

HYSOY



*A Hydrogenated Biopolymer
— Enabling Next-Generation Plastics*

Plastics & Biocomposites Processing

HySoy™ enables more stable extrusion while eliminating predrying for Polylactic Acid—further unlocking the potential of this one bioplastic alone.

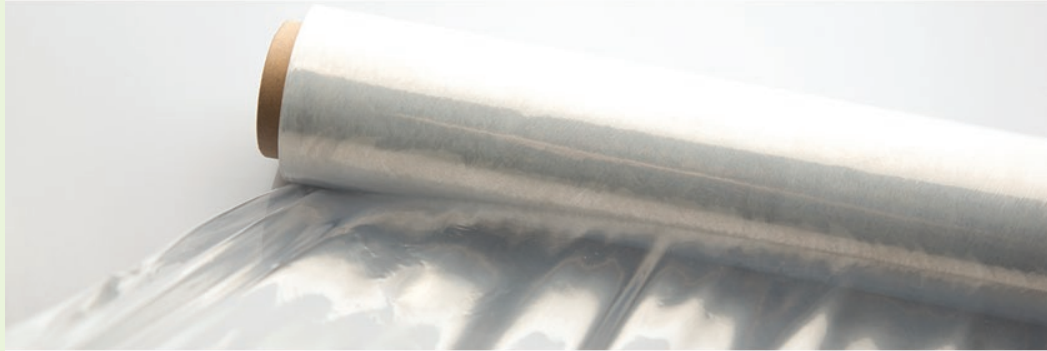


APPLICATIONS

HySoy can be compounded with many materials to unlock new product innovations:

- ▶ **BioPlastics:** Alloys and processing aids
- ▶ **Wood Plastic Composites:** Moisture resistance, processing, coupling, and masterbatching
- ▶ **Plastics & Filled Plastics:** High loading, high fillers, masterbatching (without compounding), and bio-content additions

Product variants may include alloys, flame retardants, lubricants, starches, biofillers, couplers, and lignin products.



Plastics are often compounded with other materials to form alloys and composites with application-tailored properties. Such fillers and additives, however, often lead to processing (e.g., extruding and molding) challenges related to lubrication, material coupling, and flow rate adjustments. Traditional solutions like petrochemical lubricants have drawbacks such as VOC/safety concerns and coupling degradation. From wood plastic composites to polylactic acid (PLA), removing processing challenges can unleash the true potential of many emerging plastic and biocomposite platforms.

Biovation's HySoy technology utilizes hydrogenated saturated triglycerides (HSTs) that, when added in the proper concentrations, lessen or eliminate issues related to lubrication, viscosity, VOCs, rheology, and coupling.

As one example, HySoy has already enabled the production of high-performance PLA films used in next-generation, formaldehyde-free biolaminates competitive with low-pressure-laminate (LPL) and high-pressure-laminate (HPL) products (Biovation's BioSurf® product line).

Biovation
Acquisition
COMPANY

Montgomery, MN | Broadway, NC
Wilmington, DE

BENEFITS

- ▶ **Ease of processing:** **HySoy** lessens or eliminates many challenges faced when loading plastics and bioplastics with fillers and additives. In PLA, it removes the requirement to pre dry, maintains rheology, allows filler and higher filler loadings, allows lower temperature processing, and enables higher processing speeds.
- ▶ **Enhanced properties via higher filler loadings:** Easier processing enables material designers to add more fillers and additives to better optimize application-specific properties and push the envelope to generate more differentiated products in the marketplace.
- ▶ **Environmentally friendly and sustainable:** **HySoy** is an all natural material and does not emit harmful VOCs during processing or in the final product.
- ▶ **Low cost:** **HySoy** is a lower-cost additive than most standard plastic lubricants, coupling agents, or other hydrogenated polymers.

IP PROTECTION STATUS

HySoy and related technologies are protected by patents, pending applications, and trade secrets.

HOW IT WORKS

HySoy is a hydrogenated biopolymer that provides lubrication, hydrogen coupling, improved filler moisture resistance, faster processing, and other benefits as a function of application:

- **HySoy PLA:** **HySoy** blended with PLA removes the requirement for drying. It also improves processing speeds, maintains processing rheology, and provides for high filler levels of hard-to-compound fillers.
- **HySoy Hydrophilic Fillers (wood or cellulose):** **HySoy** greatly improves lubrication without interfering with the common problem of coupling wood to plastic. **HySoy** also improves the water resistance of these materials in wood plastic composite compounds.
- **HySoy Pre Compounding and Filler Coating:** **HySoy** can be melt sprayed onto various fillers to improve their moisture resistance, enhance coupling, and benefit overall processing through lubrication.
- **HySoy Hybrid Blends:** **HySoy** can be blended with other additives such as colorants, coupling agents, fire retardants and more to provide a number of processing and dispersion advantages.



HYSOY IN ACTION

A leading compounder uses **HySoy** to process PLA sheets for improved processing speed, less polymer degradation, and removal of PLA pre-drying steps.

A leading wood plastic composite maker tested **HySoy** leading to improved output speeds and moisture resistance.

A leading PLA producer evaluated **HySoy** proving enhanced processing and reduction of polymer degradation.

A leading extrusion company pushed **HySoy** to 50/50 blends with PLA to create new grades of bioplastics with properties closer to polyethylene.