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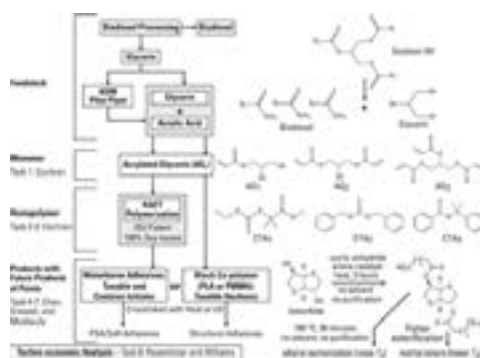
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Biobased adhesive for construction applications

This work presentation will highlight the research at the National Science Foundation (NSF) on Bioplastics and Biocomposites (CB²) as well as provide a detailed review of a project focused on biobased adhesives. Iowa State University (ISU) is in the process of scaling-up a demonstration of a commercially-viable family of economically competitive, biobased adhesives that comprise thermo-/photo-curable waterborne structural adhesives for wood-based composite materials. Much of the fundamental research into the polymerization – based on an innovative process developed at ISU – has been completed (see Figure) and the chemical pathways are fully understood; the current work focuses on identification and resolution of any remaining hurdles related to scale-up, demonstration of quality assurance, and optimization of the manufacturing process for industry compliance and acceptance.

The work has demonstrated the production of OSB (oriented strand board) produced with biobased adhesives that exhibit performance equal or even superior to currently available OSB boards. The bio-based OSB boards were compression molded with standard wood chips. Various thermal cycles and chemical initiators were studied to optimize the production of the OSB boards as well as their performance. The biobased OSB products exhibited superior tensile strength, three-point bend strength, toughness well as water resistance. They release zero VOCs (volatile organic compounds) and are economically competitive with boards manufactured using commercial adhesives. The team has completed a first draft of an LCA (life cycle assessment) and of a techno-economic model. A comparison of the production of biobased OSBs to commercially available OSBs showed a significant reduction in environmental impacts caused by the biobased product at competitive costs. The team at ISU is able to produce 1000 pounds of adhesive each day in the new pilot plant constructed at ISU's Biocentury Farm.



Biography

Dr. David Grewell received a BS, MS and Ph.D. in Industrial Systems and Welding Engineering from The Ohio State University with minors in biomedical engineering and polymer processing in 1989, 2002 and 2005, respectively. He holds 14 patents, has been given numerous honors and awards and as well as numerous publications, including two books. His interests include joining of plastics, micro-fabrication, laser processing of materials, bioplastics and biofuels. He currently works at Iowa State University as a Professor in the department of Agricultural and Biosystems Engineering. Dr. Grewell is the Director of the NSF Center for Bioplastics and Biocomposites, is the Chair of the Biopolymers & Biocomposites Research Team, a Board Member of the Ultrasonic Industry Association, Society of Plastics Industry and Society of Plastics Engineers. He also has a position at the University of Erlangen in Germany and is Fellow of the Society of Plastics Engineers.

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