Adding Value With Co-products

What is this technology?

A biobased adhesive for wood products made during consolidated bioprocessing of biomass to ethanol.

Co-products of cellulosic ethanol will be needed to enhance process economics

- High feedstock costs and low ethanol value will constrain investment in cellulosic ethanol technologies.
- Co-products of cellulosic ethanol can improve process economics, particularly if they are easily recoverable, have high value in use, and avoid waste disposal issues.

Consolidated bioprocessing (CBP) holds promise as a cellulosic ethanol platform

- Anaerobic bacteria produce their own cellulase and hemicellulase enzymes, then ferment the products to ethanol.
- This "single pot" process reduces capital costs, may reduce pretreatment requirements, and permits pentose fermentations.

CBP bacteria produce a novel adhesive

- Growth on cellulosic materials results in production of a novel extracellular polysaccharide (EPS) that aggressively binds cellulose and promotes bacterial contact.
- Residue remaining at end of fermentation (EPS + bacteria + residual substrate) can serve as a wood adhesive.
- Residue alone can bond wood and is suitable for dry applications, but not stable under wet conditions.
- Blending in substantial amounts with existing wood adhesives (e.g., phenol-formaldehyde) produces adhesive blend suitable for wet applications.

Moving Forward

- We are interested in partnering with collaborators having fermentation capacity suitable to produce the adhesive residue in amounts sufficient for large-scale testing.
- We are also interested in working with wood products manufacturers to test the adhesive in their production environment.

Contact Information

Paul J. Weimer, Research Microbiologist, U.S. Dairy Forage Research Center
608-890-0075; Paul.Weimer@ars.usda.gov
http://www.ars.usda.gov/main/site_main.htm?modecode=36553000