



# Good Practices by Japanese Companies for Reducing Microplastics



**Ministry of the Environment**  
Government of Japan



2021 Edition

# Introduction

At the G20 Osaka Summit held in 2019, Japan presented the “Osaka Blue Ocean Vision,” which aims to reduce additional pollution by marine plastic litter to zero by 2050, and this vision has been shared with many countries and regions. Initiatives are also being advanced in order to achieve this vision.

At the Fifth session of the United Nations Environment Assembly (UNEA-5.2) in March 2022, a resolution was adopted on ending plastic pollution, including in the marine environment. An intergovernmental negotiating committee (INC) is convened to develop an international legally binding instrument. This resolution recognizes that plastic pollution includes microplastics.

Many technologies for reducing microplastics have yet to be established. Under such circumstances, in order to effectively reduce pollution, it is important to review such technologies and know-how possessed by companies from the perspectives of prevention, reduction, and collection of microplastics, and to disseminate the best technology and know-how available at the present time both nationally and internationally.

The Ministry of the Environment has been compiling a collection of good practices on the efforts and technologies of Japanese companies that contribute to the prevention, reduction, and collection of microplastics. This document is expected to encourage domestic efforts and help promote international measures against microplastics.

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Ministry of the Environment, Japan  
Office of Policies against Marine Plastics Pollution,  
Environment Management Bureau

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Adastria Co., Ltd.

## CASE 01

### Sale of FIBER HOLD BAG, a laundry net with an enhanced ability to reduce the outflow of fiber fragments

Using a laundry net when washing can prevent both damage to clothes and the outflow of plastic chemical fiber fragments. Adastria Co., Ltd. develops and sells FIBER HOLD BAG, a laundry net that reduces the outflow of fiber fragments by about 80% compared to laundry done without a net.

Standard laundry mesh nets have a hole size of about 0.7 mm, but the size of the holes in this net is 0.05 mm, allowing it to catch finer fiber fragments. Furthermore, by giving it a two-layer structure and attaching fasteners on the top and bottom, the fiber fragments accumulated on the inside remain in the net and do not return to the clothing, and this design allows clothing and fiber fragments to be easily removed separately. In order for this initiative to spread, the price has been set at an affordable 1500 to 2200 yen.



"FIBER HOLD BAG," a laundry net

#### Contact information

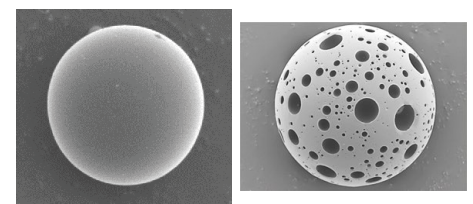
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Daicel Corporation

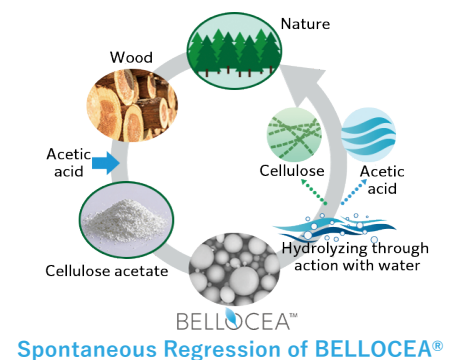
## CASE 02

### Development of substitute cellulose material with spherical particles for cosmetics use

Daicel Corporation is developing advanced spherical fine particles of cellulose acetate, which is a naturally recurring material manufactured from cellulose, as a replacement for the spherical particles (microplastics) used in cosmetics. Because the fine particles obtained through our original perfect sphere fine particle technology have a smooth surface and excellent sphericity, they can generally achieve the same functionality as conventional plastic fine particles while being eco-friendly. Additionally, the development of variations such as a porous particle with improved functions like a wrinkle blurring effect have further advanced its use in society.



Enlarged picture of "BELLOCEA®"



Spontaneous Regression of BELLOCEA®

#### Contact information

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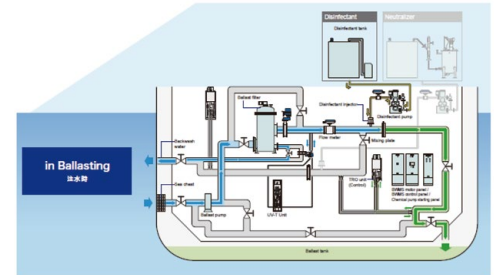
JFE Engineering Corporation

## CASE 03

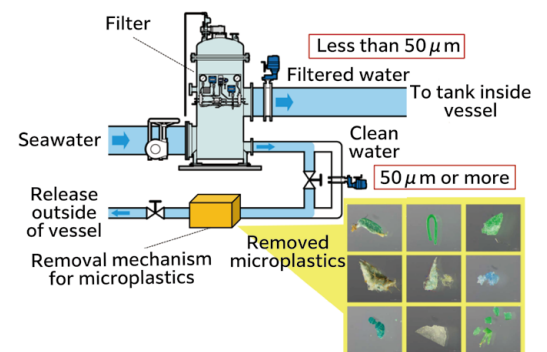
# Removing microplastics using a ballast water treatment system equipped with a filtration device

In order to balance vessels when they are empty, they take seawater (ballast water) into a tank inside the vessel and discharge it when the ship is loaded. Since organisms are dispersed through this ballast water and adversely affect the ecosystem, systems for detoxifying the ballast water are compulsory.

JFE Engineering uses a filter in its ballast water treatment equipment, “JFE BallastAce<sup>®</sup>,” to capture organisms 50 μm or larger before releasing the water into the raw water environment. Since the filter captures microplastics as well as organisms, we are currently planning a mechanism for removing these microplastics when the water is released.



Ballast Water Treatment System JFE BallastAce<sup>®</sup>



Details of microplastic removal parts

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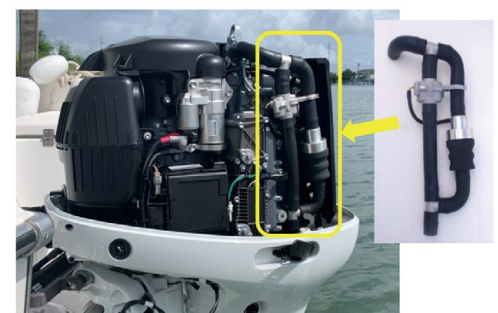
Suzuki Motor Corporation

## CASE 04

# Outboard motor micro-plastic collecting device

We focused on the structure through which outboard motors propel vessels pumping large amounts of water to cool the engine and returning the water after cooling it to develop a type of filter that can be attached to the return water hose and collect microplastics.

Because this device utilizes the water that is returned after it cools the engine, it does not affect the cruising performance of the outboard motor. The filter can easily be replaced by opening the engine cover, allowing for the continuous collection of microplastics. In addition to microplastics, we have also collected fishing lines and the like.



Outboard motor equipped with a micro-plastic collecting device



Examples of vessels to which it can be installed  
Outboard motor boats  
(Targets: pleasure boats, fishing boats)

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Spiber Inc.

## CASE 05

# Practical development of artificial protein fibers

As one type of bioplastic, protein materials are attracting attention as a new option. This is because (1) they can be produced via a fermentation method that uses microorganisms, so their primary materials do not rely on fossil resources and are highly biodegradable, and (2) various properties can be imparted by controlling the ratios and arrangement of the amino acids.

Spiber Inc. is leading the world in the practical development of artificial protein fibers by collaborating with THE NORTH FACE to launch products, and it began operations at a plant in Thailand for producing raw protein materials in 2021.



Practical development of artificial protein fibers

### Contact information

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Sumitomo Rubber Industries, Ltd.

## CASE 06

# Making a practical system for controlling microplastic migration from artificial turf

Sumitomo Rubber Industries, Ltd., in cooperation with Nishinomiya City in Hyogo Prefecture, performed a demonstration test last February for controlling microplastic migration from artificial turf for sports. Based on the results, a request was received from Yamanakako village in Yamanashi Prefecture last November for full-scale renovations with artificial turf, and the "composite control system" was installed and put into practical use throughout the pitch. The details of the measures are as follows, and the latest measures for controlling migration were adopted based on the company's developments.

- (1) Placement of artificial turf in the periphery without an infill material (barrier and maintenance zone)
- (2) Installation of barrier material with high drainage capabilities around the circumference of the ball stop fence
- (3) Installation of filter material with high drainage capabilities in all side ditches
- (4) Use of high durability yarn and high density infill material



Introduction of "Composite control system"

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Sekisui Jushi Corporation

## CASE 07

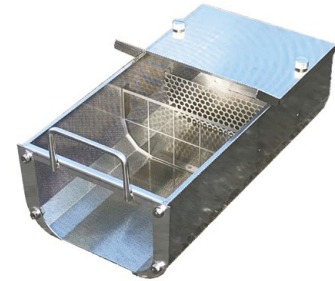
# "MP Filter GT" initiative for reducing the outflow of microplastics from facilities

As marine pollution from plastic waste has become a worldwide problem, Sekisui Jushi Corporation is earnestly taking various initiatives to end this problem.

For the first stage, they have commercialized "MP Filter GT," which reduces the outflow of turf fragments and rubber chips from fields with artificial turf in order to maintain the surrounding environment.

[Advantages of MP Filter GT]

- (1) Efficient collection of most yarn and infills.  
It maintains the surrounding environment by efficiently collecting yarn and infills chips that flow out from artificial turf fields during heavy rain and long term use.
- (2) Can be installed by one person.  
It can be installed and uninstalled by one person, using the drainage canals around the field.
- (3) Easy Maintenance  
The yarn and infills collected by MP filter can be easily removed.



MP Filter (main unit)



MP Filter when installed

### Contact information

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Teijin Frontier Co., Ltd.

## CASE 08

# Fiber structures for functional clothing that reduce fiber fragments

Products that have undergone rising generally have a structure that tends to generate fiber fragments during laundry cycles. TEIJIN FRONTIER CO., LTD. has developed a functional clothing product that can reduce the generation of fiber fragments during laundry cycles while taking advantage of the texture and heat insulation created by the rising process.

This is achieved by using polyester filaments and constructing a lightweight and bulky garment fiber structure without using rising process. In addition, using special functional fibers and structures can prevent the unpleasant sticky sensation caused by sweat absorption and quick drying, as well as the cold sensation caused by sweat cooling.



DELTAPEAK™ TL



Image of fabric cross section

### Contact information

Teijin Frontier Co., Ltd.  
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Japan Chemical Fibers Association

CASE **09**

# International standardization of fiber fragment measurement test method

Currently, there is no standardized measurement method for determining the amount of fiber fragments that flows out during laundry cycles. The Japan Chemical Fibers Association, in cooperation with related industries, is proceeding with development with the aim of ISO standardization originating in Japan so that the amount of fiber fragments that flow out during laundry cycles can be measured using conditions similar to actual laundering.

This will promote the development of textile products that generate fewer fiber fragments and is expected to set Japan's high-performance textile products apart. Moreover, it shows the potential for contributing to the evaluation of the amount of laundry-derived fiber fragments in the marine environment and estimating the amount of fiber fragment outflow.



Test procedure

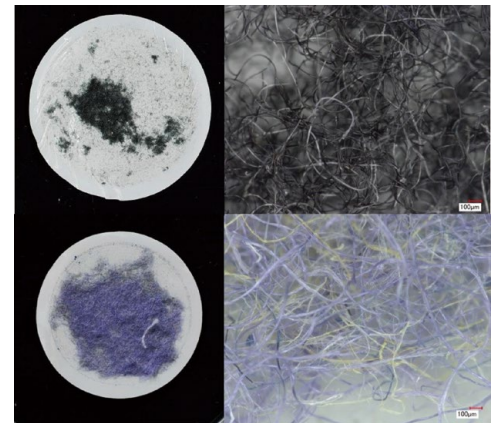


Photo of collected fragments

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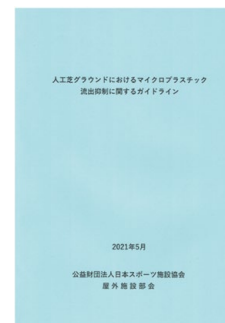
Japan Sport Facilities Association

CASE **10**

# Creation and publication of "Guidelines for Reducing the Outflow of Microplastics from Grounds with Artificial Turf"

The Outdoor Facilities Working Group of the Japan Sport Facilities Association has members from 52 companies involved in the construction of outdoor sports facilities. Many of them are involved in the construction of facilities with artificial turf, and 24 sell their own brand of artificial turf for sports.

Recently, it was determined based on the results of a study on the outflow of microplastics from artificial turf into the ocean through rivers that the working group needed to quickly make a proposal for measures to reduce this outflow. Therefore, in May 2021, 700 pamphlets were made and distributed to the Japan Sport Facilities Association and members of the working group. It was also released on the website of the working group in January 2022.



Guidelines for Reducing the Outflow of Microplastics (Cover)



Guidelines for Reducing the Outflow of Microplastics (Table of contents)

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Japan Fertilizer & Ammonia Producers Association

## CASE 11

# Advocating the ideal of "achieving agriculture by 2030 that does not rely on coated fertilizers that use plastic"

Three fertilizer-related groups (ZEN-NOH, Japan Compound Fertilizer Association, and Japan Fertilizer & Ammonia Producers Association) have published the following policies for concrete initiatives.

- (1) Promulgation of the fact that plastic is used in the coating material of coated fertilizers
- (2) Request for cooperation with measures to prevent outflow from rice fields
- (3) Demonstration and spread of alternative fertilization methods; development and spread of new environmentally-friendly technology

An action policy (roadmap) for preventing the outflow of plastic coating shells from slow-release fertilizers into the ocean was released on the Association's website in January 2022.



Informational materials on preventing the outflow of coated fertilizer shells (JAF Edition)

Contact information

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THE JAPAN PLASTICS INDUSTRY FEDERATION

## CASE 12

# Activities for controlling the outflow of resin pellets, etc.

In 1991, it was confirmed in various locations that resin pellets, the raw material for plastic products, were washing ashore.

In response to this, The Japan Plastics Industry Federation began an investigation into resin pellet leakage in cooperation with industry, government, and NPOs in 1992, and it created and distributed a "resin pellet leakage prevention manual," conducted a survey, and took other measures to firmly promote awareness-raising activities within the industry and prevent leaks.

In 2021, a new leaflet was created for small and medium-sized businesses, and with the cooperation of government offices and regional governments, it is being distributed nationally.



Leaflet "To all businesses that handle plastic pellets"

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 Document URL: [http://www.jpif.gr.jp/9kankyo/conts/A4\\_pellet\\_OL\\_PRINT.pdf](http://www.jpif.gr.jp/9kankyo/conts/A4_pellet_OL_PRINT.pdf)

Plants Laboratory Inc.

## CASE 13

# Development of medium for hydroponics using marine-biodegradable plastic

Urethane medium, currently widely used in domestic hydroponics, is prone to tearing when separated from the roots after harvesting, and is also degraded by ultraviolet light, requiring proper storage and disposal after use.

This not only places a burden on the hydroponic farmer and the plant factory operator, but there is also the concern that microscopic particles are leaking into the soil and wastewater.

Plants Laboratory, Inc. is developing a hydroponic growing medium using marine biodegradable resin. This will reduce the impact of environmental leakage while displaying benefits to the user such as reduced labor costs for separating the medium and roots, and simplified storage and disposal after use.



Germination status in medium for hydroponics

### Contact information

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Mizuno Corporation

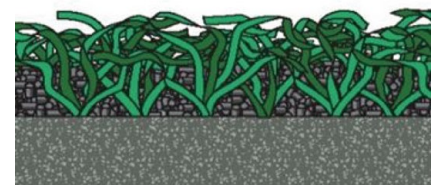
## CASE 14

# Reducing the outflow of microplastics with the "MS Craft Series," an artificial turf with crimped pile

The advantage of Mizuno's artificial turf series, "MS Craft," is its specially crimped pile. The artificial turf with crimped pile can reduce the scattering of the infill, which reduces outflow of infill by rainfall and reduces the amount of the infill carried outside of the ground on shoes or clothing. "MS Craft Baseball Turf," an artificial turf specifically for baseball, has a pile structure with greater durability regarding the metal spikes used by baseball players, and the decay rate of the tensile strength of the pile is three times that of conventional products. The improved durability of the pile reduces the occurrence of microplastics caused by pile tearing.



"MS Craft Baseball Turf," an artificial turf for baseball



Cross-sectional figure

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Rengo Co., Ltd.

## CASE 15

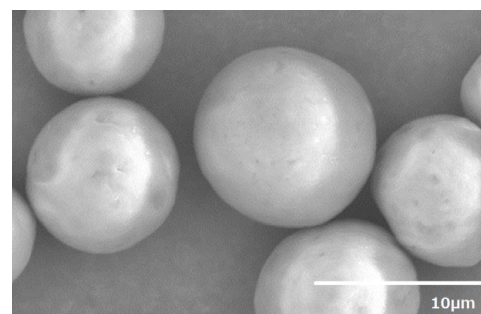
# A cellulose-based replacement for microplastic beads

Viscopearl® (cellulose beads) is a biodegradable spherical particulate material made of 100% cellulose derived from wood pulp. With a wide range of particle sizes, from 3  $\mu\text{m}$  to 4 mm, it has a high affinity for both water and oil as well as chemical resistance and heat resistance; therefore, it can be used for a variety of purposes, such as detergents, cosmetics ingredients, abrasives, and fillers.

It is also marine-biodegradable (with an “OK Biodegradable MARINE” certificate); consequently, it has the potential to contribute to a reduction in marine microplastic waste by substituting for plastic particles that could flow out into the sea.



Viscopearl®



Electron Micrograph

### Contact information

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