



Biomass Program

Bioproducts R&D

Wood Adhesives from Bark-Derived Phenols

Wood bark has high lignin content and when it is pyrolyzed (subjected to elevated temperatures in the absence of oxygen), it yields a liquid bio-oil product rich in natural phenol derivatives. The phenol derivatives are isolated and recovered for application as a replacement for fossil-based phenol in phenol-formaldehyde (PF) resins used in oriented strand board (OSB) and plywood.

Ensyn and its partners are working to pilot the commercial-scale production of a viable PF resin using phenol derivatives from tree bark and certify its use in structural building products such as plywood and OSB. The potential worldwide market size for PF resins in these applications is on the order of 1.2 billion pounds annually.

This project uses low-value mill residues as the feedstock and pyrolyzes it using Ensyn's Rapid Thermal Processing (RTP™) process. The major product is a bio-oil rich in phenol derivatives, which can be effectively used as a phenol replacement in PF resins. A solid product, char, is also formed and several options exist for using it to generate power onsite or to use it to purify wastewater and/or stack gases or as a feedstock for activated carbon synthesis.



Mill residue feedstock and bio-oil and char products.

R&D Pathway

Under the scope of the DOE project, Ensyn converted two streams from Weyerhaeuser's operations using its patented RTP™ (Rapid Thermal Processing) technology. One sample was a mill residue and the other was a forest plantation residue. Natural Resin was produced from these two samples and tested in OSB resin formations. Char utilization options, including use as a feedstock for activated carbon synthesis or as a fuel, will be explored

Benefits

- Add value to mill residues
- Diversify the product streams of the forest product industry
- Displace fossil-based phenol in certain phenol-formaldehyde resins

Applications

Successful demonstration of producing PF resins from mill residue will provide a way to upgrade low-value mill residues to high-value products and improve the economics of the forest product biorefinery.

Project Partners

Ensyn Renewables Inc.
ARC Resins/Timbec
Dynea Oy
Georgia-Pacific Corporation
Weyerhaeuser Company

Project Period

FY 2000 – FY 2004

For more information contact:

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Visit the Web site for the Office of the Biomass Program (OBP) at
www.eere.energy.gov/biomass.html

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