

## PLATFORMS FOR GROWTH

**Co-Organized By:**  
**The MIT Microphotonics Center · iNEMI · NIST-AMTech · PSMC**

*Photonic components are being deployed to meet the energy, bandwidth density and latency requirements for Information System scaling.*

- *The number of photonic components deployed in IT systems is increasing.*
- *The contribution of photonics to system cost is becoming significant.*
- *If a common manufacturing platform is shared across the industry, one can expect that cost reduction will scale with manufacturing volume.*

*High volume production will establish a global learning curve for photonic system manufacturing that will deliver 1000x cost reduction and functionality increase during the next decade. The key technology value points during this transition are design, processing, assembly, packaging, test and Big M manufacturing. **Firms that cling to high margin, low volume paradigms will lose market share to firms that embrace the new platforms that deliver simplicity, cost reduction and fast time-to-market.** The Spring Meeting will assess this platform development with contributions from the key suppliers of materials, tools, assembly-package-test and foundry services. Each session will feature a NOW-NEXT-LIMITS Technology Roadmap to be updated during the meeting.*

### DAY 1: THURSDAY, APRIL 23

8:15      **Registration and Light Breakfast**

8:55      **Spring Meeting Context and Expectations**  
*Prof. Lionel C. Kimerling, Director, MIT Microphotonics Center*

### SESSION I: MANUFACTURING PLATFORMS AND LEARNING CURVES

PHOTONIC COMPONENTS MUST BE IN HVM AT LOW COST WITH THE HIGHEST POSSIBLE LEVELS OF INTEGRATION.

*Session Chair: Ms. Alexis Bjorlin, GM, Silicon Photonics Solutions Group, Intel Corporation*

9:00      **Introduction: The Photonic System Manufacturing Roadmap**  
*Dr. Richard Grzybowski, Director, Research & Development, MACOM Integrated Photonic Solutions*

9:05      **Commercial Silicon Photonics: Volume and Cost Targets**  
*Dr. Kal Shastri, Distinguished Engineer, Cisco*

9:30      **Optical Transceiver Trends for Data Center Applications – How Much Photonic Integration Do We Need?**  
*Dr. Robert Blum, Director of Strategic Marketing, Oclaro Inc.*

9:55      **Silicon Photonics: The Final Countdown**  
*Mr. James Kisner, Senior Vice President, Jefferies LLC*

10:20      **Break**

### SESSION II: ROADMAP EMULATORS AND COST ANALYSES

CONCEPTUAL SYSTEM PHYSICAL ARCHITECTURES SERVE AS TARGETS FOR COMPONENT ROADMAPS, AND COST MODELS SUPPORT TRADEOFF DECISIONS.

*Session Chair: Dr. Atul Srivastava, CTO, NEL-America*

10:35      **TWG Report: The Two PSMC Roadmap Emulators**  
*Dr. Robert Pfahl, Senior Consultant, iNEMI, Principal Investigator of PSMC Program*

10:40      **Heterogeneous Integration for Data Center Applications**  
*Prof. John E. Bowers, Professor, UCSB*

11:00      **Emulator #2 – IoT, Sensors**  
*Prof. Juejun Hu, Assistant Professor, MIT*

11:20      **The PSMC Microphotonics Cost Model: A Status Update**  
*Ms. Wei Yu, Graduate Student, MIT*

Appendix C: Agenda for Spring 2015 Workshop  
Le Méridien Cambridge-MIT, 20 Sidney St., Cambridge  
**April 23-24, 2015**

### **SESSION III: OPEN ARCHITECTURE SYSTEM OPTIMIZATION**

OPEN SYSTEMS ENABLE A MORE COMPETITIVE, FLEXIBLE, MULTI-VENDOR APPROACHES TO HIGH VOLUME MANUFACTURING WITH BENEFITS TO ALL PLAYERS. THE INDUSTRY MODELS FOR COOPERATION MAY NEED MODIFICATION.

*Session Chair: Dr. Rob Stone, Technical Director, Broadcom*

- 11:40 **TWG Report: Open Architecture System Optimization**  
*Prof. Lionel C. Kimerling, Director, MIT Microphotonics Center*
- 11:45 **Digital Optical Phase Locked Loop for Low Power Consumption and High-Speed Coherent Detection**  
*Dr. Tetsuya Kawanishi, Professor, NICT/Waseda University*
- 12:10 **Attendee Lunch**  
**Microphotonics Center Industry Consortium Board Meeting**

### **SESSION IV: PACKAGING OF ELECTRONIC PHOTONIC SYSTEMS**

PACKAGING OF SIPH CHIPS IS A MAJOR CHALLENGE: THERMAL, ELECTRICAL, AND OPTICAL OUTPUT FROM A SMALL MICRO-MODULE WITH STACKED DIE, ELECTRO-OPTICAL SUBSTRATE, INTERPOSER OR SOCKETED TO PWB

*Session Chair: Dr. Alan Evans, Program Director, Optical Connectivity Solutions, Corning Incorporated*

- 1:35 **TWG Report: Photonic System Packaging**  
*Dr. Bill Bottoms, Chairman, 3MTS*
- 1:40 **Packaging for Integrated Photonics and Electronics Converged Systems at PETRA**  
*Dr. Takahiro Nakamura, Chief Technology Director, PETRA*
- 2:00 **Photonic Packaging and Assembly for Cost-Efficiency and Scalability**  
*Dr. Tymon Barwicz, Research Scientist, IBM*

### **SESSION V: MANUFACTURING TOOLS: ASSEMBLY AND TEST**

NEW TOOLS WILL BE NECESSARY TO PROVIDE HVM CAPABILITY FOR COMPONENT PARTS, SUBSYSTEMS AND FINAL ASSEMBLY OF SIPH SYSTEMS. THIS WILL BE A MOVING TARGET AS COMPONENT TECHNOLOGIES CHANGE.

*Session Chair: Mr. Daniel Evans, CTO, Palomar Technologies*

- 2:20 **TWG Report: Assembly and Test**  
*Mr. Richard Otte, President and CEO, Promex Industries, Inc.*
- 2:25 **Production Test Method for Optical Interconnect Device**  
*Mr. Hidenobu Matsumura, R&D Manager, Advantest Corp.*
- 2:45 **Precision Automation**  
*Mr. Michael Chalsen, President, MRSI Systems and Mr. Cyriac Devasia, Vice President of Engineering, MRSI Systems*
- 3:05 **Technical Working Group Breakouts**
- 5:30-7:30p **Networking Reception**

Appendix C: Agenda for Spring 2015 Workshop  
Le Méridien Cambridge-MIT, 20 Sidney St., Cambridge  
**April 23-24, 2015**

**DAY 2: FRIDAY, APRIL 24**

**8:30 Light Breakfast**

**9:00 Key Points from Day 1**  
*Prof. Lionel C. Kimerling, Director, MIT Microphotonics Center*

**SESSION VI: CIRCUIT BOARDS, BACKPLANES AND CONNECTORS**

CONNECTORS WILL MOVE FROM MM TO SM, AND BACKPLANE ARCHITECTURE WILL CHANGE TO A CABLED STRUCTURE. THE REQUIRED OPCB, WITH SMT CONNECTORS IS A MAJOR CHALLENGE.

*Session Chair: Dr. Patrick Thomas, Lab Manager, E&E Group, 3M*

**9:10 TWG Report: Markets and Technology Roadmap**  
*Mr. John MacWilliams, Principal Consultant, US Competitors LLC*

**9:25 Connector and Optical Cable Technology and Manufacturing**  
*Mr. Terry Bowen, Fellow Scientist, TE Connectivity*

**9:45 Silicone Polymer Waveguides for Optical Interconnects**  
*Dr. Mustafa Mohamed, Program Manager, Dow Corning Corp.*

**10:05 Multifiber Ferrule and Connector Technology**  
*Mr. Darrell Childers, Vice President of Development, US Conec*

**10:25 Break**

**SESSION VII: MONOLITHIC INTEGRATION**

ULSI INTEGRATION OF SiPH ICs WILL BE NECESSARY TO ACHIEVE COST TARGETS. INTEGRATION MUST BE COST-EFFECTIVE, BALANCING ULSI AGAINST MULTI-VENDOR DEVICE AVAILABILITY AND SiP ASSEMBLY.

*Session Chair: Mr. Bill O'Mara, Advanced Technology Development, Analog Devices*

**10:40 TWG Report: Monolithic Photonic Integration**  
*Dr. Jurgen Michel, Senior Research Scientist, MIT Microphotonics Center*

**10:45 Silicon Photonics for Coherent Communications: Design for Manufacturing**  
*Dr. Christopher Doerr, Director of Photonic Integration, Acacia Communications*

**11:05 Silicon Photonics for Future Systems: A University Project**  
*Prof. Graham T. Reed, Professor, University of Southampton*

**11:25 Panel Discussion - Silicon Photonics: An Industry Roadmap**  
*Panel Chair: Prof. Kazumi Wada, Professor, University of Tokyo*

**11:45 Attendee Lunch**

**12:45 Technical Working Group Breakouts and Reports**

**2:45 Conference Summary**  
*Prof. Lionel C. Kimerling, Director, MIT Microphotonics Center*

**3:00 Adjourn**