

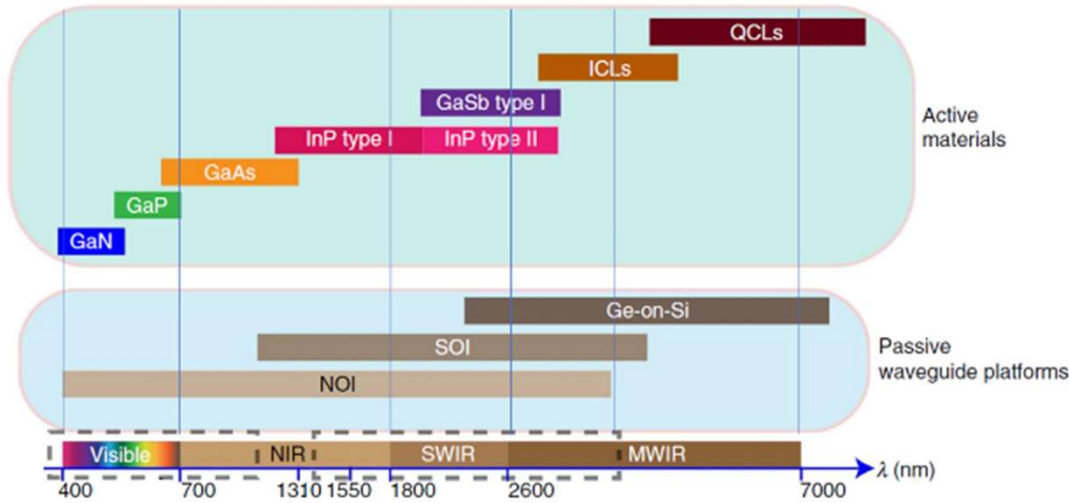
# PIC Test Solutions

## Agenda

- Trend
  - Industries
  - EXFO Product Portfolio
  - Passive PIC Testing
  - Active PIC Testing
  - Hybrid O/E and E/O Testing
  - Trx Performance Testing
  - Solution Example
-

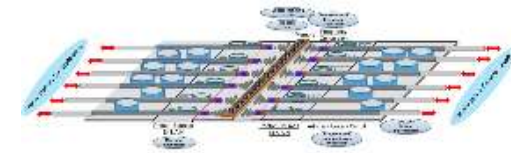
# Trend

## Materials

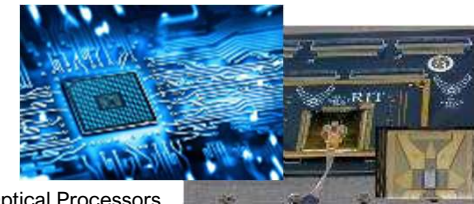


Building Block	InP	SiPh	SiN	Glass	Polymer	Silica	LiNbO3
Passive components	++	++	+++	+++	+++	+++	Hybrid
Polarization components	++	++	++	+	+	Hybrid	Hybrid
Lasers	+++	Hybrid	Hybrid	Hybrid	Hybrid	Hybrid	Hybrid
Modulators	+++	++	+	Thermal	+++	Hybrid	+++
Switches	++	++	+	+	+	+	Hybrid
Optical amplifiers	+++	Hybrid	Hybrid	Hybrid	Hybrid	Hybrid	Hybrid
Detectors	+++	++	Hybrid	Hybrid	Hybrid	Hybrid	Hybrid
PROs	• Best for laser/active integration • Smallest size	• Best for electronic/optical integration • Smallest size	• Low cost • Small size	• Simple process, low cost	• Compatible with Si/InP platform	• Low losses • Low cost	• Very good modulation function
CONs	• Wavelength limited to 1.3 μm to 1.7 μm • Higher cost in large volume production • Complex Epi	• Difficult to get light in and out	• Material properties are process dependent	• Few functions are possible	• Reliability / thermal management issues	• No active functionalities	• Low damage threshold
INDUSTRY STATUS	RAMPING UP	HIGH VOLUME	LOW VOLUME PRODUCTION	PRE-SERIES	R&D QUALIFICATION	HIGH VOLUME	HIGH VOLUME

## Products - Components

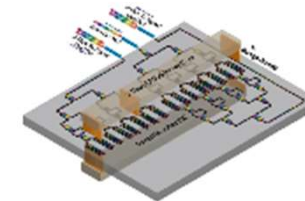


Quantum Memory

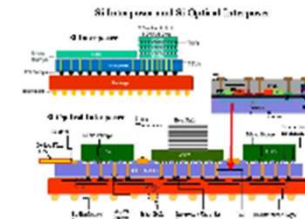


Programmable Optical-Electrical Processors

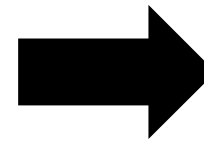
Optical Processors



Optical Interconnects (transceivers)



Optical Interposers



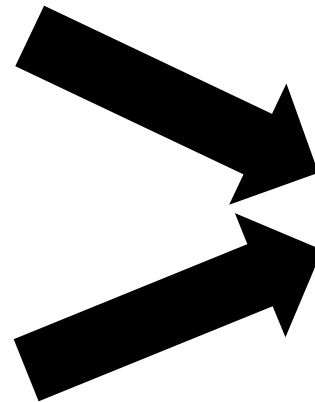
Ultimately every component will be PIC based

# Industries

Semiconductor Industry

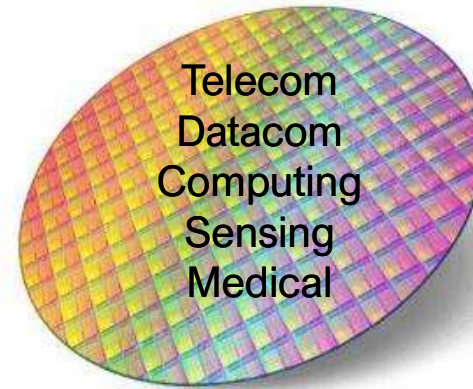


Photonics Industry



IC  
+  
= PIC

Industry Sectors:



Optical & hybrid applications:

- Transceivers
- On-board optics
- Memory
- LiDAR
- Quantum
- Imaging-Scanning
- Single Photon
- Sensing
- Computing
- AI
- IoT

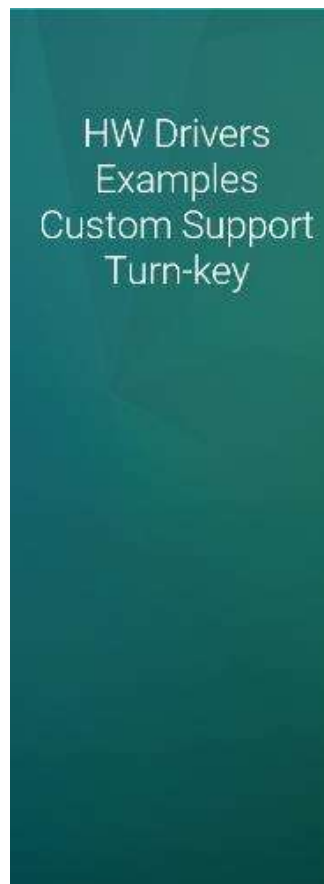
Semiconductor industry will be forced into photonics due to its advantages

# EXFO (PIC) Product Portfolio

## Instrumentation



## Automation



## Solutions



# Instrumentation: Passive (O/O) PIC testing

IL & RL & PDL vs WL



TLS



TLS

IL & RL vs WL

TLS



TLS



TLS

IL vs WL

TLS



LED

IL vs WL



LED

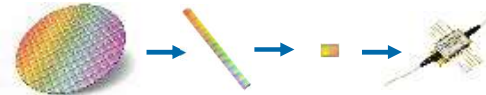


LED



T.F.

DUT



Receiver



OPM system



OPM system

OPM



OSA

OSA



OSA

OSA



# Instrumentation: Active (E/O) PIC testing

Wavelength only

Wavelength and Power

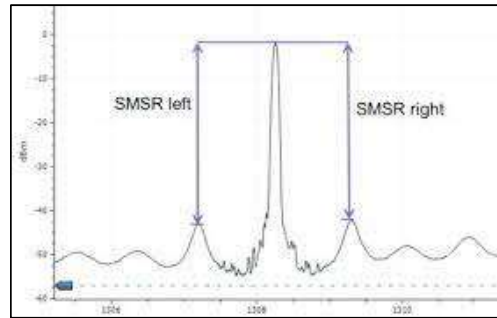
Source



TLS



TLS

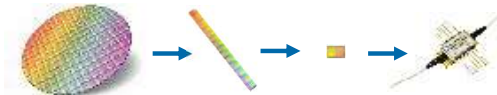


Third Party



Current or Voltage Source (SMU)

DUT



Receiver



CT440



CTP10

OSA



OSA



O/E Converter

# Instrumentation: Hybrid O/E and E/O PIC testing

EXFO



OPM system



OPM system



OSA



OSA

Third Party



Current Meter (SMU)



Current or Voltage Source (SMU)



Optical Amplifier



RF tester

# Instrumentation: PIC TRx Performance testing

EXFO



T&D



BERT



Eye Analyzer - Scope

Third Party



Keysight



Tektronix



Anritsu



# Solution Example: 1xN O/O PM PIC Testing

