Live

Next Generation Biocomposite Materials: How the Science of Genomics Can Revolutionise the Automotive Sector

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Abstract: A project just under way in Western Canada will soon deliver fully renewable biocomposite materials to the Canadian industry based on fibre from flax germplasm with traits genetically optimized for use in advanced composite materials. The project, performed with partners from the University of British Columbia, the University of Manitoba, Westward Industries, the Composites Innovation Centre and Genome Prairie, is using semi-structural components of a prototype bio-vehicle developed with two industrial partners in Manitoba as proof-of-concept of the approach. Current practices for manufacturing biocomposites material depend on mixing percentages of natural fibre with fiberglass in appropriate laminate structures and using petroleum-based resins as a binding matrix. However, fibre feedstocks from flax and other crops have not been phenotypically screened and catalogued for their use in specific biocomposite applications. Issues of the greatest industrial relevance are: i) the lack of uniformity of fibres leading to inconsistency of product performance; ii) poor adhesion of fibres to petroleum-based resin (binding matrix) leading to poor material strength; & iii) the absence of natural resins that provide the required optimum binding capacity, thermostability, and biodegradability (related to ii). The project will also incorporate the use of microbial polymer/resins synthesized by a novel bacterium, *Pseudomonas putida* strain LS46. Growth of this bacterium on different carbon sources results in polymers with different monomer composition. Characterization of the physical and thermal properties of the different polymers will identify those that exhibit complementary physical and chemical properties required for binding to the optimised flax fibres in the biocomposite materials. This project, therefore, will develop a new generation of genetically optimised biocomposites for industrial applications.

Biography: David B. Levin is a Professor in the Department of Biosystems Engineering, at the University of Manitoba. Dr. Levin holds a Bachelors of Environmental Studies from the University of Waterloo and a Masters of Science at the University of Guelph. He obtained his PhD at McGill University in 1987 in Molecular Virology, and was a professor in the Department of Biology at the University of Victoria from 1991 to 2006, when he moved to the University of Manitoba, Department of Biosystems Engineering, to set up a

new program in “bioengineering for biofuels and bioproducts”. Dr. Levin holds an NSERC Discovery grant focused on the “Genomics of cellulose fermentation for process optimization”. Dr. Levin was the co-Lead on a Genome Canada funded project on “Microbial genomics for biofuels and co-products from biorefining processes” with Dr. Richard Sparling (Department of Microbiology). Dr. Levin was also led the Hydrogen Production and Purification theme of the

NSERC funded Hydrogen Canada (H2CAN) network, and was the Prairie Platform leader within BioFuelNet, a pan-Canadian research network funded by the Network Centres of Excellence (NCE) program. Dr. Levin currently serves as a Faculty Advisor for the University of Manitoba Space Applications and Technology Society (UMSATS), a student driven research group focused on sending a micro-satellite containing a mini-ecosystem in to low earth orbit. In 2015, he was been nominated for a Tier 1 Canada Research Chair, and with his colleagues Dr. Richard Sparling (Department of Microbiology) and Dr. Nazim Cicek, (Department of Biosystems Engineering), for the Brockhouse Canada Prize for Interdisciplinary Research in Science and Engineering.

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