

Proterro produces low-cost fermentable sugars

by Susanne Retka Schill

Development-stage firm Proterro Inc. has begun its outreach to find a partner to help take its R&D to the next level. Venture-capital backed Proterro has developed a technology using a microorganism grown in a unique bioreactor that secretes fermentable sugars using sunlight, CO₂, water and a few commonly available micronutrients. Economic modeling suggests the system should produce fermentable sugars at a lower cost than sugarcane, according to Kef Kasdin, Proterro CEO and a general partner and cofounder of one of the backers, Battelle Ventures LP.

The microorganism used is cyanobacteria that has been engineered to enhance its capabilities to produce sugar. An important point, Kasdin added, is that the organism secretes sugar, unlike most algae systems where the organism is destroyed to extract the biofuel feedstock. The unique design of the bioreactor addresses the Achilles heel of algae systems—the large volumes of water and capital intensive photobioreactors or land requirements for ponds and aeration required to successfully culture algae.

Proterro's developers turned to nature for a different model and designed a bioreactor based on the leaf. "One of the problems is getting light and carbon dioxide to algae in an efficient way," she explained. The Proterro bioreactor mimics the leaf in growing the microorganism on a fabric surface providing maximum exposure to sunlight while flowing a thin layer of water, CO₂ and nutrients underneath, removing the sugar in the process.

The sugar solution produced includes important nutrients generally added for fermentation in ethanol plants, she added. The company believes the system could be added to an ethanol plant, making use of the plant's CO₂, fermentation and distillation systems.

Proterro has achieved proof of concept and successfully scaled the bioreactor up 40-fold from the initial Petri dish experiments to a square meter system. Kasdin said the next step is to find partners to help finance the development of a larger system. "Our idea is that this would be a modular system, and our belief is this could be a capital efficient process."

"In our view, what's hampering the adoption of biofuels is cost and a lot of the cost is in feedstock," Kasdin said. "If we can do better than Brazilian sugarcane cost levels, we could have a more economical biofuel. Our approach circumvents a lot of steps to get a significantly lower-cost sugar." The company has trademarked the sugar product as Protose, calling it a fortified fermentation ready feedstock. "We're not taking it all the way to fuel," she added, but expect to partner with others who are in the business of producing ethanol or other products based on sugar processes.

The research has been backed by \$5 million in venture capital coming from Braemar Energy Ventures and Battelle Ventures. Braemar is an investor in several cellulosic ethanol development ventures including Verenum Corp., Solazyme Inc. and Enerkem Inc. Battelle Ventures is an independent venture capital firm associated with the Battelle Memorial Institute—manager of the U.S. DOE's six national laboratories. Most of the projects backed by Battelle Ventures in the clean tech sector are in the solar energy, batteries and energy efficiency space. Proterro is its only biofuels project.

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