

CNC with expanded polystyrene foam on cusp of commercialization



Steve Price, CEO of Alberta Innovates Bio Solutions, at this year's Impact Innovation event.

“Your interest in searching and researching bio solutions has made it a great year for AI Bio,” announced Steve Price, CEO of Alberta Innovates Bio Solutions (AI Bio) at this year's 6th Annual Impact Innovation event held recently in Edmonton.

Emceed by former Discovery Channel personality and Calgary resident Jay Ingram, Impact Innovation provides AI Bio with an opportunity to showcase some of its supported projects. Many projects aim to provide the forest industry with opportunities to diversify its markets with novel building and biomaterials extracted from wood fibre.

Promising commercial application of one wood-based biomaterial—cellulose nanocrystals (CNC)—was featured prominently at this year's Impact Innovation event. CNC is 10,000 times smaller than a human hair with unique mechanical properties. This lightweight biomaterial that looks like cotton candy in dry form can provide two times the stiffness of aluminum and 10 times the strength of stainless steel when dispersed into another material. Alberta Innovates operates one of the few pilot-scale CNC production facilities in the world,

giving Alberta researchers the benefit of easy access to this novel biomaterial.

Through research supported by AI Bio, researchers have been working to find the best ways to combine CNC with expanded polystyrene (EPS) foams and in an electrospun adhesive layer in CNC-reinforced foam-core sandwich composite structures. These foams are commonly used as protective packaging material around televisions and computers. Preliminary results show that with just a one per cent CNC application, researchers can improve the foam's strength by 60 per cent. University of Alberta Project Lead, Dr. Cagri Ayranci, said that this application provides “a great benefit to industry”. By increasing the mechanical properties of this foam material with CNC, the same performance can be achieved with less material volume in such applications as roof, floor and wall insulation.

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One of North America’s largest EPS foam producers is located in Calgary.

“They are already very interested in the product and we will be talking to them in terms of commercialization,” said Ayranci. He noted that this is only one potential commercial use for CNC, with other potential applications in biomedical devices, ropes, textiles, filtration, and pharmaceutical applications.

Another speaker at Impact Innovation showcased ongoing research supported by AI Bio related to the impact of disturbances such as wildfires and salvage logging on water quality and forest ecology.

Dr. Uldis Silins, Professor of Renewable Resources at the Faculty of Agricultural Life and Environmental Sciences at the University of Alberta, said that that the province has a long history of conducting research related to the impact of wildfires in areas where Albertans access clean water.

“The lion’s share of the water on which we depend in our economy and society really originates in the forested region of our province,” said Dr. Silins.

So the impact of climate change on the occurrence, severity, and size of wildfires, their impact on localized and downstream water resources in forested landscapes, as well as the common practice of salvage logging, have been studied extensively as part of a wide ranging project called the Southern Rockies Watershed Project. The first phase of this project discovered that it can take considerable time to recover—decades in some instances—for such important ecological elements in stream water as nitrogen and phosphorus, and their contribution to sediment production and organics.

“This idea that we have disturbance and that things then return to an undisturbed state is something that we are really starting to rethink,” Dr. Silins said. The project is now entering Phase II. As part of this phase, researchers will study how forestry practices

and alternative harvesting methods also impact water quality downstream.

AI Bio CEO Price described the past year as “extremely busy” for the corporation. It was therefore particularly timely to inform those present what the future holds for AI Bio. The province has embarked on a more consolidated management structure for its Alberta Innovates family of research corporations.

Pamela Valentine, transitional CEO of the new Alberta Innovates Corporation, says the management board’s goal is to create “one-door access to supports, expert advice and services,” to those seeking financial support for research and development that will contribute to the province’s economic diversification.

The consolidation of four current Alberta Innovates Corporations into a single, integrated agency will focus on the key sectors of food, fibre, energy, environment and health.

The agenda and online presentations made at AI Bio’s Impact Innovation event are available for viewing at <http://bio.albertainnovates.ca/about/corpevents/impactinnovation2016/>.

This story was reprinted with permission from the May/June 2016 issue of the Logging and Sawmill Journal, http://forestnet.com/LSIssues/2016_may_june/edge.php.



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