Yasumitsu Orii**  
Nagase



**Shigenori Aoki**  
Fujitsu

### About:

An overwhelming amount of data is generated daily, out of which 90% is unstructured. Such data cannot be easily stored in a traditional column-row database, therefore, it is not easily searchable and more difficult to analyze. Today, artificial intelligence (AI) has the ability to analyze unstructured data, however, it also requires a high amount of energy. AI is expected to become one of the biggest energy consumers on the planet. A brain-inspired devices and quantum devices are very attractive to support a future AI due to its low power consumption. In this session, the panelists will discuss the future semiconductor packages in the era of a brain-inspired devices and quantum devices.

### Chair:

Yasumitsu Orii – Nagase  
Shigenori Aoki - Fujitsu

### Speakers:

Hiroyuki Akinaga – The National Institute of Advanced Science and Technology (AIST)  
Rama Divakaruni – IBM T. J. Watson Research, Albany NY  
Subramanian S. Iyer – University of California, Los Angeles, “CHIPS”  
Swaminathan Madhavan – Georgia Institute of Technology  
Takashi Hisada – IBM Research Tokyo

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## HETEROGENEOUS INTEGRATION ROADMAP WORKSHOP

### THE NEXT PHASE OF INNOVATION: HETEROGENEOUS INTEGRATION

#### About:

The Heterogeneous Integration Roadmap (HIR), released October 2019, is a roadmap to the future of electronics identifying technology requirements and potential solutions. The primary objective is to stimulate pre-competitive collaboration between industry, academia and government to accelerate progress. The roadmap offers professionals, industry, academia and research institutes a comprehensive, strategic forecast of technology over the next 15 years. The HIR also delivers a 25-year projection for heterogeneous integration of Emerging Research Devices and Emerging Research Materials with longer research-and-development timelines. With the release of the 2019 HIR edition, the preparation of the 2020 edition is well underway.

This HIR workshop @ECTC 2020 will feature speakers from all 22 chapters in 4 separate sessions together with an HIR overview presentation. They will describe their work in HIR 2019 and their focus for HIR 2020. The purposes for the HIR workshop are to broaden the proliferation of the roadmap content to the virtual ECTC 2020 participants for dialogue and feedback for inclusion into the 2020 edition.

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#### Moderators



**Amr Helmy**  
Univ. of Toronto



**Bill Bottoms**  
3MT Solutions



**Ravi Mahajan**  
Intel



**Tom Salmon**  
SEMI



**William Chen**  
ASE

*Additionally, several industry experts will participate and present during this workshop*