An Update on AIM Photonics
November 17, 2015
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An Update on AIM Photonics

November 17, 2015
Welcome

Dr. Alan Willner
Chair
NPI Steering Committee
Agenda

Welcome & Introduction: Dr. Alan Willner, chair, NPI Steering Committee

AIM Photonics Update: Dr. Thomas L. Koch, chair, Technical Review Board, AIM Photonics

Closing Remarks: Dr. Tom Baer, past chair, NPI Steering Committee
Who We Are

A collaborative alliance seeking to unite industry, academia and government to identify and advance areas of photonics critical to maintaining US competitiveness and national security.
Partners

Founding Sponsors:

OSA
The Optical Society

SPIE

Sponsors:

IEEE
Photonics Society

APS
physics

Laser Institute of America

Laser Applications and Safety
Collaborators & Supporters

Various logos and names of organizations are shown, including:
- College of Optical Sciences
- The Institute of Optics
- CREOL UCF
- ALPHA Advanced Laboratories
- THORLABS
- C1 CHAMPION ONE
- Simphotek
- OIDA
- Florida Photonics Cluster
- Infinera
- Directed Light Inc.
- ACS Chemistry for Life
- Lasermech
- Optical Society of Southern California
- Biophotonic Solutions Inc.
- Mi-Light Michigan Photonics Cluster
- Raydiance
- New York Photonics
- SPRC The Stanford Photonics Research Center
- Open Photonics
- Jenoptik
- National Academy of Sciences
National Photonics Initiative

Defense & Nat’l Security
Energy
Health Care & Medicine
Communications & IT
Manufacturing
National Research Council Report
NPI Advocacy Strategy

- Educate members of Congress
- Build champions
- Collaborate with the Administration
- Secure legislative language & funding
Educate Elected Officials & the Public In-District
Educate Elected Officials in Washington
NPI Greatest Successes: Congressional

- Secured optics and photonics report language in the National Defense Authorization Act (NDAA) for FY 2015
- Secured optics and photonics language in the Senate-introduced America COMPETES Reauthorization Act of 2014
- Supported optics and photonics language in the House-passed Reinvesting in American Manufacturing Innovation (RAMI) Act, which was included in the FY2015 omnibus bill
- Hosted numerous fly-ins, in-district visits and congressional meetings to demonstrate constituent support for NPI priorities in Congress and optics and photonics policy leadership: COMPETES, RAMI, NDAA, ITAR, Higher Education Act
NPI Greatest Successes: Administration

• **Advanced Manufacturing**: Mobilized and led photonics community to support and secure presidential endorsement for a DOD-led Integrated Photonics Institute for Manufacturing Innovation (IP-IMI).

• **Health Care and Medicine**: Created and launched the NPI Photonics Industry Neuroscience Group (PING) alongside White House and federal agency officials in support of BRAIN Initiative Grand Challenge; developed and published first-of-its-kind optics and photonics technology road map for White House and program managers across five agencies.

• **IT and Communications**: Secured seat at White House policymaking table to ensure optics and photonics are part of next generation High Performance Computing architectures.
NPI’s Role in the IP-IMI Process

• Submitted a white paper to White House Office of Science and Technology Policy (OSTP) staff recommending a photonics prototyping and advanced manufacturing facility; opened the door to conversations between the NPI and DOD, and aided in the national push for a photonics IMI.
• Hosted webinars with DOD officials to educate the photonics community about the selection process.
• Coordinated responses to the FOA from dozens of experts, and matched industry with academia to submit proposals.
• Provided regular communication to the community as to relevant deadlines and information.
• Upon request, supplied a letter of support to include in proposal submissions.
• Engaged the media around the IP-IMI announcement.
AIM Photonics

The NPI is strongly committed to supporting the winning New York consortium through the platforms, programs and resources of the NPI’s top scientific societies.
AIM Photonics Update

Dr. Thomas L. Koch, chair, Technical Review Board, AIM Photonics
How Did We Get Here?
Acknowledging Key Contributions

- 2013: Creation of National Photonics Initiative
- Outreach Events, Task Forces, White Papers ....
  - NPI Telecommunications Taskforce
  - NPI Sensors for Energy and Environment Taskforce
  - NPI Education and Workforce Development Taskforce
  - NPI Photonics Industry Neuroscience Group
  - NPI High-Powered Lasers Taskforce
- Focus on NNMI program, emerging interest in Photonic Integration
- June 2, 2014: NNMI RFI, Photonics one of six topics for down selection to two
- October 3, 2014: Integrated Photonics selected for IMI, >$220M
- November 5, 2014: FOA; Concept papers, down-select finalists for full proposals
AIM Photonics Launch – July 27, 2015, Rochester, NY

US VICE PRESIDENT JOE BIDEN (CENTER) MEETS SUNY POLYTECHNIC INSTITUTE’S FOUNDING PRESIDENT AND CEO DR. ALAIN KALOYEROS (FAR LEFT) AND NEW YORK STATE GOVERNOR ANDREW CUOMO (RIGHT OF CENTER) DURING THE OFFICIAL ANNOUNCEMENT OF THE AIM PHOTONICS HUB IN ROCHESTER, NY, ON JULY 27, 2015.

• American Institute for Manufacturing Integrated Photonics (AIM Photonics)

• Sixth Institute in National Network of Manufacturing Innovation (NNMI) program.

• Largest institute to date, with $110M of federal funding and more than $500M of matching funding from state, industry, and academic partners
Core Integrated Photonics Fab Facility

SUNY Poly Albany NanoTech Complex – Albany, NY:
- 1.3 million Sq. Ft. facility with 300 and 450mm toolsets
- 135,000 Sq. Ft. of class 10K and better cleanroom
- Wet labs, metrology labs and 3D packaging
- 65nm low power CMOS base line; 7nm CMOS capable
- Leading edge lithography and dedicated eng. staff
- Multiple prior photonics DARPA projects

SUNY Poly Albany NanoTech Complex – Albany, NY:
- Years of proven results in Si photonics
- 300mm wafer tools provide unprecedented quality photonics
- Sematech partnerships drive continued investment to remain at state-of-the-art
- 3D stacking w/CMOS

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## Institute Members

### Government
- New York State
- California State
- Massachusetts State

### Industry
#### Tier 1
- Intel
- United Technologies
- GE
- Infinera
- HP
- ACACIA
- IBM
- GLOBAL FOUNDRIES
- Cisco
- LOCKHEED MARTIN
- Synopsys
- Cadence
- Raytheon
- Mentor Graphics

#### Tier 2
- CORNING
- Aurrion
- TE
- IQE

#### Tier 3
- 4D
- Harris
- Boeing
- Nistica
- Keysight Technologies
- Northrop Grumman
- Samtec
- Analog Photonics

### Academic
#### Tier 1
- SUNY Polytechnic Institute
- UCSB
- MIT
- Columbia University
- UC Davis
- RIT
- University of Rochester
- University of Arizona

#### Tier 2
- Caltech
- Berkeley
- UC San Diego
- Stanford University
- Boston University
- University of Virginia

### Trade Associations
- NEATEC
- SPIE
- SEMI
- OSA
- Institute
- OP-TEC

### Committed Participants and Supporters

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**Mission**

Create a national institute supporting the end-to-end integrated photonics manufacturing ecosystem in the U.S. by expanding upon a highly successful public-private partnership model with open-access to world-class shared-use resources and capabilities.

**Key Concepts for AIM Photonics:**

- *Provide venue for US cooperative development of advanced manufacturing solutions*
- *Catalyze maturation and stratification of the integrated photonics ecosystem*
- *Provide world-leading photonic integration technology access/on-ramps to SME’s, government, academic, and entrepreneurial communities*
Manufacturing Readiness Levels

**MRL 1-3**
- Mfg Concepts Identified
- Key Processes Identified
- Producibility assessment initiated

**MRL 4**
- Mfg Processes Identified
- Mfg Processes Develop.
- Mfg equipment in relative environment
- Producibility assessment ongoing
- Cost drivers identified

**MRL 5**
- Mfg Processes Demo’d
- Mfg equipment in relevant environment
- Producibility assessment ongoing
- Cost drivers analyzed
- Long lead items identified

**MRL 6**
- Critical Mfg Processes
- Mfg processes in validation
- Producibility improvement underway
- Trade studies conducted
- Supply chain validated
- Long lead plans in place

**MRL 7**
- Prototype Mfg System
- All materials ready for LRIP
- Mfg processes proven for LRIP
- Supply chain established

**MRL 8**
- Process Maturity Demo
- Overall Mfg Process Operates
- At target Quality, Cost and Lead times

**MRL 9**
- Mfg Processes Proven
- All key Processes Meet process Control Targets
- Overall Mfg Process Operates At 6-Sigma Quality, and Meets Cost and Lead times Estimates

**MRL 10**
- Highest Production Readiness
- System in Production
- Or Meets Engineering Performance & Reliability

**Primary Institute Focus MRL 4-7**
This market is held back by a lack of common manufacturing technology platforms

1. Industry sets the pace: exploring technology potentials, revolutionizing the data and sensing market

2. Scientific/defense market leverages industry pace: building on solid ground, adding uniquely required functionalities
Role of Manufacturing innovation Centers of Excellence (MCEs):

- Function like manufacturing & design platforms in a corporation
- Drive stratification/maturation of photonic integration industry ecosystem
- Provide baseline capabilities in each manufacturing support area (i.e., for foundry services)
- Use Technical Working Groups (TWGs) comprised of institute partners for inputs & project proposals
- Select projects that maximize synergy across KTMAs and advance AIM Photonics manufacturing capacity
- Each MCE has industry, government, and academic co-leads
Role of KTMAs:

- Function like “business units” in a corporation
- Bring photonic integration needs from different market application segments
- Use Technical Working Groups (TWGs) comprised of institute partners for inputs & project proposals
- Select projects that serve as drivers to advance AIM Photonics manufacturing capability
- Each KTMA has industry, government, and academic co-leads
Technical Review Board (TRB):

- Cooperatively identify highest impact baseline and advanced capability projects

- Comprised of industry, government, and academic leads for each KTMA and MCE, together with AIM executive management and government oversight

- Provide prioritized recommendation of project portfolio (new projects, project sunsets) to AIM Photonics executive team and Leadership Council

- Provide visibility for Leadership Council and executive team to project status, linkages and project management issues on biannual basis
# AIM Photonics Annual Planning Cycle

## 2016 Road-Mapping Activities

<table>
<thead>
<tr>
<th>Month</th>
<th>Activity</th>
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<tbody>
<tr>
<td>Jan</td>
<td>AIM Photonics All-Institute Meeting: Meet to Discuss New Technology/Market Factors Roadmapping</td>
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<tr>
<td>Feb</td>
<td>5/23 Ongoing bi-weekly meetings for broad input-road-mapping TWGs</td>
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<tr>
<td>Mar</td>
<td>12/5 AIM Photonics All-Institute Meeting: Meet to Discuss Joint Roadmapping</td>
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<td>Apr</td>
<td>Q1 Leadership Council Meeting: Provide Inputs for Roadmap Distillation into Key Stakeholder Priorities (February)</td>
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<tr>
<td>May</td>
<td>Q2 Leadership Council Meeting: Review 2016 Project Status and status of Addressing Stakeholder Priorities (May)</td>
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<tr>
<td>Jun</td>
<td>Q3 Leadership Council Meeting: Respond to TRB Recommendations and Authorize Detailed Project Planning (Sept)</td>
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<tr>
<td>Jul</td>
<td>Q4 Leadership Council Meeting: Review 2016 Project Status and 2017 Project Summaries for Authorization to Execute (Dec)</td>
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<tr>
<td>Aug</td>
<td>LC Pre-read 9/17 - 9/26</td>
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<tr>
<td>Sep</td>
<td>LC Pre-read 11/26 - 12/5</td>
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<tr>
<td>Oct</td>
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<td>Nov</td>
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## 2016 Leadership Council Activities

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<td>Jan</td>
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<td>Feb</td>
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<td>Mar</td>
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<tr>
<td>Apr</td>
<td>TRB Meeting #1: Discuss Evolving 2017 Project Portfolio &amp; Start Initial Discussion on Priorities and Plan Modifications (4/25)</td>
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<tr>
<td>May</td>
<td>TRB Pre-Reads &amp; Scores 8/1 - 8/14</td>
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<tr>
<td>Jun</td>
<td>TRB Meeting #2: Proposed 2017 Project Evaluation &amp; Prioritization Process (8/15)</td>
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<td>Jul</td>
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## 2016 TWG/TRB Activities

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<tr>
<th>Month</th>
<th>Activity</th>
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<tbody>
<tr>
<td>Jan</td>
<td>TWG Meeting: Examine &amp; Distill Broad Roadmap Input for AIM Member Priorities</td>
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<tr>
<td>Feb</td>
<td>TWG Meeting: Convert Gaps into Actionable Projects</td>
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<tr>
<td>Mar</td>
<td>TWG Meeting: Capture Critical Gaps Relative to AIM Capabilities</td>
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<tr>
<td>Apr</td>
<td>TWG Meeting: Identify Linkages to MCEs and/or other KTMAS</td>
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<tr>
<td>May</td>
<td>TWG Meeting: Work with COO/CTO to Close Linkages to MCEs and/or other KTMAS</td>
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<tr>
<td>Jun</td>
<td>Executive Team Prepares &amp; Distributes Project Proposal Portfolio (7/18, 7/31)</td>
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<tr>
<td>Jul</td>
<td>2017 Project Proposal Documentation DUE from TWGs Leads (8/17/9/16)</td>
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<tr>
<td>Aug</td>
<td>Executive Team Reviews TRB Recommended Projects &amp; Prepares Proposed Project Portfolio for LC (9/20 - 11/17)</td>
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<tr>
<td>Sep</td>
<td>TWGs start to prepare Project Plan Documentation for TRB Meeting (6/1 - 7/17)</td>
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<td>Oct</td>
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## 2017 Project Planning

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<td>3/1</td>
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<td>8/4</td>
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Dramatically compressed schedule:

• Launch pilot phase projects to get institute function up and working

• Establish linkages, expose functional/operational gaps/issues

• Most pilot projects based on projects identified during proposal phase

• Emphasis on MCE capabilities
### EPDA  
**Electronic Photonic Design Automation**

**Lead**
Peter Goetz  
Rob Scarmozzino  
Mike Watts  
RNL  
Synopsys  
MIT

**Contacts**
Rob Scarmozzino  
Synopsys  
Mike Watts  
MIT

**Features:**
- Development of a set of integrated design tools for photonic and combined electronic-photonic components.
- Models for Si and InP devices.
- Integrated electronic-photonic design environment.
- Design tools/PDK.
- Intellectual Property protection.

### MPWA  
**Multi Project Wafer / Assembly**

**Lead**
Atilla Szep  
Darwin Enicks  
Jeremiah Hebding  
AFRL  
Corning  
SUNY Poly

**Contacts**
Darwin Enicks  
Corning  
Jeremiah Hebding  
SUNY Poly

**Features:**
- Provision of full MPWA services including Foundry Broker and Foundry Operations for both Si and InP based photonic devices & components.
- Availability of in-house 300mm Si and InP fabrication facilities.
- III-V laser integration.
- Interposer 2.5D/3D integration.

### ICT  
**Inline Control & Test**

**Lead**
Nick Usechak  
Wilfried Haensch  
Douglas La Tulipe  
AFRL  
IBM  
SUNY Poly

**Contacts**
Wilfried Haensch  
IBM  
Douglas La Tulipe  
SUNY Poly

**Features:**
- Robust optical testing for photonics applications using inline and stand-alone approaches.
- High-throughput, high-functionality wafer-scale optical probe test.
- On wafer photonic test cells for process control.
- Multi-channel I/O fiber array test interfaces.

### TAP  
**Test, Assembly & Optical Packaging**

**Lead**
Justin Bickford  
Alan Evans  
Tom Brown  
ARL  
Corning  
UR

**Contacts**
Justin Bickford  
Alan Evans  
Tom Brown  
ARL  
Corning  
UR

**Features:**
- Development of standardized advanced automated, no-touch and accessible processes for PIC test, assembly & optical packaging.
- Integration of 2D, 2.5D and 3D subassemblies into system-level package.
- Fiber/WG attach, and pick and place capabilities.
- Sub-micron 3D inspection tools.
- In-house prototype photonics optical packaging center.
## DataCom / Telecom

**Lead** Mike Gerhold  
**Contacts** Ray Beausoleil, Srinath Kalluri, John Bowers  
**ARO HP Intel UCSB**

Initiative focuses on the challenges for manufacturing high volume, low cost Terabit-scale photonic interconnectivity technology for advanced high performance embedded computing and data centers. Initially focus is on ultra-high-speed, high quality multi-wavelength communications links exceeding Tb/s bandwidth densities; and multi-port (high-radix) spatial and wavelength selective, nanosecond-scale reconfigurable switches.

## Analog RF Applications

**Lead** Keith Williams  
**Contacts** Fred Kish, Larry Coldren  
**NRL Infinera UCSB**

Initiative objective is to develop manufacturing technologies specifically targeted for producing high volume chip-scale microwave photonics for demanding applications requiring very high optical performance fidelity. The driving goal is to address the critical challenges for the mass manufacture capable integration of high-dynamic range ultra-low loss broadband PICs and microwave frequency electronic ICs for unprecedented analog RF transmission communication performance.

## PIC Sensors

**Lead** Jason Guicheteau  
**Contacts** Jeff King, Benjamin Miller  
**ECBC Corning UR**

Initiative addresses the manufacturing challenges of chemical and biochemical sensors realized in glass/silicon materials, and demonstrates how the proposed solutions can facilitate high-volume production of embedded sensors connecting to, or integrated with, mobile platforms. Goals include development and demonstration of manufacturing methods enabling dramatic miniaturization of sensor systems based on glass/silicon integrated photonics and novel engineered glass surfaces.

## PIC Array Technologies

**Lead** Tom Nelson  
**Contacts** Wel-Chiao Fang, Mike Watts  
**AFRL Intel MIT**

Initiative addresses the manufacturing challenges associated with PIC Phased Arrays. Phased arrays enable high-speed steered projection and imaging without moving parts. Near-term focus will include Free-Space Communications, then extending to Light Distance And Ranging (LIDAR), Biomedical Imaging, and Display Technologies.
Examples of Team Technology Capabilities

(a) High Q resonators (Caltech)
(b) Indium Phosphide Integration (Infinera)
(c) InP & Si Integration (UCSB)
(d) Through Oxide Vias (TOVs) (SUNY Poly)
(e) 300mm Bonded SiPhotonic-CMOS Wafer
TOV Electronic-Photonic Integration (MIT-CNSE-UCB)

- **Capacitance:** \( \sim 1\text{-to-2fF/contact} \)
- **Density:** \( \sim 3\mu\text{m pitch} \)
- **Yield:** CNSE has demo yields of >99.999%
- **Results:** Demonstrated the lowest power silicon photonic communication link to date (250fJ/bit)
Integrated Photonics MPWA Offering

- Shared reticle, targeted at SMEs, DoD and universities
- Aggregator offers turn-key services
  1. Designer-facing application engineer
  2. Logistics and fab execution

- Standardized process
  - Interposer with design-for-assembly and test
  - Pre-validated library of design elements

- Customization with NRE
  - Optimal for larger customers
Inspire, attract and retain community college, undergraduate, graduate students and veterans through career transition to the photonics industry

- on/off-ramp career pathways for all supply chain skill levels
- transition paths between academic and industry sectors through internships, apprenticeships and hands-on training

Basic educational courses:

- photonic system modeling
- design automation
- materials and processing
- metrology and testing
- integrated photonics packaging
- integrated photonics applications

The AIM Photonics Academy will provide a unified learning, training, knowledge, technology and workforce deployment platform
Membership Agreement
Consistent to all members, is negotiated once and contains Federal Government flow down terms from Cooperative Agreement and general terms and conditions, such as:
- Governance / Intellectual Property / Membership Tier Structure / Project Class Structure / Term and Termination

Membership Scope Exhibit
Specific to each Member, reviewed annually, contains:
- Tier selection / applicable Program Segments / specific Member proprietary projects

Membership Fee Exhibit
Contains the financial obligation of the Member, cash and cash equivalent; reviewed annually

Project Award Agreements
Only Members with an executed Member Agreement may be a Participant under a Project Award Agreement
- Each Member who participates in at least one Project will have a Project Award Agreement which incorporates a Project Scope document for each Project
- Project Scope documents are common to all Participants in a given Project, and specify contributions including cash and cash equivalents (background IP, personnel, equipment, etc.), rights, obligations, proprietary project IP terms, milestones and deliverables

Member Tiers
Contributions, Benefits & Rights define Tier level of Industrial / Academic Member
- Tier 1 / Tier 2 / Tier 3 / Observer
- IP rights and project planning/participation vary with Tier level

Project Categories
Classes define Rights in IP
- Class A – Consortium / Primarily Institute funded, Projects to be central to Institute Mission
- IP ownership is sole/joint according to inventorship among Participants, licenses as per Membership Agreement
- Class B – Corporate or Government Interest / Partially Institute funded; Projects require positive ROI for Institute
- Proprietary Projects, IP ownership & license rights negotiated among Participants & Institute, IP is shielded from others
- Class C – Services / Completely Participant funded, Projects to be profitable for Institute
- Work for Hire, negotiated by the Participant & Institute, IP is shielded from others
## Contributions

<table>
<thead>
<tr>
<th>Industry Membership Tiers</th>
<th>Benefits and Rights of Membership</th>
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</table>
| **Tier 1** – Industrial member pays annual membership fee of at least $1 million with a 5 year commitment. Opt-out period is 2 years. In years 1-5, a mix of cash and cash-equivalent (with a minimum of $100k in cash in year 1 ramping to full cash in year 6), with continued participation requiring an all cash contribution. | ▪ One Seat on Leadership Council, which among other things provides company the right to steer overall direction of the Institute and provide application space direction.  
▪ Access to participate in and to IP generated from all collaborative programs.  
▪ As long as membership fee is paid in at least partially in cash, AIM will reimburse company for up to three (3) company assignees up to $150,000 each, limited to the amount of membership fee paid in cash above the pre-determined cash minimum.  
▪ Ability to submit a proprietary project. |
| **Tier 2** – Industrial member pays annual membership fee of at least $500,000 and a 3 year commitment. Opt-out period is 1 year. In years 1-5, a mix of cash and cash-equivalent (with a minimum of $100k in cash in year 1 ramping to full cash in year 6), with continued participation requiring an all cash contribution. | ▪ Access to participate in and to IP generated from three (3) collaborative programs of company choosing.  
▪ As long as membership fee is paid in at least partially in cash, AIM will reimburse company for up to one (1) company assignee up to $150,000, limited to the amount of membership fee paid in cash above the pre-determined cash minimum.  
▪ Ability to submit a proprietary project. |
| **Tier 3** – Industrial member pays annual membership fee with a target of $100,000 in cash-equivalent form and a 2 year commitment. Opt-out period is 1 year. | ▪ Access to participate in and to IP generated from one (1) collaborative program of company choosing. |
| **Industry Observer** – Observer pays annual membership fee of $2,500. | ▪ Receive access to an annual Institute newsletter and participate in the annual meeting. |

### University and Non-Profit Membership Tiers

| Tier 1 – Member must provide a greater than 1:1 cost match for project(s) the university actively participates, can be cash or cash equivalent; must be meaningful and critical to success of AIM. Total 5 year contribution must be equal to or greater than $5 million over the course of 5 years. | ▪ Allowed access to participate in one or more KTMA, MCE, ED-WFD, Roadmap Technical Working Groups.  
▪ Ability to participate in and access to results and IP generated from all collaborative programs.  
▪ Right to submit proposals to perform work on projects.  
▪ Ability to submit proprietary projects. |
| Tier 2 – Member must provide an at least 1:2 cost match, can be cash or cash equivalent; must be meaningful and critical to success of AIM. Contribution is only required should university project be chosen. | ▪ Allowed access to participate in one or more KTMA, MCE, ED-WFD, Roadmap Technical Working Groups, however, not in a leadership role, unless executive team deems it necessary.  
▪ Access to participate in and to IP generated from collaborative projects, where they provide 1:2 cost match. |
| **Observer** – No fee expected. | ▪ Receive access to annual meeting and receive Institute’s quarterly newsletter; no rights to participate in projects other than educational support (meant mostly for community colleges). |
## Classes | Funding

### Active Participation
- Assumes that the Member providing the facility (e.g., SUNY Poly for wafer processing) is always named as a Participant in the respective Project

### Intellectual Property
- Project IP ownership is sole/joint according to inventorship among Participants.
- All Tier 1 Members, Tier 2 Members participating in the relevant KTMA/MCE and Project Participants have rights to use Project IP internally. Sublicensing is allowed only to the extent necessary for customers to use Member’s products based on the Project IP.
- US Government has Government use rights.
- Background IP remains property of contributing Participant and is licensed to the extent necessary to practice the Project IP, unless otherwise specified in the Project IP Plan.

## Institute Project Classes

### Class A – Consortium
- Primarily Institute Funded (subject to Leadership Council determination of centrality to Mission and SIP and alignment to KTMA/MCEs)
- May include US Government funds
- Primarily executed by Participants
- Tier 1 Assignees allowed. Non-Tier 1 Assignees allowed only if home company is Participant
- US Government participation allowed

### Class B – Corporate Interest or Government Interest
- Partially Institute funded (subject to Leadership Council determination of positive ROI to Institute)
- Corporate Interest - no US Government funds and primarily Participant funded
- Government Interest – at least partially funded by Government in addition to Cooperative Agreement funding and primarily Participant funded
- Executed by Participants
- Assignees allowed only if home company is Participant

### Class C – Services
- Completely Participant funded on a profitable basis to Institute
- Executed by Participants
- Assignees allowed only if home company is Participant
- Institute human and physical resources provided only on an as-available basis

### Ownership of Project IP
- Ownership of Project IP and license rights negotiated among Participants and Institute and documented in the Project Award Agreement.
- Background IP remains property of contributing Participant. If provided for use in the Project, license rights are to be negotiated among Participants and Institute and documented in the Project Award Agreement.

### Work for Hire/Negotiated
- Work for Hire/Negotiated by the Participant and Institute.
AIM Photonics website:

• www.aim photonics.com

AIM Photonics contacts:

• Government and Industry Outreach Executives
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• Department of Defense IP-IMI Program Management
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AIM Photonics aims to:
- Provide venue for US cooperative development of advanced manufacturing solutions;
  - pathway for integrated photonics to leverage the market-supported continuing investments into VLSI manufacturing technologies
- Drive maturation and stratification of the integrated photonics ecosystem
  - EPDA, MPWA, ICT, TAP
  - workforce development to support manufacturing & market growth
- Provide world-leading photonic integration technology access/on-ramps to SME’s, government, academic, and entrepreneurial communities
- Become *self-sustainable within 5 years*

How to benefit from AIM Photonics:
- Exercise capabilities as user (MPWA, etc.)
- Influence the direction/capability, leverage the investment to meet your needs:
  - Join AIM Photonics!
  - *Participate in MCE and KTMA Technical Working Groups (TWGs)*
Q&A

Dr. Tom Baer
Past chair
NPI Steering Committee
Stay Involved

www.lightourfuture.org

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