

Materials for the AI Era

Special Feature | Advanced Materials Supporting the AI Era

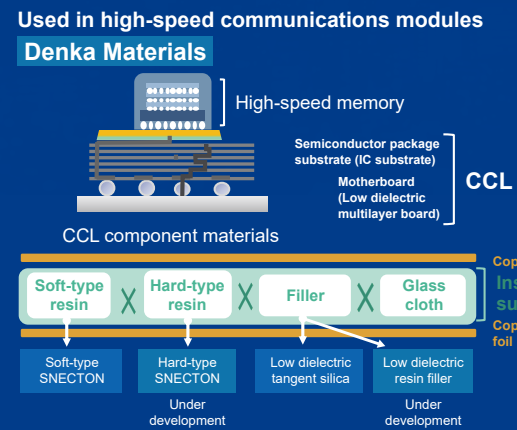
—SNECTON, Spherical Silica, and Spherical Alumina—
 —Denka Materials for Low Dielectric Loss and Heat Dissipation—

Evolution of AI/High-Speed Communications and Denka's Thermal Management Technologies

PCs and smartphones have become indispensable in our daily lives, increasing the importance of the communications systems that support them. As next-generation communications offering ultra-high speeds, multiple concurrent communication, and low latency become more widespread, the development of AI servers, data centers, and telecommunications base stations is accelerating, driving growing demand for higher-capacity, higher-speed data communications. The electric circuit boards that support these systems are formed using copper-clad laminates (CCLs) as base materials, with electrical characteristics that determine the quality of communications. Advances in high-speed memory are also increasing the importance of materials with low dielectric properties. To meet these increasingly sophisticated needs, we use our thermal management expertise to provide not only resins with excellent electrical properties, but also fillers that impart heat dissipation and low-loss characteristics.

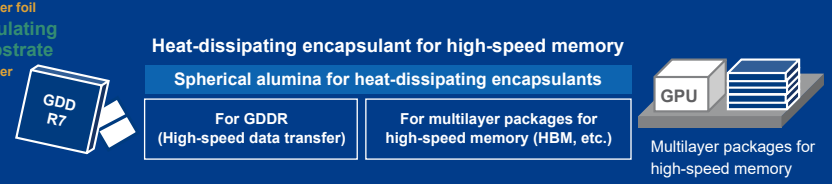
Copper-Clad Laminates (CCLs): SNECTON and Spherical Silica

The insulating layer of a CCL mainly comprises four components: soft-type resin, hard-type resin, filler, and glass cloth. To achieve high-speed communications such as AI applications, these component materials require exceptionally low dielectric loss tangent characteristics. We market SNECTON as a soft-type resin and low dielectric-loss-tangent silica as a filler. SNECTON is also under development as a hard-type resin, enabling us to provide solutions in three of the four component areas. We are also developing a new organic low dielectric resin filler to expand our filler lineup **P19**. Our ability to approach the market with both organic and inorganic materials is one of our strengths.



High-Speed Memory: Spherical Alumina

Our spherical alumina lineup includes products with a wide range of particle sizes. By optimally combining these products, we can propose formulations that deliver high heat dissipation. We are also able to produce fine powders that support semiconductor miniaturization, giving us comprehensive capabilities not available at other companies. Leveraging these strengths, we are focusing on sales for use in multilayer packages such as GDDR, HBM, and other products where demand is expanding.



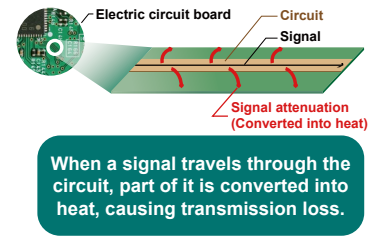
SNECTON (Launched in February 2025)



Denka's SNECTON is a resin material equipped with electrical properties including a low dielectric constant and low dielectric loss tangent, allowing it to reduce transmission loss^{*1}.

^{*1} Transmission loss: A phenomenon in which part of an electrical signal is converted into heat and lost as the signal travels through an electric circuit board. As communication speeds increase, transmission loss can cause greater signal attenuation and increased power consumption. It is one of the key challenges in achieving high-speed, high-capacity communications.

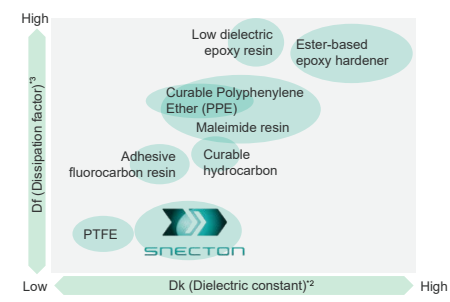
Mechanism of transmission loss



Strengths of SNECTON Outstanding Electrical Properties "Low dielectric properties" and "Workability"

Low dielectric properties: Its low dissipation factor is comparable to or better than that of PTFE (fluorocarbon resin), the highest-performing product currently available.

Processability: The material can be laminated and also offers excellent heat resistance and adhesion to copper foil.

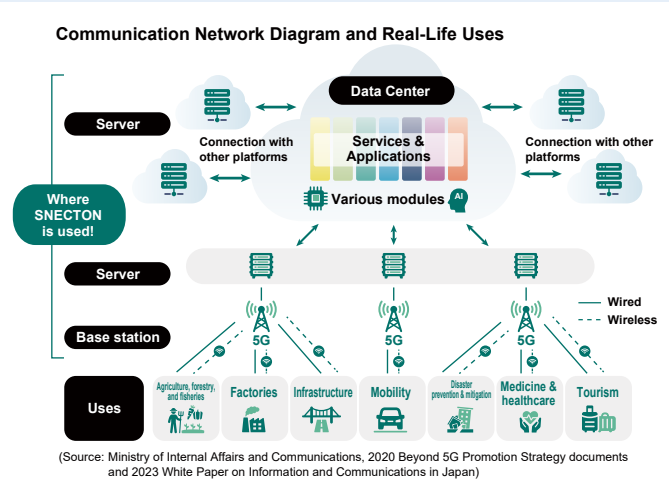


^{*2} Dielectric constant: A value that represents how much an electric signal polarizes (becomes unevenly distributed) within a material as it travels along wiring. The lower the dielectric constant, the faster and more accurately signals can be transmitted.

^{*3} Dissipation factor: A value that indicates how easily electrical energy is lost (the degree of attenuation) as an electrical signal passes through a material. The lower the dissipation factor, the less likely the electrical energy of a signal is to be converted into heat, allowing the signal to be transmitted efficiently over longer distances. This is a particularly important performance indicator for high-performance, large electric circuit boards.

Leveraging SNECTON's Strengths for Data Centers

SNECTON is expected to be mainly utilized in the motherboards for data centers, cellular base stations, AI servers, etc., and it is currently being tested in copper-clad laminates (CCLs), flexible copper-clad laminates (FCCLs), and various interlayer insulation materials. Of these applications, Denka is focusing on data centers as a new target market, where, in addition to the previously mentioned issue of transmission loss, heat dissipation is also a major challenge. Compared to other materials, SNECTON can reduce the dielectric loss of CCLs by 30 to 50%, and by reducing transmission loss, it is therefore expected to contribute to addressing both heat dissipation and electricity cost issues across entire data centers.



Dedicated SNECTON Manufacturing Plant Completed
Establishing Mass-production Capacity to Meet Expanding Demand

In response to the rapid growth of the market, in May 2026 we completed a dedicated SNECTON manufacturing plant at the Chiba Plant, representing a total investment of approximately 7 billion yen, and established a full-scale mass-production system. With this plant now in operation, we have established a stable supply system capable of supporting customers' mass-production schedules amid the anticipated growth in demand. This investment goes beyond responding to growing demand—by strengthening supply capacity, it will further enhance the foundation of the business. Going forward, we will closely monitor market trends and customers' adoption plans, develop an optimal production and supply system, and link these efforts to sustainable business growth.



Exterior of the SNECTON manufacturing plant

[Facility Overview]
Location: Denka Company Limited's Chiba Plant
(6 Goiminamikaigan, Ichihara City, Chiba Prefecture)
Details: SNECTON manufacturing plant
Investment: Approx. ¥7 billion

Phase 2 Plan

Supply key materials for thermal management and establish them as de facto standards in cutting-edge fields



SNECTON

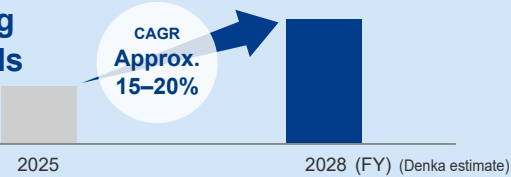
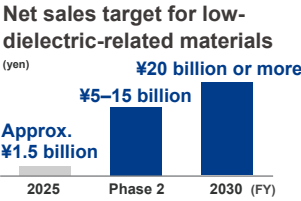
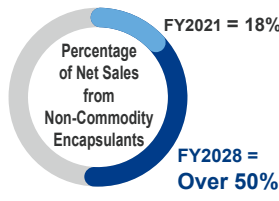
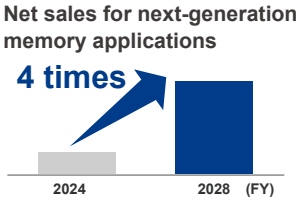


Spherical silica



Spherical alumina

Market for heat-dissipating and low dielectric materials for AI data centers



Strategies for Each Product

For data centers, cellular base stations, AI servers, and other applications
Soft type: Mass production through operation of the dedicated plant
Hard type: Explore deployment in high-value-added applications where SNECTON's advantages can be maximized

Low-dissipation-factor grade
In addition to data centers, cellular base stations, and AI servers, focus on optical ferrule applications

Heat-dissipating encapsulants
Meet steady demand for GDDR7 applications
Focus on customer evaluations of next-generation GDDR grades
Develop new grades, in addition to securing adoption for new multilayer high-speed memory package applications (including HBM)

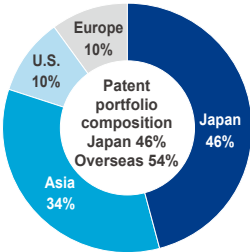


PICKUP

Intellectual Property × SNECTON
—Intangible Assets in a Growth Area—

Three-way Collaboration Driving the SNECTON Business
(Intangible Assets in the Form of Human Resources)

In the SNECTON business, a next-generation growth driver, Denka is making maximum use of intangible assets and building a foundation for strategically generating earnings. At the current business creation stage, based on the resource-based view, the business division, R&D Division, and Intellectual Property Division are working as one integrated team to promote patent applications with the global market in mind. Across a wide range of areas, including copolymers, compositions, and formulations, we have filed patent applications covering our proprietary and surrounding technologies (more than 150 applications across individual countries) and obtained patent rights (a 100% patent allowance rate as of June 2026), thereby creating barriers to entry.

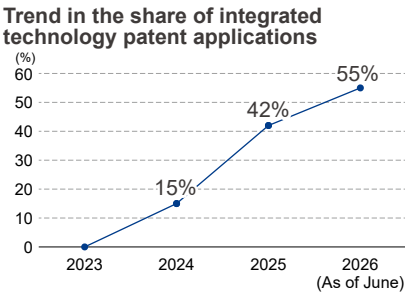


Company-wide Collaboration and Expansion into Integrated Technologies (Intangible Assets as an Organization)

The business division, R&D Division, and Intellectual Property Division meet twice a month to keep the latest technology trends, business strategies, and intellectual property activities constantly aligned. This collaboration has evolved into a company-wide framework involving our production and R&D sites. Through this framework, we pass on SNECTON's core technologies and expand into integrated technologies that combine them with fundamental technologies such as various fillers, thereby continuously expanding our business domains.

Strategic Approach in Coordination with Management and Business Divisions (Intellectual Property Strategy)

Rather than limiting intellectual property activities to the acquisition of rights, we formulate strategies through IP landscaping (IPL) using business frameworks such as 3C analysis, Five Forces analysis, and the product life cycle analysis. By analyzing the market environment and competitive trends from multiple perspectives, we have established a framework that enables us to propose intellectual property strategies to business divisions and management. In particular, with reference to the Intellectual Property and Intangible Asset Governance Guidelines (published by the Cabinet Office), we are identifying and organizing the strengths of our current and future businesses. We are working on "backcasting patent applications" to close the gap between the intellectual property and intangible assets that currently underpin our competitive advantage (current state: As Is) and those that must be developed to secure a competitive advantage in the future (Denka's vision for the future: To Be). Based on this approach, we have designated integrated technologies that combine "low dielectric properties" and "high heat dissipation," which will become increasingly important as integration density and operating frequencies rise, as a priority area and are building an intellectual property portfolio in this area.



- Toru Arai**
Fellow, Business Promoting Department, Electronics and Innovative Products Division
- Shunichi Sugawara**
Section Manager, Intellectual Property Department, New Business Development Division
- Hitoshi Kaneko**
Intellectual Property Department, New Business Development Division
- Masaru Hasegawa**
Group Leader, Advanced Polymer Research Department, Denka Innovation Center, New Business Development Division
- Toshiaki Nagumo**
General Manager, Intellectual Property Department, New Business Development Division
- Yuki Hisha**
Section Manager, Business Promoting Department, Electronics and Innovative Products Division

Long-term Intellectual Property Investment and KPIs Supporting Competitiveness (IP KPIs)

To firmly establish SNECTON's competitive advantage, we will continue making long-term investments in intellectual property. We have set ambitious IP KPIs to continuously increase patent applications from both "offensive" and "defensive" perspectives, and accelerate the development of a patent network with strong deterrent power. Specifically, we have set targets to increase the number of patent applications year on year and to raise the foreign filing ratio for SNECTON-related applications by 15 percentage points above the company-wide average (approximately 45% in 2025), thereby positively supporting global business expansion. We have also set a target of 90% for the use of accelerated examination, aiming to accelerate business expansion and stabilization through the rapid acquisition of patent rights.

1 Number of patent applications
Increase year on year

2 Foreign filing ratio for SNECTON-related applications
+15%
Compared with the Company-wide average (2025: Approx. 45%)

Strongly support global business expansion

3 Use of accelerated examination
90%

Promote early business launch and stabilization through rapid acquisition of rights

Promote the development of a patent network and business growth by setting ambitious IP KPIs

Brand Strategy (IP Mix)

In addition to a patent strategy for protecting technologies, we are promoting an "IP mix" combining patent and trademark strategies. By establishing SNECTON as a product brand, we are increasing its market recognition and reliability and contributing to long-term enhancement of corporate value.



Registered trademark No. 6803909

Future Development of Low Dielectric and Heat Dissipation Materials

Low Dielectric and Heat Dissipation Materials

SNECTON (organic)

Boron nitride (BN) (inorganic)

Spherical silica (inorganic)

Spherical alumina (inorganic)

Under development

Low dielectric resin filler (organic)

Expand the Lineup

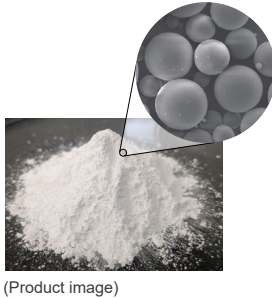
Sequentially develop grades with different characteristics, including product form and glass transition temperature

Providing Integrated Solutions to Meet Increasingly Sophisticated Demand

We are focusing on expanding SNECTON and related low dielectric materials into a wider range of applications. Demand for SNECTON's dielectric properties is expected to grow further, with applications envisioned in printed wiring boards and next-generation semiconductors. To address a broad range of applications, we will sequentially develop a variety of grades and expand our lineup, including integrated solutions with spherical alumina, spherical fused silica, and boron nitride.

Under Development: Low dielectric Resin Filler

We are developing a low dielectric resin filler by combining our proprietary resin design technology with fine-particle control technology. Compared with spherical silica, a typical inorganic filler, this technology features a low dielectric constant (low Dk), low dielectric loss tangent (low Df), and low specific gravity. By significantly reducing signal transmission loss and delay in high-frequency bands, the filler can reduce power consumption and help make entire modules lighter in applications such as servers, communications infrastructure, mobile devices, and automotive boards. We expect it to be used in a wide range of applications, including printed wiring boards and advanced package substrates. As a manufacturer with expertise in both resins and fillers, we will also strengthen our solution business through co-creation with customers and aim to achieve sustainable growth and establish a competitive advantage in the next-generation electronic materials market.



Applications in Printed Wiring Boards and Next-generation Semiconductors

Printed Wiring Boards

Market trends

High-speed communications

Low dielectric loss tangent (Df)

Applications for Denka products

SNECTON

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Spherical silica

Low dielectric resin filler

Shape variations tailored to applications, including flexible and rigid materials

Low dielectric loss tangent

Low dielectric loss tangent and low thermal expansion

Main applications

Copper-clad laminates

Flexible copper-clad laminates

Interlayer insulating material

Next-generation Semiconductors

Market trends

Higher speed

Low dielectric loss tangent (Dk)

Higher integration and miniaturization

Heat dissipation and low thermal expansion

Applications for Denka products

HBM

Interposer

Package substrates

Spherical alumina

Boron nitride (BN)

SNECTON

Spherical silica

Heat dissipation properties, low thermal expansion, and dielectric properties

Surface-treated spherical nano-BN (heat dissipation)

Thermal conductivity and electrical insulation

Dielectric properties (low dielectric loss tangent, low dielectric constant)

Lamination processability and heat resistance

Low thermal expansion and dielectric properties