



# 1<sup>st</sup> BUILD-UP SUBSTRATE SYMPOSIUM

In person event

May 2<sup>nd</sup>-3<sup>rd</sup> 2024

SEMI, 673 S. Milpitas Blvd

Milpitas, CA 95035



## Organizing Committee



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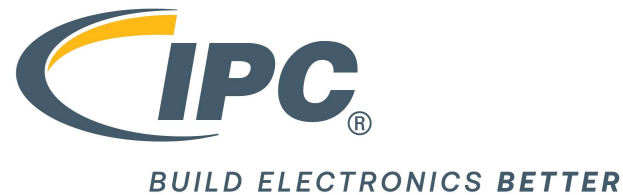
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Applied Materials



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DAY 1 Program  
 May 2, 2024  
 at  
 SEMI  
 673 S. Milpitas Blvd  
 Milpitas, CA 95035

May 2nd Thurs	Schedule	Speakers	Affiliation	Talk Title
Opening	8:30am	Habib Hichri	Ajinomoto	Opening and BUSS program
Keynote I	8:45am	Daniel Berger	NAPMP, Associate Director	Keynote:NAPMP Plans & Advanced Substrate Onshoring
Keynote II	9:30am	D.C. Hu	SiPlus, Founder	2.XD Integrated Substrate Solutions for High Performance Computing
	10:15am	<i>Tea Break</i>		
Substrate Manufacturing & Onshoring (Chair: Rozalia Beica)	11:00am	Sundar Kamath	Sanmina	An American PCB Manufacturer's Perspective on the Domestic Substrates Manufacturing Opportunity
	11:20am	Meredith LaBeau	Calumet, CTO	Onshoring Organic Substrates (High-Density Build-Ups):A tale of Domestic Manufacturing & Title 3 Investments
	11:40am	Sung Jin Kim	Absolics, CTO	Packaging Substrate Solutions for Advanced Packaging Requirements
	12:00pm	Michael Gleason	GreenSource Fabrication	DPA Title III Expansion Update
	12:20pm	<i>Lunch from Dish Dash</i>		
Materials Advances for Substrates (Chair: Annette Teng)	1:30pm	Yishio Nishimura	Ajinomoto	Advanced Insulating Material for Next Generation Packaging
	1:50pm	Yuta Ogawa	Taiyo Ink	Taiyo's Photo-Dielectric for High Density Substrate Applications
	2:10pm	Fukui Masato	Resonac	Substrate Materials for Advanced Packaging
	2:30pm	Hikaru Mizuno	JSR Micro	Novel Low Loss Materials for Advanced IC Packaging
Emerging Substrate Technologies (Chair: Steven Verhaverbeke)	2:50pm	Steven Verhaverbeke	AMAT	Wafer Level Substrates – An Emerging New Technology
	3:10pm	Farhang Yazdani	BroadPak	Advanced X64 UCle Interface Implementatio on a Substrate
	3:30pm	Ken Yang, Vineeth Harish	UCLA	Chiplet Integration on Organic Buildup with Silicon Interconnect Fabric
	3:50pm	<i>Tea Break</i>		
"Substrate Needs: User Perspective" Panel session moderated by Jan Vardaman	4:30pm	Sai Boyapati	AMD, Sr. Dir. Adv. Pkg.	<b>Substrate Needs: The User Perspective</b>
		<a href="#">Diane Peng</a>	Marvell	
		<a href="#">Omar Bchir</a>	Qualcomm	
		<a href="#">Susan Bagen</a>	Raytheon, Microelectronics Cstt.	
		Jon Woodyard	Microsoft, Principal Engineer	
	5:30pm	<i>Barbecue Dinner catered by Armadillo Willy's</i>		

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DAY 2 Program  
 May 3, 2024  
 at  
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May 3rd Friday	Schedule	Speakers	Affiliation	Talk Title
Keynote I	9:00am	Venky Sundaram	3D System Scaling	USA Landscape for Substrate Manufacturing
Keynote II	9:35am	Rahul Iyer	KCK Group	Venture Funding for startups
	10:10am	30 minutes Coffee/Tea break		
Panel Equipment for Substrates (Chair: <b>Kuldip Johal</b> )	10:40am	Kyle Baker	MKS Instruments	QCW CO2 laser drilling for FCBGA applications.
	11:00am	Takuma Yoshikawa	Nikko Materials	The Latest Vacuum Lamination Challenges and Technology
	11:20am	Frank Bruening	MSD-Atotech	Systems solutions for Advanced IC substrate manufacturing
	11:40pm	Rozalia Beica	LQDX	The Future of AI and HPC Substrates: A Breakthrough Interconnect Technology
	12:00pm	60 minutes Lunch		
Panel Equipment and Technologies for Substrates (Chair: <b>Kuldip Johal</b> )	1:00pm	Harish V Penmethsa	Applied Materials	Metallization Technologies for Advanced Substrates
	1:20pm	Keith Best	Onto Innovation	Challenges for Organic & Glass Core Substrates as Advanced Packaging RDL Approaches < 2 μm L/S
	1:40pm	Gustavo Ramos	Green Source Engineering	Manufacturing with Zero Liquid Discharge (ZLD)
	2:00pm	Saminda Dharmarathna	MacDermid Alpha	Advanced Electroplating Processes for IC Substrates – Redistribution Layer and Embedded Trenches
	2:20pm	Purnima Narayanan	YES	Advanced packaging metallization-Substrate interaction with catalyst & electroless deposition of Cu
	2:40pm	20 minutes Tea break		
Inspection and Testing (Chair: <b>Farhang Yazdani</b> )	3:00pm	Robert Bishop	Beltonics	Advanced Metrology for High Density Substrates
	3:20pm	Orit Hava Armon Hershkovich	KLA Corporation	Inspection challenges in ICS & Advanced panel packaging markets
“Empowering Startups in Advanced Substrates: A Key Component in US Onshoring” Panel session moderated by <b>Venky Sundaram and Kuldip Johal</b>	3:40pm-4:40pm	Simon McElrea	LQDX	Empowering Startups in Advanced Substrates: A Key Component in US Onshoring Supply chain innovations
		Sam Salama	Hyperion	
		Tristan O. El Bouayadi	Thintronics	
		Siddharth Ravichandran	Chipletz	Empowering Startups in Advanced Substrates: A Key Component in US Onshoring Substrate and Design Innovations
		Brett Sawyer	Nubis Communications	
Michael Gleason	GreenSource Fabrication			
<b>Book Raffle &amp; Closing</b>	4:40pm	Habib Hichri	Ajinomoto Fine Techno USA Corp	Closing Remarks



## DAY 1 TECHNICAL SESSION

# Substrate Manufacturing & Onshoring



Rozalia Beica  
[rozalia@LQDX.com](mailto:rozalia@LQDX.com)  
Chief Commercial Officer  
LQDX

IC Substrates, essential for the production of semiconductors and electronic devices, have historically been sourced from overseas markets, primarily in Asia. However, vulnerabilities exposed by supply chain disruptions have prompted a renaissance in domestic manufacturing initiatives. In this session, experts and industry leaders will address the role of technology and innovation in driving the substrate manufacturing and onshoring in US.

May 2nd	Schedule	Speakers	Affiliation	Talk Title
<b>Substrate Manufacturing &amp; Onshoring</b> (Chair: Rozalia Beica)	11:00am	Sundar Kamath	Sanmina, CTO	An American PCB Manufacturer's Perspective on the Domestic Substrates Manufacturing Opportunity
	11:20am	Meredith LaBeau	Calumet, CTO	Onshoring Organic Substrates (High-Density Build-Ups): A tale of Domestic Manufacturing & Title 3 Investments
	11:40am	Sung Jin Kim	Absolics, CTO	Packaging Substrate Solutions for Advanced Packaging Requirements
	12:00pm	Michael Gleason	GreenSource Fabrication, Director Product Development	DPA Title III Expansion Update



## DAY 1 TECHNICAL SESSION

# Materials Advances for Substrates



Annette Teng  
[ateng@sunypoly.edu](mailto:ateng@sunypoly.edu)  
Director of Package Integration  
AIM Photonics, TAP Facilities

May 2nd	Schedule	Speakers	Affiliation	Talk Title
Chair: Annette Teng	1:30pm	Yishio Nishimura	Ajinomoto	Advanced Insulating Material for Next Generation Packaging
	1:50pm	Yuta Ogawa	TaiyoInk	Taiyo's Photo-Dielectric for High Density Substrate Applications
	2:10pm	Fukui Masato	Resonac	Substrate Materials for Advanced Packaging
	2:30pm	Hikaru Mizuno	JSR Micro	Novel Low Loss Materials for Advanced IC Packaging

This session will focus on development of new organic dielectric materials for high density build-up substrate. There are challenges to find materials for thinner and stronger substrate while increasing the formfactor to support more and larger chiplets with good manufacturing yields and device performance. The race to find viable materials and processes with properties to support high transmission speed with low loss approaching <3um line space width will be presented.



# DAY 1 TECHNICAL SESSION

## Emerging Substrate Technologies



Steven Verhaverbeke  
[Steven\\_Verhaverbeke@amat.com](mailto:Steven_Verhaverbeke@amat.com)  
Applied Materials

May 2nd	Time	Speakers	Affiliation	Talk Title
Chair: Steven Verhaverbeke	2:50pm	Steven Verhaverbeke	AMAT	Wafer Level Substrates – An Emerging New Technology
	3:10pm	Farhang Yazdani	BroadPak	Advanced X64 UCle Interface Implementation on a Substrate
	3:30pm	Ken Yang, Vineeth Harish	UCLA	Chiplet Integration on Organic Buildup with Silicon Interconnect Fabric

This session will focus on Novel Substrate Technologies that have the potential to bring back Substrate Technologies to the USA. The first talk in this session will introduce Wafer-Level Substrates and contrast this against the current incumbent Panel-Level Substrates with existing installed base in Asia. The second talk in this session will introduce novel substrate finishing structures to enable die bumping on substrates with a <math><10\mu\text{m}</math> pitch. The final talk in this session will introduce novel technologies to enable UCle connectivity between dies directly on substrates without any Si interposer or RDL interposer.



# DAY 1 PANEL SESSION

## Substrate Needs: The User



Jan Vardaman  
[jan@techsearchinc.com](mailto:jan@techsearchinc.com)  
President  
TechSearch International, Inc.

Moderator	Time	Panelist	Affiliation	Title
Jan Vardaman	4:30pm to 5:30pm	Sai Boyapati	AMD	Senior Director Advanced Packaging
		Diane Peng	Marvell	Senior Principal Engineer
		Omar Bchir	Qualcomm	Senior Director of Engineering, Package Process & Technology
		Susan Bagen	Raytheon	Microelectronics Consultant
		Jon Woodyard	Microsoft	Principal Engineer

Substrates are required to support high-performance compute and telecom, automotive electronic, consumer, defense, and medical applications. Regardless of the interposer technology, silicon or redistribution layer substrates, attachment to a build-up substrate creates the final package. There is also interest in continuing direct chip attach to a high-density organic substrate, with options including a glass core. This panel provides substrate user perspectives on feature size requirements today and tomorrow. Highlighted is a discussion on requirements to be a substrate supplier in the different applications. Reliability requirements and any special substrate needs are described. Consideration of geographic location for substrate suppliers is addressed.





Jan Vardaman  
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President  
TechSearch International, Inc.

## Day 1 Panel session Substrate Needs: The User Perspective

### Panelists from AMD, Marvell, Qualcomm, Raytheon & Microsoft will address topics on

- a) What substrate density is required to meet needs over the next few years for your applications? (L/S, Via/pad)
  - Does the use of an interposer reduce the demands on feature size?
- b) Where does glass core or glass substrate fit in advanced packaging and what are the key applications that will drive its development?
  - When do you expect this technology to be ready?
- c) What board-level reliability requirements do you require or do you look at BLR data when considering substrate supply? What other considerations are important to be a substrate supplier? Is geographic location a consideration?
- d) What process and metrology tools are needed to improve yield for large, high-layer count, high-density substrates?
- e) What is required to build a North American advanced packaging ecosystem that includes substrate manufacturing
  - What are the major challenges?

## DAY 2 SESSION



### Panel Equipment and Technologies for Substrates (Chair: Kuldip Johal)

The focus of the session is equipment / processes used for IC substrate manufacturing for current POR HVM and next generation. We have leading industry experts from the supply chain to provide incite to IC substate tools.

May 3rd Friday	Schedule	Speakers	Affiliation	Talk Title
Panel Equipment and Technologies for Substrates (Chair Kuldip Johal)	10:40am	Kyle Baker	MKS Instruments	QCW CO2 laser drilling for FCBGA applications.
	11:00am	Takuma Yoshikawa	Nikko Materials	The Latest Vacuum Lamination Challenges and Technology
	11:20am	Frank Bruening	MSD-Atotech	Systems solutions for Advanced IC substrate manufacturing
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	12:00pm	60 minutes lunch		
Panel Equipment and Technologies for Substrates (Chair: Kuldip Johal)	1:00pm	Harish V Penmethsa	Applied Materials	Metallization Technologies for Advanced Substrates
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	1:40pm	Gustavo Ramos	Green Source Engineering	Manufacturing with Zero Liquid Discharge (ZLD)
	2:00pm	Saminda Dharmarathna	MacDermid Alpha	Advanced Electroplating Processes for IC Substrates – Redistribution Layer and Embedded Trenches
	2:20pm	Purnima Narayanan	YES	Advanced packaging metallization-Substrate interaction with catalyst & electroless deposition of Cu



# DAY 2 TECHNICAL SESSION INSPECTION AND TESTING



Farhang Yazdani  
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President & CTO  
Broadpak

May 3rd Friday	Schedule	Speakers	Affiliation	Talk Title
Inspection and Testing (Chair: Farhang)	3:00pm	Robert Bishop	Beltonics	Advanced Metrology for High Density Substrates
	3:20pm	Orit Hava Armon Hershkovich	KLA Corporation	Inspection challenges in ICS & Advanced panel packaging markets

# DAY 2 PANEL SESSION

## Empowering Startups in Advanced Substrates: A Key Component in US Onshoring



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 Founder  
 3D System Scaling



Kuldip Johal  
[Kuldip.johal@atotech.com](mailto:Kuldip.johal@atotech.com)  
 Global OEM Director  
 MKS Instruments, Inc.

Moderators	Time	Panelists	Affiliation	
Venky Sundaram & Kuldip Johal	4:00pm-5:00pm	Simon McElrea	LQDX	Supply Chain Innovations
		Sam Salama	Hyperion	
		Tristan O. El Bouayadi	Thintronics	Substrate and Design Innovations
		Siddharth Ravichandran	Chipletz	
		Brett Sawyer	Nubis Communications	
Michael Gleason	Greensource			

In this panel session, we will convene a diverse group of US-based startups from across the package substrate value chain. The goal is to engage in an insightful discussion about the critical role these startups play in revitalizing US leadership in advanced packaging. The panel will feature perspectives from various angles:

**Materials and Process Tool Startups:** These startups provide essential tools and materials that enable the next generation of substrates. From novel manufacturing processes to advanced materials, they are attempting to disrupt the substrate supply chain.

**New Substrate Design and Product Startups:** These innovative companies are at the forefront of developing cutting-edge substrate designs and integrating advanced technologies such as photonics, contributing to innovations that drive power efficiency, performance enhancements, and miniaturization.

This interactive session with audience engagement will explore how startups are reshaping the landscape of advanced substrates and on shoring.

Raffle Drawing at  
5:00pm May 3<sup>rd</sup>  
Must be present to  
win 2023 book  
Autographed by  
John Lau



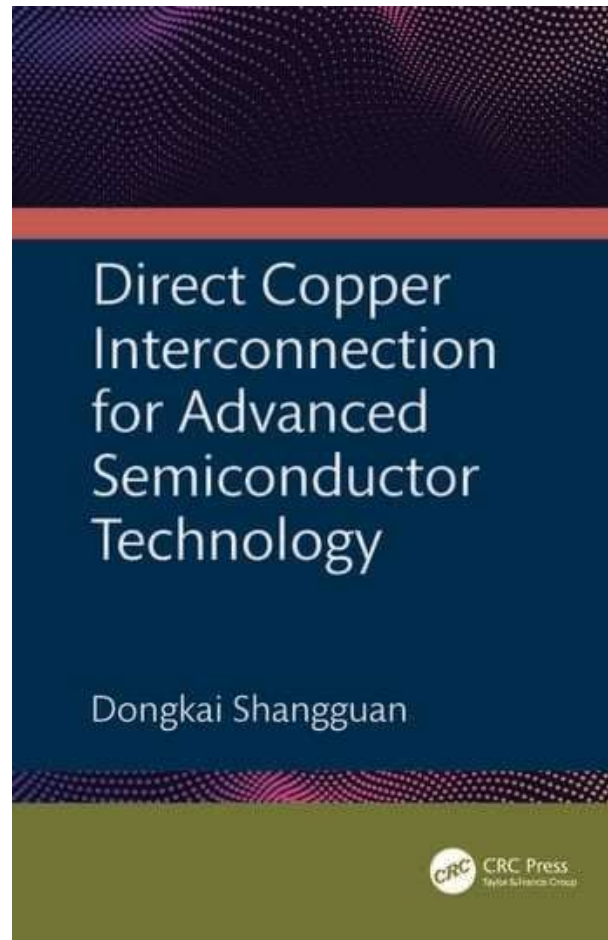
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Raffle Drawing at  
5:00pm May 3<sup>rd</sup>  
Must be present to  
win upcoming book  
By  
Dongkai Shangguan

*To be Mailed direct  
to winner*



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- Chapter 2 **Direct Copper Interconnection for Die/Wafer Bonding: Overview**  
Tzu-Heng Hung, and Kuan-Neng Chen
- Chapter 3 **Hybrid Bonding Process Technology**  
Guilian Gao and Laura Mirkarimi
- Chapter 4 **Materials for Hybrid Bonding**  
Andrea Chacko, Dongshun Bai, and Rama Puligadda
- Chapter 5 **Copper Electrodeposition for Advanced Packaging & Hybrid Bonding**  
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- Chapter 12 **Applications of Hybrid Bonding and Chiplets for Heterogeneous Integration**  
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