

Business Strategy for the IT-related Chemicals Sector

October 4, 2019

Sumitomo Chemical

Masaki Matsui

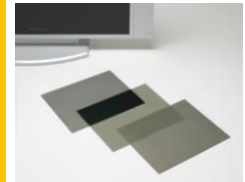
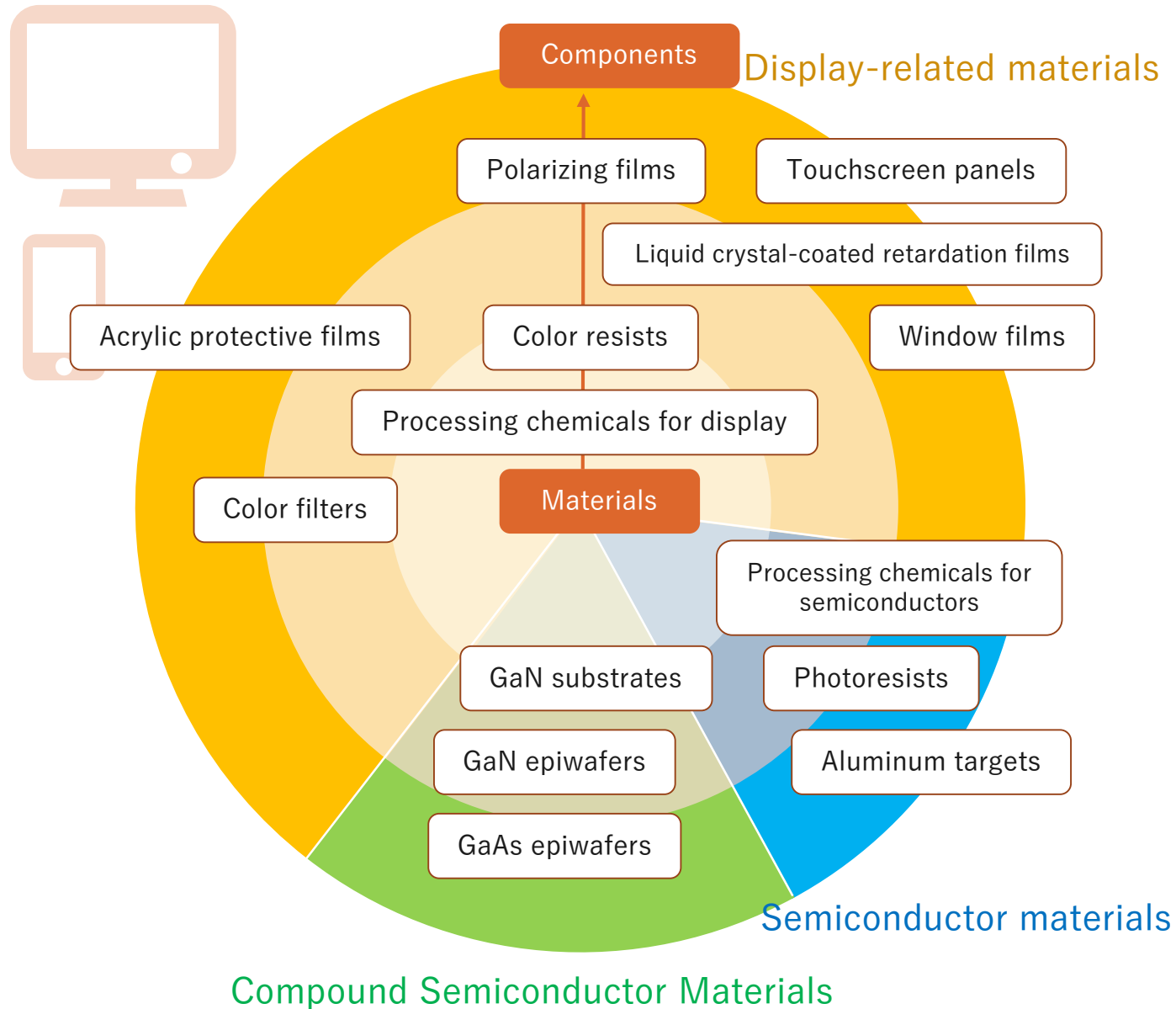
IT-related Chemicals Sector,
Representative Director & Managing Executive Officer

1. Overview of the IT-related Chemicals
2. Business Environment for the IT-related Chemicals
3. Enhance Profitability of Existing Business
4. Next-generation Business
5. Earnings Outlook

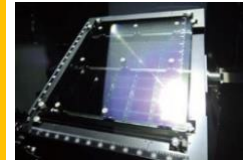
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Introduction of Major Products of the IT-related Chemicals



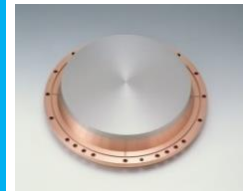
Polarizing films



Touchscreen panels



Photoresists



Aluminum targets



GaAs epiwafers

* Structure of Polarizing Films



Surface treatment layer

Protection film

Polarizer

Protection film
Retardation film

Adhesive

In-house materials

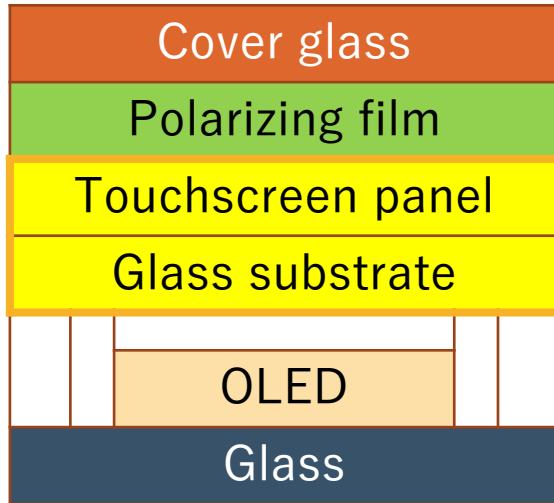
Acrylic protective film

Liquid crystal-coated retardation film

Increase utilization rate of in-house designed polymer

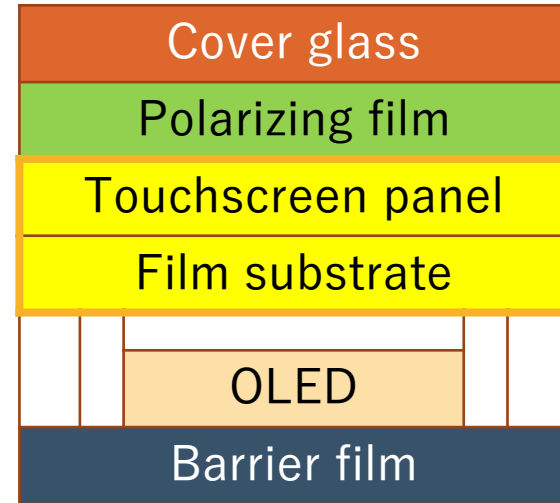
* Structure of Touchscreen Panels

Created sensors on glass substrates



Glass-type touchscreen panels

Film-type touchscreen panels



Sensor production is possible for all types of film substrates

Our proprietary manufacturing processes

* Process of Semiconductor Materials

1. Metal Vapor deposition

Aluminum Target



2. Photoresist coating

Photoresist



3. Exposure

Sumitomo
Chemicals' products



4. Development

Processing chemicals*



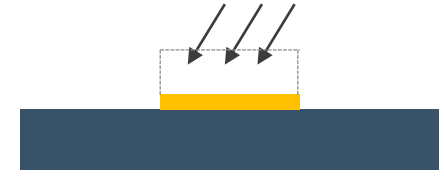
5. Etching

Processing chemicals*



6. Resist Stripping

Processing chemicals*



7. Cleaning

Processing chemicals*

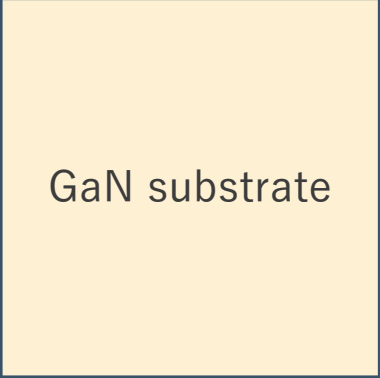

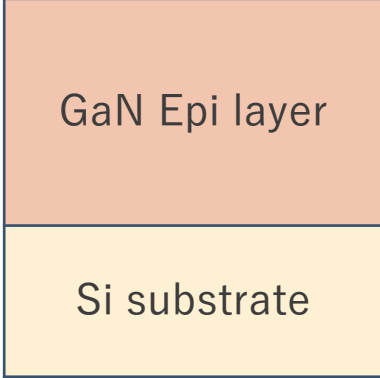
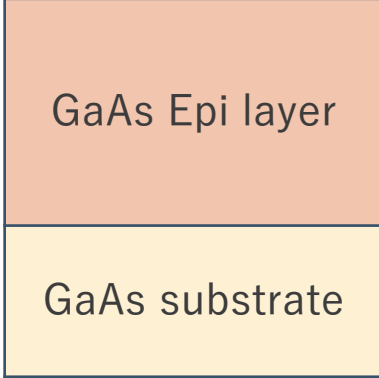


8. Drying



* Processing chemicals: used in various processes such as development, etching, stripping, cleaning, etc.

* Composition of Compound Semiconductor Materials

Type	GaN substrate	GaN on SiC	GaN on Si	GaAs epiwafers
Structure				
Major Applications	<ul style="list-style-type: none"> • Blue laser • High-brightness LED 	<ul style="list-style-type: none"> • High-frequency transistors for base stations 	<ul style="list-style-type: none"> • Power device 	<ul style="list-style-type: none"> • Portable switch • Face authentication laser • Devices for 5G communication base stations

History of the IT-related Chemicals

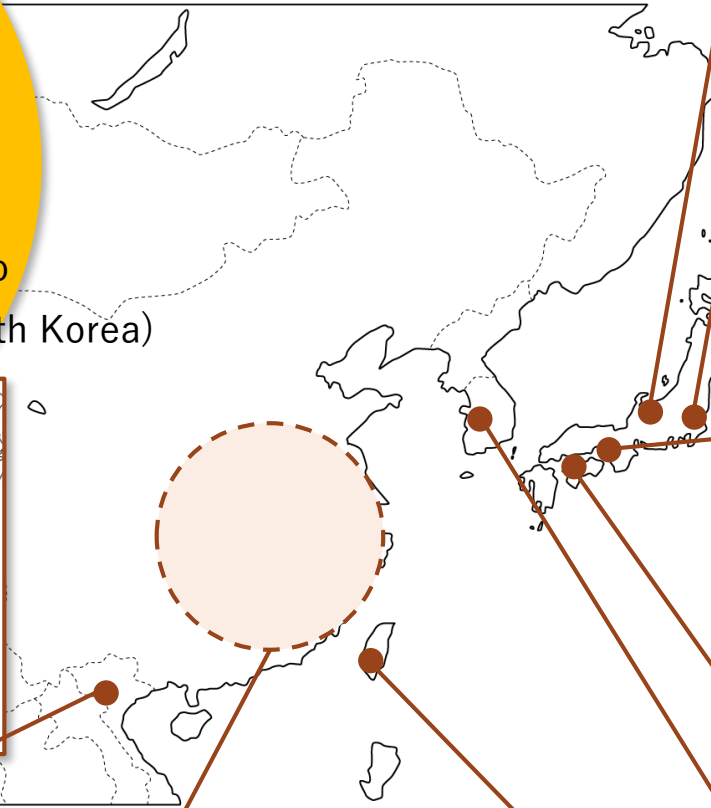
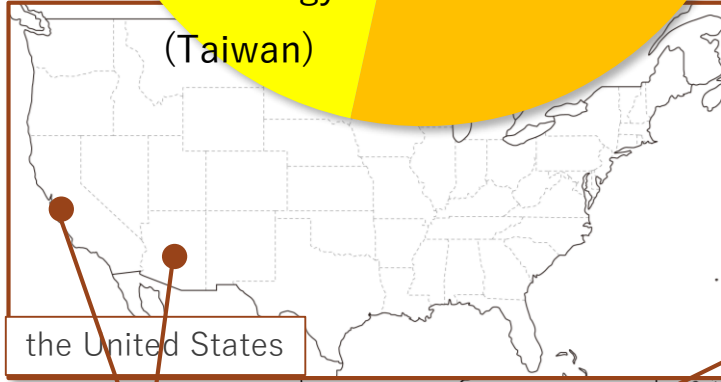
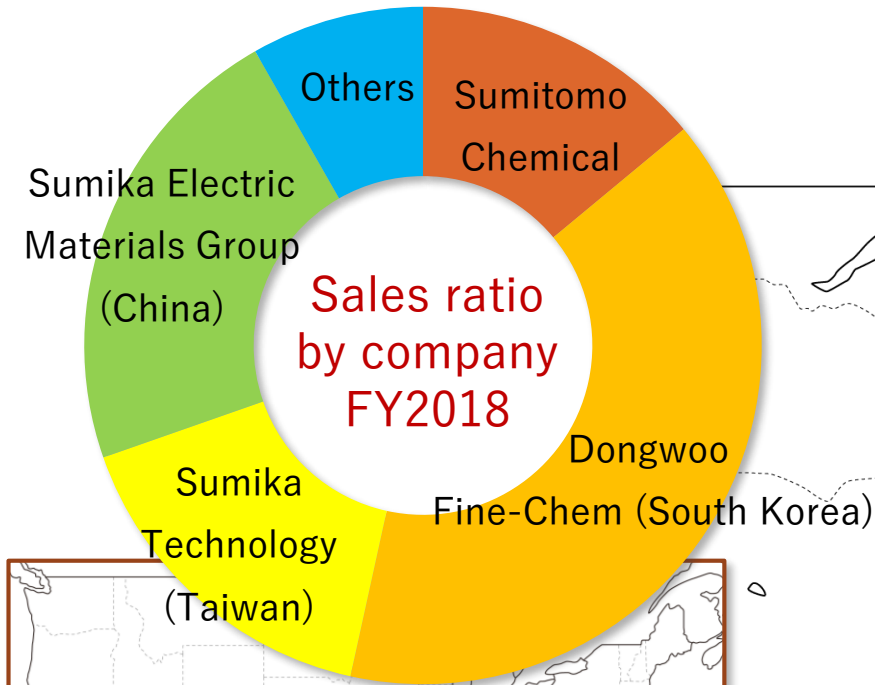
Year	-2000	2001-2003	2004-2006	2007-2009	2010-2012	2013-2015	2016-2018	2019-	Future trends
Market	Beginning of the LCD market				Advent of OLED in mobile devices 4G Communication				5G communication
Display Materials	Polarizing film business began operations		Front end plant for polarizing film established in South Korea and Taiwan			Front end plant for polarizing film established in China			<p>Growth and diversification in demand in automotive applications</p> <p>Growing demand for flexible devices</p>
Semiconductor Materials	Processing chemical business expanded into South Korea	Color filter business began operations			Touchscreen panel business (glass and film) began operations in South Korea		Full-scale launch of polarizing film business for automotive applications		China becomes the center of demand
				Full-scale development of processing chemical business in China	Expanded capacity of a manufacturing facility for photoresists in Osaka (1)		Expanded capacity of a manufacturing facility for photoresists in Osaka (2)		Improving the performance of semiconductors
		Production facility established in the U.S.			Acquired compound semiconductor business from Hitachi Metals				


Initiatives to Transform Business Structure

year	-2013	2014	2015	2016	2017	2018	2019-
Withdrawal from businesses	Gallium	Organometallic		Light guide plates	Sapphire substrates		
Conversion of plants				Sapphire substrates → (Heat-resistant separator*)	Color filter → Touchscreen panel		
Others	Color resist laboratory established in Taiwan			Color resist laboratory established in China		Front end plant for polarizing film in China Acquisition of equity interests of joint ventures	

*The product of the Energy & Functional Materials Sector


Introduction of locations






Sanritz

Polarizing films




SCIOCS


Compound semiconductors



Osaka Works

Photoresists, etc.



Ohe Works 

Polarizing films




SUMITOMO CHEMICAL
ADVANCED TECHNOLOGIES

Compound semiconductors, etc.




Sumika Electric Materials Vietnam

Polarizing films




Sumika Electric Materials China (12 companies)

Polarizing films
Processing chemicals, etc.



Sumika Technology

Polarization films, etc.



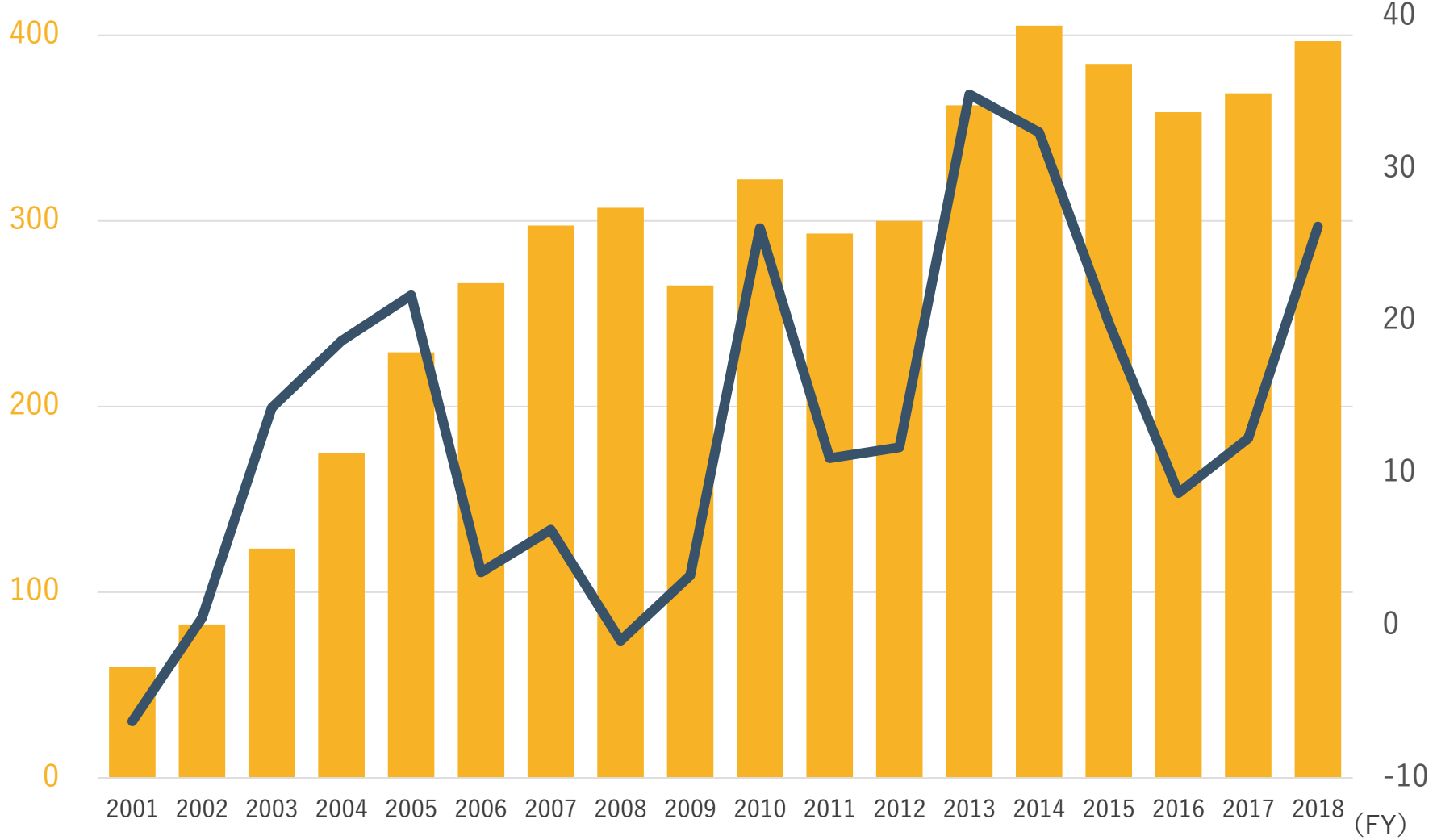
Dongwoo Fine-Chem

Polarizing films,
processing chemicals
Touchscreen panels, etc.

Performance Trends of the IT-related Chemicals

(Billions of yen)

(Billions of yen)



■ Net sales/Sales revenue (left axis)
 — Operating income/Core operating income (right axis)

Figures for years through FY2016 are based on JGAAP/Figures for years from FY2017 onward are based on IFRS.

1. Overview of the IT-related Chemicals

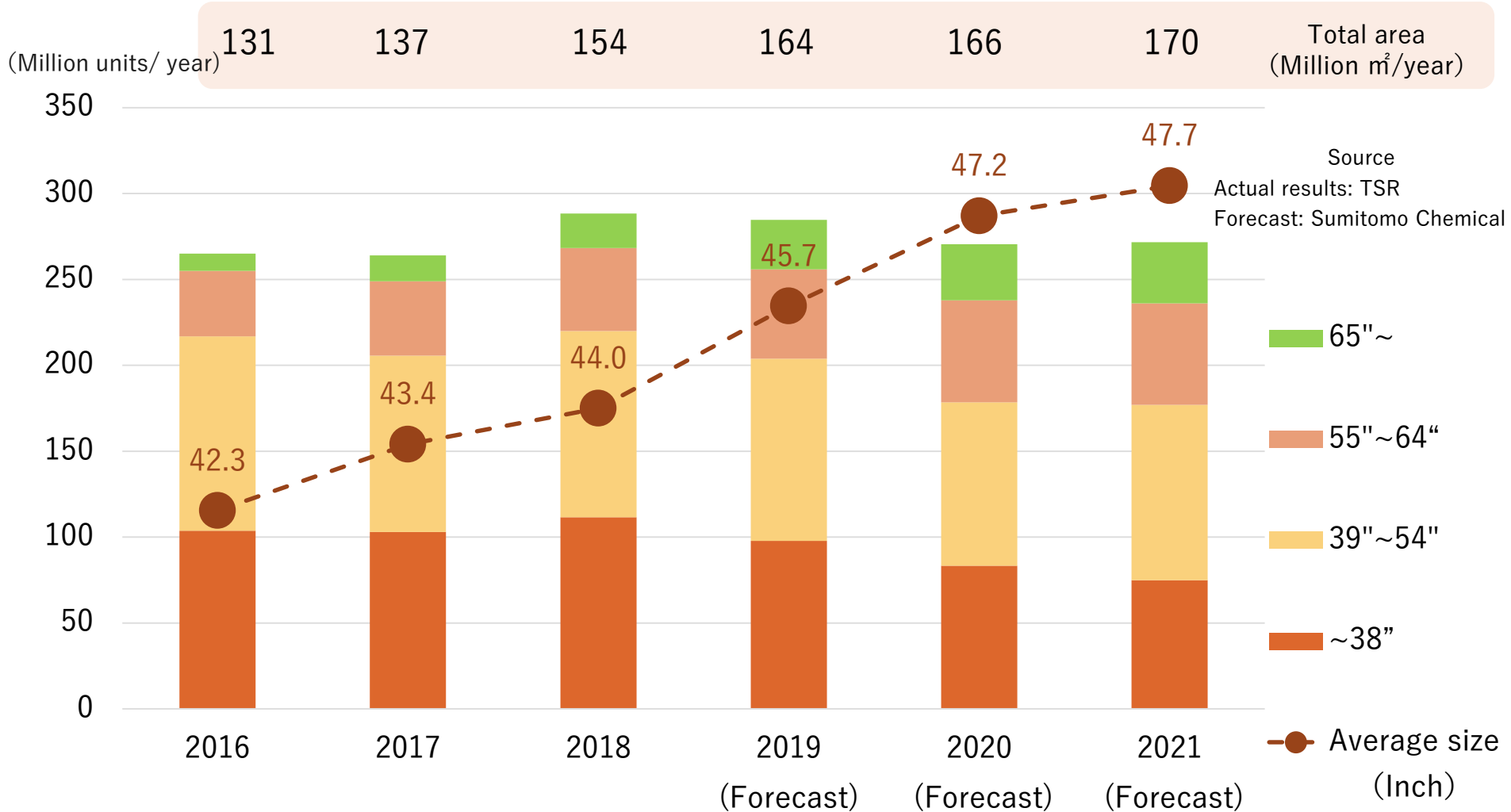
2. Business Environment for the IT-related Chemicals

3. Enhance Profitability of Existing Business

4. Next-generation Business

5. Earnings Outlook

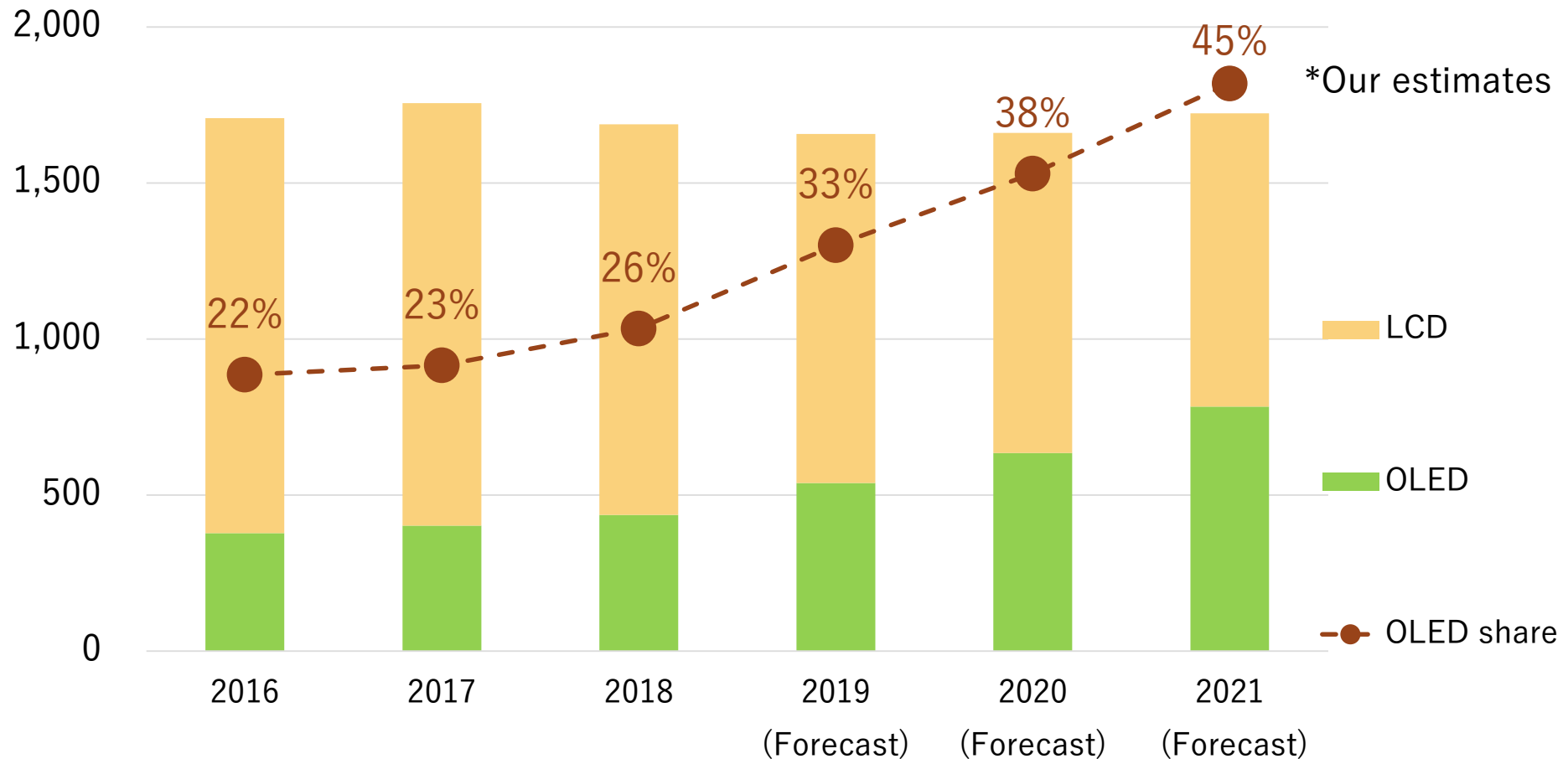
Market Perspective (1)TV Displays Market



- Number of TV displays peaked in 2018 (total area is increasing)
- Display sizes continue to grow (44 inches in 2018 to 48 inches in 2021)

Market Perspective (2) Mobile Displays Market

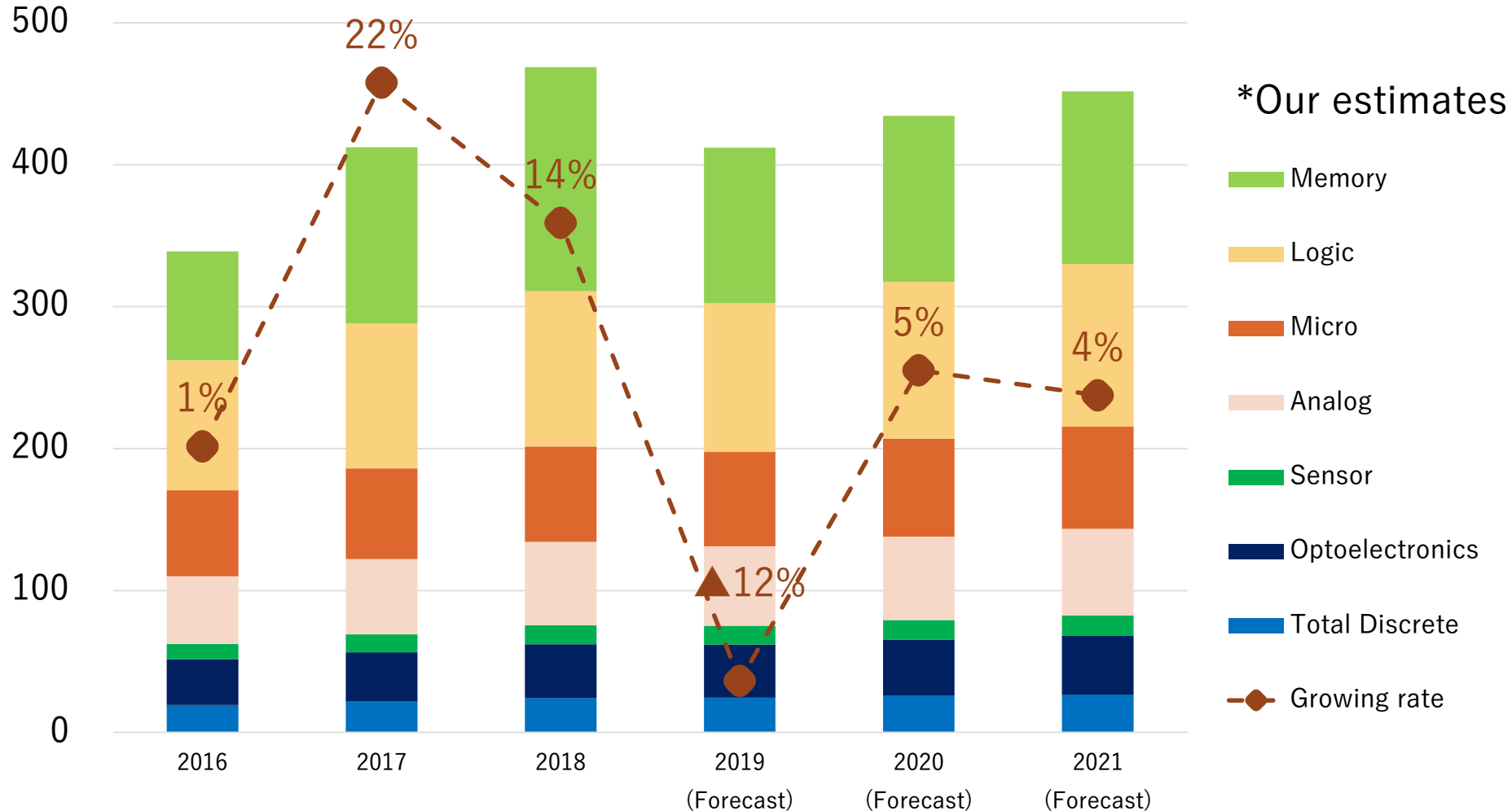
(Million units/ year)



- The high-end market is expected to expand after 2021 with the spread of 5G communication
- Growth in OLED share (26% in 2018 → 45% in 2021)

Market Perspective (3) Semiconductor Market

(Billions of dollar)



- Memory will begin recovering in 2020, despite sluggish demand in 2019.
- The size of the market temporarily highly increased due to the surge in memory prices in 2017 to 2018

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The Corporate Business Plan (FY2019-FY2021)

《Characteristics of the IT-related Chemicals》

Rapid technological innovation
(short product cycle)

Volatility in demand

Emphasis on assembly and
processing businesses

【Basic policy】

Expanding in-house production of key materials

Shifting priority from quantity to quality

Further improving the sector's business portfolio

【Addressing issues】

I

Secure returns from upfront investments

III

Develop and launch new products in growth fields

II

Maximize profitability of existing businesses

IV

Promote globally integrated management system

Business Strategy for Polarizing Films (1) Pursuing High Value-added Products

II Maximize profitability of existing businesses

III Develop and launch new products in growth fields

	Mid-term Issues	Initiatives
TV	<ul style="list-style-type: none"> Focus development on the high-end (high brilliance, high resolution) and ultra-large-scale businesses 	<ul style="list-style-type: none"> Utilization of key materials made in-house Expand production capacity for liquid crystal-coated retardation film Maximize the ratio of polarizing films using acrylic protective film
Mobile	<ul style="list-style-type: none"> Secure market share in OLEDs and other high-end models 	<ul style="list-style-type: none"> Further thinning of PVA polarizers Strengthen support for all-screen devices
Automotive	<ul style="list-style-type: none"> Full-scale entry into the automotive field 	<ul style="list-style-type: none"> Business Alliance with Sanritz Synergy between Sanritz's knowledge and our ability to respond to customers
Window film	<ul style="list-style-type: none"> Establish superiority in the flexible materials field 	<ul style="list-style-type: none"> Begin full-scale mass production of window films and launch composite products

* Business Alliance with Sanritz

Invested in Sanritz as part of a structural reform of the polarizing film business

■ Overview of Sanritz (as of the end of March 2019)

- Headquarter and plant: Nyuzen, Toyama Prefecture
- Employees: Approx. 340
- Number of lines: 2

■ Objective for the alliance

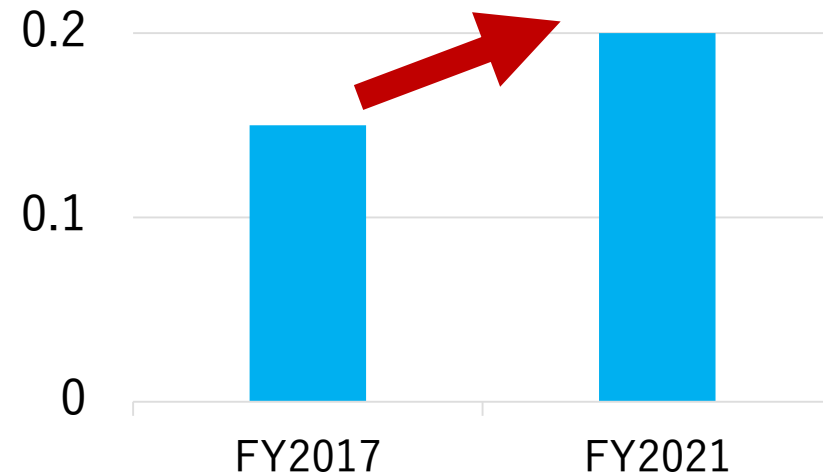
- Expand automotive business through integration of both companies' technologies
- Securing ultra-wide lines

■ Details of the alliance

- Our stake: Over 50% (as of the end of September 2019)
- Dispatching executives and staff from Sumitomo Chemical

(Billions of sheets/year)

Automotive Panel Market



Market expected to expand further due to advances in smart mobility

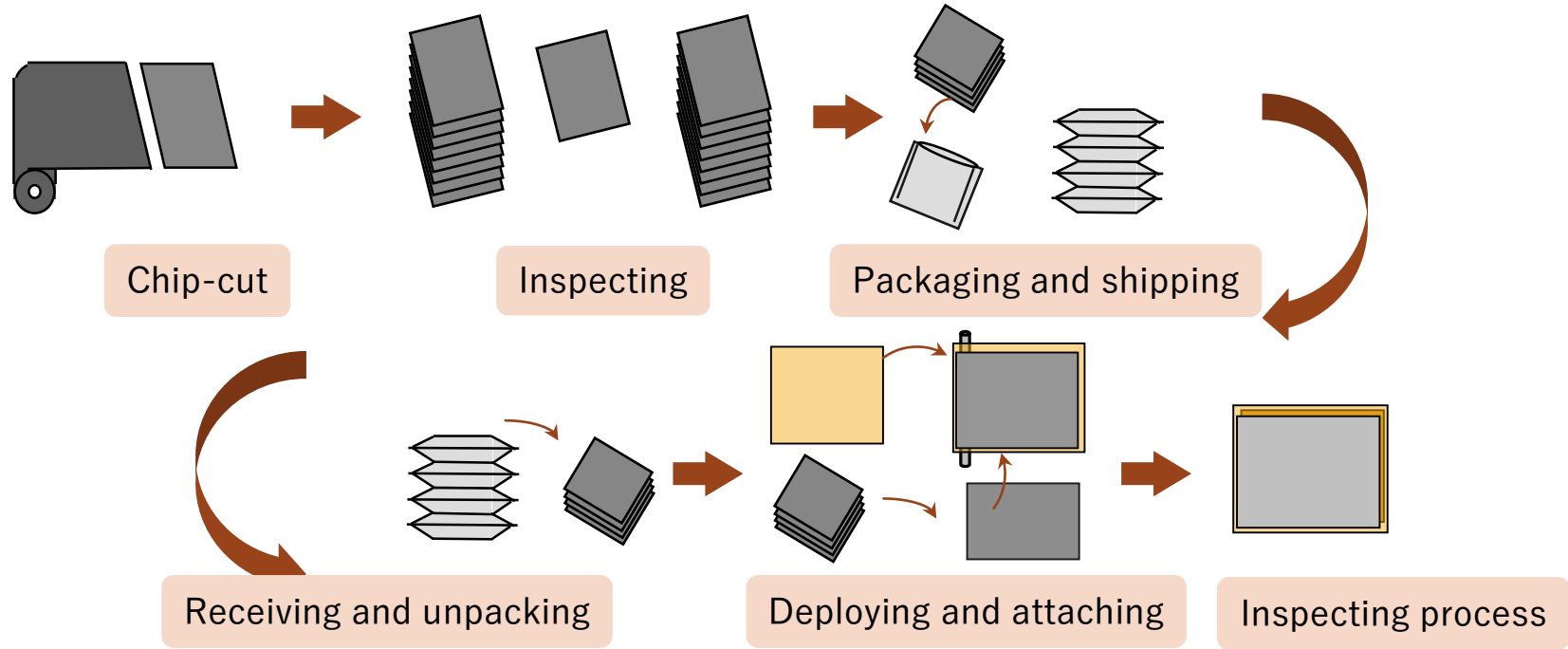
II Maximize profitability of existing businesses

IV Promote globally integrated management system

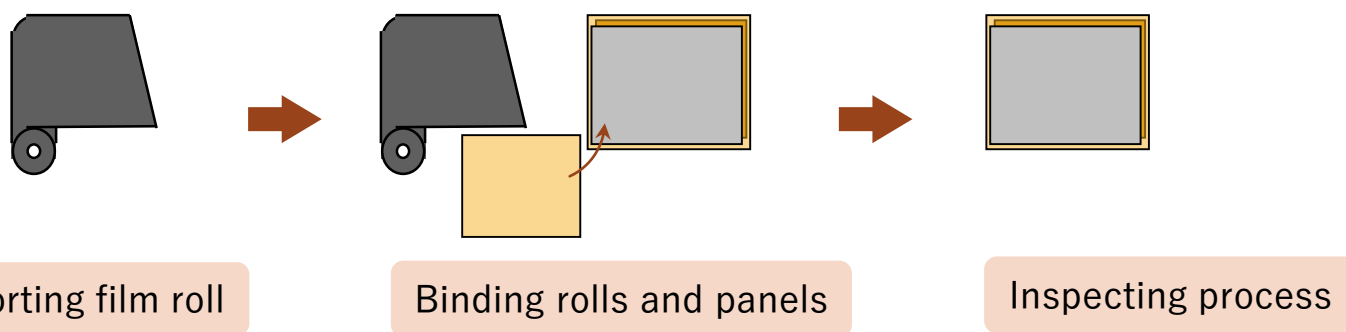
Mid-term issues		Initiatives
Supply-chain reform	Front end	<ul style="list-style-type: none"> • Complete optimal global production by utilizing the pre-processing production line in China, which started mass production in the middle of 2018
	Back end	<ul style="list-style-type: none"> • Optimization of our back end production facilities in response to the shift in the production locations of panel manufacturers (Chip Cut/Roll to Panel) • Minimize inspections by improving the quality of jumbo rolls • Improve utilization rate by consolidating products, etc.

* Production System for Polarizing Films

Chip-cut



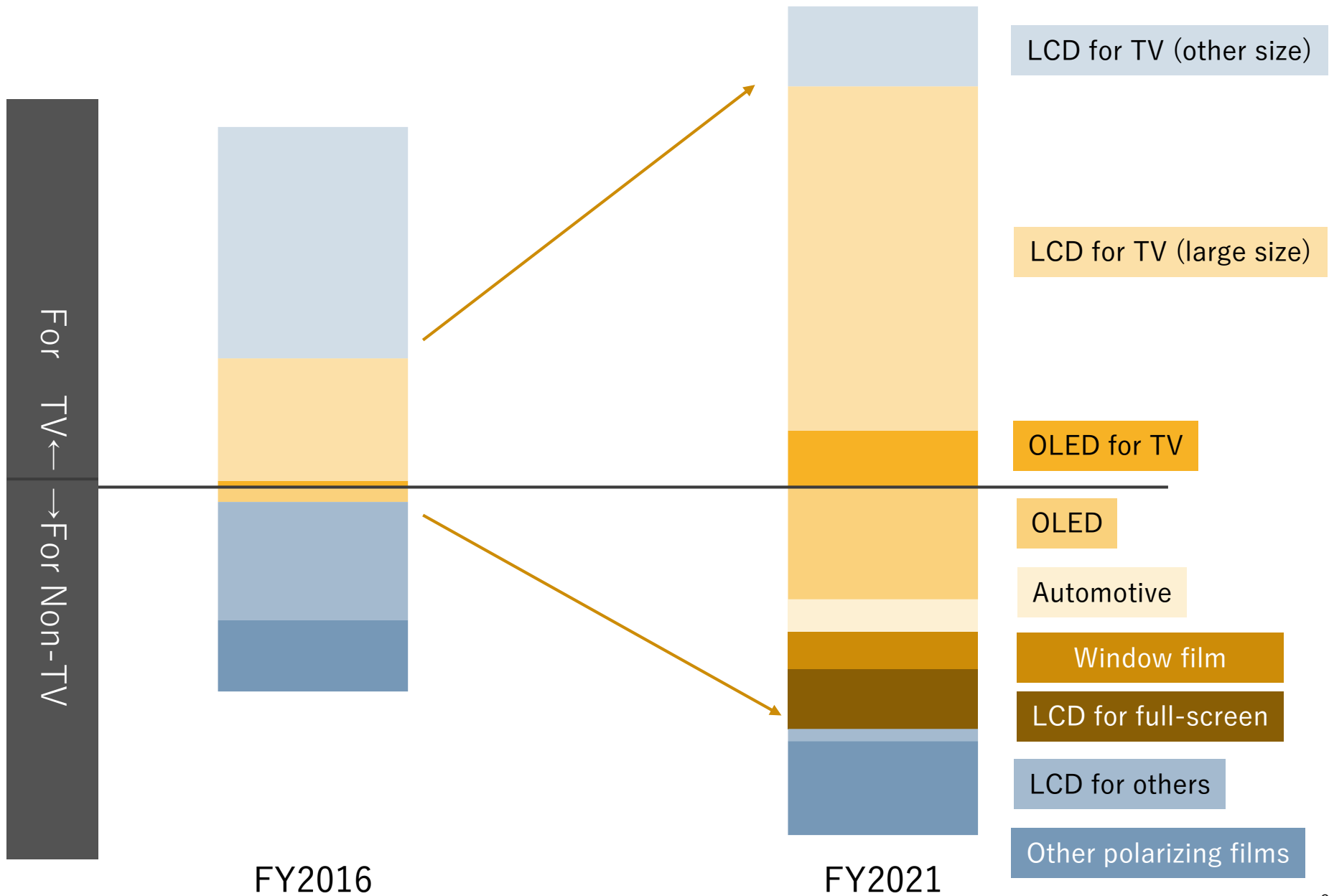
Roll to Panel



Processes that can be eliminated by shifting to roll to panel	Polarizing film manufacturers	Chip cutting, inspection, and in-house packaging
	Display manufacturers	Unpacking, deploying, and inspecting

* Transformation of the Business Structure of Polarizing Films

(Image of Sales Revenue)



Touchscreen Panel Business Strategy

II

Maximize profitability of existing businesses

III

Develop and launch new products in growth fields

	Mid-term issues	Initiatives
Glass-type	<ul style="list-style-type: none"> Maintain high market share for existing products 	<ul style="list-style-type: none"> Maintain high capacity utilization at plants while responding to the increasingly sophisticated demands of our customers
Film-type	<ul style="list-style-type: none"> Expand sales to new customers by improving our technological capabilities and cost competitiveness and through product differentiation 	<ul style="list-style-type: none"> Accelerate development for Chinese customers in expectation of increased demand from the second half of FY2019
	<ul style="list-style-type: none"> Develop new next-generation sensors 	<ul style="list-style-type: none"> Increase earnings by launching new products under development as soon as possible and maintaining operations <ul style="list-style-type: none"> -5G antennas - Touchscreen panels for automotive use - Large-area touchscreen panels

Semiconductor Materials Business Strategy (1) Steady Initiatives for Investment Returns

I	Secure returns from upfront investments	III	Develop and launch new products in growth fields	IV	Promote globally integrated management system
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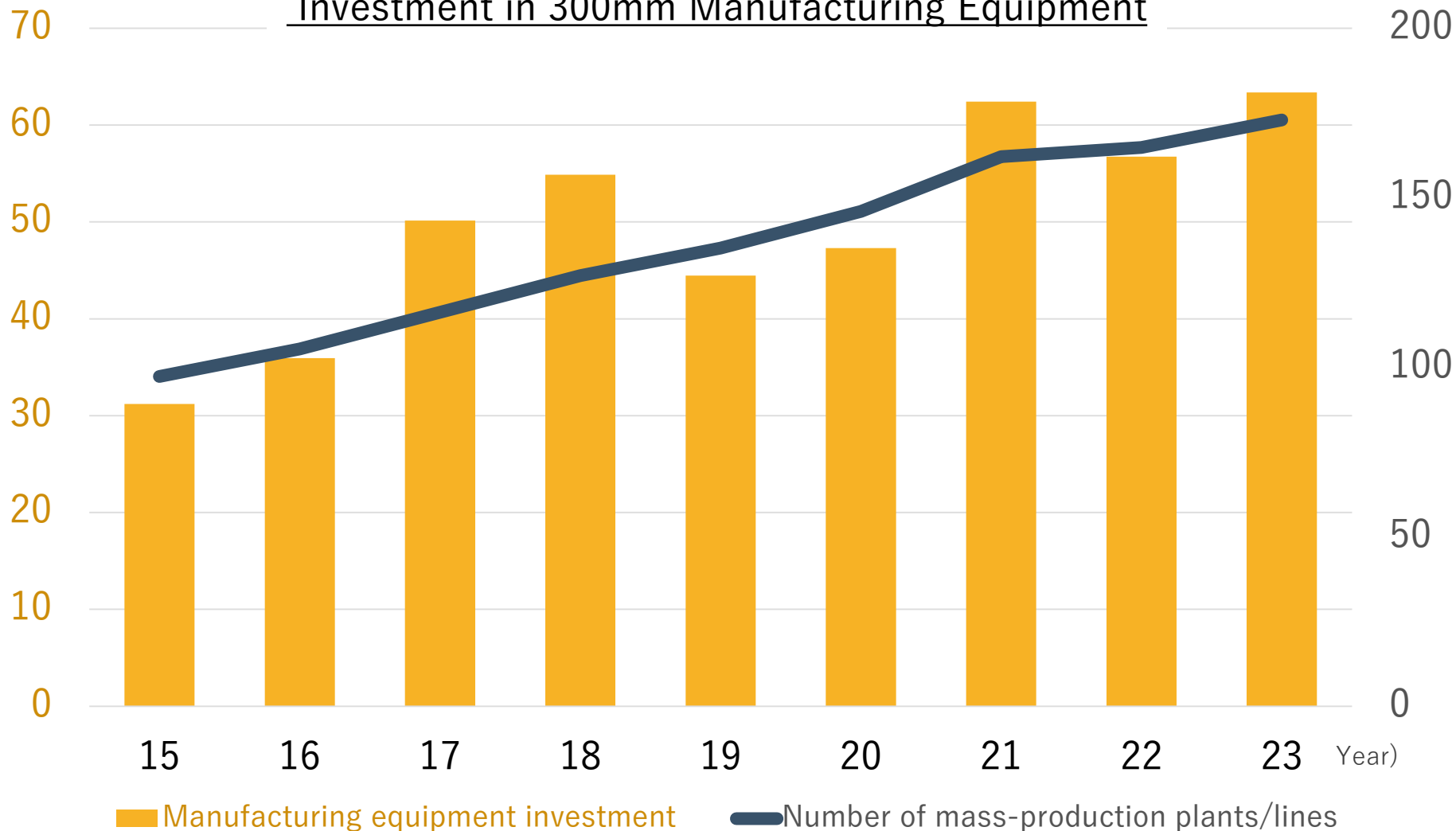
	Mid-term issues	Initiatives
Photoreists	<ul style="list-style-type: none"> Maintain high market share for Immersion ArF 	<ul style="list-style-type: none"> Vertical start-up of Immersion ArF capacity enhancement and acquisition of customer certification Strengthen customer support and expand production facilities
	<ul style="list-style-type: none"> Develop and expand sales of next-generation products: EUV, thick-film resists, etc. 	<ul style="list-style-type: none"> Responding to growing demand in cutting-edge fields such as DRAM and 3D NAND Strengthen carefully tailored approaches to each customer Efficiently allocate development and sales resources (Strengthen global sales collaboration)
Processing chemicals For semiconductors	<ul style="list-style-type: none"> Launch of new lines in China and South Korea 	<ul style="list-style-type: none"> Expand and launch plants as scheduled (Changzhou and Xi'an in 2019, South Korea in 2020) Develop supply system, including alliances with other companies in the same industry, based on customer demand

* Expansion of Semiconductor Materials Market *Our estimates

(Billions of dollar)

(Number of lines)

Investment in 300mm Manufacturing Equipment



Investment in semiconductor production equipment has been on an increasing trend

* Expansion of Our Semiconductor Materials Business

Sales revenue of Semiconductor Materials

More than 1.5 times

Growth of silicon-based semiconductors

- Increase in semiconductor integration (Ultra-miniaturization/High-layering)
- Launch new lines in China and South Korea

↓ ↓

Expand sales of resists and processing chemicals for semiconductor

Increased demand for silicon-based semiconductors Growth of compound semiconductors

- Wide use of 5G communication
- ↓ ↓
- Expand sales of related materials

FY2018

FY2021

Next corporate business plan

■ Processing chemicals for semiconductors

■ Photoresist

■ Compound semiconductor

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5G Communications/Sensors
5. Earnings Outlook

Sumitomo Chemical

- Semiconductor thin film manufacturing technology
- Core technologies for polarizing

Create next-generation businesses by integrating internal and external resources
< Diamond sensors, polarizing films for automotive use >

Acquisitions and investments

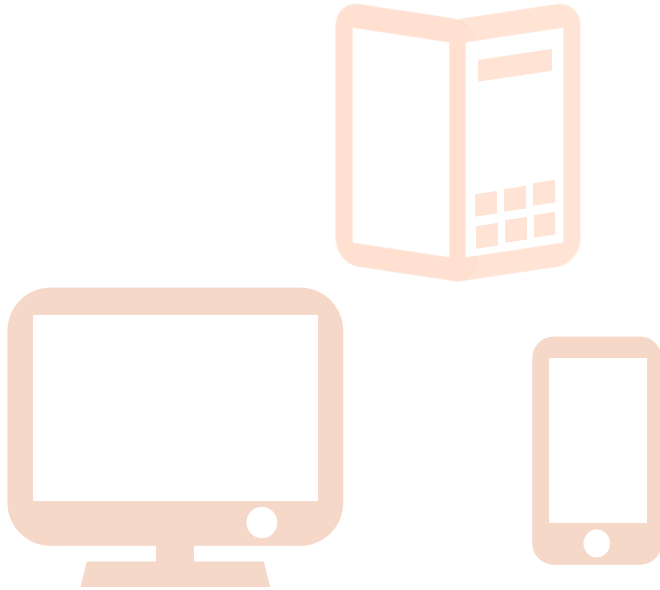
- Acquired compound semiconductor business from Hitachi Metals
Promote new business creation
- Acquisition of Sanritz

Open innovation

- Joint development of diamond sensors with startups and research institutions
- Joint development of new polarizing film materials with materials manufacturers

Next-generation Businesses (1) New Display-related Areas

Demand is increasing for materials that respond to the evolution of display technology and contribute to the production of high color reproduction, high contrast, high definition, and flexible displays.



Foldable Display

- Film-type touchscreen panel
- Window film
- Coated-type polarizer

For foldable smartphones

OLED

- Liquid crystal-coated retardation film
- Coating-type polarizer
- Polymer OLED materials

For thin displays with high contrast and high color reproducibility

Other next-generation displays

- QD resists
- QD ink

For displays utilizing QD and for μ LED displays

Next-generation Businesses (2) Mobility Areas

In line with the progress of automotive electronics, the deployment of automotive displays has begun in earnest. Demand is also increasing for laser light sources (VCSEL) for sensors, which are indispensable for autonomous driving.

Automotive display

- Highly durable polarizing films
- Highly durable touchscreen panels

For high-resolution, wide-viewing-angle display materials with superior heat resistance

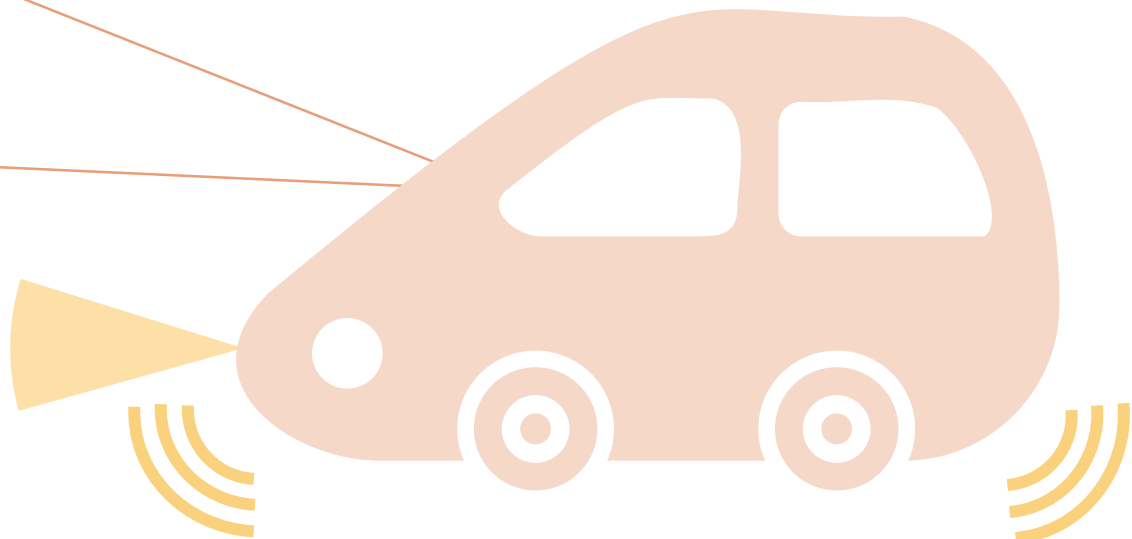
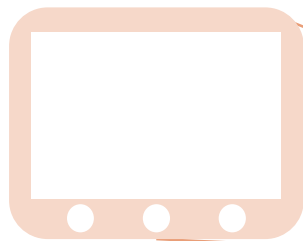
Autonomous driving

- Epiwafers for VCSEL
- GaN epiwafers for high-speed switches

For facial recognition, driving support (for LiDAR systems) using 3D sensitization

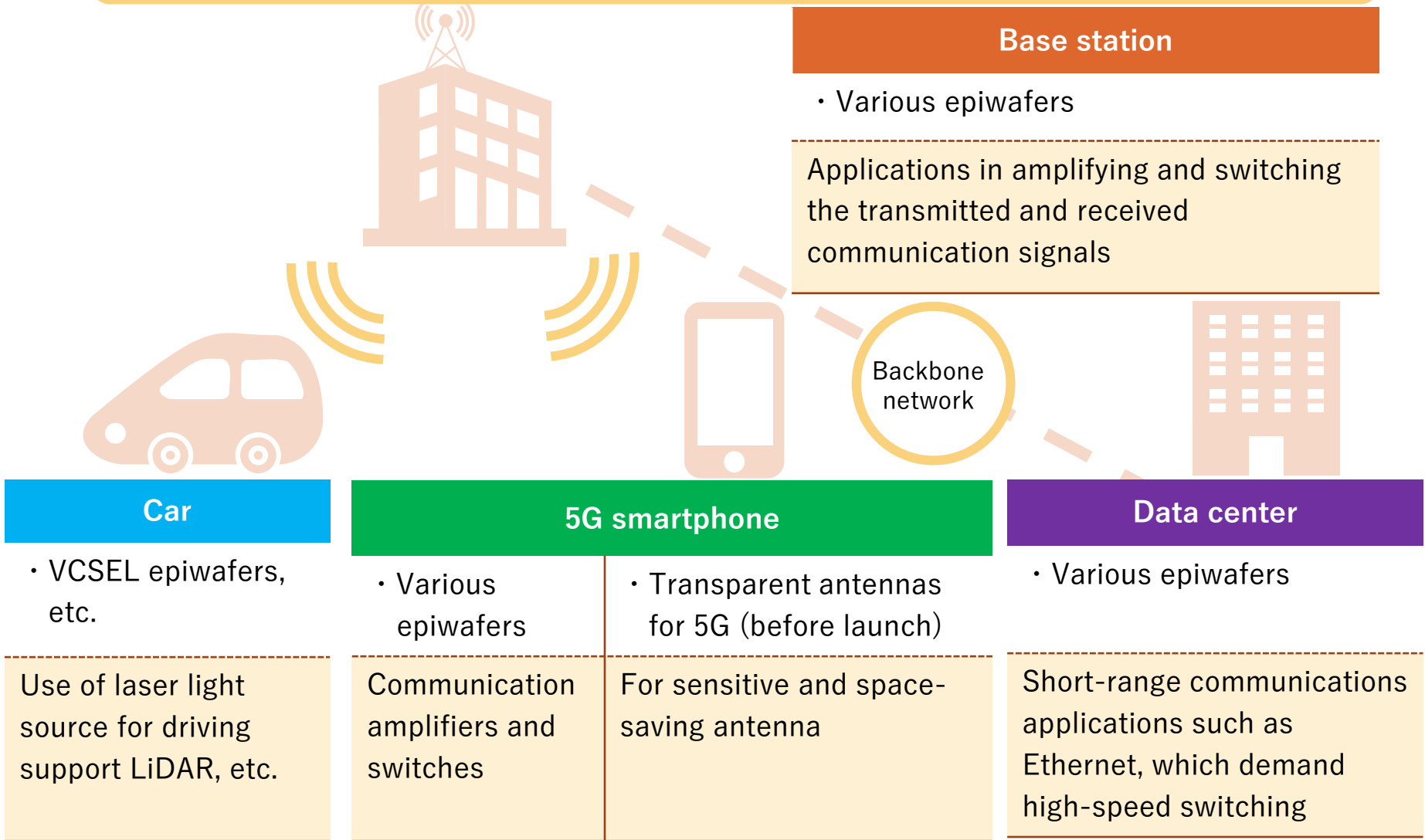
Others

- GaN substrates
 - Photoresists
- For lighting and sensors



Next-generation Business (3) 5G Communication-related Materials

Compound semiconductors with excellent high-frequency characteristics are expected to be applied to 5G communication equipment, optical communication networks supporting 5G communication



Base station

- Various epiwafers

Applications in amplifying and switching the transmitted and received communication signals

Backbone network

Car

- VCSEL epiwafers, etc.

Use of laser light source for driving support LiDAR, etc.

5G smartphone

- Various epiwafers

Communication amplifiers and switches

- Transparent antennas for 5G (before launch)

For sensitive and space-saving antenna

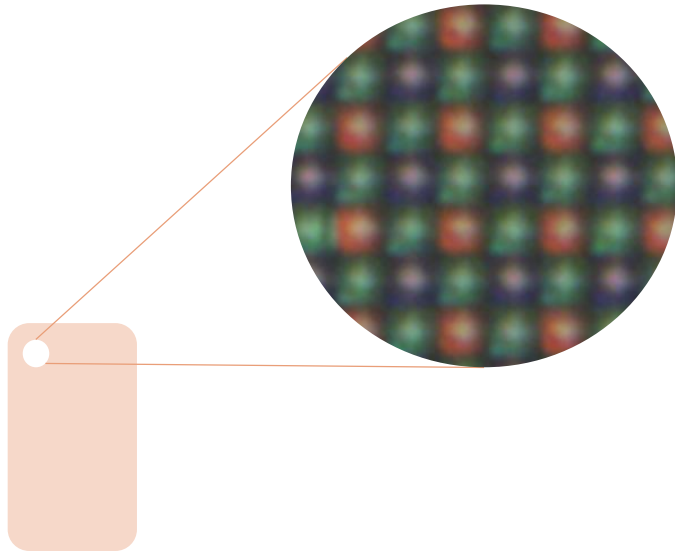
Data center

- Various epiwafers

Short-range communications applications such as Ethernet, which demand high-speed switching

Next-generation Business (4) Sensor-related Areas

With the spread of IoT, the use of sensors is expected to expand in a wide range of fields, including automobiles, security, plants, and medical care



CMOS Image Sensors

- Color resists
- Micro lenses

For the next-generation sensor, which is highly sensitive and thin film

Healthcare sensors

- Diamond sensors

Utilized for a simplified medical examination device using urinalysis

MEMS devices

- KNN Piezoelectric Device

For angular velocity and acceleration sensors and inkjet heads

Displays

- Large-area touchscreen panels

For flexible touch panels with large screens (up to 65 inches)

* Scale of Business for Next-generation Products

Sales revenue of next-generation products



FY2018

Next-generation products

- New displays
- Mobility
- 5G communications
- Sensors

Target of sales revenue:
Approx. 50 billion yen

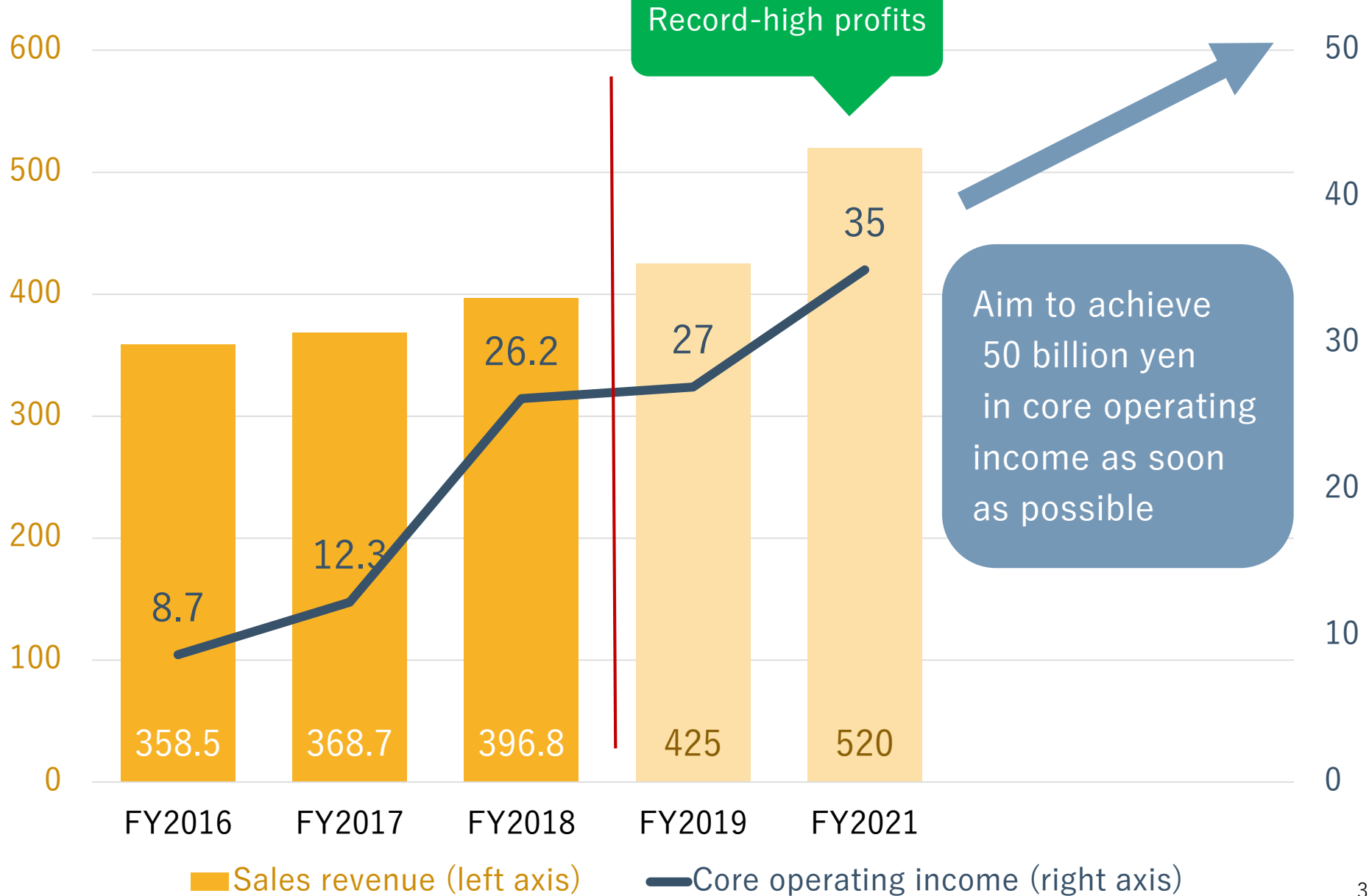
From the current corporate business plan to the beginning of the next corporate business plan

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Earnings Outlook

(Billions of yen)

(Billions of yen)



Cautionary Statement

Statements made in this document with respect to Sumitomo Chemical's current plans, estimates, strategies and beliefs that are not historical facts are forward-looking statements about the future performance of Sumitomo Chemical. These statements are based on management's assumptions and beliefs in light of the information currently available to it, and involve risks and uncertainties.

The important factors that could cause actual results to differ materially from those discussed in the forward-looking statements include, but are not limited to, general economic conditions in Sumitomo Chemical's markets; demand for, and competitive pricing pressure on, Sumitomo Chemical's products in the marketplace; Sumitomo Chemical's ability to continue to win acceptance for its products in these highly competitive markets; and movements of currency exchange rates.