LIGHTWAVELOGIC™

Faster by Design

Investor Presentation:

Macrotrends Investment Conference

12th Nov 2021

Michael Lebby, CEO

Lightwave Logic (NASDAQ:LWLG)

Safe harbor

LIGHTWAVELOGIC™

The information in this presentation may contain forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995. You can identify these statements by use of the words "may," "will," "should," "plans," "explores," "expects," "anticipates," "continue," "estimate," "project," "intend," and similar expressions. Forward-looking statements involve risks and uncertainties that could cause actual results to differ materially from those projected or anticipated. These risks and uncertainties include, but are not limited to, general economic and business conditions, effects of continued geopolitical unrest and regional conflicts, competition, changes in technology and methods of marketing, delays in completing various engineering and manufacturing programs, changes in customer order patterns, changes in product mix, continued success in technological advances and delivering technological innovations, shortages in components, production delays due to performance quality issues with outsourced components, and various other factors beyond the Company's control.

Lightwave Logic overview

- **Successfully up-listed to NASDAQ in 1st Sept 2021**
  - Organic up-list (no reverse split)
  - Invited to speak at investment conferences
  - Invited to speak at international technical conferences
- **Strong Balance Sheet**
  - Looking to strengthen for product acceleration to market
- **Very strong IP and patent position**
  - Over 70+ patents & patent applications
  - Freedom of manufacturing

Lightwave Logic NASDAQ: LWLG	
Share Price[1]	$13.52
Market Cap[1]	$1.46B
Cash[2]	$13.9M
Total Liabilities[1]	$1.0M
Shares Outstanding	107.8M
Headquarters	Englewood, CO

1) As of 12th November, 2021
2) As of 16th August, 2021

Company Headquarters

Ringing the bell at NASDAQ (10th Sept 2021)

NASDAQ and Lightwave Logic energy…..

Closing the market 10th September at 4pm East coast time precisely…

Lightwave Logic impact

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Company Headquarters

- **We are a technology platform that is designed to help scale existing internet structure by providing transmission of data at higher speeds with less power**
- Essential for data communications & telecommunications markets)

- **We leverage our proprietary electro-optic (EO) polymer materials to create photonic devices** (that convert data from electrical signals into optical signals)
- **Technology evaluation underway** with Tier-1 partners under NDA
- **In-house control of material supply, device fabrication & package design**

Technology impact → Faster internet; lower power consumption


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Applications & Markets

We solve headaches for the internet

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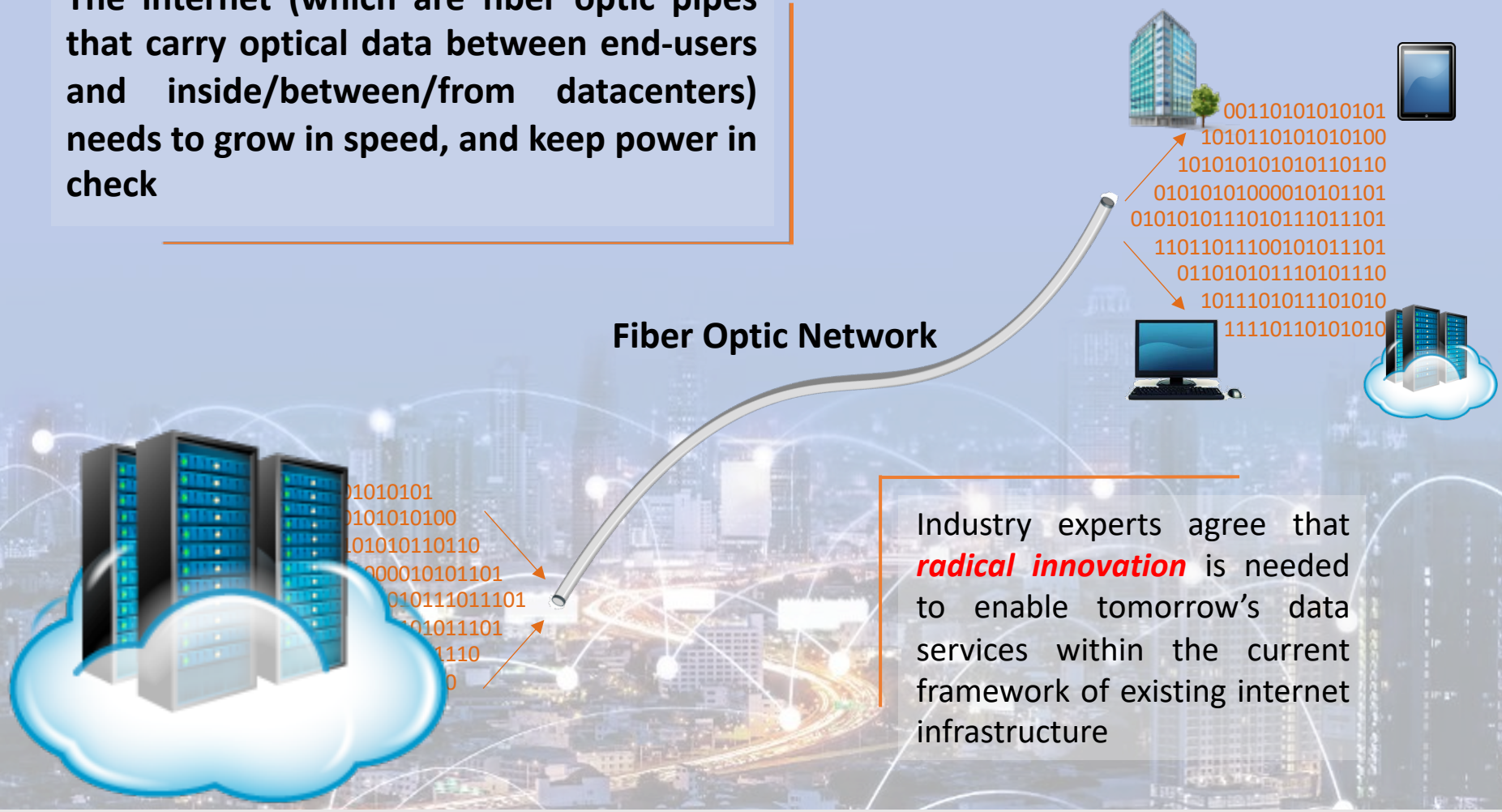
The internet (which are fiber optic pipes that carry optical data between end-users and inside/between/from datacenters) needs to grow in speed, and keep power in check



Industry experts agree that ***radical innovation*** is needed to enable tomorrow's data services within the current framework of existing internet infrastructure

Our photonic devices are the radical innovation the internet needs…

However, the traffic keeps on growing…

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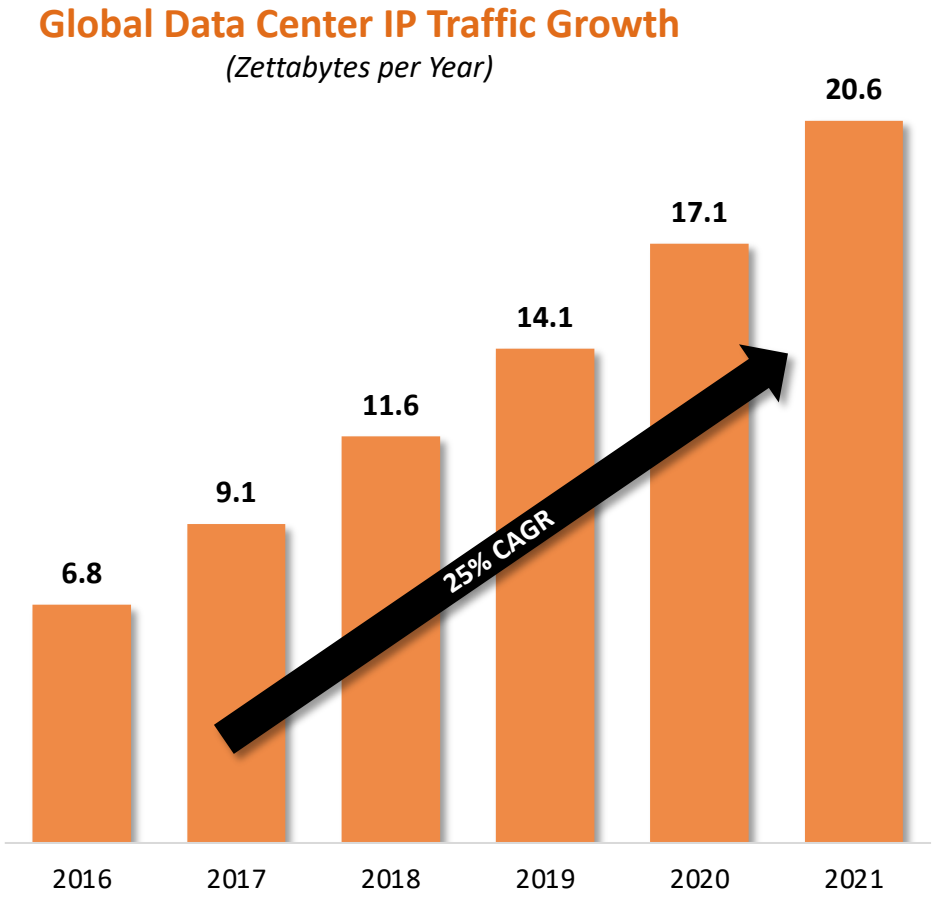
- Network capacity is rapidly falling behind traffic growth with the exponential rise of consumer-level data usage
- Network cost and energy consumption have become the new hot spot for data providers



Polymers can transform the internet with better performance

Source: Cisco Global Cloud Index

Photonics components markets are huge

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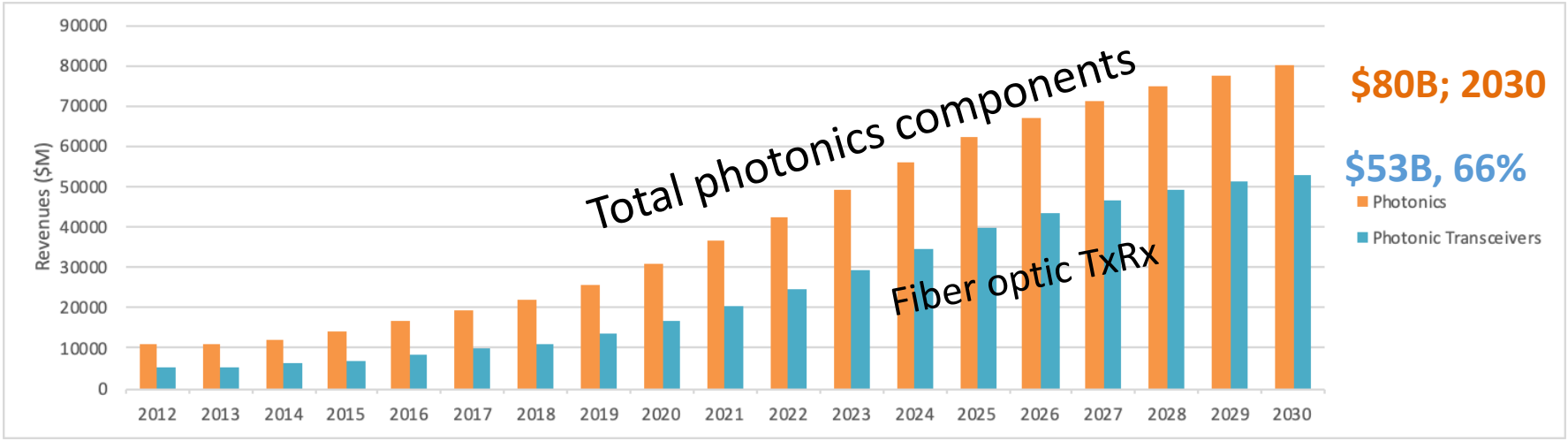
- Fiber optic transceivers and modules are a perfect vehicle for hybrid PICs



Fiber optic transceivers & modules explode over next decade

Source: Oculi

Photonics markets broaden significantly

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Photonics applications	Photonics → 2030 (rough forecasts*)	Opportunity for PICs (polymer & silicon photonics/InP)
5G systems/back haul/RF	~$4-10B	Existing
Display/project	~$5-20B	Yes
Automotive (LIDAR)	~$20-50B	Yes
Optical sensing/3D	~$2-5B	Yes
Bio-photonic sensing	~$2-5B	Yes
Medical	~$5-10B	Yes
Instrumentation	~$1-3B	Yes
Fiber comms	~$40-60B	Existing
HPC/computational/AI	~$10-20B	Existing
DCI/datacenter	~$20-30B	Existing

Photonics becomes ubiquitous during the next decade

*Source: *Many market forecasts predict huge photonics opportunities; Oculi*

Proprietary EO polymer technology

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Starting With Fiber Communications, Our Technology Can be Extended To More Applications

Lightwave's proprietary, internally-engineered organic polymer materials use **less power & increase data throughput in existing network infrastructure**

How? By developing **ultrafast optical modulators** using its polymers that convert ultra-high-speed electrical data to light that travels over existing fiber-optic networks

Current Applications

- Initial prototypes cover today's state-of-the-art 50/100 Gbaud and the next-generation 400 Gbaud fiber optic applications
- Target speeds up to 100 & 200 Gigabaud per device, 800 & 1600 Gbit/s in aggregate with low voltage
- Modulators can be integrated to make more complex chips such as multi-channel modulators for higher aggregate speed

Future Applications

- Potential development of new polymer materials for specific **non-communication applications** such as: LIDAR automotive, sensing, displays, high speed computational processing, crypto, medical, and areas **where light needs to be switched quickly at low power**

Our polymers enable faster devices, low power solutions today

Our competitive advantages

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Our Technology Suite Addresses Major Pain Points Facing Network Operators

ENERGY SAVINGS

We reduce network energy costs…
Our low-cost, easy to fabricate modulators operate at a low voltage, that can save network operators on energy costs as compared to competing solutions.

FASTER NETWORKS

We enable faster networks...
Our robust, stable Perkinamine™ family of materials will allow network operators to squeeze more performance from existing network infrastructure.

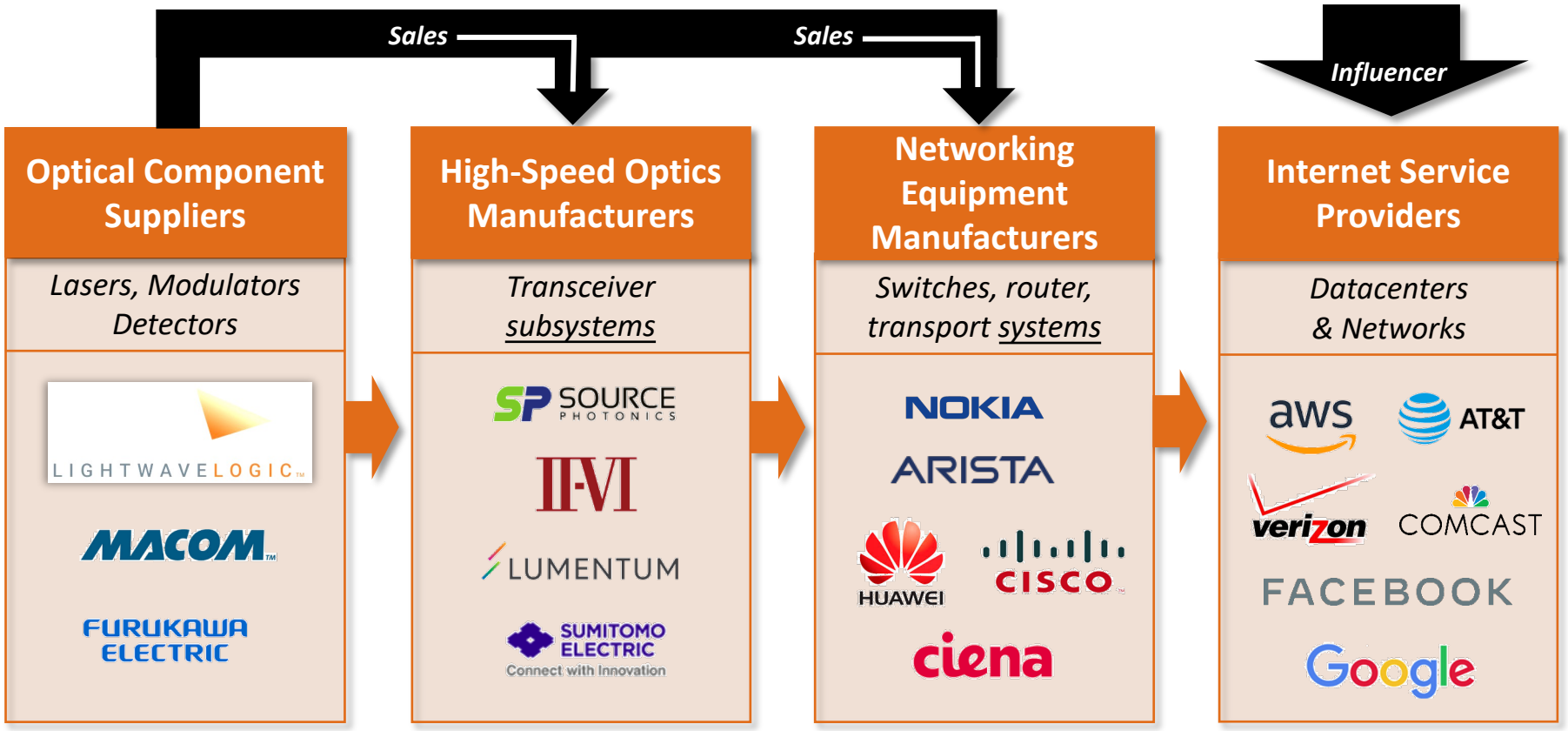
ENGINEERING ADVANTAGE

Technology Platform Flexibility..
Full control from materials science to device & package design will allow greater flexibility to adapt performance and cost to each individual application.

Our technology addresses customer pain-points…

Targeting customers

As an optical component supplier, our plan is to sell into components, high-speed optics, and networking equipment manufacturers



Potential to enter market in many verticals

Business model & commercialization roadmap

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Multi-Pronged Business Model:

3-pronged business model with customer engagement process…


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Intellectual Property

Robust intellectual property portfolio

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70+ Patents & Patent Applications

Freedom of manufacturing…

Technology transfer (large foundries)
Licensing royalties (OEM, CM, Comms customers)

ISSUED	ISSUED	INTERNATIONAL
Heterocyclical chromophore architectures	Polymer modulator devices Fab, high speed, PIC, pkg	USA, EU, Canada, Japan and China
PUBLISHED	**ACQUIRED**	**FILING**
Advanced polymer/ silicon photonics materials, devices inventions	Lumera/Gigoptix Patent portfolio (15 Patents)	Innovative polymers Silicon photonics

Powerful patent portfolio with freedom of manufacturing


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Technologies

Our technology breaks through the wall…

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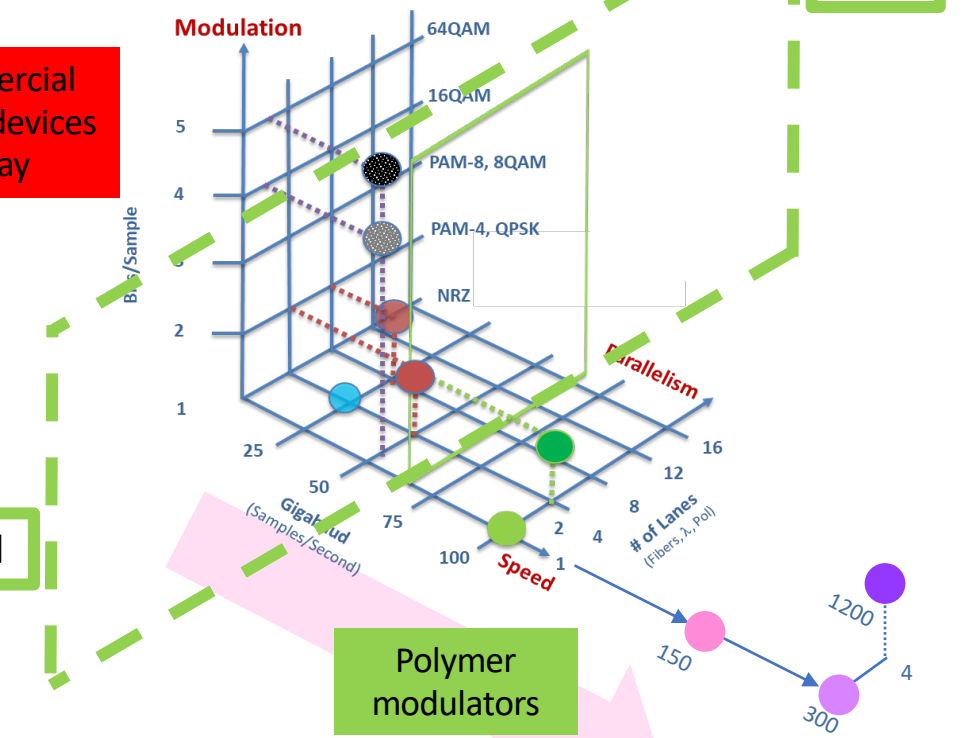
Commercial optical devices today

Wall

Wall



Data rates after breaking through the wall…

- 100Gbps = 100Gbaud, NRZ, 1 lane
- 800Gbps = 100Gbaud, PAM4, 4 lanes
- 150Gbps = 150Gbaud, NRZ, 1 lane
- 300Gbps = 150Gbaud, PAM4, 1 lane
- 1200Gbps = 150Gbaud, PAM4, 4 lanes

Polymers are 3X faster…

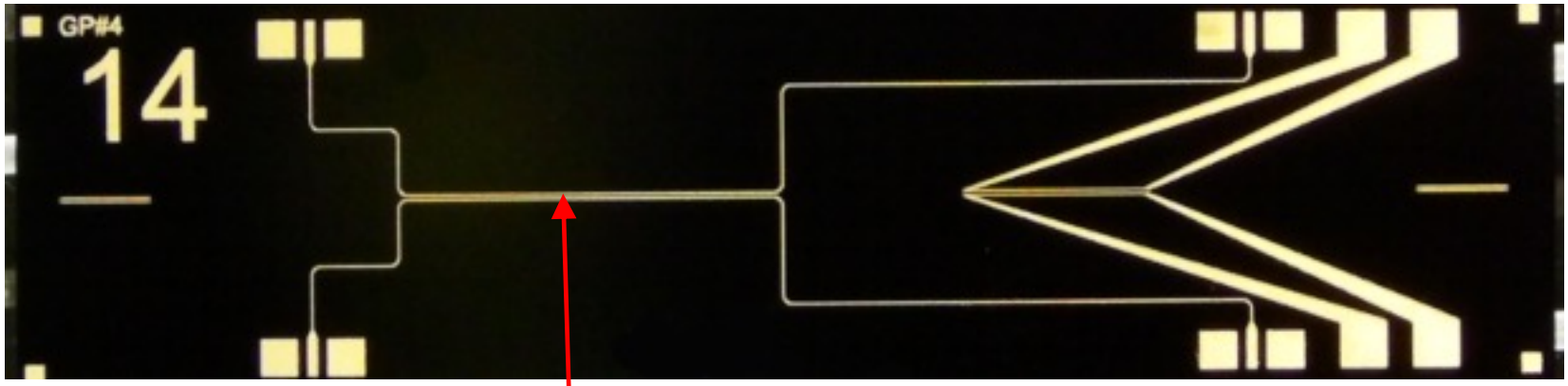
Polymer has head-room to go ***much much*** faster than competition

Polymer modulator chip

Optical input

Die 17 mm long x 4 mm wide

Optical output



RF contacts

Active region (4mm) where the waveguides are

Thermal bias control

Polymer optical modulator chip fabricated on silicon wafers

Natural integration with big foundries

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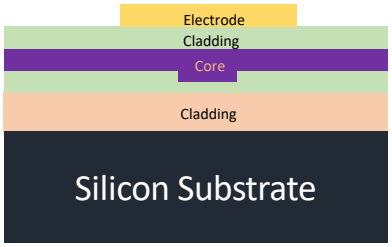
Additive to semiconductor platforms (silicon photonics, InP, GaAs…) to enhance performance

Polymer Stack™

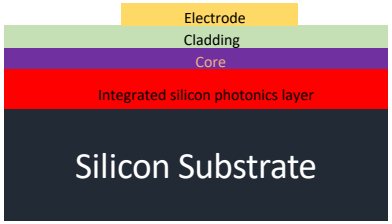


Classic!

Polymer stack modulator

- 3-layer polymer stack waveguides
- Linear Pockel's effect phase modulator (or Amplitude modulator if in Mach-Zehnder)
- Excellent high-speed performance (>100 GHz), low voltage (~1 V Vπ), and high stability.
- Standard fab equipment & methods

Polymer Plus™

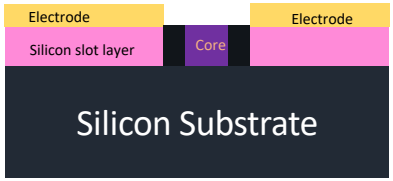


Additive!

Simpler and easier to integrate

- Minimizing polymer layers for integration of modulator with other devices in Si (or other) PIC platform
- Spin-on wafer-level hybrid integration
- Natural integration with PDK of silicon foundries

Polymer Slot™



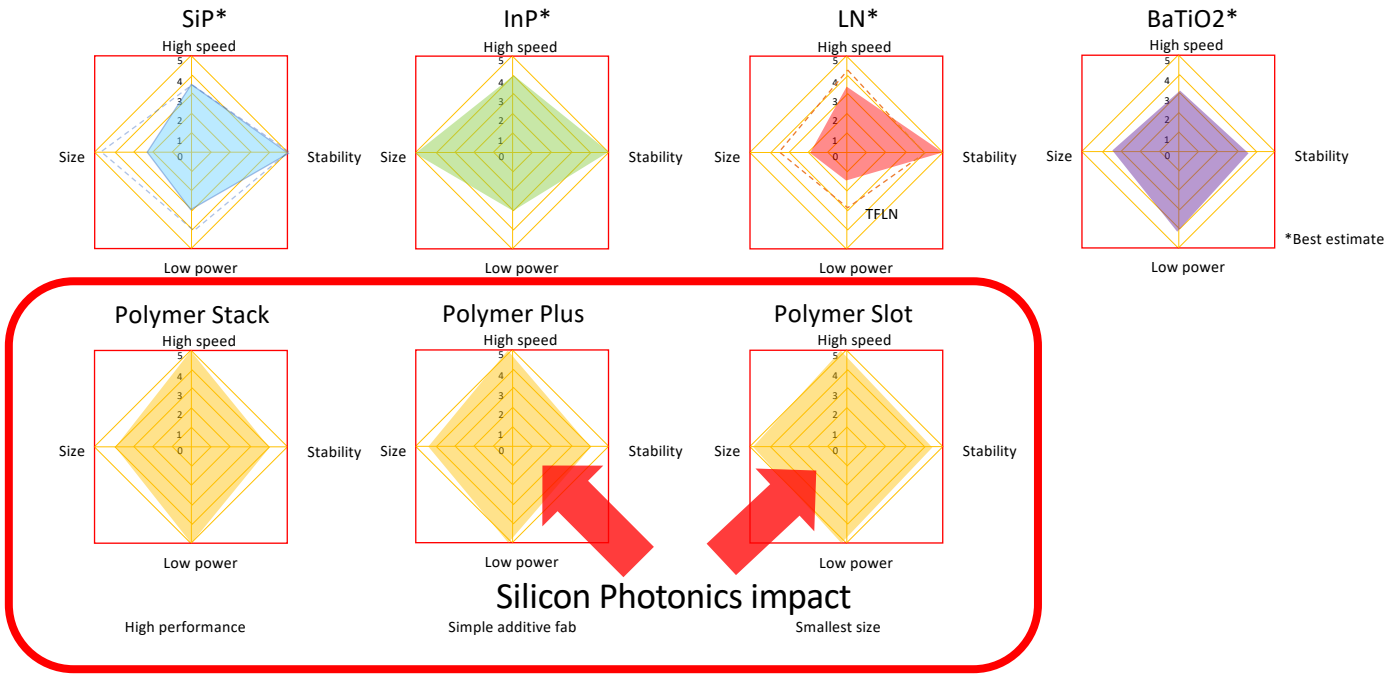
Tiny!

Polymers in Si slot modulators

- Small size for highest integration levels
- Modulator device itself is hybrid silicon-EO Polymer (Silicon provides the waveguiding and electric field, EO polymer provides the high-speed EO functionality)
- Natural integration with PDK of silicon foundries

Turbo-charge **your silicon photonics & integrated photonics with polymers…**

Polymer attributes are impressive…



- **Polymer Stack™** - Traditional design. Very high performance
- **Polymer Plus™** - Boost to SiPh PICs fabricated in CMOS foundries
- **Polymer Slot™** - Smallest form factor. Ideal for SiPh/CMOS foundry

Technology strengths and weaknesses → polymer platforms are attractive

** Best estimates*

Relative technical comparison of modulators

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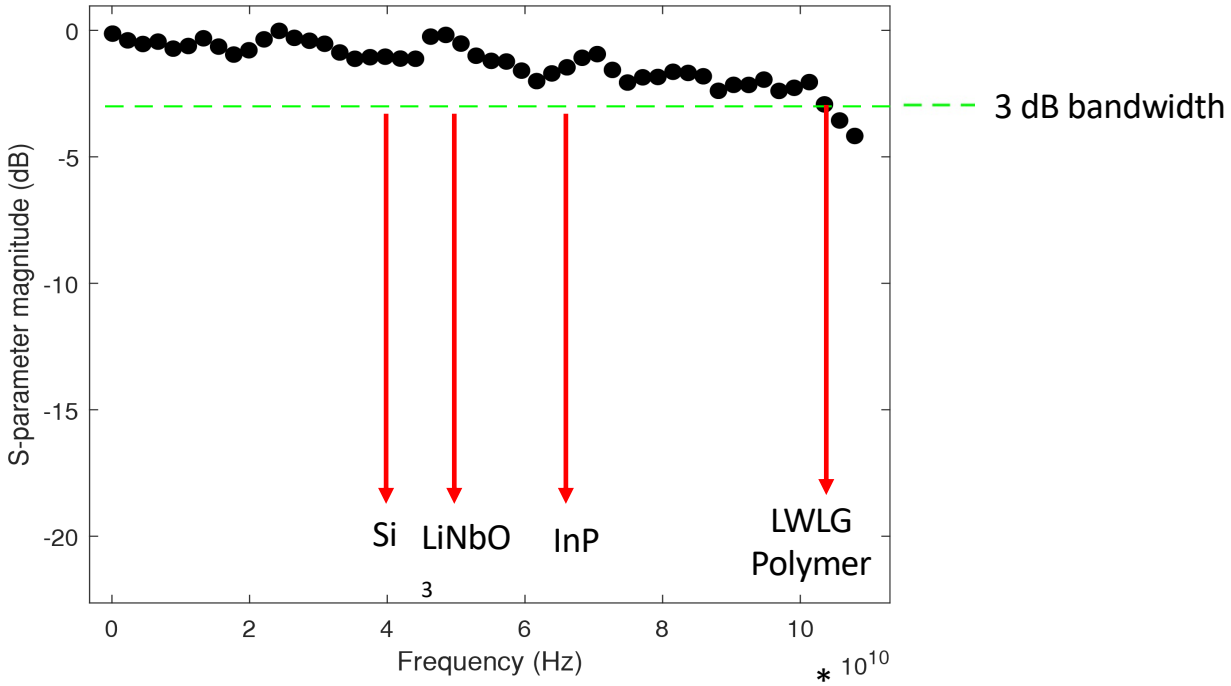
Optical bandwidth – polymer modulators



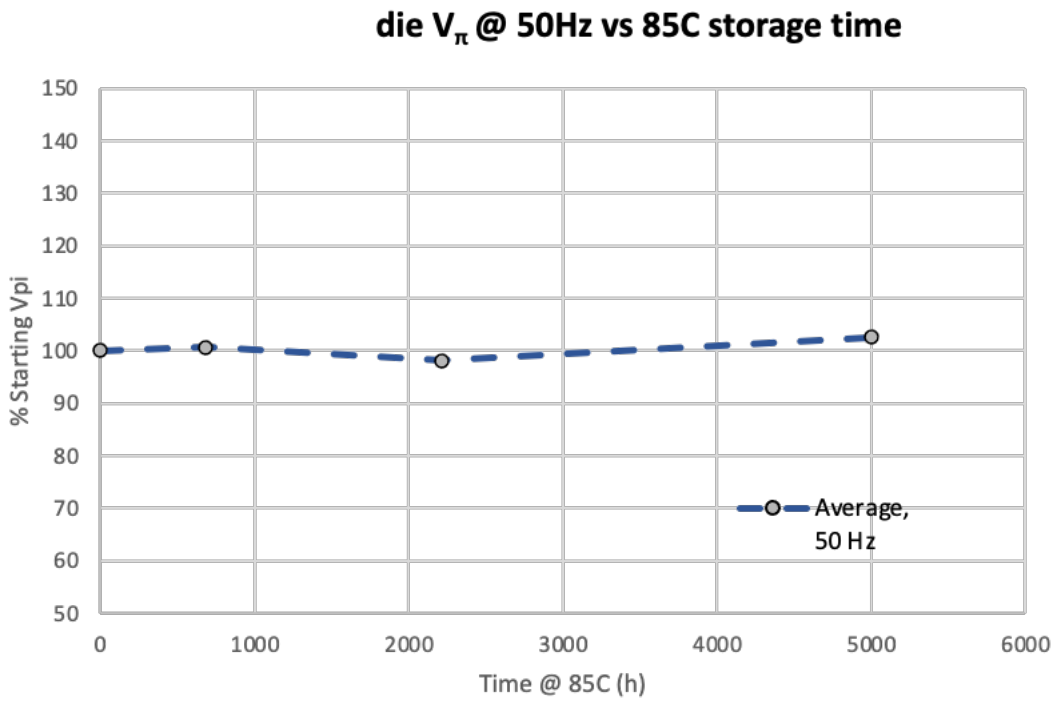
Si – Silicon photonics
LiNbO – Lithium Niobate
InP – Indium Phosphide

Polymer modulators outperform competitive semiconductor technologies

Source: LWLG

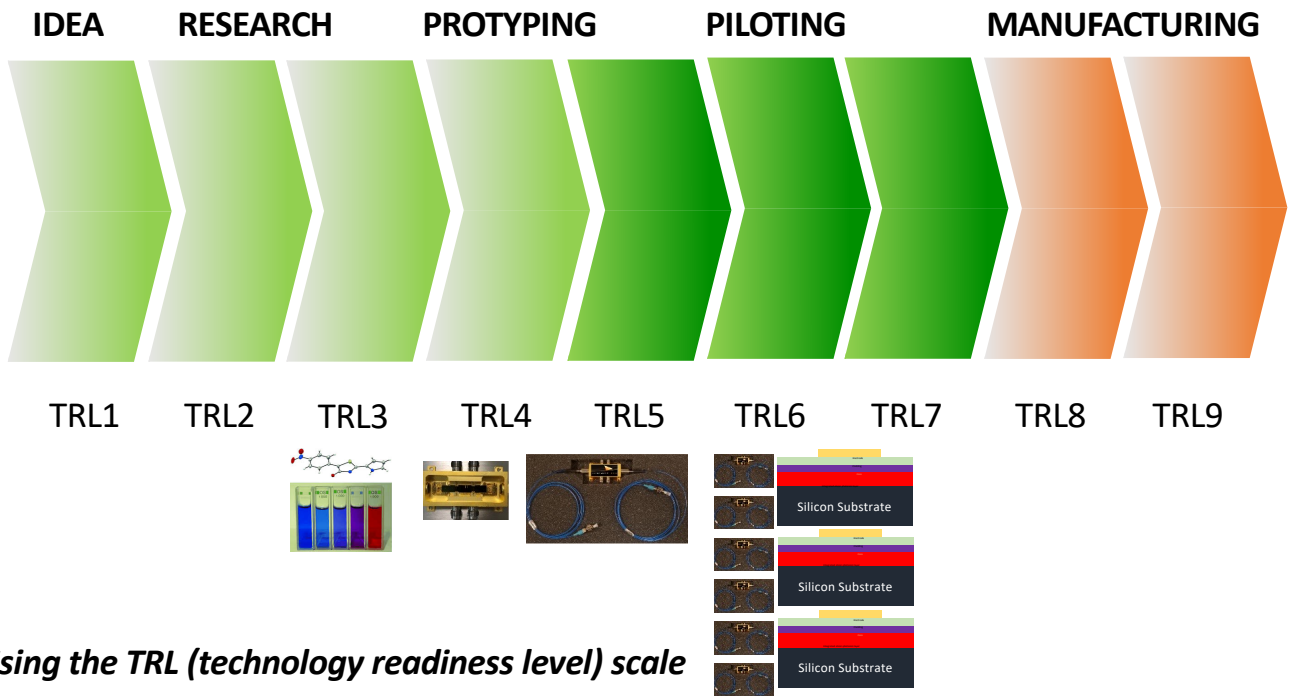
Stability of polymers

- 3 layer-stack devices
- Over 5khrs stability @ 85C
- Voltage delta <5% @ 50Hz for continuous change



Polymer modulator chip stability >5000Hrs

Route to maturity & volume

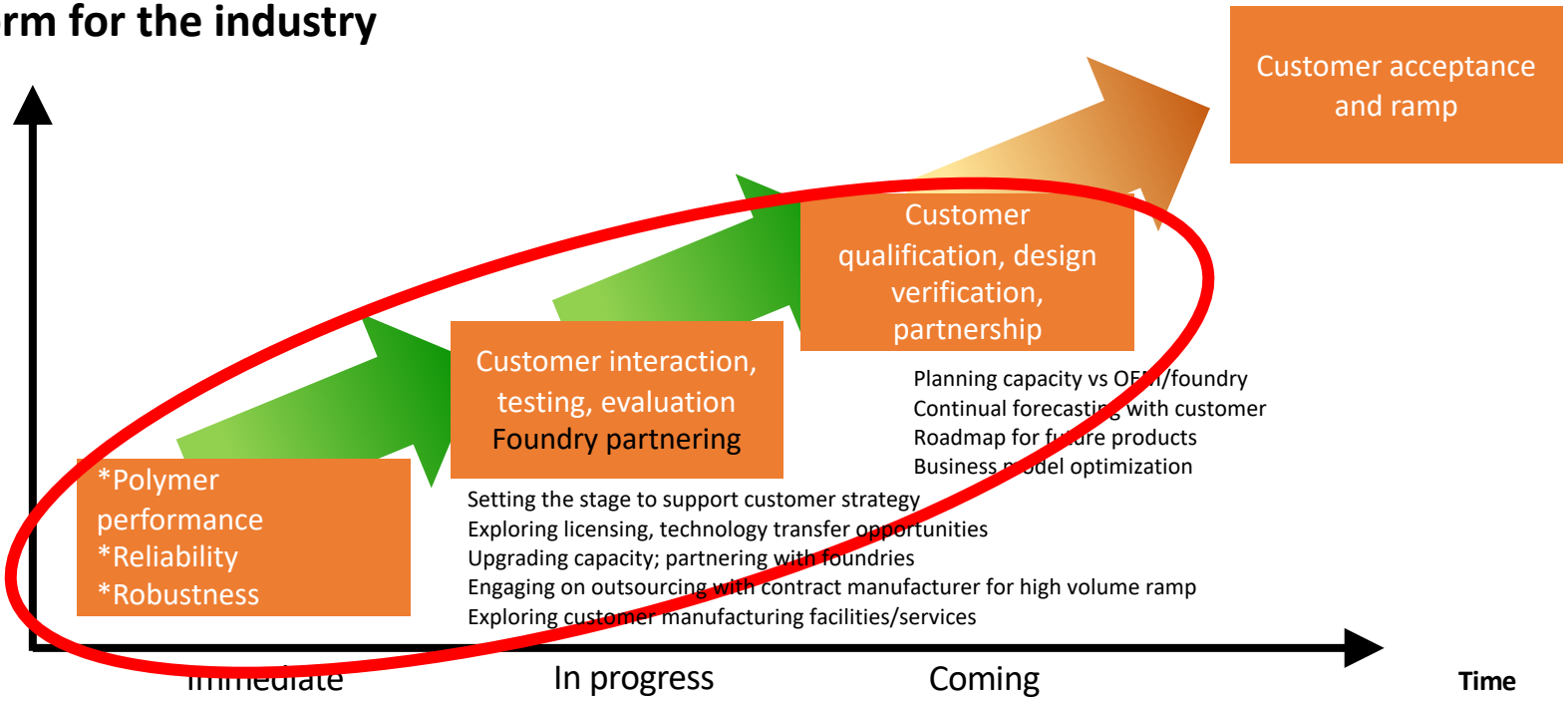


Using the TRL (technology readiness level) scale

We are progressing on the TRL scale

Polymer business roadmap

Driving forward with our 'high speed, low power' polymer platform for the industry



Current engagement includes foundry partnering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Foundry Scaling

Silicon foundries are hungry for ‘opto’ business

- CMOS fabrication plants want silicon photonics…new upside
- PDKs will drive the hybrid integration of PIC platforms

Drive to 200/300mm allows competitive PIC cost/volume and scale

*PDK = Process Development Kit

Technology roadmap

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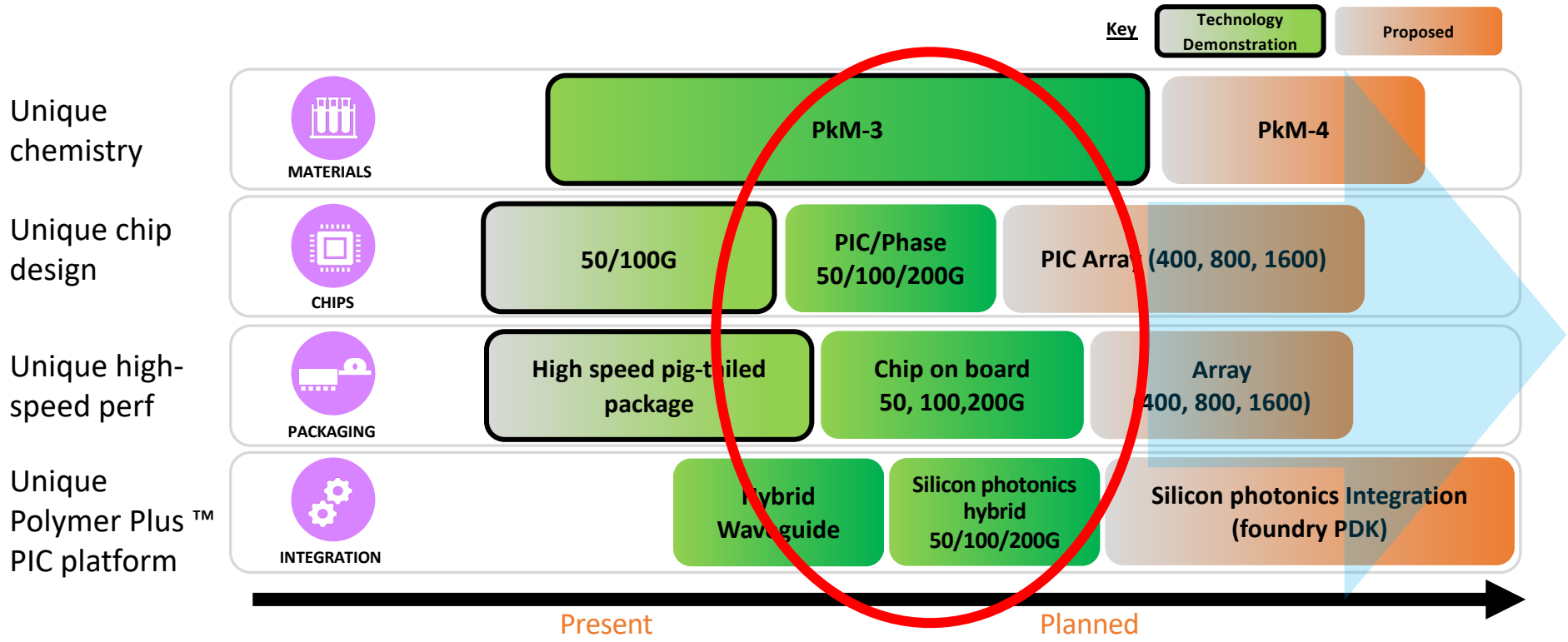

Our technology roadmap emphasizes our unique value to the industry

Partnering with silicon foundries

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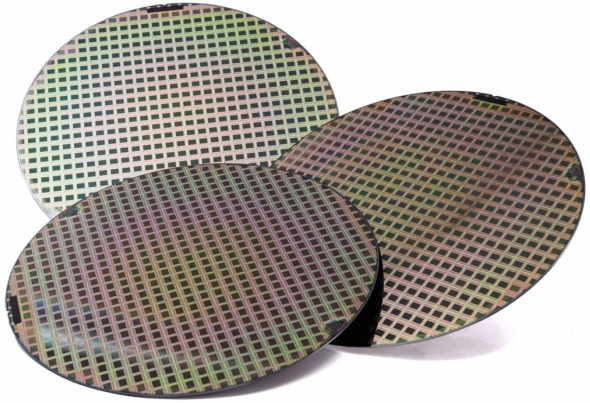
- Process Development Kit (PDK) *to include polymers*
  - Standard fabrication techniques
    - Wet etching, dry etching, metallization, dielectric deposition, spinning, curing, baking, poling
  - PDK is provided by the foundry in SiPh
  - PDK allows you to create innovative designs and ramp volume quickly…*perfect vehicle for polymers*



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PDKs are the route to partner with foundries

*PDK = Process Development Kit

Industry award

- 14th September 2021
- European Conference on Optical Communications (ECOC) exhibition industry award
- Optical integration award to Lightwave Logic Inc.

ECOC Exhibition industry award for optical integration


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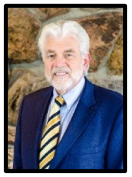
Leadership

Experienced management & board

Dr. Michael S. Lebby - CEO

35+ years in photonics & semiconductors (CEO/CTO level)

MOTOROLA · intel · tyco · AT&T Bell Laboratories



Mr. Jim Marcelli - President & COO

35+ years experience in finance & operations

TERADYNE · SANMINA · nti

Rear Admiral Tom Zelibor, USN (Ret)
Chairman

35+ years experience in global operations & CEO leadership

SPACE FOUNDATION

Dr. Joseph A. Miller, Jr.
Independent Director

35+ years chemistry, fiber optics R&D (CTO level)

DUPONT · CORNING · Greatbatch

Dr. Fred Leonberger
Independent Director

35+ years in optical modulators & systems (CTO level)

MIT Lincoln Laboratory · JDSU · NATIONAL ACADEMY OF ENGINEERING

Mr. Ronald A. Bucchi
Independent Director

35+ years experience in accounting & finance

FARMINGTON BANK · SIGN PRO

Mr. Siraj Nour El-Ahmadi
Independent Director

Leadership in telecom network equipment businesses (CTO level)

Menara NETWORKS · NORTEL NETWORKS™

World class advisory board

Dr. Craig Ciesla

Innovator in optics, microfluidics, electronics and nanofabrication (CTO/CEO level)

illumina® tactus intel TOSHIBA JDSU

Dr. Christoph Harder

Expert in photonics, technology development, and manufacturing/selling of photonics components/apps (CTO/CEO level)

SWISS PHOTONICS NORTEL ETH zürich IBM JDSU

Dr. Andreas Umbach

Coach and consultant on entrepreneurship and photonics technologies (CTO/CEO level)

u2t photonics FINISAR Fraunhofer HHI

Dr. Franky So

Leading materials research authority and thought leader in polymer-based OLEDs (CTO/Professor level)

MOTOROLA Hoechst Celanese Hoechst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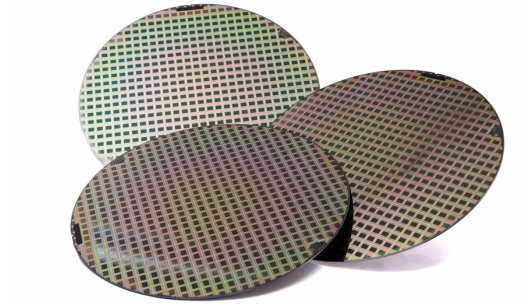
Summary

Partnering for success

- Our technology platform that is working to help **scale existing internet structure (enabling technology)**
- **Technology designed to transmit data at higher speeds with less power** (essential for data communications & telecommunications markets)
- **Leveraging internally-engineered electro-optic (EO) polymers** to create photonic devices that convert data from electrical signals into optical signals
- **Working with multiple foundries, packaging partners and module/transceiver partners to position Lightwave for future high-volume production**
- **Technology evaluation underway with Tier-1 partners under NDA**



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Leveraging our partners to commercialize our technology in polymers

1) Oculi llc.

Contact

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