METAOPTICS

Making Miniaturization Possible

Company Presentation

2026

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About MetaOptics

MetaOptics is an advanced optics company that develops high-performance metalens solutions for compact and efficient optical systems

Lenses integrated into a wide range of applications by our customers including:

- **5G Smartphones**
- **Pico Projectors**
- **Contactless 3D biometric modules**
- **Industrial Applications/IOT**

Headquartered in Singapore and SGX-listed on 9 September 2025

Expansion plan to leverage upon success to date and expand globally

Transforming the Future of Optics by Unlocking True Miniaturization

Investment Highlights

METAOPTICS

- **Large, Existing $20+B Optical Lens Market Opportunity**

- **Multiple Opportunities in Variety of End Markets**
  - Core opportunities – smartphone, consumer electronics, security, automotive, industrial
  - Potentially larger incremental markets

- **Metalens technology offers significant technological advantage**
  ******AAPL lens TAM alone nearly $~1B***

- **Management Team with significant Industry Experience**

Highly Experienced Management Team

Mark Thng, Executive Chairman

- Mark Thng has over 30 years of experience in senior leadership roles across prominent U.S. multinational corporations (MNCs) and innovative optics technology firms. His impressive career has spanned engineering, general management, and operational leadership in industries ranging from data storage to advanced micro-optics.
- **Heptagon**: Served as Vice President of Operations for six years, helping transform Heptagon into a world-leading micro-optics supplier. Led the build-out of precision manufacturing at scale, enabling Heptagon to become a key optical sensor supplier to Apple for iPhone products. Played a critical role in scaling operations through a high-growth phase and supporting the company's billion-dollar acquisition by ams Osram in 2018.
- **Benchmark Electronics**: As General Manager, Mark was responsible for the strategic and operational performance of one of the top global electronics manufacturing service providers. He was instrumental in building the sputter systems and chemical polishing systems for AMAT.
- **Seagate Technology**: Held key leadership roles overseeing engineering and operational excellence in one of the world's leading providers of data storage solutions.

Aloysius Chua Hao Peng, Executive Director & Chief Executive Officer

- Aloysius Chua Hao Peng is Co-founder, Executive Director and Chief Executive Officer and has been with the company since June 2021, previously serving as Projects Manager and Projects Director. He oversees core technical and operational initiatives including metalens fabrication, equipment development, advanced assembly, and supply chain establishment, while also leading innovation and business development in metalens technology.

Chu Wee Liat, Chief Financial Officer

- Chu Wee Liat joined MetaOptics Technologies in January 2025 as Chief Financial Officer. He leads the company's financial strategy and capital management, partnering with the leadership team to drive disciplined growth and long-term value creation. He brings extensive experience from PricewaterhouseCoopers in Singapore and Silicon Valley, where he focused on audits of SEC-registered public companies and transaction advisory engagements across Southeast Asia. He previously led acquisitions and early-stage venture investments at Advanced MedTech Holdings.

One of 11 Singapore companies showcasing at the Singapore Pavilion of CES 2025 in Las Vegas

MetaOptics Products & Technology

Ultra-Wide FOV NIR Metalens

Single-Layer RGB Metalens

Single-Layer RGB Metalens

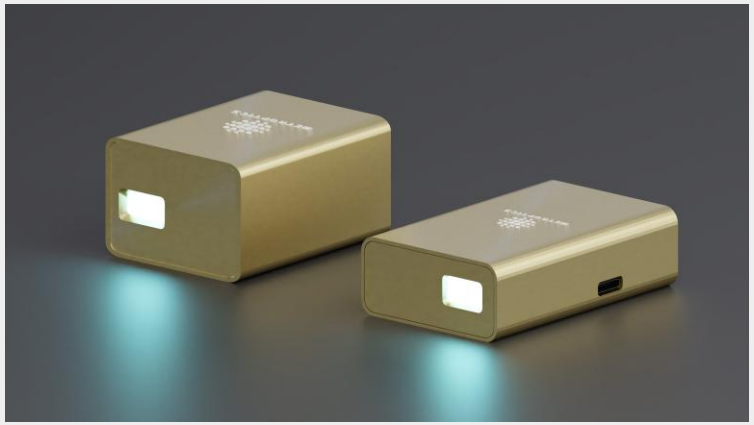
Metalens Colour Camera Module

IoT Metalens Colour Camera

Infrared Metalens Camera

3D Biometric Metalens Sensors

2nd Gen. Pico Projector



Metalens-Integrated AI Smart Glasses

Metalens Smartphone

MetaOptics' Metalens Superiority Across Multiple Facets

	Conventional Lens	METAOPTICS Metalens
Image Performance	Requires multiple curved elements to correct aberrations, limiting performance in compact systems	Achieves high-quality, aberration-corrected imaging through **a single nanoscale layer**
Miniaturization	Constrained by physical curvature and bulk thickness	Ultra flat (nm) design enables dramatically **smaller & lighter** optical modules
Simplified Structure	Multi-element stacks with mechanical housings and precise alignment requirements	**Single flat optical surface** replaces assemblies, reducing parts and alignment needs
Thermal Stability & Energy Efficiency	Optical performance drifts with temperature and requires more material that retains heat	Thin, low-mass nanostructures maintain **stable performance** with reduced thermal sensitivity and energy loss
Manufacturing Leverage	Cost-effective and mature supply chain, but labor-intensive process	Can leverage **cost-effective** semiconductor manufacturing process for **mass production**

Competitive Advantage

End-to-End Vertical Integration

*Full-stack service capabilities, from **design to end-product delivery**; offering a one-stop shop for customers*

Flexible Manufacturing Enabled by Multiple Fabrication Processes

*Leveraging **DUV immersion photolithography** and **Direct Laser Writing** fabrication technology (traditionally E-beam Photolithography)*

Semiconductor-Compatible Mass Production and Manufacturing

***Top 3 globally** in mass production capabilities and shipments*

Colored Metalens Capability

***Only optical metalens company** in the world with a strategic focus on color imaging application*

Glass-Based Metalens Fabrication

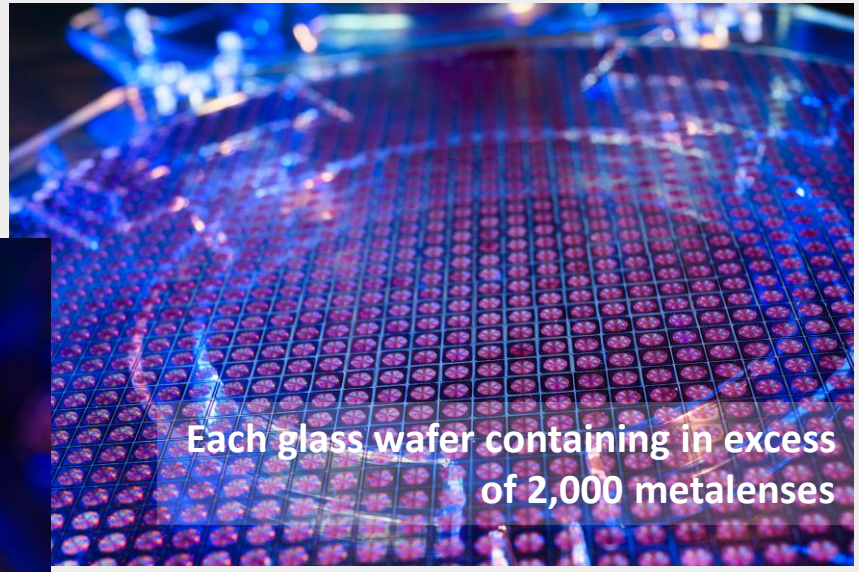
***Leveraging glass** as major base material of substrate for improved optical performance and manufacturing scalability (traditionally silicon-based)*

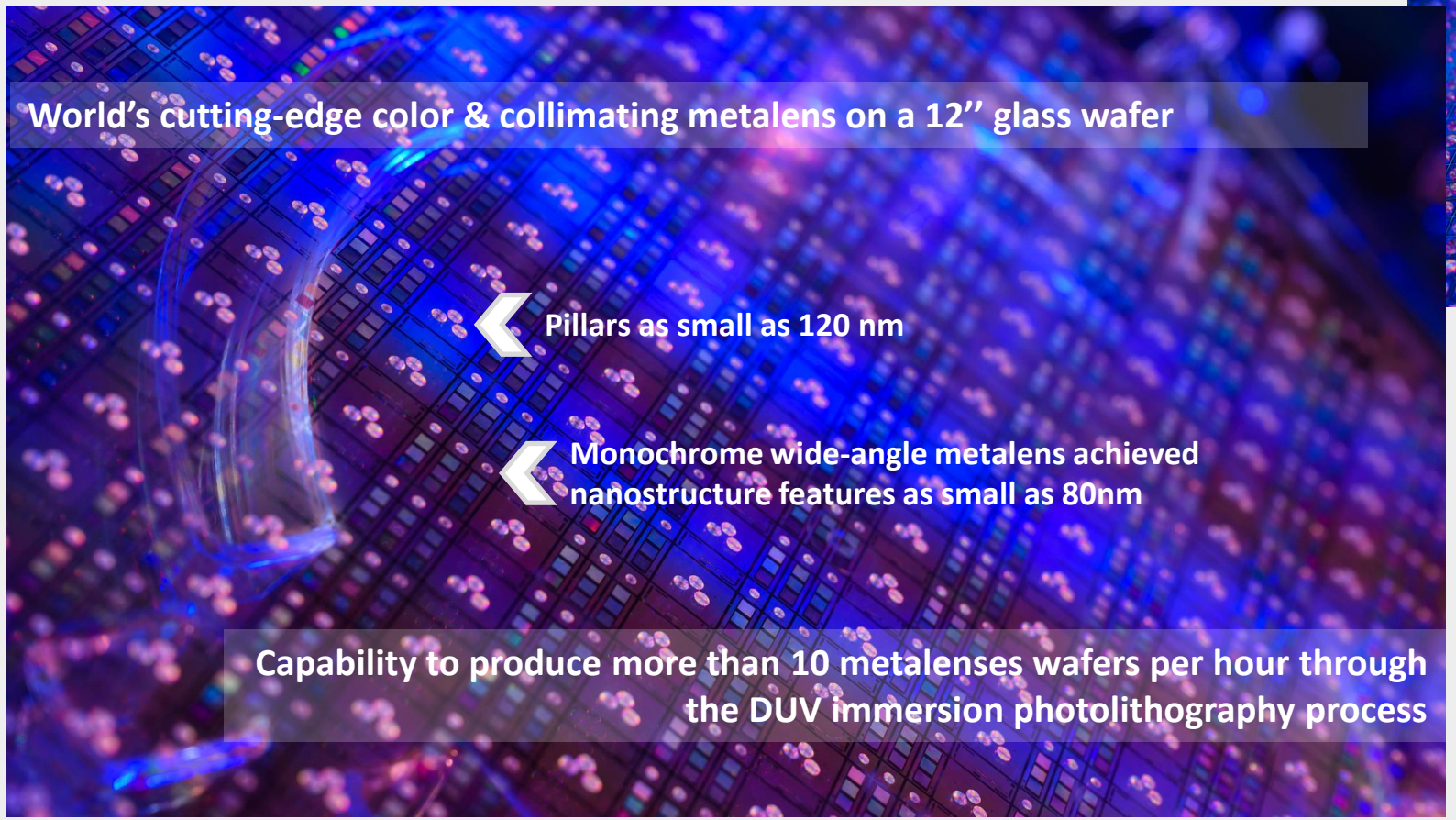
Demonstrated Consumer Electronics Prototypes

*Metalens-integrated **smartphones**, AI **smart glasses**, **projectors**, etc.*

Mass Production Capabilities

*MetaOptics was the **first in the industry to achieve mass production capability for color metalenses** on 12-inch glass substrates.*





MetaOptics in 2024

Ranks	Ranks
3rd	5th
Globally	Globally
with mass production capabilities & shipments[1]	among all metalens companies

"Mass Production" refers to the shipment of 1 million metalens units per year in numericals
Source: Independent Market Report[1]

Metalens Market

Total Addressable Market (TAM) & Key Sectors

Metalens TAM & Market Penetration

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Global Optical Metalens Industry Key Developments History

2011-2016: The Birth of Optical Metalens

2017-2019: Advancements in Fabrication & Performance Enhancement

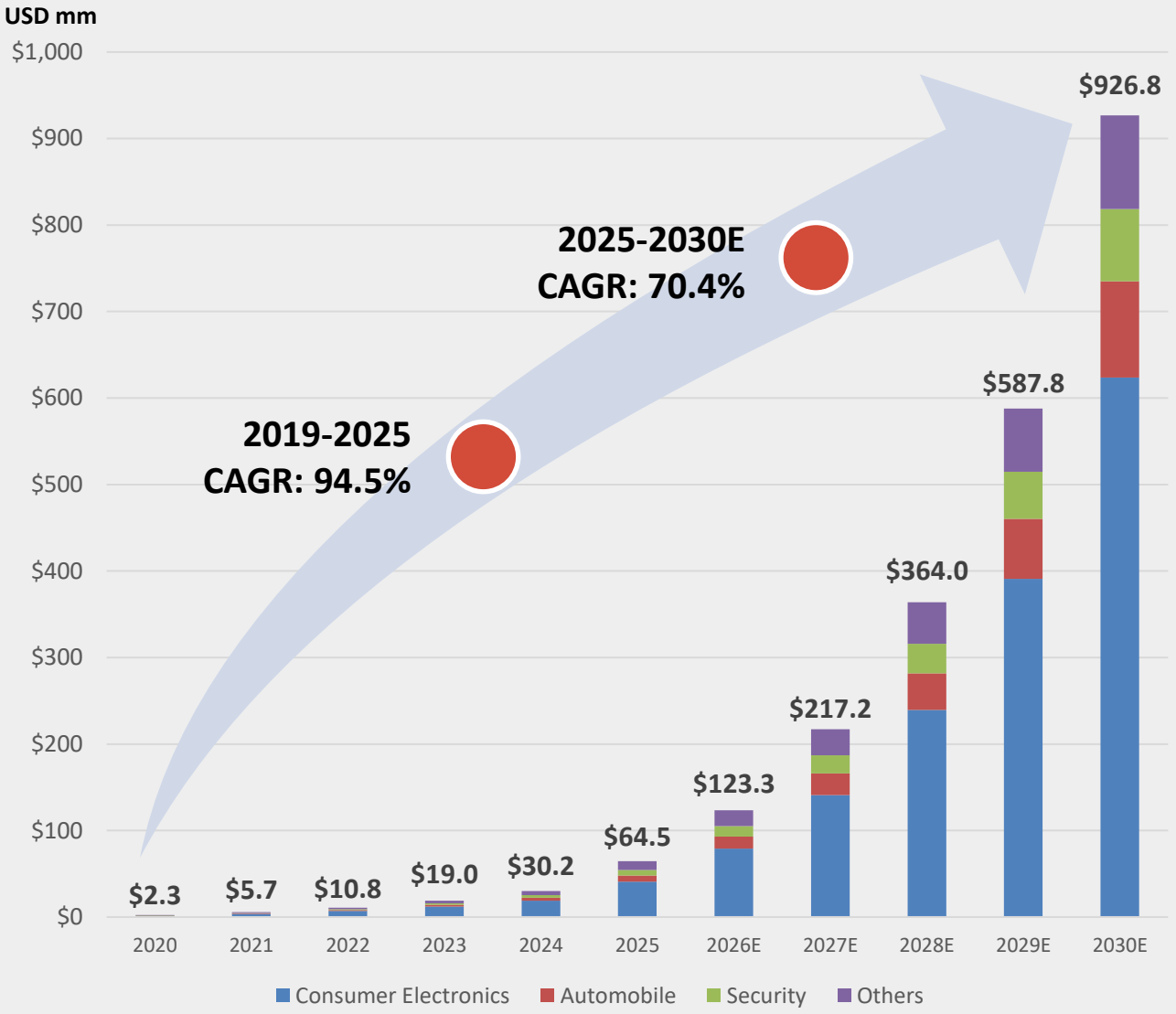
2019-2022: Early Commercialization and Industry Piloting

2023-Today: Expanded Application & Market Growth

CAGR by Application

CAGR	2020-2025	2025-2030E
Consumer Electronics	93.5%	72.5%
Automobile	97.0%	73.2%
Security	95.6%	66.4%
Others	96.5%	61.3%

Optical Metalens Industry Market Size (Revenue)



Source: China Insights Consultancy

Key Sectors Poised for Immediate Metalens Impact

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Consumer Electronics

Smartphone, AR/VR systems, and IoT devices sectors leading the way for compact, lightweight, and efficient optical solutions

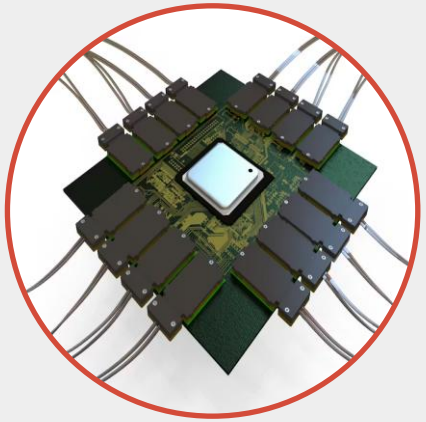
Automobile

Metalens contribute to the development of compact, high-resolution systems in the realm of autonomous driving and ADAS

Security

Enabling broadband infrared and multispectral imaging, allowing clearer, more detailed images in low-light conditions

Co-Packaged Optics



CPO plays a direct and major role in booming industries such as data centers & cloud computing, AI & HPC, etc.

Others

Applications into the optical communication, fiber optics, semiconductor, telecommunications, biomedical, etc. sectors

Strategically aligned to accelerate growth across endless range of high-growth industry application

Source: China Insights Consultancy

U.S. Expansion Strategy

*In October 2025, MetaOptics established its U.S. entity registered in Nevada – **MetaOptics, Inc. USA**. It also strategically located U.S. office space in the heart of Silicon Valley, CA region near leading semiconductor & smart device companies.*

Customer Relationships

Stanford Engineering SystemX Alliance Program

- Accepted as an **Associate Member** under the **Stanford Engineering SystemX Alliance Program**
- Access to Stanford's **research infrastructure**, **faculty**, and **talent pool**
- Supports technical validation and quick-turn metalens prototyping capabilities for U.S. customers developing next-gen devices
- Opportunity to access **Stanford's robust tech-company network** for showcasing metalens technology and **drive industry adoption**

Customer Relationships Build Out

- Actively engaging several **major USA-based technology companies** and other entities to explore partnership opportunities in optical metalens solutions for data communications, next-generation sensors, and smart devices
- Multiple NDAs with prospective U.S. tech customers

Operational Expansion

U.S. Universities & Semiconductor OEMs

- Ongoing discussions to **implement DLW equipment** to select U.S. universities and/or semiconductor OEMs to create **"mini foundry"** for small volume, quick turnaround prototyping
- DLW equipment capable of fabricating nanostructures with feature sizes as small as **120-150nm** (size typically required for colored metalens)

U.S. Foundry Development

- Strategically located in close proximity with major U.S.-based technology companies
- Enabling faster **co-development cycles**, easier **IP collaboration**, and faster **prototyping and qualification** with potential customers
- U.S. foundry enables **scalable**, **reliable**, and **high-precision manufacturing** of metalens technology
- Equipped with **12-inch DUV lithography tools** for high throughput fabrication of colored metalens

Future Strategic Plans

MetaOptics' Opportunities

- Deliver high-performance metalens solutions to customers across North America
- Extend metalens design & manufacturing expertise to many world class U.S. clients and partners
- Establish long-term partnerships with U.S. universities for R&D, prototyping, and fabrication opportunities

Potential sector entry

- 5G Smartphones
- Data Communications
- Data Centers
- Fiber Optics
- AI Semiconductor Manufacturing
- Consumer Electronics

Establishing a methodological U.S. expansion roadmap to scale metalens technology customer adoption

Commercialization Roadmap

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Phase 1

R&D and Tech Readiness

- ✓ Early-stage research, simulation, and lab-scale experiments
- ✓ Validate core optical principals, metalens design methodologies, and performance targets
- ✓ Prototype build out
- ✓ Establishing internal IP foundation
- ✓ Establish mass production capabilities

Phase 2

Infrastructure Build-Out

- ✓ Infrastructure build out in the Silicon Valley, U.S. region
- ✓ Early engagement with U.S.-based technology companies
- ✓ Establish key partnerships with strategic stakeholders
- • Establish U.S. “mini foundry” for select key partners
- • Deployment of DLW equipment for key partners for prototyping

Phase 3

Infrastructure Expansion

- • Development of U.S. foundry
- • Build out U.S. operations, infrastructure, and partner network
- • Expanding partnerships and engagements with prospective customers and key stakeholders
- • Increase deployment and sale of DLW equipment
- • Driving broader industry adoption of metalens technology

Phase 4

Strategic Customer Engagement

- • Validate technology performance in customer systems
- • Align with customer qualification cycles, reliability testing, and field performance
- • Integration into early adopter products and next-gen device roadmaps
- • Exponential foundry revenue generation

Phase 5

Commercial Launch + Revenue Scale

- • Formalize long-term customer supply agreements and ecosystem partnerships
- • Ramp mass-production of metalens
- • Innovation with next gen metalens products

Currently between Phase 1 and 2

Long-term, multi-year process

Investment Highlights

METAOPTICS

Endless Industry Application Opportunities

Expanding global market integration opportunities across high growth technology sectors, including Consumer Electronics, Automobile, Security, AI Infrastructure, etc.

Established Mass Production Capabilities

Successfully demonstrated mass production capability of metalenses on a 12-inch glass wafer. Ranks 3rd globally with mass production capabilities and shipments.

Clear Demand for Miniaturized Designs

Metalenses replace bulky, multi-element traditional lenses with ultra-thin, nanostructured surfaces on a single layer to meet the growing demand of compact and lightweight product designs.

Strategic Position to Enter the U.S. Market

Established U.S. entity and strategic office location in the heart of Silicon Valley, early engagements with leading U.S. technology companies, and partnerships with U.S. universities.

Vertically Integrated Full-Stack Design and Manufacturing

Enables mass production in a cost-effective manner, reduce lead times, and maintain greater control over the entire production process to serve as a one-stop metalens provider.

METAOPTICS

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