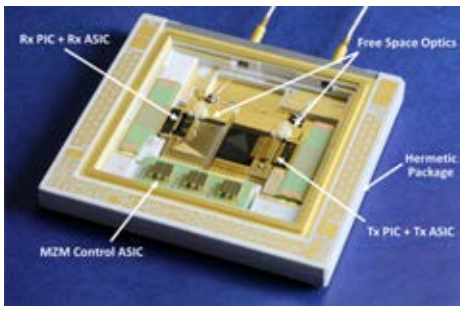
AIM Photonics points with pride to giant steps

AIM Photonics, the huge $600 million public-private US optics consortium, based in New York state, is upbeat as it heads into its fifth year.

The consortium, known as the American Institute for Manufacturing Integrated Photonics, received an initial award of $110 million from the Department of Defense. Now, it has its sights set on not only future federal defense funding beyond 2020 but also self-sustainability through partnerships with big industry players, now that its test, asssembly, and packaging (TAP) facility is active in Rochester, New York.



MPW integrated photonic chips, ready for shipping. Credit: Peter Goetz.

"A lot is happening," said Frank Tolic, the chief marketing officer of AIM, in a major understatement. "We are working toward approval of new funding with the DoD, but we are also working to be sustainable with less government funds, now that we have an established ecosystem that provides the entire solution from design to final product all under one institute."

A new CEO will be named in early 2020, replacing Michael Liehr, who retired at the end of 2019 from his post at AIM and as the SUNY Polytechnic Institute's executive VP for technology and innovation. Show Daily asked Liehr to discuss his achievements and his future plans.

What has AIM Photonics accomplished so far?

In just four years, we have established an entire photonic integrated circuit (PIC) manufacturing ecosystem. This is a major accomplishment, considering we started with a blank sheet of paper. There were many pieces missing including design enablement standards, HVP (high volume production) manufacturing methods, advanced technology directives, and the most difficult and most expensive part—test, assembly and packaging. We leveraged the prior learning from the PIC baseline we developed at the Albany Nanotech facility, and grew from there. Now users have access to an established development and final product program not available elsewhere.

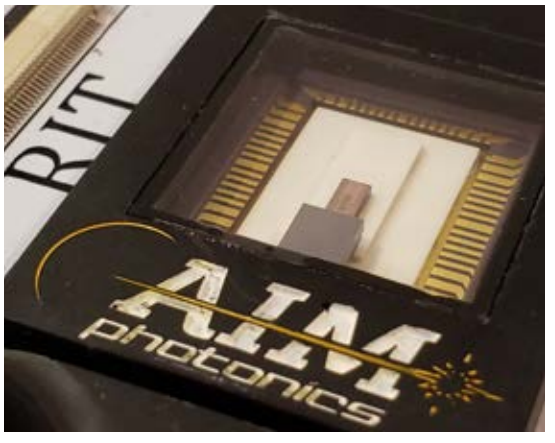
What were some of the challenges and successes?

Our first goal was establishing a team of industrial, academic and government partner/members that understood the needs for future HVP PIC manufacturing, and focusing on those needs. I would say some of the successes our partners have achieved are with advanced PIC datacom transceivers; bio and chemical sensors, and RF (radio frequency) over fiber research are great examples, not to mention the one-of-its kind 300 mm TAP facility now up and running, which houses some of the most advanced PIC packaging tooling in the world. This would not have been possible without the support of the DoD, New York state, and all of the AIM Photonics Members.

What is the structure of AIM?

Acting CEO is Doug Grose, who is also the president of NY CREATES, short for the New York Center for Research, Economic Advancement, Technology, Engineering and Science. That nonprofit, based in Albany, oversees SUNY Polytechnic's vast holdings across New York State.

AIM's Integrated Photonics Wafer Development Engineering team is located at labs in Albany. Its TAP development and operations team is housed at the AIM facility in Rochester, New York. Since it opened in 2015, the consortium has become the world's only open research foundry producing photonic integrated circuit (PIC) devices on a 300 mm diameter wafer.



Packaged AIM Photonic chip with a fiber array attached. The chip was packaged by the RIT Integrated Photonics group led by Professor Stefan Preble. Credit: Frank Tolic.

Replacing heavy wiring in jets

As an AIM Photonics member, Lockheed Martin has been working on a radio frequency over fiber solution for future warfighters. Current platforms communicate via electrical cabling, wiring and electronic signals. Replacing these structures with fiber optics and integrated photonics significantly reduces weight of the fighter and reduces power consumption.

AIM Photonics TAP Facility Metrology Lab scanning electron microscope integrated with secondary ion mass spectrometry. Credit: Frank Tolic.

"Integrated photonics is going to give us the opportunity to be more compact in how photonics fits onto our platforms, saving size, weight and power. And then we also get the inherent benefit of photonics which is the bandwidth capability, and the scalability we need in our platforms," said Rick Stevens, a Lockheed Martin Fellow.

AIM Photonics' TAP Facility Metrology Lab dual beam spectroscopic ellipsometer. Credit: Frank Tolic

Hundreds of wafer runs

From its start in 2015, AIM's experts have achieved success in helping with wafer design and with moving them to speeded-up multiproject wafer (MPW) runs, for companies of all sizes.

Last year, AIM reported that it had cut the timetable for MPWs from 130 days to fewer than 80 days, while adding new mask levels and functionality. The MPW program has provided benefits to small to medium enterprise (SME) companies that are producing lower-cost crucial PIC components.

Biomedical sensor breakthroughs

In one project, AIM has partnered with industry, university talent and startups in Rochester, New York, to advance diagnostics equipment for blood testing, and on a new generation of film sensors involving microfluidics. The sensors will monitor tiny amounts of fluid, at a sub-millimeter scale, to enable high-throughput screening, which in turn allows millions of chemical tests in a short time. "We have produced working samples of these microfluidic devices to check blood samples," Tolic said.

"The advanced node microelectronic chip facility, where AIM Photonics PIC research takes place, has provided significant capabilities and access at very reasonable costs," said Benjamin Miller, of the University of Rochester Medical School, a professor in three departments – dermatology, biomedical engineering and the Institute for Optics.

FORD BURKHART

Startup winners continued from page 01

Senorics GmbH for its VIS/NIR spectroscopic sensor on chip level. "Spectroscopy can easily provide reliable data to enable robust and fact-based decision making," said CEO Ronny Timmrick. "Our mission is creating the spectroscopic tools necessary to facilitate this process."

Labby Inc. took second place with its farm-efficient milk analyzer technology. "Current milk testing is costly and time consuming," said founder and CEO Anshuman Das. "Our milk analyzer technology instantly provides quality data to farmers and informs them about individual and herd health. This crucial data lets them be proactive and take preventive measures to ensure maximum profitability."

Third place went to Circle Optics for the Hydra – a stitch-less, 360-degree camera. "The Hydra is setting a new standard for 360-degree content capture by making it as easy as a regular point-and-shoot camera," said director of operations Ian Gauger. "Our breakthrough came from realizing polygonal fields of view – not just circular – are possible."

KAREN THOMAS