Eat Well, Live Well.

AJINOMOTO

Ajinomoto Co., Inc. Business Briefing

ABF-Based Growth Strategy in ICT

Genjin Mago

President and Representative Director
Ajinomoto Fine-Techno Co., Inc.

June 13, 2023

1 Overview of ICT

2 Semiconductor Market Forecast

3 Competitive Advantage in ICT

4 Medium- to Long-Term Business Strategy in ICT

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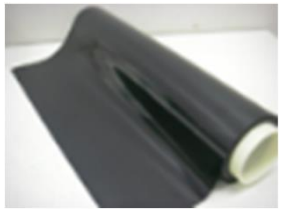
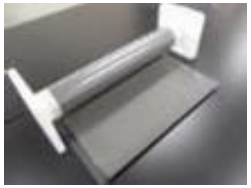
1.Overview of ICT
Functional Materials Business

ABF: *Ajinomoto Buildup Film®*
RCC: Resin coated copper foil

Product lineup

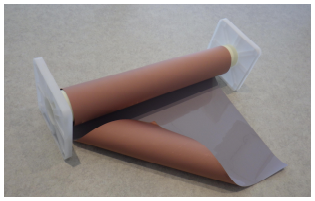


Molding film



Magnetic materials

ABF



ABF-RCC

Molding ink

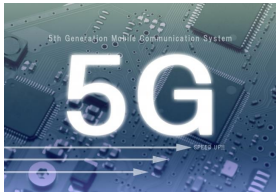
Computing platforms

PCs

Servers

Automobiles

Game devices



Networks

Mobile devices

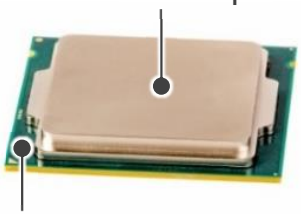
By supporting a variety of computing platforms through our diverse product lineup, we will contribute to people's well-being.

1.Overview of ICT
Examples of the Use of ABF

Film-type insulation material

protecting the core components

in personal computers



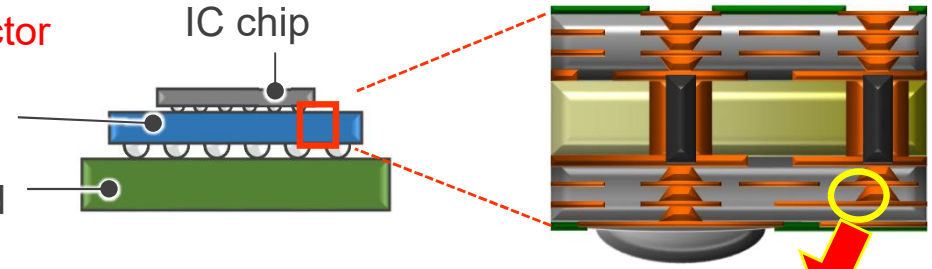
Motherboard

Semiconductor packaging substrate

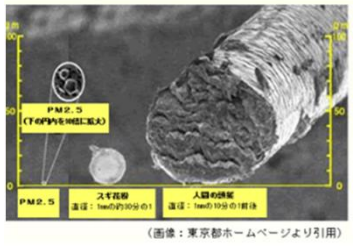
Cross-section of packaging substrate

Semiconductor packaging substrate

Motherboard

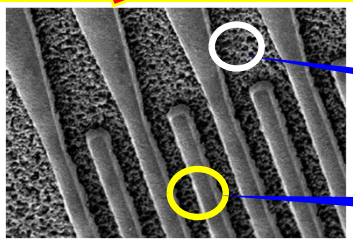


- IC chip protection
- Signal transmission between IC and motherboard



（画像：東京都ホームページより引用）

Reference: Human hair, 100μm



10μm

First developed in 1999, ABF is an insulation material used between buildup substrate layers.
For the more than 20 years since then, it has been continuously used as the de facto standard by major semiconductor manufacturers.

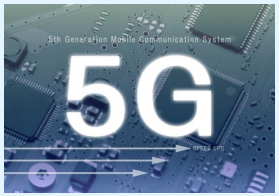
1.Overview of ICT

New Market and New Application Development Strategy for ABF

Markets

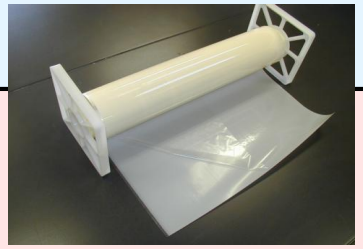
New

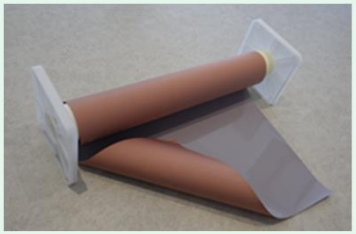
Servers, networks, AI



Efforts toward new applications

Ajinomoto Build-up Film®
(ABF)





New markets

New efforts

Market penetration

New development

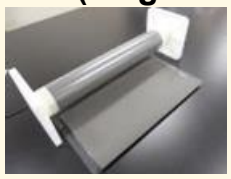
Existing

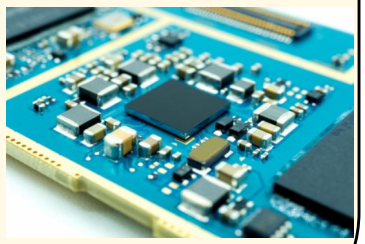
Continued adoption in PC and game markets

Grow new materials in existing applications
Inductor applications

Inductors are parts that convert electrical energy into magnetic energy

AFTINNOVA®
(magnetic material)

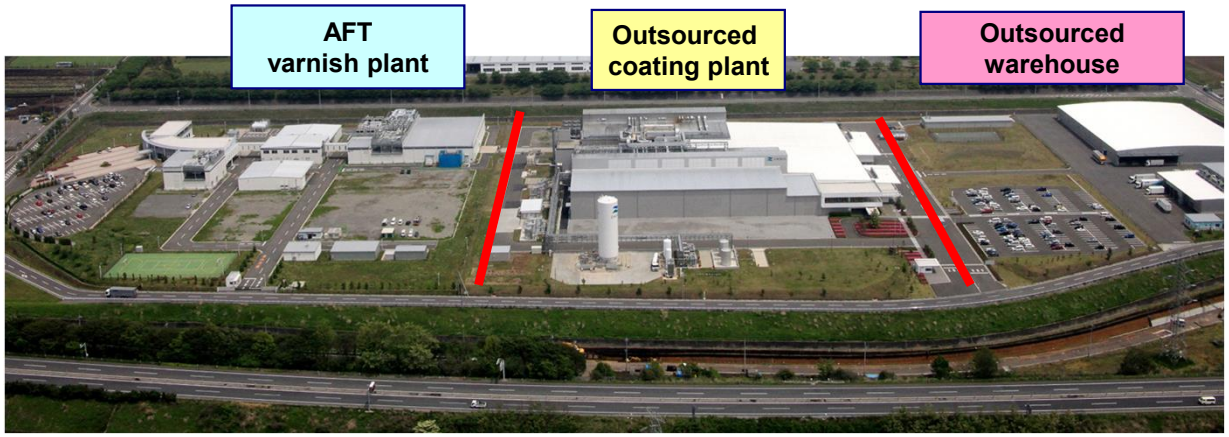




Existing **Products** **New**

1.Overview of ICT Production Sites

Bird's-eye view of the Gunma Plant



Japan

Gunma Plant

Head Office Plant

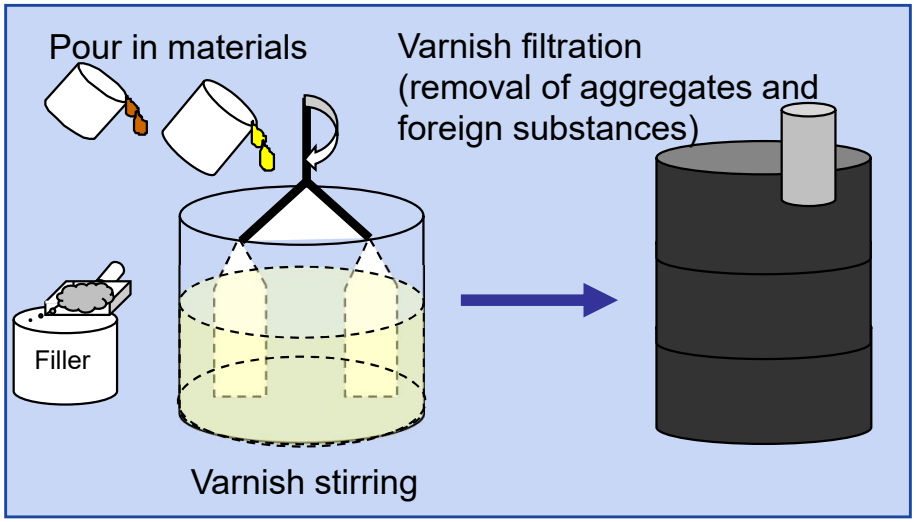
Taiwan

While taking BCP into consideration, concentrating our production sites in Japan enables highly efficient, low-environmental impact production.

1.Overview of ICT
Growth Investments Aimed at 2030

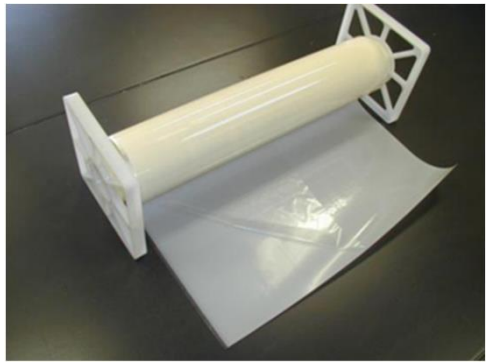
We are committed to the stable supply of ABF to meet continuously growing demand originating in AI, communications, and other high-performance computing (HPC), in addition to PCs and servers.

Stage 1: Varnish production
Ajinomoto Fine-Techno



Stage 2: Coating and cutting
Outsourced

Apply varnish on PET film



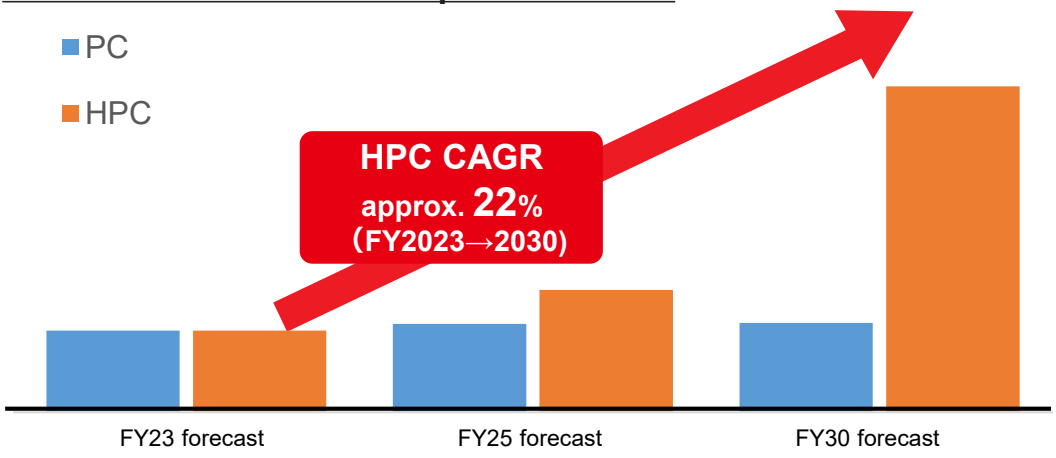
Stage 3: Warehouse storage
Outsourced

Packing (frozen storage)

- **While demand in the semiconductor market is currently undergoing adjustment, we expect continuous growth until 2030. We plan to actively invest in increased production (approximately 25 billion yen from FY2023).**
- **Our new varnish manufacturing factory will enable highly efficient production by adopting a partially automated system (smart factory) and by scaling up single batches.**

2. Semiconductor Market Forecast
Market Forecast (Semiconductor Device Shipment Volume)

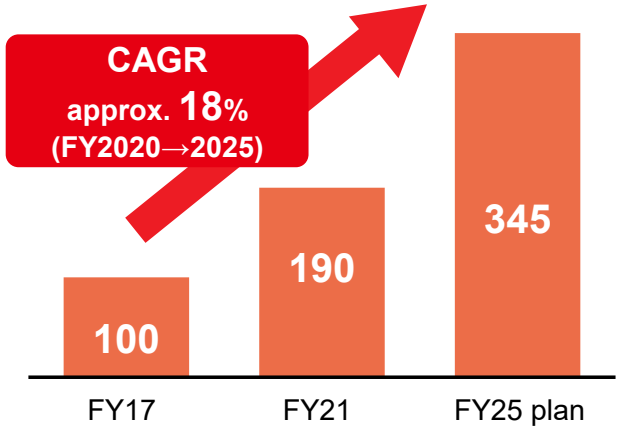
Semiconductor device shipment volume



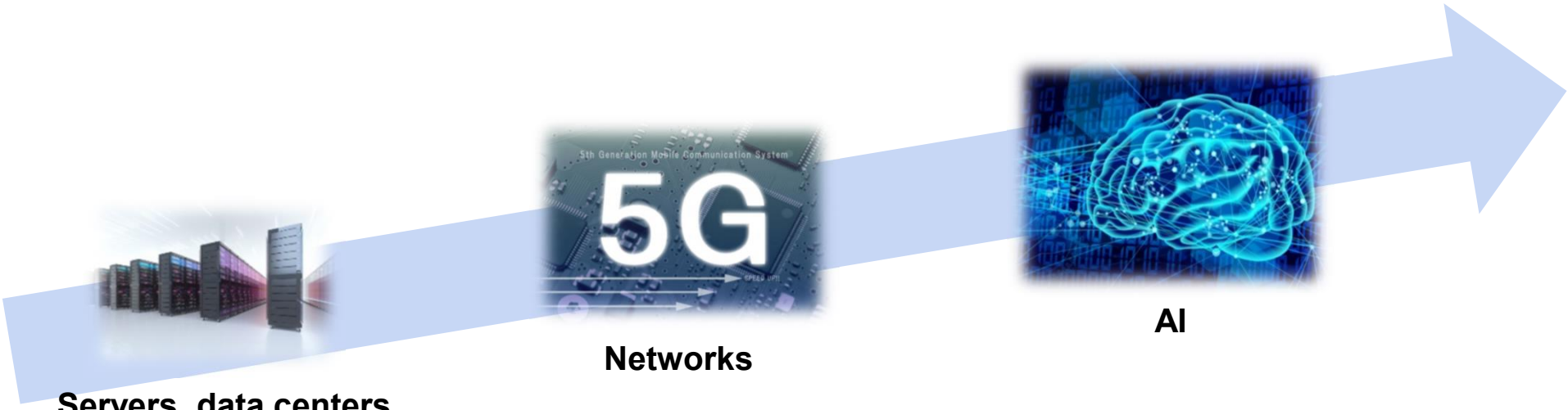
Estimate with FY2023 shipment volume set to 100

Estimate by Ajinomoto Co. based on "In-depth analysis of semiconductor package and module substrate-related markets" (2022), Fuji Chimera Research Institute

***Ajinomoto Build-up Film*® (ABF) shipment volume**



Estimate with FY2017 shipment volume set to 100



Servers, data centers

Networks

AI

HPC applications used in telecommunications and information infrastructure will be a strong driver of ABF demand.

2. Semiconductor Market Forecast

Drivers of ABF Demand

PC

HPC
(High-performance Computing)

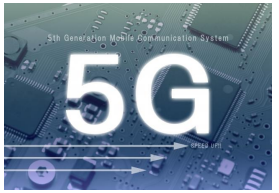
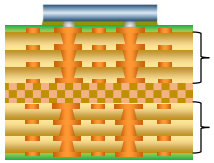
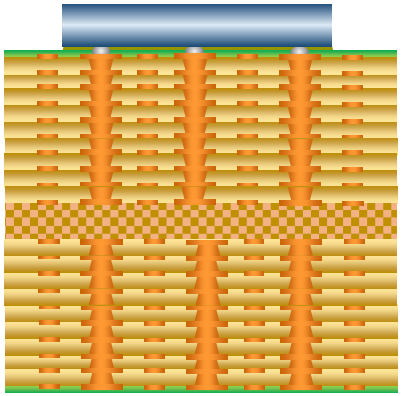


Illustration of substrate cross-section



ABF 3 layers

ABF 3 layers



ABF 9 layers

Uses 10 times the ABF

ABF 9 layers

Substrate area index: 1
Uses a total of 6 layers of ABF

Substrate surface area index: 3.5
Uses a total of 18 layers of ABF

Autonomous driving, deep learning, and natural language AI are expected to drive increases in high-performance CPUs. High-performance CPU substrates use over 10 times more ABF than substrates for PCs.

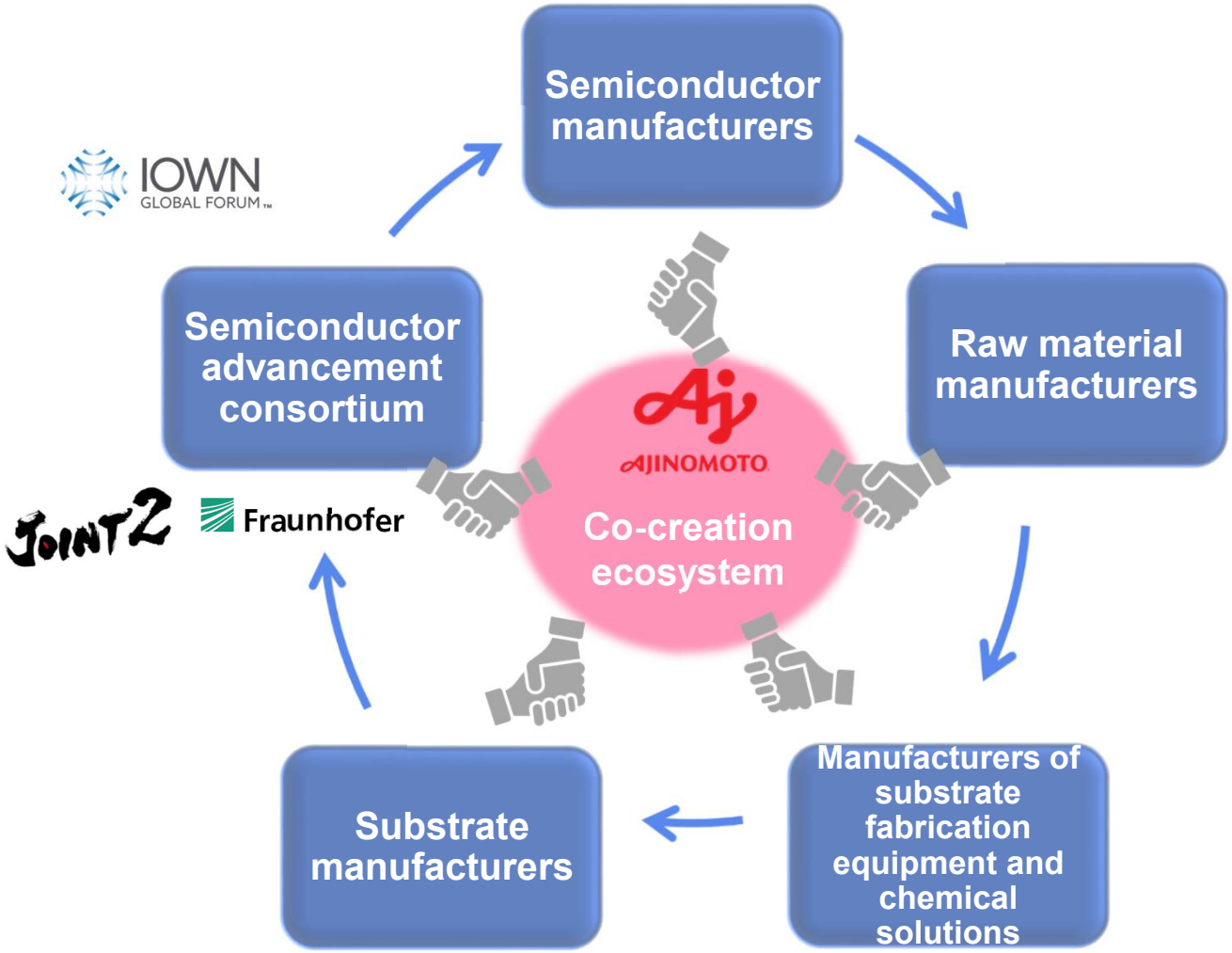
HPC will drive demand for ABF through the double effects of quantity and the amount of ABF used.

3. Competitive Advantage in ICT

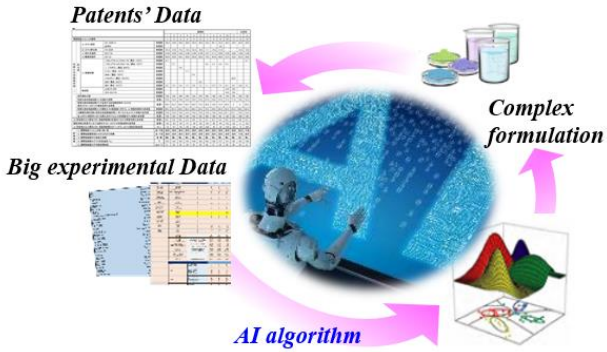
Rapid Development System

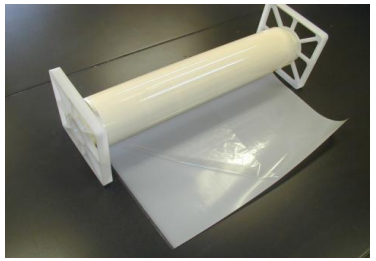
Utilizing the strength of ABF as the de facto standard, players in the semiconductor development value chain are coming together to evolve semiconductors. Amid this, we will maintain and extend the position that we have built with ABF.

Semiconductor development value chain



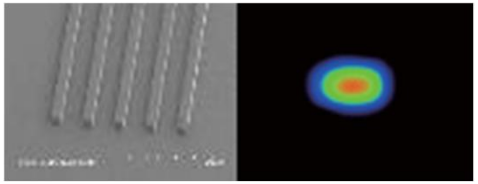
Artificial Intelligence (AI)
Materials Informatics (MI)





Next-generation ABF

Photonics-electronics convergence

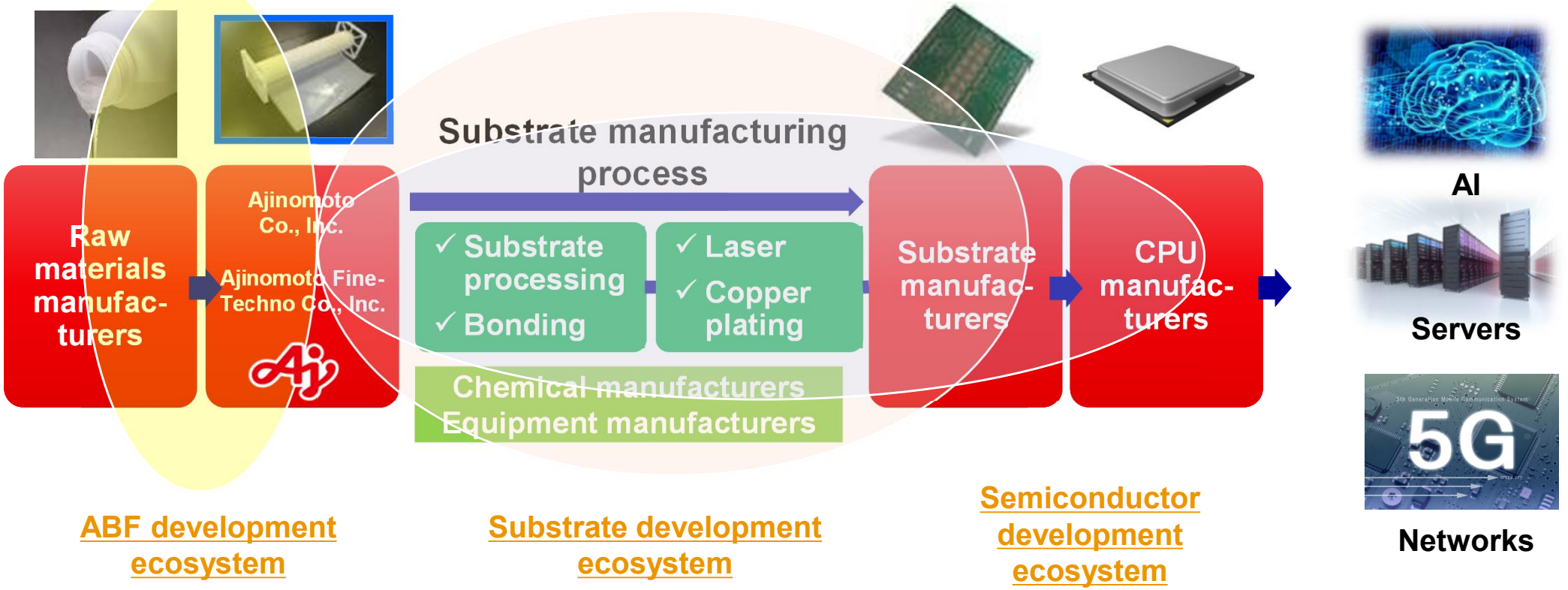


3. Competitive Advantage in ICT

The Co-creation Ecosystem for ABF

Co-creation ecosystem that ABF achieves with BMX*

*Business model transformation

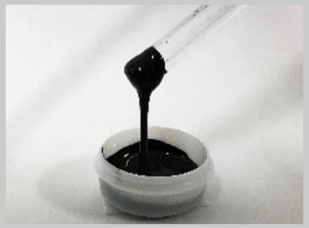


We will extend BMX (development in a co-creation ecosystem), utilizing the strength of ABF as the de facto standard.
BMX reinforces the competitive advantage of ABF.

3. Competitive Advantage in ICT

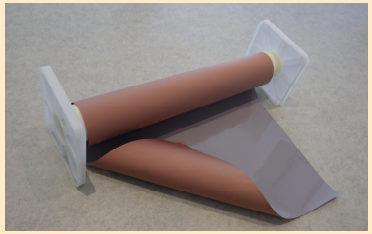
Deployment of ABF Core Technologies

Magnetic materials



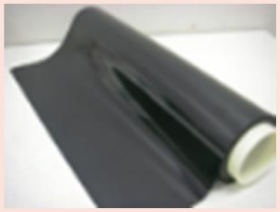
Contribution to lower energy usage

ABF-RCC



Contribution to miniaturization

Molding materials



Contribution to high reliability

Magnetic fillers

Copper foil

high loading of filler

ABF core technologies based on "AminoScience"

We hold high-value patents in wide-ranging technologies, constructing barriers to entry

Prospects for ABF

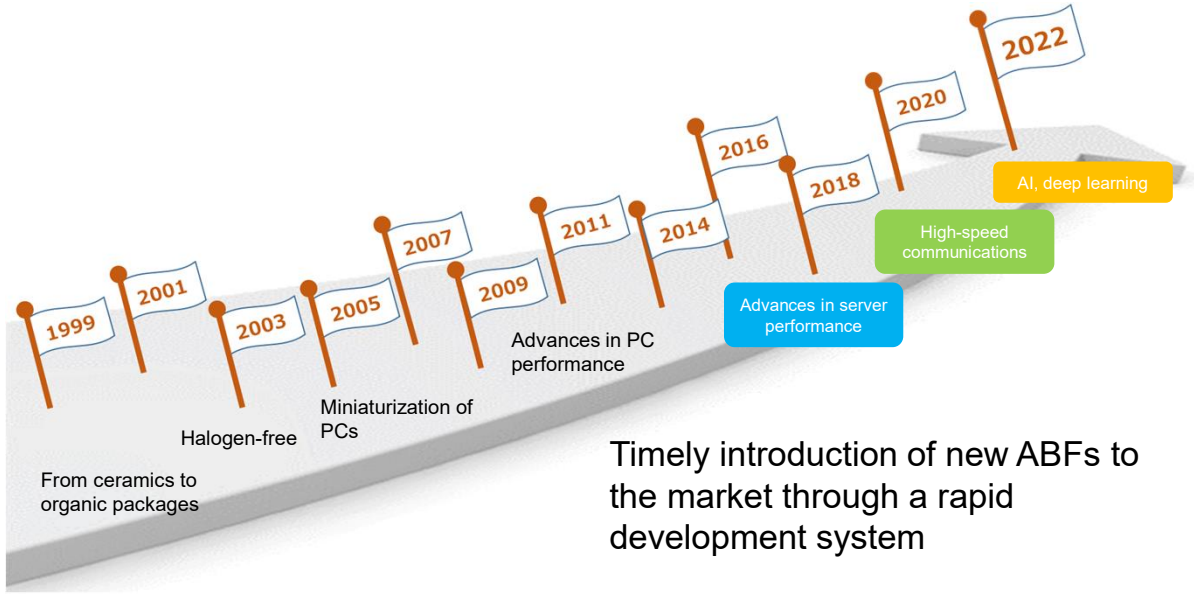
Strengthening of medium- to long-term development and co-creation structure

New research building established in 2022

- Closer communication with customers
- Introduction of the most recent substrate manufacturing equipment
- A space for open innovation

We will further accelerate rapid development through BMX (co-creation ecosystem) to achieve medium- to long-term stable growth.

State of adoption by major semiconductor manufacturers



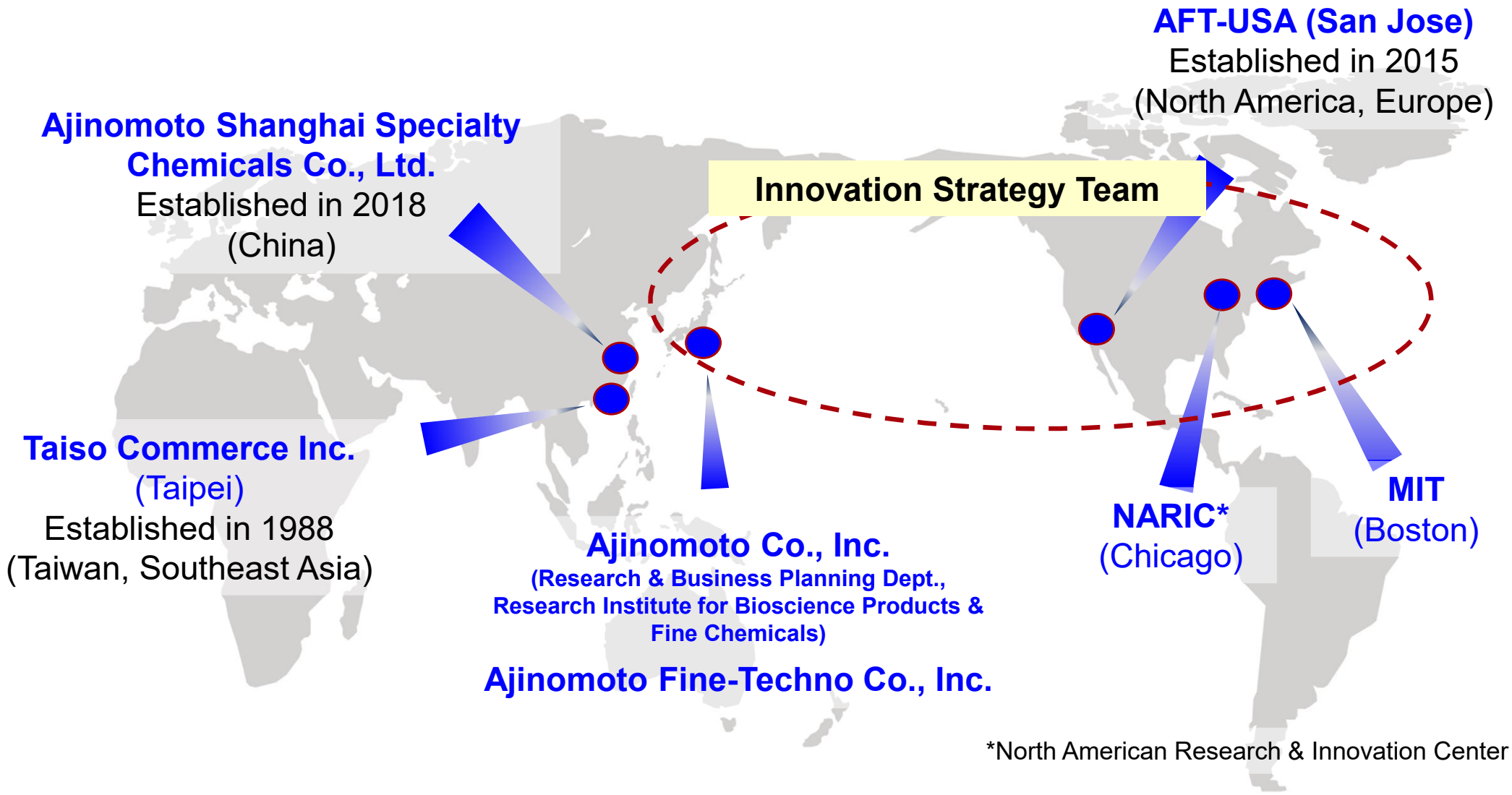
Timely introduction of new ABFs to the market through a rapid development system

- The unique properties of ABF have contributed to the evolution of semiconductors for over two decades
- ABF is the de facto standard material consistently used in semiconductor package development

We will continue to secure continued adoption through BMX and will continue contributing to the evolution of ICT modalities.

4. Medium- to Long-Term Business Strategy in ICT

Strengthening Our Global Network



*North American Research & Innovation Center

Ability to achieve BMX closely tied to customers through the use of global talent

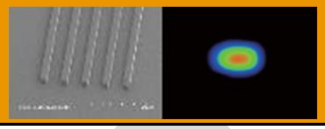
4. Medium- to Long-Term Business Strategy in ICT

Next-Generation Areas Targeted in ICT

By providing key materials through a development and co-creation ecosystem centered on ABF and technologies based on "AminoScience," we will contribute to the achievement of advanced IT modalities and future society.

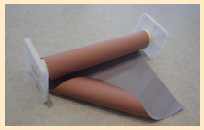
"AminoScience"-based technologies

Next-generation materials



Magnetic materials

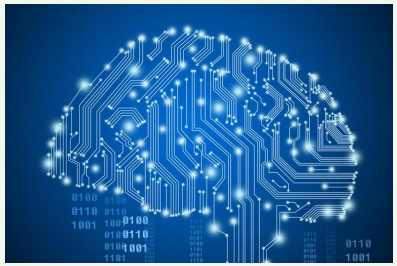
ABF-RCC



Molding materials

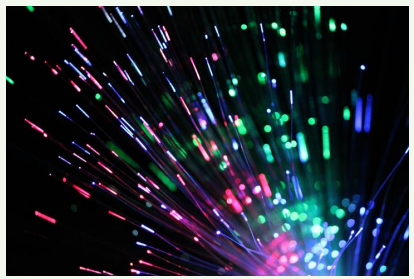
ABF

Advanced IT modalities



Neuro-computing

Quantum computing

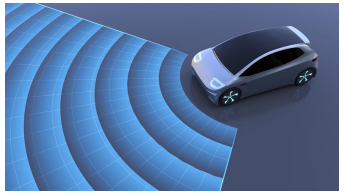


Optical computing

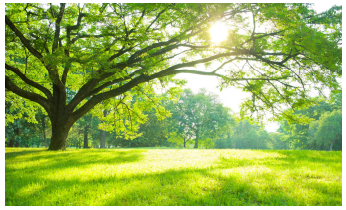
Future society

High-speed communications

Smart cities



Autonomous driving



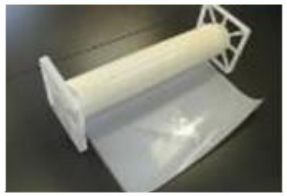
Decarbonized society

4. Medium- to Long-Term Business Strategy in ICT

Contributing to Society through ASV

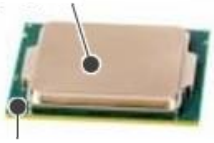
We will achieve energy conservation in electronic devices through ABF and magnetic materials, greatly contributing to the reduction of CO_2.

Ajinomoto Build-up Film® (ABF)



Reduction of electric signal transmission loss

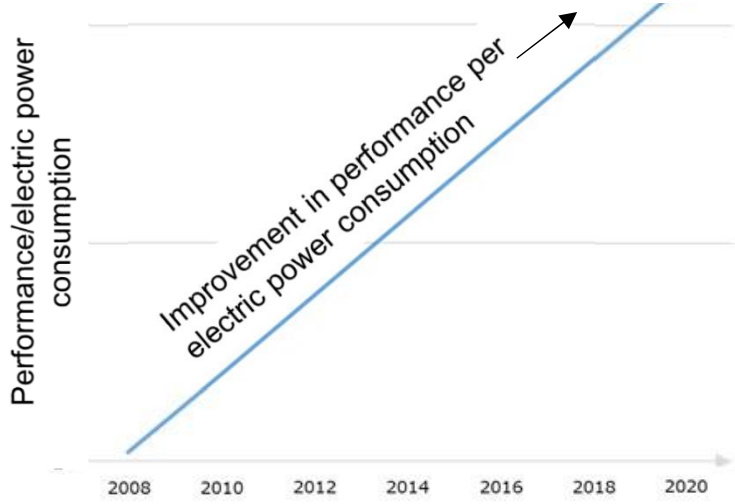
IC chip



Semiconductor packaging substrate

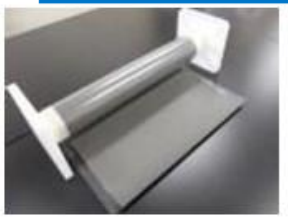
Greater energy conservation in semiconductor packages

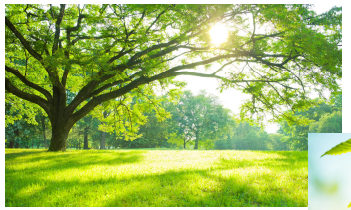
Trend of logic semiconductor performance per electric power consumption



Reference: Summarizing CPU and GPU Design Trends with Product Data' Yifan Sun, et al.

Magnetic materials *AFTINNOVA®*





While growing our business through ICT, we will contribute to people's well-being.

Eat Well, Live Well.

AJINOMOTO®

- Forward-looking statements, such as business performance forecasts, made in these materials are based on management's estimates, assumptions and projections at the time of publication. A number of factors could cause actual results to differ materially from expectations.
- This material includes summary figures that have not been audited so the numbers may change.
- Amounts presented in these materials are rounded down.
- “AminoScience” is a trademark of Ajinomoto Co., Inc registered in Japan.