



May 22, 2024

LiveDo Corporation

Nagase & Co., Ltd.

Nagase ChemteX Corporation

Joint Development of Adult Disposable Diapers with Bio-based Super Absorbent Polymers

LiveDo Corporation (Head Office: Osaka, Osaka; President and Representative Director: Tomohito Uda) and Nagase & Co., Ltd. (Head Office: Chiyoda-ku, Tokyo; Representative Director, President and CEO: Hiroyuki Ueshima), along with NAGASE Group's core manufacturing company Nagase ChemteX Corporation (Head Office: Osaka, Osaka; President and CEO: Satoru Fujii), have entered into an agreement for the joint development of adult disposable diapers and incontinence products.

This joint development aims to release a product in 2027 or later using a polymer developed by the NAGASE Group with a high biomass content and biodegradability, as well as high absorbability (SAP *1), as the absorbent material in disposable diapers by LiveDo Corporation. This practical implementation of environmentally-friendly sanitary products using SAPs with high biomass content is a pioneering example, and they will be sold to nursing care facilities, medical facilities, and drugstores as sustainable products.

Role of Each Company

LiveDo Corporation	Performance evaluation, development and manufacture of adult disposable diaper products
Nagase ChemteX	Development and manufacture of SAP for use in disposable diapers
Nagase & Co.	Development of environmentally-friendly materials and new market development

Issues with Disposable Diapers

The consumption of adult disposable diapers is increasing in Japan along with the growth of the population aged 65 and older. In 2020, 556,000 tons of disposable diapers were used in the year (*2), with disposable diapers estimated to account for 5.2 to 5.4% of general waste (*3). Used disposable diapers are generally incinerated, and since fuel may be necessary depending on the water content due to urine, the increase in CO₂ emissions is becoming a problem.

Solving Social Issues with Development of Environmentally-friendly Disposable Diapers

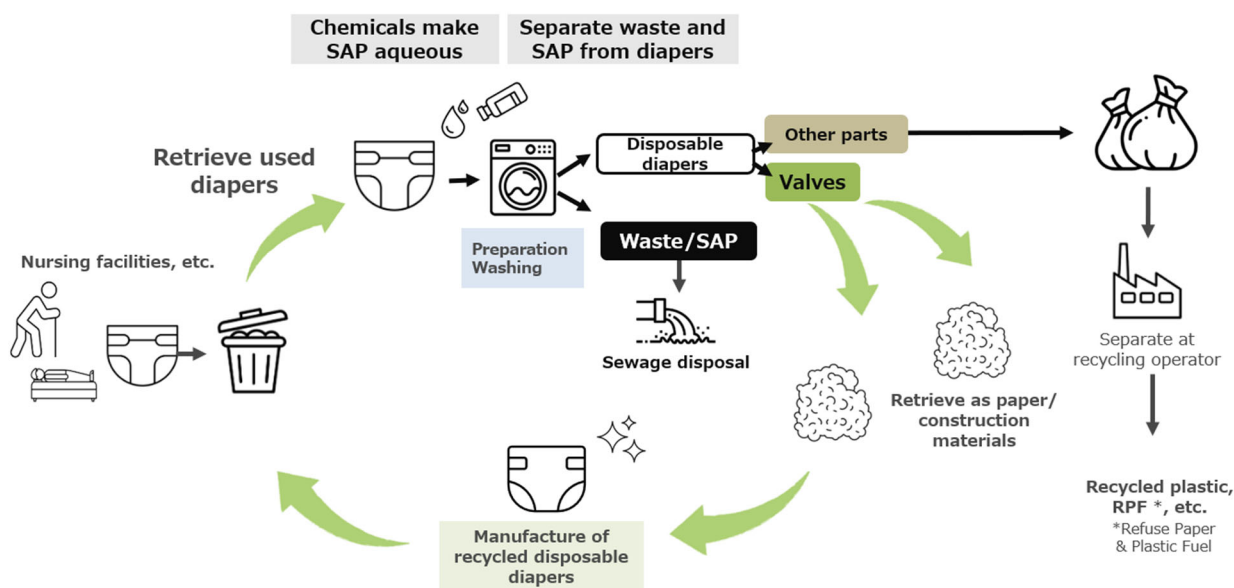
This joint development project focused on the property of the SAP developed by NAGASE, which when turned to gel after absorbing water can be rapidly changed to an aqueous solution by adding a small amount of chemicals. This property makes it possible to separate the disposable diaper and gelatinous SAP, which should solve the issue of the gelatinous SAP remaining in regards to the Ministry of Land, Infrastructure, Transport and Tourism's "Towards Accepting Disposable Diapers in the Sewage System," as well as leading to the recycling of disposable diapers promoted by the Ministry

of the Environment (*4), contributing to solving the issues related to the disposal of used disposable diapers.

Through the development of this product, the aim is to contribute to decreasing the labor burden for disposal and CO₂ emissions from incineration by making it possible to dispose of used sanitary products via the sewage system, by developing sanitary products combining the newly developed SAP and water soluble materials. In the future, efforts will also be made on a recycling scheme to improve the resource retrieval efficiency of used disposable diapers (see figure below). This is the first example in the industry of the joint development of adult disposable diapers using SAP with high biomass content and that can rapidly dissolve into an aqueous solution, and the intent is to make environmentally-friendly adult disposable diaper products with consideration for disposable via the sewage system and promoting recycling.

Through this joint development project, the three companies will aim to contribute to solving social issues by developing sustainable adult disposable diapers in an industry first and by promoting their recycling.

■Scheme for Reducing CO₂ Emissions and Retrieving/Recycling Resources



*1: ["Bio-based Super Absorbent Polymer with High Biomass Content Successfully Developed" \(nagase.co.jp\)](https://www.nagase.co.jp)

*2: "Guidelines on Recycling Used Disposable Diapers", Ministry of the Environment (Japanese only): [900534449.pdf \(env.go.jp\)](https://www.env.go.jp/900534449.pdf)

*3: "Report on Results of Project to Promote Recycling Used Disposable Diapers," Ministry of the Environment (Japanese only): [000152774.pdf \(env.go.jp\)](https://www.env.go.jp/000152774.pdf)

*4: ["Towards Accepting Disposable Diapers in the Sewage System," Ministry of Land, Infrastructure, Transport and Tourism \(Japanese only\) \(mlit.go.jp\)](https://www.mlit.go.jp)

[“Recycling Disposable Diapers,” Environmental Restoration and Resource Cycle, Ministry of the Environment \(Japanese only\) \(env.go.jp\)](#)

■ About the SAP Developed by the NAGASE Group

SAPs are polymers with high absorbability which are used in a wide variety of fields, from sanitary products such as disposable diapers to agricultural and greening products. Most existing SAPs are polyacrylic and have a large environmental burden due to being petroleum based and non-biodegradable, while biodegradable SAPs with a low environmental burden made from natural materials did not have sufficient absorbability and were considered inviable as final products.

In February 2023, the NAGASE Group succeeded in the development of an SAP maximizing absorbability while increasing the proportion biomaterials used, primarily starch, by combining the enzyme technologies of Nagase Viita Co., Ltd. (Kita-ku, Okayama; Representative Director Naoki Yasuba) and the resin manufacturing techniques of Nagase ChemteX, core manufacturing subsidiaries of the Group.

■ LiveDo × NAGASE (Strengths of Each Company)

[LiveDo Corporation]

In the fields of “Care” and “Cure,” LiveDo is engaged in businesses to “support the power of life” for individuals. Their Life Care business in the field of nursing care manufactures and sells adult diapers under the Refre brand, which are chosen by nursing care professionals for industrial use in facilities and hospitals. Their Cure business in the medical field manufactures and sells surgical kits used in surgery rooms at hospitals, with a growing market share in recent years.

[NAGASE Group]

With approximately 110 Group companies in 30 countries and regions around the world, the NAGASE Group is involved in businesses in a wide variety of fields including chemicals, electronics, mobility, energy, food, medicine, and bio. In addition to its functions as a trading firm, it has production and R&D functions, and by combing the diverse functions of the Group aims to solve the manufacturing issues of customers worldwide through materials, thereby contributing to solving increasingly complex social issues such as climate change and food crises.

■ LiveDo Corporation Overview

- **Company Name:** LiveDo Corporation
- **Head Office:** Osaka, Osaka
- **Representative:** President and Representative Director Tomohito Uda
- **Business Summary:** Manufacture and sale of adult diapers, supplies and products used in caregiving, disposable medical products (surgical non-woven fabric items and surgical kit products)
- **URL:** <https://livedo.jp/english/>

■Nagase & Co. Overview

- **Company Name:** Nagase & Co., Ltd.
- **Head Office:** Chiyoda-ku, Tokyo
- **Representative:** Representative Director, President and CEO Hiroyuki Ueshima
- **Business Summary:** Import/export and domestic sales of chemicals, plastics, electronics materials, cosmetics and health foods
- **URL:** <https://www.nagase.co.jp/english/>

■Nagase ChemteX Overview

- **Company Name:** Nagase ChemteX Corporation
- **Head Office:** Osaka, Osaka
- **Representative:** President and CEO Satoru Fujii
- **Business Summary:** Production and sale of high-performance resins including formulated epoxy resins, photolithography materials, epichlorohydrin derivatives, acrylic polymers, conductive coating materials, disinfectants and antimicrobial agents
- **URL:** <https://group.nagase.com/nagasechemtex/en/>

◆Inquiries

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