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100TH

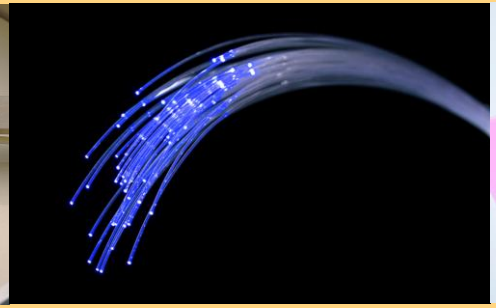
TORAY IR Day

Medium-Term Management Program Project “IGNITION 2028”

Electronic & Information Materials Business

June 9, 2026

Masahiro Hirano
Corporate Vice President,
General Manager, Electronic & Information Materials Division
Toray Industries, Inc.



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I

Business Overview & Toray's Strengths

Overview of the Electronic & Information Materials Business

Overview

Main fields

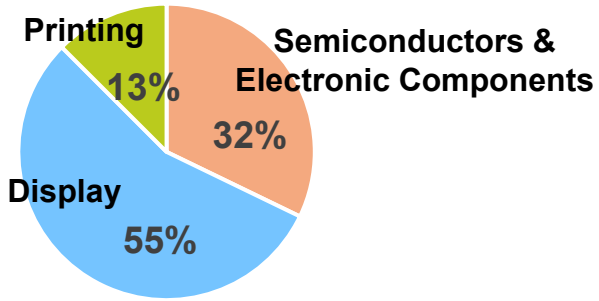
- Semiconductors & Electronic Components
- Display
- Printing

Production sites

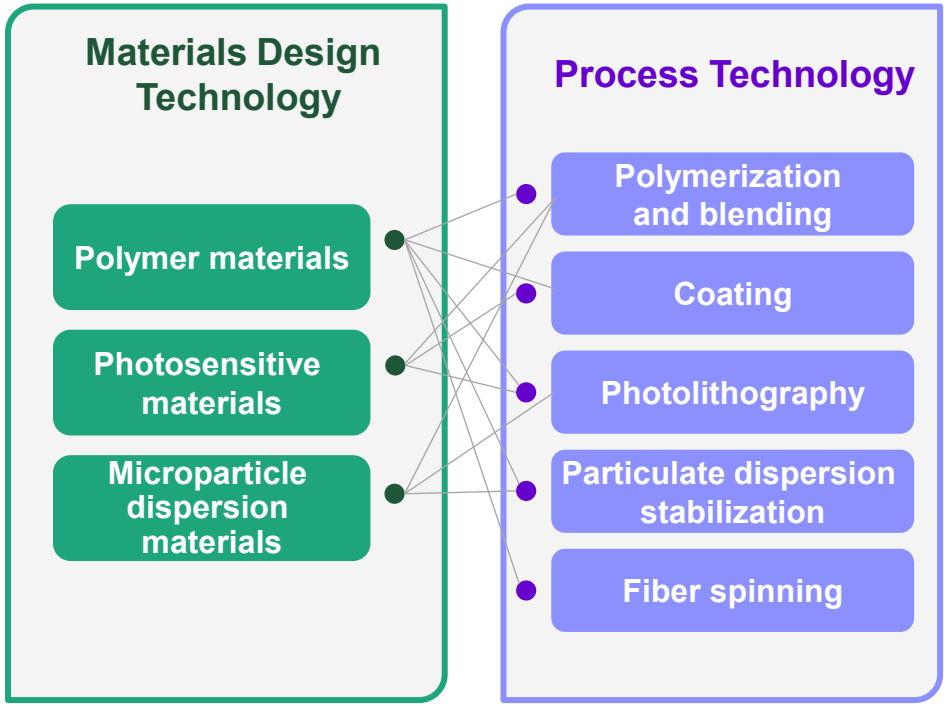
- In Japan: Shiga Plant, Okazaki Plant, Aichi Plant, Tokai Plant
- Outside Japan: Czech Republic, Republic of Korea

Revenue Breakdown

FY 2025



Technology platform



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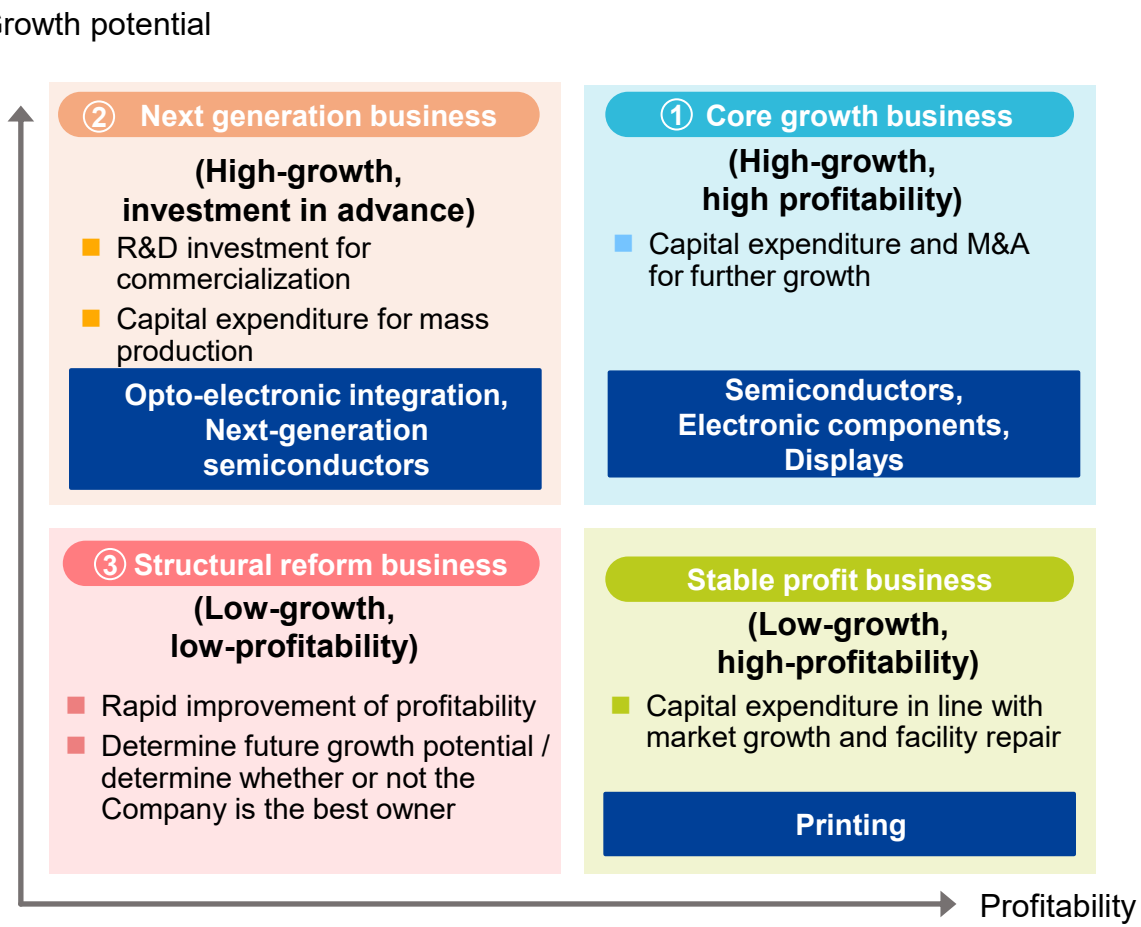
Strategic Positioning of Electronic & Information Materials Business in Toray Group

Leveraging strong partnerships with key customers, we aim to maintain and expand high market share in semiconductor, electronic component and display applications through environmental solutions and timely launches of next-generation products. We will also accelerate new business creation in growth areas such as next-generation semiconductors and optical communication materials.

TORAY VISION 2050

The world Toray envisions in 2050

1. A world where people live in harmony with the planet, resources are recycled, and nature regenerates
   - Environment | Decarbonizing, recycling, air
2. A world where prosperity is created and shared in safe and secure societies
   - Society | Semiconductor, space and defense, mobility
3. A world where everyone lives in health and comfort
   - People | Water, healthcare, comfort



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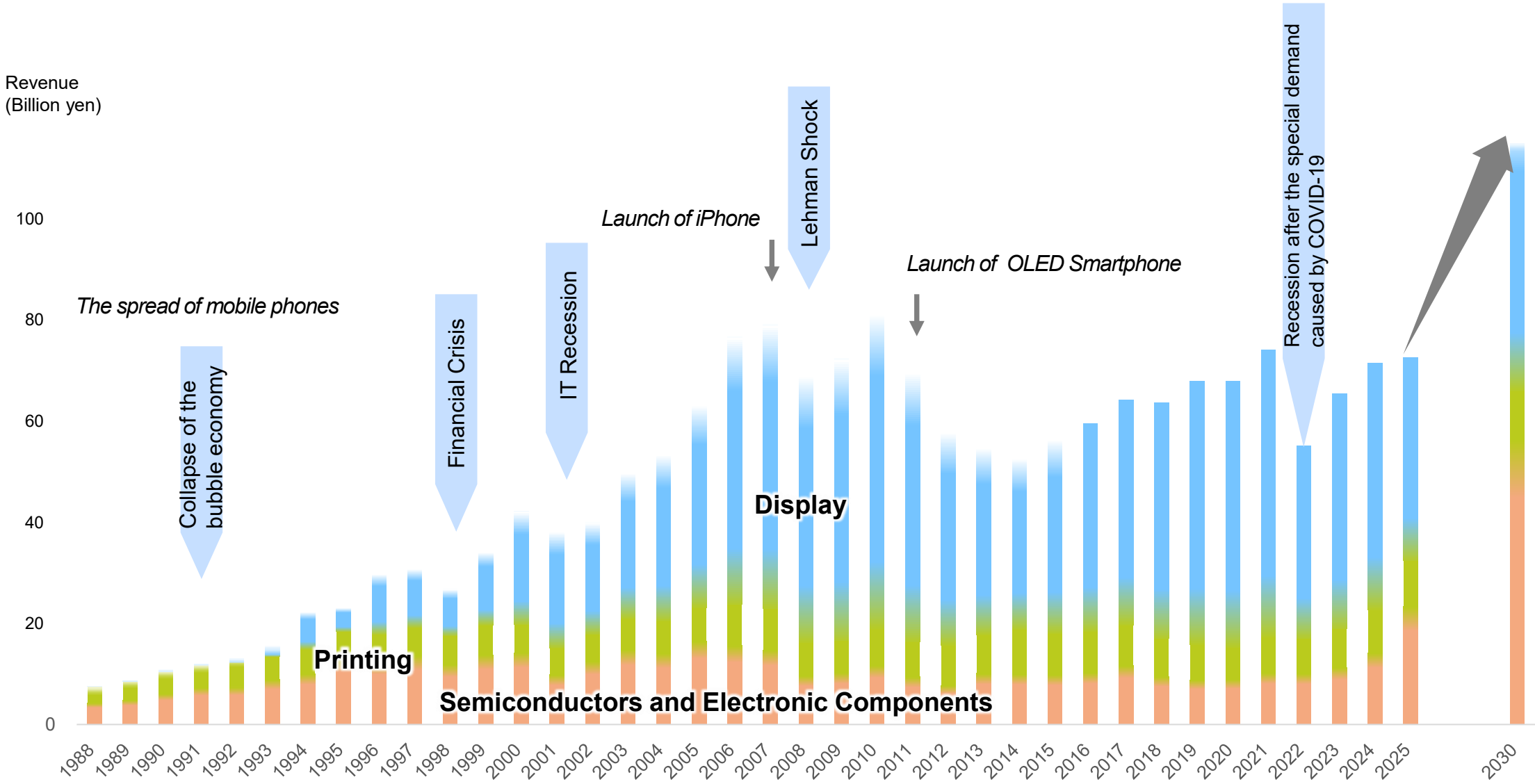
Trends in the Electronic & Information Materials Business



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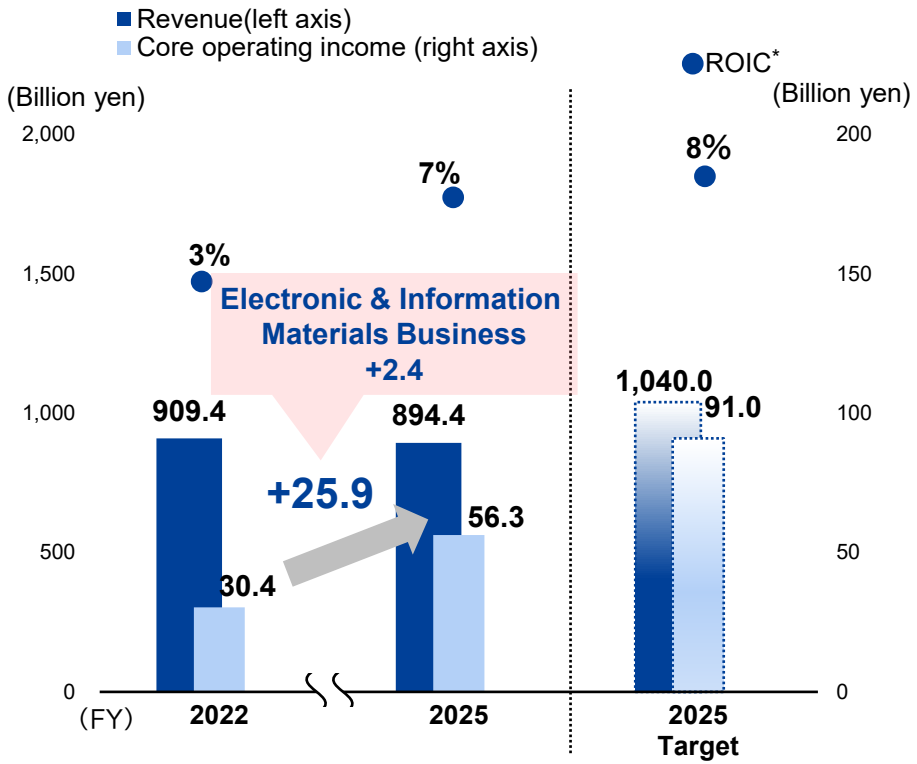
II

Reviewing the Medium-Term Management Program, “Project AP-G 2025”

Reviewing the Medium-Term Management Program, “Project AP-G 2025”

Although the electronic information materials business fell short of its target, profit increased compared with FY 2022

Performance trends (Performance Chemicals Segment)



*ROIC = Core operating income after tax / average invested capital (average of the balances at beginning and end of the period)

Electronic & Information Materials Business

FY 2025 Target: Not achieved

■ **Display**

Declining demand for TVs and PCs, unmet sales targets due to delayed micro-LED market launch, and declining market share of OLED-related materials

■ **Semiconductors and electronic components**

Sales expansion targets were not achieved due to stagnant demand for end products such as xEVs.

Profit increase compared to FY 2022

■ **Semiconductors and electronic components**

Expanding market share in power semiconductors and SAW filter applications

Mass production of new products for power inductors began

■ **Printing**

Expansion in the can printing market segment

Fundamental cost structure reform through consolidation into European manufacturing sites

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III

Business Environment and Demand Trends

Business Environment Surrounding the Electronic & Information Materials Business

Semiconductors and electronic components	**Explosive growth in data center semiconductors and electronic components driven by generative AI demand** ■ Expansion of data center investments driven by generative AI ⇒ Simultaneous expansion in demand for high-performance logic, memory, and electronic components (including inductors) ■ Accelerating development in opt-electronic integration driven by the shift from electrical to optical technologies for higher speed and lower power consumption ■ Growth in power semiconductors driven by xEV and expansion of infrastructure for renewable energy
Display	**Further advancement in display functionality** ■ Growth in OLED display share and advancement in functionality ■ Increasing demand for new materials development for new devices such as foldable smartphones and wearable devices
Printing	**Declining paper media and expanding printing market for packaging (labels and flexible packaging)** ■ Growing demand for beverage cans, flexible packaging, and tube printing ■ A shift toward recyclable and mono-material packaging and solvent-free printing processes (volatile organic carbon (VOC) -free, CO_2 emission reduction) due to tightening environmental regulations

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IV

Medium-Term Management Program “IGNITION 2028”

Key Challenges

Achieving sustainable mid- to long-term growth and stability through core business expansion and next-generation business creation

Business environment

Semiconductors and electronic components

- Rapid expansion of data center applications driven by rising demand for generative AI
- Emergence of new technologies (such as opto-electronic integration)

Display

- Advancement of mobile device functionality and evolution of flat panel displays
- Material development needs for new devices

Printing

- Expansion of flexible packaging and tube printing markets
- Higher-definition printing of beverage cans
- Increasing environmental demands

Core business expansion

Expansion of sales of strategic products in growth markets and regions

Polyimide materials, Siloxane materials, Paste materials
Organic EL light-emitting materials, Color resist materials
Ceramic materials, Plastic optical fiber, COF
Inductor coil, Resin relief printing plate
Flexo plate, Offset printing plate

Next-generation business creation

Creation of new businesses in the AI data center field

- Opto-electronic integration
- Advanced packaging

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Basic Policy of "IGNITION 2028"

Strengthening competitive advantage and driving sustainable share growth through proactive development and launch of new products anticipating market changes.
Accelerating creation of new business through focused investment in semiconductors and electronic components, anticipating growing demand for data centers and related markets.

What to achieve in the next three years

(1)	Addressing rapidly growing demand for semiconductors and electronic components	■ Expansion of high-resolution, environmentally friendly differentiated products ■ Expanding market share through new product launches
(2)	Addressing changing material needs driven by display structure evolution and new devices	■ Product development tailored to the needs of each company ■ Focusing on expanding sales of new products, including positive black material for polarizer-less panels
(3)	Addressing the beverage can, tube, and packaging printing markets	■ Responding to the demand for higher-definition printing for beverage cans and tubes ■ Expansion of printing plates for environmentally friendly flexible packaging materials
(4)	Launching large-scale new businesses targeting AI data centers and the opto-electronic integration market	■ Accelerating the development of optical communication materials for AI servers ■ Focusing on the development and commercialization of next-generation semiconductor materials
(5)	Strengthening global collaboration	■ Strengthening global collaboration among Japan, the United States, the Republic of Korea, China, Taiwan, Singapore, Germany, and the Czech Republic

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IV-1

“IGNITION 2028” -Semiconductors and Electronic Components-

Semiconductor and Electronic Components Sector Business Strategy

Business environment

Power semiconductor

- On an expansion trend driven by the growth of xEV and data centers
- Full-fledged adoption of SiC/GaN

AI semiconductors

- AI semiconductor demand is expected to grow over the medium- to long- term with the adoption of generative AI
- Rising performance requirements for materials, including finer wiring, driven by higher performance needs

Electronic components

- Share of wafer-level packages for SAW filters is increasing, in line with space-saving requirements in mobile devices such as smartphones
- Expansion of thin-film power inductors supported by miniaturization and high-frequency requirements of electronic components

Toray's strengths

- **Environmentally friendly product lineup**
  NMP-free, fluorine-free
- **Expanding applications of ultra-thick film and precision plating technologies**
- **Strong partnerships with industry leaders**

Business strategy

- **Driving further share growth through differentiation with environmentally friendly products**
- **Expanding business through promoting the applications of ultra-thick film plating technologies for thin-film inductor coils**
- **Accelerating early-stage development of materials for generative AI memory and logic semiconductors**

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Deployment of STEMCO COF Technologies

STEMCO

Established in the Republic of Korea in 1995
as a joint venture between Toray and Samsung Group

Core technologies

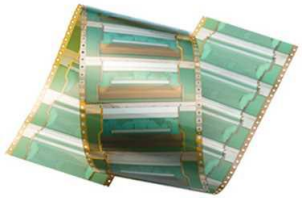
1-Metal COF (Chip on Film)

- **Precision etching**

Copper etching pattern processing

2-Metal COF (Chip on Film)

- **Precision plating**

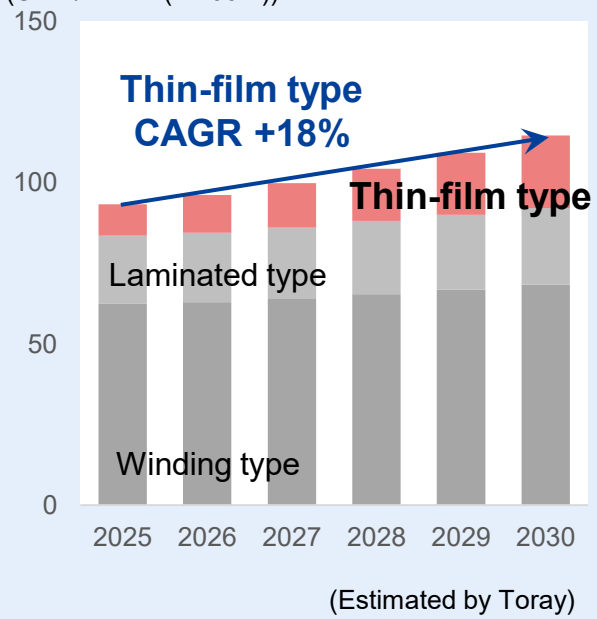


Copper pattern plating

Driving new applications of core technologies

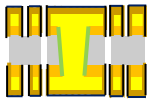
Expanding into the thin-film inductor coil market leveraging plating and fine patterning technologies developed through COF mass production

Power inductor market



(Estimated by Toray)

STEMCO Thin-film-type inductor coil



- Substrate via formation
- Pattern copper plating
- Etching
- CVD

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“IGNITION 2028”
-Display-

Display Sector Business Strategy

Business environment

OLED

- Smartphone demand is expected to grow at a modest 2% CAGR, constrained by longer replacement cycles, while OLED-adopted devices are projected to expand at a 4% CAGR
- Heightened requirements for new materials driven by the expansion of foldable smartphones and applications in tablets, PCs, and automotive uses

LCD

- Advancing requirements in high-end monitor applications, including wider color gamut, blue light reduction and transition to cadmium-free (Cd-free) materials in response to environmental regulations

Micro LED

- Full-fledged expansion is expected around 2030, primarily in small-sized displays, driven by advantages such as high brightness, high contrast and long lifetime

Toray's strengths

- **Design and development of polyimide and siloxane materials, mass production technology**
- **Design and development of Cd and lead-free wavelength conversion materials, mass production technology**
- **Supply chain management**

Business strategy

- **New product development based on early identification of future needs, steady mass production, and differentiation through excellent quality**
- **Proactive sales of high-performance products aligned with needs**

Polarizer-less ..... Black materials

Cd-Free ..... Organic wavelength conversion materials

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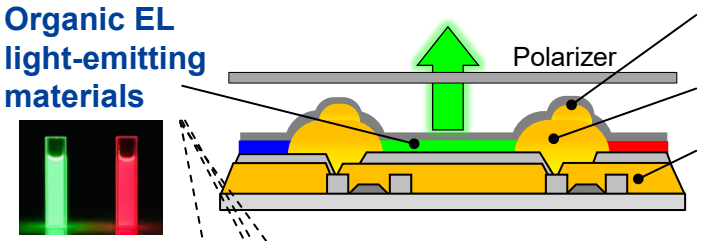
Development of New Products for OLED Displays

OLED display structure



Organic EL light-emitting materials

Spacer Layer (PS)

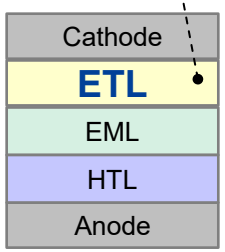
Pixel Separation Layer (PDL)

Planarized Layer (PNL)

Industry-standard materials

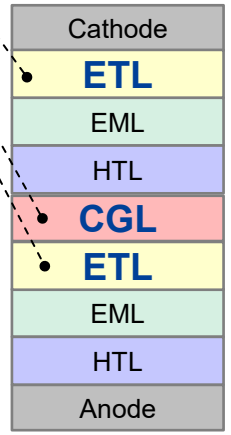
Element structure

Single structure



- ✓ Smartphone
- ✓ Smartwatch

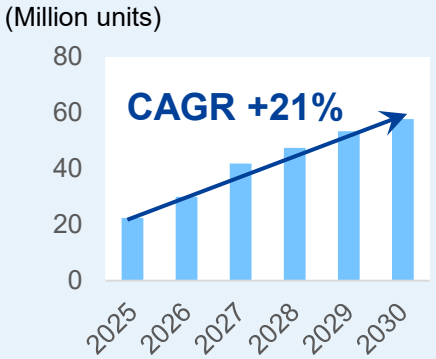
Tandem structure



- ✓ Television
- ✓ Tablet
- ✓ Laptop
- ✓ In-vehicle display
- ✓ AR/VR Glasses

Black materials for OLED displays

Foldable smartphone panel market



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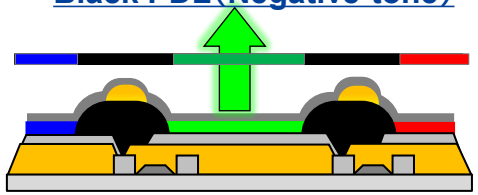
- Adopts polarizer-less panels
- Black material needs for suppressing external light reflection

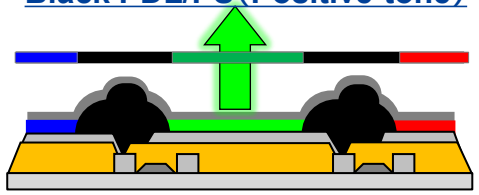
Black material for polarizer-less panels

- Material proposals tailored to panel structures and processes

Black PDL（Negative-tone）



Black PDL/PS（Positive-tone）



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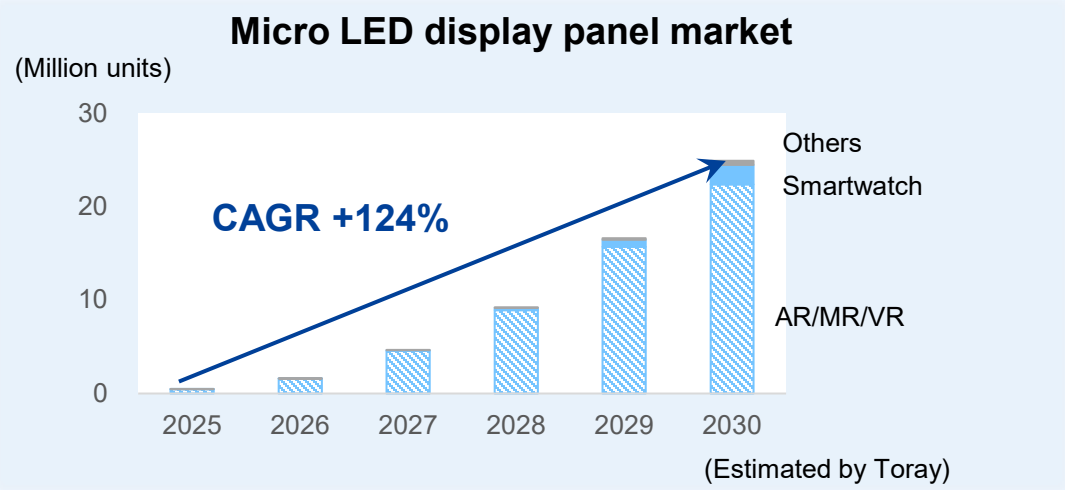
Development of New Products for Micro LED Displays

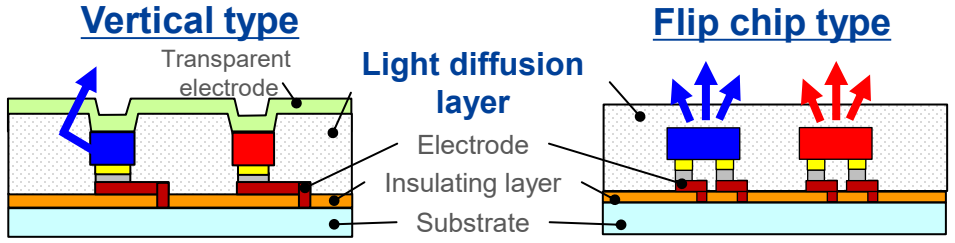


Leveraging Toray's proprietary technologies such as

- **Refractive index control**
- **Light diffusion technologies,**

we have developed light diffusion and partition materials to achieve higher brightness and contrast in micro-LED displays.

Light diffusion material

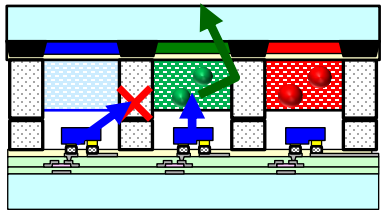


- High reflectivity, high diffusion
- High-resolution, fine contact hole processing

- High reflectivity, high diffusion
- Excellent planarization performance
- Excellent underfill performance

Partition materials

Color conversion type



- Control of light-blocking and light reflectivity tailored to customer needs
- Siloxane material

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IV-3

“IGNITION 2028”
-Printing-

Printing Sector Business Strategy

Business environment

- Commercial printing and publishing markets are on a flat to declining trend
- Beverage can and tube printing is steadily expanding, with greater diversification and higher definition
- Packaging printing demand is expanding driven by changes in logistics due to e-commerce growth, population increase, and rising consumption in emerging markets

Beverage cans & tubes

- Aluminum cans expanding due to high recyclability
- Advancing high-definition printing in line with increasing demand for enhanced visual appeal

Flexible packaging

- Rising demand for mono-material packaging and solvent-free printing processes driven by stricter environmental regulations

Toray's strengths

- **Proprietary printing plate technologies**

  High-definition, high-durability resin relief plates and proprietary offset plates
- **Environmentally friendly printing technology**
- **Global network**

Business strategy

- **Expanding beverage can and tube business in Asia, Europe and China by promoting high-definition printing in combination with dedicated printing machines**
- **Expanding sales of flexible packaging business in Japan and Asia, where high-definition printing is required, by capturing demand for mono-materials and solvent-free processes**

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Initiatives for Environmentally Friendly Flexible Packaging Printing

Contributing to the environment through reduced environmental impact in printing processes and enhanced recyclability of flexible packaging materials

2017
Start of development of waterless offset printing system for flexible packaging

2019
Development of waterless offset printing press for flexible packaging

2020
Successful demonstration of 100% VOC-Free waterless EB offset printing technology

2021
Commercialization of dedicated waterless offset printing plates for flexible packaging

IMPRIMA

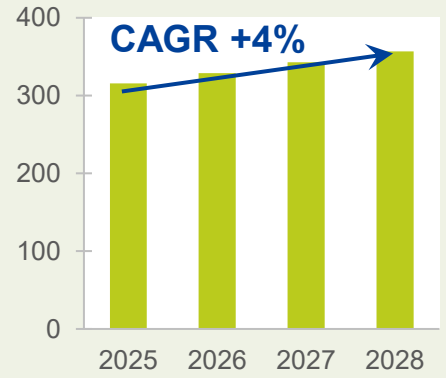
2022
Start of collaboration with Chemosvit (Slovakia) on waterless EB offset printing

2023
Joint development on Mono-material Film Packaging Technologies
(Mitsui Chemicals, Inc., Kumagai Co., Ltd.)

2023
Commercialization of food packaging using 100% VOC-free waterless EB offset printing (ITP Foods Sdn. Bhd. (Malaysia))

2024
Joint development of film packaging and flexographic printing technologies for EU food plastic regulations (Dow Inc., Comexi Group Industries, S.A.U., Sakata Inx Corporation, SGK Japan(Schawk Japan K.K.))

Flexible packaging printing market
(billion US$)



(Estimated by Toray)

EB waterless offset printing plates
EB* flexo plates
*EB: Electron beams

- **EB curing (no combustion treatment required)**
- **Solvent-free ink**
- **Low plate cost**

1. **Low CO_2 emissions**
2. **Handling a wide variety of small lots**
3. **Low VOC emissions**
4. **Low chemical leaching into food**

Efforts to shift to mono-material structures

EB printing plates
EB printing technology

✖

Mono-material film Vapor deposition technology

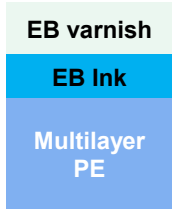
New material and process design for mono-material flexible packaging

Conventional Packaging

- ✓ **Heterogeneous lamination**
- ✓ **Recycling difficulties**

Mono-material packaging

Mono-material + Adhesive-free Recyclability



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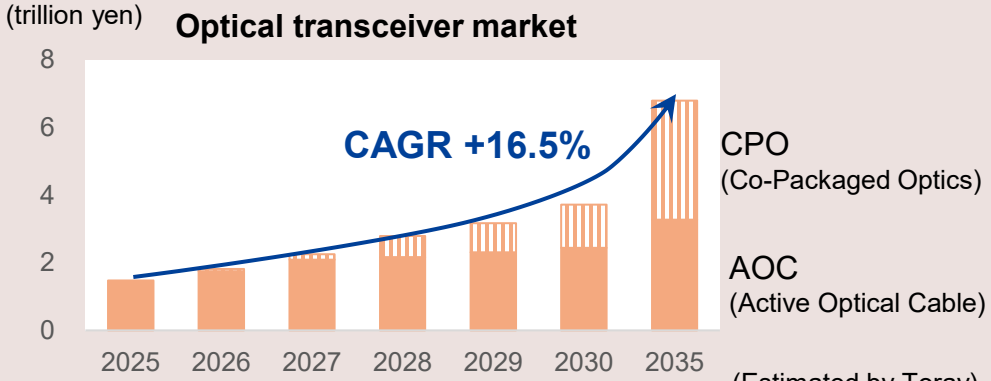
IV-4

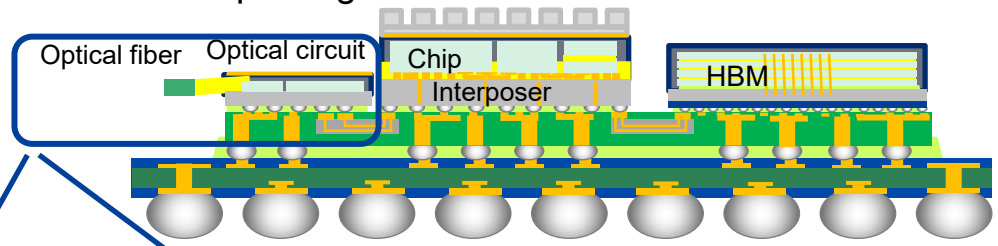
“IGNITION 2028”
-Growth Areas-

Development of Material Technologies for Opto-Electronic Integration

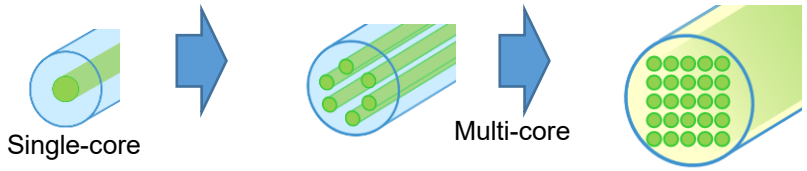
Promoting the development of materials and technologies for opto-electronic integration to enable lower power consumption in next-generation high-speed communications



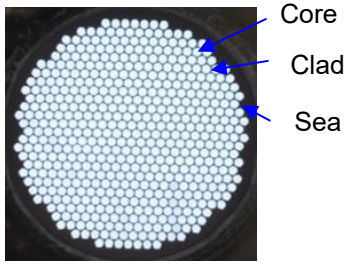
Chiplet-type
photoelectric co-package



Multi-core plastic optical fiber for communication



Increasing the capacity of communications through the use of multi-core



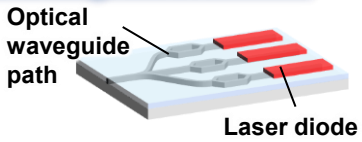
Elemental technology : NANODESIGN™

Ultra-precise composite spinneret section

Cross-section is formed by fine flow

Packaging technology for opto-electronic integration

Demonstrated mass transfer packaging technology for laser diodes



Laser light source element for optical communication transferred and bonded onto an Si wafer*
*Light source element: Provided by Tyndall National Institute, an Irish research institution

Electrical property evaluation

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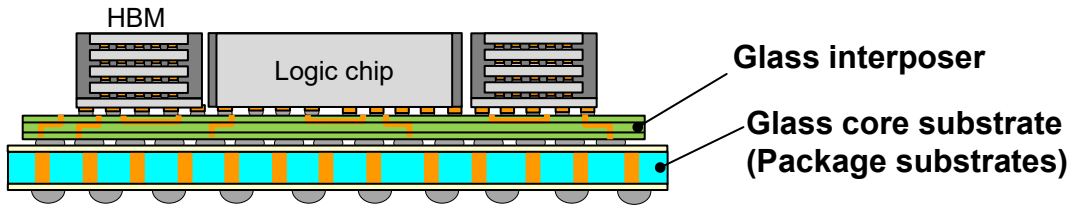
Advanced Material Technologies Development for Data Center Semiconductor Substrates and Packaging

Technology trends

Increase in chip and HBM count driving larger size and higher density

- Larger interposers ⇒ Panel-level processing
- Increased I/O count ⇒ Fine-Pitch Interconnects
- Increased substrate warpage ⇒ Glass-core substrate for warpage reduction



Materials for glass core substrates

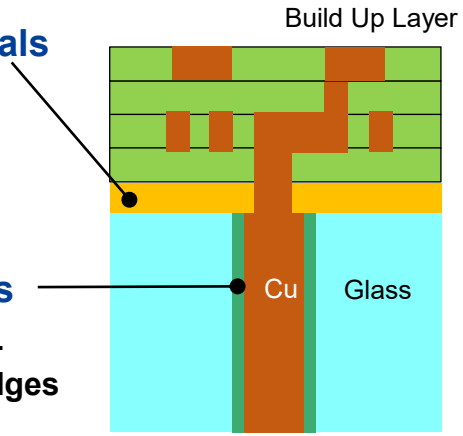
Material technologies for new substrates and architectures

①Stress-relief buffer materials

- Modulus control
- Relieves stress between the build-up layer and the glass

②Glass-reinforced materials

- Preventing cracks in through-glass vias and at substrate edges



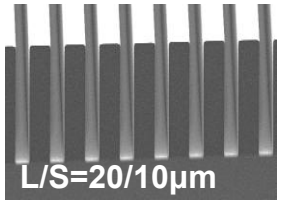
Materials for interposers and dielectric films for redistribution layers (RDL)

Material technologies for fine patterning and larger substrates

①Photodefinable polyimide sheet

- Dry film dielectric materials compatible with large-panel processing
- Low-shrinkage materials enabling reduced warpage

Processing example



②Next-generation photodefinable polyimide coatings for advanced packaging

(Under development)

③Non-photodefinable polyimide coating materials

- Enabling both high-resolution patterning and superior film properties

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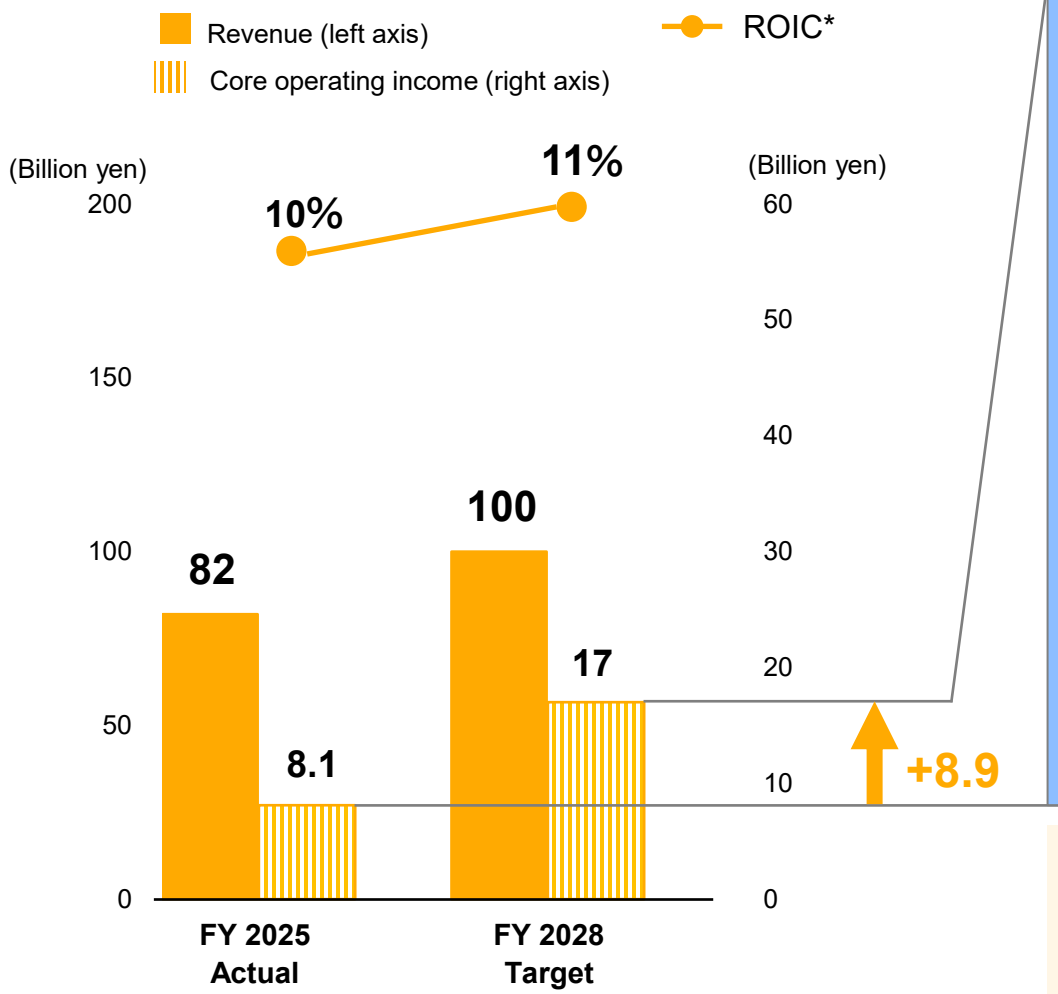
V

Target for FY 2028 and Contribution Breakdown by Business and Initiative

IGNITION 2028 Target



*ROIC = Core operating income after tax / average invested capital
(average of the balances at beginning and end of the period)

Growth Strategy

Semiconductors and electronic components

- **Expansion of environmentally friendly products**
  Driving sales of environmentally compliant polyimide coating materials, including NMP-free products, for power semiconductor applications
- **Expansion of STEMCO's new products**
  Enhancing the "winning formula" strategy through collaboration with Samsung Electro-Mechanics, our JV partner and global leader in thin-film power inductors

Display

- **Expansion of new products related to OLED display materials**
  Refreshing the "winning formula" strategy by introducing proprietary products, including positive-tone black materials with halftone capability and superior chemical resistance

Printing

- **Driving sales expansion in beverage can and tube markets and launching environmentally friendly flexible packaging printing**

Building new businesses to support accelerated growth beyond FY 2029

- **Commercialization of multi-core optical fiber**
  Launch optical fibers, enabled by proprietary NANODESIGN™ and resin flow control technologies, that contribute to cost reduction of high-capacity communications and telecom laser modules amid growing demand in data centers

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