POET Technologies Inc.

Needham Technology Conference

January 14, 2021 4:15pm EST

Safe Harbor

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Other than any obligation to disclose material information under applicable securities laws or otherwise as may be required by law, the Corporation undertakes no obligation to revise or update any forward-looking statements after the date hereof.

POET Technologies - Photonics Design & Development

POET Technologies Inc. (HQ)
Ontario, Toronto, CANADA

ODIS Inc.
Allentown, Pennsylvania

POET Technologies Pte. Ltd.
Singapore

POET Optoelectronics Shenzhen Co. Ltd
Shenzhen, PRC

30 Employees

74 Patents and 12 Pending

02 Technology Offerings

- POET Optical Interposer Platform
- Designs for Lasers, Detectors, Modulators, etc.

03 Operating Subsidiaries

01 Joint Venture Company

- Super Photonics Xiamen Co. Ltd.
  Xiamen, PRC

Exchanges: TSXV: PTK OTCQX: POETF

What is Photonics and Why is Photonics Important?

- Photonics devices create, detect and manipulate light. Laser generated light is fundamental to sensing, computing, data and telecommunications – the biggest trends in computing today

Proliferation of Cloud Computing

Data Centers
Network Switching

Growth of Artificial Intelligence

Neuromorphic
Optical Computing

Adoption of 5G and Edge

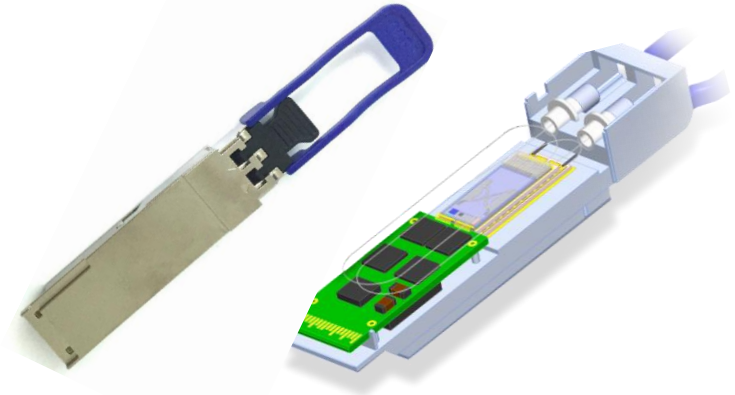
Communications
Internet of Things

POET Opportunity

>$1 Billion Annual Revenue Potential

	Transceivers for Datacom	5G Networks	Co-Packaged Optics	Optical Computing and Edge Applications
Market Size SAM (peak 2021-28) :	$2-3.5B annually	$3-5B annually	$2-3B annually	$3-5B annually
Development Partners:	Tier 1 NA European	Several in play	Several in play	US-based Start-up
JV / Assembly & Test Partner(s):	Sanan IC JV SuperPhotonics	Sanan IC JV SuperPhotonics	TBD	TBD
Potential Customers:	Multiple module makers	Multiple module makers	Cisco Arista Juniper	Nvidia HPE
Revenue Potential:	$250M+ annually	$250M+ annually	$250M+ annually	$250M+ annually

Photonic Transceivers Convert Digital Electric Signals Into Light Signals and Back Again



Photons and light waves compared to copper:

- 100X more data per second
- 10X lower power consumption
- 10X less heat produced

Conventional Approaches are Expensive and Slow

- Making reliable photonics devices are expensive in both capital and labor
  - Cost declines have not kept up with Moore's Law- most photonics modules are built individually
- Multiple different components must be able to interconnect seamlessly
- Integration of components at wafer-scale has not been fully implemented even by the largest companies working for the past 20 years

Photonics	Electronics	Optics
Lasers	Controllers	Mirrors
Detectors	Amplifiers	Lenses
Modulators	ASIC's	Prisms
Multiplexers	Monitors	Collimators
De-multiplexers	Micro-processors	Polarizers
Size Converters	Memory	Beam Splitters

POET's Approach

- POET took on the dual challenge of INTEGRATION and PLATFORM to develop a unique, disruptive and differentiating new entry into photonics markets

Integration is the practice of combining different parts or functions so that they work together seamlessly

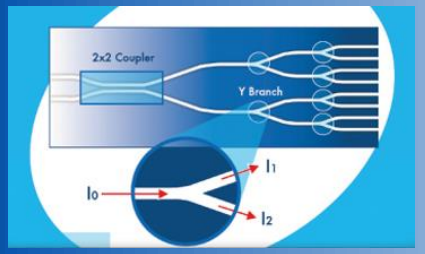
A **platform** is a group of technologies that are used as a base upon which other applications, processes or technologies are developed

A popular example of the combination of Integration and Platform Technology

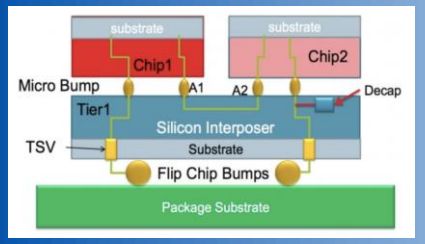
POET's Optical Interposer™ Platform

- A unifying hybrid optoelectronics WAFER SCALE integration platform

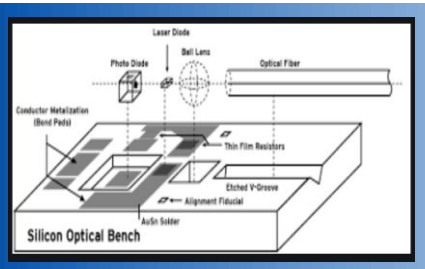
POET Optical Interposer



Passive Optical Device Integration ✓



Interposer Functionality ✓

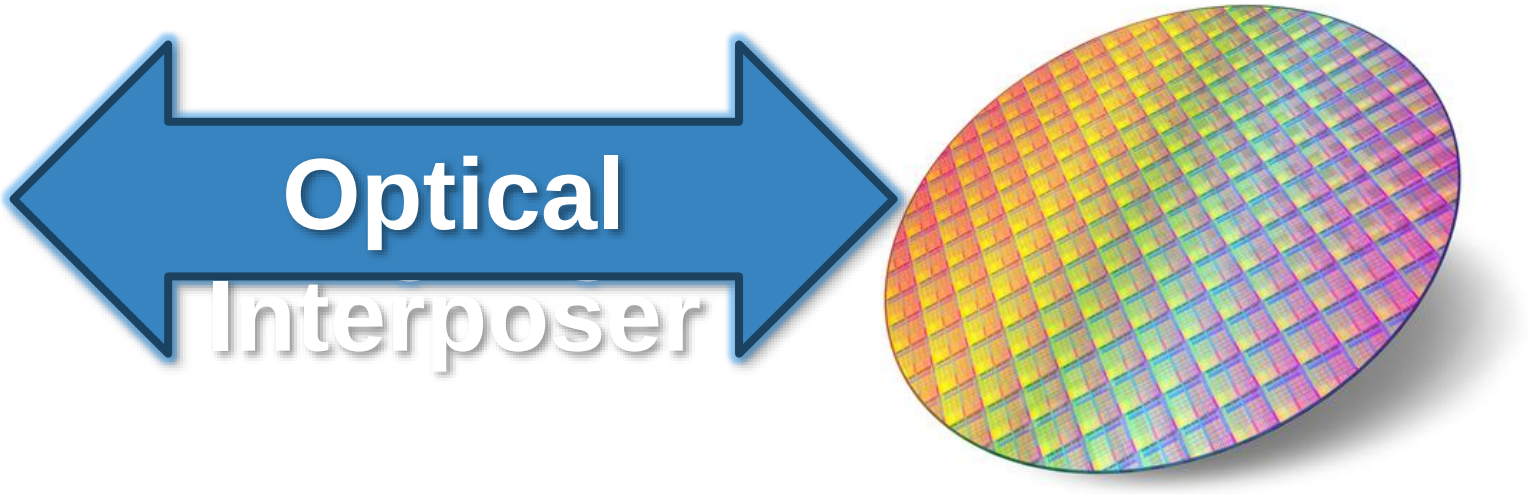


Micro Optic Assembly ✓

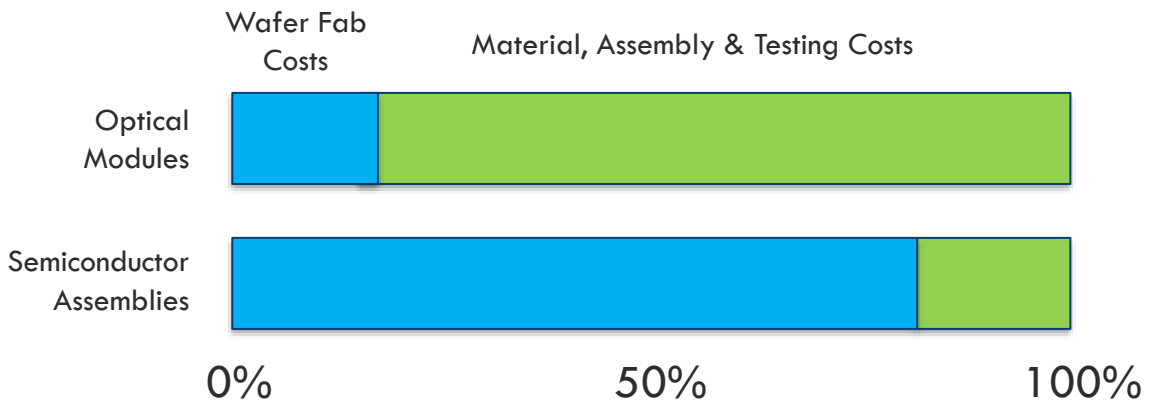
Photonics ; Optics ; Electronics

POET has done for Photonics what Semiconductors did for Electronics – Achieving Lower Cost and Higher Performance through Device Integration and Wafer-Level Fabrication

- The POET Optical Interposer™ is an **integration platform** that combines photonic, electronic and optical devices in the same **chip-scale package** – fabricated, assembled and tested all at **wafer scale**



Why Integration Matters



- Materials, Assembly & Testing = 80% of total cost of an optical module, with the optical components and packaging representing => 70% of the total
- The opposite is true for semiconductors
- The only way to reduce optical module cost is to address the cost of optical components, materials, assembly and test.
- By applying proven wafer-scale semiconductor manufacturing techniques to achieve Integration, POET:
  - Dramatically reduces component cost
  - Improves size, power, cost, speed, reliability and scalability
  - Enables new functionalities

Breakdown of Optical Module Costs

Indirect Costs: **20%**

Materials, Assembly & Test **80%**

Total Cost **100%**

Breakdown of Materials, Assembly & Test Costs

Electrical Components: **10%**

Optical Components: **40%**

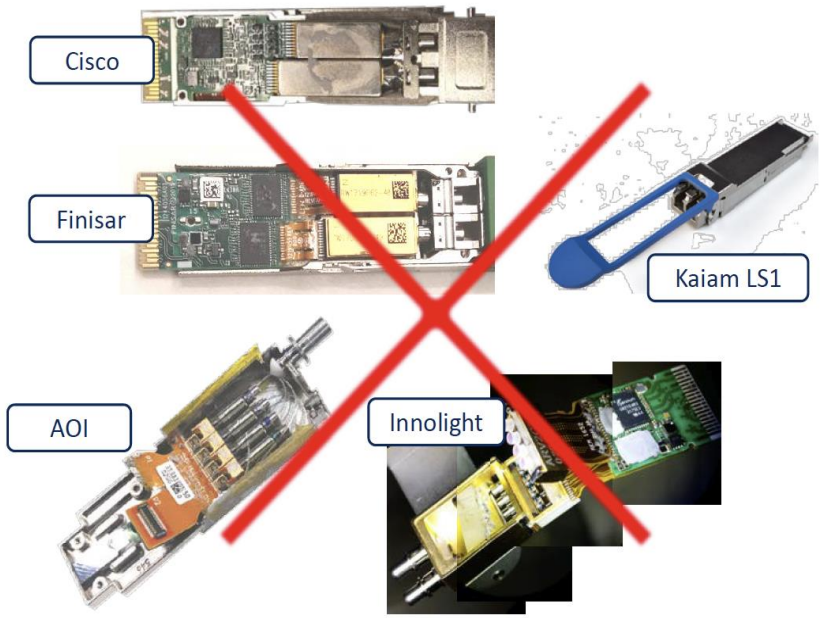
Packaging: **50%**

90% of Material, Assembly & Test Costs => **70% of Total Cost**

Rethinking the Transceiver

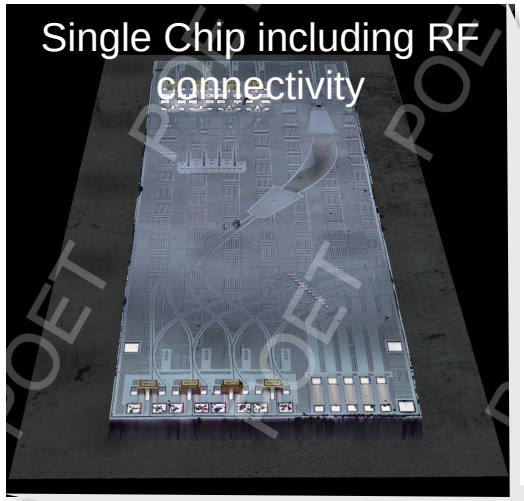
- Combining All Photonics / Optics Components into One Chip
- And building them hundreds at a time instead of one at a time, at wafer scale

Competing Technologies

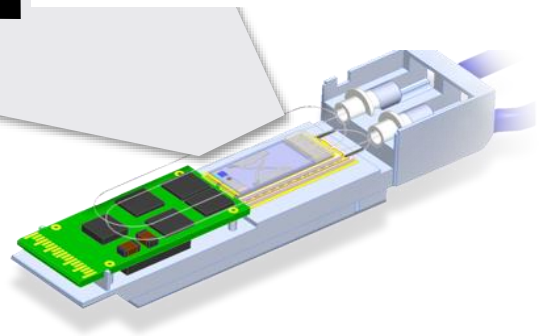


- Discrete micro-optics or TOSA/ROSA approach
- Lots of components, assembly and alignment
- Limited scalability: no space for high channel count products
- Limited cost scalability

POET

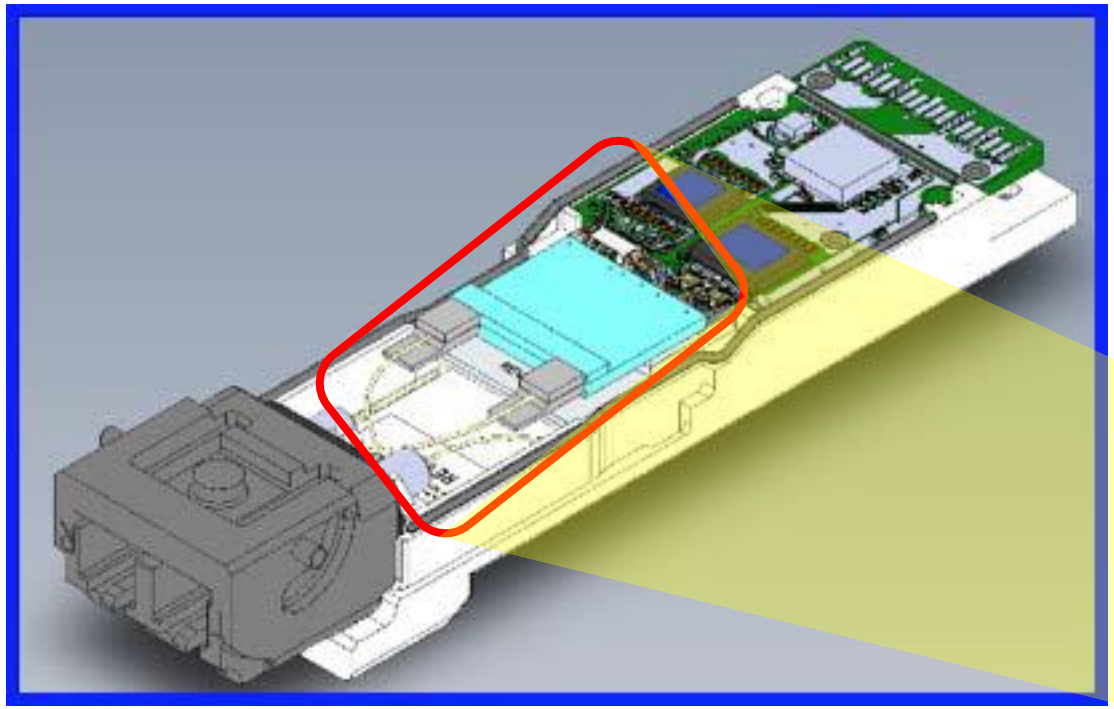


- Simpler BOM and reduced number of build/test steps
- Standard assembly technologies
- Scalable for future higher density products

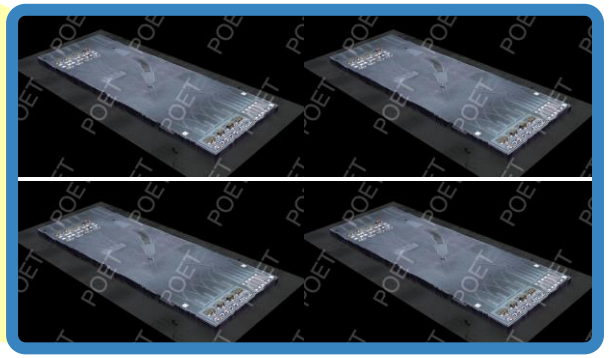


The World's Smallest and Lowest Cost 100G Optical Engine

- 4 x 25G DML Lasers, 4 High Speed Photodiodes, 4 Monitor Photodiodes, Mulitplexers, DeMultiplexers, Power Taps and Fiber Attach
  - all on a 9mm x 6mm POET Optical Interposer platform



FOUR POET Optical Engines can fit in a space occupied by one !!



How POET Wins :

- Simplified Packaging
- Lower Bill of Materials (BOM) Cost
- Highly Automated Wafer Scale Manufacturing
- Dense, Smallest Form Factor
- Excellent Electrical and Optical Performance

Benefits of POET's Optical Interposer

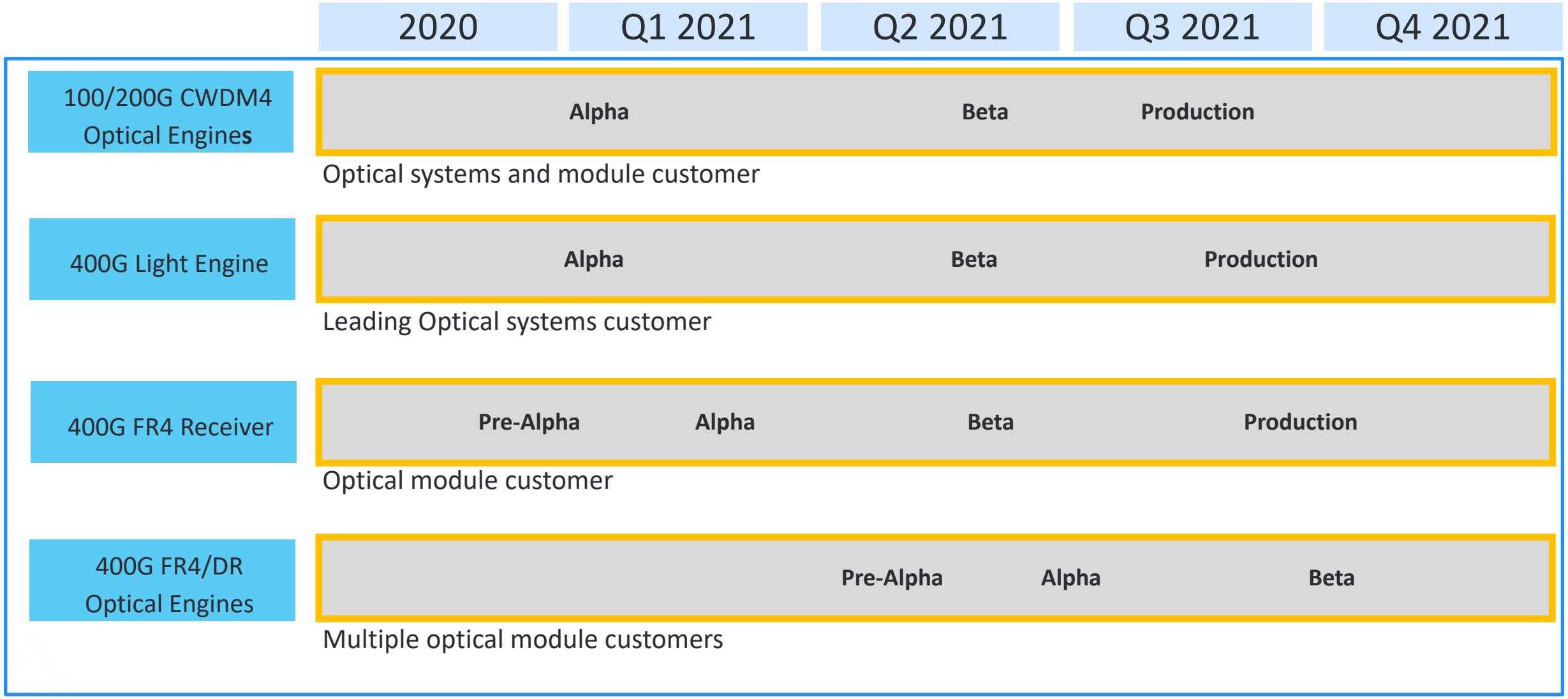
- The benefits POET's Optical Interposer add up to a truly disruptive entry into large-scale photonics markets

✓ Dramatically lower module cost	*25% - 40% less*
✓ Lower CAPEX investment for module assembly & test	*1/10th of others (discrete or SiPh PIC based)*
✓ Chip-scale package	*Reduces power consumption*
✓ Wafer-level assembly and test	*Built 100's at a time, not 1 at a time*
✓ Planar architecture	*Ease of production and flexibility in design*
✓ Platform technology	*Adaptable to multiple applications (e.g., 5G, AI, IOT)*

Industry Firsts

- Industry's smallest complete Transmit and Receive Optical Engine
- Industry's best continuous wave (CW) laser coupling efficiency with wafer scale passive alignment
- Industry's best fiber to Interposer coupling loss < 0.5dB
- Industry's first flip chip Directly Modulated Laser (DML) meeting 100G/200G application requirements
- Industry's first wafer scale assembly compatible Multiplexer/DeMultiplexer meeting CWDM4 (100G) and FR4 (400G) requirements
- Industry's first Hybrid Photonics assembly platform combining the benefits of passive optical filters, RF Interposers and Micro optics

Product Roadmap driven by Customer Engagement



One Stop Design to Production

- POET controls the supply chain to ensure performance, cost and delivery to customers

Optical Interposer	Photonic Devices	Electronics	Assembly & Test
POET Owned and Designed	Strategic Sourcing Co-Designed POET Specified	Off-the-Shelf or Customer Specified	Strategic Sourcing Co-Designed POET Specified
SILTERRA	Almae Technologies DenseLight 厦门市三安集成电路有限公司 Xiamen Sanan Integrated Circuit Co., Ltd		SP

Joint Venture Enables Scale

- Super Photonics Xiamen – POET and Sanan IC Joint Venture (JV)
  - Vertically integrated manufacturing for Optical Engines
  - Ability to rapidly scale production

Sanan IC | Xiamen Sanan Integrated Circuit Co., Ltd.
- Xiamen Torch High-Tech Industrial Development Zone
- US$500 million investment on180,000 square meters
- Compound semiconductor manufacturing platform
- Process technologies for microwave radio frequency, high power electronics & lasers

Sanan Optoelectronics Co. Ltd. (Parent)
- LED, filters, power electronics, microwave integrated circuits and optical comms.
- Produces 25 million 6” wafers per year with 4 locations and over 8,500 acres
- US$1 billion Revenue; US$14 billion market cap
- Shanghai Stock Exchange (600703)

Summary

- POET successfully transitioned from technology development to product development in the second half of 2020
- Data from prototype devices assembled at wafer-scale showing performance that exceeds internal expectations
- Super Photonics Xiamen provides ability to meet customer demand and to scale rapidly
- POET has an opportunity to build a $1 Billion annual revenue business in just the 4 application areas that we are working in today


POET
Technologies

POET Potential Customers

- Partial list of prospective customers for Optical Engines for Optical Transceivers and for Co-Packaged Optics

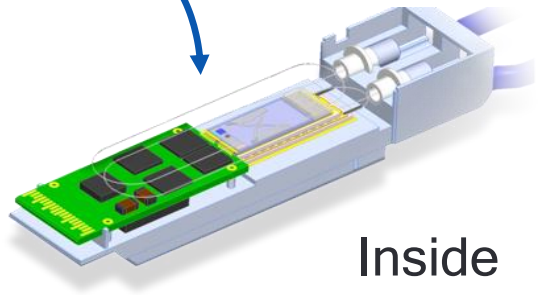
Transceiver Module		Optical System	Cloud Data Center
ADVA	Accelink	Cisco	AWS
Delta	Cloudlight	Huawei	Google
Molex	GigaL	Juniper	Facebook
Eoptolink	HG	Acacia	AliBaba
Hisilicon	Huali	Arista	
Source	Xgiga	Nokia	
Hisense	Hengtong		

POET's Optical Engine Replaces Costly Components Inside the Transceiver Module

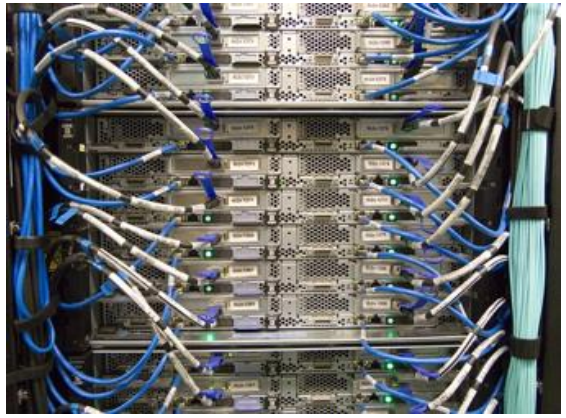
- An Optical Engine is an integrated device that emits, guides, modulates and detects light, and communicates with other electronic devices within the optical transceiver module

POET Optical Engine

Packaged Transceiver

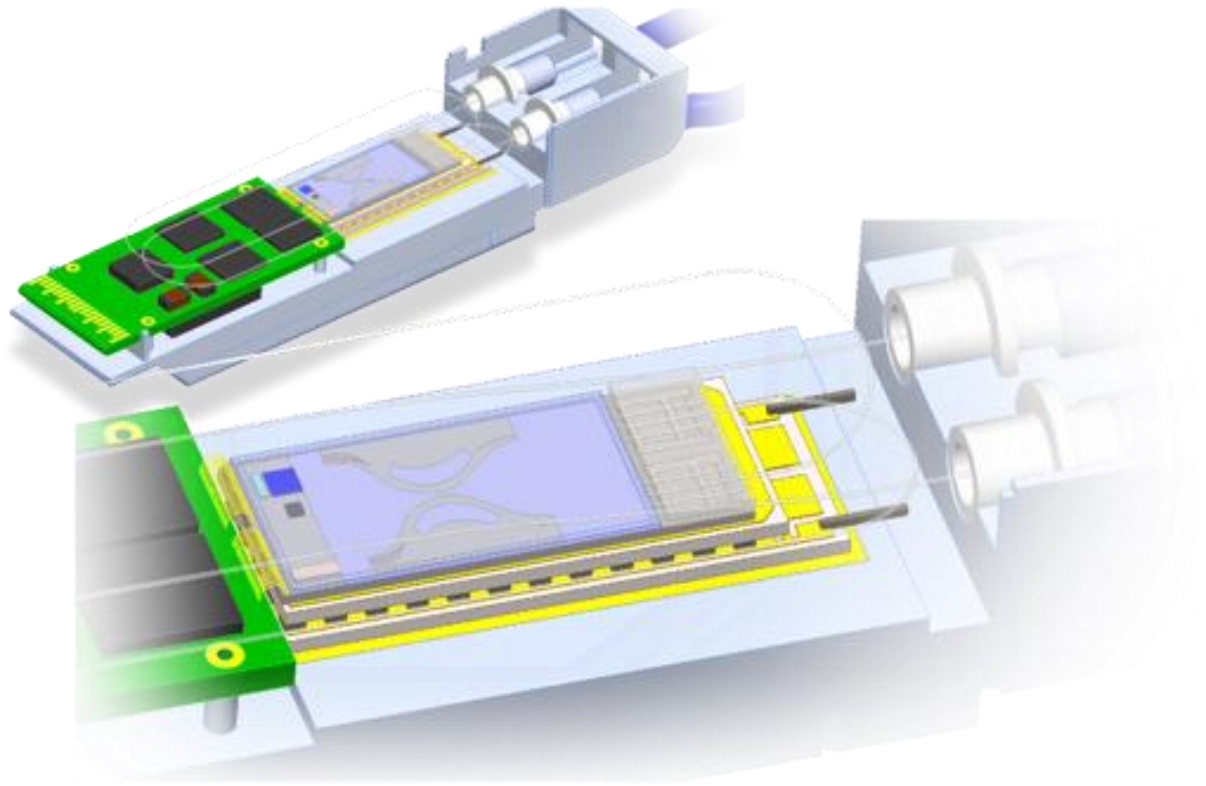


Inside Transceiver Module



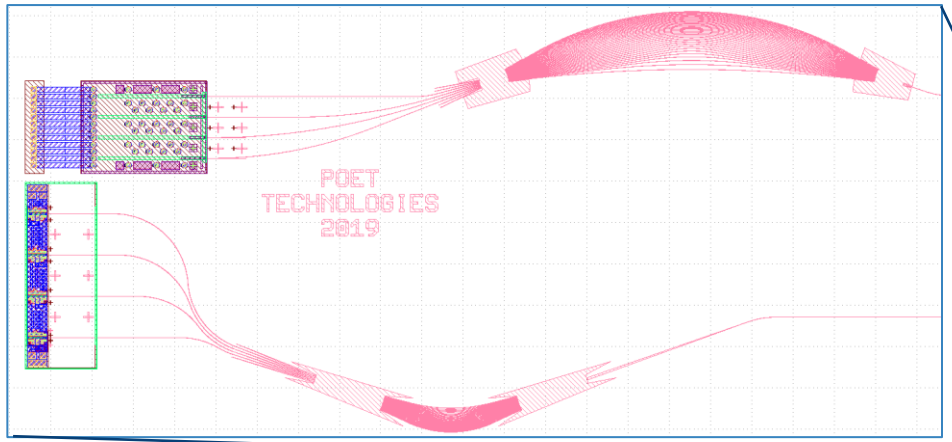
Data Center Switch

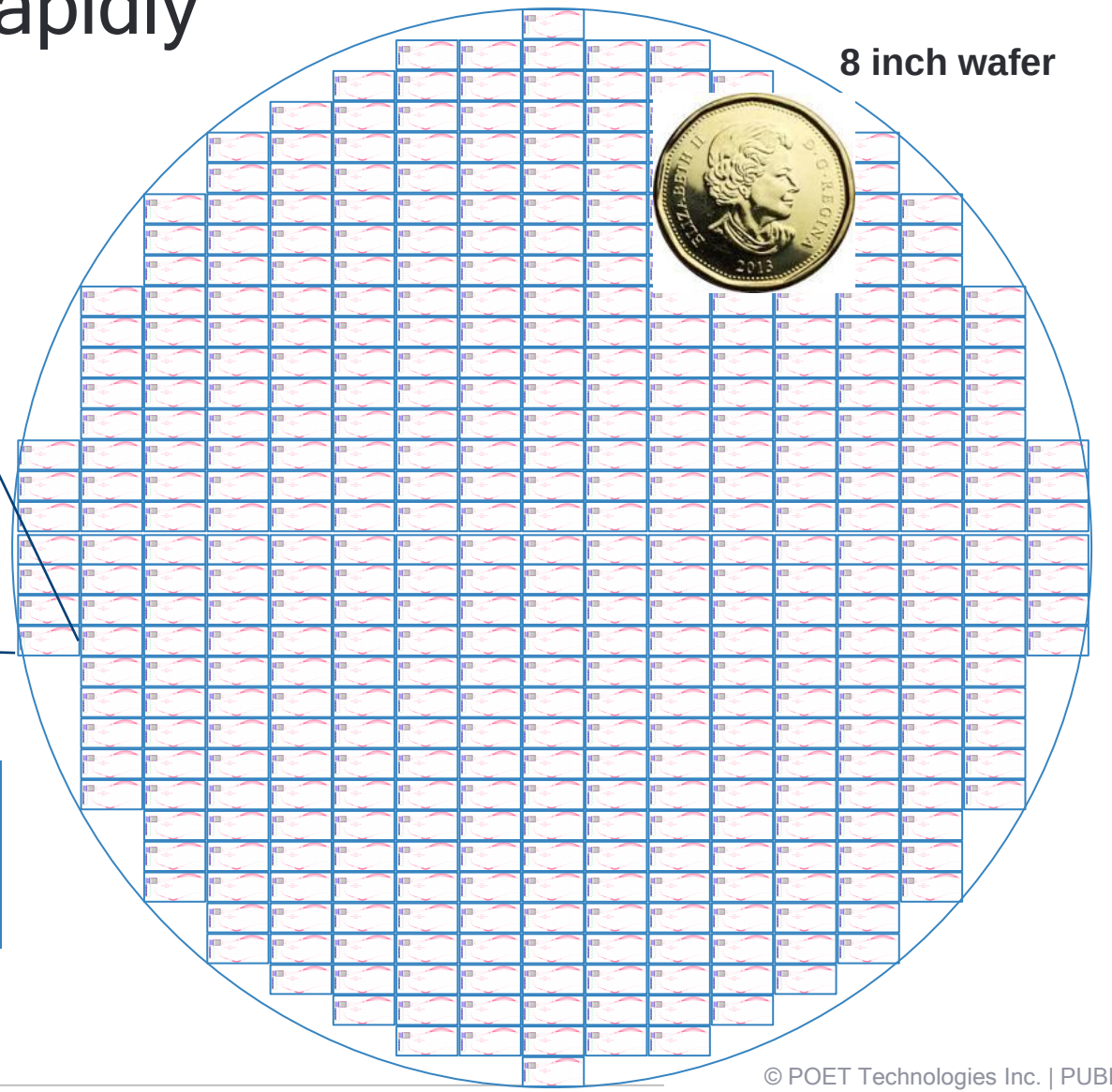
A Hybrid Optoelectronic Integration Platform



- The POET Optical Interposer™ platform for component integration, test and packaging – all at wafer-level
- Utilizing the highest performance components from different material sets (Si, InP, SiON, GaN)
- All built on a 200mm CMOS wafer incorporating passive optical components, waveguides and electrical interconnects
- Flip-chip assembly of photonics and electronics with passive alignment enables automated, chip-scale packaging

The Power of Wafer-Scale Integration: Lower Cost and the ability to Scale Production Rapidly

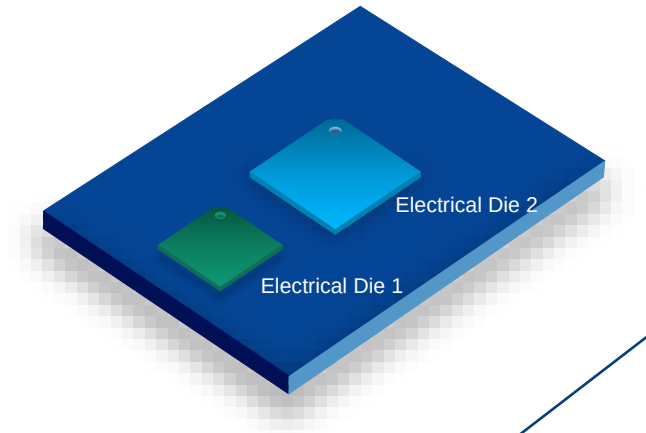




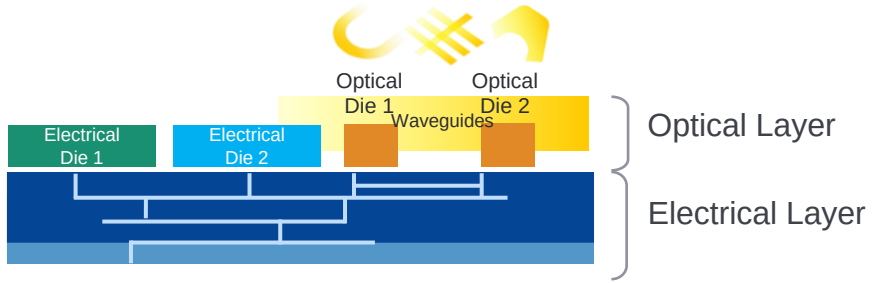
>400 Optical Engines on a single wafer!

Ultra Low-loss Waveguides Enable Device Integration

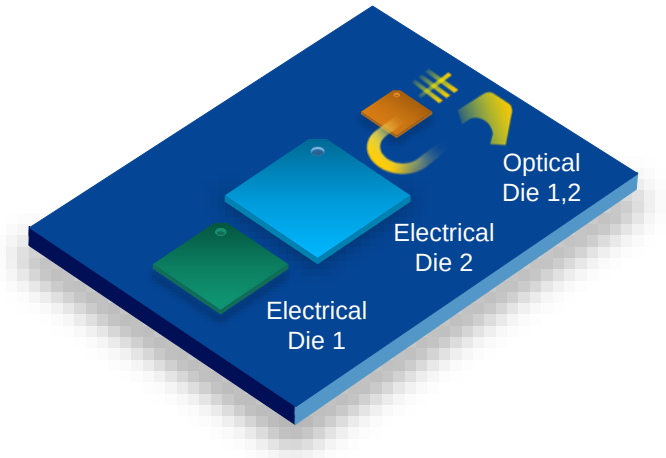
Electrical Interposer



- Typical electrical interposer with high-speed electrical connections among electrical devices



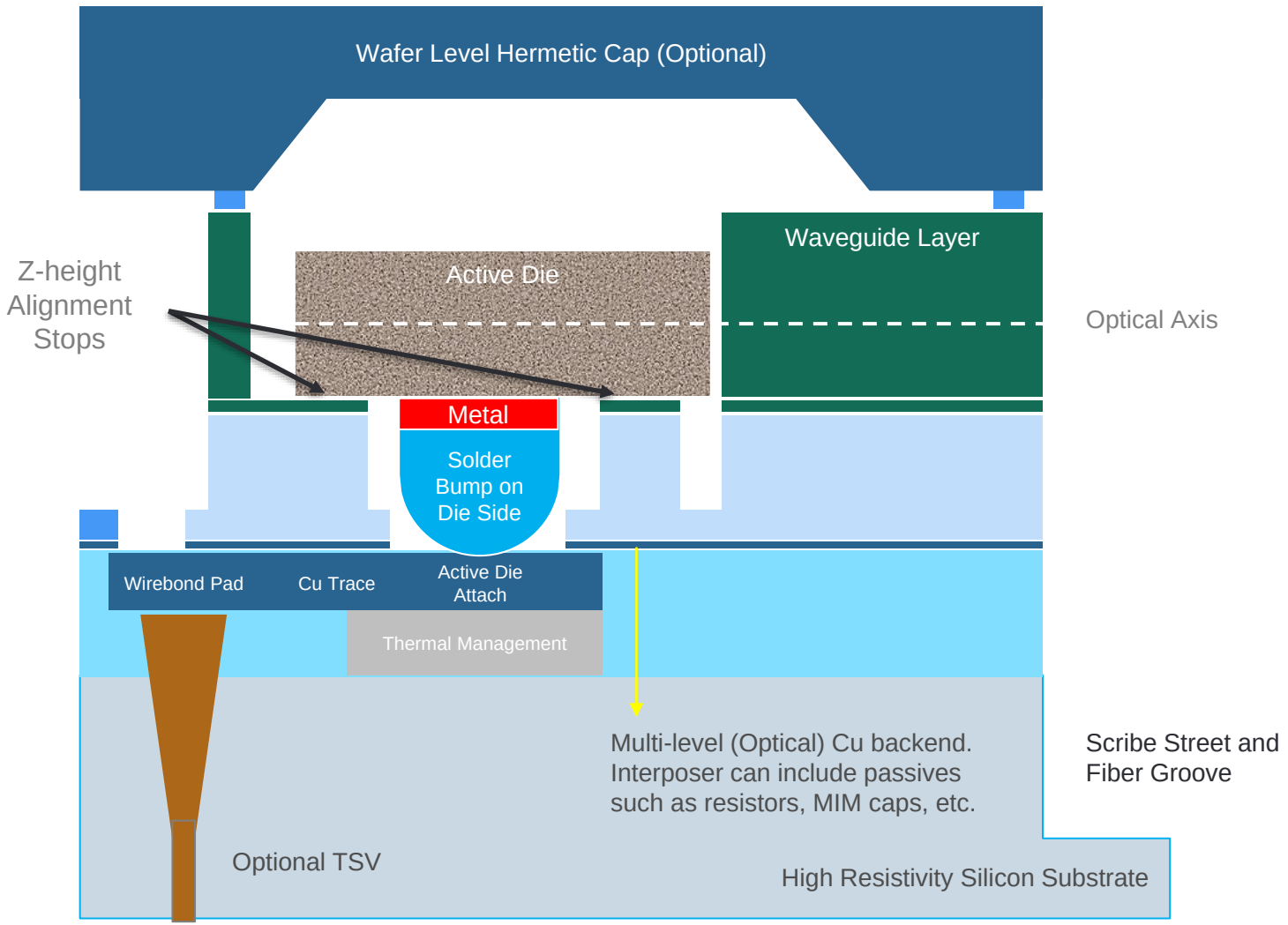
Low Optical Signal Loss	**< 1 dB/cm**
Athermal	**< 0.015 nm/℃**



- Proprietary low-stress, low-loss, athermal waveguides deposited on top layer at <400℃ - fully CMOS compatible
- Waveguides built with all required passive devices in one monolithic layer; electronic devices flip-chipped onto platform
- Full access to electrical interconnects for high-speed communication among all devices

POET's Optical Interposer

Planar Architecture for Passive Alignment of Active Devices

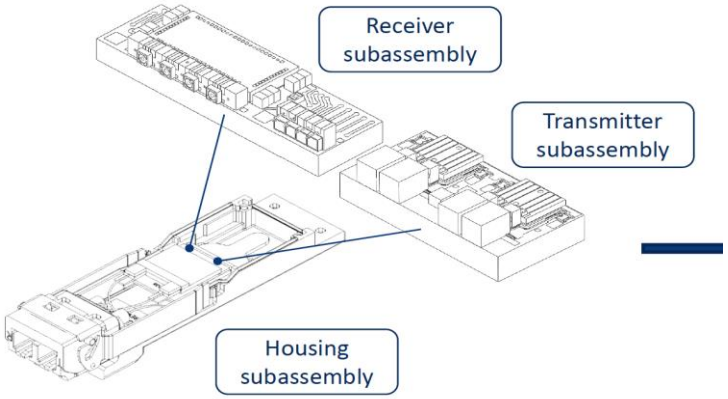


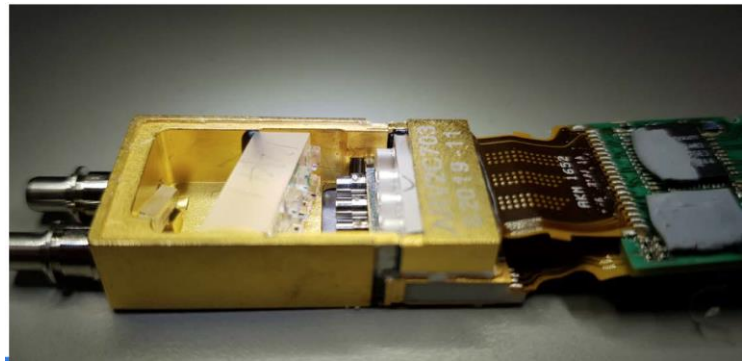
- Passive alignment of active photonic devices (lasers, modulators) using optical reference planes and built-in “x” “y” and “z” stops fabricated using advanced CMOS processing
- Waveguides built above top metal allowing access to high-speed interconnects enabling integration of IC’s
- Superior thermal management with direct heat-sinks to lower layers in normal Silicon wafers (not Silicon on Insulator)

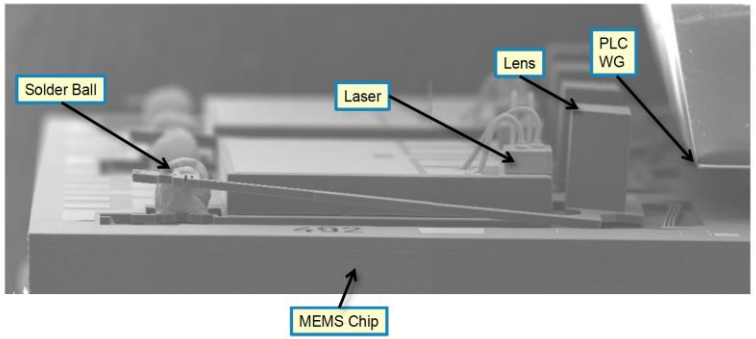
Combining All Photonics / Optics Components into One Chip

- And building them hundreds at a time instead of one at a time, at wafer scale

Competing Technologies

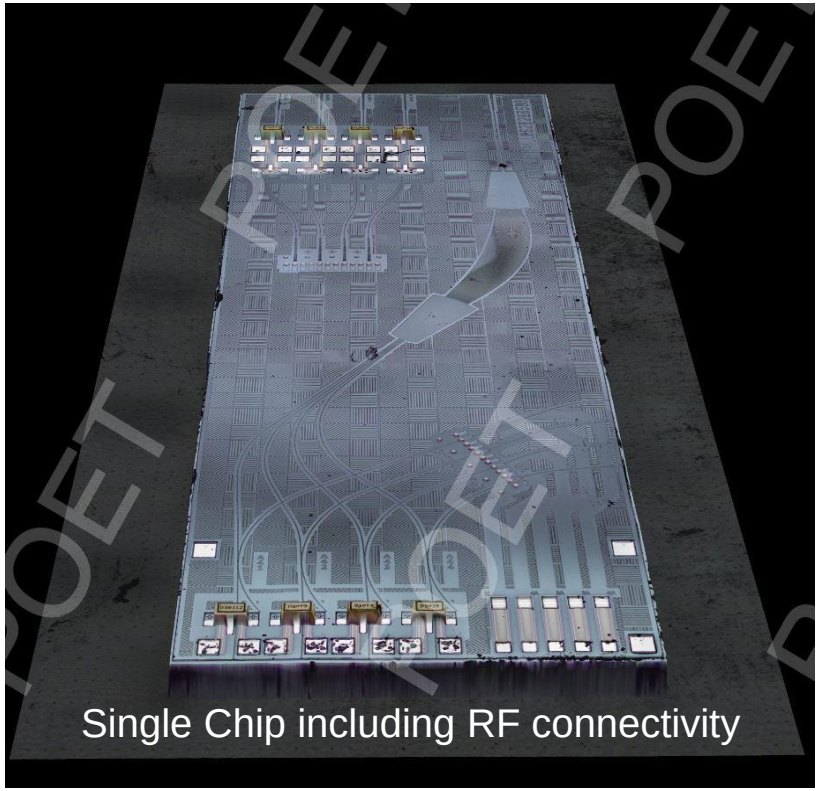






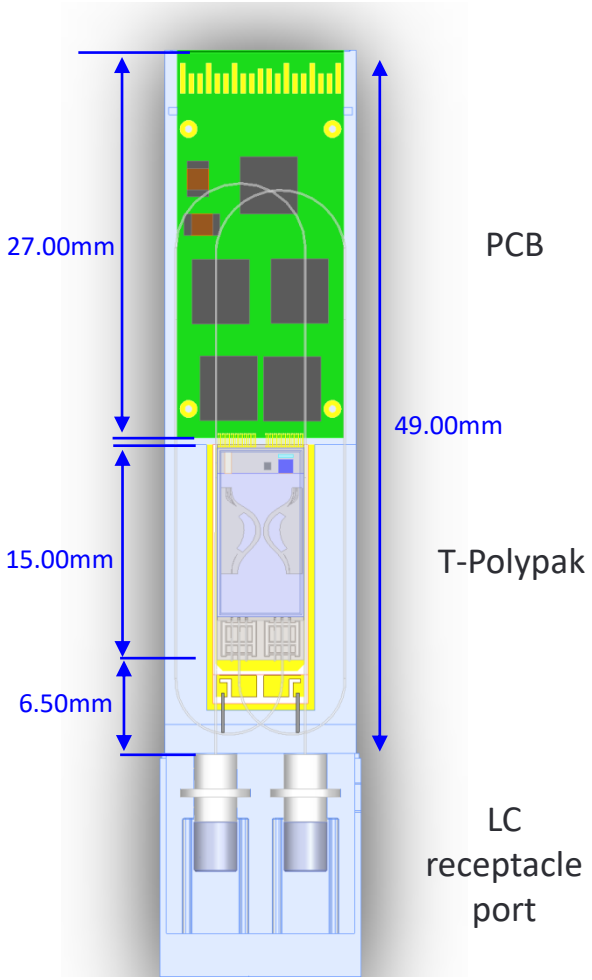
- Multiple sub-assemblies
- Multiple Active Alignments
- Multiple Chips
- Multiple “Gold Boxes”
- Multiple Fiber attach units

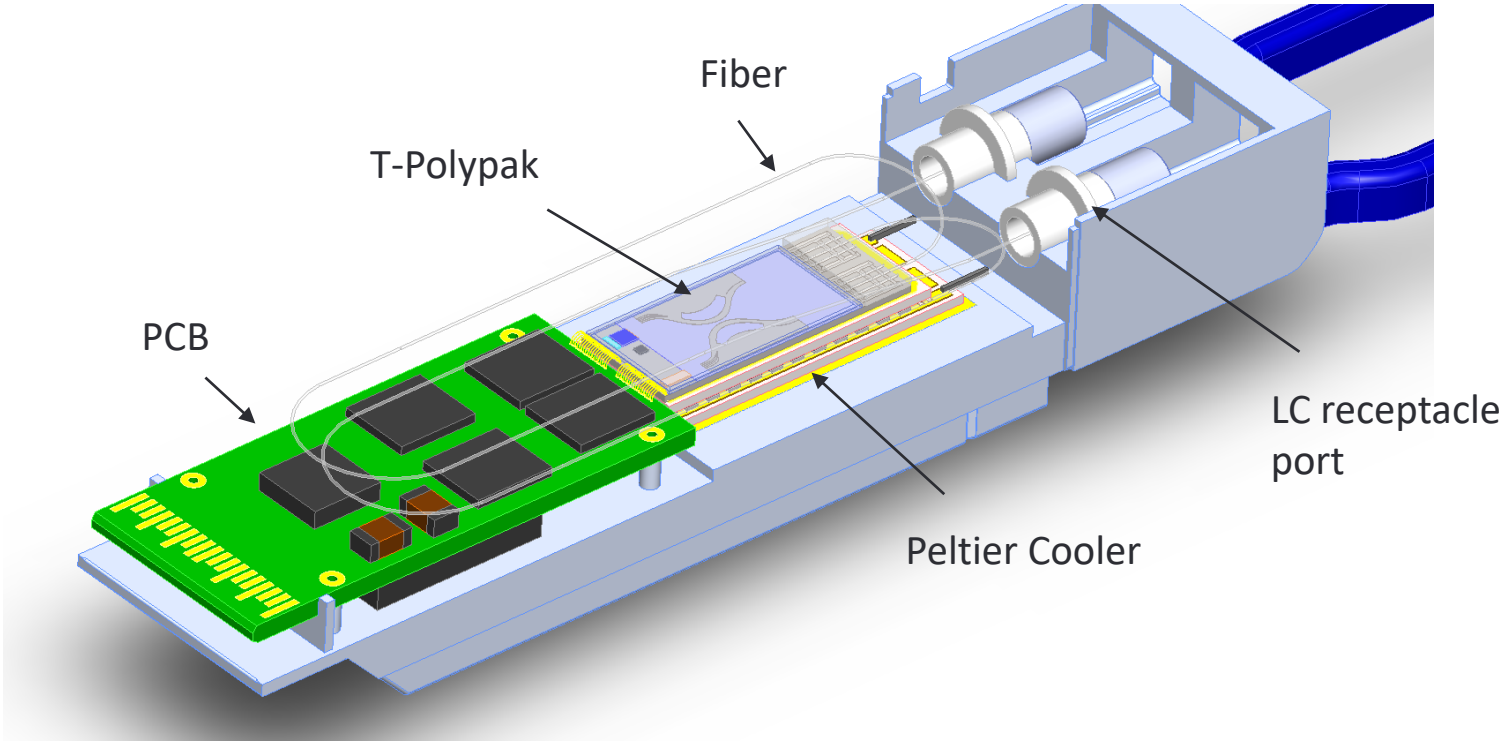
POET



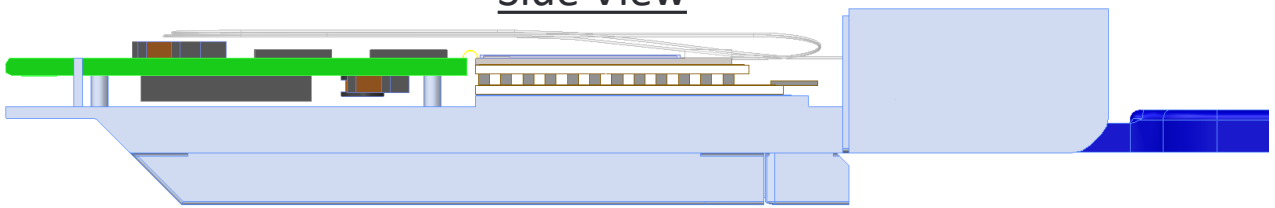
Open Hatch View

Top View





Side View



Exploded View