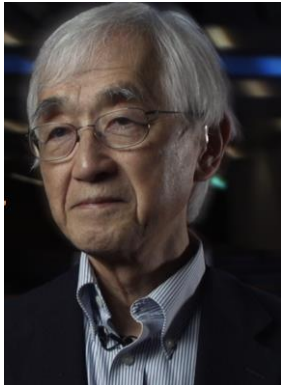


Heterogeneous Integration Roadmap (HIR)

The Heterogeneous Integration Roadmap (HIR), released in October 2019, is a roadmap to the future of electronics packaging, 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 technology forecast 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 more comprehensive research and development timelines.

Speakers Biography



William Chen (Bill) holds the position of ASE Fellow & Senior Technical Advisor at ASE Group. Prior to joining the ASE, he was Director at the Institute of Materials Research & Engineering (IMRE) in Singapore, following a distinguished career at IBM Corporation. Bill is a past President of the IEEE Electronics Packaging Society. He is a Life Fellow of IEEE and a Fellow of ASME. He received the ASME InterPACK Achievement Award in 2007. In 2018, he received the IEEE Electronics Packaging Field Award, recognizing his contribution to electronic packaging, from research & development through industrialization.

Bill chairs the Heterogeneous Integration Roadmap initiative, co-sponsored by 3 IEEE Societies (EPS, EDS & Photonics) together with SEMI & ASME Electronics & Photonics Packaging Division .



Ravi Mahajan is an Intel Fellow responsible for Assembly and Packaging Technology Pathfinding for future silicon nodes. Ravi also represents Intel in academia through research advisory boards, conference leadership and participation in various student initiatives. He has led Pathfinding efforts to define Package Architectures, Technologies and Assembly Processes for multiple Intel silicon nodes including 90nm, 65nm, 45nm, 32nm, 22nm and 7nm silicon. Ravi joined Intel in 1992 after earning his Ph.D. in Mechanical Engineering from Lehigh University. He holds the original patents for silicon bridges that became the foundation for Intel's EMIB technology. His early insights have led to high-performance, cost-effective cooling solutions for high-end microprocessors and the proliferation of photo-mechanics techniques for thermo-mechanical stress model validation. His contributions during his Intel career have earned him numerous industry honors, including the SRC's 2015 Mahboob Khan Outstanding Industry Liaison Award, the 2016 THERMI Award from SEMITHERM, the 2016 Allan Kraus Thermal Management Medal & the 2018 InterPACK Achievement award from ASME, the 2019 "Outstanding Service and Leadership to the IEEE" Awards from IEEE Phoenix Section & Region 6 and most recently the 2020 Richard Chu ITherm Award and the 2020 ASME EPPD Excellence in Mechanics Award. He is one of the founding editors for the Intel Assembly and Test Technology Journal (IATTJ) and currently VP of Publications & Managing Editor-in-Chief of the IEEE Transactions of the CPMT. He has long been associated with

ASME's InterPACK conference and was Conference Co-Chair of the 2017 Conference. Ravi is a Fellow of two leading societies, ASME and IEEE.



Dr. Bottoms received a B.S. degree in Physics from Huntington College in Montgomery, Alabama in 1965, and a Ph.D. in Solid State from Tulane University in New Orleans in 1969 and is currently Chairman of Third Millennium Test Solutions. He has worked as a faculty member in the department of electrical engineering at Princeton University, manager of Research and Development at Varian Associates, founding President of the Semiconductor Equipment Group of Varian Associates and general Partner of Patricof & Co. Ventures.

Dr. Bottoms has participated in the start up and growth of many companies through his venture capital activity and through his own work as an entrepreneur.

He has served as Chairman and CEO of many companies both public. Some of his current responsibilities include:

- Emeritus Member of the Board of Tulane University
- Co-Chair of the Heterogeneous Integration Roadmap
- Chairman of the SEMI's Awards Committee
- Member of the Board of MIT's Microphotonic Center
- Chairman of Fluence Analytics
- Chairman of the Technology Board of Tulane's POLYRMC center.
- Chairman of Third Millennium Test Solutions



Dr. Patrick McCluskey is a Professor of Mechanical Engineering at the University of Maryland, College Park and the Director of the ME Department's Design and Systems Reliability Division. He has over 25 years of research experience in the areas of thermal management, reliability, and packaging of electronic systems for use in extreme temperature environments and power applications. Dr. McCluskey has published three books and over 150 peer-reviewed technical articles with over 3000 citations. He is an associate editor of the IEEE Transactions on Components, Packaging, and Manufacturing Technology, a member of the board of governors of the IEEE Electronic Packaging Society, a fellow and director of IMAPS and a member of ASME and AIAA.



Dr. Helmy received my Ph.D. from the University of Glasgow. After, he joined Agilent labs in the UK working for the semiconductor product group. He now leads a group in Photonics at the University of Toronto. His research interests include photonic device physics, with emphasis on plasmonics, nonlinear and

quantum photonics for applications in information processing and sensing. He represents the IEEE Photonics Society within the IEEE Quantum Initiative, and I am Co-Chair of the HIR also representing the Photonics Society.