

**Business** flow

Musashino Chemical Laboratory, Ltd. offers a wide variety of resorbable polymers on a custom synthesis or contract manufacturing basis. We invite you to discuss your requirements in property and conduct product manufacturing according to the following procedures:



Product requirements are discussed. If our current stock is satisfactory for the customer's requirements, we may proceed to the (8) Purchasing Agreement.

After determining the requirements, a quotation is prepared. Upon receiving the order, the sample is produced with our laboratory machine.

The sample is evaluated by the customer. If there are any further requests, it would be possible to produce another sample once the details are confirmed.

A commercial production test agreement is necessary prior to the test.

Sample production is conducted at our commercial plant on a medium-scale amount, following the production procedure from the laboratory machine production (3).

The sample produced from (6) is evaluated by the customer. We can correspond to necessary adjustments to the best of our capability.

The product is specifically made for the customer and the product specification is determined. After finalizing the purchasing contract, the official business is initiated.

\*An NDA(Non-Disclosure Agreement) can be made if necessary.





Musashino Chemical Laboratory, Ltd.

https://www.musashino.com/english

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Moving the world forward with innovative polymers

# High Purity Polylactic Acid (PLA)

## MUSASHINO CHEMICAL LABORATORY, LTD.



Musashino Chemical Laboratory, Ltd. is the sole manufacturer of lactic acid in Japan, producing DL-lactic acid (Racemic mixture) through synthesis and L-and D-lactic acid (Optical isomers) through fermentation, and can supply to any country in the world. With our high-quality products and stable supply process, our products are utilized by customers in a wide variety of fields.

High Purity Polylactic Acid is manufactured from our pharmaceutical grade lactic acid through our cutting-edge polymerization methods and high-level quality control. Highly credible in quality, it is primarily applied as an ingredient for medical devices and innovative cosmetic products. We customize every customer's order, matching their desired specification and requirements to the utmost degree.

### Main **Products**

#### Poly-L-lactic acid

Poly-L-lactic acid, a crystalline polymer having a high biocompatibility with the human body, is commonly used for orthopedic implants. Body fluids degrade this polymer into oligomers, and eventually monomeric lactic acid which is subsequently resorbed and metabolized by the body. Another advantage of this polymer is a high melt flow rate, suitable for the production of finely-molded medical devices such as transdermal microneedles.

#### Poly-DL-lactic acid

Poly-DL-lactic acid is an amorphous polymer, randomly copolymerized from D-and L-lactic acid. It has a characteristic of being highly dissolvable with many kinds of organic solvents and is widely used for innovative cosmetic Nano-films or biodegradable inks.

#### Poly-D-lactic acid

Poly-D-lactic acid has been drawing attention as an ingredient of heart-resistant poly lactic acid, which is often called Stereo-complex or Stereo-block polylactic acid. It is also researched for being used as a nucleating agent for Poly L-lactic acid.

#### \*This product conforms to the standards of USP Plastic Class VI.



**\*PDLLA** and **PLGA** for drug delivery system (DDS)

We manufacture **Poly-DL-lactic acid** and **Poly-lactic-co-glycolic acid** which have been the most practical polymeric biomaterials for use in controlled drug delivery systems. These materials are registered in a Drug Master File (DMF) in the Food and Drug Administration (FDA) of the U.S.A. (DMF Number Assigned: 29280). Please directly contact us with respect to these products.

(Inquiry webpage: http://www.musashino.com/contact/input)

Product Advantages

4) Less hydrolysis due to a low monomer content

Applications

Properties

- Puncture needles for Glucose monitoring)
- 3) Medical or cosmetic biodegradable Nano films
- 4) Dental implants

3) High optical purity

5) Biocompatible coated materials and external preparations

#### Chemical properties (Poly-L-lactic acid)

1)	Molecular weight (Mw)	: •	90,
2)	L-Enantiomer content (%)	: 1	mo
3)	Residual lactide content (ppm)	:	less
4)	Metal content (ppm)	:	less
5)	M. P. (℃)	:	175
6)	T. G. (°C)	: !	56
7)	Product shape	: (	Col
8)	Color	: '	Wh

#### Mechanical properties (Poly-L-lactic acid, Mw:220,000, Crystal)

- 1) Tensile strength (MPa)
- 2) Tensile elongation (%)
- 3) Tensile modulus (GPa)
- 4) Flexural strength (MPa)
- 5) Flexural modulus (GPa)
- 6) Deflection temperature under load (°C): 144
- 7) Specific gravity

\*The data mentioned above is shown as a general property of our PLA, not product specification.



1) Free of Plastic additives (plasticizers, anti-oxidants, colorants, etc) 2) Highly reliable traceability due to the production through the dedicated manufacture facility with our pharmaceutical grade lactic acid.

1) Orthopedic implants (bone fixation devices) 2) Finely-molded medical devices (Transdermal microneedles,

,000 ~ 350,000 ore than 99.5 s than 500 s than 10 (as Pb) 5~185 ~62 lumn (Length 2.2 mm · Diameter 2mm) ite or Pale yellow



:72 : 2.5 : 4.3 :122 : 4.5 : 1.26





PLA production plant



ISO9001 certificate