

***kuraray***

# Meeting generational needs of today and tomorrow



**Septon™** BIO-series

Liquid Farnesene Rubber

# Our Mission

We are committed to developing new fields of business using pioneering technology that improves the environment and enhances the quality of life throughout the world.

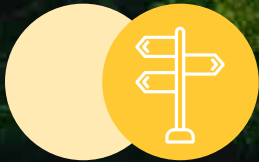
“For people and the planet—to achieve what no one else can.”

# Our Values



## Philosophy

- Respect for individuals
- Close cooperation to attain shared goals
- Constant creation of new value



## Guiding Principles

- Safety is the cornerstone of everything we do
- Customers' needs are our top priority
- We act on ideas in the workplace

# Our Commitment

- We will constantly develop and provide safe, high-quality products and services.
- We will maintain a sound relationship with society through good communication.
  - We will strive to preserve and improve the global environment, and to secure safety and health in all our workplaces.
- We will value all members of the Kuraray community and respect their rights.
  - We will always conduct business in a free, fair and transparent manner.
  - We will honor all intellectual property and secure data and information in a proper manner.

# The Process: From sugarcane to Kuraray's unique, bio-based high-performance elastomers



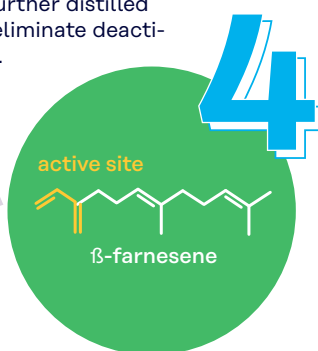
The process starts with Bonsucro-certified sugarcane. This certification ensures the feedstock is grown and harvested in a responsible, sustainable manner.



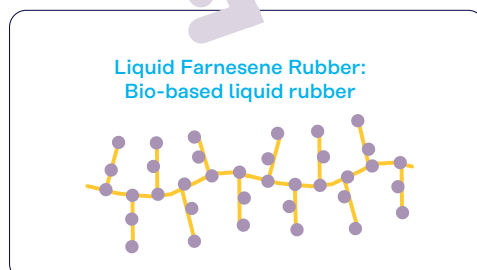
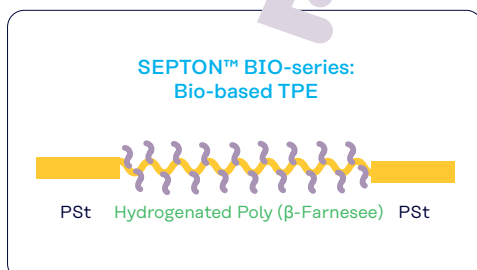
Using an innovative, microbial engineering technology, sugar is extracted and fermented, ultimately producing Beta-Farnesene.



Before polymerization,  $\beta$ -farnesene is further distilled and purified to eliminate deactivate ingredients.



$\beta$ -farnesene is polymerized into a hydrogenated styrene-farnesene copolymer and liquid farnesene rubber.



# What is SEPTON™ BIO-series?

SEPTON™ BIO-series is a unique hydrogenated styrene farnesene block copolymer (HSFC). Kuraray is the first and only manufacturer of bio-based HSBC materials on the market. As one of the leading suppliers of TPEs, Kuraray is responding to increasing industry demand for more sustainable materials that can significantly improve an end product's environmental footprint.

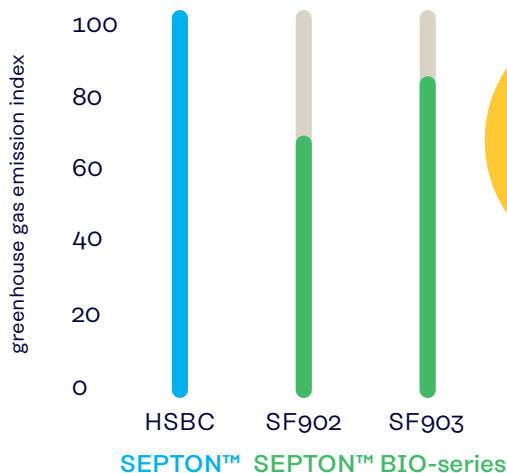


## Features and benefits

- Bio-based polymer with up to 80% bio content
- Lower greenhouse gas emissions than conventional SEBS/SEEPS
- Excellent wet and dry grip performance
- Strong and stable adhesion force across a wide temperature range
- Good processability
- Good damping properties over a wide temperature range
- Low compression set, low permanent set
- Soft without plasticizer
- Enables adhesive applications with excellent removability and no residue

## Applications\*

- Adhesives, coatings, sealants
- Compounding
- Consumer goods
- Electronics
- Industrial & construction
- Mobility
- Sporting goods & footwear
- 3D printing



## SEPTON™ BIO-series:

Hydrogenated Poly (β-Farnesene)

\*For certain applications, SEPTON™ BIO-series and liquid farnesene rubber cannot be introduced due to raw material supply relations. Please contact our sales representatives.

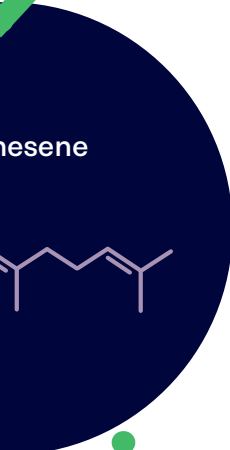
\*\*Assumptions & Limitations  
For detailed information on assumptions and limitations, please contact our sales representatives.

# What is Liquid Farnesene Rubber?



sugarcane

Kuraray has expanded its liquid rubber portfolio with liquid farnesene rubber, a product based on natural and renewable materials. It contains a polymerized form of  $\beta$ -farnesene, a bio-based monomer. Liquid farnesene rubber functions like a reactive plasticizer, but has a much higher molecular weight than normal plasticizers. The co-vulcanizable material significantly reduces migration, which improves the durability of rubber compounds. Its use during the rubber compounding stage significantly reduces processing time while maintaining the physical properties of rubber compounds. This results in lower processing costs.



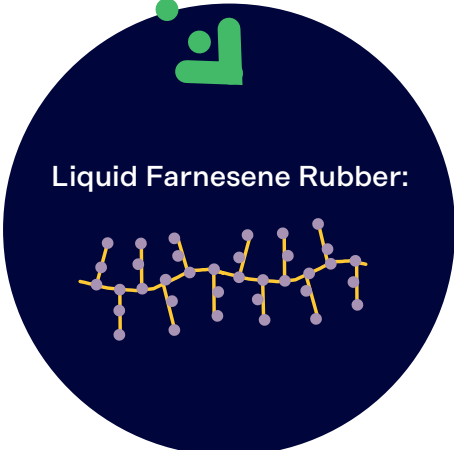
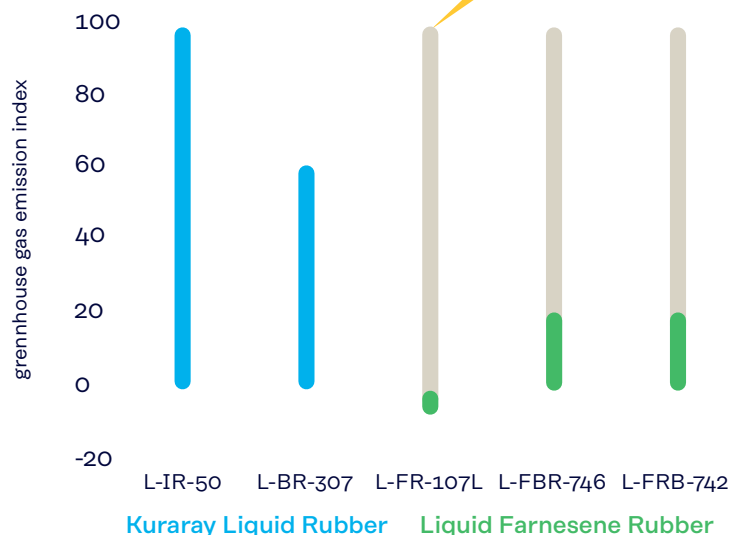
## Features and benefits

- Bio-based material
- Good plasticizing effect
- Low migration
- Low  $\tan\delta$  over a wide temperature range
- Excellent softening effect at low temperature (low  $T_g$ )
- Less entanglement between molecules
- High reactivity of branched double bonds
- High molecular weight and low viscosity

## Applications\*

- Adhesives, coatings, sealants
- Rubber compounding
- Mobility
- Sporting goods & footwear

Up to **108%** reduction in greenhouse gas emissions\*\*



### Principles & Frameworks

- Calculation principles & frameworks: ISO14040:2006 and ISO14044:2006
- Lifecycle Inventory database: IDEA (Inventory Database for Environmental Analyses) version 2.3
- LCIA model: IPCC AR5 100a

### System Boundaries

- Cradle to gate
- Biogenic Carbon absorption is included
- Incineration and transportation to customer sites are not included

# Adding value to your products—worldwide



Kuraray is a world leader in specialty chemicals and functional materials. We are committed to developing products that ensure quality and value while helping our customers differentiate themselves from their competition.

Kuraray's Elastomer Division started in 1972 with the production of polyisoprene rubber and the development of new rubber materials based on Isoprene in the Kashima Plant. From the first

production line, the Elastomer Division continuously grew and invented new products such as KURARAY LIQUID RUBBER, ISOBAM™, SEPTON™, HYBRAR™ and KURARITY™.

Kuraray strives to develop new and innovative high-performance products for customers around the globe. Learn more about Kuraray's Elastomer products, visit [elastomer.kuraray.com](https://elastomer.kuraray.com).

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