MIT MICROPHOTONICS CENTER FALL MEETING

Le Méridien Cambridge-MIT, 20 Sidney St., Cambridge
November 6-7, 2014

THE TECHNOLOGY SUPPLY CHAIN

Co-Organized By:
The MIT Microphotonics Center and iNEMI
The NIST-AMTech Photonic Systems Manufacturing Consortium

Information systems are being deployed with greater fractions of photonic links as systems scale to higher bandwidth. Cost effective, high capacity manufacturing of photonic systems is dependent on i) the coordination of a technology supply chain under an inclusive Roadmap, and ii) the coordination of a vendor supply chain under efficient business practices. This meeting will examine enabling technologies for pervasive commercialization of optical interconnects and signal processors.

DAY 1: THURSDAY, NOVEMBER 6

8:15 **Registration and Light Breakfast**

SESSION I: PLENARY SESSION

THE IMPORTANCE OF INTEGRATED PHOTONICS MANUFACTURING

Session Chair: Dr. Richard Grzybowski, Director of Research and Development, MACOM Integrated Photonic Solutions

8:50 **Fall Meeting Context and Expectations**
Prof. Lionel C. Kimerling, Director, MIT Microphotonics Center

9:00 **Keynote: The State of the Industry**
Dr. Tom Hausken, Senior Industry Advisor, OIDA/OSA

9:25 **Keynote: Expectations for the Microphotonics Supply Chain**
Dr. Katharine Schmidtke, Strategic Sourcing Manager, Optical Technology, Facebook

9:50 **Break**

10:00 **Production in the Innovation Economy**
Dr. Elisabeth Reynolds, Executive Director, Industrial Performance Center, MIT

10:25 **National Initiatives in Advanced Manufacturing**
Dr. Frank Gayle, Deputy Director of the Advanced Manufacturing National Program Office (AMNPO)

10:50 **Break**

SESSION II: ROADMAPS, ROADBLOCKS AND PLATFORM SOLUTIONS

THE INDUSTRY TRANSITION TO HIGH VOLUME PHOTONIC SYSTEM MANUFACTURING

Session Chair: Dr. Frederick Sears, Research Director, Science & Technology, Corning, Inc.

11:00 **The Roadmap for Electronic-Photonic System Packaging**
Dr. Bill Bottoms, Chairman, 3MTS

11:20 **Assembly of Photonic Systems: Value Points and Roadblocks**
Dr. Richard Otte, President and CEO, Promex Industries, Inc.

11:40 **The Transition to High Volume Manufacturing of Photonic Systems**
Dr. Randolph Kirchain, Principal Research Scientist, Materials Systems Laboratory, MIT

12:00 **Attendee Lunch**
Microphotonics Center Industry Consortium Board Meeting

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SESSION III: INTEGRATED PHOTONICS MANUFACTURING

THE FOUNDRY ROLE IN RESEARCH, DEVELOPMENT AND MANUFACTURING

Session Chair: Dr. Mark Webster, Engineering Manager, Cisco Systems

2:00 ***Keynote:*** **Supply Chain Perspectives from Silicon Photonics Manufacturing: From Optical Chipsets to Modules**
Dr. Subal Sahni, Principal Engineer, Luxtera

2:25 **Integrated Photonics Fab at CNSE – SUNY Poly**
Dr. Michael Liehr, Executive Vice President for Innovation and Technology, CNSE

2:45 **European Photonic Foundry Services**
Dr. Pieter Dumon, Research Engineer, IMEC; CTO, Luceda Photonics

3:05 **The TIA-SCR R&D Foundry for Silicon Photonics**
Dr. Youichi Sakakibara, Senior Researcher, AIST, Japan

3:20 Break

SESSION IV: INTERFACES, PACKAGING, ASSEMBLY AND TEST

COST, TOOLS, TROUGHPUT, YIELD AND RELIABILITY

Session Chair: Dr. Vivek Raghunathan, Sr. Process Engineer, Intel

3:30 **Tool Automation for Hybrid Photonic Integration**
Dr. Daniel D. Evans, Jr., CTO/Applications Manager, Palomar Technologies

3:50 **Enabling Technologies: Hermetic Micro-Packaging of Edge Emitting DMLs**
Dr. Chris Gudeman, CTO, Innovative Micro Technology (IMT)

4:10 **Leveraging the Silicon Platform for Packaging and Reliability**
Dr. Dong Pan, CEO, SiFotonics Technologies

4:30 **Connector Industry and TE Connectivity**
Dr. John MacWilliams, Principal Consultant and Analyst, Bishop and Associates (for Terry Bowen, TE Connectivity)

4:50 Break

SESSION V: INTRODUCTION TO THE PSMC WORKSHOP

Session Chair: Dr. Bill Bottoms, Chairman, 3MTS

5:00 **Introduction to PSMC: Goals and Progress**
Dr. Robert Pfahl, Senior Consultant, iNEMI

5:10 **TWG Briefing Presentations (suggested length: 10min)**
- Hybrid Integration TWG: *Dick Otte, Promex Industries*
- Packaging of Electronic Photonic Systems TWG: *Bill Bottoms, 3MTS*
- Circuit boards, Backplanes and Connectors TWG: *John MacWilliams, Bishop*
- Monolithic Integration TWG: *Lionel Kimerling, MIT*

6:00 Networking Reception

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DAY 2: FRIDAY, NOVEMBER 7

8:15 **Light Breakfast**

8:50 **Key Points from Day 1**
Prof. Lionel C. Kimerling, Director, MIT Microphotonics Center

SESSION VI: OPEN ARCHITECTURE SYSTEM DYNAMICS

APPLICATION REQUIREMENTS, SYSTEM PERFORMANCE TARGETS AND MANUFACTURING
Session Chair: Dr. Tremont Miao, Engineer, ADI

9:00 **Keynote: The Data Center: Evolving Architecture and Hardware**
Dr. Madeleine Glick, Senior Research Scientist, University of Arizona

9:25 **TWG Report: Connector & Printed Circuit Input to Roadmap**
Dr. John MacWilliams, Principal Consultant and Analyst, Bishop and Associates

SESSION VII: BUILDING PLATFORMS FOR MONOLITHIC INTEGRATION

CHIP-LEVEL INTEGRATION, DESIGN FOR MANUFACTURING
Session Chair: Dr. Anuradha Agarwal, Principal Research Scientist, MIT

9:40 **Keynote: High Spectral Efficiency with Microphotonic Integration**
Dr. Long Chen, Photonic Integration Lead, Acacia Communications

10:00 **Integrated Photonic Technologies for On-Chip, Fiber-Optic and Space Communications**
Prof. Jonathan Klamkin, Assistant Professor, Boston University

10:20 **Case Study in Cooperative Development: CMP Process for Germanium**
Dr. Jurgen Michel, Senior Research Scientist, MIT and Zhan Chen, Global Business Director, Cabot Microelectronics Corporation

10:40 **Monolithic Microphotonics for Ubiquitous Sensing**
Prof. Juejun Hu, Assistant Professor, University of Delaware and MIT

SESSION VIII: PSMC WORKSHOP

PSMC Leadership Team: Dr. Bill Bottoms, Dr. Richard Grzybowski, Prof. Lionel C. Kimerling, Dr. Randolph Kirchain, Dr. John MacWilliams, Dr. Jim McElroy, Dr. Elsa Olivetti, Dr. Richard Otte, and Dr. Bob Pfahl

11:00 **Working Group Discussion Breakouts (opportunity to give TWG prep materials)**
-Survey Data Analysis and Validation: Lisa is completing compilation; to all today
-Brainstorming Data: in Dick's Thursday talk (perhaps a summary slide for Bill)
-OASO TWG Report (Kim: one summary slide for Bill)

12-1 **Working Lunch**

2:00 **Workshop reports**
-Problem Definition: Pareto Chart for "Limitations in the Supply Chain"
-Now, Next, Future: Roadmap Refinements
-TWG and IMI Action Items

3:00 **Conference summary**
Prof. Lionel C. Kimerling, Director, MIT Microphotonics Center

3:15 **Adjourn**