

Microalgae produce more oil faster for energy, food or products

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Scientists today described technology that accelerates microalgae's ability to produce many different types of renewable oils for fuels, chemicals, foods and personal-care products within days using standard industrial fermentation. The presentation was part of the 245th National Meeting & Exposition of the American Chemical Society (ACS).

Walter Rakitsky, Ph.D, explained that [microalgae](#) are the original oil producers on earth, and that all of the oil-producing machinery present in higher plants resides within these single-cell organisms. Solazyme's breakthrough biotechnology platform unlocks the power of microalgae, achieving over 80 percent oil within each individual cell at commercial scale while changing the triglyceride oil paradigm by their ability to tailor the oil profiles by carbon chain and saturation. The ability to produce multiple [oils](#) in a matter of days out of one plant location using standard industrial fermentation is a game-changer. Solazyme's patented microalgae strains have become the workhorses of a growing industry focused on producing commercial quantities of microalgal oil for energy and food applications. Rakitsky is with Solazyme, Inc., of South San Francisco, Calif., one of the largest and most successful of those companies, which in 2011 supplied 100 percent microalgal-derived advanced biofuel for the first U.S. passenger jetliner flight powered by advanced biofuel.

In a keynote talk at the ACS meeting, Rakitsky described Solazyme's technology platform that enables the company to produce multiple oils from heart-healthy high-oleic oils for food to oils that are tailored to

have specific performance and functionality benefits in industry, such as safer dielectric fluids and oils that are the highest-value cuts of the barrel for advanced fuels. The benefits of these oils far surpass those of other oils that are currently available today.

"For the first time in history, we have unlocked the ability to completely design and tailor oils," he said. "This breakthrough allows us to create oils optimized for everything from high-performance jet and diesel fuel to renewable chemicals to skin-care products and heart-healthy food oils. These oils could replace or enhance the properties of oils derived from the world's three dominant sources: petroleum, plants and animals."

Producing custom-tailored oils starts with optimizing the algae to produce the right kind of oil, and from there, the flexibility of the fermentation platform really comes into play. Solazyme is able to produce all of these oils in one location simply by switching out the strain of microalgae they use, Rakitsky explained. Unlike other algal oil production processes, in which algae grow in open ponds, Solazyme grows microalgae in total darkness in the same kind of fermentation vats used to produce vinegar, medicines and scores of other products. Instead of sunlight, energy for the microalgae's growth comes from low-cost, plant-based sugars. This gives the company a completely consistent, repeatable industrial process to produce tailored oil at scale.

Sugar from traditional sources such as sugarcane and corn has advantages for growing microalgae, especially their abundance and relatively low cost, Rakitsky said. The company's first fit-for-purpose commercial-scale production plant is under construction with their partner Bunge next to a sugarcane mill in Brazil. Initial production capacity will be 110,000 tons of microalgal oil annually, expanding up to 330,700 tons. In addition, the company has a production agreement with ADM in Clinton, Iowa, for 22,000 tons of oil, expandable to 110,000 tons. Ultimately, cellulosic sources of sugars from non-food plants or

plant waste materials, like grasses or corn stover, may take over as those technologies reach the right scale and cost structures.

More information: Abstract

Solazyme, Inc. is a renewable oil and bioproducts company that transforms a range of low-cost plant-based sugars into high-value tailored triglyceride oils. Headquartered in South San Francisco, Solazyme's renewable products can replace or enhance the properties of oils derived from the world's three dominant sources: petroleum, plants, and animals.

Harnessing the oil-producing capabilities of microalgae, Solazyme's biotechnology platform utilizes standard industrial fermentation equipment to efficiently scale and accelerate natural oil development cycle time from years to merely a few days. By feeding simple plant sugars to proprietary strains of microalgae in industrial fermentation vessels, Solazyme takes advantage of "indirect photosynthesis", in contrast to the traditional open-pond approaches most often associated with microalgae.

Today, Solazyme's biotechnology platform is pioneering the expanded the use of renewable, resources by producing oils that are tailored to meet specific industry demands, impacting end-use applications ranging from fuels to chemicals to foods. These unique oil profiles have performance and functionality benefits that far surpass what's currently available.

Throughout this presentation, Solazyme will highlight the versatility of the technology platform by discussing the properties and applications of a new source of renewable oils derived from microalgae.

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