Optical Polymer Wafers for the future AR Glasses

-Connecting Materials, Process, and Partners-

Mari MOTOMURA

Diffrar™ Project
Semiconductor & Optical Materials Division
ICT Solution Business Sector
Mitsui Chemicals, Inc.

14th October, 2026

Overview of Mitsui Chemicals, Inc.

Mitsui Chemicals

Life & Healthcare Solutions Business Sector

- Vision Care Materials Division
- Personal Care Materials Division
- Oral Care Business Division
- Mitsui Chemicals Crop & Life Solutions
- Medical Business Development Division

Mobility Solutions Business Sector

- Elastomers Division
- Performance Compound Division
- PP Composites Division
- Mitsui Elastomers Singapore
- Composites Materials Business Development Division
- Mobility Solutions Development Division

ICT Solutions Business Sector

- Semiconductor & Optical Materials Division
- Coating & Engineering Materials Division
- Mitsui Chemicals ICT Materia
- Mitsui Chemicals Asahi Life Materials
- ICT Materials Business Division

Basic & Green Materials Business Sector

- Phenols Division
- Industrial Chemicals Division
- Sustainable Feedstocks Division
- Licensing Division
- Polyurethanes Division
- Prime Polymer

Established: 1997
Origin 1912, Mitsui Mining

Head Office: Tokyo, Japan

Employees: 16,967
(consolidated, as of 03/2026)

Subsidiaries & Affiliates: 154
(including equity-method affiliates)

Revenue: ¥1,669
(≒US$11B)
(consolidated / 2025FY)

A leading Japanese chemical company with a diverse portfolio

What can Mitsui Chemicals contribute to AR glasses industry?

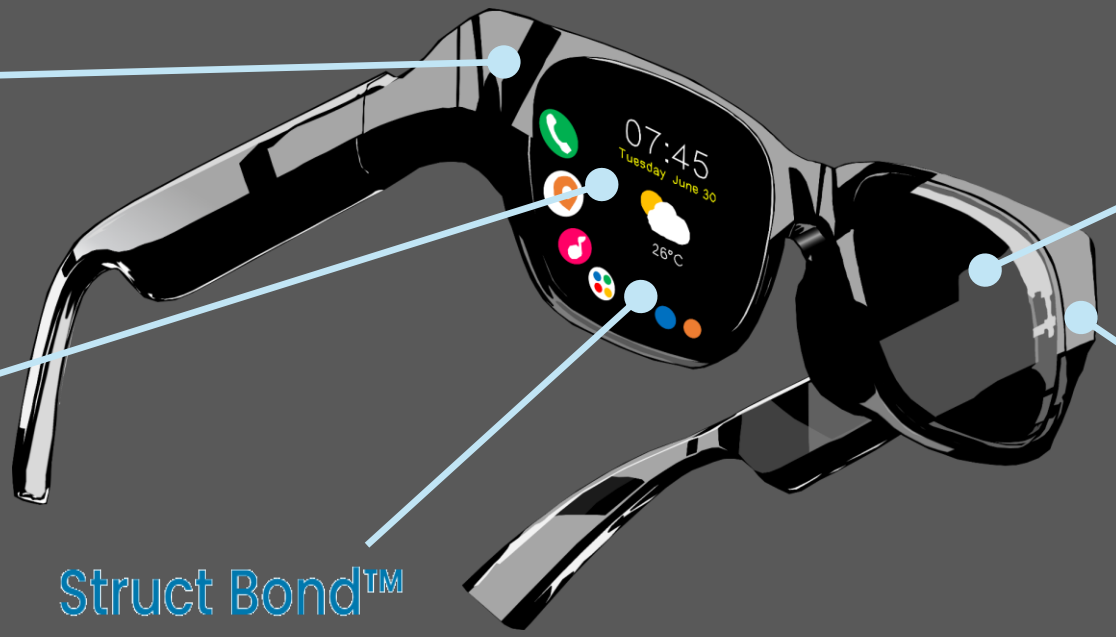
Materials for AR glasses

- -Materials for eyeglass lenses
- -Functional adhesive
- -Polymers for optical wafer, frame, camera lenses
- -Protective tape for processing

Website for materials

MR™ : MR™ High Refractive Index Lens Material | Mitsui Chemicals, Inc.
TPX™ : https://jp.mitsuichemicals.com/en/special/tpx/
APEL™:APEL™, cyclic olefin Copolymer | MITSUI CHEMICALS, INC.
Struct Bond™:Struct Bond™ | MITSUI CHEMICALS, INC.
Diffrar™:Diffrar™ | MITSUI CHEMICALS, INC.

APEL™
Camera lens material



MR™
Material for push/pull lenses

Diffrar
Polymer optical waveguide substrate

Struct Bond™
Functional adhesive

TPX™
Lightest polymer material among thermoplastic

AR Glasses Challenges & Potential of Polymer Wafer

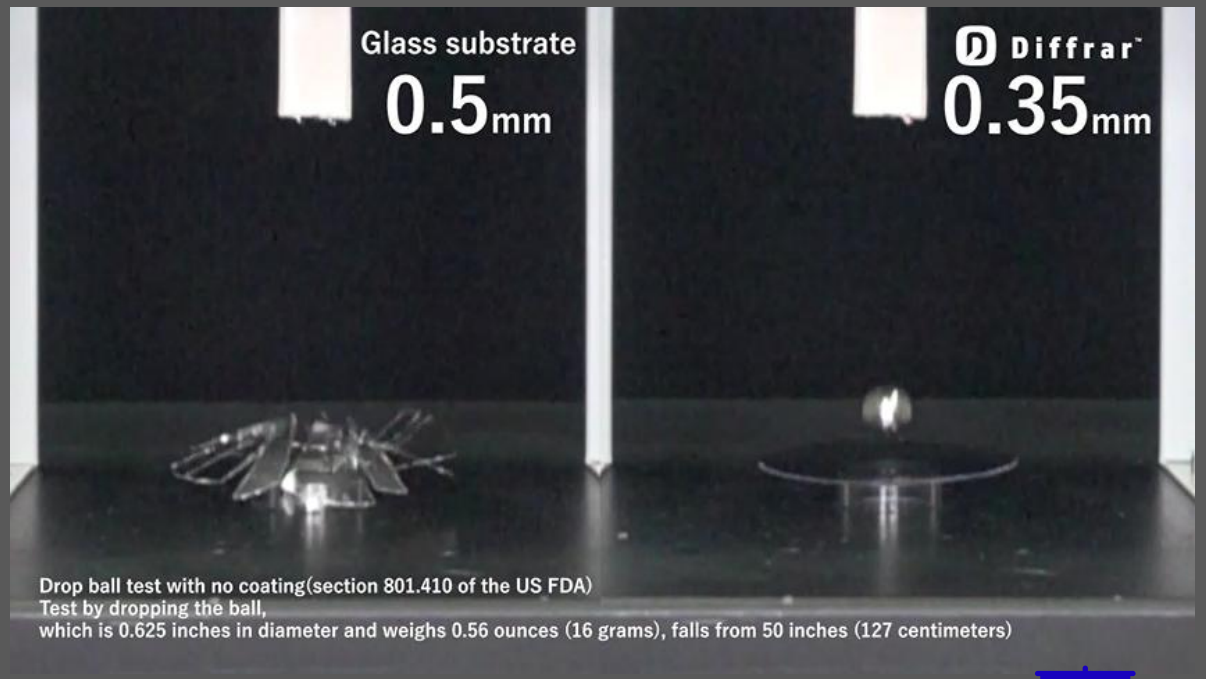
Industry Challenges

- -Comfort for everyday use
- -Durable & safe for consumer use
- -Manufacturing processability

Concept illustration generated with Microsoft Copilot.

Potential of Polymer Wafers

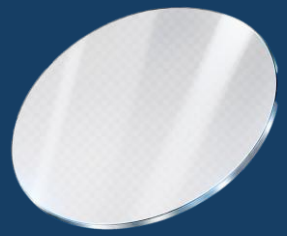
- -Light weight
- -Impact Resistance
- -Compatibility with ophthalmic lens



Video Link(YouTube) : Click here ➡

Building polymer wafer ecosystem for AR glasses

Wafer Manufacturing



-Material Development
-Wafer Specification
-Wafer Quality

Wave Guide Manufacturing

-Cutting
-Coating(HC, ARC)
-NIL Printing
-Bonding
-Alignment

AR Glass Manufacturing

-Alignment
-Bonding
-System Integration

Concept illustration generated with Microsoft Copilot.

2024	2025	2026	2027
-NIL Spin Coating Process Validation INKRON EVG -Demonstrate a SRG WG with FOV 20° dispelix (Both presented at SPIE2025)	-Inkjet Process Validation (Presented at SPIE2026) INKRON	Evaluating with ecosystem partners -AR coating for polymer wafer -Another NIL coating for 8-inch wafer -Developing demonstrator with wider FOV, brighter	*Future Collaboration Plans (Open for Discussion)*

AR glass demonstration by Diffrar (demonstrated at SPIE 2025)

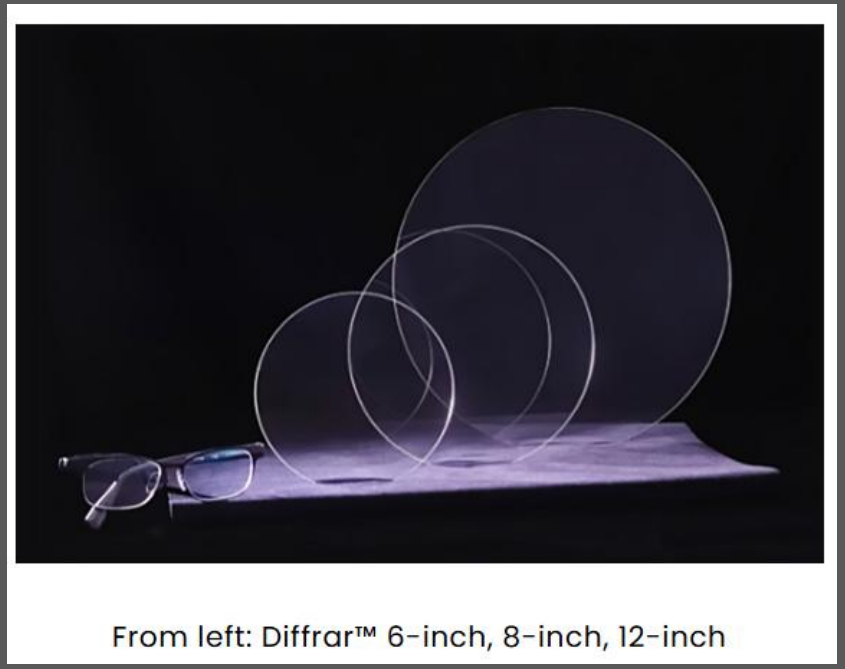
Demonstrator design concept

PARAMETERS	TYPICAL VALUE	NOTE
Center wavelength	460, 525, 625 nm	
Input pupil diameter	4 (mm)	
Field of view	20 degree	diagonal, full color
Eye relief	16 mm	
Eyebox	12 x 12 mm	
Brightness efficiency	1100 nits/lm	white
MTF	50 %	@ 15 lp/deg, white
Transmittance	85 %	Through OC grating
Dimensions	63 x 42 mm	
Thickness	0.7 mm	
Weight	1.85 g	

Mitsui Chemicals × dispelix

Diffrar™ Today and Future

Properties	X167	X174T4
Refractive index, n_e	1.67	1.74
Abbe number, ν_e	31	33
Specific gravity, ρ	1.37	1.47
Internal transmittance, $T_{10mmt,470nm}$ (%)	99.2	98.7
Size (inch)	6, 8, 12	
Thickness (mm)	0.5 – 1.0	
Total thickness variation (μm)	< 1	
Warpage (μm)	20 – 40	
Roughness, S_q (nm)	0.5 – 1	
Birefringence (nm)	< 5	



From left: Diffrar™ 6-inch, 8-inch, 12-inch

All properties are representative measurement figures obtained under specified test methods at Mitsui Chemicals, and are not guaranteed specifications.

- ✓ Higher Refractive Index for Lighter WG & Design Flexibility for binoc-full color AR glasses
- ✓ Uniform Quality in Larger Wafer for Consistent Waveguide & AR Glasses Quality
- ✓ Wafers with coatings/patterns (with ecosystem partners)

We look forward to working with ecosystem partners to shape the future of AR glasses and unlock new possibilities with polymer wafers.

Mitsui Chemicals

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Thank you for listening:

Let's stay connected!

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Feel free to reach out for any questions or collaborations!