Business strategy for semiconductor materials

Feb. 27, 2025

ADEKA

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Agenda

1. Introduction

2. Business strategy for semiconductor materials

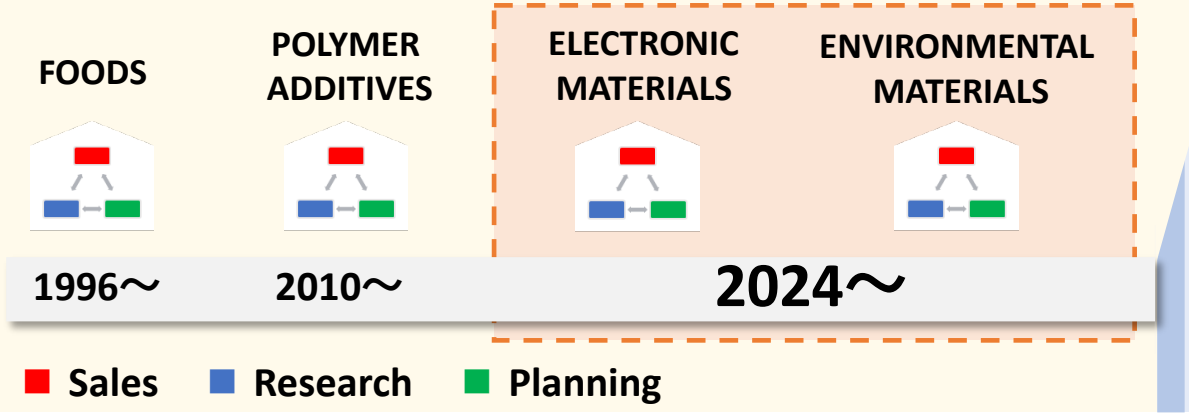
Reorganization

Step1 Jul. 1st, 2024 ～

ELECTRONIC MATERIALS Div. was established

Sales, research and planning functions were integrated to respond to needs

Transformation into four divisions



Step2 Apr. 1st, 2025 ～

Reorganized into SEMICONDUCTOR MATERIALS Div.

Specializing in semiconductors and focusing on expanding sales

Business restructuring

Growth domain × Selection & concentration

- Human capital
- Products Technology
- Equipment (Assets)

Increase the capital efficiency and earning power of the business with an eye toward the future after achieving net sales of ¥500 billion

Vision of the SEMICONDUCTOR MATERIALS Division

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Underpin the development of an ICT-based society in the world that is changing significantly due to paradigm shifts, create new value with advanced materials, and contribute to people's affluent lives

Unit: billion yen

	FY2023	FY2026	FY2030	FY2030～
Net Sales*	32.5	50.0＜	110.0＜	
Operating profit (OPM)	9.0 (28%)	13.0＜ (26%＜)	22.0＜ (20%＜)	

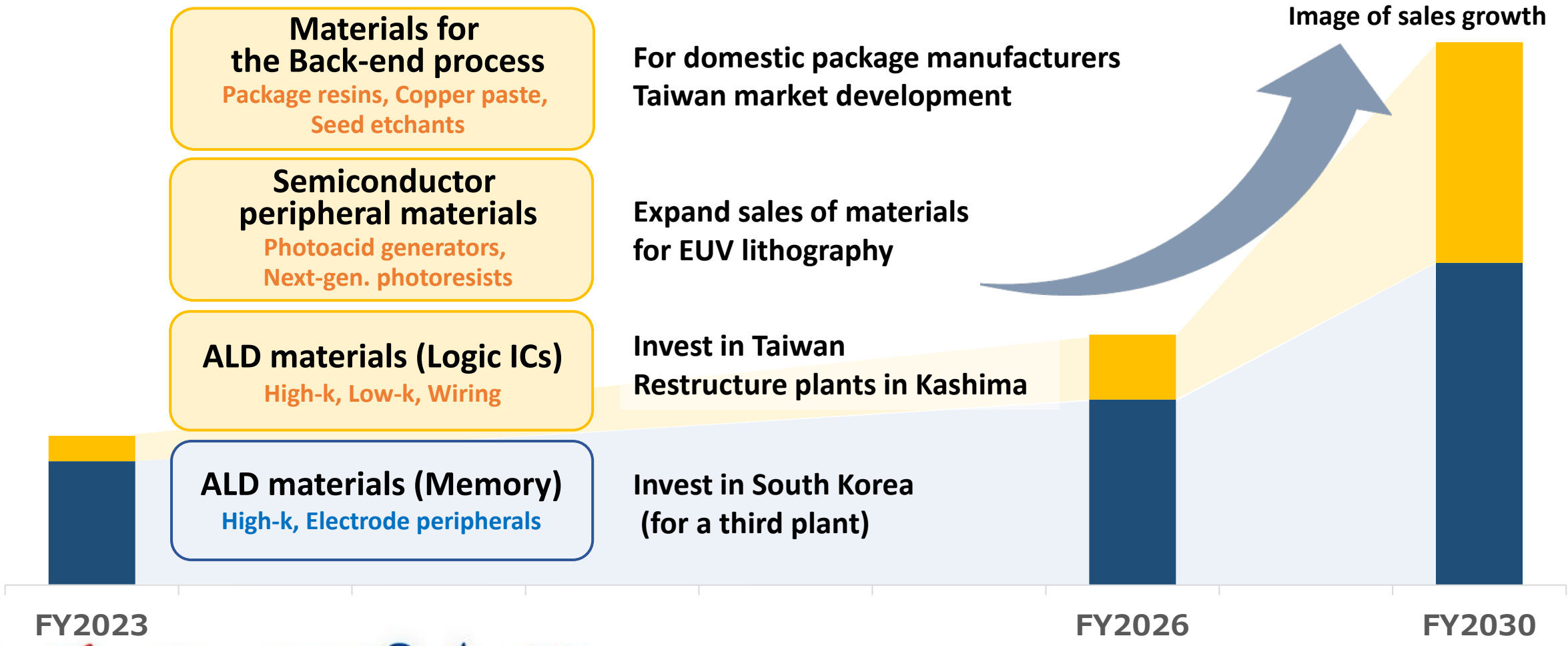
Both net sales and operating profit have significantly improved.

Active capital investment and R&D investment

＊Excluding sales of display materials

Focus Products and Projected Growth of Sales

Sales of high-k materials for advanced semiconductor memory will continue to grow.
Sales of advanced materials for logic ICs, photoresists and Back-end process will expand at the same time



For the Continued Growth of Semiconductor Materials

Pay attention to the semiconductor market

Focusing Management Resources

Manpower

Increase the No. of researchers

Shift to human resources that are capable of understanding the needs of the market and cultivating new businesses

Goods

(Product transfers the reorganization)

Products and technologies for the semiconductor Back-end process

Transfer to SEMICONDUCTOR materials

Display materials and others

Transfer to ENVIRONMENTAL materials

Capital

Continuation of growth investment

Review fixed costs
- Companywide -

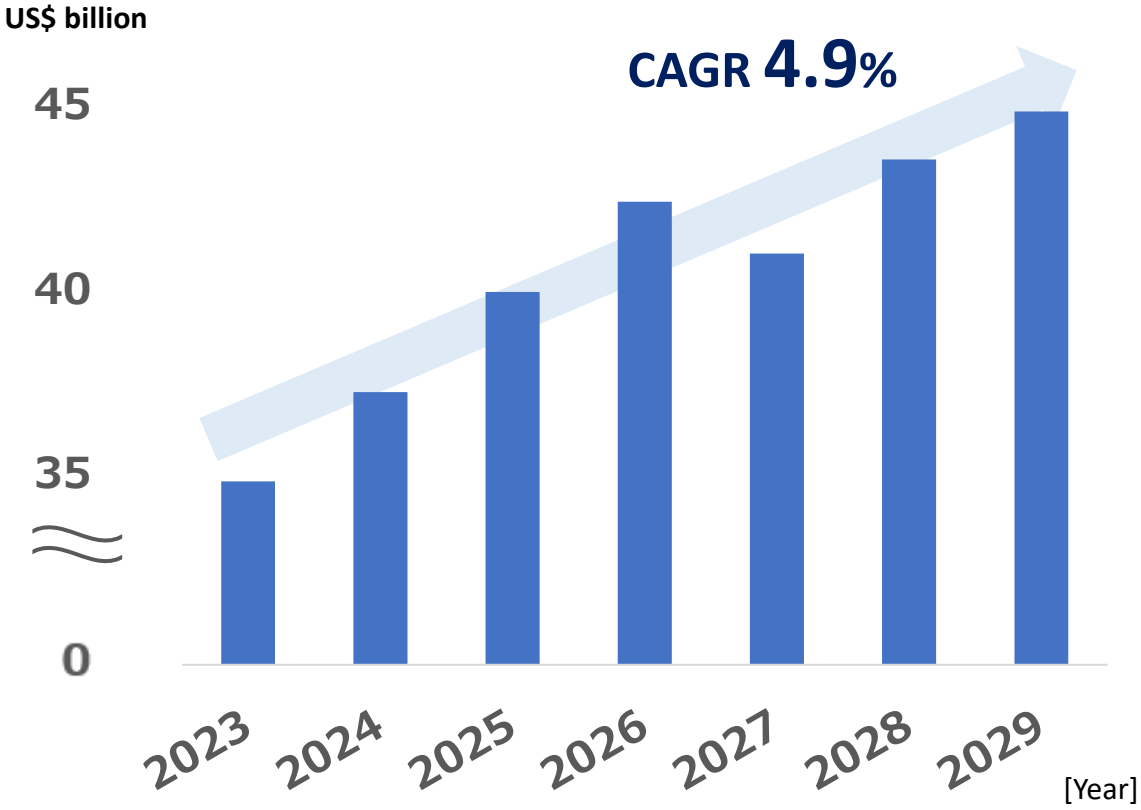
(Reallocation and restructuring)

Business growth through expansion into area the Back-end process in addition to the front-end process

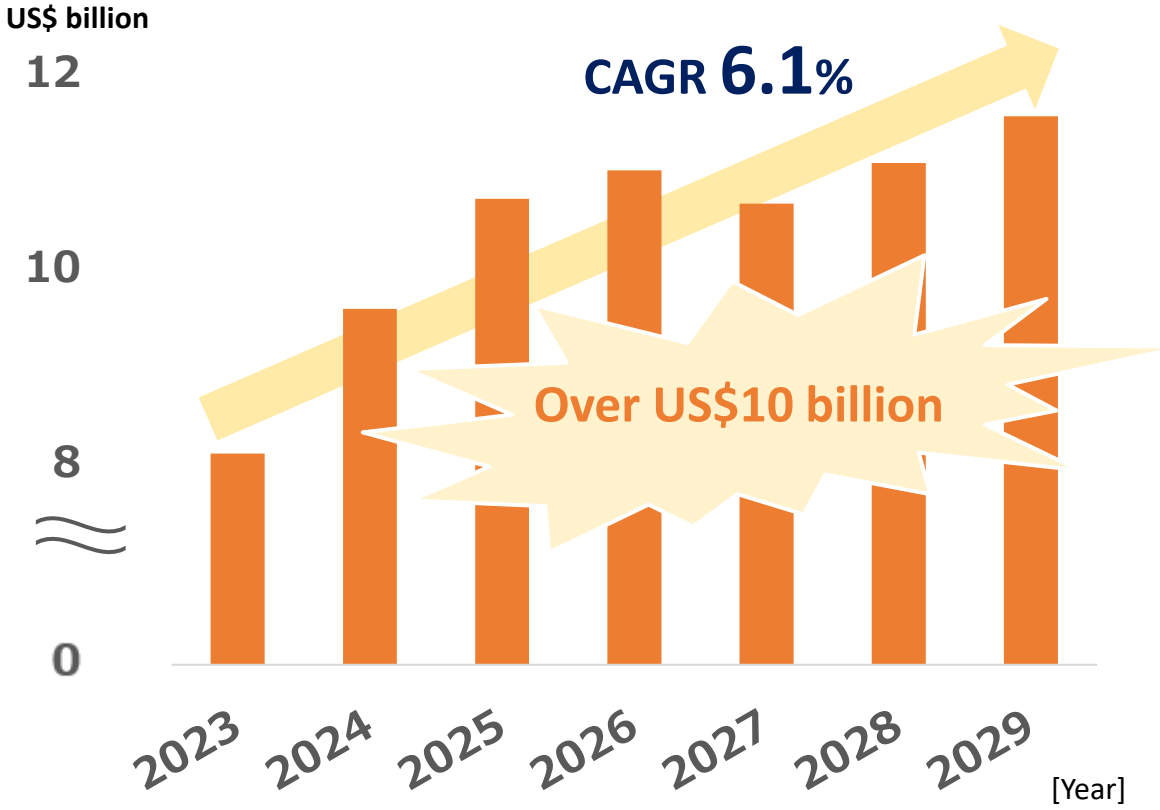
Semiconductor market forecast

The semiconductor market has expanded quickly. It is expected to reach around US$1 trillion by 2030.

Front-end process

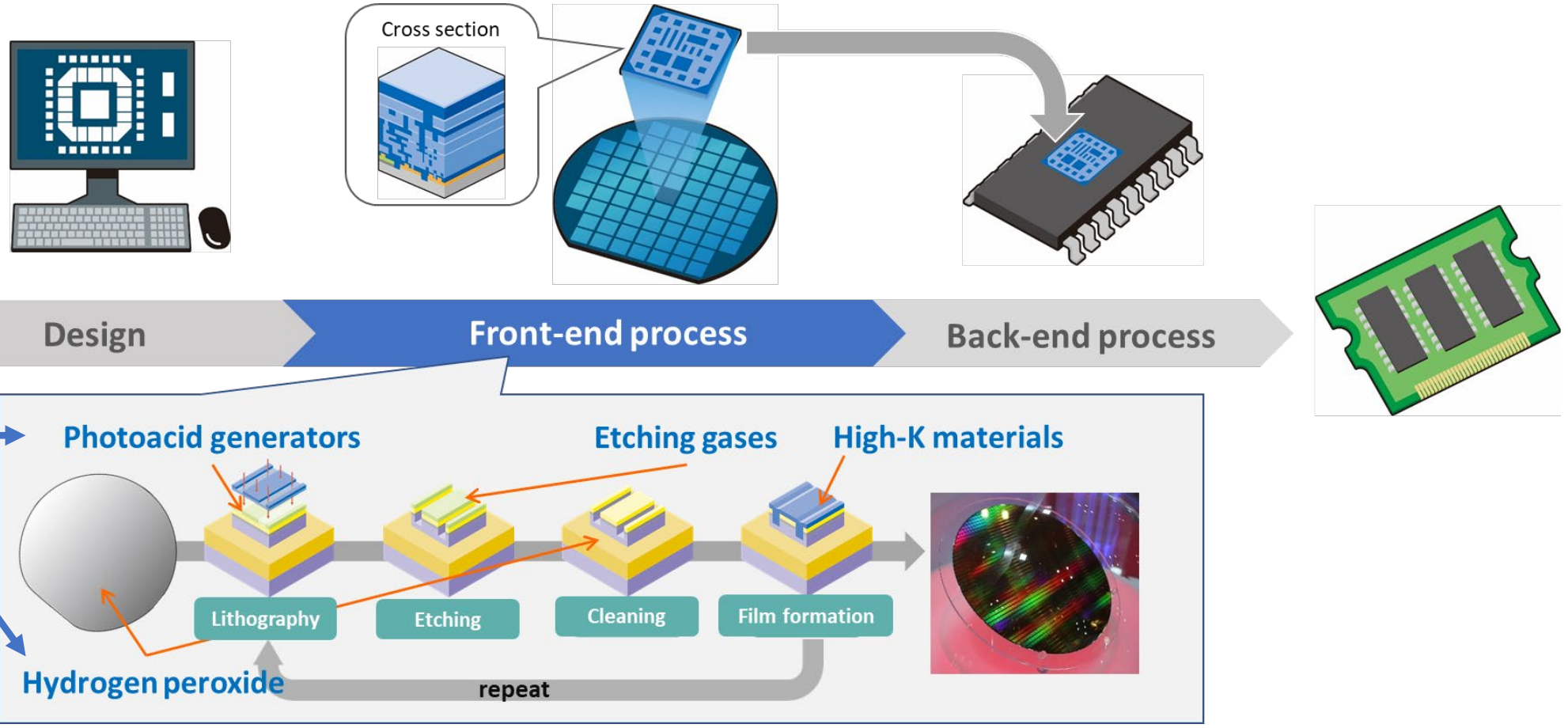


Back-end process



From Fuji Keizai Co., Ltd.'s Current Status of and Future Outlook for the Semiconductor Materials Markets 2024

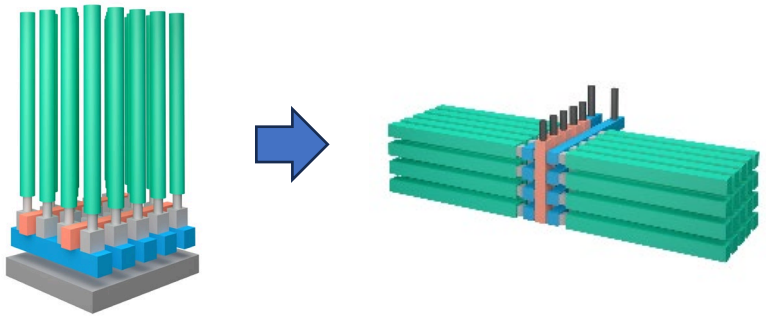
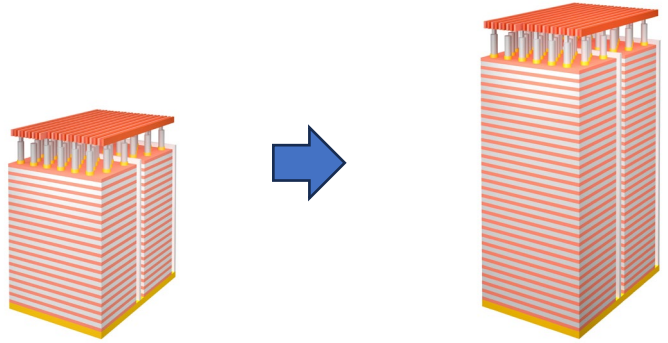
Semiconductor Manufacturing Process and ADEKA's Strengths



Our strengths

- **Able to quickly develop products** with an eye toward the next generation and beyond
- **Excellent quality management technologies** to satisfy strict semiconductor standards

Technology Trends for Memory Semiconductors and Development Policy

	DRAM	3D-NAND
Technology trends		
	Miniaturization and higher capacity	Increase of the stacking layer
Development policy	• Achieve miniaturization, higher capacity and lower power consumption using leading-edge ALD materials • Establish a structure for developing and supplying products that will be needed two to three generations in the future	

DRAM Technology Roadmap and Material Development

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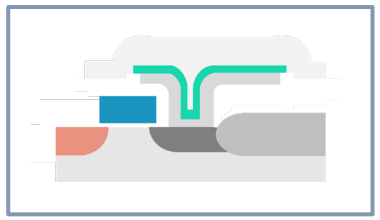
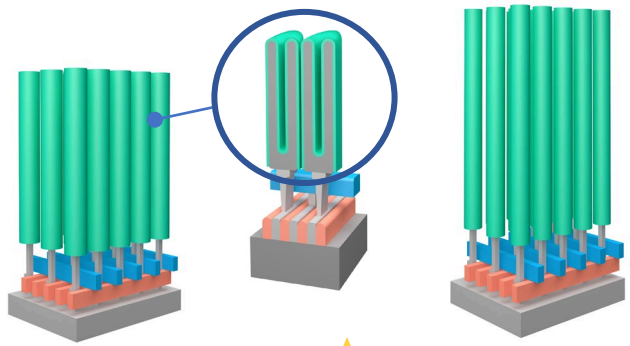
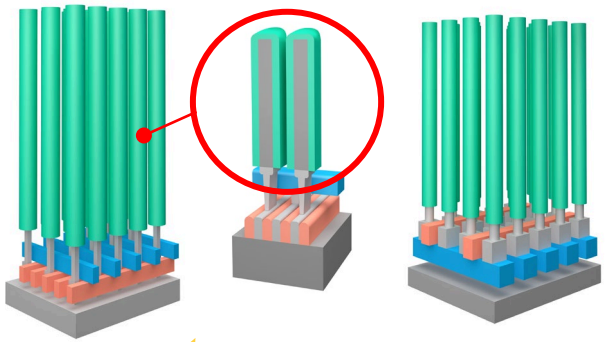
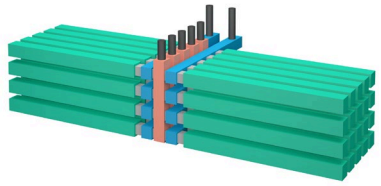
Roadmap	1990	2000	2010	2020	2030～
	Stack structure	Cylinder structure		Pillar structure	3D-DRAM







$6F^2 \rightarrow 4F^2$



Start supplying High-k materials for capacitors

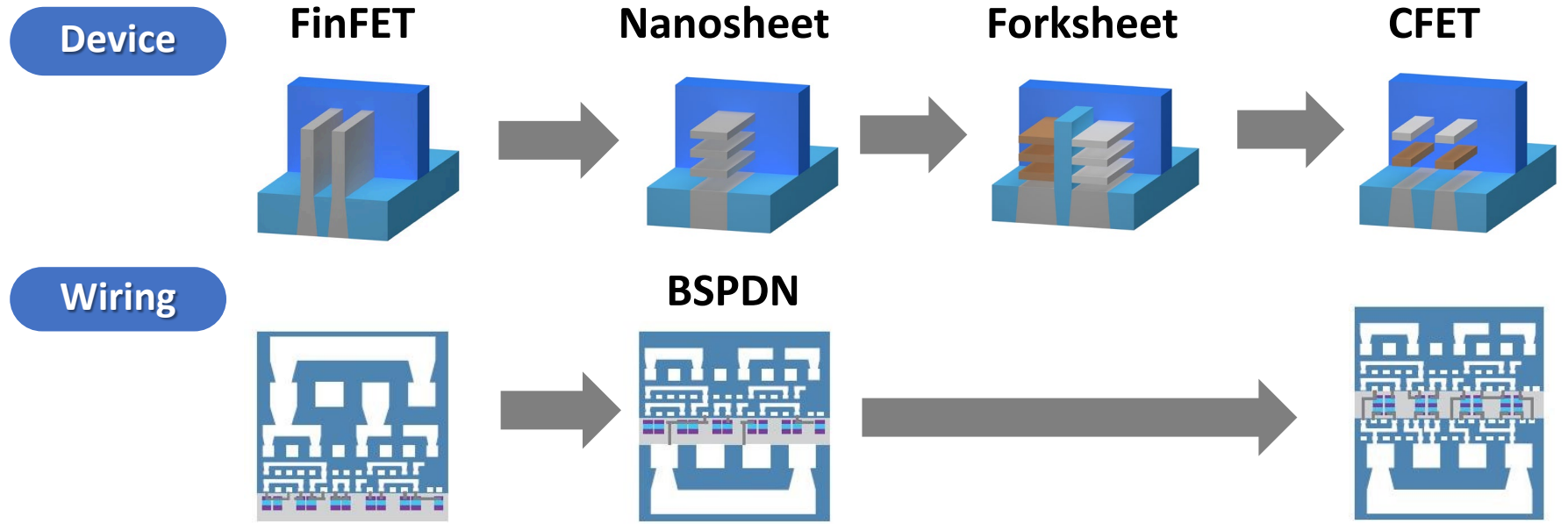
Evolution of high-k materials

Adoption of new materials around capacitors

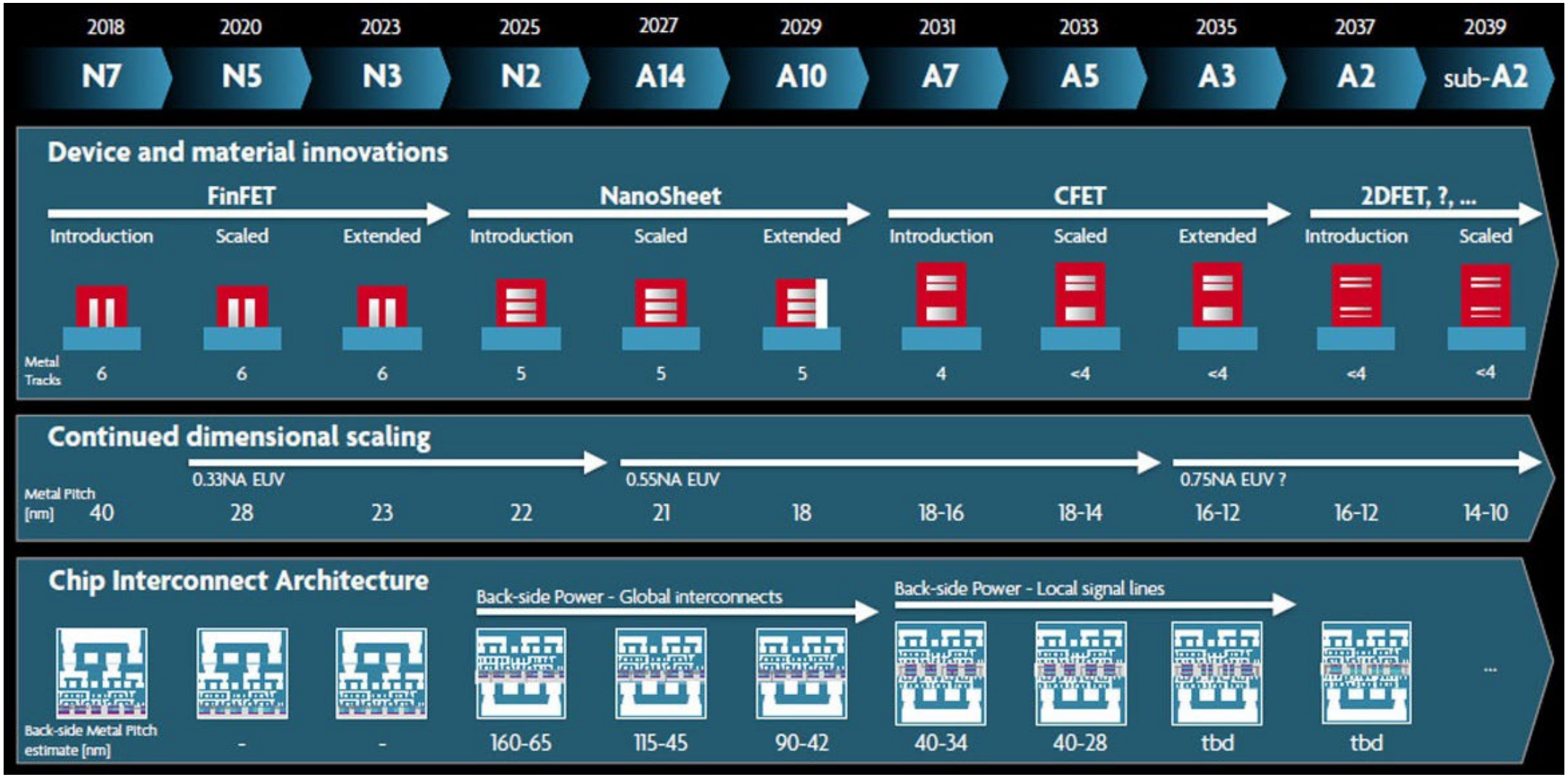
ASD/ALE technologies Bonding technologies

With the change in the element structure of DRAM,
work hard to develop new materials and continue to supply new products

Technology Trends for Logic ICs and Development Policy

Technology trends	 **Along with the continued progress in miniaturization, the structures of transistors and multi-layer wiring are changing.**
Development policy	• **Aim to be a main supplier with materials that are ready for structural change** • **Conduct joint development with leading companies in the industry and with semiconductor equipment manufacturers**

Technology Roadmap and Material Development for Logic ICs



From the news portal site “TECH＋” https://news.mynavi.jp/techplus/article/20240625-2972758/（Publication date：Jun. 25, 2024）

Logic ICs generations and our targets

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N7	N5	N3	N2	A14	A10	A7	A3	A2	sub-A2

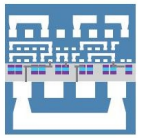
Device

FinFET → Nanosheet → CFET → 2DFET,?,...

- High-k gate dielectrics
- Threshold voltage tuning film
- New low-k materials
- New channel materials for Two-dimensional semiconductors

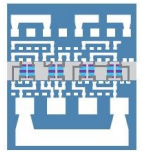
Wiring

To Back-side Power Delivery Network



Back-side Power – Global interconnects

- New low-k film
- Metal wiring materials



Back-side Power – Local signal lines

- New wiring materials
- Graphene

Based on the imec “ITF World 2024” announcement materials created by ADEKA CORP.

Expansion of sales of photoacid generators

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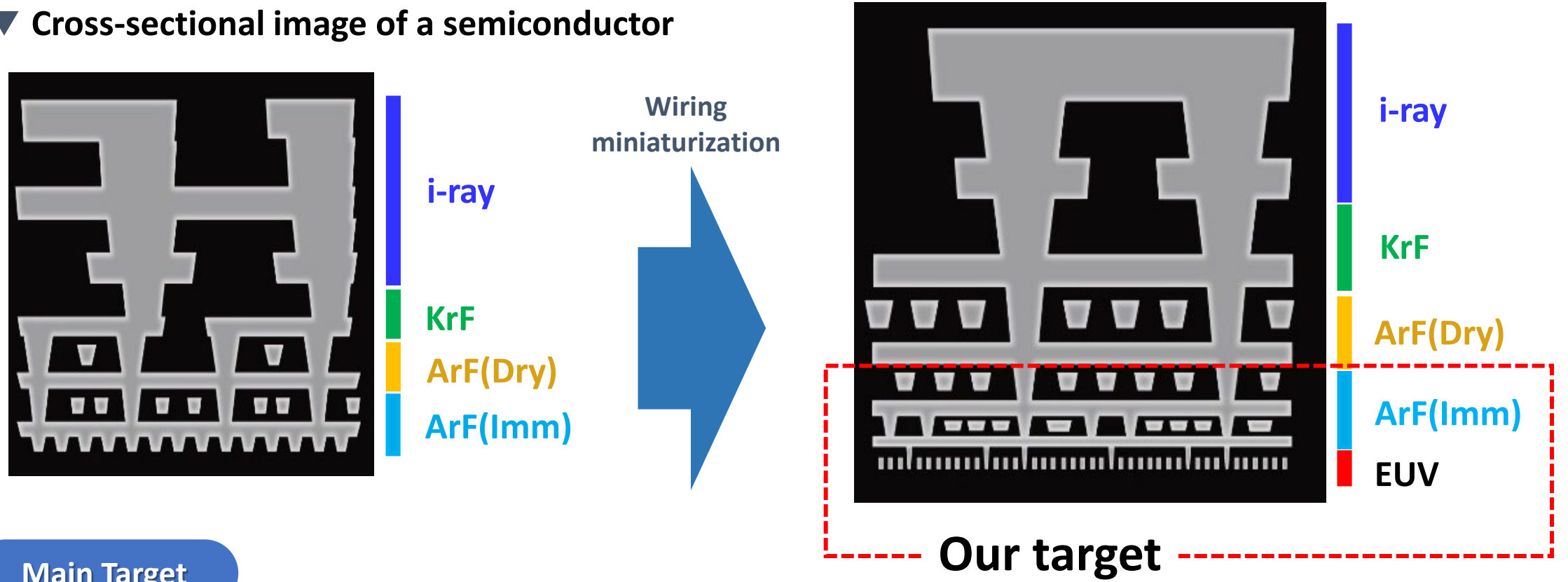
Photoacid generator

Key materials for semiconductor photoresists

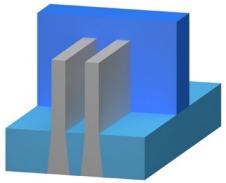
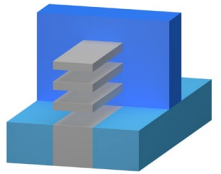
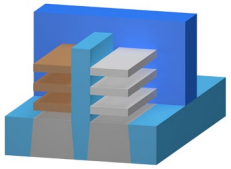
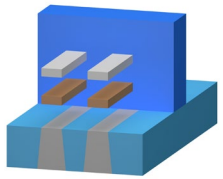
▼ Cross-sectional image of a semiconductor



Main Target

Photoacid generators that ensure the expansion of the advanced photoresist (ArF and EUV) market

Technology trends for semiconductor lithography and development policy

Technology trends	**Year**	**2022-2023**	**2024-2025**	**2027-2028**	**2029 ～**
	Node	**N3**	**N2**	**A14**	**A10**
	Device				
	EUV patterning technologies	**EUV MP**			**EUV MP High NA EUV**
	Resist	**CAR**	**CAR (＋MOR)**	**CAR＋MOR**	**CAR＋MOR**
Development policy	• **Specialize in the development of advanced photoresist materials** • **Shift seamlessly from research and development to mass production**				

Expansion of the business area to the semiconductor Back-end process

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Expand applications for our fundamental technologies and existing products to the area of the semiconductor Back-end process

Fundamental technologies and existing products

Hydrogen peroxide | Etching technologies | Surfactant | Dispersion technology | UV initiators | Latent curing agent

Metal selective etchant

Ultrafine

Low-temperature sintering copper paste

Stress relaxation

High thermal conductivity resin sheets

High reliability

Epoxy resin adhesives

High performance

Applied development

SAP seed etchant

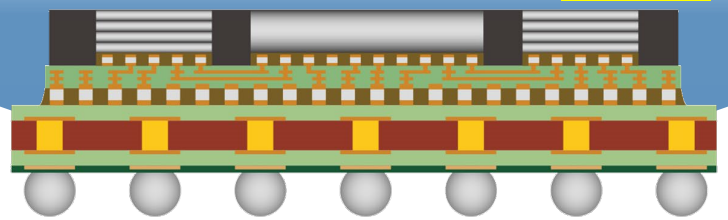
Die bonding

TIM

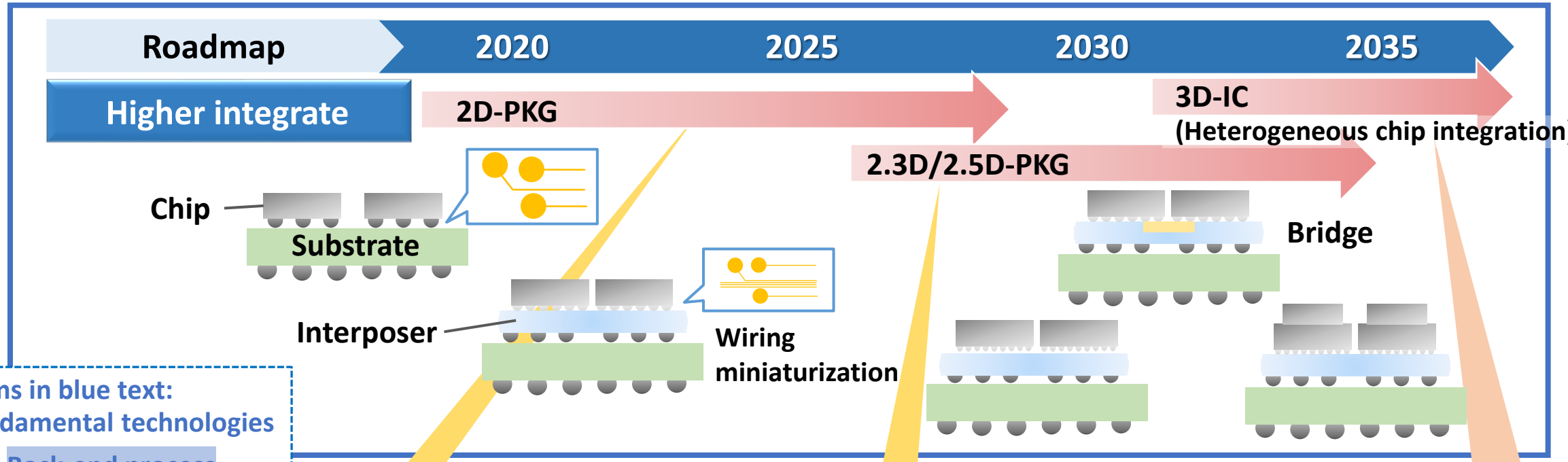
NCF

Sealing agents

Underfill
Sidefill



Technology Roadmap and Material Development for the Back-end process



Items in blue text:
Fundamental technologies
--> Back-end process

Items in black text:
front-end process
--> Back-end process

Seed etchants agents,
Thermally conductive sheets・NCF,
Die bonding・TIM,
Underfill agents
PAG for i-ray photoresists

Metallic for TSV and TGV,
ALD materials

Hybrid bonding
Silicon photonics

Apply fundamental technologies and existing products

Search for technologies and develop new materials

Area-Specific Business Expansion

ADEKA KOREA

Increase local production operations for semiconductor materials

- Building for a third plant completed. (Oct. 2024)
- The R&D Center was extended and relocated. (Apr. 2024)

A D E K A （ JAPAN ）

Strengthen leading-edge research and development of production technologies

- Build a new research building at the Kuki R&D Center. (Scheduled in Apr. 2026)
- Establish a new Chiba research lab. (Scheduled in Apr. 2025)

ADEKA USA

Accelerate adoption of new semiconductor materials

- Opening of the West coast office. (Apr. 2024)
- Develop markets for next-gen. semiconductor materials.

ADEKA（CHINA）

Expand sales of Legacy materials

ADEKA FINE CHEMICAL TAIWAN

Fully enter the market of materials for advanced logic ICs

- A semiconductor material plant was constructed. (Oct. 2023)

Expand into Taiwan and the U.S. by leveraging the business expertise acquired in Japan and Korea

Capital investment plan

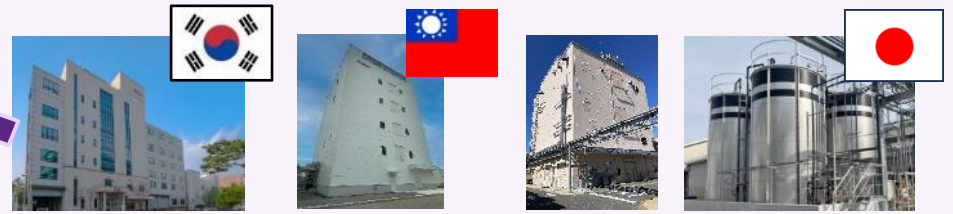
Current MTMP：*ADX 2026*

Unit: billion yen

		Amount
Total amount (3-year)		75.0
Plant investment	Polymer Additives	6.2
	Electronic Materials	15.8
	Environmental Materials	4.4
	Food Products	10.1
	Life Science	4.2
	Other	5.0
Research investment*1		19.7
Common and others (general, sales, systems, etc.)		9.2

*1 Including expenses for the construction of a new research building in the Kuki R&D Center (approx. 10 billion yen).
*2 Figures are expressed in units of 100 million yen.

At least ¥10 billion was invested in semiconductor materials in the 3-year period of the previous MTMP *ADX 2023*



Equipment that has been invested in is coming online + New active investment (Production technologies, photoresists etc.) = Construction of a foundation for expanding of semiconductor materials

■ Create innovative new products

Scheduled for completion in Jan. 2026

Semiconductor Materials | Environmental Materials

ALD materials & Semiconductor packages

▲ The Kuki R&D Center (Completion image)

Expand the Semiconductor Business in Taiwan

New plant coming online

Materials for cutting-edge logic ICs

Location	Amount invested	Completion
Tainan City	¥2.5 billion	Oct. 2023

Currently	The process of obtaining user certification in the progression towards mass production

▲ ADEKA FINE CHEMICAL TAIWAN Tainan Plant

Construct a plant in Taiwan that will play a part in technological innovation for logic ICs

Fully enter the semiconductor business in Taiwan

Glossary

CAGR
Compound Annual Growth Rate

PAG
Photoacid Generator

ASD
Area Selective Deposition

ALE
Atomic Layer Etching

CAR
Chemically Amplified Resist

MP
Multi-Patterning

MOR
Metal Oxide Resist

SAP
Semi-Additive Process

A method of forming a seed layer and creating wiring using photolithography and plating

TIM
Thermal Interface Material

NCF
Non-Conductive Film

TSV
Through-Silicon Via

TGV
Through-Glass Via