

Enabling New Applications in the AR Market

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Product Marketing | CTO Office | Engineered Optics Group

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Applied Materials Confidential

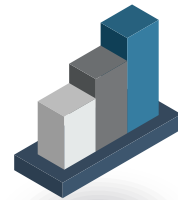




FOUNDED IN 1967

World's #1

semiconductor and display equipment company



\$25.79 billion
revenue



\$2.8 billion
R&D spending



~17,300
patents



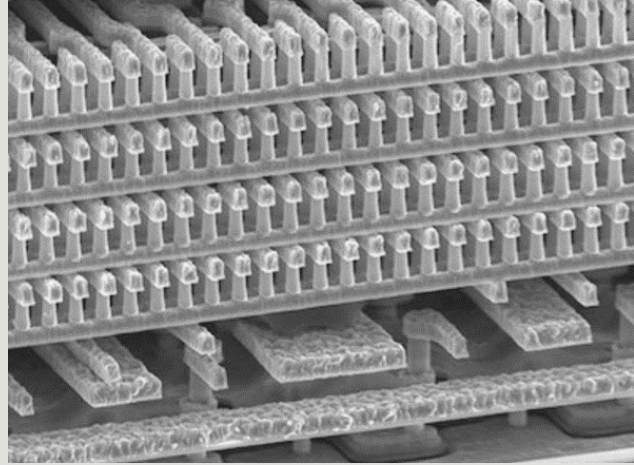
~33,000
employees
in **24** countries

Data as of fiscal year end, October 30, 2022

Applied Materials and the Engineered Optics Group

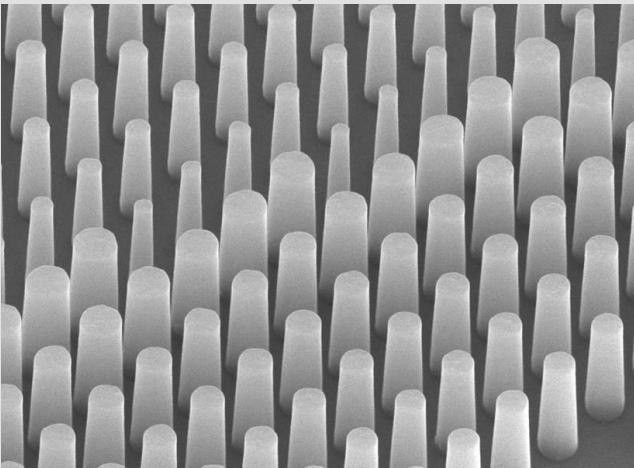
» Flexible materials engineering capability

Semiconductor



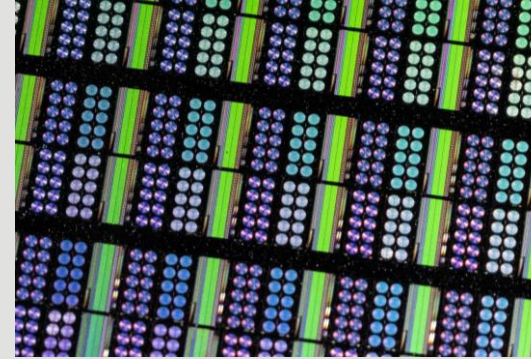
Nanostructures
Manipulating
Electrons

Engineered Optics

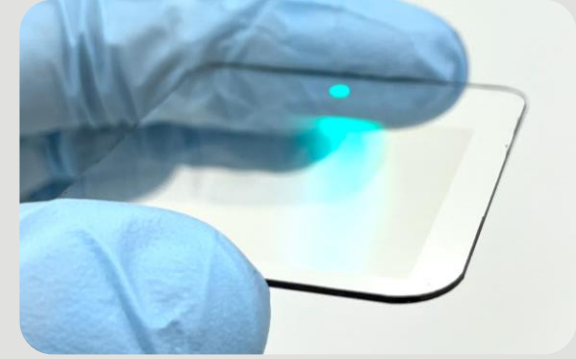


Nanostructures
Manipulating
Photons

Scaled by Applied Materials...



NIR Metalenses



Waveguide Combiners

Leveraging our 50 years of experience

Optical device performance

New materials, precise control of material optical properties & critical dimensions & shapes

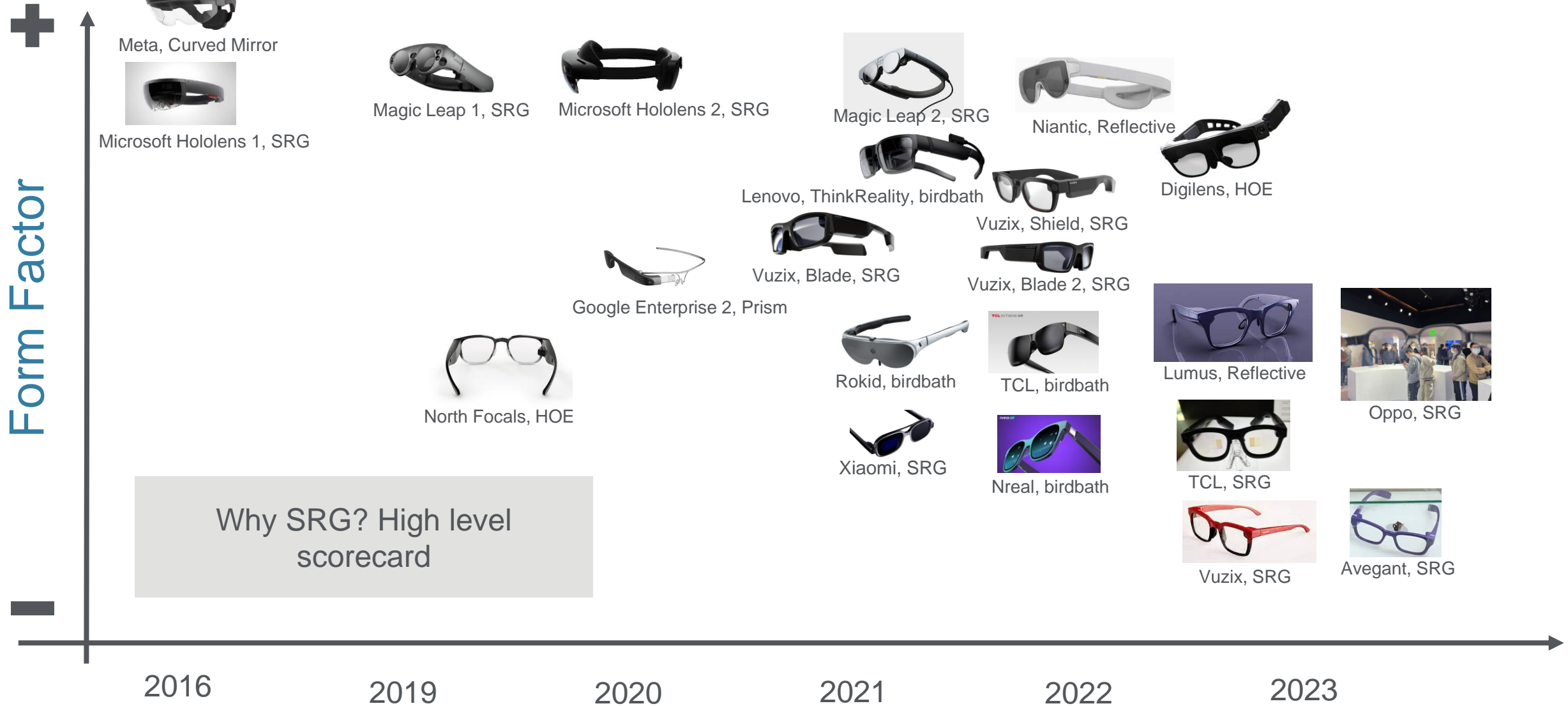
Exotic transparent substrates

Customized equipment & process

Yield, cost

Mature & proven 300mm wafer processing

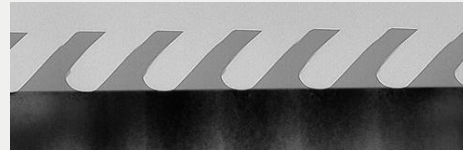
AR/MR Evolving Form Factor



Engineered Optics Introduction

- Native **300mm** transparent substrate handling
- **Custom** 300mm Processes & Metrology Equipment built on mature platforms
- Custom Back End Equipment

Technology

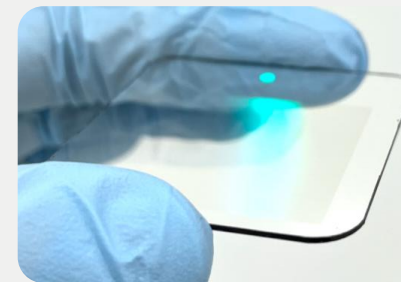


- **Etched device focus**
- **Advanced characterization** and test
- Broad range of **material sets**
- **Double sided** processing
- Front & Back-end processing

Novel Capabilities



Offerings



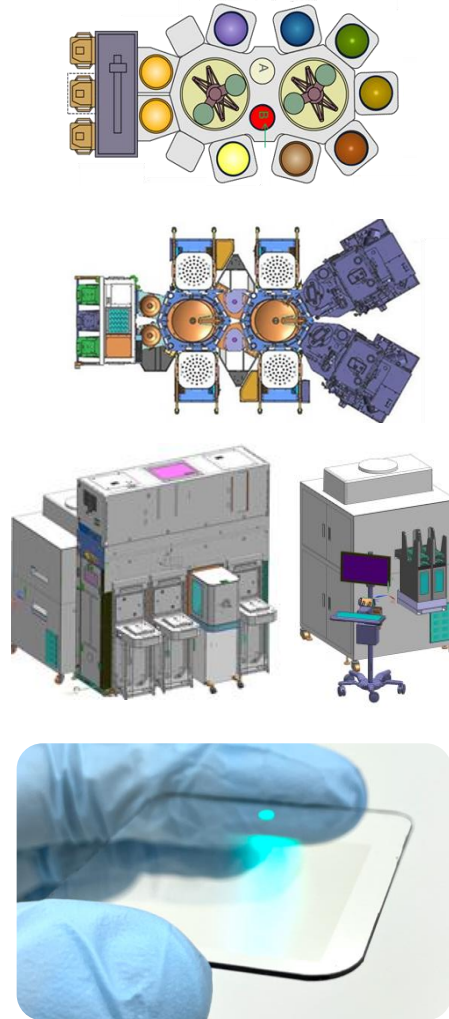
We make photonic devices

- AR Etched Waveguides
- IR Metaoptics

We offer:

- 1 stop shop
- Development Service
- Manufacturing Service

Fully Integrated Process Flow on 300mm Transparent Substrates

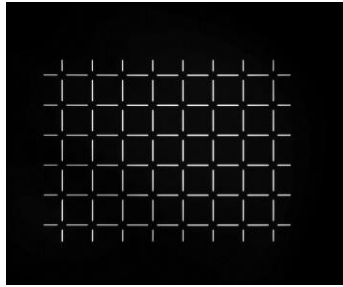


- Film Stack Deposition
- Litho
- Etch (Angle + Depth Variation)
- Backside Litho + Etch
For Double Sided
- Encapsulation + Coatings
- Dicing, Edge Blackening, Packaging
- Optical Performance Metrology

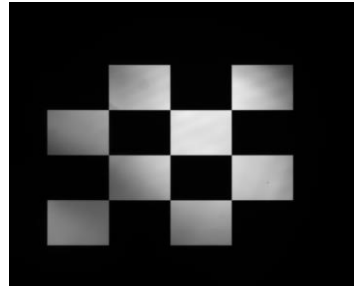
Automated Optical Performance Metrology System

Waveguide KPI

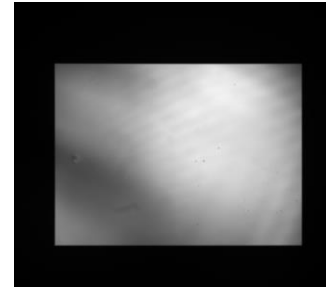
MTF



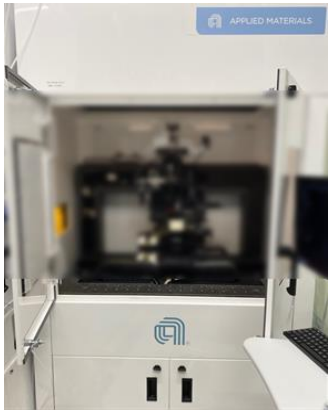
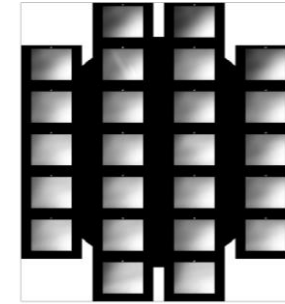
Contrast



Efficiency



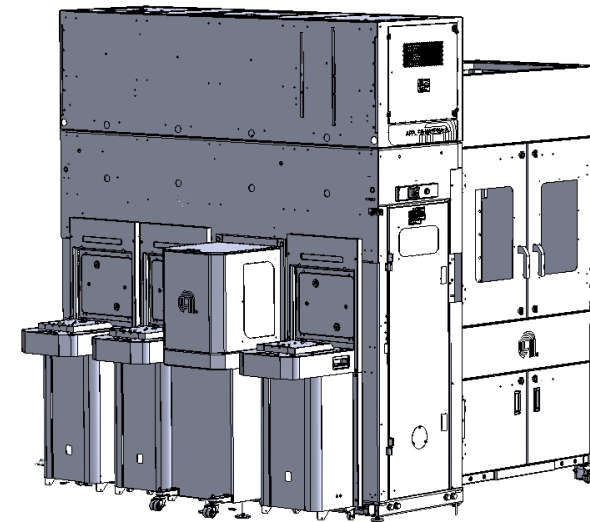
Uniformity



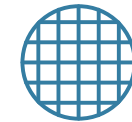
Wafer Test



Part Test (on trays)



10°-60°FOV

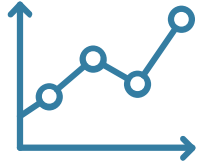


200/300 mm



High
Throughput

Metalenses for NIR 3D Sensing and Imaging



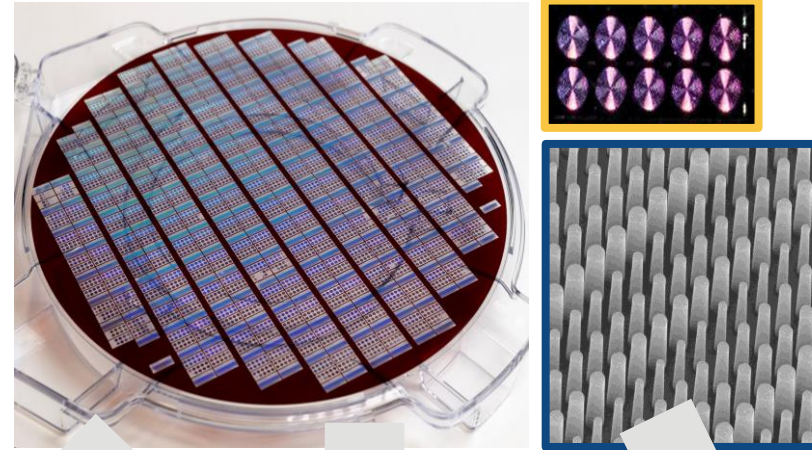
Market of **17B\$ in 2027**,
8B\$ in 2021 (Yole)



Narrow Band, One Wavelength

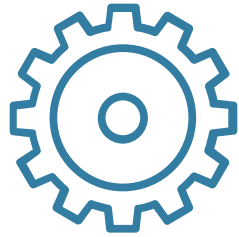


Reducing Cost



Engagement Models

**Bring your design file
and specs**

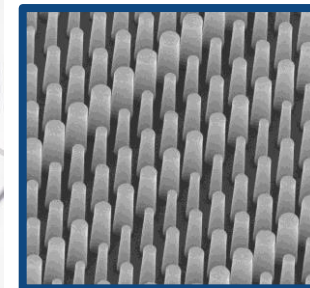
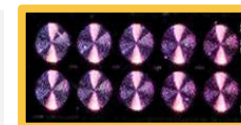
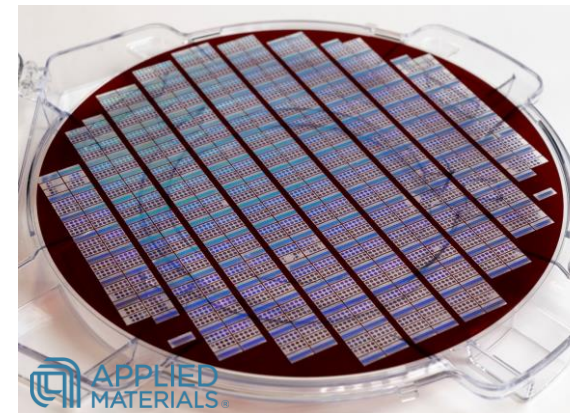
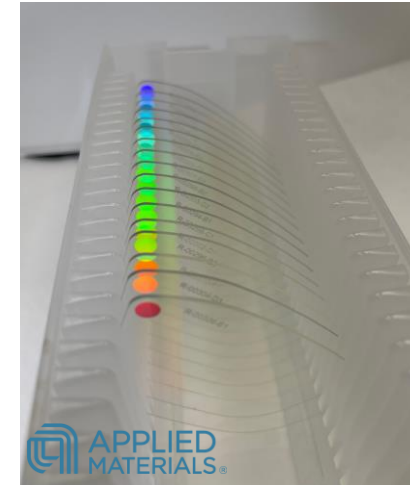


PDK

Bring your idea



BD Team Europe
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APPLIED
MATERIALS®

make possible