

# Wafer-Level Optics and Module Capabilities for Emerging Applications

2026-05

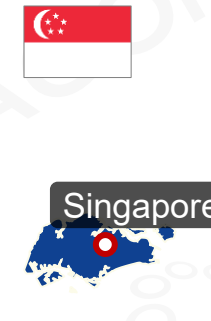
HEPTAGON

**CONTENTS**

- **Company Overview**
- **Typical Products, Services, Applications**
- **Added Value to Customers**
  - Benefits of Wafer-Level Optics (WLO) Technology
  - How WLO Technology Enables Your Applications
  - Ensuring the Performance and Reliability of Our Products
  - Work with Us – From Design to Mass Production
- **Summary**

# Focuslight Overview

- Founded in 2007 by Dr. Victor X. Liu, headquartered in Xi'an, China.
- A fast-growing company that develops and manufactures:
  - **Laser sources and materials** (Photon Generation)
  - **Optical components** (Photon Control)
  - **Photonics module and system solutions** (Application Solutions) focusing on **optical communication, consumer electronics, and pan-semiconductor applications.**
- A **global photonics foundry** offering process development and manufacturing services to the global photonics community.
- Publicly listed in the Shanghai Stock Exchange (Ticker Symbol: 688167).



# Milestones



**2007**

Founding of Focuslight



**2018**

Dongguan delivery and high-volume manufacturing center officially in operation

**IPO**

**2021**

Successful IPO at Shanghai Stock Market



**2024**

Acquisition of ams OSRAM's optical component assets;  
Relaunch of Heptagon brand



**2025**

Hefei Base officially in operation



**LIMO**

Lissotschenko Mikrooptik

**2017**

Acquisition of LIMO;  
Started providing photon control and photonics application solutions



**2019**

Global branding identity upgrade



**2024**

Acquisition of SUSS MicroOptics



**2024**

Shaoguan Base officially in operation



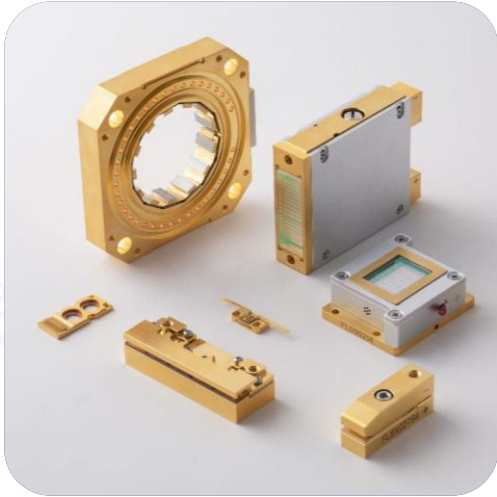
**BRIGHTVIEW**  
TECHNOLOGIES

**2026**

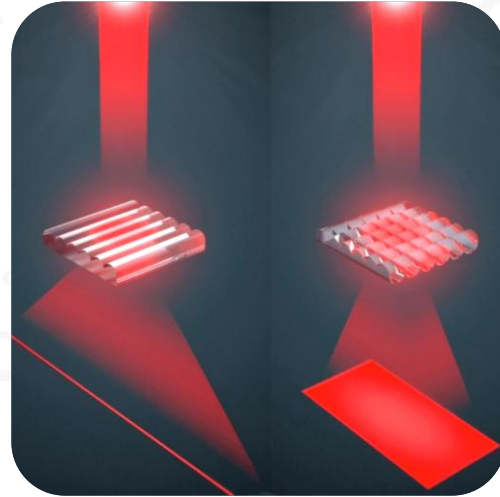
Announced strategic partnership with BrightView



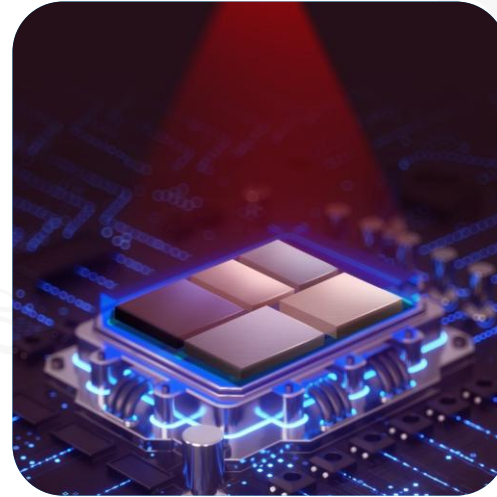
# Business and Branding



Photon  
Generation



Photon  
Control



Photonics  
Application  
Solutions



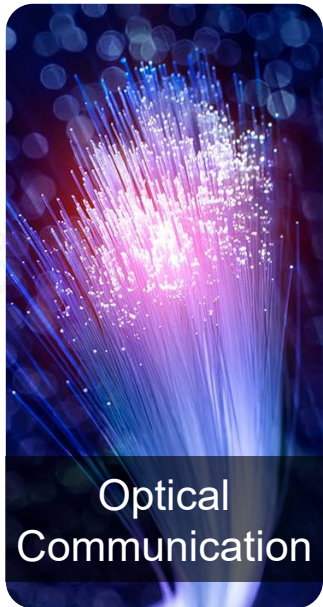
Global  
Photonics  
Foundry

**FOCUSLIGHT**  
Never stop exploring

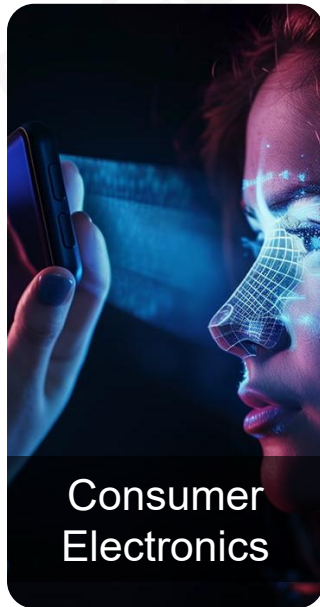


 **HEPTAGON**

# Markets



16%  
revenue



9%  
revenue



22%  
revenue



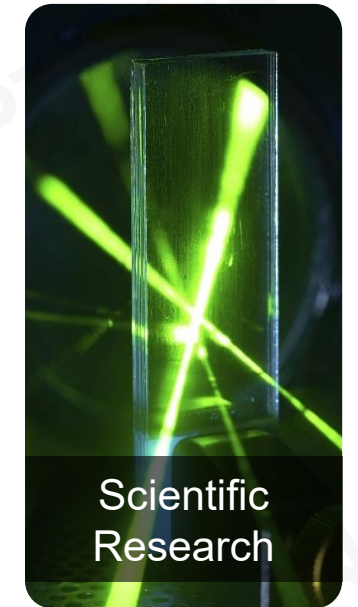
18%  
revenue



11%  
revenue



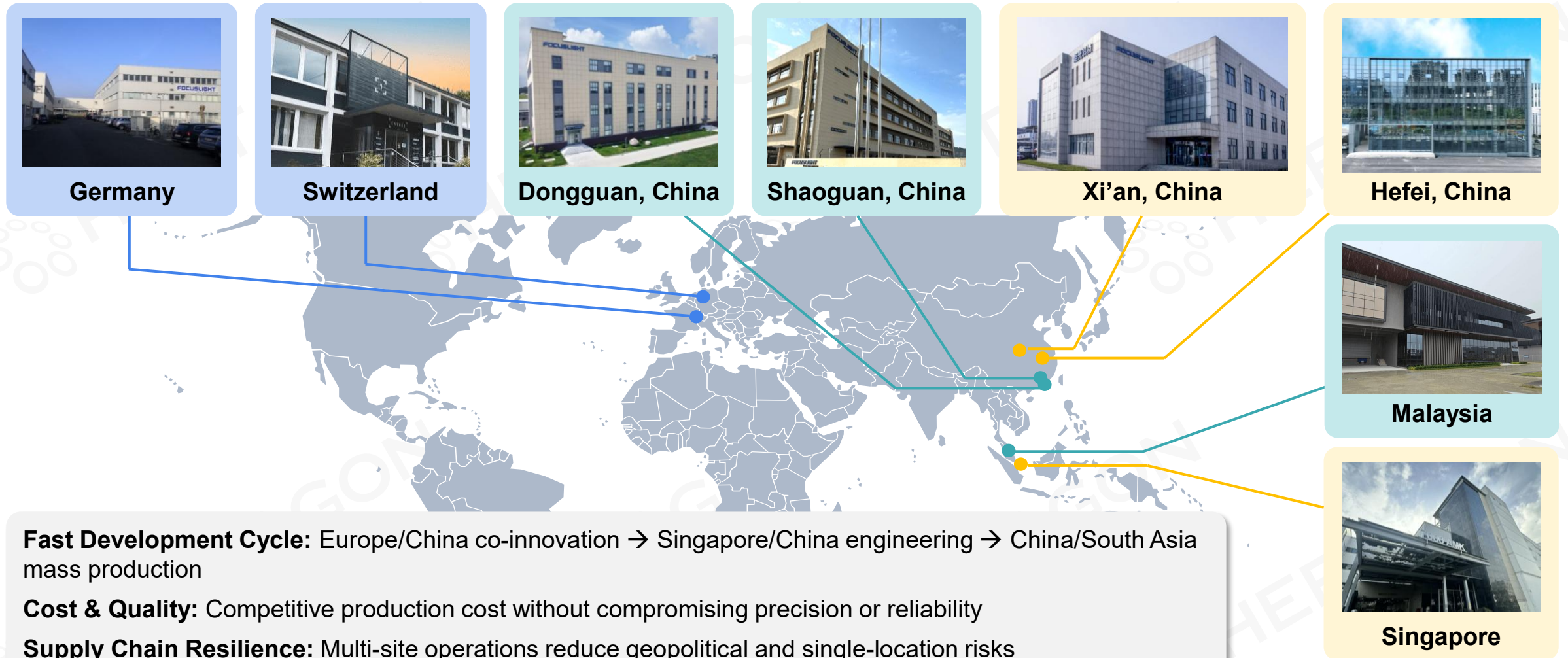
24%  
revenue



1%  
revenue

*\* Based on accumulated revenue data from 2026 Q1 with rounded figures*

# Focuslight Global Operations System



**Fast Development Cycle:** Europe/China co-innovation → Singapore/China engineering → China/South Asia mass production

**Cost & Quality:** Competitive production cost without compromising precision or reliability

**Supply Chain Resilience:** Multi-site operations reduce geopolitical and single-location risks

**Customer Proximity:** Localized fast response across China, USA, Europe, and Southeast Asia

# Heptagon is Back as a Focuslight Brand



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[← Return](#) Focuslight Technologies Inc. Completes Acquisition of ams OSRAM's Optical Component Assets, Further Strengthening Its Global Competitiveness in Optics Solutions

Time: 2024-09-02

[Download](#)

Xi'an, China, September 2nd, 2024 – Focuslight Technologies Inc. (Shanghai Stock Exchange: 688167), a global provider of high-power diode lasers and materials, laser optics and photonics modules and system solutions, **today announces the successful acquisition of optical component assets from ams OSRAM AG**. This marks another strategic move and milestone following Focuslight's acquisitions of LIMO GmbH in 2017 and SUSS MicroOptics SA (now as Focuslight Switzerland SA) in January 2024, providing a strong foundation on its commitment to expanding its capabilities and footprint in the global photonics market.

**News source:** <https://focuslight.com/news-events/newslist/focuslight-technologies-inc-completes-acquisition-of-ams-osrams-optical-component-assets-further-strengthening-its-global-competitiveness-in-optics-solutions/>

Focuslight also plans a full integration of the acquired assets into its existing business structure. The company will reorganize and integrate certain assets into its Automotive Business Unit to strengthen its capabilities in serving global automotive customers. A **Strategic Growth Division** will be established to house the R&D teams and equipment related to consumer electronics, disposable medical solutions, and other emerging applications. All products associated with these assets will be unified under the **Focuslight** brand.

Meanwhile, a **Global Photonics Foundry Business Unit** will be established serving as a global center for photonics industry process development and manufacturing services under the historic **Heptagon** brand, which was originally founded in 1993 and will now continue its legacy of innovation, quality, and high-volume manufacturing under Focuslight's global operations, transforming its customer's ideas and designs into industry-powering photonics solutions.

# Story of Heptagon

Established in 1993, Heptagon became a leading brand in the micro-optics industry, renowned for its expertise in advanced optical packaging, wafer-level micro-optical modules, and high-volume manufacturing for consumer electronics.

Now reborn as Heptagon Photonics, we continue this world-class legacy, delivering miniaturized, high-performance, and cost-effective photonics solutions to drive innovation in emerging markets.

Visit [www.hptg.com](http://www.hptg.com) for more information

- 2024 The Heptagon brand is restored after acquisition by Focuslight for its wafer-level-optics-based businesses
- 2017 Acquired by ams
- 2016 2 billion units shipped
- 2015 Entry into 3D and IoT
- 2014 Entry into wearables
- 2013 1 billion (1,000,000,000) units shipped
- 2010 First light WLO solution for leading smartphone OEM
- 2007 Imaging WLO high-volume manufacturing in Singapore
- 2006 First wafer-level CMOS micro-optics solution to leading handset OEM
- 2002 First wafer-level micro-optics solution
- 1993 The company Heptagon was founded



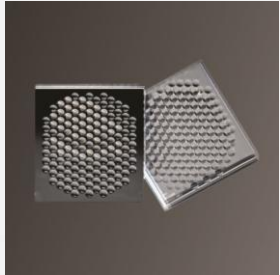
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# Products and Services

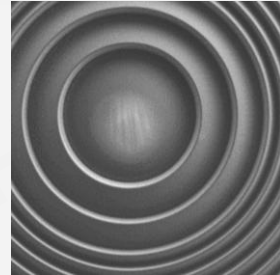
## Beam Shaping and Pattern Generating



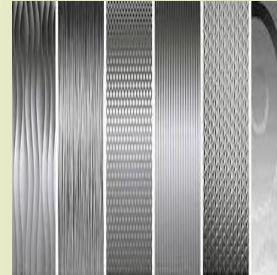
Pattern-Generating MLA



Engineered PoG Diffusers

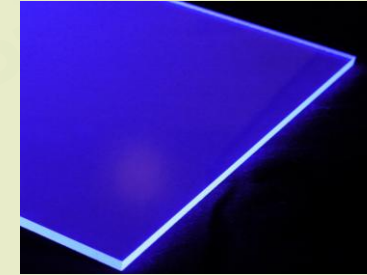


Diffractive Optical Element (DOE)



Diffusing and Hiding Films

## Guide and Extraction



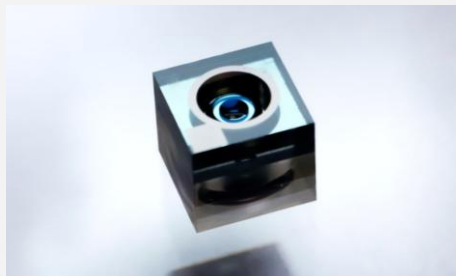
Light Guiding Films

## Reflecting



Reflectivity Films

## Imaging and Projection



Imaging Lens Modules



Projection Lens Modules

## 3D Sensing



Sensing Modules

## Semicon Foundry

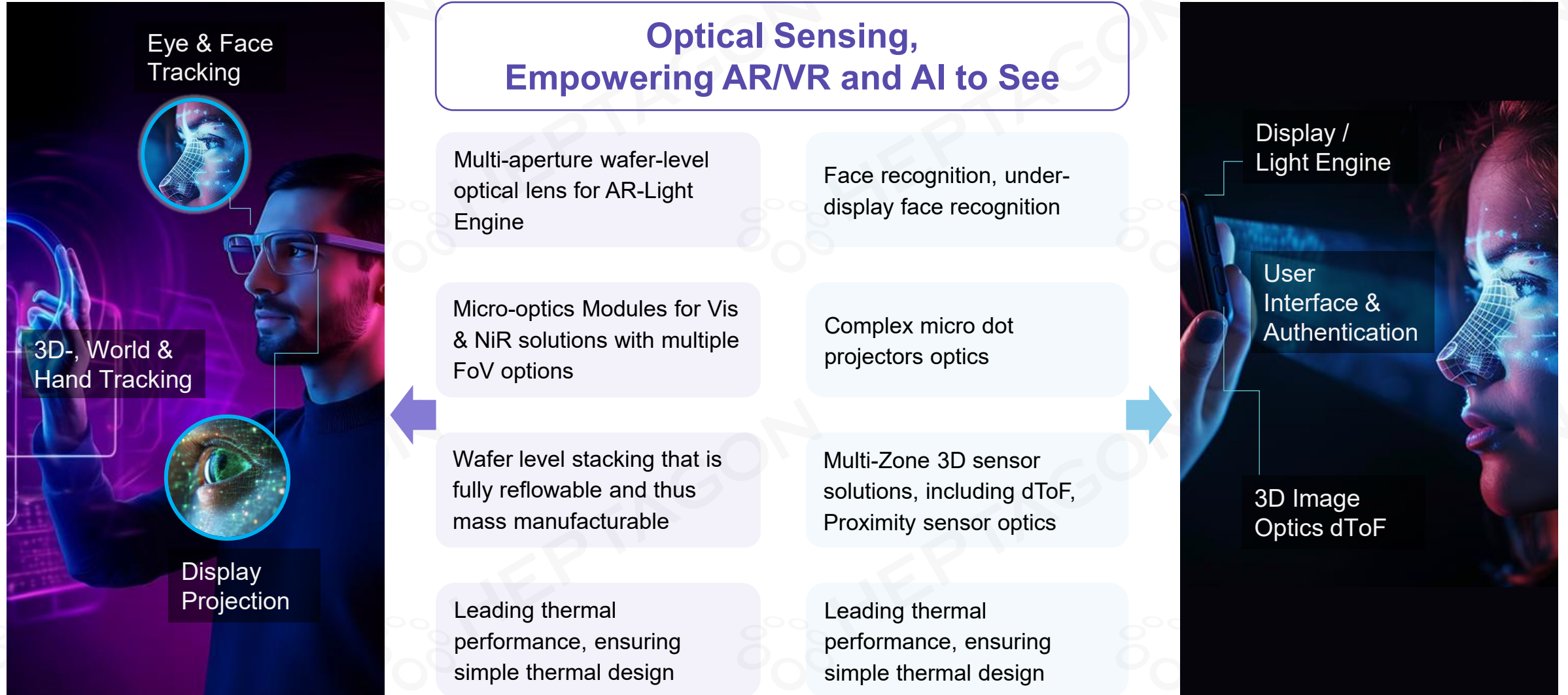


Optical Component and Module Imprinting Service on Si Wafers



# Typical Application and Products

## Consumer Electronics



# Typical Application and Products

Automotive, Robotics, Medical



In-Cabin Sensing



Endoscopy

### Tailored Diffusor Micro-Optics

Irregular Micro Lens Arrays for flood illuminators with various FOIs

### Pattern-Generating Micro-Optics

MLA-based Projected Lighting System

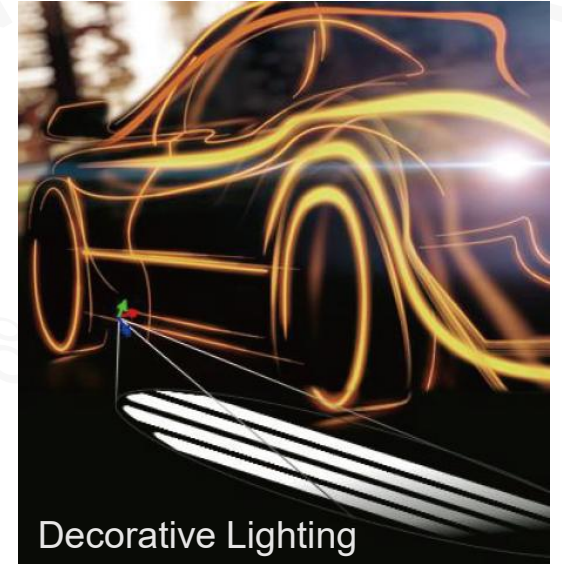
MLA-based molded module

Pattern from a single illuminator

Pattern from a pair of illuminator

### Imaging and Projection Micro-Optics

WLO lens & camera integration for chip-on-tip medical endoscopes



Decorative Lighting



Home / Service Robotics

HEPTAGON

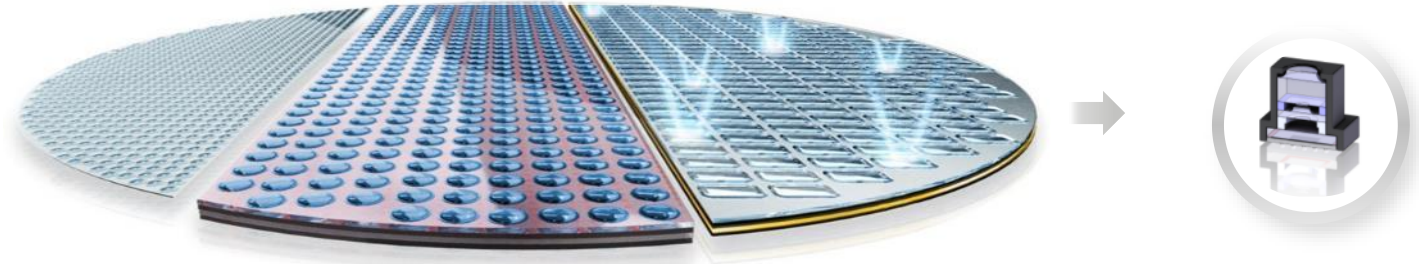
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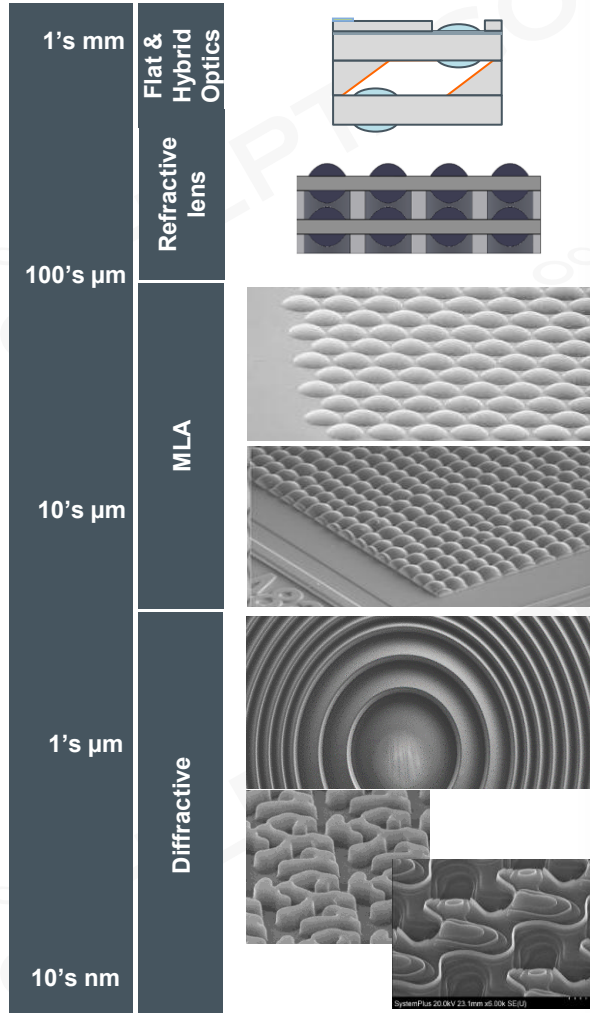
# Wafer Level Optics – Common Technology Base

Design for Manufacturing by In-House Wafer Level Optics & Stacking Technology

Wafer-Level Optics, Electronics, Packaging, Integration, Testing and Processing



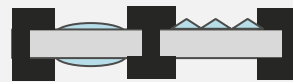
Wafer-level imprinted optics from mm down to nm-scale



**WLO**  
(Wafer Level Optics)



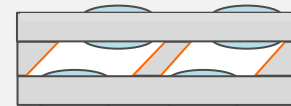
WLO



Encapsulated optics

Diffractive & refractive optics, MLAs, diffusers

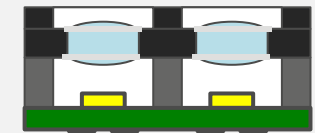
**WLS**  
(Wafer Level Stacking)



Folded path

Imaging lenses, projector lenses

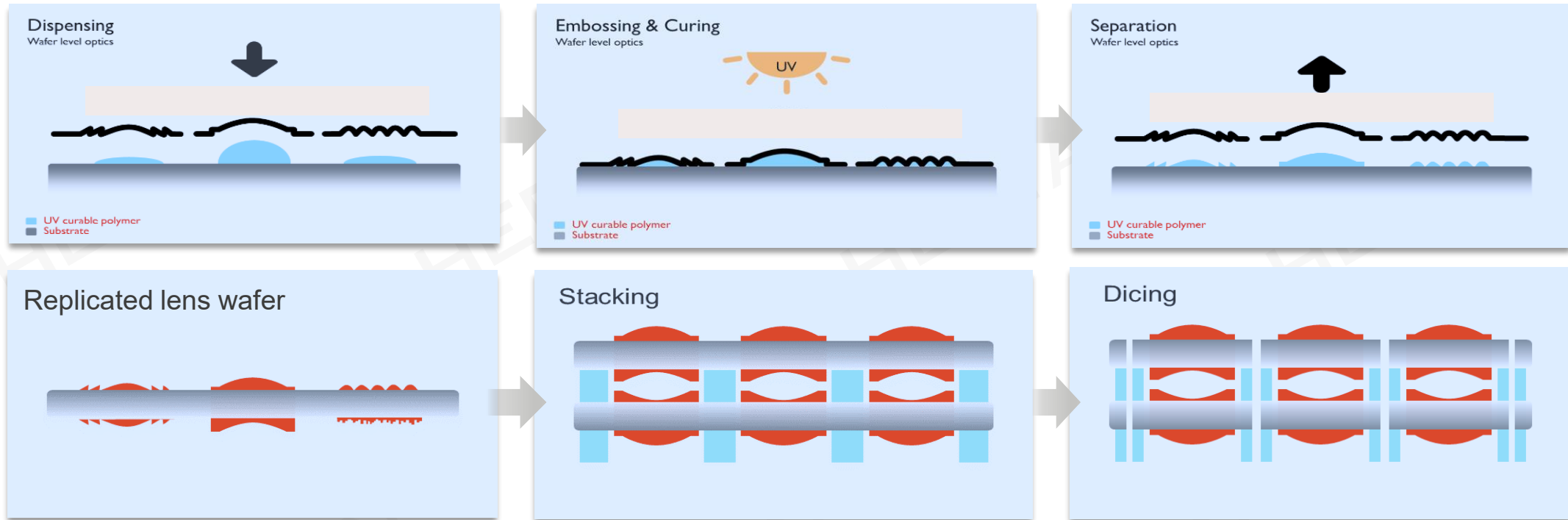
**WLI**  
(Wafer Level Integration)



Molded module

Optical sensor & illumination modules

# Wafer Level Optics – Basic Manufacturing Process



## WLO Competitive Advantages:

- Full wafer-scale process for high volume mass production
- UV curing, Low temperature, low pressure process
- Conformal, microfluidic filling for micro/nano structures
- Conformal reproduction of features less than  $1\mu\text{m}$
- Reflowable optical material with high thermal performance

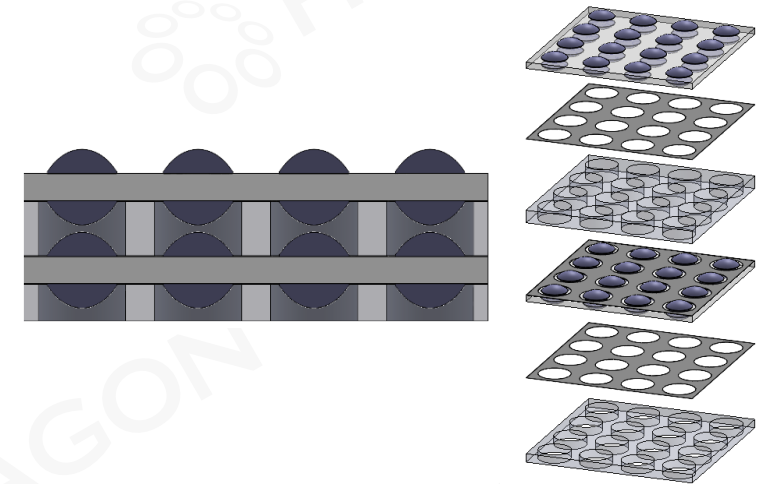
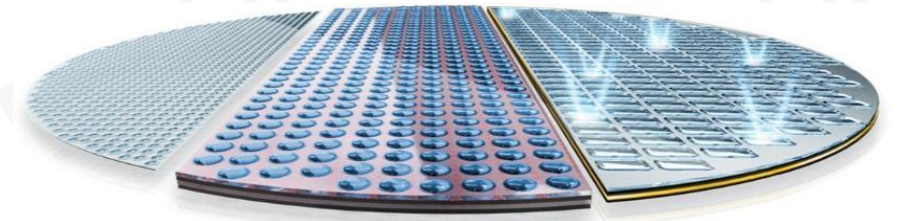
## Unique Advantages for High Performance u-Camera:

- Full Solution reflowability, no Compromise of Function, Fit, Cosmetics
- No barrels, mounts, highly compact, highly integrated optical solutions
- Miniaturization ( $\text{mm}^2$ ) flexibility, advanced capabilities, performance
- Concepts to ensure quality mass production volume solutions
- Active Alignment to sensor delivering  $\mu\text{WLO}$ +Image Sensor Modules

Reflowable WLO-lens systems enable smallest footprint for  $\mu\text{camera}$  devices and integration

# Benefits – Wafer-Level Optics and Stacking

- **Wafer-Level Optics (WLO)** is an extremely high-precise fabrication technology for micro-optics at large volume
  - ✓ Wafer-scale process rapidly scalable for mass production
  - ✓ Tends to be profitable at high volume (MP >100 wafers per production) due to relatively high master & tooling cost
- **Wafer-Level Stacking (WLS)** enables high-performance and highly integrated micro-optical system products
  - ✓ Micron-level precision stacking of multiple optics wafers using leading-edge mask aligners
  - ✓ Wafer-scale bonding using rigid spacers and materials with excellent thermal and mechanical stability
  - ✓ Economic wafer-scale integration of added functions such as apertures, coatings, spectral filters, a.o.

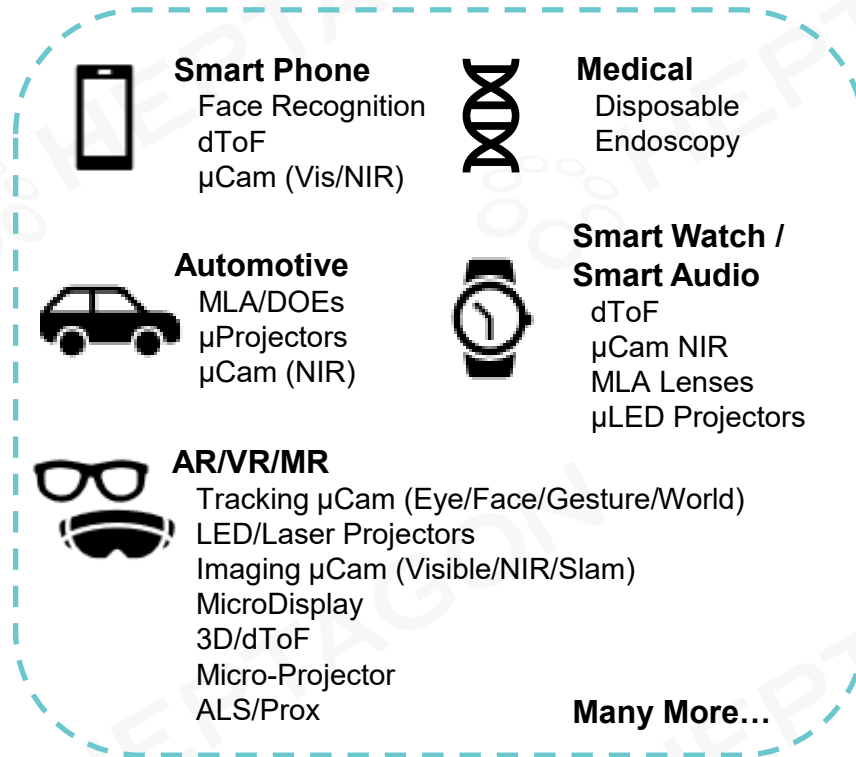


- WLO & WLS benefits can be leveraged best in high-volume markets such as Consumer Electronics, AR/VR & Automotive
- Committed to providing reliable, high-performance WLO products and superior development services to our customers

# How WLO Technology Enables Your Applications

Developing Customized Wafer-Level Optics Solutions for our Customers

Customer Concepts, Requirements...  
Target Application Spec Sharing

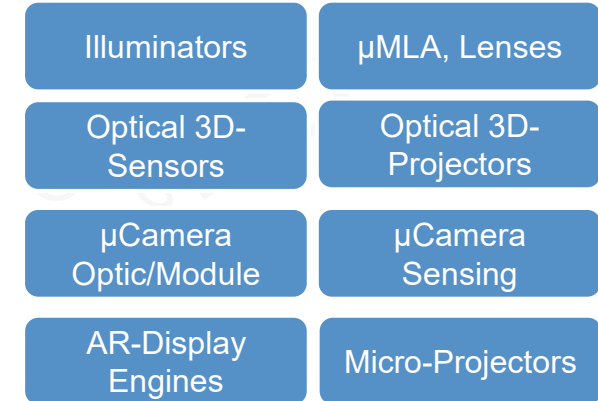


Optical Component  
System Level Solutions



Delivering the Optic or Module to Customer,  
Semicon or indeed ISP partner

Final Solutions  
Module or Application Level



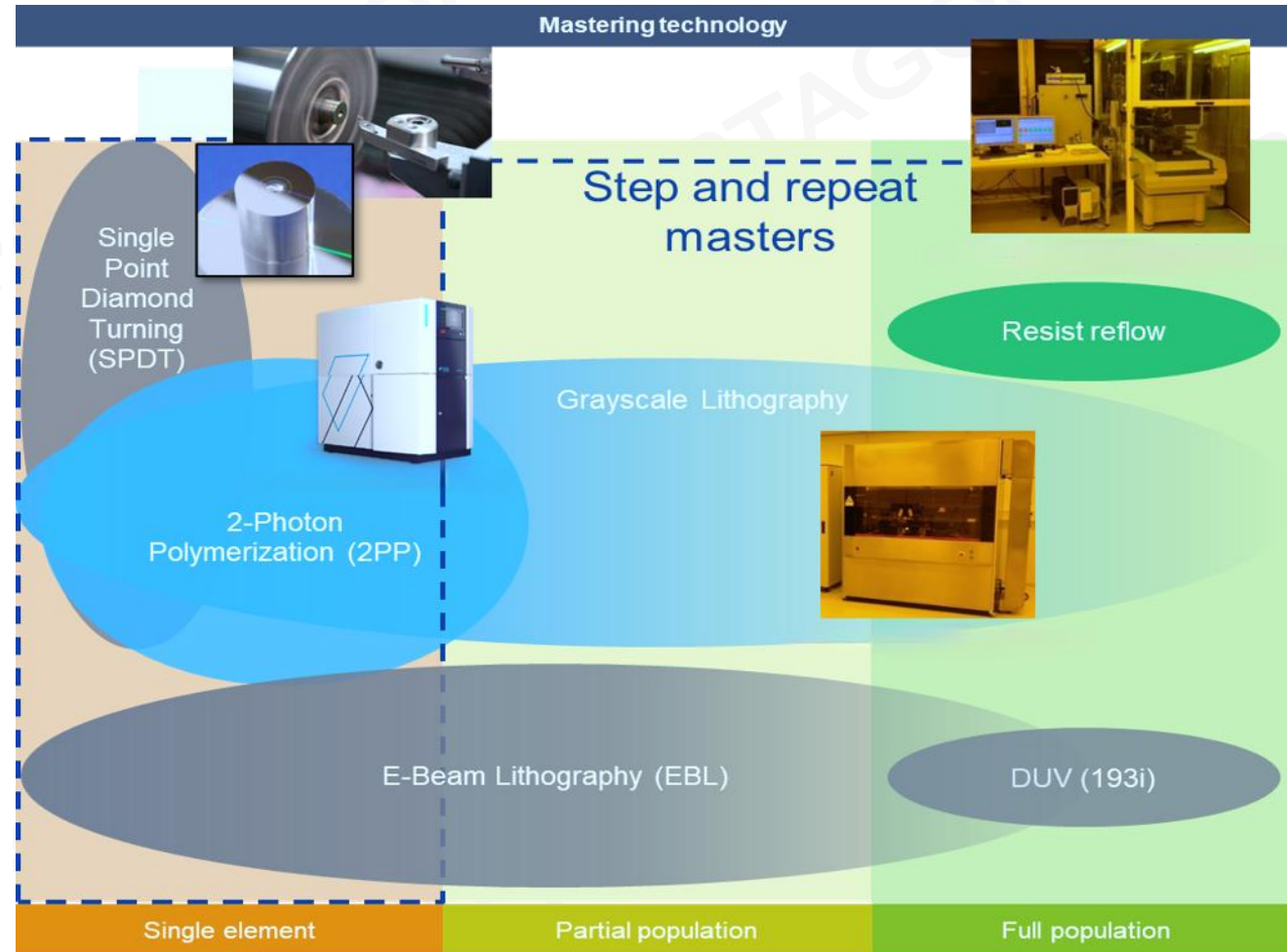
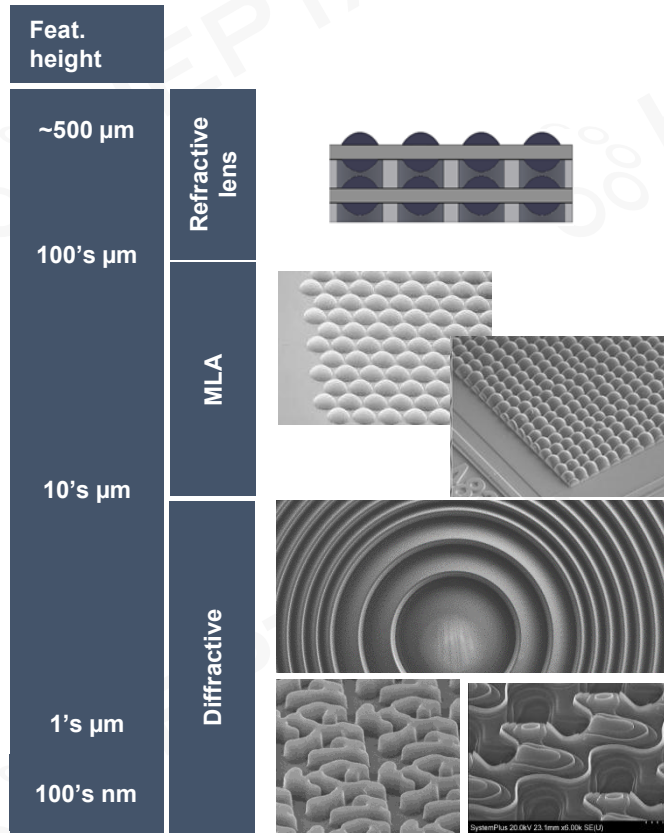
**USP for WLO, WLS, WLI**

- Outstanding Performance
- Micro Size
- Reflowability
- High Volume Manufacturing

Wafer-Level Optics solutions are generally **customer and application specific**, due to specific targets as well as specific semiconductor light source, μ-display and light detector components

# Our Mastering Capabilities – All Starts from Here

Our R&D Lab and Equipment



# Ensuring the Optical Performance of Products

## Metrology Capabilities



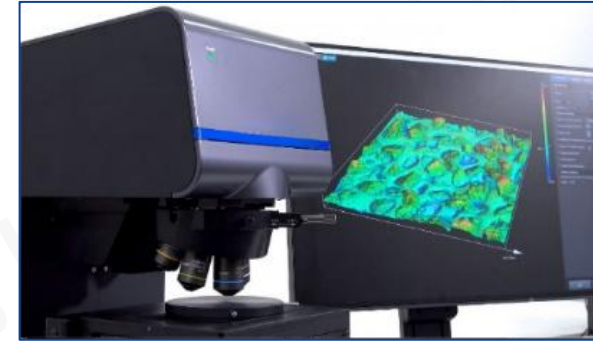
**Coordinate Measuring Machine**



**Contour Measuring Instrument**



**White Light Interferometer**



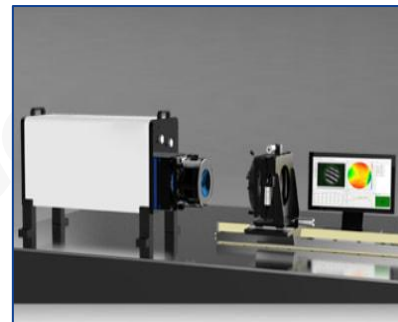
**Confocal Microscope**



**SEM**



**Precision Goniometer**



**Large-diameter horizontal planar & cylindrical interferometer**



**Full Size Measuring Instrument**



**Off-Center Measuring Instrument**



**Ion-miller**



**3D Optical Profiler**

# Ensuring the Product Reliability



**Temperature Shock Chamber x3**

Temp. range: -55~150°C  
Thermal shock (Switching time≤1min) : <30s



**Thermal Cycling Chamber x3**

Temp. range: -55~150°C  
Heating/freezing rate: ≤15°C/min



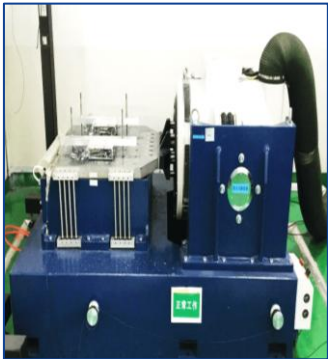
**High / Low Temperature & High Humidity Chamber x5**

Temp. range: -55~150°C  
R.H. range: 20~98% RH



**High-pressure boiling testing chamber x1**

Temp. range: 100~132°C  
R.H. range: 100% R.H.  
Pressure: <5atm



**Vibration table x1**

10000kgf max force; 2~2500Hz frequency, 2m/s max speed



**Salt Spray Test device x1**

According to ISO 9227:2017



**Xenon lamp aging tester x1**

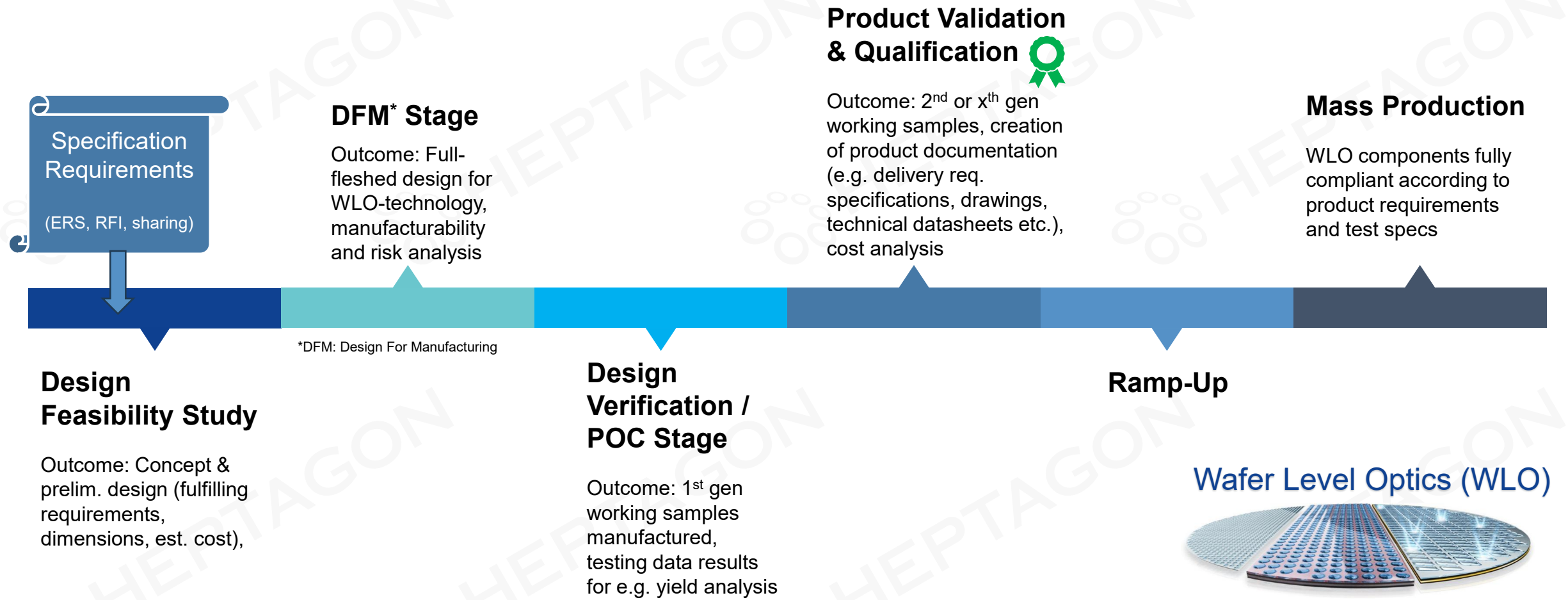
According to DIN 75220



**Reflow Oven x1**

# Work with Us – From Concept to Mass Production

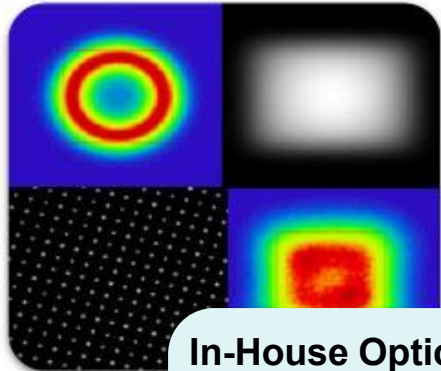
Value Chain for Customer-Specific Micro-Optics Solutions



In-House Skills and Capabilities, Delivering Concepts, Design using DFM Development Cycle and Testing  
Ensuring high volume manufacturing, with reliability delivering proven Quality

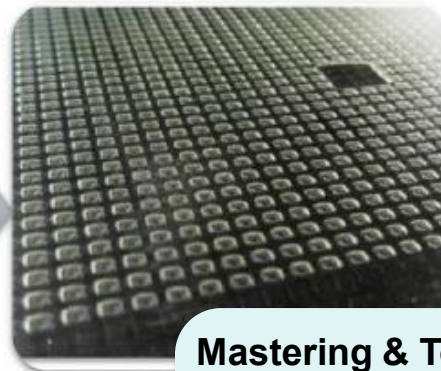
# Work with Us – From Concept to Mass Production

Full-Scale Capabilities for the Whole Process



## In-House Optical & Mechanical Design

- Location: Switzerland
- Ray trace and wave optics
- Full CAD capacity
- Physics simulation
- Single-Element to Full System Designs



## Mastering & Tooling

- Master in-house and 3rd party
- Tooling: in-house
- Locations: Singapore and Switzerland
- Wide range of micro- and nano-structures possible



## In-House Wafer Rep., Stacking and BE Process

- Location: Singapore
- Epoxy on glass, multiple materials options available
- Capacity for high volume production of micro-optics



## In-House Optical & Final Testing

- Location: Singapore
- High UPH
- Wafer level, unit level, and module level testing with standard and customized systems

In-House Vertically Integrated Capability: Design, Development, Manufacturing, Reliability and Optical Test

## 1

Based on the available technical capabilities, we provide our **product portfolio** (standard, customizable) or pure custom **Heptagon designs**.

The customer can then integrate these **Heptagon products** into their application solutions.

## 2

Based on the available technical capabilities, we cooperate with the customer, provide our **foundry service** to convert **customer's designs** into mass produced products.

These products will then be the **customer's own products**.

Both business models (products and foundry service) share the same technology base, yet they power the customer's business in different ways.

# Summary



- **30+ Years of Optical Design & Simulation + Volume Production Expertise**
- **Advanced & Unique Wafer-level-Technologies to Provide Various Optical Solutions**
- **Reliable, Stable Quality + High Precision Products for Various Applications**
- **Fast Response + Customized Service Available**



**Your committed and reliable long-term partner in photonics application solutions**

# THANK YOU



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