National Center for Agricultural Utilization Research

Plant Polymer Research

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Research Projects

• Advanced Starch-Based Materials for Non-Food Applications
• Modification of Natural Polymers by Thermo-Mechanical Processing
• Determination of Structure-Property Relationships in Biological Macromolecules Using Biophysical Approaches

Research Interests

• Development of novel products from agricultural commodities and coproducts
• Electroactive bioplastics
• Polymer electrolytes
• Starch graft copolymers using reactive extrusion or microwave assisted synthesis
• Structure-property relationships of natural polymers
• Green composites from degradable polymers and agricultural coproducts
• Controlled release from starch matrices
• Maillard reactions using reactive extrusion
• Biobased smart materials
Equipment & Instrumentation

Processing
- Werner-Pfleiderer ZSK 30 mm twin screw extruder
- Milacron Injection Molder with a variety of sample molds
- Brabender single screw extruder with rod, ribbon, blown film and sheet dies
- Haake Rheometer

Evaluation
- Tensile Properties (Instron)
- Electrical properties of polymers
  - Electro-Tech Systems (ETS) Model 487 Resistometer with Model 803B (film) and Model 808 (powder/liquid) cells
  - ETS Model 880 autoranging resistometer with model 841, 842, and 844 pressure pin probes
  - Ecopia Hall Effect Measurement System
  - Electrochemical Impedance Spectroscopy (PARSTAT 2273) with Gamry cells & software suites
- Environmental chamber (temperature/humidity)
- Melt Flow Index
- UV-VIS
- FT-IR
- SEM, AFM
- NMR
- Shimadzu HPLC-SEC system for water soluble polymers (20K-10M)

Work with Dr. Finkenstadt

Dr. Finkenstadt seeks collaboration with other scientists and is willing to host visiting scientists in her lab or participate in an exchange. Some programs that may provide funding:

- Grants.gov is a central storehouse for information on over 1,000 federal grant programs and access to approximately $400 billion in annual awards

- The Norman E. Borlaug International Agricultural Science and Technology Fellows Program

- Selected International Grants, Exchanges, Fellowships, and Collaborative Research Opportunities in Agriculture
Peer-Reviewed Publications


Additional Publications


Presentations at Scientific Meetings (Abstracts)


A8. **Finkenstadt, V. L.** and Willett J. L.  The effect of borate cross-linking on the physical properties of starch-based polymers.  35\textsuperscript{th} Midwest Regional Meeting of the American Chemical Society.  St. Louis, MO. October 11-13, 2000.

A9. **Finkenstadt, V. L.** and Willett J. L.  Peer mentoring at the National Center for Agricultural Utilization Research (USDA).  35\textsuperscript{th} Midwest Regional Meeting of the American Chemical Society.  St. Louis, MO. October 11-13, 2000.


A11. **Finkenstadt, V. L.** and Willett J. L.  Effect of stearate salts on the mechanical properties of starch polymeric materials.  34\textsuperscript{th} Great Lakes Regional Meeting of the ACS. Minneapolis, MN. June 2-4, 2002.

A12. **Finkenstadt, V. L.**, *Hitt, H. C.* and Willett, J. L.  Controlled release using starch as a floating dosage matrix.  224\textsuperscript{th} National Meeting of the American Chemical Society.  Boston, MA. August 18-22, 2002.


*Last Revised: March 18, 2008*