

# The Teijin Group's Innovations

## Frameworks for Creating Continuous and Genuine Business Opportunities and Accelerating Market Development

Envisioning tomorrow, the Teijin Group has continued to take on the challenge of creating products and services that will support the society of the future. As society undergoes a transformation at unprecedented speeds due to the evolution of technology, we will leverage the distinctive characteristics found in our diverse business fields of Materials, Healthcare, and IT. We will also tackle social issues head-on through our three solutions of "Environmental Value," "Safety, Security, and Disaster Mitigation," and "Demographic Change and Increased Health Consciousness." In these ways, we will support the society of the future.

The Teijin Group views innovation as a series of activities involved in building a business, ranging from product and service creation to profit making. In order to address social needs and issues from a global perspective, we aim to leverage the unique comprehensive strengths and agility of the Teijin Group. Drawing on our research and development (R&D) network, which comprises 12 R&D laboratories overseas and 12 in Japan, we are invigorating our organization by strengthening collaboration between Group companies. At the same time, we are incorporating frameworks to accelerate innovations by respecting the diverse backgrounds of all employees and enabling them to exercise their individual abilities while

fostering a sense of Groupwide unity. Additionally, we are striving to reinforce our R&D capabilities through the utilization of IoT monitoring technologies, AI technologies, and materials informatics (MI). We are also actively leveraging collaboration not just within the Group but also with external organizations. Through these means, we are working to spur innovation at a greater pace than ever before.

Under the Group's intellectual property (IP) strategy, we identify core areas that have the potential to become the competency of each business based on the results of our detailed analysis of the external business environment and strategically acquire intellectual properties accordingly. By doing so, we have established a robust intellectual property portfolio that helps us secure our competitive edge. For our analysis of intellectual property information pertaining to the creation of business strategies, we incorporate IP landscapes and other methods and actively make use of ICT tools to conduct an analysis on technological trends and overall competitiveness based on both patent and non-patent information. We then make efforts to ensure that the results of this analysis are used to facilitate business-related decision-making.

## Developing Technologies and Markets to Support the Society of the Future

### ● Environmental Value Solutions

The Teijin Group is striving to tackle various issues with a view to realizing a sustainable world. To that end, we are working to reduce CO<sub>2</sub> emissions by developing high-performance lightweight materials and components geared toward aircraft and automobiles that help lower fuel consumption. For example, we develop lightweight fiber-reinforced plastic components with high tenacity as well as tire cords with high tenacity and high rigidity. We also develop such materials as high-performance fibers used as friction materials in the braking systems of automobiles. For promoting the development of lightweight materials related to next-generation automobiles, we established Teijin Automotive

Center Europe GmbH (TACE), which handles such functions as the design of automotive composites as well as the planning and prototyping of multi-materials, in Europe, an environmentally advanced area. As for efforts toward clean energy, we are engaged in the development of lightweight hydrogen pressure vessels and pipelines, in addition to materials and components for next-generation batteries. Also, we are working to address technological issues related to the recycling of chemicals and composites. As part of these efforts, during fiscal 2020 we plan on establishing a development base in Europe focused on eco-friendly fields. In this way, we will further aim to contribute to the development of a circular economy.

### ● Safety, Security, and Disaster Mitigation Solutions

We are taking steps to ensure the safety and peace of mind of people and local communities. In terms of technology related to earthquake countermeasures, we are promoting the development of high-tenacity, highly flexible aramid fibers and carbon fibers for use as reinforcements to enhance the earthquake resistance of concrete structures. In addition, we engage in the

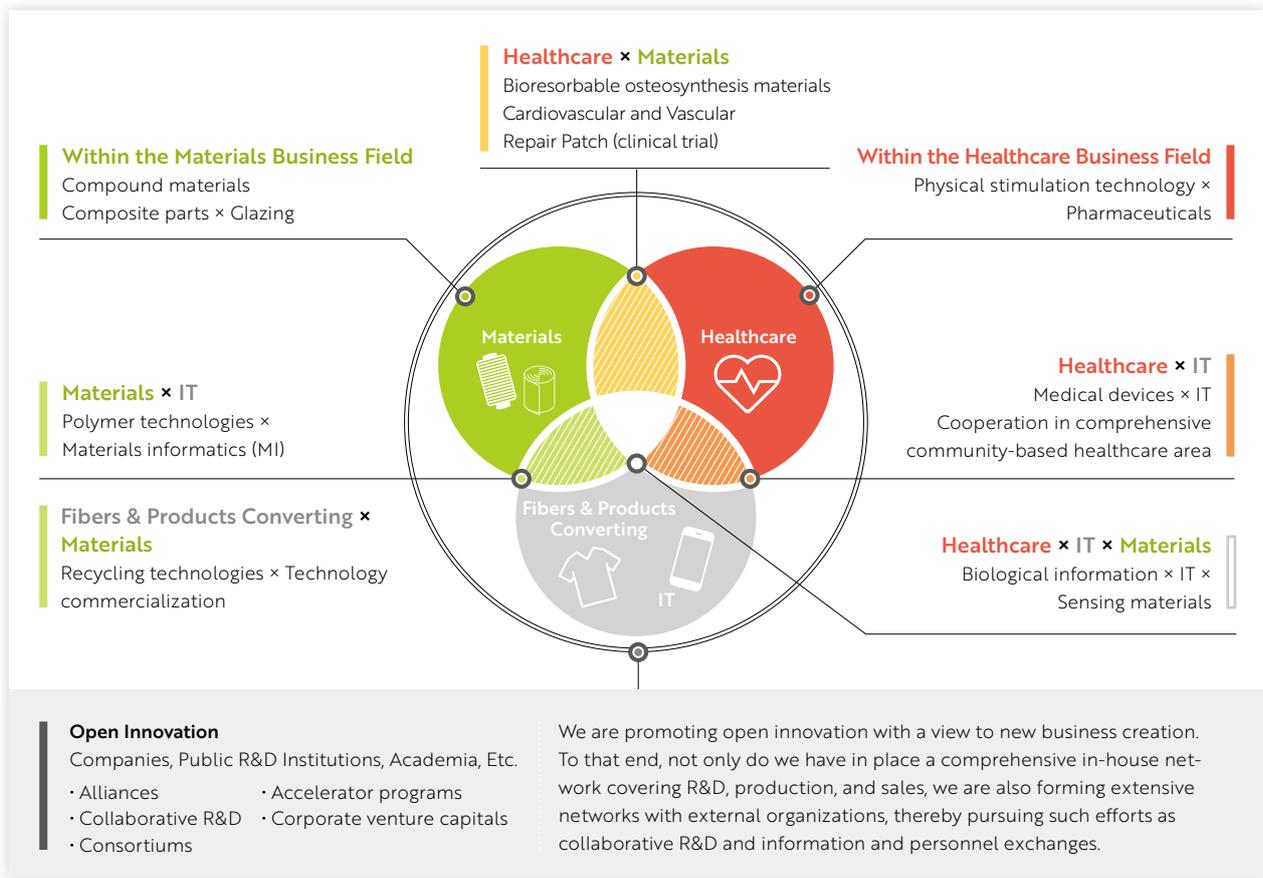
manufacture and sale of aramid fibers with outstanding flame resistance, which are used in fireproof clothing to protect firefighters. At the same time, we leverage IT technologies and sensing technologies to develop firefighting uniforms that help avoid the risk of heatstroke. Through such efforts, we are further pursuing the shift toward high-performance materials.

### ● Demographic Change and Increased Health Consciousness Solutions

To support healthy and comfortable lifestyles, not only do we promote R&D activities on pharmaceuticals, home healthcare devices, and artificial joints, we also put our long-cultivated technologies and know-how into practice to develop functional food ingredients, which are not covered by medical insurance. Furthermore, with the aim of building community-based healthcare platforms, we have established a 24-hour call center, in-home nursing care stations, and *VitalLink* (an information sharing system for team-based healthcare). Through such efforts, we are evolving our highly unique home healthcare platforms. By expanding these platforms to cover areas ranging from

pre-symptomatic care to healthcare, rehabilitation, and nursing care, we are striving to develop a lineup of products and services that corresponds to the health conditions of various people. Moreover, as the value of healthcare solutions rises around the world through the combination of products and services and digital technologies, in April 2020 we decided to launch and invest up to approximately US\$90 million in Medtech Convergence Fund, a U.S.-based healthcare venture capital fund, in order to strengthen long-term partnerships aimed at expanding the Healthcare Business in the global market. Through this investment, we will promote joint incubation activities and aim to further revitalize R&D functions for creating innovative healthcare products and services.

## Enhancing Unique, Innovative Products and Services through Collaboration Within and Outside the Teijin Group



### Materials × IT

#### Polymer Technologies × Materials Informatics (MI)

Amid changes within the social environment, such as the evolution of mobility and the advancement of next-generation telecommunications, we are promoting a digital transformation even in our R&D activities so that we can accurately grasp the need for new materials and components that respond to these social changes and provide them accordingly. For example, we are promoting the development of materials and components that incorporate MI and other forms of information science. Also, to address the issues pertaining to the shift to lightweight and high-performance materials, we are leveraging not only the data we have accumulated in-house but also an abundance of external data as we strive to create new value while collaborating with external organizations.

### Healthcare × IT

#### Medical Devices × IT

In the field of comprehensive community-based healthcare, we are integrating IT technologies within our home healthcare platforms\*1 to reinforce community-based healthcare platforms that support healthy and comfortable lifestyles by forming connections between people and products and people themselves. Also, in addition to connections between people and products, we are aiming for the Internet of Customers, which forms connections with customers. With this goal, we are leveraging data pertaining to health and illnesses to promote the development of products and services that predict the onset of an illness and help prevent that illness from becoming severe. Furthermore, we are offering *Sleep Styles*, a sleep

quality improvement program that utilizes online apps, to support corporate health management.

### Healthcare × Materials

#### Cardiovascular and Vascular Repair Patch (Clinical Trial)

We are working to develop a Cardiovascular and Vascular Repair Patch\*2 in collaboration with Osaka Medical College and Fukui Tateami Co., Ltd. This patch represents an innovative medical device that integrates our long-cultivated orthopedic implantable device technologies with advanced fiber technologies and biocompatible polymer technologies. Through implantation of the Cardiovascular and Vascular Repair Patch into the affected area of a patient's heart or vascular wall, the absorbable portion is replaced with the patient's own tissue. Furthermore, as the patch has a structure that is able to grow naturally, it is expected to help reduce the risk of reoperation.

### Healthcare × IT × Materials

#### Biological Information × IT × Sensing Materials

We are rolling out the *MATOUS* brand as a comprehensive wearable solution that enables the highly accurate sensing of the heart's electrical signals, heartbeat, and amount of physical movement on a continuous basis through the integration of high-performance fibers and sensing technologies. We are utilizing this effort to promote rehabilitation in medical and health fields, improve health through exercise, and implement sports training. Also, in labor-related fields, we are working to make use of this effort in the reduction of labor burden and the acquisition of technical skills.

\*1 Nationwide sales and service network comprising 2,000 personnel, a 24-hour call center, in-house nursing care stations, and *VitalLink* (an information sharing system for team-based healthcare), etc.

\*2 Clinical trial launched in 2019