



PPE

Fighting PPE Pollution with the Science of Biodegradability

James Langford | Sep 01, 2023

After disposable face masks, once worn mostly in labs, hospitals and factories, became a healthcare necessity virtually everywhere two years ago, production began to surge. So did pollution.

As a result, manufacturers of safety gear are now working to counter the potential doubling of the planet’s plastic waste within the next 20 years amid the disposal of single-use gloves and masks, turning to design innovations such as biodegradable PPE.

Plastic Pollution

Spiking use of PPE over the past two years exponentially worsened plastic pollution, a United Nations official says.

Among them is Showa Group, the global producer of industrial hand protection, which won *GreenCircle* certification last year for eight biodegradable protective gloves. Founded in 2009, GreenCircle evaluates the accuracy of product-sustainability claims by global manufacturers.

Showa, which introduced its first biodegradable nitrile glove 10 years ago, now boasts the most extensive range of them on the market through its Eco Best portfolio.

The handwear is engineered with an *organic additive* that enables decomposition within one to five years, the company says, compared with more than 100 years for other products.

‘Speedy, natural degradation’

“Imbuing gloves with biodegradable technology creates a speedy, natural degradation process,” Showa says.

Testing from independent laboratories has shown Eco Best gloves *decomposed 82 percent* in 386 days,

a little more than a year, while gloves without the additive decayed only 1.9 percent in the same period, Showa says.

“While PPE waste was an issue before 2020, COVID-19 exacerbated the problem,” the company says in a statement. “Single-use glove waste rose over tenfold due to the spike in usage.”

Biodegradable Solution

Showa Group won GreenCircle certification for eight of its biodegradable gloves.

An estimated 5 billion more people began wearing PPE, which meant billions of gloves, masks, gowns and other safety gear were used every month, the International Finance Corporation, a division of the World Bank Group, said in its *Innovation in Manufacturing Personal Protective Equipment report* in 2021.

Early estimates placed the total used per month at 1 billion masks and 500 million gloves a month, and if even 1 percent were disposed of incorrectly, that would amount to 10 million masks, the World Wildlife Fund warned.

“Plastic pollution was already one of the greatest threats to our planet before the coronavirus outbreak,” Pamela Coke-Hamilton, director of the International Trade Center, a partnership of the United Nations Conference on Trade and Development and the World Trade Organization, says in a statement. “The sudden boom in the daily use of certain products to keep people safe and stop the disease is making things much, much worse.”

In response, the United Nations has urged government and businesses alike to identify and develop substitutes for plastic that don’t rely on fossil fuels.

Non-toxic, biodegradable or easily recyclable materials that could do the job include natural fibers, paper, cardboard, rice husk and natural rubber, the organization said.

Team Green-95 Makes a Biodegradable Mask

Last year, a team of University of California, Davis, students rose to the challenge by submitting a biodegradable substitute for the N95 mask in the Bidesign Challenge Summit, a global competition for high school and college students to develop new biotech applications.

The team, which called itself Green-95, made its mask from shellfish and crop waste products, the *university says*. Fully biodegradable, it was designed to filter out 95 percent of airborne particles.

Research is also underway at a variety of companies to develop more biodegradable PPE, including medical-grade face masks.

In Canada, *FPInnovations* teamed with Natural Resources Canada and the forest industry to build a biodegradable non-medical face mask. And in the U.S., ELoMed has introduced a *biodegradable surgical* mask made from natural items like corn, cassava, sugar cane, and sugar beet.

At the same time, Showa has pledged to keep investing heavily in the research and development of products with lower environmental impact. In April, its biodegradable nitrile gloves became the first to receive 510(k) approval from the U.S. Food and Drug Administration.

The clearance, which indicates that the agency reviewed the product's safety and effectiveness based on data submitted by the company, spans Showa's M7005PF product line of single-use nitrile gloves. They're designed for medical exams and other settings in which the examiner and patient need protection from contamination.

"Showa launched its biodegradable nitrile gloves a decade ago as an industry first, and since that time, we've continued to invest in technology that reduces the environmental impact of PPE glove waste—a huge challenge with medical PPE during the pandemic," says Brian Moseley, the company's manager of regulatory affairs and quality assurance.

Amid supply chain upheaval during the past two years, fueled by shutdowns, global conflict and snarled shipping lanes, Showa has also taken steps to **boost production** in the U.S.

"Every aspect of our medical glove production—from manufacturing to raw materials to packaging—is 100 percent sourced in the U.S. and available today for healthcare buyers seeking to end their reliance" on overseas suppliers, Showa Group President Richard Heppell says in a statement.

In **February**, executives said the company had invested \$35 million in expanding its Fayette, Alabama, plant with four high-speed monorail lines that will bring annual production capability to 1.2 billion single-use nitrile gloves by the end of this year.

An additional \$81.3 million from the U.S. Department of Health and Human Services will be used to build out two adjacent factories, which will begin operations in June 2023 and September 2024. Together, they will boost production capacity to 2.8 billion gloves a year.

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