

Developing New Businesses

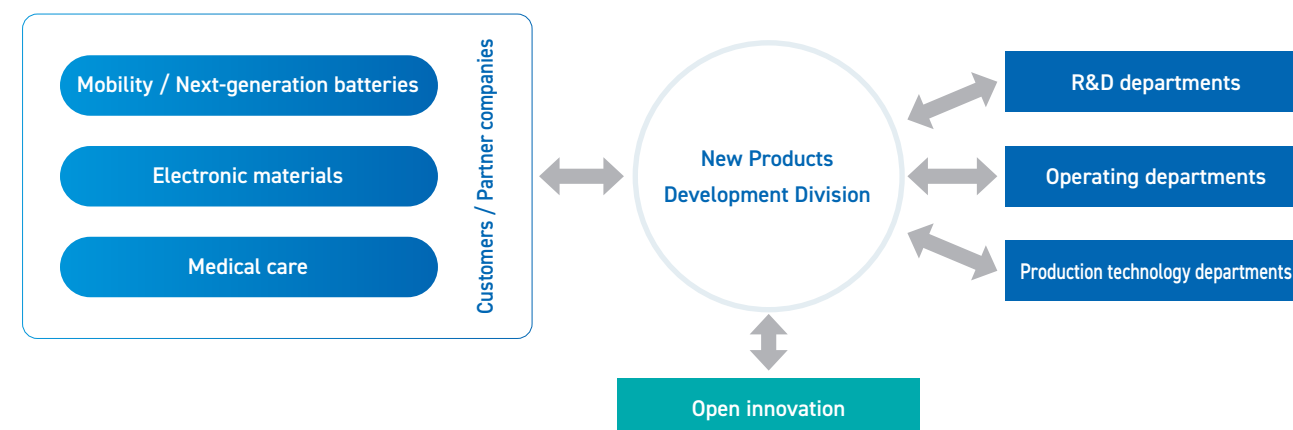
The New Products Development Division is engaged in the research and development of innovative chemical materials that pave the way to the future. Our mission is to provide new value to our customers and society focused on three key focus areas: mobility, electronic materials, and medical care. Using our core technologies in the areas of molecular design, compounding, and analysis, we explore innovative ideas and pursue the highest quality, providing high-value-added products that meet the sophisticated demands of our customers.

We especially value close connections with our customers and aim to propose order-made solutions that quickly and accurately address their needs. Diverse human capital from our R&D departments, operating departments and production technology departments work as a unified team to strengthen collaboration with our partner companies and research institutions, utilizing open innovation to achieve early output for each research theme while continuing to take on challenges aimed at achieving a sustainable society.



Executive Officer, General Manager,
New Products Development Division
Toshiaki Takei

Role of the New Products Development Division



CASE 1 Outer lens for LiDAR

ARONIX Sheet

Light Detection and Ranging (LiDAR) is a next-generation sensing technology that uses laser light to detect objects several hundred meters away even in dark locations. It has begun to be used in a wide range of fields to expand autonomous driving in automobiles, robotics, and other applications. ARONIX Sheet is a high-quality sheet created by newly developing proprietary reaction control technology and three-dimensionally cross-linking the acrylic special oligomer "ARONIX," which is normally used in adhesives and coating agents at the thicknesses of several microns, into a plate form. It combines excellent laser light transmittance, environmental durability, and resistance to cracking to maximize LiDAR performance. With adoption in Japan as the starting point, global expansion is accelerating. We are also promoting expansion into new applications such as smart glasses.



CASE 2 Developing dental bone filling materials using new materials

EGCG-modified gelatin sponge and β -TCP composite

The Company is working on the development of new dental bone graft materials by combining EGCG*-modified gelatin developed by Osaka Dental University and Kyoto Institute of Technology with β -TCP, a highly bioabsorbable material composed of calcium and phosphorus similar to bone. Dental bone graft materials are used in dental implant treatment to regenerate alveolar bone when bone thickness or height is insufficient and play an essential role in improving the success rate of implant treatment. The product under development is expected to improve convenience for dentists with its faster bone regeneration speed and superior usability compared to conventional products. Going forward, we will apply the sponge manufacturing technology we have cultivated over the years and aim for early commercialization.

*EGCG: (-)-epigallocatechin gallate

Schematic diagram of the preparation of EGCG-modified gelatin sponges (EGCG-GS) by aqueous synthesis

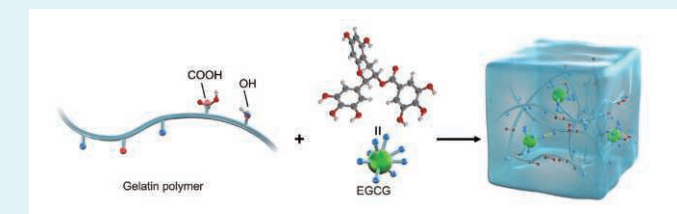
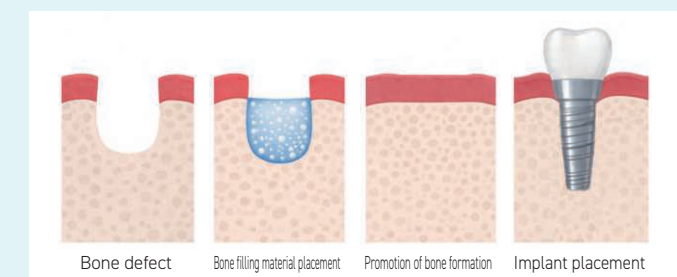


Diagram of alveolar bone regeneration and implant treatment with bone filling materials



CASE 3 Contributing to carbon neutrality in the mobility field

Solid electrolytes for next-generation batteries

To further expand the battery materials business, we are promoting the development of high ion-conductive solid electrolytes for all-solid-state batteries, a market that is expected to grow in the future. While leveraging our technological capabilities developed across our Group's extensive business scope, we are actively incorporating new technologies and working on the development of competitive solid electrolytes from both organic and inorganic materials. Organic materials such as organic crystals and polymers are being developed for practical use as gap fillers and binders in all-solid-state lithium-ion batteries. Meanwhile, oxide-based inorganic electrolytes for sodium-ion batteries have been successfully manufactured at pilot scale, and we are aiming for customer acquisition both in Japan and overseas by targeting applications not only in all-solid-state batteries but also as performance-enhancing materials for conventional liquid-electrolyte batteries.

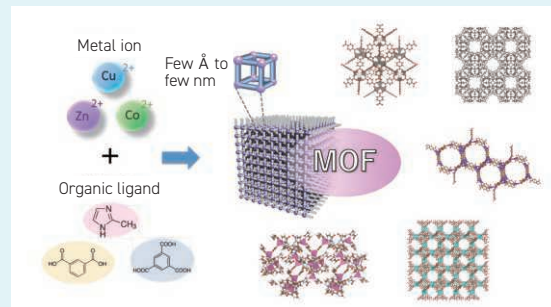


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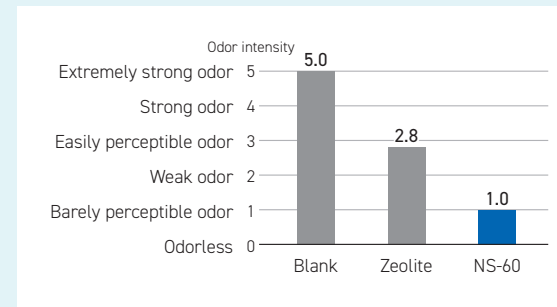
CASE 4 New deodorant developed from the porous material MOF**KESMON “NS-60”**

The Company markets the inorganic deodorant KESMON, which works through chemical adsorption, and it is widely adopted for deodorant textiles and nursing care products. We have developed the new deodorant KESMON “NS-60,” which is made from metal organic framework (MOF), a porous material that has attracted attention in recent years. “NS-60” demonstrates superior deodorizing performance against a wide variety of odors compared with conventional products and can be used for a broad range of applications, including odors from recycled resin. Going forward, based on the design and manufacturing technologies for inorganic functional products that we have developed, we will promote the synthesis and production of various MOFs and aim for social implementation and expansion of applications not only to deodorization but also to environmental purification, gas separation, and a variety of other fields. We believe we can contribute to solving social issues and sustainable growth through these R&D activities.

Diagram of MOF



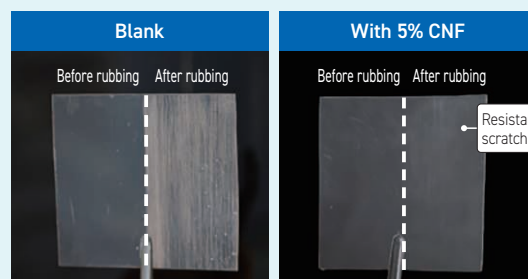
Deodorizing effect of KESMON “NS-60” on recycled resin odor

**CASE 5** Cellulose nanofibers (CNF)**Developing hydrophobic-modified CNF**

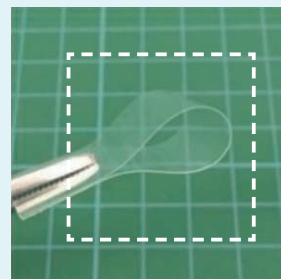
AronFibro T-OP100 (oxidized cellulose), which is currently on the market, leverages its characteristics of low viscosity and high concentration and is adopted for pigment dispersion applications such as paints. However, its use is limited to water-based materials because it is supplied with water as the dispersion medium. We have developed hydrophobic-modified CNF using our unique technology to expand the application of CNF. When incorporated into UV-curing resins, CNF with a diameter of several nanometers does not block light and improves the scratch resistance and bend tolerance of the resin after curing. In particular, it is expected to reinforce transparent materials (optical components, etc.), which have conventionally been difficult to reinforce. Furthermore, by taking advantage of CNF's low coefficient of thermal expansion, it is also expected to be applied to adhesives and other materials that exhibit minimal dimensional change due to temperature. In 2026 we will establish a sample evaluation system, obtain evaluations from many customers, and aim for early adoption.

Reinforcement for both hardness and flexibility

Improved hardness and scratch resistance of coating film



Bend tolerance also improved!



Hydrophobic-modified CNF

*Using polarizing plate

**Toward early output of development themes****Research Solution Department****Fusion of customer needs, and the Company's seeds and functions**

The Research Solution Department, operating under an organizational structure that integrates research, sales, and development functions, is promoting the discovery of high-quality new large-scale themes through the matching of market needs and the Company's seeds. By consistently handling everything from theme exploration to proposal, the department promptly identifies short-, medium-, and long-term high-value-added themes and quickly delivers outputs. Targeting growth fields such as semiconductors and mobility, it will roll out its core business products, including adhesives, polymers, ARONIX, and high-performance inorganic materials. The department is also actively advancing co-creation with major users and expansion into overseas markets. By accurately capturing the latest market trends and customer needs and creating valuable solutions with flexible thinking and a sense of speed, it will continue to contribute to business expansion and the development of new markets.

Productive Technology Innovation Center**End-to-end responsibility from early-stage research through basic planning for mass-production facilities**

The Productive Technology Innovation Center was established with two objectives: to facilitate the smooth scale-up and early market launch of new products, and to realize a next-generation operating model that combines competitiveness with stable operations, taking the integration of three electrolysis plants as a model case. As our R&D divisions work to create “No. 1” - “Only 1” products, numerous new materials have been developed using production technologies that are new to the company. To bring these new products to market rapidly through competitive manufacturing processes, the Center will adopt innovative approaches, establish a collaborative framework with the engineering and plant technology development divisions, and drive development by making active use of pilot facilities and full-scale production equipment at its plants. In the process, the Center will also nurture talent in process development and aim to become a core organization for the company's production technology.

Accelerating conversion of development themes to value at maximum speed**Research Solution Department****Fusion of customer needs and the Company's seeds**
Ability to capture the market

Creating valuable themes from a market-driven perspective

- Exploration of market needs
- Integrated organization of research, sales, and development
- Creation of large-scale themes
- Deployment in semiconductors and mobility
- Co-creation with overseas and major users

**Productive Technology Innovation Center****From process development to basic planning of mass production**
Capability to develop new materials

Establishing a competitive advantage through innovative processes

- Scale-up
- Building competitive processes
- From pilot to actual equipment utilization
- Collaboration between plants and engineers
- Next-generation operating model



Realizing maximum business speed

Early output