WAVESPLITTER™
TECHNOLOGIES, INC.

# WST Chip /OE Product

*Sep. 2024*

# WaveSplitter History & Key Milestones

| | |
|---|---|
| 1996 | Company Founded & Established in San Jose, CA . |
| Pre 2003 | Passive Fiber Optics Components, Focused on WDM / DWDM WavePump and AWG Products. |
| 2003-10 | Relocated Company to Taiwan in 2005. Started Active Optical TRx Development:<br>10G LX4 and 100Base-MTRJ to Cisco, and Fiber Optic of HDMI Link TRx. |
| 2010-13 | Active Optical TRx Products Approved and Received Vendor Code from Google, Amazon, and HP |
| 2014-19 | 10G and 40G MM TRx Products Approved and Received Vendor Code from Microsoft.<br>Developed 40G SM and 100G MM&SM QSFP TRx & AOCs with Suppliers . |
| 2020-21 | Established TRx Module Mfg. Factory in Taipei.<br>Established LDs Mfg. Factory in Taoyuan & Developed 10/25G CWDM DFB LDs. |
| 2021-22 | Developed 10/25G LR/BIDI and 25G ER/BIDI TRx Products.<br>Developed 25G 1310nm TE/TM Mode DFB LDs for 5G Network & 10G PON Applications.<br>Developed 1310nm High Power CW LDs for Si-Photonic Technology Products. |
| 2022-23 | Developed/Design-in 10G XGSPON BOSA & Combo Q-OSA products for customers<br>Developed 40/100G CWDM4 TRx products |
| 2023-24 | Developing 28G 1310nm TM Mode DFB LDs & BOSA for 25G PON Applications.<br>Will Develop 4/8-wavengths High Power CW LDs for Si-Photonic Technology Products.<br>Developing 100G DR1, 400G DR4,800G 2xDR4/2xFR4 & 1.6T CPO Engine & TRx for HPC/AI/DC.<br>Co- Developing 10G/25G MAC PON SFP TRx with customers. |

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# *WaveSplitter Global Offices*

- **HQ & Module Factory: Taipei, Taiwan**
  - LDs & Module Sales Marketing
  - Module R&D
  - Module Supply Chain Management
  - Qualification and Manufacturing
- **TWN: LDs Factory, Taoyuan, Taiwan**
  - LDs & OSA Package Sales Marketing
  - LDs & OSA Package R&D
  - LDs & OSA Supply Chain Management
  - Qualification and Manufacturing
- **N. America: Fremont, CA**
  - Sales Marketing
  - Customer Service
- **Japan: Tokyo, Japan**
  - Sales Marketing
  - Customer Service
- **Vietnam**
  - Component (TOSA & BOSA) Manufacturing
  - PON Module Manufacturing
  - BOSA/Q-OSA & Module Customer Service
- **China: Shenzhen, China**
  - Component & Module Supply Chain Management

***Lighting the Cloud on Fiber***
***Paving the Way for 5G Networks, AI, HPC, Datacenter and Sensing for Self Driving***

***WST Confidential***

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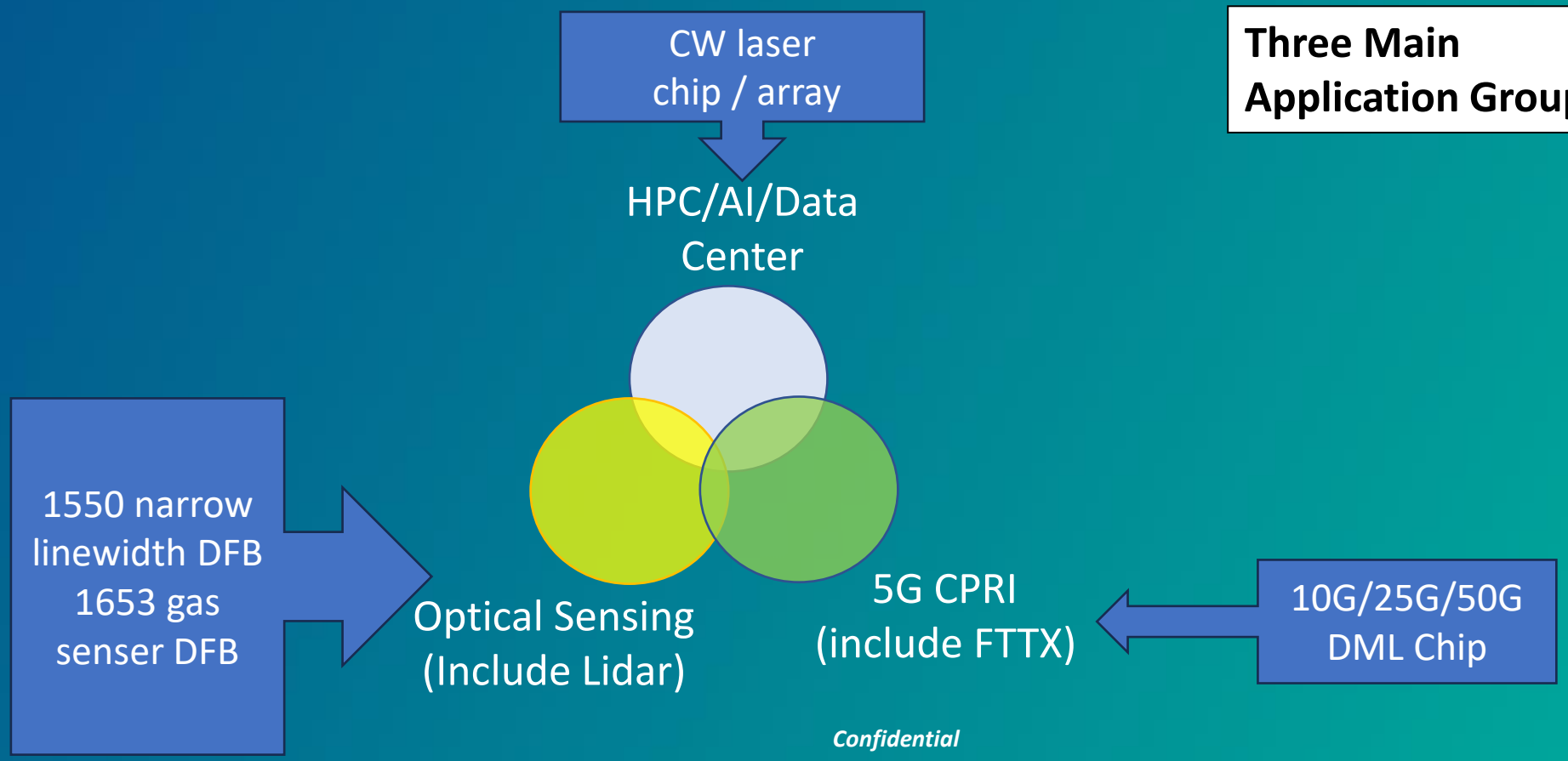
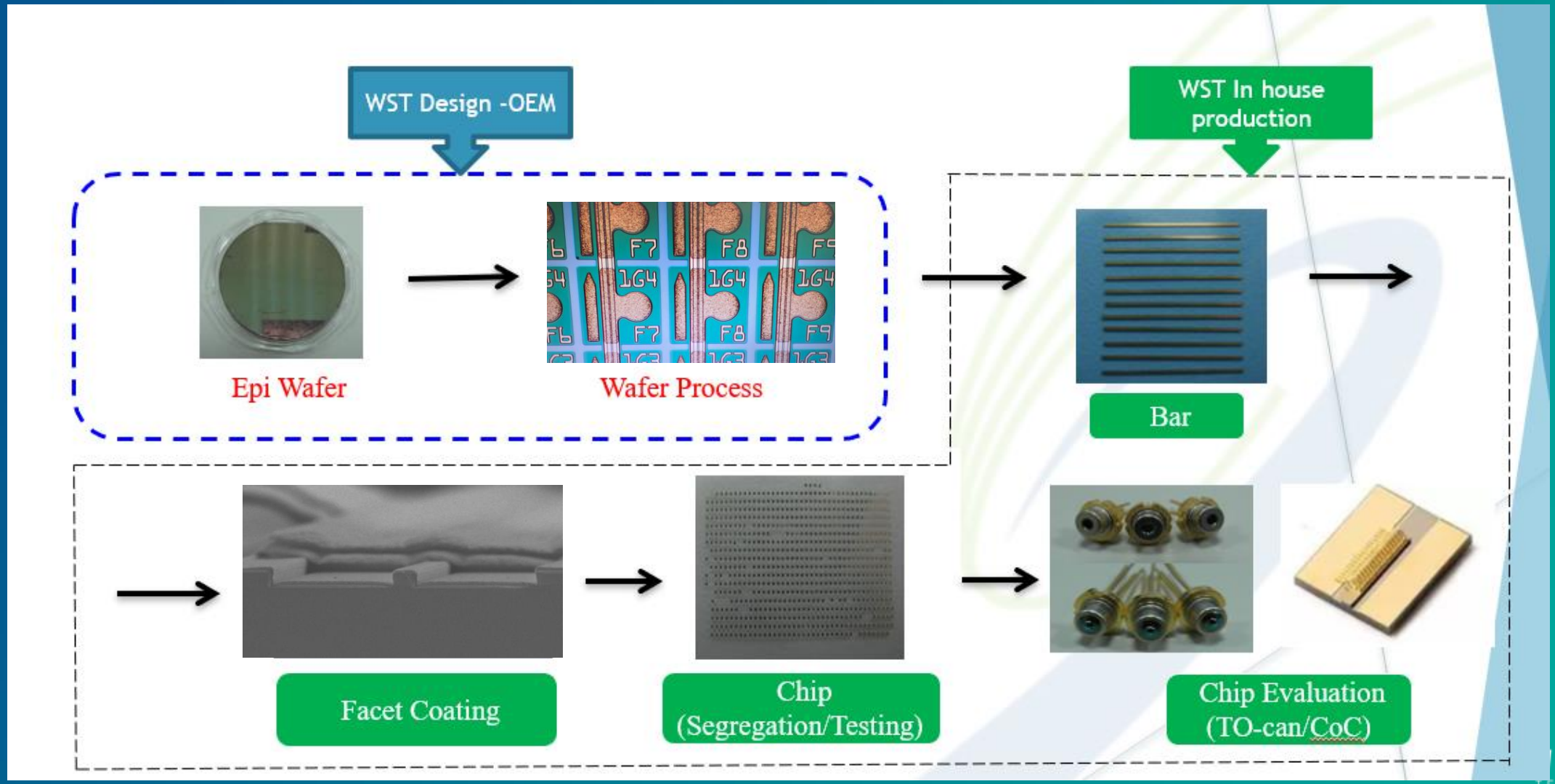
# Company Missions

Be a leading suppliers of optical solutions for 5G Networking, HPC/AI, Datacenter as well as Optical Sensing Applications.



# DFB LD / CW LD Chip Process Flow



# *Chip current position*

- CW laser chip: 70mW CW laser chip compete to Broadcom chip
- 100mW CW laser chip will be MP 2024
- 400G DR4 Optical engine & OSFP 800G 2×DR4 LPOTRX sample ready
- by 2025 Q1

- 10G/25G /50G PON DML chip ：

  10G PON: The best C/P chip

  25G PON : Leading company

  50G PON & Data Center:Samples will be ready by end of 2024

- 1550nm narrow linewidth DFB chip: developing
- 1653nm DFB gas senser: developing with customer

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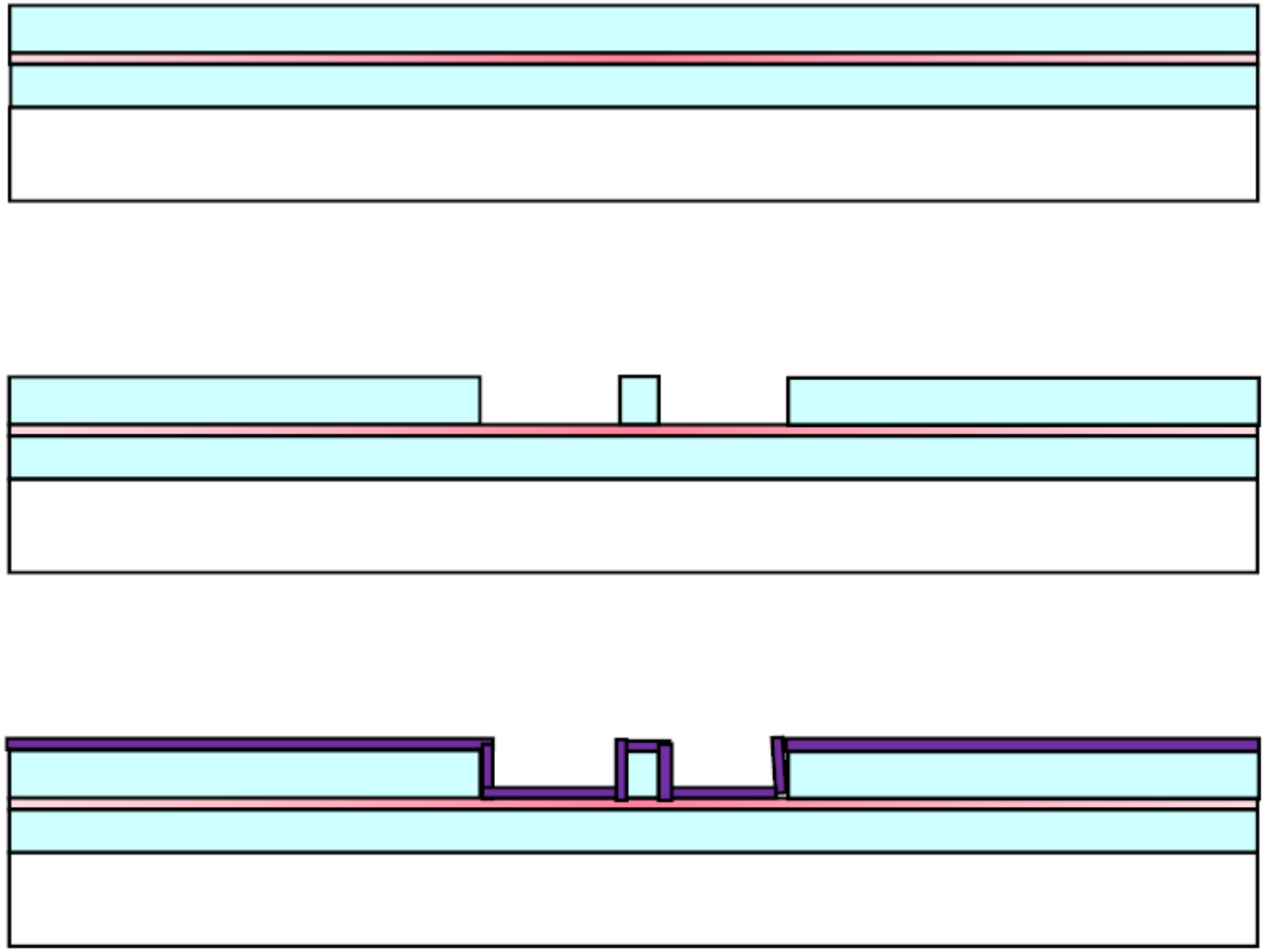
# Wafer process -1/3



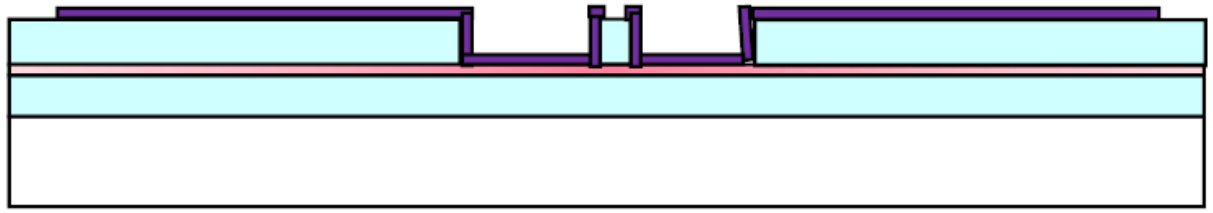
## Mask 1: Ridge

Dry+Wet etching
Ridge width 2.0um
Etching stop layer at 1.85um

## Passivation film

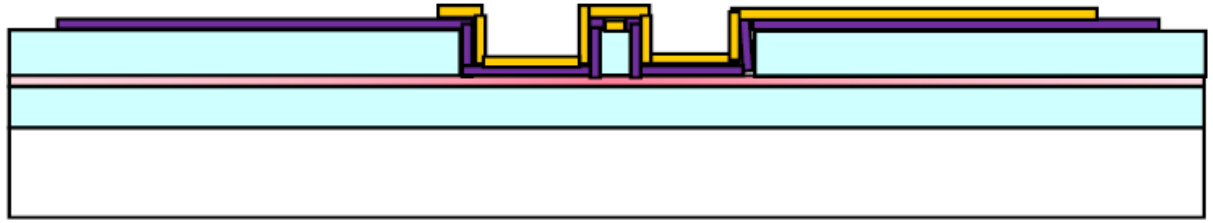
SiNx=0.3um

# Wafer process -2/3



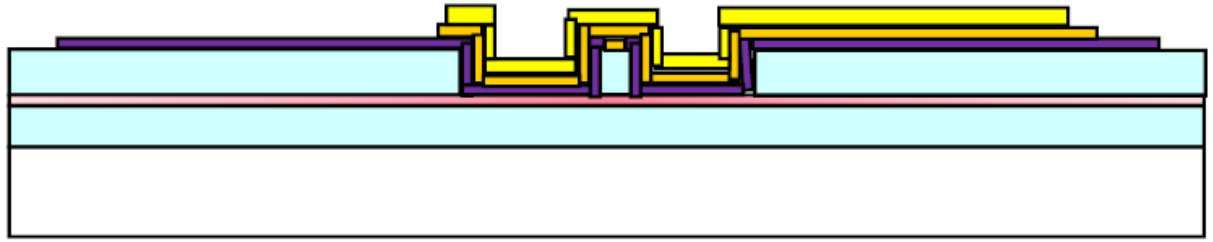
## Mask 2:
## Open contact

Dry+Wet etching



## Mask 3: P-metal

Ti / Pt / Au=0.5um
Anneal 400°C



## Mask 4:
## Au-plating

Au=1um

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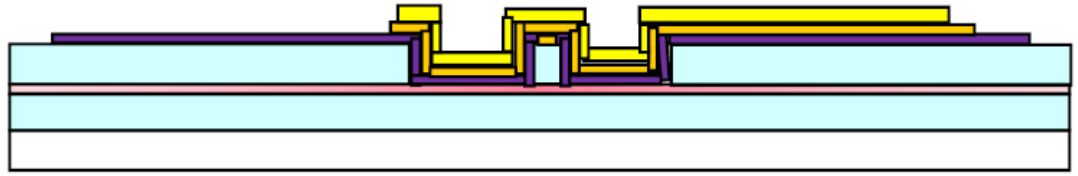
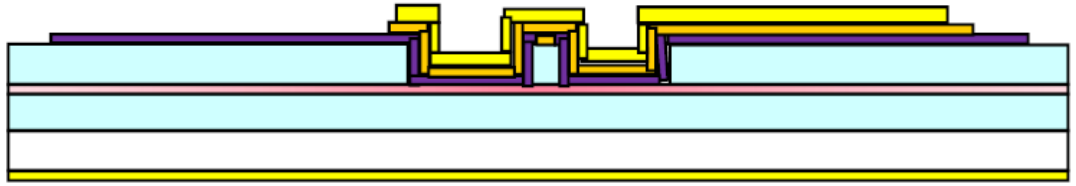
# Wafer process -3/3



Wafer Lapping

thickness : 120um+/-10um

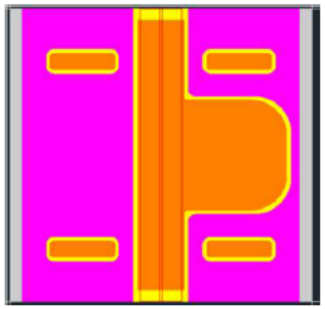


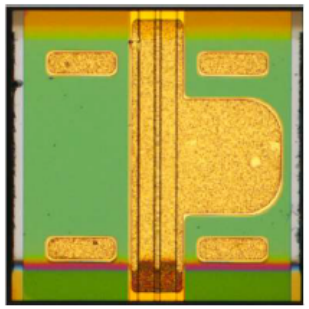
N-metal

AuGeNi/Au=0.4um

RTA Anneal

Top View





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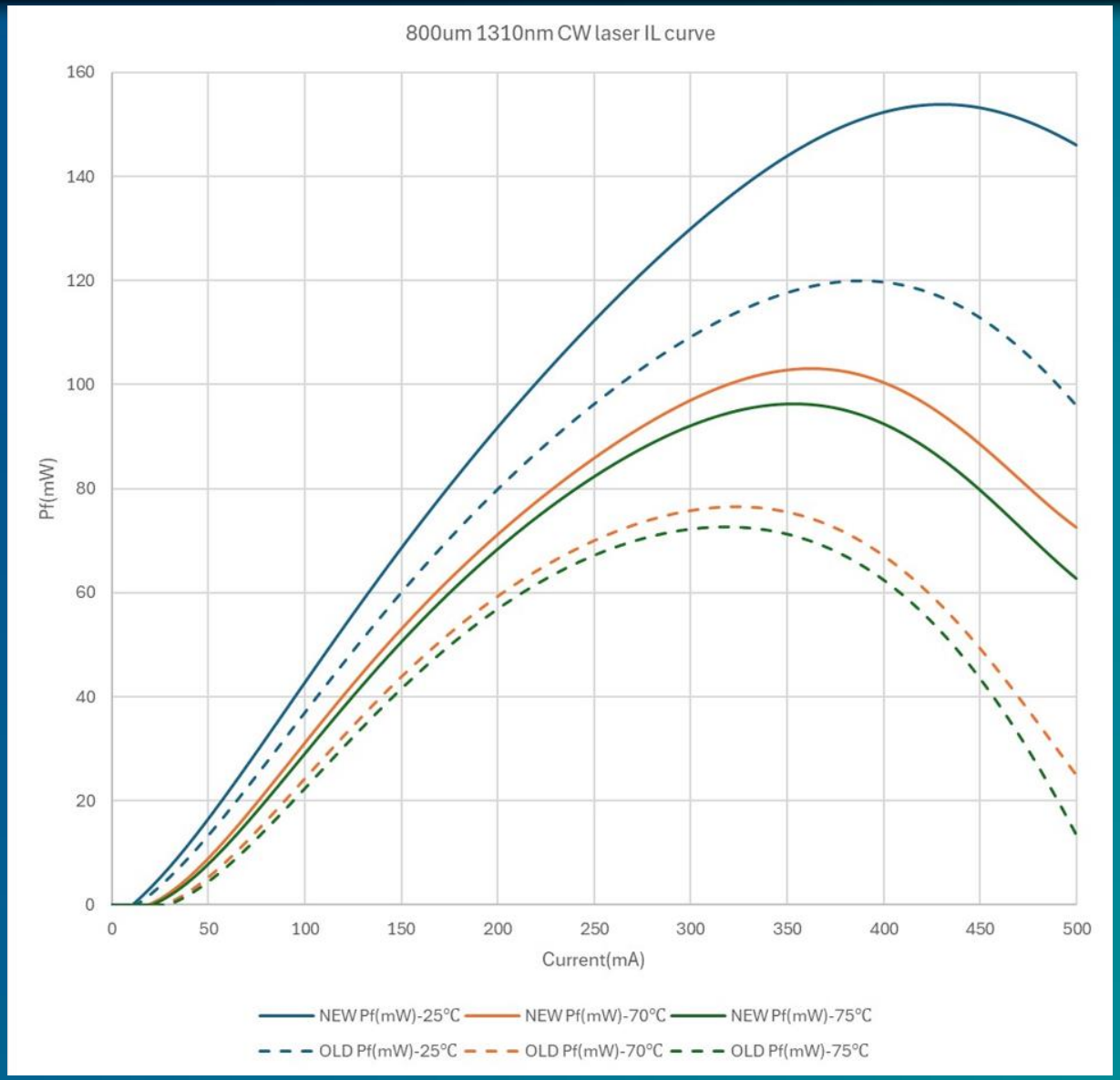
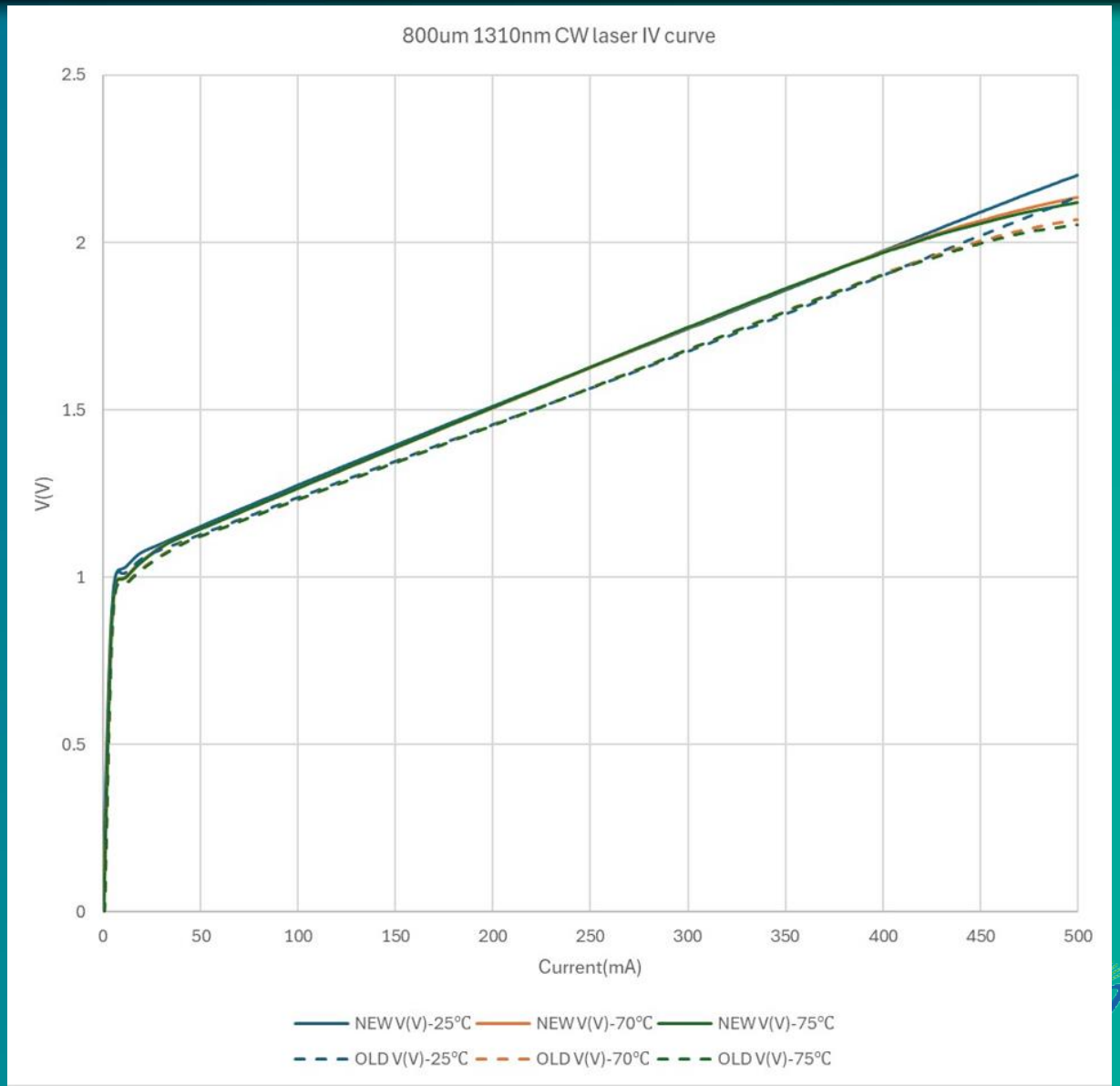
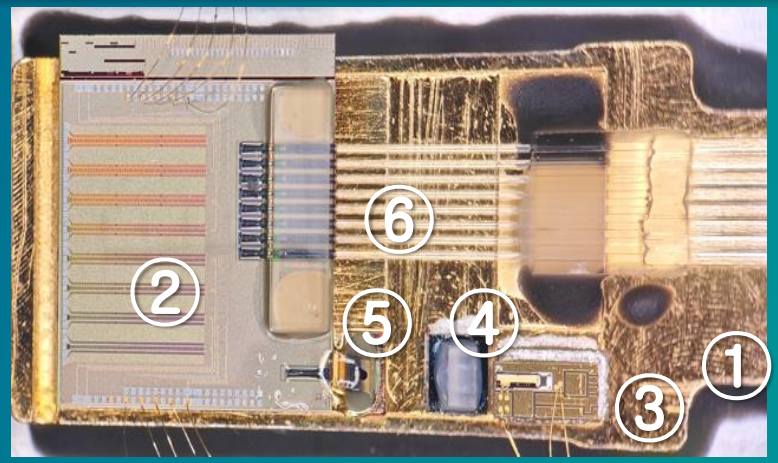
# High Power 1310nm CW DFB Laser LIV Curve (800um CL old -70mW vs new version-100mW)



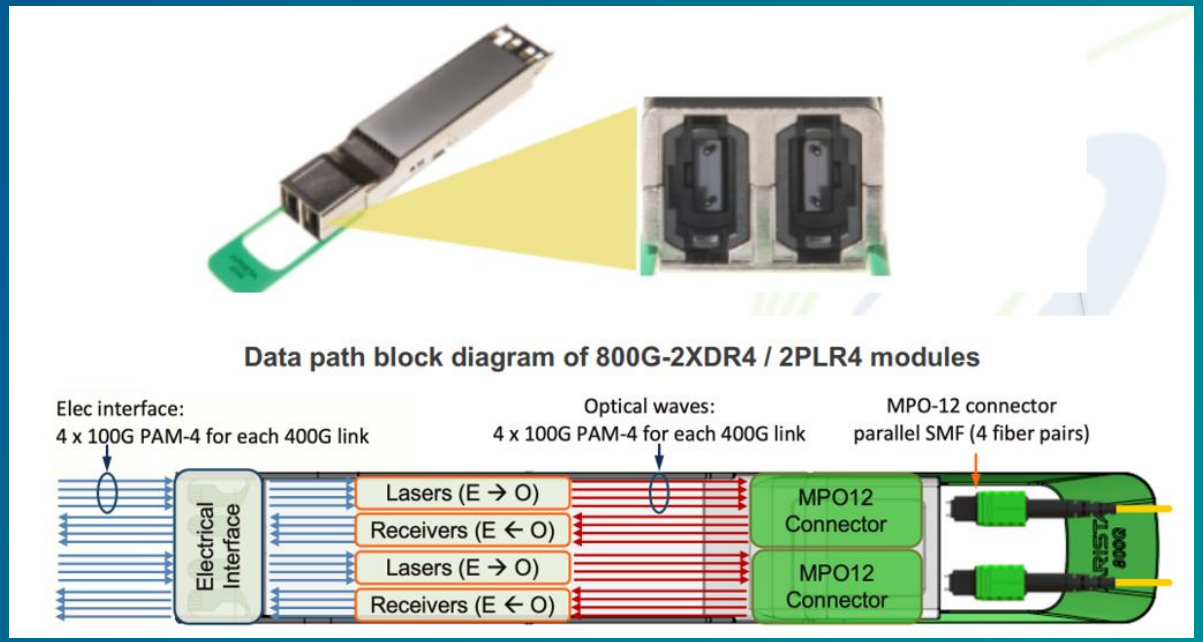
# CW LD Application (Transceiver)
# (Chip ⇨ Optical Engine ⇨ LPO Transceiver)

DFB Chip




Optical Engine

| | |
|---|---|
| ① | Metal Base |
| ② | PIC |
| ③ | CoC |
| ④ | ASP Lens |
| ⑤ | Isolator |
| ⑥ | Fiber Array |




LPO Transceiver

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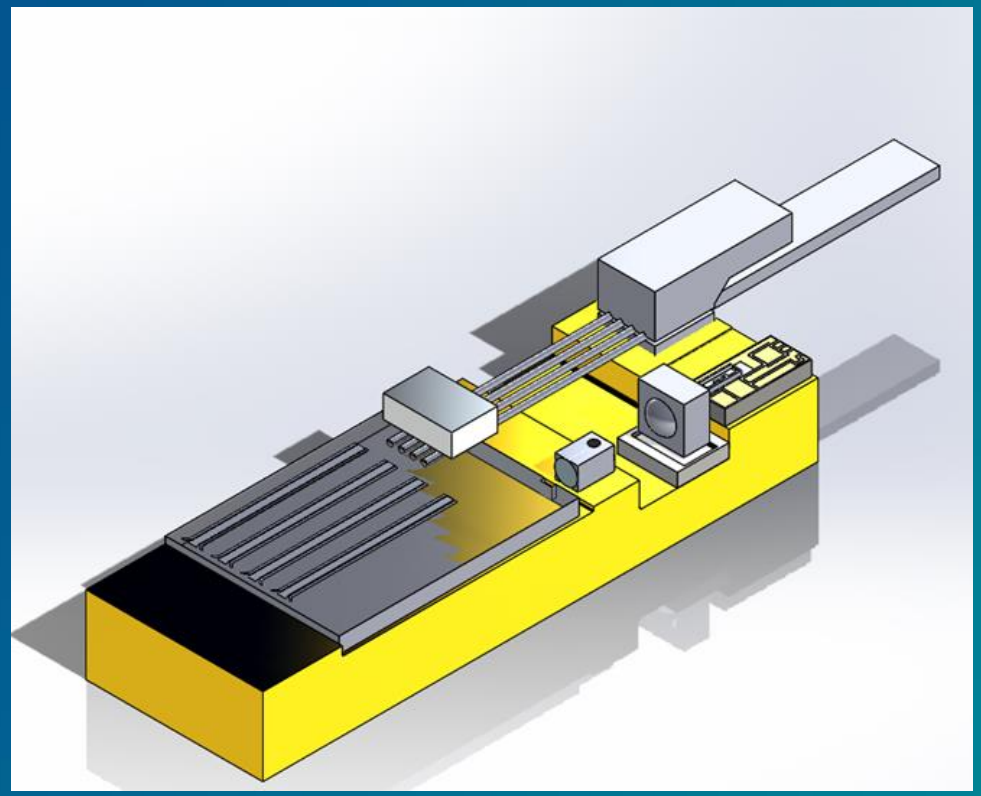
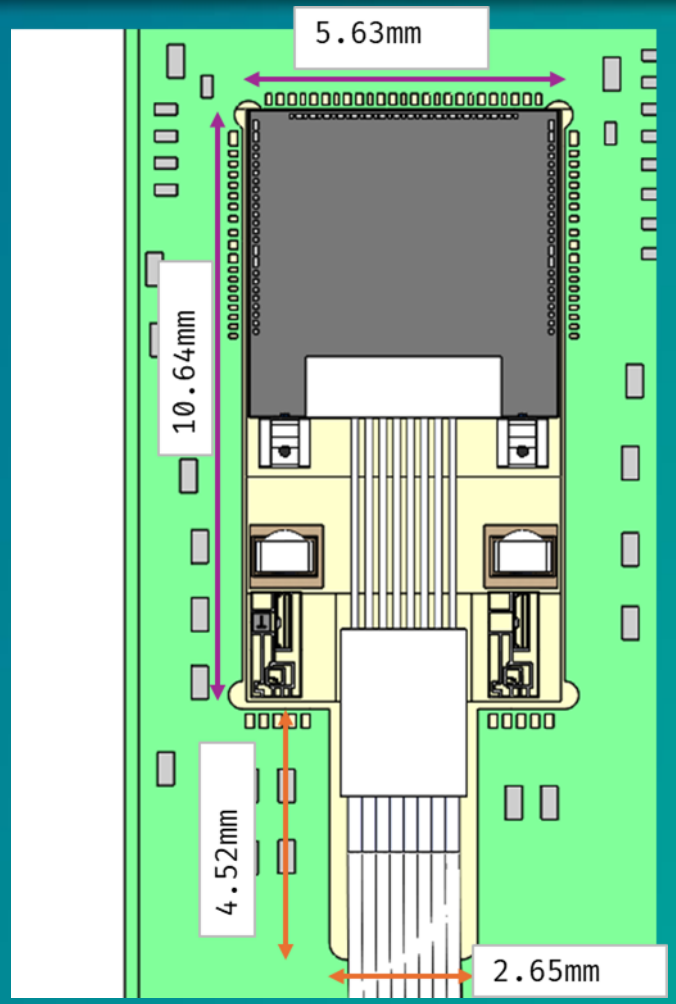
# 400G DR4 / 800G (2*DR4) Optical Engine



400G O/E




800G O/E

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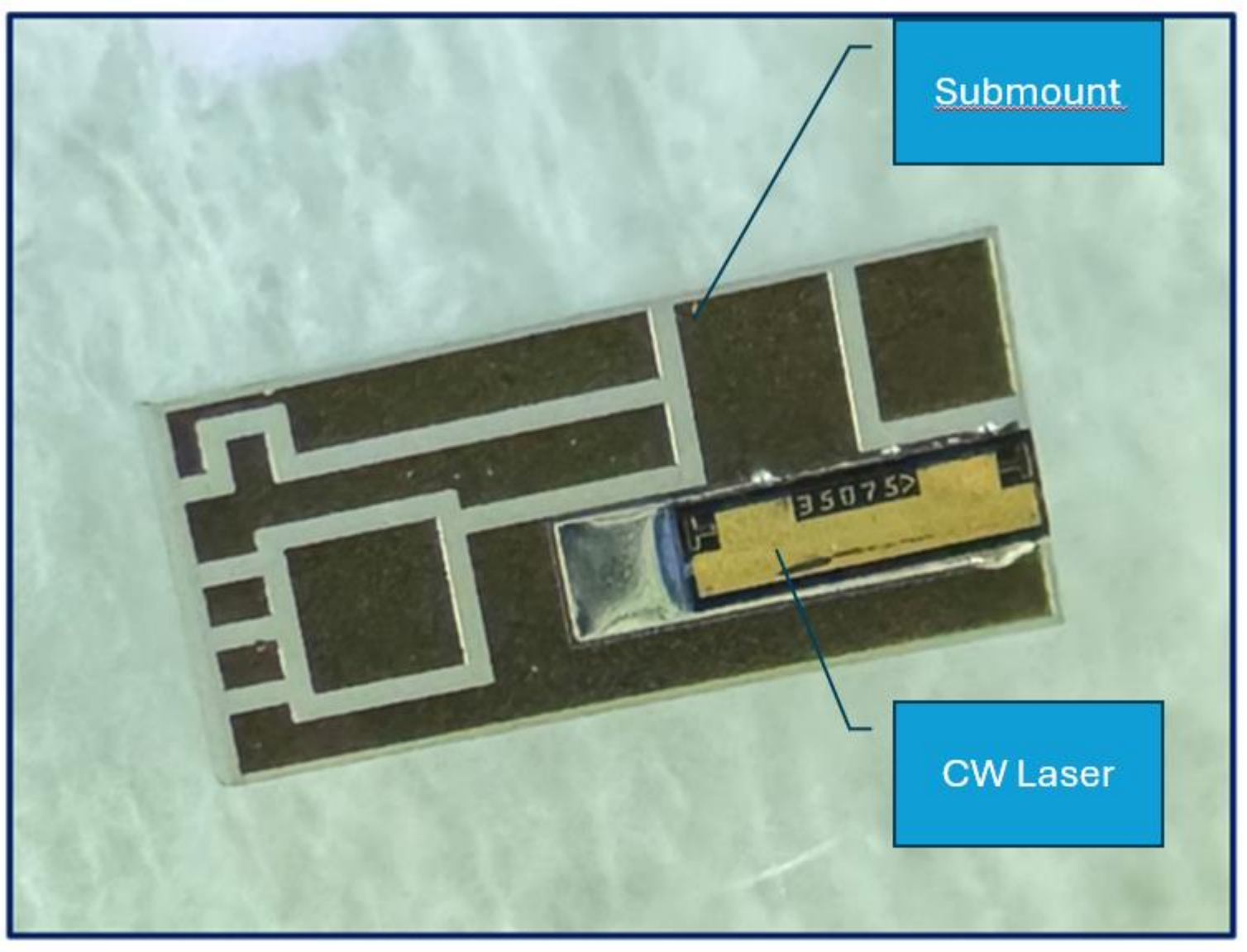
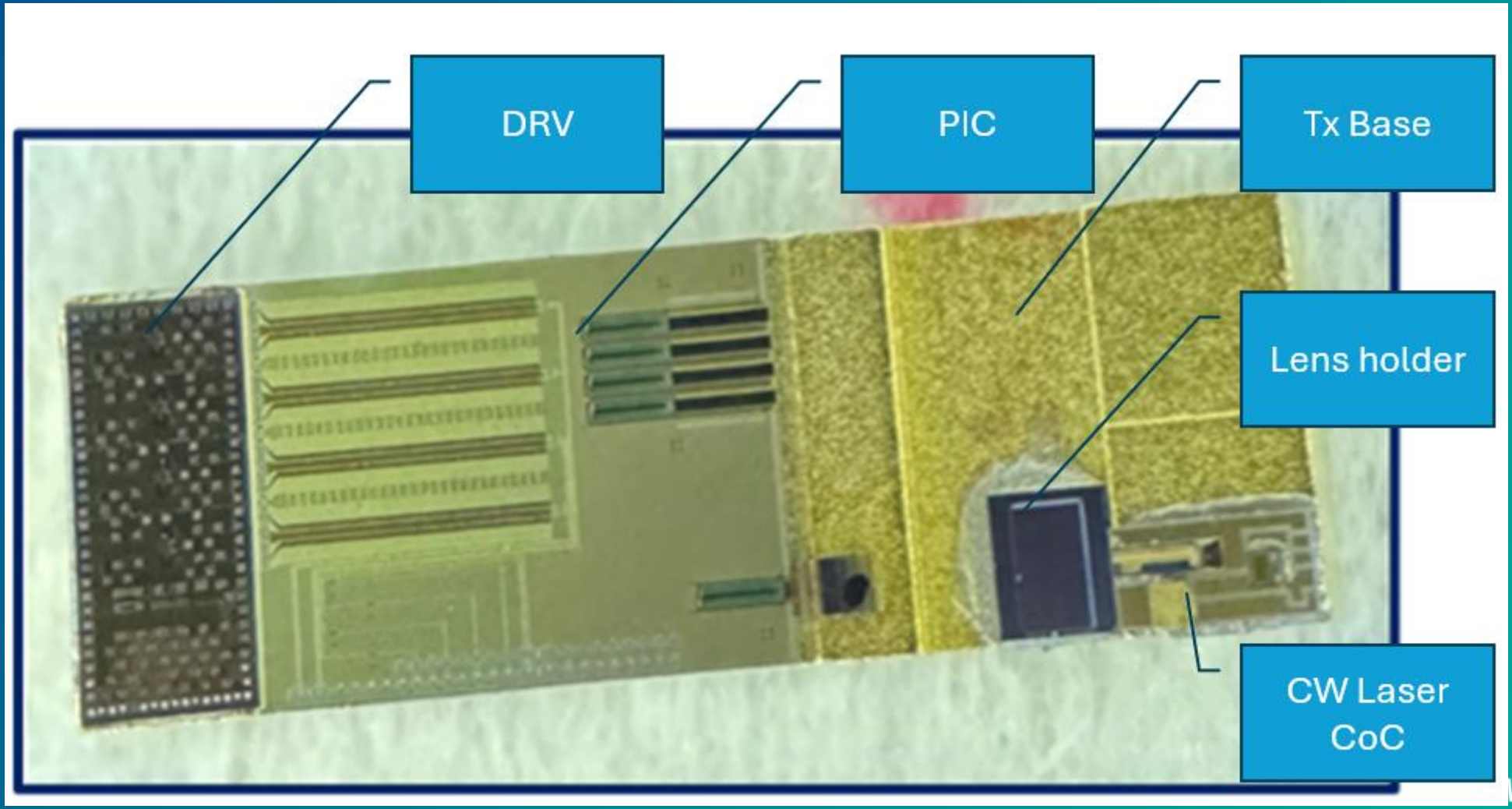
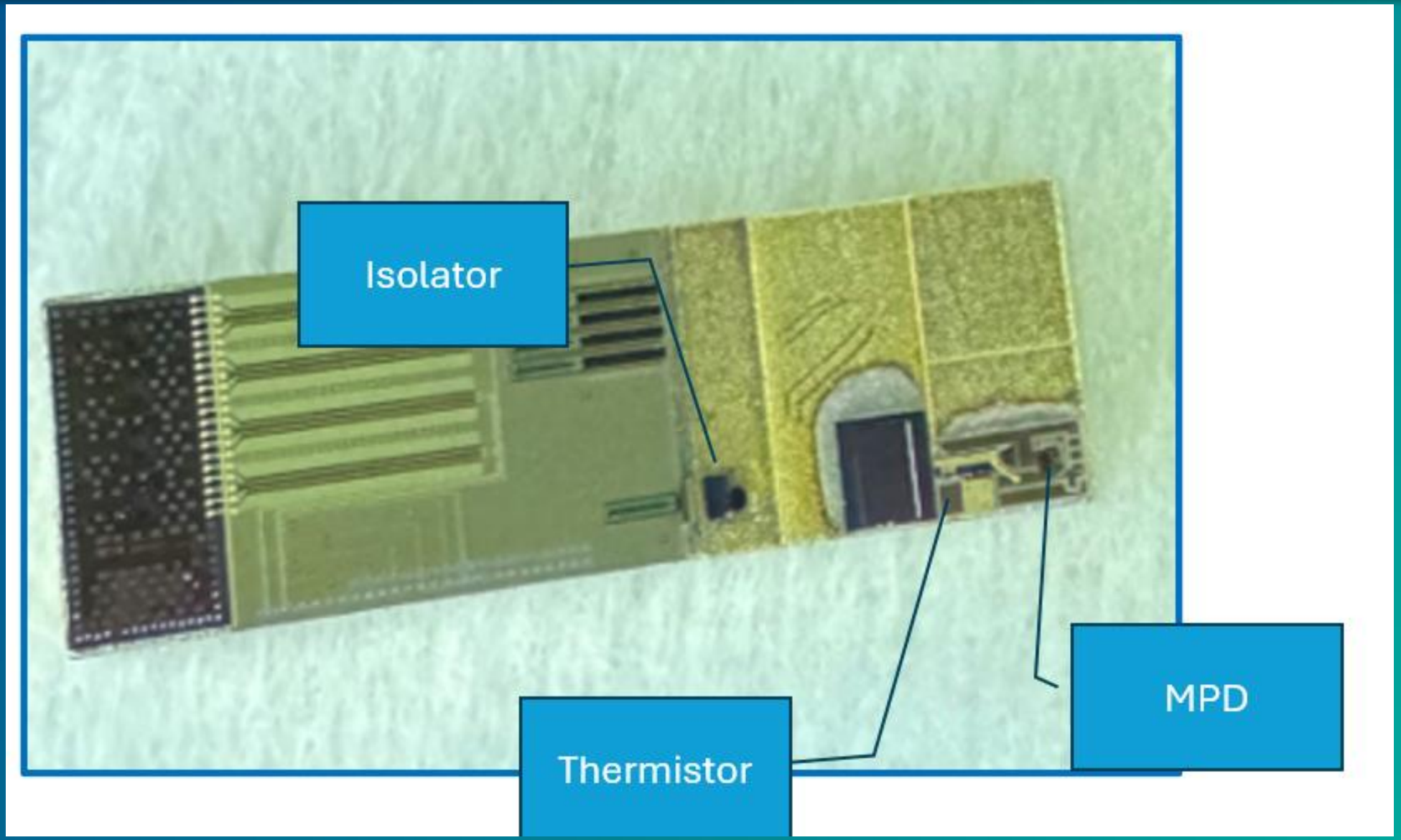
# Optical Engine process 1/7
# CW Laser CoC



# Optical Engine process 2/7
# Put PIC/Lens CoC/Lens holder into TX Base



# Optical Engine process 3/7
# Put Isolator / Thermistor / MPD into TX Base

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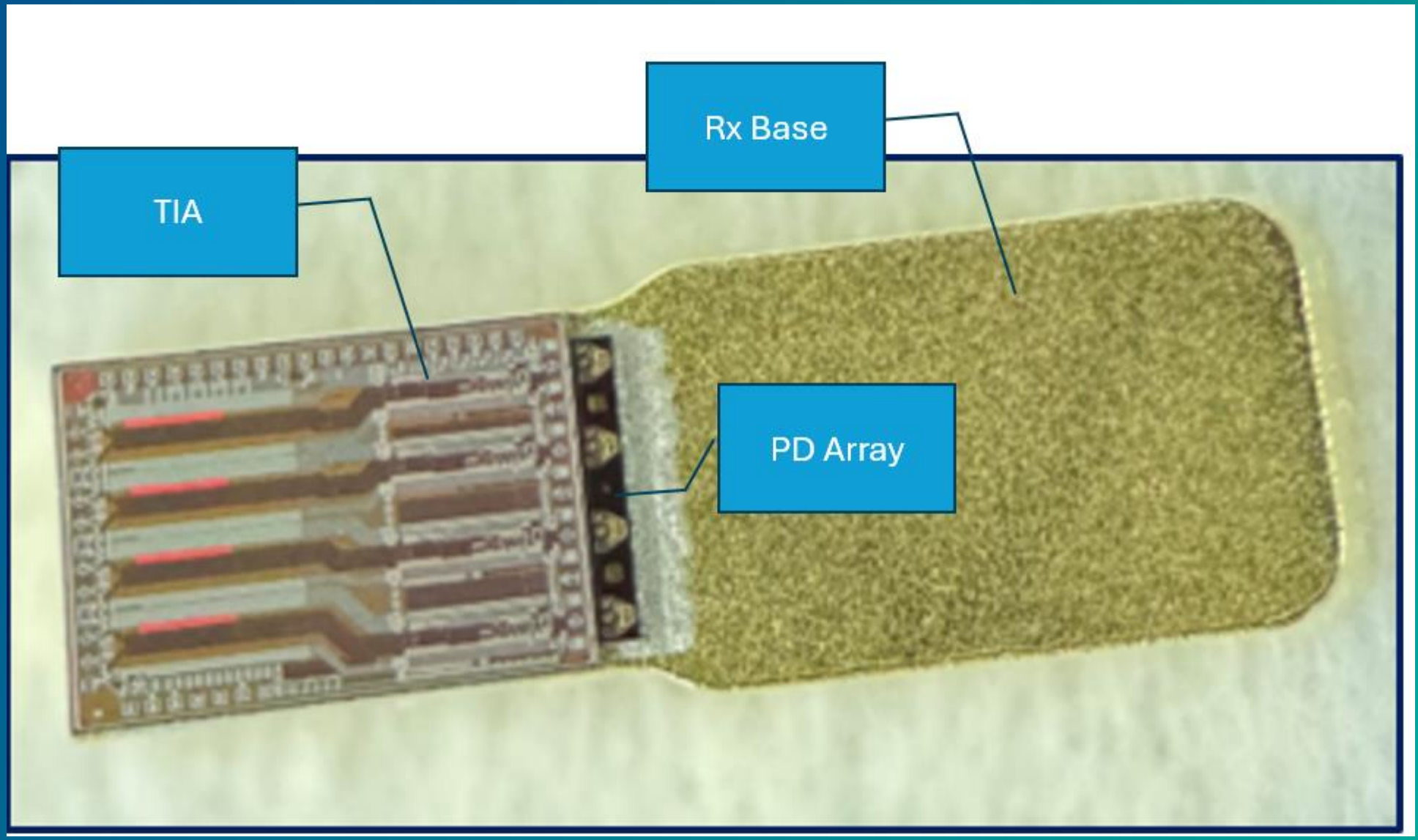
# Optical Engine process 4/7
# Put TIA/ PD Array into RX Base

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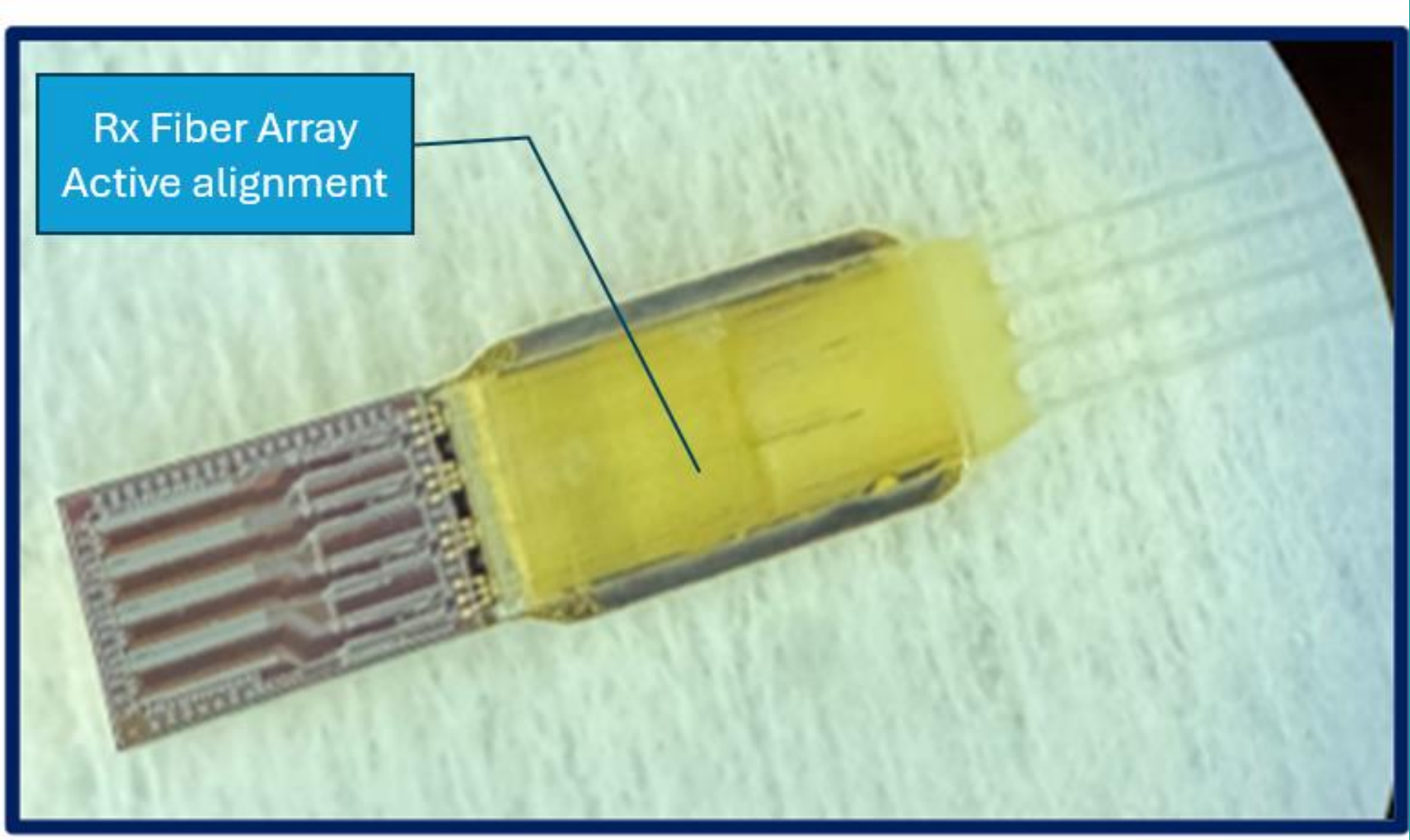
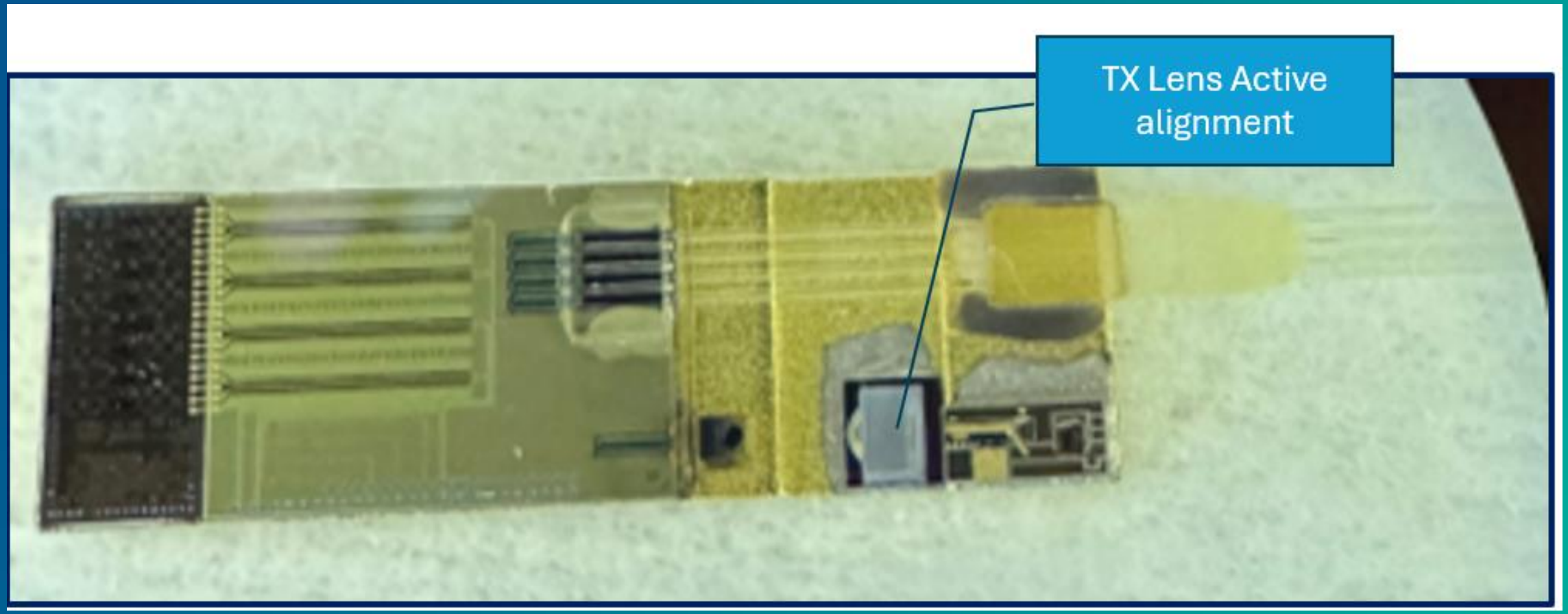
# Optical Engine process 5/7
# RX Fiber Array Active Alignment(45D)



# *Optical Engine process 6/7*
# *TX Fiber Array Passive Alignment*
# *(Fiber into V Groove)*

# Optical Engine process 7/7
# TX Lens Active Alignment