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SEIKOAT® T -EF201, a Novel Non-fluorinated Oil-resistant Coating Agent Capable of Maintaining High Air Permeability of Paper

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A fluorinated oil-resistant agent was used to impart oil resistance to paper, but there have been cases where an organic fluorine compound must be replaced with an alternative because of concerns about health and the environment. However, it is difficult to obtain the same oil resistance as a fluorinated oil-resistant agent. In addition, when a non-fluorinated oil-resistant agent such as acrylic is used, the air permeability of the paper is reduced and it becomes difficult for steam to escape, which deteriorates the texture of French fries and other fried foods.

This paper introduces “SEIKOAT T-EF201”, a new a non-fluorinated oil-resistant agent that can maintain high air permeability of paper while being a non-fluorinated agent.

"SEIKOAT T-EF201 has characteristics below:

- High oil resistance and high air permeability comparable to a fluorinated oil-resistant agent
- The percentage of biomass material in the solid content is more than 95%
- Biodegradation degree (relative value) of more than 750
- Conform to FDA21CFR § 176.170, § 176.180

“SEIKOAT T-EF201” is a more environmentally friendly oil-resistant coating agent that has highly containing biomass and has the characteristics of being biodegradable.

Development of water-based coating agent for paper packaging materials

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Environmental pollution caused by improperly treated plastic waste is one of the environmental problems that must be dealt with on a global scale. In particular, the amount of plastic waste discharged as packaging material is 69% of the total amount of plastic waste[1)], therefore it is more important to reduce the amount of plastic used in packaging material to prevent environmental pollution.

"Paper," which is a biomass material that exhibits biodegradability, is attracting attention as a sustainable material that can replace plastic, and new paper packaging materials with excellent plastic functions such as water vapor barrier resistance, oil resistance, water resistance, heat sealability, flexibility, and tear strength are being actively developed. In the field of food wrapping paper, the development of fluorine-free oil-resistant paper is being promoted against the background of stricter restrictions on the use of perfluoroalkyl substances, which may pose a health risk. Therefore, we are developing functional water-based products (AW series) to solve these sustainability issues.

In this paper, we introduce AW-500, AW-102, AW-200 from AW series, which are functional water-based coating agents for paper packaging materials that have been developed focusing on the functions of water vapor barrier, heat sealability, and oil resistance. We will also report on the development status of products compatible with Positive List System for Utensils, Containers and Packaging.

Introduction for VOITH Group Pilot Coater and Development Activityof Barrier Coating Paper using Curtain Coater

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In recent years, plastic products have been replaced by paper products as part of attempts to reduce environmental impact in order to realize a sustainable society. The VOITH Group has been contributing to this environmentally friendly trend by providing customers with access to its pilot coater and coating technology know-how in Heidenheim, Germany and Motomiya, Fukushima Prefecture.

The VOITH pilot coater in Heidenheim has recently undergone improvements, with a particular focus on its drying capacity and curtain coater. Here, we would like to introduce the Heidenheim pilot coater.

We will also introduce our pilot coater facility in Motomiya City, Fukushima Prefecture, and our development activities related to barrier coatings.

Technologies for Reuse of Beverage Paper Packages

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This time, we will introduce a cavitation pulper made by Repulping Technology, Germany, a separator for multi-layered substrates made by Saperatec, Germany, and a hydrodynamic friction washer made by HydroDyn, Germany, under the theme of reuse of beverage paper packages. The SDGs, adopted at the United Nations Summit in 2015, aim to achieve a sustainable and better world by 2030, and we believe that the equipment and technologies we introduce will overcome challenges that are difficult to be addressed with existing technologies in recycling for the effective use of resources. In order to recycle beverage paper packages, it is necessary to separate paper from laminated polyethylene and aluminum, and furthermore, to clean ink and dirt, which is difficult to do efficiently with existing technologies. Repulping Technology's cavitation pulper separates paper from other impurities; Saperatec's multi-layer material separator separates polyethylene from aluminum; and HydroDyn's hydrodynamic friction cleaning equipment de-inks on film.

We hope that the widespread use of these technologies for recovering paper, aluminum, and polyethylene from beverage paper packages will help realize the reuse of resources.

Development of biomass plastics derived from wood pulp

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The functions and low costs of conventional plastics are of essence for our daily and modern life in these days. In the view of sustainability of our globe, we have to care about the emission of the global warming gas and spilling out of the plastics which potentially turned into microplastics. Biomass plastics being good alternatives for them, we still have been confronting some difficulties especially about the material procurement. Therefore, our company have been developing a novel production process for biomass plastics derived from wood pulp for paper making.

We had developed the technology for transforming wood pulp to ethanol which is material for ethylene by biochemical process with yeast. As a beginning of our project, we examined the reproducibility of the technology and manufactured pulp derived ethanol at small and large scale. The ethanol was converted to ethylene by a chemical process which was followed by the polymerization to polyethylene. Purification method that was established to obtain highly purified pulp derived ethanol employed pulp derived polyethylene production.

Manufacturing of pulp derived polylactic acid was also achieved. The raw lactic acid was also obtained by fermentation, whose yeast was replaced by lactic acid bacteria.

Development of Applications for Non-beverage Paper Container "SPOPS" and Future Plans.

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Nippon Paper Industries has developed and commercialized a paper container "SPOPS" for non-beverage applications such as cosmetics and daily necessities. It enables to improve usability at the same time it is eco-friendly. Recently, it has been applied for hand sanitizer containers and for containers for products with new business models such as subscription services for daily necessities. In addition, a high-speed filling machine has been developed that improves productivity and it is expected that SPOPS will be adopted by major brands. In the future, we would like to promote the recycling of used cartons of SPOPS and enter the global market.

Development of paper packaging for plastic reduction

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Pillow packaging bags made of paper-based materials have been attracting attention from the viewpoint of reducing plastic usage. However, the application of paper materials to the pillow packaging has been limited due to the difficulty in ensuring required quality such as strength, water- and oil-resistance, barrier properties, and printability. In order to have paper pillow packaging used in more fields of applications, we have developed two paper-based packaging materials. One is a highly flexible packaging material that has high puncture strength at the same time. This packaging material is relatively resistant to pinhole formation and is not easily wrinkled during bag manufacturing. The other is a packaging material, in that variable information such as expiration dates, lot numbers, barcode, and QR can be printed with a UV laser. As the information can be printed without direct contact with printheads, printing defects such as faint printouts can be avoided and high quality printing is possible even on paper-based materials where the surface is not smooth. This report introduces the details of these two newly-developed packaging materials.

Development of biomass based non-woven fabric for thermoforming, "Kinarito"

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We have developed a novel airlaid nonwoven fabric that is made from biomass materials, such as pulp and polylactic acid (PLA). This nonwoven fablic, named Kinarito, possesses good biodegradability due to its designed composition. Kinarito can not only be used as is biodegradable nonwoven fabric but also be thermoformed into various packaging shapes. Its features and possible applications are discussed.

Market deployment of Micro Cellulose Beads

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Plastic products used in a wide variety of situations, from packaging containers to household products, are essential materials in our daily lives. However, ocean plastics problem has become a global issue. In addition to plastic debris that is not properly processed and flow into the ocean while maintaining its shape, miniscule pieces of plastic which called microplastics, are also a serious problem that affects the ecosystem.

Microplastics include those that are affected by waves and ultraviolet rays during the process of entering the ocean and become small plastic particles, as well as plastics originally found in abrasive compound, face washes, and cosmetics, which are smaller in size. Microplastics are difficult to be removed by wastewater treatment and are said to be discharged into the ocean with little or no recovery, remaining in nature for hundreds of years.

We have been manufacturing and selling biodegradable cellulose beads named "Viscopearl" since 1995, and in April 2022, we started its operation of a new plant for small-diameter cellulose beads, which are expected to be an alternative material to microplastic beads. In this paper, we introduce the features of cellulose beads as well as their future market development.

Adsorption thermal storage system "Mega stock" by using waste heat

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We have developed the open-cycle type adsorbent thermal storage system, so called “Mega Stock”. Based on adsorbent of HAS-Clay, the thermal storage system can utilize the low-temperature waste heat. In the offline heat transportation type, the thermal storage tank charged in the co-generation system was transported by the tractor-trailer and used to heat up water and air in a swimming center. The adsorption heat storage system was evaluated through three kinds of seasons: summer, interphase, and winter. By the tests the regenerating efficiency of 90% or more was confirmed. On the other hand, we performed the demonstration test of the offline heat transportation from the charged thermal storage in the co-generation system to the air handling unit (AHU) of painting process by the tractor. The energy consumption of the cold and hot water used in AHU decreased by dehumidifying the air which flowed into AHU with the thermal storage tank. And, the CO_2 reduction effect of 57% was confirmed from the test.

Initiatives for low-carbonization in Kanto Mill(Katsuta)

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In Hokuetsu Corporation Kanto Mill (Katsuta site), the No.2 biomass boiler (2B) and No.2 steam turbine generator (2T/G) generate steam and electric power for the whole facilities, and the surplus electricity is supplied outside for sale. This boiler mainly uses wood chip derived from construction waste, coal, and paper sludge and waste plastic generated inside the mill. On calorie basis, about 90% of the fuel is wood chip and paper sludge, about 1% is waste plastic, and the rest of around 10% is coal.

Our company set a goal in 2021, that it will achieve virtually zero of carbon dioxide emission by 2050. For this goal, we have already started efforts to reduce coal used for fuel in 2020. In this report we introduce the examples of coal reduction so far and future policies.