

# N ext

## Next-Generation Products & Solutions

### Management Approach

With the Sumitomo Rubber Industries' R&D organization and facilities at the core of our efforts, we promote R&D activities in a wide range of fields related to the Tire, Sports, Industrial and Other Products businesses in close cooperation with subsidiaries and affiliates around the world.

The intellectual capital accumulated through such activities becomes the driving force that generates products with competitive advantages as well as new growth.

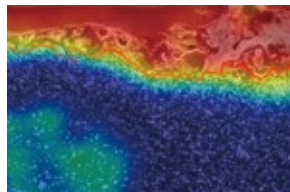
## Joint Research Involving Industry-Academia Collaboration

The Sumitomo Rubber Groups is engaged in the development of new technologies via participation in industry-academia collaboration involving universities boasting cutting-edge technologies. Some of our research results have garnered external academic recognition and been featured in globally prominent science magazines and databases.

### Results of Joint Research on AI Technology That Accelerates the Development of New Technologies to Extend the Longevity of Tire Performance, Published in Nature Index

A sponsored article introducing the results of our joint research with Hokkaido University involving the utilization of AI has been published as part of a special feature on materials science on the website of Nature Index, which is one of the world's leading databases of research results.

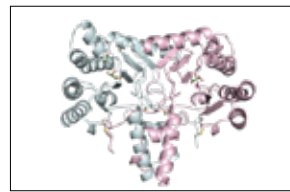
The use of AI allows for analysis at a level of precision that is well beyond human capabilities, making it possible to extrapolate rubber properties from electron microscope imagery. Currently, this technology is being applied to the development of Performance Sustaining Technology, one of the SMART TYRE CONCEPT technology elements.



### Elucidating the Structure of Tomato Enzymes (Similar to Natural Rubber Synthases)

Through joint research undertaken with Tohoku University, Kanazawa University and RIKEN, we have elucidated the structure and succeeded in the functional modification of an enzyme (NDPS1) that is found in tomatoes and that has a similar structure to the enzymes involved in the biosynthesis of natural rubber. It is our hope that the above findings regarding the structure of NDPS1 will make it possible to shed further light on the mechanisms behind the biosynthesis of natural rubber, which, in turn, will allow for new advancements in the development of technologies to ensure a stable and reliable supply of natural rubber.

The results of this research were published in *The FEBS Journal*, which is a leading international journal in the field of life sciences.

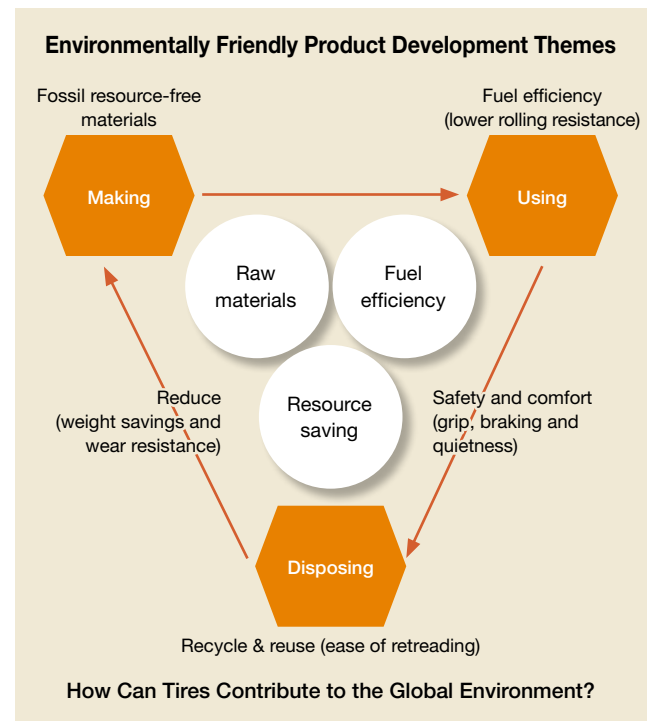


### Developing New Technology to Estimate Tire Wear Utilizing Tire Internal Power Generation Technology

We have been working with Kansai University on the joint development of an innovative technology that harnesses the rotation of tires to generate electricity. The technology employs a static-based power generation device installed inside tires.

Specifically, our verification testing revealed that sensors installed around tires can be sufficiently powered by such a device without batteries. The output and performance of the device is enhanced via the optimization of frictional electrification structures and materials along with the incorporation of charging functions. Furthermore, we developed a method for estimating tire wear levels and calculating tire contact footprint through the analysis of a voltage waveform arising from the power generation device. In addition to opening up the door to various applications for tire solutions services, these new technologies are sure to provide a wealth of know-how that can be put to use in future tire development.

In addition, in recognition of these research efforts, we were chosen by the Disaster Mitigation Sustainable Technology Association to receive the Disaster Prevention and Mitigation Sustainable Grand Prize, Disaster Prevention, Disaster Mitigation and SDGs Prize and Japan Prize in the Academy & Junior Academy Category.



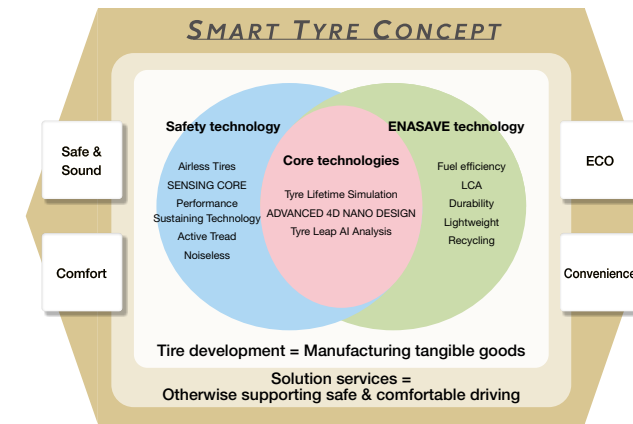
## Pursuing "Safety and Comfort," "Economy" and "Quality"

### SMART TYRE CONCEPT

We aspire to realize a society free of traffic accidents and, to this end, strive to create tires capable of changing the future. Guided by these aspirations, we developed the SMART TYRE CONCEPT. Amid the ongoing shift from car ownership to car

sharing and pooling, we are developing tires with ever better safety performance and environmental friendliness while enhancing the content of peripheral services.

#### SMART TYRE CONCEPT



With core technologies backed by simulations and AI-based analysis serving as a central component of the concept, we have created solution businesses in the course of advancing our tire development efforts employing safety technologies and ENASAVE technologies to pursue both driving safety and environmental friendliness. We will strive to deliver joy and well-being for all even as we give due consideration to environmental concerns.

#### Six Key Elements of the SMART TYRE CONCEPT

- Safety technologies**
- 1 SENSING CORE, making the tire itself a sensor**  
A groundbreaking sensing technology leveraging a unique algorithm that makes the tire a sensor
  - 2 Active Tread enabling the real-time adjustment of rubber functions**  
A technology capable of actively adjusting rubber functions in response to changes in road conditions
  - 3 Performance Sustaining Technology**  
A technology that restrains the alteration of and repairs rubber's inner structure to prevent performance deterioration due to degradation over time
  - 4 Airless Tires free of the risk of going flat**  
Development of GYROBLADE, a tire that has no need to be filled with air
- ENASAVE technologies**
- 5 Tire Life Cycle Assessment (LCA) improving environmental friendliness**  
Enhancement of environmental performance throughout the entire product life cycle to realize a recycling-oriented society
  - 6 Proposal of optimal tire maintenance** [▶ p. 27](#)  
Sensor-driven monitoring of tire pressure and temperature during driving and the utilization of data gleaned from sensors
- Solution services**

## Developing Environmentally Friendly Products

Sumitomo Rubber Industries aims to simultaneously realize the sustainable development of society and corporate growth for itself. In line with this aim, we promote the development of products friendly to the Earth's environment. After commencing the development of tires completely free of fossil resources in 2001, we completed "ENASAVE 100" in 2013, achieving the creation of a 100% fossil resource-free tire. In line with "Driving Our

Future Challenge 2050," our Long-Term Sustainability Policy established in 2021, we have also positioned the development of environmentally friendly products as an important initiative. Accordingly, our efforts to develop these products encompass all of our Tire, Sports and Industrial Products businesses, with an eye to achieving our targets for 2030 and 2050.

### DUNLOP "e. SPORT MAXX," the First Replacement Tires Released by Sumitomo Rubber Industries for EVs

For an EV to increase the driving distance achievable with one round of charging, it is necessary to reduce rolling resistance and curb energy consumption. Our "e. SPORT MAXX" has been made using our proprietary material development technologies, which have enabled the unique composition of the tire's rubber. Thanks to these technologies, this product achieved the highest level of fuel (energy) efficiency among our products while also realizing greatly improved wet grip performance and steering stability. Furthermore, we successfully decreased the weight of the tire itself, with the aim of saving resources used and contributing to the reduction of environmental burden. Not only that, the "e. SPORT MAXX" features on its side walls a logomark printed using "Nano Black," a proprietary black pigment application technology, as we pursued a design that makes it stand out.



### "XXIO GGC-X141," the First Standing Golf Bag Released by Sumitomo Rubber Industries Incorporating Recycled Polyester, Was Developed with Due Consideration Given to Environmental Friendliness

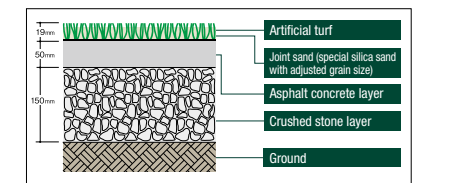
Polyester boasts superior strength while being lightweight. Due to these features, polyester is the best material for types of sports goods that are subject to rough usage. Although these features are unchanged for recycled polyester, the recycled material can often be contaminated by traces of foreign substances that could not be removed through the recycling process and result in uneven coloring of the finished product. Treating this unevenness in coloring as a positive, we have developed a unique design for "XXIO GGC-X141," with 95% of its outer materials composed of recycled polyester. The incorporation of recycled polyester into materials for caddie bags has made us a pioneer among golf gear makers that manufacture golf balls and clubs.



Waste materials set to be processed into recycled polyester

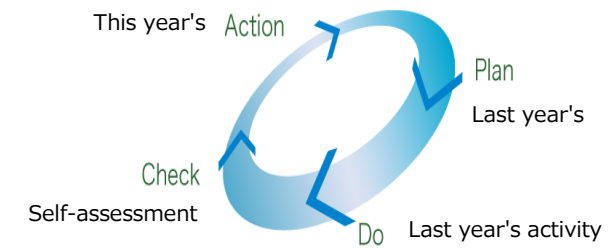
### "Omni Court XPH," Artificial Turf Incorporating Sand for Use on Tennis Courts


The artificial turf for sporting facilities is now considered a possible source of microplastic dispersion into rivers and the sea over time, due to the breakage of turf fiber and the leakage of rubber chips incorporated as fillers. Aware of this possibility, Sumitomo Rubber Industries is engaged in surveys and the planning of countermeasures. The "Omni Court XPH," artificial turf incorporating sand for use on the tennis court, uses a superior yarn that is 1.4 times as durable as its predecessor model (Omni Court XP). This durability helps curb the dispersion of microplastics. The development of this model has been registered with the "Plastic Smart" database developed by the Ministry of the Environment.



# Targets and Results

We verify results and set targets for the following year, based on the Group's activity guidelines "GENKI." Here are the goals and results we set for each item.



Plan Fiscal 2021 Target	GRI Guidelines	Do Fiscal 2021 Activity Result	Check Self- Assessment <sup>*1</sup>	Action Fiscal 2022 Target	Medium-to-long-term (2025) Targets
<b>⑪ Developing environmentally friendly products</b>					
Develop and market environmentally friendly products	302-5	<ul style="list-style-type: none"> <li>Released FALKEN "EUROALL SEASON AS210," the first tires to incorporate "CORESEAL," a technology that prevents air leakage, targeting the German market</li> </ul>	100%	Develop and market environmentally friendly products	 Product development staying a step ahead of times
<b>⑫ Pursuing "safety and comfort," "economy" and "quality"</b>					
Commercialize new technologies	416-1	<ul style="list-style-type: none"> <li>Released "DUNLOP WINTER MAXX SJ8+" studless SUV tires incorporating "nano dimpling rubber" and Liquid Farnesene Rubber, which together dramatically improve performance on icy roads</li> </ul>	100%	Commercialize new technologies	Providing new value in safety and comfort performance

\*1 Self-assessment uses comparison with baseline year (1 - reduction ratio) in the following formula to calculate the achievement rate:

$$\left( 1 - \left| \frac{\text{Baseline Value} - \text{Actual Value}}{\text{Baseline Value}} \right| \right) \times 100\%$$