

Iowa State students take their professor's advice and start an Ames bioenergy company

July 6 2010

Iowa State University's Robert C. Brown pulled a few of his graduate students aside a couple years back and offered up an extracurricular challenge.

"You are all experts on pyrolysis," he remembers telling them. "Why don't you start a company specifically to commercialize bio-oil recovery?"

The result is Avello Bioenergy Inc. based at Iowa State University's BioCentury Research Farm just west of Ames.

Brown - an Anson Marston Distinguished Professor of Engineering, the Gary and Donna Hoover Chair in Mechanical Engineering and Iowa Farm Bureau director of Iowa State's Bioeconomy Institute - had worked with the students to research and develop fast pyrolysis technology. Fast pyrolysis quickly heats biomass (such as corn stalks and leaves) in the absence of oxygen to produce a liquid product known as bio-oil that can be used to manufacture fuels and chemicals and a solid product called biochar that can be used to enrich soil and remove greenhouse gases from the atmosphere.

The students - Jared Brown, Cody Ellens and Anthony Pollard, all December 2009 graduates of Iowa State - worked with Brown to develop three types of fast pyrolysis reactors. Brown, Pollard and Sam Jones, a former assistant scientist for Iowa State's Center for Sustainable Environmental Technologies, also worked together to invent a new

pyrolysis technology that improves, collects and separates bio-oil into various liquid fractions. A patent has been filed for the technology.

Brown said the separation technology is a big step because bio-oil is such a complex mixture of chemicals and compounds that it's very difficult to process. He said bio-oil is much easier to process if it's separated into various fractions that are analogous to the "heavy ends" and "light ends" in petroleum refining.

That separation is what the new company is all about. Avello, in fact, is a Latin verb meaning "to separate."

Dennis Banasiak, a former energy and agchemical executive who recently worked as an industry liaison for the Bioeconomy Institute and is now president of Avello Bioenergy, said the company's focus will be to use the separation technology to produce bio-oils that can be used to replace petroleum-based materials in asphalt, can be processed into various renewable chemicals and can be used as renewable industrial fuels.

Banasiak said the company has licenses from the Iowa State University Research Foundation Inc. granting it exclusive rights to use the bio-oil separation technology and a Bio-asphalt developed by Christopher Williams, an Iowa State associate professor of civil, construction and environmental engineering.

The company's initial work includes equipping a new product development lab and using Iowa State's fast pyrolysis facility to process biomass for several days at a time. The facility can process up to a quarter ton of biomass per day.

The company is also working to raise money to build a demonstration plant capable of processing 2.5 tons of biomass per day.

"We have proven this concept," Banasiak said. "We just need to scale up. We have to demonstrate this at larger scales."

The company has already won awards for its business plan: Avello won \$5,000 and top prize honors in 2009's statewide Pappajohn New Venture Business Plan Competition and was recognized at the 2009 Rice University Business Plan Competition. This spring, Avello also received a \$150,000 demonstration grant from the Iowa Department of Economic Development.

Banasiak said locating the company at Iowa State facilities is a key piece to its business plan.

"The BioCentury Research Farm offers us the ability to use the existing fast pyrolysis pilot plant without spending a lot of money to do our development," he said. "We can lease the facility from the university and get our data. This facility gives us a quicker path toward commercialization."

And what does Brown, who's listed as a company co-founder but is not directly involved with the company's operations, think of the business his former students are building?

"It's a very competitive environment and hard to raise capital," Brown said. "But they have a unique technology that presents some exciting opportunities."

Provided by Iowa State University

Citation: Iowa State students take their professor's advice and start an Ames bioenergy company (2010, July 6) retrieved 26 April 2024 from <https://phys.org/news/2010-07-iowa-state-students-professor-advice.html>

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