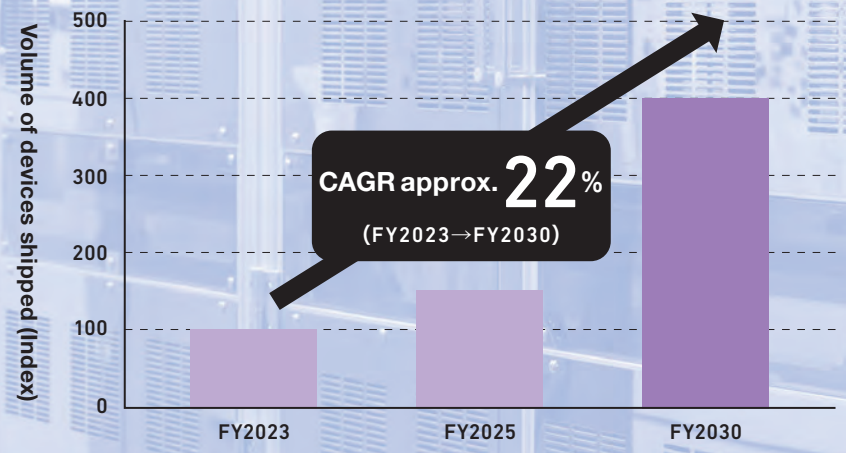
ICT

# ABF: The semiconductor insulator film that has become a global standard

**Ajinomoto Build-up Film® (ABF) continues to achieve high levels of growth as the de facto standard in the semiconductor market, which is anticipated to reach ¥100 trillion in 2030. What is the secret behind its overwhelming dominance?**

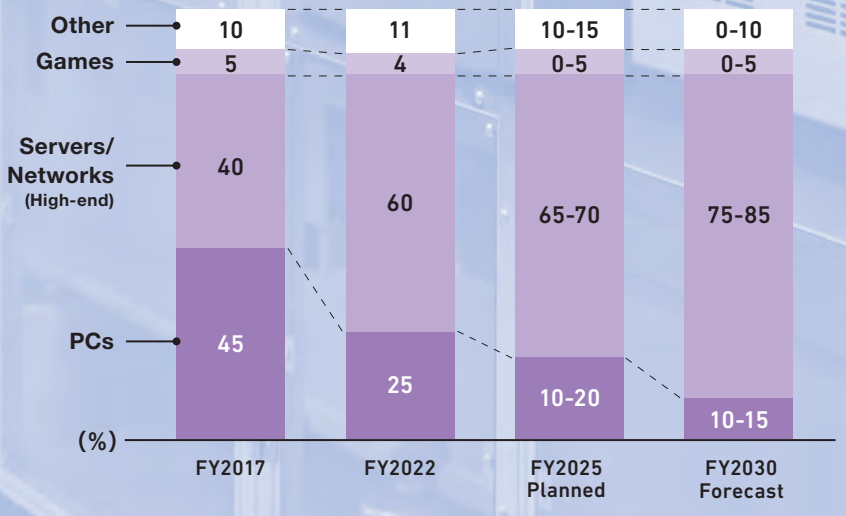
**[Growth of the HPC* market (devices)]**




Source: Fuji Chimera Research Institute, Semiconductor packages/Module substrates In-depth analysis of related markets 2022 Edition

* High-performance computing

**[Trends in volume by ABF application]**




* Ajinomoto Group estimates

## What strengths have led to the continued use of ABF in the semiconductor industry for so many years?

The semiconductor market is expected to reach ¥100 trillion in 2030, with digital technologies centering around semiconductors forming a foundation for our everyday lives, as well as being essential to achieving progress and building a technologically advanced future. Against this backdrop, Ajinomoto Build-up Film® (ABF) continues to achieve high levels of growth as the de facto standard in the semiconductor market. ABF from Ajinomoto Fine-Techno Co., Inc., has won acclaim as an essential insulation material for the high-performance CPU packages that are the heart of today's PCs.

While it may seem somewhat incongruous that the Ajinomoto Group makes materials that form part of a semiconductor package, these materials were created based on "AminoScience," which is the result of our research on amino acids. The Group first turned its attention to curing agents for epoxy resins and associated functionality in the 1970s, using our knowledge of amino acid technology, and has continued with research at the fundamental level. The need for new types of insulating materials grew in the 1990s as CPUs became increasingly highly integrated, and major semiconductor manufacturers adopted ABF as the Group took on the difficult task of switching from ink-based insulation material to film. That switch saw ABF gain instant access to the market.

The strength of ABF lies in its ability to handle the constant increase in CPU capabilities, and in the Group's ability to rapidly develop products that meet the needs of our customers. Another strength of the Group lies in our ability to enter the development and manufacturing sites of our customers, allowing us to maintain our position as a partner in the creation of new value.

Going forward, the IoT[*1] is expected to facilitate the high-speed exchange of large volumes of information between both people and things, helping the formation of a highly advanced information-based society, and creating new value. Accordingly, the markets for both semiconductors and semiconductor packaging are expected to grow even further, and the manufacturing processes and materials supporting them are also expected to grow more sophisticated.

The Ajinomoto Group has based its development of ABF on a strongly held vision of contributing to the growth of a smart society. Looking to the future, we will continue to work as a member of an ecosystem that is essential to the industry, helping create the technologies our customers need. The Group is actively engaged in working in other new domains in addition to ABF. We hope that you will continue to watch us as a leading innovator in this industry.

**Cross-sectional image of a package substrate**


*1 Performing automatic recognition, control, and remote measurement, etc. by connecting various objects to the Internet or communicating with each other by using communication functions

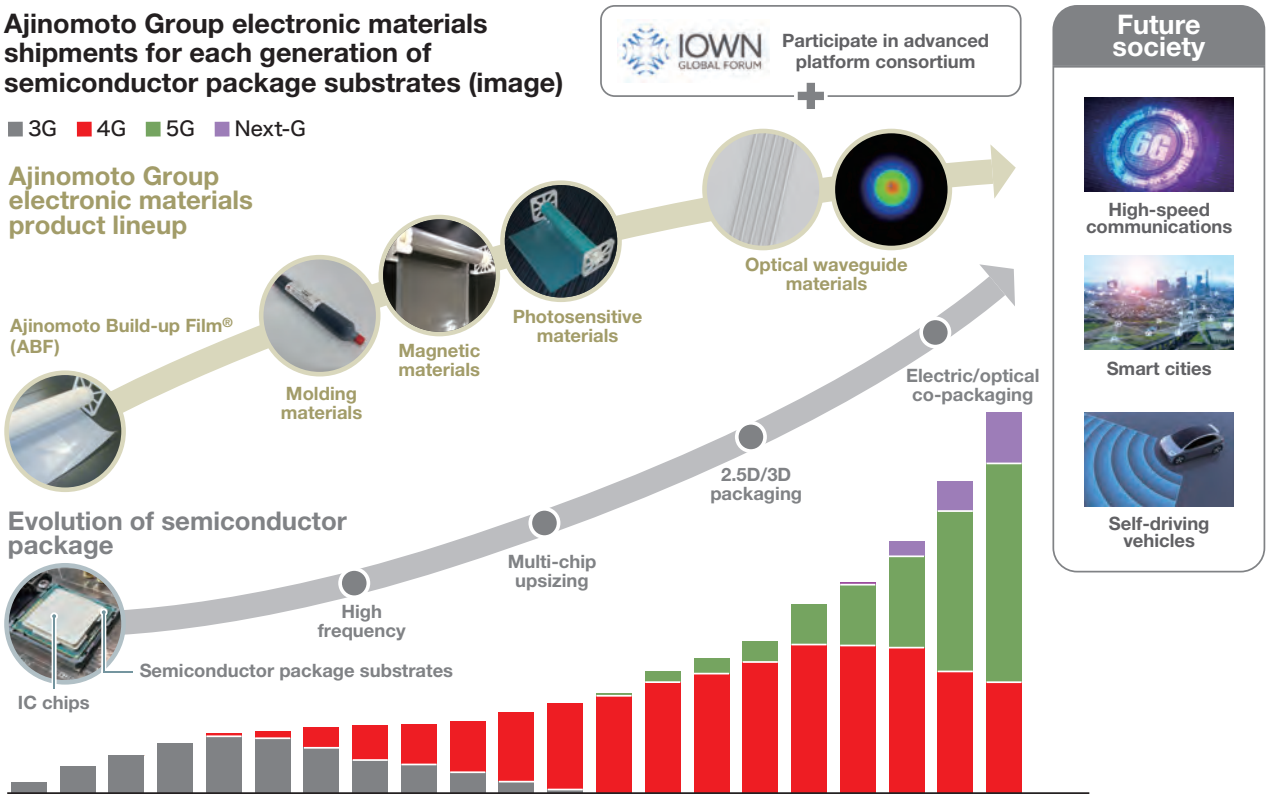
ICT

# An image of the future in the ICT area

**Future society will be supported by highly developed ICT. We will contribute to the realization of a future society using the wealth of knowledge that the Ajinomoto Group has cultivated through ABF development, etc., based on “AminoScience.”**

It is predicted that the society of 2030 and beyond will be a smart society, in which people and things are interconnected, supported by highly developed ICT, a society in which people are freed from physical handicaps and limitations. In order to acquire the technologies needed to bring that future to reality, such as the optical waveguide technologies that enable low power consumption and high-speed communications, advanced technologies such as bioelectronics that link living organisms to devices, and advanced semiconduction packaging materials that make low transmission loss possible, the Ajinomoto Group will work in close cooperation with leading companies and participate in academia and consortiums, leveraging its unique network to create customer value quickly.

In the future, we will continue to use our development co-creation ecosystem to provide key materials based on “AminoScience,” helping to bring to reality a future with a decarbonized society, and 6G next-generation communications networks along with smart cities and self-driving vehicles that make use of them.



## Why is the technology of the Ajinomoto Group needed in an era of intense competition for semiconductors?

### Tadashi Kamewada

**U.S.-based semiconductor consultant**
**AZ Supply Chain Solutions**

After joining the Japanese subsidiary of a major U.S. semiconductor manufacturer, moved to the company's U.S. headquarters in 1997, where he managed supply chains for package substrates, back-end materials, and other equipment. He is currently active as a business consultant in the semiconductor industry.

Boasting a market share of close to 100% worldwide, Ajinomoto Build-up Film® (ABF) continues to achieve high levels of growth as the de facto standard in the semiconductor market. How did ABF achieve this dominance so quickly? We asked semiconductor consultant Tadashi Kamewada about the strengths and future potential of this material.

**Q What were your initial impressions on the potential of the switch to film from ink-based insulation material?**

"With the intensifying competition in the mid-1990s, insulating films were groundbreaking because of the reliability of the products using them, as well as the cost reductions, manufacturing process efficiencies, and miniaturization they offered. I first encountered the Ajinomoto Group in 1998, when I was working for a major U.S. semiconductor manufacturer. When I was introduced to them, I was surprised that the Group was making semiconductor materials. We evaluated the material thoroughly over three years before deciding to adopt it, and all of the employees involved in its development were outstandingly patient and responsive."

**Q What points allowed ABF to revolutionize the market so quickly?**

"In the semiconductor world things are only on or off. Once the decision has been made to adopt ABF, it is used in all CPUs of that generation. Even major competitors are wary of entering this niche market. Although it was a late starter, there was no substitute for ABF, and it immediately captured the market."

**Q What are the merits of the rapid development capabilities of the Ajinomoto Group?**

"Although it's the norm today for semiconductor manufacturers to team up with materials suppliers and substrate makers, ABF pioneered this approach, offering greater ability to address issues during manufacturing development, and ultimately allowing rapid development of CPUs. Once good team relationships have been established it is difficult to gain entry later. There is also the benefit of being able to keep pace with clients over the long term."

**Q How do you feel about innovative technology at the Ajinomoto Group?**

"In the semiconductor industry we are constantly holding technology meetings with our business partners based on a roadmap for the future. In my view, when making next-generation products, the Ajinomoto Group offers timely provision of parts and materials that meet the needs of our customers, and also adds high performance and flexible processing."

**Q What was your impression of the Ajinomoto Group as a business partner?**

"The Ajinomoto Group, including its engineers and sales personnel, is very good at building relationships for co-creation. What's more, they appear to have accumulated a great deal of knowledge related to materials development. Semiconductors feature a range of materials, and thus complex adjustment is needed to ensure that the component materials are compatible with each other and provide acceptable performance. To that end, the Ajinomoto Group possesses a library of accumulated knowledge that allows prompt handling of complex adjustment. The extensive expertise they have acquired through ABF development is truly amazing."

**Q Looking to the future, what role do you think the Ajinomoto Group will shoulder in the semiconductor industry?**

"The current focus of the industry on back-end packaging should make ABF even more important as a core substrate material. The increasing sophistication of semiconductors brings with it a growing need for ABF, which will make it even more influential in the future."