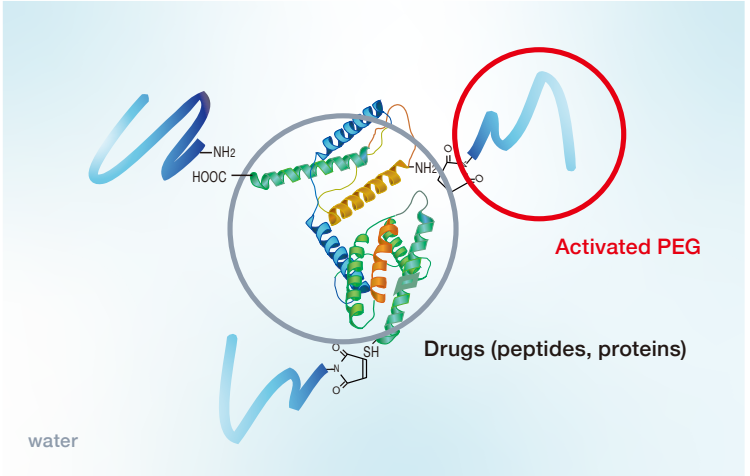
Examples of value creation through the business model (+Plus! NOF) ❶

DDS materials using activated PEG

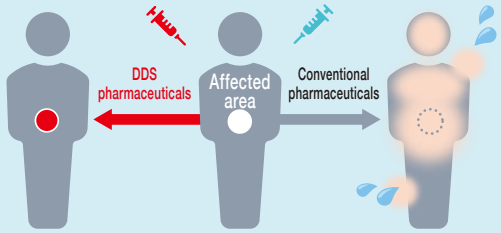
Core and growth products | Life Science Business

NOF commercialized DDS materials in 2001, blending its technologies for high purification and molecular design to enhance the efficacy of pharmaceuticals. We boast the world's leading share of activated PEG, which enhances the retention of peptide and protein drugs within the body. We are also focusing on functional lipids for delivering nucleic acid drugs and gene therapy drugs into cells.



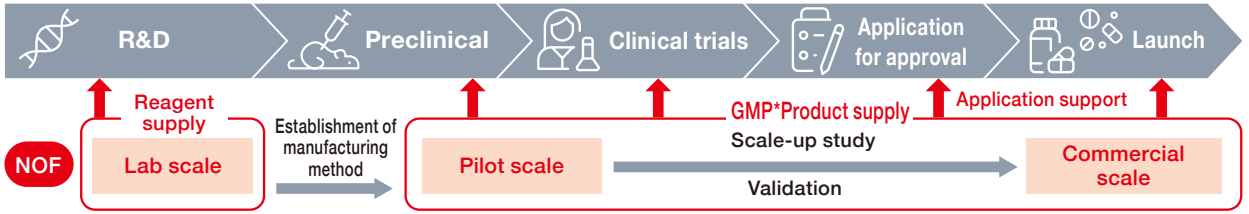
What is DDS?

A drug delivery system (DDS) is a system that delivers a drug to the desired location within the body, in the required amount and at the appropriate time. DDS enables the efficient delivery of drugs to affected areas, thereby enhancing therapeutic efficacy. By improving the retention of drugs within the body, DDS can also reduce the frequency of administration. This helps reduce the burden on patients and improve their quality of life.



Drug discovery flow

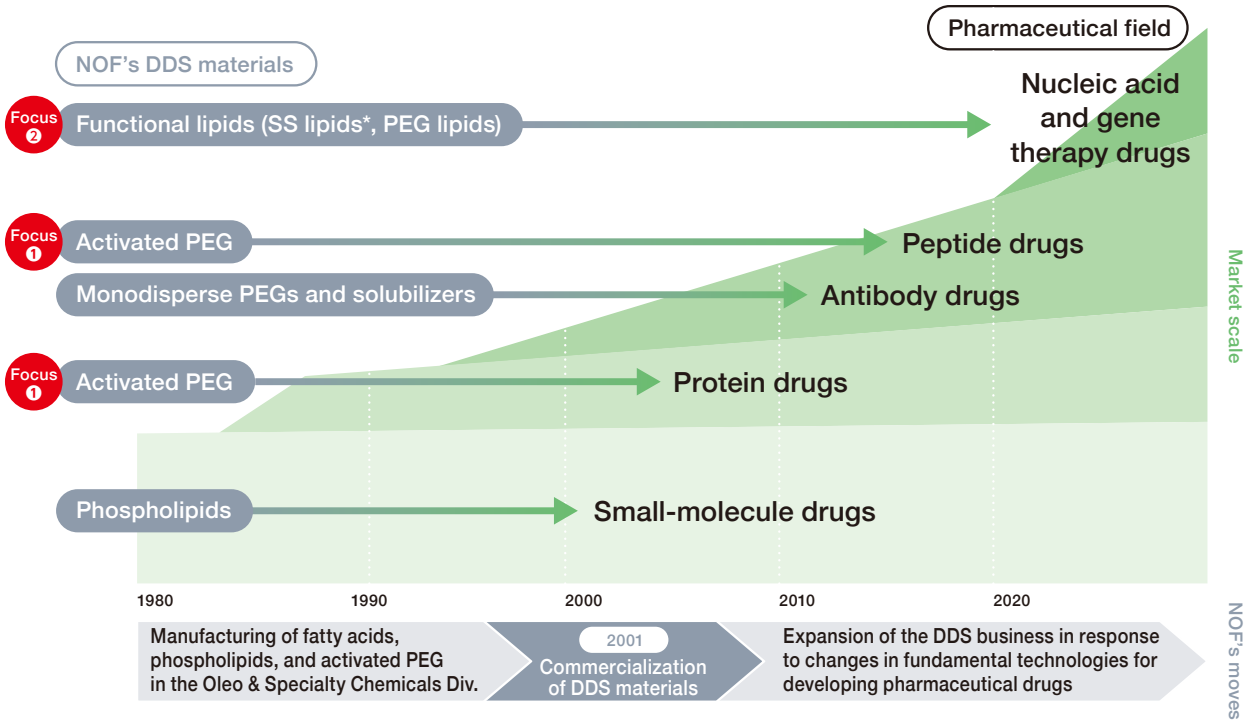
Development stage of customer [pharmaceutical manufacturer]



From the R&D stage of pharmaceutical manufacturers, NOF also develops materials that meet the requirements of pharmaceuticals. During the R&D stage of pharmaceuticals, prototype DDS materials are developed at the laboratory level, and reagents are provided to drug manufacturers to verify basic data (lab scale). Once the manufacturing method is established, the design of manufacturing facility, etc., is verified using equipment on a smaller scale than actual production machinery (pilot scale). Then, while scaling up to a production-scale plant (commercial scale), we provide pharmaceutical manufacturers with materials that conform to management standards.

During the scale-up process, it is important to confirm that quality remains stable even when production scale is expanded. This verification is called validation. Management standards for pharmaceuticals, such as safety, are becoming ever stricter, and sufficient manufacturing control is required. We do not stop at merely providing materials, but have established a system to collaborate appropriately with pharmaceutical manufacturers according to the development stage, contributing to functional improvements.

* GMP: Abbreviation for Good Manufacturing Practice. Standards for manufacturing management and quality control required of manufacturers and marketing authorization holders of pharmaceuticals, etc.



* NOF's proprietary ionizable lipids that combine efficient nucleic acid delivery with low toxicity

Regarding product development

NOF has been commercializing DDS materials since 2001, utilizing manufacturing technologies for fatty acids, phospholipids, and activated PEG cultivated through its oleochemical business. DDS was initially limited to phospholipids for small-molecule drugs (low-molecular-weight compounds primarily produced by chemical synthesis, which were the mainstream of conventional pharmaceuticals) and activated PEG for protein drugs, but subsequently, we expanded the business in response to changes in drug discovery platform technologies. We have developed new materials for antibody drugs, peptide drugs, nucleic acid drugs, gene therapy drugs, and others. Going forward, we will focus on expanding sales of functional lipids into the nucleic acid drug and gene therapy drug market, which is forecast to grow at a high rate averaging 42%* annually (2023 to 2028), and on developing new products.

* Source:Evaluate Pharma

Business environment and NOF's measures

The market for biopharmaceuticals is expected to continue to expand, due to the advantage of fewer side effects and reduced impact on patients. On the other hand, pharmaceuticals are required to meet strict requirements in terms of quality and safety, etc., making it essential to balance more advanced technology with thorough manufacturing control. In 2021, Japan's GMP Ministerial Ordinance, which sets the standards for pharmaceutical manufacturing control, was revised, tightening regulations further.

As a top manufacturer of DDS materials, NOF is investing in facilities and human resources to continue supplying high-quality products that meet safety standards. In 2025, an activated PEG manufacturing facility with an investment exceeding ¥10.0 billion began operations at Aichi Works. We will maintain high manufacturing quality with GMP-compliant facilities.

Strengths of NOF's DDS materials

- Capable of custom-made responses tailored to customer needs
- Production of high-quality activated PEG that is challenging for other companies
- Abundant lineup of functional lipids

Focus 1 Activated PEG

Peptide and protein drugs

Pharmaceutical development companies

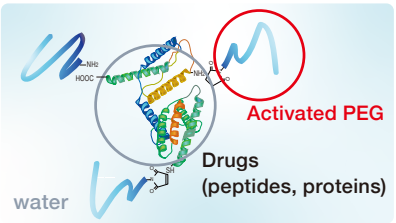
Drug
(Peptide, protein)

+

NOF product

Activated PEG
Confers water solubility

Prolongs drug retention in the body



Global share

No.1

Activated PEG is hydrophilic and, when chemically conjugated with hydrophobic substances such as peptides or proteins, imparts high water solubility. In addition, peptide and protein drugs modified with activated PEG demonstrate improved retention in the body, enabling more efficient treatment. NOF holds the No.1 global share in activated PEG, and increasing numbers of biopharmaceuticals have been made using our materials in recent years.

Reinforcing production of activated PEG

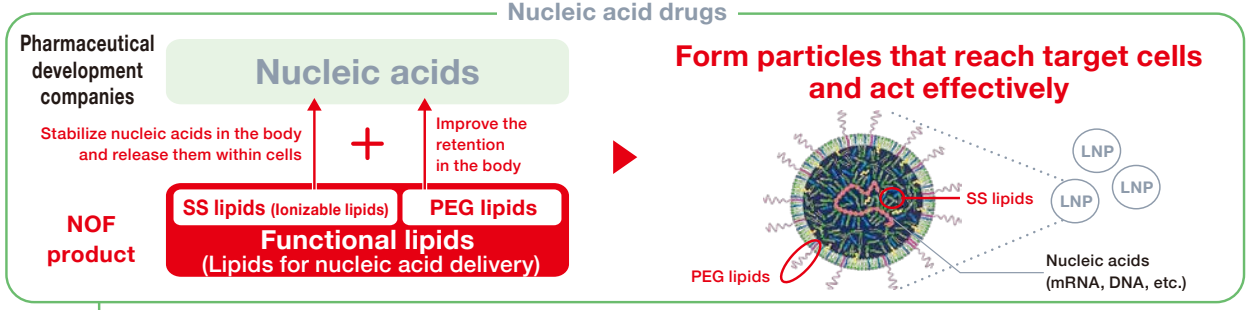
In October 2025, a new manufacturing facility for activated PEG began operations at our Aichi Works. The facility is approximately twice the size of the DDS plant at the Kawasaki plant and its state-of-the-art manufacturing facility has three key characteristics: (1) GMP-compliant equipment that enables production at larger batch scales* than before, (2) Realization of a smart factory through the digital transformation (DX) of manufacturing and quality control, and (3) Contribution to carbon neutrality through the use of solar panels and energy-saving design features.

* The amount of material processed per cycle in a specific process stage

Support for custom-made solutions and solving user challenges

NOF also offers custom-made solutions for DDS materials such as activated PEG, pharmaceutical and medical polymers, and functional lipids, tailored to customer needs. We have responded to needs such as improving safety and duration by utilizing molecular design technologies accumulated over the years. Furthermore, as support for solving challenges faced by users, we have developed various analytical methods to assure the quality of NOF products and support pharmaceutical manufacturers in obtaining approval from the U.S. Food and Drug Administration (FDA) and the European Medicines Agency (EMA).

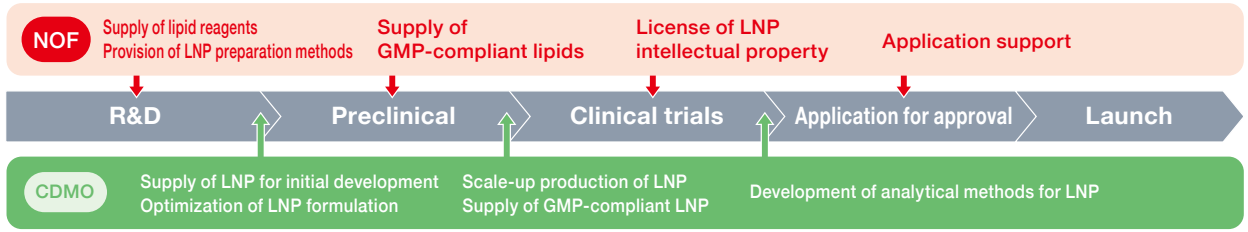
Focus 2 Functional lipids (SS lipids, PEG lipids)



Development of proprietary lipids

For nucleic acid drugs and gene therapies to be effective, it is essential to safely deliver nucleic acids such as mRNA and DNA to specific organs. To achieve this, lipid nanoparticles (LNPs), which serve as capsules to transport nucleic acids, are used. The functional lipids offered by NOF are vital components of LNPs and play a crucial role in efficiently delivering nucleic acids in the body. NOF has developed proprietary ionizable lipids called SS Lipids, which feature enhanced degradability within cells.

Start of collaboration with contracted drug development and manufacturing organizations



We have invested in Phosphorex, a contract development and manufacturing organization (CDMO) specialized in LNPs, and are further strengthening our business through this partnership. This partnership enables us to provide contract development and manufacturing services for LNP formulations tailored to each customer's stage of development.

Employee comments

In my previous job, I worked in quality assurance at a pharmaceutical company. I decided to change jobs because I wanted to work in a role where I could contribute to patients' health in a more expansive manner. Although our work may not be visible, I believe it is valuable because it supports patients in the here and now.

K•S
Quality Assurance Section

Employee comments

Seeing my father receiving cancer treatment, I felt that I wanted to contribute to treatment methods that not only cure the disease but also alleviate suffering. Building a track record of use for the products we have developed in Boston, a global center of therapeutics technology, should help expand product sales and enable us to deliver treatments that place less burden on patients. We share the knowledge gained locally with our laboratories, linking it to the future of patients.

Y•K
Boston base sales representative