

Biosurfactants at Scale

Growth Success, Collaboration and the Future of Eco-friendly Surfactants

In response to the urgent need for sustainable solutions in the surfactants industry, companies like Locus Ingredients are developing environmentally friendly biosurfactants. The company is committed to revolutionizing the market by replacing traditional surfactants with sustainable alternatives. With a focus on superior performance and reduced environmental impact, it is driving the transformation towards a more eco-friendly future in the surfactants industry. And they are achieving success at a rapid rate. Christene Smith sat down with CEO Tim Staub to discuss their scale-up success, the importance of strong collaboration, and the focus on sustainability in the surfactants industry.

CHEManager: *Your company has grown rapidly since its establishment in 2020. Can you tell us more about the factors that contributed to your successful scale-up and market penetration in such a short period of time?*

Tim Staub: There are three key success factors:

- The first one is demand. The downstream markets that depend on innovation from the surfactants industry are hungry for new technologies that offer performance benefits while solving many pressing sustainability issues. Our biosurfactants are unique in that they are multifunctional and 100% bio-based with a low carbon footprint. The bio-

surfactants minimize skin irritation that may occur with traditional surfactants. They offer superior cleansing, degreasing and detergency. They can also be formulated easily as a co-surfactant with other bio-based surfactants such as APG's and amino-surfactants. They're great surfactants, with or without the 'bio.'

- The second factor is scalability. Fermentation-produced biosurfactants are not new. Glycolipids, and specifically sophorolipids, have been studied for decades. But they've been difficult to produce economically at any scale that makes sense.

Our ability to scale rapidly and cost-effectively in our patented modular fermentation platform has been

important to our ability to move quickly for our customers and partners. We invested early and aggressively to build and scale our manufacturing capabilities to drive economies of scale. That has proven to be prescient.

- The third factor is our scientific expertise. We have world-class laboratories in both Solon, Ohio and in Richmond, Virginia. The work done by these highly skilled scientific teams has driven our ability to understand how our biosurfactants work, where they work and how they can be formulated to create a competitive advantage for our customers and partners.

Collaboration appears to be a central driver of your success. How have partnerships and collaborations played a role in the growth and development of your business?

T. Staub: Our strategy is to drive market penetration and scale through collaborations. Your assessment is spot on—it is a central driver of our success. Our focus is to innovate, validate and collaborate throughout our commercialization process:

- **Innovate:** We innovate on our technology, how to produce it economically, how to build capacity cost



Tim Staub, CEO, Locus Ingredients

effectively, how to build competitive advantage for our customers and partners, how to deliver that value, and how to protect that value in our intellectual property strategies.

- **Validate:** We validate by coming to the market directly to demonstrate our value proposition, and to understand the fundamental market drivers, including pricing, that drive our value proposition. Often, in the validation step, we recognize opportunities to refine the innovation step in a circular manner.
- **Collaborate:** While we are in the validation phase, we're assessing and talking to potential partners, and when the time is right, we select the best partner to move rapidly forward in a collaboration—resulting in demand volumes that drive the economies of scale necessary to grow a global surfactant business. Recent examples include our global distribution agreement with Dow to sell our biosurfactants in the personal care and home care markets; and our partnership with Veolia Water Technologies to develop new sustainable water and process treatment additives.

Could you share some insights from your personal experience in the industry that have influenced your approach to sustainable biosurfactants and the overall vision of the company?





T. Staub: The biosurfactants business is both rewarding and challenging, but in many ways it's no different than any other surfactant or specialty chemical business. Locus Ingredients is driven by innovation, teamwork, relationships, competencies, and core values like integrity and trust. We're driven by customers, markets and applications. We're driven to create competitive advantages for our company, for our partners, and for our customers—but not necessarily in that order. It's important to remember that it's never about us. We exist only if we are creating value for our customers and partners. So, we focus our energy on understanding market and customer needs and aligning our team(s) to create an advantage—for us, but more importantly for the users of our biosurfactant ingredients.

The surfactant industry is experiencing a shift towards more sustainable products. In your opinion, what are the main drivers behind this trend, and how is Locus Ingredients positioned to capitalize on this market demand?

T. Staub: There are several drivers but ultimately, they culminate in the reality that climate change is real, and humanity is in a race to reduce environmental impact—minimize carbon, along with nitrous oxide and methane emissions. Consumers also want less hazardous chemicals in their products, less skin irritation, and less residual risk from compounds like 1,4-dioxane. Consumers care about deforestation and human rights, and they're reading labels to look for ingredients like palm oil. Investors are demanding change. Governments are demanding change. Boards are demanding change. All of this is rooted in the recognition of the negative impacts that chemical ingredients have on climate change, and the need for alternatives that are safer for both people and the planet.

We are well positioned to meet this market demand based on multiple key factors:

■ **Company-wide decarbonization and biological focus:** The main mission of Locus Ingredients, our parent company (Locus Fermentation Solutions) and our sister business units is to develop high-performing biologicals as chemical alternatives that decarbonize the industries we serve—in agriculture, in energy, in water, in consumer products, in mining and in a myriad of other industries. We are a low carbon, non-GMO microbial discovery company. We have the scientific expertise, financing

and production processes needed to make a global impact.

■ **Proprietary fermentation with rapid scalability:** We have a core capability to rapidly build and scale fermentation production—anywhere in the world with access to water and electricity—in six to twelve months. We have some of the highest-performing and most sustainable biosurfactant solutions with rapid scalability to meet global demand. The process and applications are backed by thousands of patent filings. And our biosurfactant production facilities were just expanded by 100,000 square feet—with total future capacity to produce 2.5 million kilograms of biosurfactants annually.

■ **Strategic collaborations:** We want to partner with the companies that are committed to the mission of a low-carbon future. These collaborations help accelerate commercialization and global availability of our sustainable biosurfactants.

The use of biosurfactants and bio-based surfactants is gaining attention in various industries. How would you describe the advantages of these types of surfactants compared to their conventional counterparts?

T. Staub: Many product formulations use chemical surfactants. In an effort to increase sustainability, many formulators are replacing surfactants made from petrochemical-based raw materials with surfactants made from bio-based, renewable feedstocks. These surfactants are known as bio-based surfactants.

However, it is important to note that “bio-based surfactants” and “biosurfactants” are not the same.

Both bio-based surfactants and biosurfactants are made from bio-based raw materials. However, bio-based surfactants can be chemically produced through traditional chemical synthesis and may not be 100% biobased. Biosurfactants are produced through fermentation with less energy and a lower carbon footprint. Locus' biosurfactants are also USDA certified as 100% biobased. Biosurfactants are a high-performance, low-carbon tool in the formulator's toolbox.

Can you elaborate on the specific benefits that Locus Ingredients' high-performance biosurfactants bring to the formulation of innovative products in the industrial and institutional (I&I) sector?



Working in the lab

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T. Staub: Our Amphi biosurfactants are multifunctional glycolipids that are great co-surfactants to improve wetting, emulsification, dispersal, cleaning, and degreasing. We have both lower HLB—Amphi CL, Amphi M—and higher HLB Amphi CH—biosurfactant choices. They are pH balanced for ease of blending and customization.

All of our biosurfactants are free of 1,4-dioxane and other toxic residuals such as formaldehyde or ethylene oxide. They meet regulatory compliance requirements such as REACH registration, and Amphi M has Toxic Substances Control Act—TSCA—and CleanGredients approval for use in Safer Choice-certified products, including for direct release to water applications.

The biosurfactants formulate easily with other ingredients, including surfactants and solvents. They're superb degreasers and cleaners, and while they're not known for foaming, they can be formulated with amino acid surfactants such as taurates and glutamates, to provide superior foaming in a formulation.

Our application lab in Richmond, Virginia has created a significant formulary library to provide formulation guidance to I&I customers in a range of applications. The clean-label formulations outperform the benchmark leading brands.

In addition to the advantages of your biosurfactants, what other sustainability initiatives or practices does Locus Ingredients embrace within its operations or supply chain?

T. Staub: Fermentation is, by design, a lower energy, lower carbon process. However, it does use some energy and requires raw materials. Decisions on the energy and raw materials used impact sustainability. Plant location deci-

sions are important. Renewably sourced energy is important. Water usage and water recycling is important. Utilizing alternative raw materials derived from waste is important. Building right-sized facilities for available inputs is important. While these decisions are often invisible to the industry, Locus is optimizing all of these factors to ensure maximized sustainability in our processes.

Looking to the future, what are your aspirations and goals for Locus Ingredients in terms of further advancements in biosurfactant technology, market expansion, and sustainability?

T. Staub: We are actively working on expansions to our biosurfactant offerings and their applications. This includes the derivatization of our biosurfactants with partners like Veolia, the global leader in water technologies. We're working on collaborations in agriculture, in lubricants and metalworking, in paints and coatings and in other industrial markets.

We're also focusing on streamlining global availability of our biosurfactants. We secured our REACH registration in the EU, and DSL is in process in Canada. We are planning expansion to Latin America and Asia, in particular Japan, Korea and Oceania. Our parent company, Locus Fermentation Solutions, is leading the charge to decarbonize energy, mining and livestock industries, and in agriculture we are the market leader in monetizing carbon sequestration for farmers. Locus Ingredients is part of a much bigger decarbonization story with our parent company, and we're proud to make a contribution in the key surfactant markets we serve.

■ <https://locusingredients.com>