



MICRO OPTICS IN POLYMER

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SONY

Hiroki Totoki
President & CEO Sony Group Corporation



Game & Network Services | Music | Pictures | Entertainment, Technology & Services | Imaging & Sensing Solutions | Financial Services | Other Segments

Sony DADC

Dietmar Tanzer
President Sony DADC Global





Thalgau, Austria

Headquarters

1983
Established

900
Employees Global

26.4 B
Products in 40Y

170,000
sqm

3
Locations (AT, CZ, US)

120 M
Products in FY24

STATE OF THE ART FAB INFRASTRUCTURE DISC

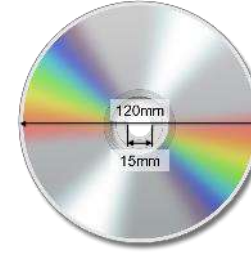
ONE-STOP SHOP SOLUTION



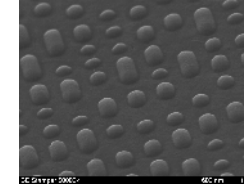
HIGH-PRECISION MICRO AND NANOTECH POLYMER SOLUTIONS



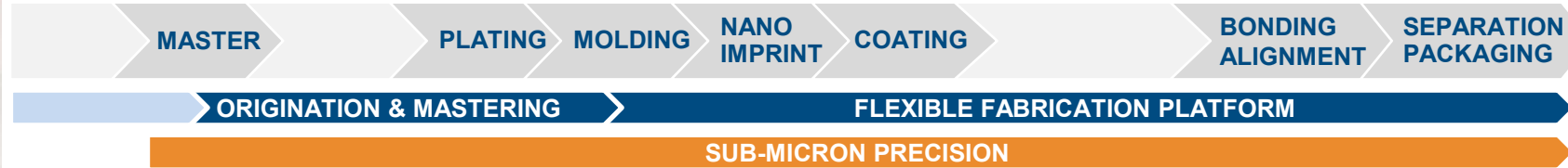
Disc Generations



Disc Shape



PIT length: 150 to 600 nm
PIT depth: 80 nm
PITCH track: 320 nm



FABRICATION TECHNOLOGIES

- › Lithography & Galvanics
- › Injection Molding (>75)
- › Nano Imprint (>35)
- › Coating (>75)
- › Bonding (>25)
- › Printing: offset/screen
- › Polycarbonate
- › High Level of Automation

SERVICES

- › Inhouse product & process development
- › Metrology & Quality
- › Procurement
- › IT Solutions
- › 24/5 to 24/7 Manufacturing
- › Secure Processes
- › Quality & Continuous Improvement
- › Project management

MAJORITY OF DISC MANUFACTURING TECHNOLOGIES OFFER A USP FOR FABRICATION OF MICRO OPTICS

ONE-STOP SHOP SOLUTION

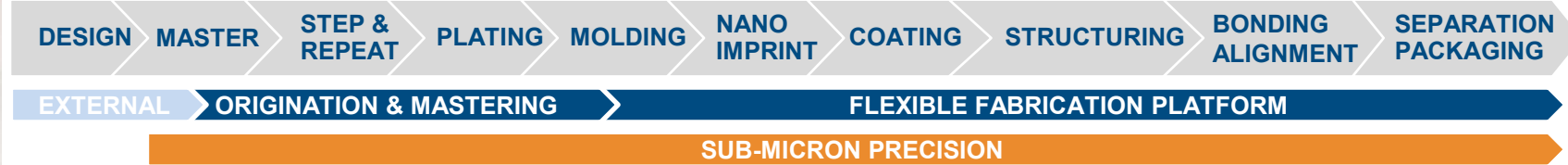
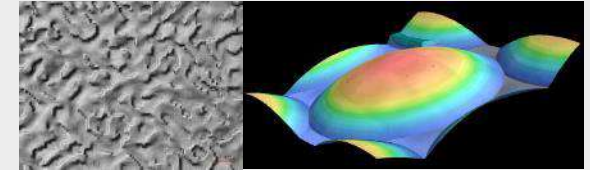


- ROE - Refractive Optical Elements
- DOE - Diffractive Optical Elements
- MOE - Meta Optical Elements

Wafer Level
Optics



Surface structure
50 nm up to 100 μ m



FABRICATION TECHNOLOGIES

- › Optical design
- › Lithography & Galvanics
- › Step & Repeat
- › Injection Molding
- › Nano Imprint
- › Coating & Structuring
- › Alignment & Bonding
- › Separation
- › PC, PP, PMMA, COP, COC
- › High Level of Automation

SERVICES

- › Inhouse product & process development
- › Metrology & Quality
- › Procurement
- › IT Solutions
- › 24/5 to 24/7 Manufacturing
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VEHICLE INDIVIDUALISATION



ADDITIONAL FUNCTIONALITY AND SAFETY

„LIGHT IS THE NEW CHROME“

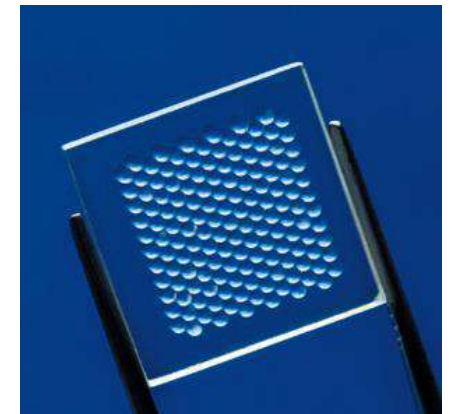
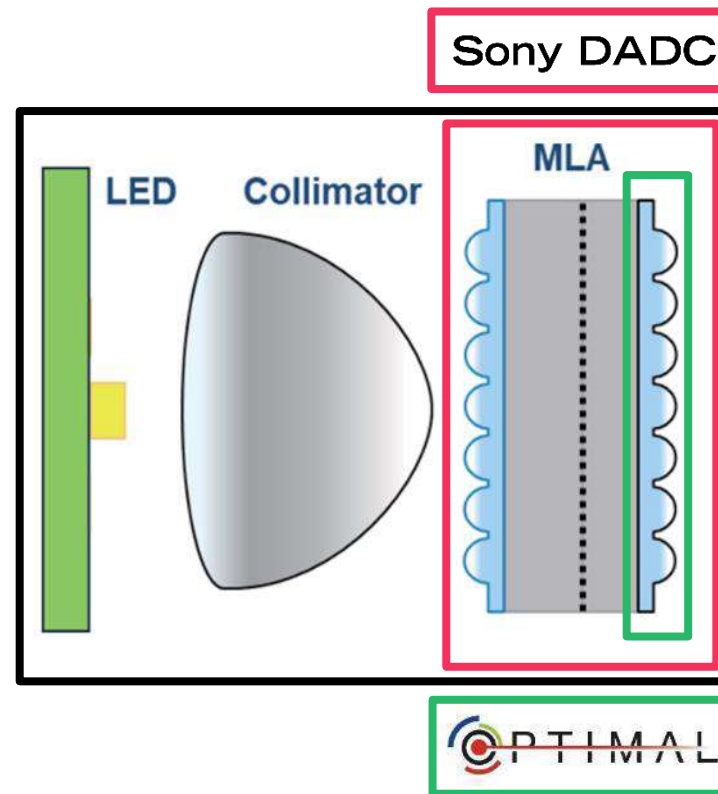
TRADITIONAL AUTOMOTIVE LIGHTING SERVES BASIC PURPOSES

EARLY ATTEMPTS AT INNOVATION INCLUDED

MICRO LENS ARRAY (MLA) TECHNOLOGY IS REVOLUTIONIZING AUTOMOTIVE LIGHTING

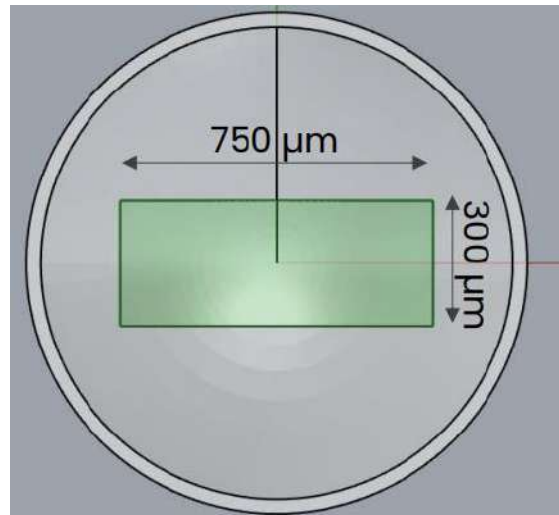
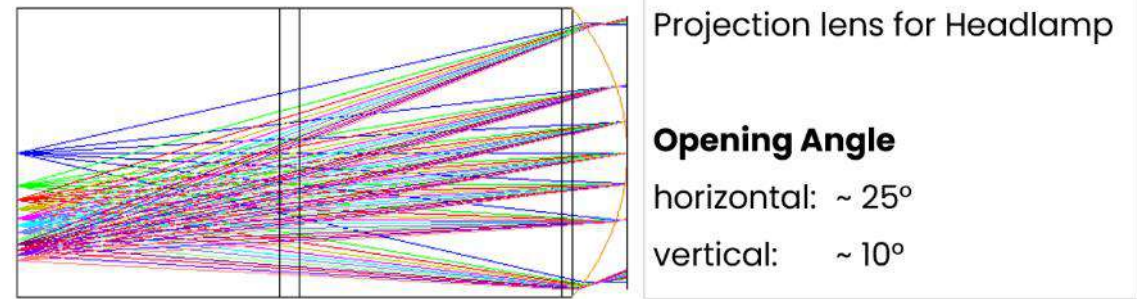
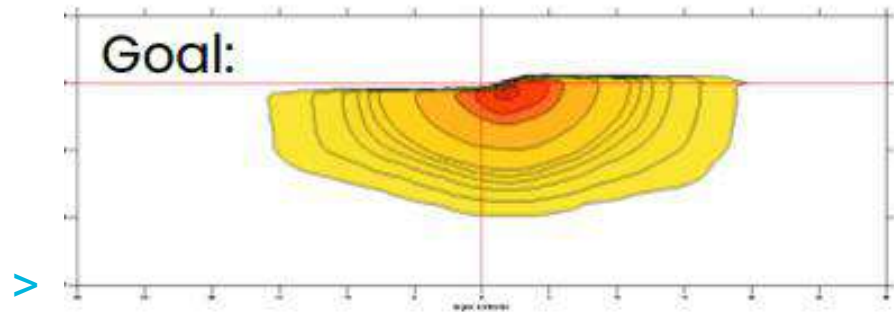
MLA TECHNOLOGY ADVANTAGES OVER CONVENTIONAL PROJECTORS

Optical Design-Partner FEV/EDL Rethschulte GmbH

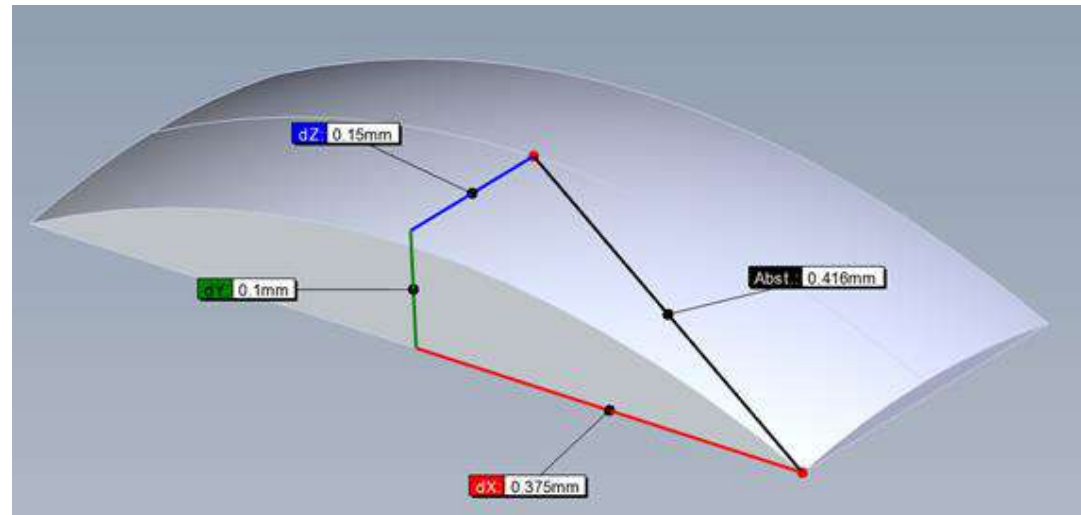


Single Lens Design

> Typical Light Distribution for Low Beam



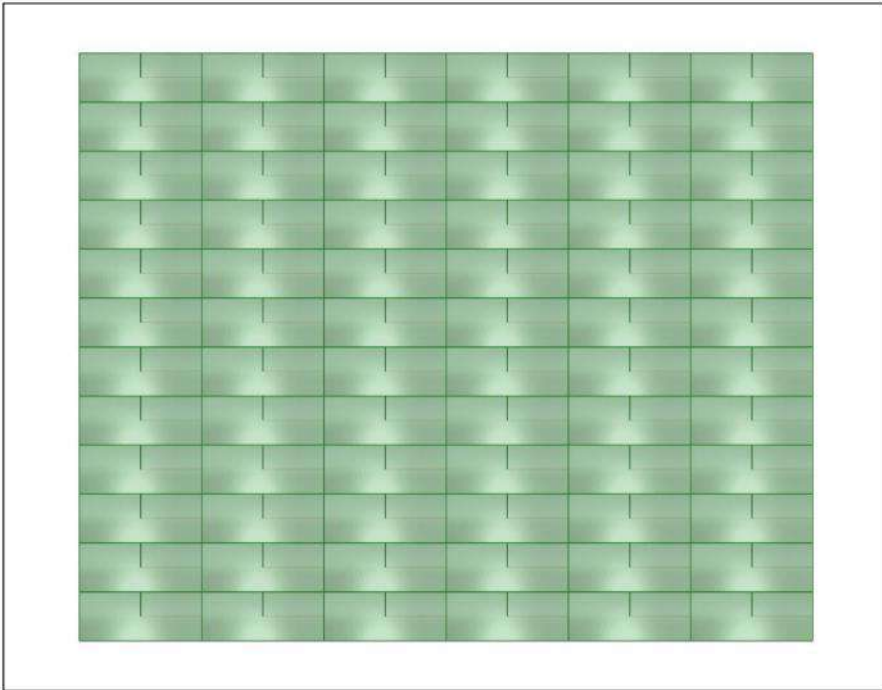
Rectangle „cut out“



Lens Array – 6 x 12 = 72 Single Lenses

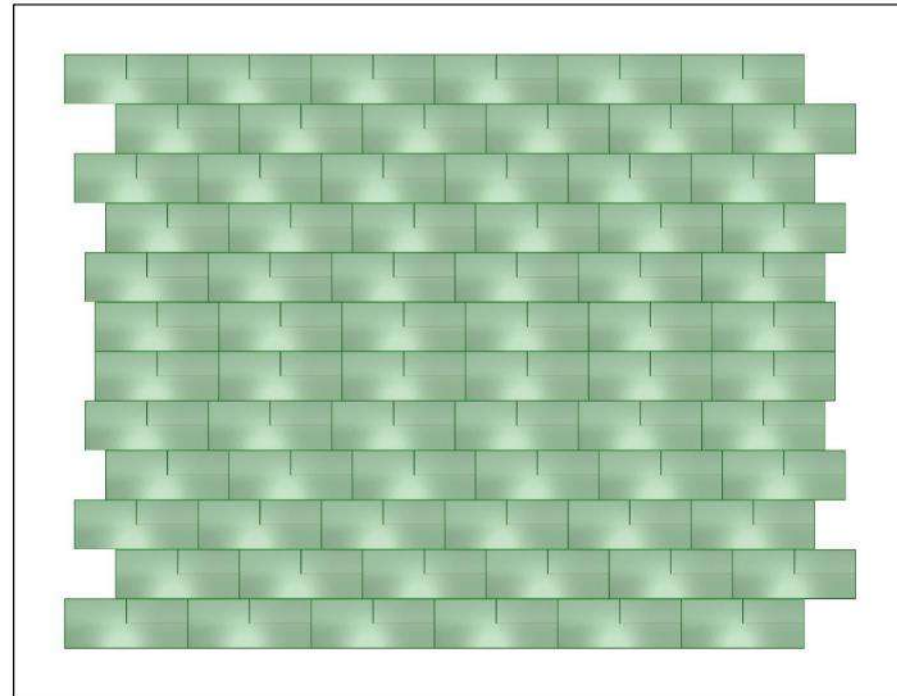
- > Standard Arrangement

- > No Lensjumps – „easy“ to produce



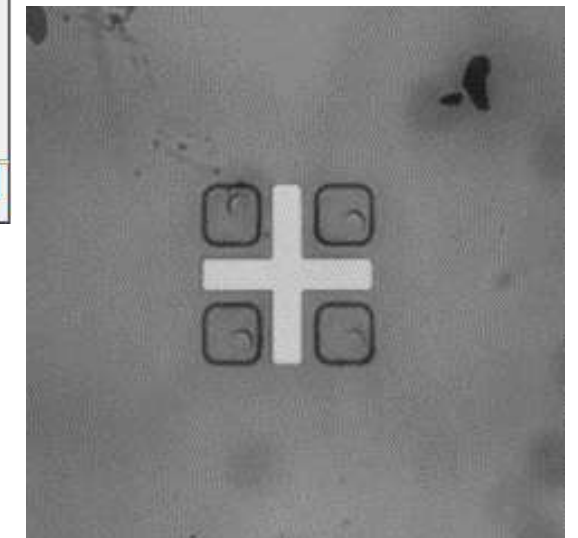
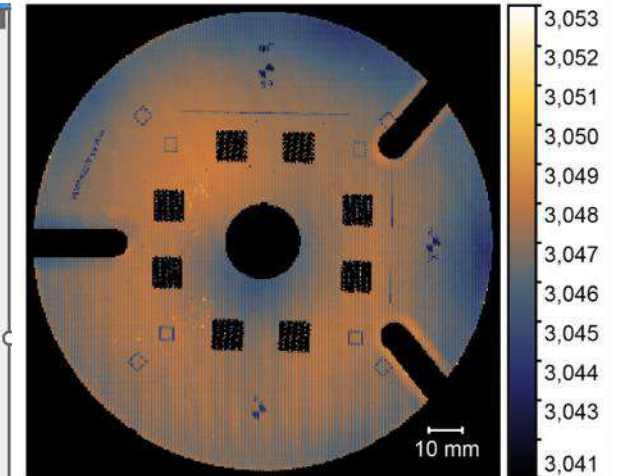
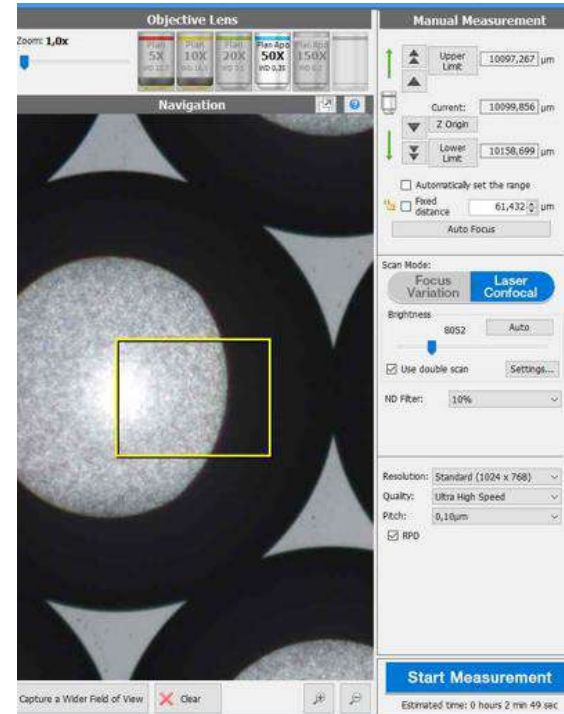
- > Optimized Arrangement

- > For better light distribution



Challenges

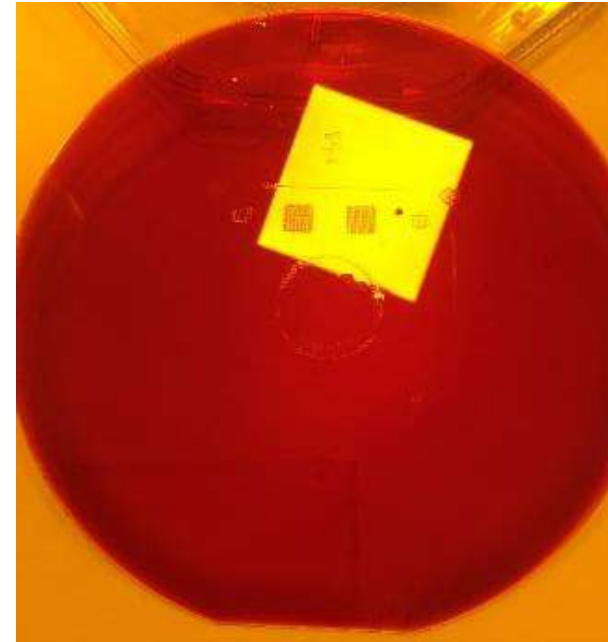
- > Substrate
 - > Flatness
 - > Roughness
- > Lenses
 - > Positioning accuracy +/- 1 μm
 - > ROC and Conic values within Limits
 - > Up to 100 μm height
 - > Surface roughness ($R_a < 0,020 \mu\text{m}$)
 - > ~100% fill factor for high light output
 - > Sidewall angles (ideal 90 degrees)
- > Alignment markers
 - > Positioning accuracy +/- 1 μm
 - > High contrast for automatic alignment system
 - > 3-5 μm structure height



Where we are

First OPTIMAL produced sample 2 x MLA

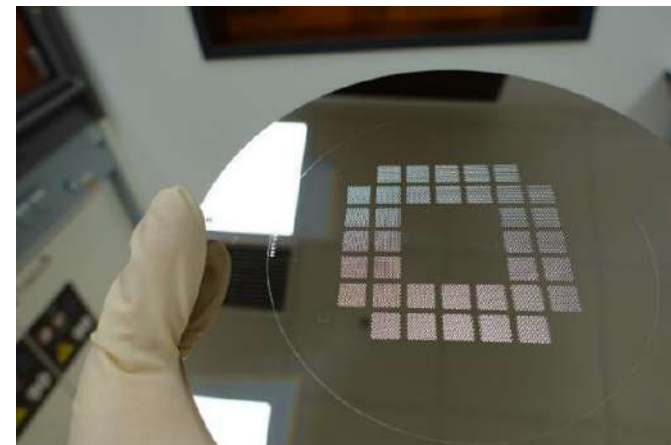
- > With almost all structures
- > Not optimized (flatness, depth, lens shape, Ra, ...)



Where to go

Full populated (up to 60 x MLA) Master Wafer

made by 



36 x MLA
diamond turned
NiP Master

Sony DADC

Micro Optics

Thank you!