

## **DAVID GREWELL**

DEPARTMENT CHAIR/PROFESSOR/DIRECTOR  
INDUSTRIAL AND MANUFACTURING ENGINEERING, NORTH DAKOTA STATE UNIVERSITY

Curriculum Vitae  
Executive Summary

### **Administrative**

Department Chair/Professor: Industrial and Manufacturing Engineering, North Dakota State University

Professor: Agricultural and Biosystems Engineering, Iowa State University

Director: I/UCRC NSF center CB<sup>2</sup>, Iowa State University, North Dakota State University

Director: I-Corps NSF Hub, Great Plains Region, North Dakota State University

Member of Board of Directors:

Society of Plastics Engineers, Welding and Joining of Plastics

Society of Plastics Engineers, Bioplastics

Plastics, Bioplastics (previously Society of Plastics Industry)

Chair, Beginning of Life, Plastics, Bioplastics (previously Society of Plastics Industry)

Ultrasonic Industry Association

Chair of Commission of International Institute of Welding, XVI (Joining of Plastics and Adhesives)

US Delegate, International Institute of Welding, Commission XVI

### **Grants Awarded**

Total: \$32,112,675

Lead PI: \$8,167,238

Co-PI: \$23,945,437

### **Publications**

Journal Articles: 84

Books: 3

Book Chapters: 14

Refereed Proceedings: 77

Invited talks: 56

### **Other**

Awards 27

Fellow of: Society of Plastics Engineers, National Academy of Inventors

Patents: 17

Team Award, College of Life Science Agriculture, ISU

International Award, College of Life Science Agriculture, ISU

Student Recruitment Award, College of Life Science Agriculture, ISU

MS Students: 17

Ph.D. Students: 10

Classes Taught: Manufacturing, Bioplastics, Statics and Strength of Materials, Applied Math

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**CANDIDATE INFORMATION**

DAVID A. GREWELL

North Dakota State University

Industrial and Manufacturing Engineering

Department Chair/Professor/CB<sup>2</sup> Director/Great Plain Region I-Corps Hub Director**EDUCATION**

Ph.D. in Welding Engineering. The Ohio State University. Minors in Biomedical Engineering and Polymer Processing (2005)

M.S. in Welding Engineering, The Ohio State University (2002)

B.S. in Welding Engineering, The Ohio State University. Elective studies in Chemistry and Chemical Engineering (1989)

**ACADEMIC POSITIONS**

**Director:** I-Corps NSF Hub, Great Plains Region, North Dakota State University 2022-Present

**Department Chair/Professor:**  
Industrial and Manufacturing Engineering, North Dakota State University 2018-Present

**Professor:**  
Agricultural and Biosystems Engineering, Iowa State University 2014-2018

**Director:**  
I/UCRC NSF center CB<sup>2</sup>, Iowa State University/North Dakota State University 2014-Present

**Associate Professor:**  
Agricultural and Biosystems Engineering, Iowa State University 2010-2014

**Courtesy Professor/Associate Professor:**  
Department of Food Science and Human Nutrition, Iowa State University 2012-Present

**Courtesy Professor:**  
Department of Polymer Processing, University of Erlangen-Nuremberg, Germany 2007-Present

**Courtesy Professor/Associate Professor:**  
Civil, Construction and Environmental Engineering, Iowa State University 2006-Present

**Assistant Professor:**  
Agricultural and Biosystems Engineering, Iowa State University 2005-2010

**PROFESSIONAL EXPERIENCE**

2018 to present

NORTH DAKOTA STATE UNIVERSITY, Industrial and Manufacturing Engineering, Department Chair, Professor. Administrative responsibilities, include financial allocation for departmental operations, teaching assignments, mentoring of junior faculty, ABET accreditation, fund raising, student recruitment, policy compliance, including Title IX, departmental leadership, reporting to college dean, class scheduling, facility manager and daily departmental functions. In addition, administration of NSF center CB<sup>2</sup>.

2005 to 2018

IOWA STATE UNIVERSITY, Agricultural and Biosystems Engineering, Assistant Professor, Associate Professor, Professor and Adjunct Professor. Teaching responsibilities in polymer processing, metals processing, advanced polymer processing, strengths of materials and numerical methods. Research focus areas included **biorenewable**, **biodegradable polymers**, nano-composites, bio-renewable fuel sources, high-power ultrasonics, **ethanol and biodiesel production**, micro-fabrications, and polymer and metal welding.

2001 to 2012

GREWELL ENGINEERING CONSULTANTS Inc., *President*, Ames, Iowa. Responsibilities include technical consulting and experimental research on plastic joining for industrial clients. Work included **proposal preparation**, budget management, scheduling, report preparation, corporation legal management and employee management. Projects included optical design, joint design, metal welding, heat flow and stress analysis, vibrational analysis, process selection, patent review and market analysis. Clients included: Emerson Electric, Eastman Kodak, Waddington North America Inc., Edison Welding Institute, and Numonics Corp.

2001 to 2005

THE OHIO STATE UNIVERSITY, *Graduate Research Associate*, Columbus, Ohio. Responsibilities included research work on laser welding, micro-joining technologies, micro-embossing, micro-assembly, lithography, welding of plastic lumber, ultrasonic treatment of advanced composites and material testing. Primary focus of study was on plastics, lasers, welding, and micro-fabrication. Served as teaching assistant for several classes and developed one class. Supervised MS and BS students, as well as laboratory experiments.

1997 to 2001

BRANSON ULTRASONIC CORPORATION, *Research Project Manager Infrared Welding*, Danbury, Connecticut. Responsibilities included **project management** for the development of **novel laser welding product line**. Aspects included: machine concept development, equipment design, process modeling, laser and optical design, optical modeling, wave guide design, laser power supply development, application development, project planning, marketing studies, laser safety concerns, international team building with extensive European travel, customer interactions and sales, personnel review, personnel training, and budget planning (\$250k). The use of high-power laser diodes (>45 W), laser diode cooling and packaging was an extensive part of the responsibilities. This work resulted in a new product line for the company with annual sales of more than +10 **million dollars and five patents**. This work also resulted in the creation of several job positions, including application engineers, optical design engineers, and manufacturing positions.

1992 to 1997

BRANSON ULTRASONIC CORPORATION, *Plastic Joining Specialist (Senior Research Engineer)*, Danbury, Connecticut. Responsibilities included project management for developing high-power ultrasonic equipment for long-term industrial needs. Aspects included: **equipment design**, process modeling, statistical analysis and design of experiments, application development, project planning, marketing studies, development of **artificial intelligence software for equipment setup**, competitor evaluation, development of new joining techniques, such as laser and IR welding, and identifying industrial trends. This position reported directly to the director of Advanced Programs and had a high level of confidentiality.

1989 to 1992

EWI/MATERIALS JOINING TECHNOLOGY, *Research Engineer (II)*, Columbus, Ohio. Responsibilities included: project management and engineering research. Management aspects included: report/proposal preparation, project budgeting and scheduling, technical staff supervision/training and general project management. Engineering aspects included: joint design, process optimization via statistical analysis and **design of experiments**, process selection, automation and development, and development of joining procedures. Areas of focus were automotive, aerospace, ultrasonics, and medical industries.

1987 to 1989

EDISON WELDING INSTITUTE, *Junior Technician*, Columbus, Ohio. Responsibilities included technical work on short- and long-term projects related to thermoplastics and composites processing and welding. This resulted in practical and theoretical experience for multiple welding methods including ultrasonic, induction, resistance-implant, linear and non-linear friction, hot plate, dielectric, IR and hot gas.

1984 to 1987

THE OHIO STATE UNIVERSITY, *Research Assistant and Technical Liaison*, Columbus, Ohio, Welding Engineering Department. Conducted studies on related variables and optimum parameters on ultrasonic compaction of polymer powders. Organized filming and layout of video for public recruiting to the department. Conducted literature review in polymer science: joining, processing and applications.

1984 to 1986

EDISON WELDING INSTITUTE, Information Service Coordinator  
THE OHIO STATE UNIVERSITY, *Resident Advisor*  
TRI-CITY AIRPORT, Maintenance technician

## SCHOLARSHIP

### **JOURNAL PUBLICATIONS (77)** : Underline indicate student

77) A. Dey, Md Rahman, , N. Yodo, **D. Grewell**, Development of biocomposite filament for fused filament fabrication from soy hulls and soy protein isolate, *Materials Today Communications*, Volume 34, 2023, ISSN 2352-4928,

Role: Involved in proposed topic for research and served as technical advisor

Concept: 50%, Writing 25%, Editing 40%

Significance: This paper promotes/justifies the used of alternative sustainable materials in additive to reduce the environmental impact of the technology.

76) S.-R. Klaus<sup>†</sup>, C. Covelli, Y. Shichen, **D. Grewell**, Structural changes from vibration welding of maple and pine woods analyzed by solid-state NMR, *Welding in the World*, 66, 961-971 (2022)

Role: Develop original concept for research and served as technical advisor

Concept: 90%, Writing 25%, Editing 25%

Significance: This is the 1<sup>st</sup> paper to dispute the finding reported in other peer-reviewed papers on the fundamental mechanisms that allow wood to be welded.

75) Md Mahfuzur Rahman, B. Lamsal, B. Byanju, **D. Grewell**, High-power sonication of soy proteins: hydroxyl radicals and their effects on protein structure Corresponding, *Ultrasonics – Sonochemistry* June 2020, 10.1016/j.ultsonch.2020.105019

Role: Served as technical advisor

Concept: 10%, Writing 25%, Editing 35%

Significance: This paper details the use of ultrasonics to improve the functionality of proteins for improved food quality.

74) S. Madbouly, J. Shrader, **D. Grewell** "Biorenewable Polymer Composites From Tall Oil-Based Polyamide And Lignin-Cellulose Fiber, Vol 132, Issue 48, June 2015, Journal of Applied Polymer Science

Role: Served as technical advisor

Concept: 10%, Writing 25%, Editing 35%

Significance: This paper details the properties of a novel, biobased plastics that will promote sustainability.

73) D. M. Kadam, M. Thunga, G. Srinivasan, S. Wang, M. R Kessler, **D. Grewell**, C. Yu, B. L. Lamsal, Effect of TiO<sub>2</sub> Nanoparticles on the Thermo-Mechanical Properties of Zein Protein Films, Vol 13, pg 35-43, Sept 2017, Journal of Food Engineering

Role: Served as technical advisor

Concept: 25%, Writing 25%, Editing 15%

Significance: This paper details new knowledge on bioplastic to promote sustainability.

72) C. Currey, N. Flax, J. Schrader, **D. Grewell**, W. Graves, Herbaceous Perennial Producers Can Grow High-quality Blanket Flower in Bioplastic-based Plant Containers, April 2019, Vol 28, Issue 2, pg 212-217, HortTechnology

Role: Served on student's plan of study committee

Concept: 50%, Writing 30%, Editing 20%

Significance: The paper details new knowledge on biobased pots that will promote the use of sustainable plastics

71) C. Annandarajah, A. Langhorst, A. Kiziltas, D. Grewell, D. Mielewski, Reza Montazami, Hybrid Cellulose-Glass Fiber Composites for Automotive Applications, Materials, 2019 Sep 28;12(19):3189. doi: 10.3390/ma12193189.

Role: Major Advisor of student

Concept: 15%. Writing 20%, Editing 30%

Significance: This paper details the proper use and design of sustainable plastics for the automotive industry as well as other industries.

70) S. Madbouly, J. Shrader, **D. Grewell**, W. Graves, K. McCabe, M. Kessler Processing and Characterization of Bio-Based Polyhydroxyalkanoate (PHA) /Polyamide (PA) Blends: Improved Flexibility and Impact Resistance of PHA-based plastics Processing and Characterization of Bio-Based Polyhydroxyalkanoate (PHA) /Polyamide (PA) Blends: Improved Flexibility and Impact Resistance of PHA-based plastics, Vol 132, Issue 27, April 2015, Journal of Applied Polymer Science

Role: Served on student's plan of study committee

Concept: 50%, Writing 20%, Editing 20%

Significance: The paper details new knowledge on biobased agricultural products that will promote the use of sustainable plastics.

69) Hee-Young Kim B. Lamsal, Jay-lin Jane, **D. Grewell**, Sheet-extruded films from blends of hydroxypropylated and native corn starches, and their characterization, Journal of Food Process Engineering Ag, 2019, <https://doi.org/10.1111/jfpe.13216>

Role: Served as major technical consultant on research and paper.

Concept: 20%, Writing 20%, Editing 10%

Significance: This paper details corn starch as a plastic to promote the use of sustainable materials.

68) **D. Grewell**, C. Xaign, C. Annandarajah, Full biobased insect repellent PLA, Polymer Engineering and Science, Vol 59, Issue 2, March 9, 2019

Role: Served as major advisor for Cindu Annandarajah and supported the project with technical expertise on plastics and polymer processing.

Concept: 50%, Writing 20%, Editing 40%

Significance: This paper details the use of biobased fabrics and potential benefits to promote the use of sustainable materials.

67) C. Annandarajah, P. Li, M. Michel, Y. Chen, R. Jamshidi, A. Kiziltas, R. Hoch, **D. Grewell**, R. Montazami, Study of Agave Fiber-Reinforced Biocomposite Films, Materials 2019, 12(1), 99; <https://doi.org/10.3390/ma12010099>

Role: Served as major advisor for Cindu Annandarajah and supported the project with technical expertise on plastics and polymer processing.

Concept: 50%, Writing 20%, Editing 40%

Significance: This paper details the use of biobased composites and potential benefits to promote the use of sustainable materials.

66) Flax, N.J. C.J. Currey, J.A. Schrader, **D. Grewell**, W.R. Graves. Coconut coir and peat biocontainers influence plant growth retardant drench efficacy. HortTechnology, June 2018 vol. 28 no. 3 370-377.

Role: Served on program of study for Nick and supported the project with technical expertise on plastics and polymer processing.

Concept: 50%, Writing 20%, Editing 20%

Significance: This paper details the use of sustainable materials for agricultural applications and help promote industry wide acceptance of these materials.

65) C. Annandarajah, **D. Grewell**, S. Clark, J. Talbert<sup>†</sup>, D. Raj Raman, Impact of Batch Thermosonication on Plasmin Activity in Stored Skim Milk: Time-Amplitude Effects, Ultrasonics Sonochemistry, Vol42, 15 May 2018

Role: Served on major professor for Annandarajah and supported the project with technical expertise on ultrasonics and design of experiments.

Concept: 50%, Writing 20%, Editing 40%

Significance: This paper details the use of ultrasonics to enhance shelf life on milk while maintaining quality. This technology has the potential of enhancing food availability on a global scale.

64) D. M. Kadam, M. Thunga, G. Srinivasan, S. Wang, M. Kessler, **D. Grewell**, C. Yu, Effect of TiO<sub>2</sub> Nanoparticles on the Thermo-Mechanical Properties of Zein Protein Films, Volume 13, September 2017, Pages 35-43, Food Packaging and Shelf Life.

Role: Served on program of study as professor for Kadam and supported the project with technical expertise on polymer processing.

Concept: 50%, Writing 25%, Editing 25%

Significance: This paper details the use of sustainable materials for packaging application and controlling the vapor barrier properties of sustainable materials.

63) N. Flax<sup>†</sup>, W. Graves, J. Schrader, **D. Grewell**, C. Currey, Commercial Greenhouse Growers Can Produce High-quality Bedding Plants in Bioplastic-based Biocontainers, HortTechnology August 2017 vol. 27 no. 4 472-481.

Role: Served on program of study as professor for Flax and supported the project with technical expertise on polymer processing.

Concept: 50%, Writing 50%, Editing 25%

Significance: This paper details the use of sustainable materials for agricultural applications and help promote industry wide acceptance of these materials.

62) K. Allen, S. Cady, **D. Grewell**<sup>†</sup>, Effect of Acetylation on the Mechanical and Thermal Properties of Soy Flour Elastomers, Volume 5, Supplement 1, January 2017, pp. 124-126(3), Journal of Renewable Materials.

Role: Served as major professor for Allen and managed project.

Concept: 50%, Writing 70%, Editing 90%

Significance: This paper detailed the rubbers filled with soy flour and compared the mechanical properties for treated and untreated fillers. This has the potential impact of reducing non-degradable plastics in the waste stream.



61) B. Demmer, **D. Grewell**<sup>†</sup>, S. Devlin, R. Stephenson, "Comparison and analysis of flexibility of bio-based/biodegradable and petrochemical cutlery, Journal of Technology, Management and Applied Engineering, March 2017, Vol. 3, No. 1, pg 2.

Role: Served as major professor for Demmer and managed project.

Concept: 50%, Writing 70%, Editing 80%

Significance: This paper detailed the performance of biobased utensils compared to petrochemical plastics and the impact of these performances on market acceptance. This has the potential impact of reducing non-degradable plastics in the waste stream.

60) S K. McCabe<sup>†</sup>, Christopher Currey, J. Schrader, **D. Grewell**, M. Kessler, J. Behrens, W. Graves, Pelletized Soy-based Bioplastic Fertilizers for Container-crop Production, HortScience, 51:1417-1426, Nov 2016

Role: Served as technical support on bioplastics and committee member for K. McCabe.

Concept: 40%, Writing 20%, Editing 20%

Significance: This paper details the use of renewable sources for fertilizers that reduce nitrogen runoff.

59) Shinnosuke Onuki, Jacek A. Koziel, William S. Jenks, Lingshuang Cai, **David Grewell**, J. H. van Leeuwen<sup>†</sup>, Taking ethanol quality beyond fuel grade: A review, J. Inst. Brew, Aug. 2016

Role: Served as technical support on biofuels.

Concept: 10%, Writing 10%, Editing 10%

Significance: This paper detailed the importance biofuel quality.

58) Guidolin, M.E.B.Z.<sup>†</sup>, Demiate, I.M., de Godoy, R.C.B., de Paula Scheer, A., **Grewell, D.**, Jane, J.-I., Structural and functional characterization of starches from Brazilian pine seeds (Araucaria angustifolia), Food Hydrocolloids (2016), doi: 10.1016/j.foodhyd.2016.08.022.

Role: Served as mentor/advisory for Guidolin while she was a visiting scholar.

Concept: 10%, Writing 10%, Editing 10%

Significance: This paper detailed the importance of proteins and protein content in native trees to Brazil.

57) S. Madbouly, J. Shrader, **D. Grewell**, W. Graves, K. McCabe, M. Kessler, G. Srinivasan, Processing and Characterization of Bio-Based Polyhydroxyalkanoate (PHA) /Polyamide (PA) Blends, J. Appl. Polym. Sci. 2015, 132, 42209

Role: Provided technical support for polymer processing.

Concept: 43%, Writing 20%, Editing 20%

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<sup>†</sup> Primary/corresponding Author/Underlined names are student or post-docs supervised by Grewell

Significance: This paper detail fundamental knowledge on thermomechanical properties of novel biobased polymer blends.

56) Vijayakumar, Sakthi<sup>†</sup>, **Grewell, David**, Anandarajah, Cindu, Benner, Lily, Clark, Stephanie Quality characteristics and plasmin activity of thermosonicated skim milk and cream, Journal of Dairy Science, Journal of Dairy Science Vol. 98 No. 10, 2015

Role: Provided technical support for ultrasonic and experimental design.

Concept: 40%, Writing 20%, Editing 20%

Significance: This is the first paper to evaluate the use of ultrasonics to reduce milk spoilage and characterizing the plasmin activity as a function of ultrasonic treatment.

55) H. Kratsch, J. Schrader, K. McCabe, G. Srinivasan<sup>†</sup>, **D. Grewell**, W. Graves, Performance and Biodegradation in Soil of Novel Horticulture Containers Made from Bioplastics and Biocomposites, HortTechnology February 2015 vol. 25 no. 1 119-131

Role: Provided technical support for polymer processing and supervised Dr. Srinivasan.

Concept: 40%, Writing 30%, Editing 15%

Significance: This paper demonstrates the use of biobased degradable plastics for industry applications and shows industry partners how to adopt these plastics.

54) Yang, S<sup>†</sup>. Madbouly, J. Schrader, **D. Grewell**, M. Kessler, W. Graves, Processing and Characterization of Bio-Based Polyhydroxyalkanoate (PHA)/Polyamide (PA) Blends, RSC Journal of Applied Polymer Science, 2015, 132(27), 42209 (DOI).

Role: Provided technical support for polymer processing.

Concept: 40%, Writing 30%, Editing 25%

Significance: This paper helps promote the use of bioplastics and details how processing can affect degradability of plastics.

53) Madbouly<sup>†</sup>, J. Shrader, **D. Grewell**, W. Graves, M. Kessler, Biodegradation Behavior of Poly (lactic acid) (PLA)/Distiller's Dried Grains with Soluble (DDGS) Composites, ACS Sustainable Chemistry & Engineering, 2015 3 (11), 2756-2766.

Role: Provided technical support for polymer processing and compounding.

Concept: 40%, Writing 30%, Editing 20%

Significance: This is the first paper that details the degradation of PLA compounded with DDGs. This information provides knowledge to user that can be used to predict degradation of PLA/DDGs composites, including rate and effect of soil quality.

52) S. Madbouly<sup>†</sup>, J. Shrader, **D. Grewell**, W. Graves, K. McCabe, M. Kessler, G. Srinivasan Characterization and Biodegradation Behavior of Bio-Based Poly(lactic acid) and Soy Protein Blends for Sustainable Horticultural Applications, *Green Chemistry*, 2015,17, 380-393.

Role: Provided technical support on processing of soy protein plastics as well as soy and PLA formulations. Was the lead investigator in developing the use of soy plastics into horticultural applications.

Concept: 50%, Writing 40%, Editing 30%

Significance: This paper details the development of soy/PLA horticultural applications. This transformational technology turns simple plant pots into self-fertilizing, biodegradable, and growth promoting plant containers. This paper details the thermo-mechanical properties of these materials to promote the use of these materials, which can offset petrochemical plastics.

51) K. G. McCabe<sup>†</sup>, J. A. Schrader, S. Madbouly, **D. Grewell**, W. R. Graves, Evaluation of Biopolymer-coated Fiber Containers for Container-grown Plants, *HortTechnology*, 2014, 24(4)

Role: Provided technical support for polymer formulations and coating technologies.

Concept: 50%, Writing 40%, Editing 30%

Significance: This paper reviews the use of traditional peat moss pots that are coated with biobased plastic coatings to reduce water loss, a major issue for traditional peat moss-based pots. This technology can broaden the use of fully biobased pots in horticultural applications, reducing the use of petrochemical plastics.

50) S. A. Madbouly<sup>†</sup>, J. A. Schrader, **D. Grewell**, M.R. Kessler, W. R. Graves, Novel Bio-based Composites of Polyhydroxyalkanoate (PHA)/ Distillers Dried Grains with Solubles (DDGS), *Royal Society of Chemistry*, 2014, 4, 39802

Role: Provided technical support for polymer mixing and interfacial adhesion as well as polymer processing.

Concept: 60%, Writing 40%, Editing 30%

Significance: This is the first paper detailing the thermo-mechanical properties of PHA and DDGS giving, producer of biobased products critical knowledge on processing and performance of PHA/DDGS composites. These materials have the potential to offset the use of petrochemical plastics, reducing the environmental impact of plastics.

49) H. Juretic, M. Montalbo-Lomboy, J (Hans) van Leeuwen, W. Cooper, **D. Grewell**<sup>†</sup>, Hydroxyl Radical Formation in Batch and Continuous Ultrasonic Systems, *Journal of Sono-Chemistry*, *Ultrasonics Sonochemistry* 22 (2014): 600-606.

Role: Provided technical support regarding high power ultrasonics and formation of free radicals in liquid processing as well as experimental design.

Concept: 90%, Writing 60%, Editing 90%

Significance: This is the first paper to characterize free radical formation in a continuous flow ultrasonic system; it also compares these results to batch processing of liquids. These results give users the knowledge required to scale-up the use of ultrasonics for liquid processing. These results can enhance biomass processing and increase the efficiencies of biomass processing for biofuel production.

48) **D. Grewell**<sup>†</sup>, Melissa Montalbo-Lomboy, Rapid Dissolution of Switchgrass in 1-Butyl – 3-Methylimidazolium Chloride by Ultrasonication, *Ultrasonics Sonochemistry*, 22 (2014) 588–599

Role: Provided technical support regarding high power ultrasonics as well as experimental results.

Concept: 90%, Writing 60%, Editing 90%

Significance: This is the first paper detailing the use of ultrasonics to accelerate the dissolution of biomass in ionic liquids with ultrasonics for the removal of lignin. These results offer an efficient technology of removing lignin from lignocellulosic biomass for the production of biofuels. These results provide fundamental knowledge that can result in broader production of biofuels and reduction of greenhouse gas.

47) **D. Grewell**<sup>†</sup>, G. Srinivasan, E. Cochran, Depolymerization of post-consumer polylactic acid products, *Journal of Renewable Materials*, *Journal of Renewable Materials* 2.3 (2014): 157-165.

Role: Provided technical support on depolymerization, characterization of decomposition components, high power ultrasonics as well as experimental design.

Concept: 90%, Writing 75%, Editing 90%

Significance: This is the first paper detailing the use of ultrasonics to depolymerize PLA in lactic acid. This allow PLA to be recycled for direct food contact applications, which can reduce the use of corn for the production of PLA and the overall environmental impact of PLA.

46) J. Riedl, **D. Grewell**<sup>†</sup>, M. Kessler, R. Raman, Peel and Shear Strength and Tear Resistance of Ultrasonically Sealed Coextruded Polyolefin Films for packaging Applications, *Welding in the World* 58.5 (2014): 619-636.

Role: Provided technical support ultrasonic welding of plastic, experimental design

Concept: 90%, Writing 70%, Editing 90%

Significance: This paper provides fundamental knowledge of process parameters and weld quality as well as quality consistency (weld strength) with polymer film application. This gives producers of packaging products insight into quality control.

45) D. M. Kadam, C. Wang, S. Wang, **D. Grewell**, B. Lamsal<sup>†</sup>, C. Yu, Microstructure and Antimicrobial Functionality of Nano-Enhanced Protein-Based Biopolymers, *Transactions of the ASABE* 57.4 (2014): 1141.

Role: Provided technical support for polymer processing and soy-based plastics.

Concept: 40%, Writing 30%, Editing 40%

Significance: This paper is the first paper that reviews the functionality of soy-based plastics. This fundamental knowledge allows the use of soy-based plastic in medical and food protection applications to enhance health care as well national security.

44) S. A. Madbouly<sup>†</sup>, J. A. Schrader, G. Srinivasan, K. Liu, K. G. McCabe, **D. Grewell**, W. R. Graves, M. R. Kessler, Biodegradation behavior of bacterial-based polyhydroxyalkanoate (PHA) and DDGS composites, *Green Chem.*, 2014, 16, 1911

Role: Provided technical support polymer processing compounding and spearheaded the initial studies.

Concept 50%, Writing 30%, Editing 30%

Significance: This paper is the first paper that shows the degradation of PHA can be controlled through the use of additives such as DDGs. This will expand the use and acceptance of bio-based plastics, such as PHA, because of the ability to control the degradation rate.

43) B. Tisserat<sup>†</sup>, L. Reifschneider, **D. Grewell**, G. Srinivasan Effect of Maleic Anhydride Concentrations, Particle Sizes and Dried Distiller's Grain and Solubles on the Mechanical and Flexural Properties of Paulownia Wood Flour Polypropylene Composites, *Journal of Reinforced Plastics and Composites*, Published online April 4, 2014, DOI: 10.1177/0731684414521886

Role: Provided technical support polymer processing and interfacial properties.

Concept 40%, Writing 40%, Editing 50%

Significance: This paper details the processing and characterization of renewable composite materials that will give designers and engineers knowledge that will help support the industry wide acceptance of renewable composite. These materials have the potential to reduce the use of petrochemical feedstock.

42) M. Thunga, D. Kumar, **D. Grewell**, M. R. Kessler, Novel Composites from Eco-friendly Soy Flour/SBS Triblock Copolymer, *Macromolecular Materials and Engineering*, Published online March 10, 2014, DOI: 10.1002/mame.201300368

Role: Provided technical support protein processing and polymer characterization.

Concept 25%, Writing 25%, Editing 25%

Significance: This paper details the processing and characterization of renewable composite materials that will give designers and engineers insight into their use for manufacturing of products. These materials are environmentally friendly and have the potential to reduce greenhouse gas emissions as well as use of petrochemical feedstock.

41) M. Thunga<sup>†</sup>, K. Chen, **D. Grewell**, M. R. Kessler, Bio-renewable Precursor Fibers from Lignin/Poly lactide Blends for Conversion to Carbon Fibers, *Carbon* 68(2014) 159-166

Role: Provided technical support on spinning technology and carbon fibers.

Concept 25%, Writing 25%, Editing 40%

Significance: This paper is the first to review PLA/lignin (by-product from pulping and energy production) as a possible precursor for carbon fibers. This technology can reduce the costs of carbon fibers and allow low cost high performance composites to be realized.

40) G. Srinivasan<sup>†</sup>, **D. Grewell**, Development of soy protein plastics using functional chemistry for short life biodegradable applications, *Journal of Renewable Materials*, Vol. 1, No. 4, November 2013.

Role: Guided research, helped prepare formulations of bioplastics, and prepare manuscript.

Concept 25%, Writing 50%, Editing 75%

Significance: This paper reviews the water stabilization of soy protein plastics. Because the plastics are traditionally water soluble, this stabilization expands the possible application of these renewable plastics, offsetting the use of petrochemical plastics and reducing environmental impacts of plastics.

39) J. A. Schrader<sup>†</sup>, G. Srinivasan, **D. Grewell**, K. G. McCabe, W. R. Graves, Fertilizer Effects of Soy-plastic Containers during Crop Production and Transplant Establishment, *HortScience*, 48(6):724-731. 2013.

Role: Helped prepare formulations of bioplastics and to interpret experimental results.

Concept 25%, Writing 10%, Editing 25%

Significance: This is the first article demonstrating that protein based plastic plant containers can enhance plant growth through self-fertilizing and root pruning effects

38) D. Mahadev Kadam<sup>†</sup>, M. Thunga, S. Wang, M. R Kessler, **D. Grewell**, B. P Lamsal, C. Yu, Preparation and Characterization of Whey Protein Isolate Films Reinforced with Porous Silica Coated Titania Nanoparticles, *Journal of Food Engineering* 117 (2013) 133-140

Role: Helped prepare the experimental design for ultrasonic treatment as well as interpret the results.

Concept 25%, Writing 10%, Editing 25%

Significance: This is the first paper detailing the use of ultrasonics for promoting strength in nano-composites from protein plastics.

37) T.Wang<sup>†</sup>, J. Gerde, Y. Linxing, L. M. Montalbo-Lomboy, **D. Grewell** Evaluation of microalgae cell disruption by ultrasonic treatment, *Bioresource Technology*, 125(2012) 175-181.

Role: Served as for Dr. Montalbo-Lomboy and as technical expert on ultrasonics and its effects on biomass.

Concept 50%, Writing 25%, Editing 25%

Significance: The results of this paper promote the use of algae for biofuels and allow other researchers to build on this knowledge. This helps promote sustainability and reduce the generation of harmful greenhouse gases. This paper is the first paper that details the energy that is dissipated in absolute values for cell disruption.

36) J. Vogel, M. Kessler, S. Sundarajan, **D. Grewell**<sup>†</sup>, Activation Energy for Diffusion and Welding of PLA Films, *Polymer Engineering and Science*, *Polym. Eng. Sci.*, 52(8), 1693 (2012)

Role: Served as primary investigator and pioneer of this technology and was the major advisor for Dr. Vogel.

Concept 90%, Writing 75%, Editing 100%

Significance: This is the first paper that details the measurements and values of the thermodynamic activation energy of polylactic acid (PLA) plastics, biorenewable and bio degradable plastics. This knowledge allows users to model the interfacial healing of PLA processes, such as welding, sealing and injection molding.

35) T. Pananuna, M. Montalbo-Lomboy, A. Noomhorm, **D. Grewell**, B. Lamsal<sup>†</sup>, High-power Ultrasonication-assisted extraction of soybean isoflavones and effect of toasting, *LWT - Food Science and Technology*, 47(1): 199-207, 2012

Role: Served as primary investigator and pioneer in the area of ultrasonics and served as a technical expert in this area for this work. In addition, Dr. Grewell was the direct supervisor of Dr. Montalbo-Lomboy.

Concept 50%, Writing 50%, Editing 25%

Significance: This the first paper that details the use of ultrasonics for the extraction of high value products such as isoflavones from soybeans. This technology can greatly reduce the costs of these products and increase their availability.

34) D. Mitra<sup>†</sup>, M. L. Rasmussen, P. Chand, V. R. Chintareddy, L. Yao, **D. Grewell**, J. G. Verkade, T. Wang, J (Hans) van Leeuwen, Value-added oil and animal feed production from corn-ethanol stillage by oleaginous *Mucor circinelloides*, *Bioresource Technology* 107 (2012) 368–375

Role: Served as primary technical source for the use of ultrasonics as well as the direct supervisor of Chand.

Concept 50%, Writing 30%, Editing 30%

Significance: This paper is the first paper that details the use of ultrasonics to enhance the value of co-products from the corn to ethanol industry which will promote the use of renewable energy sources.

33) M. Montalbo-Lomboy<sup>†</sup>, S. Khanal, J. (Hans) van Leeuwen, D. R. Raman, **D. Grewell**, Ultrasonic Pretreatment of Corn Slurry for Simultaneous Saccharification and Fermentation, *Biotechnology Progress*, December 2011, 27(6), pp. 1561-1569

Role: Served as primary investigator and pioneer in the area of ultrasonics and biofuel production. In addition, Dr. Grewell was the direct supervisor of Dr. Montalbo-Lomboy.

Concept 100%, Writing 50%, Editing 50%

Significance: This paper detailed the use of high-energy ultrasound to pretreat corn starch, thereby allowing dry-grin ethanol facilities to save significant amounts of energy and to thereby increase their efficiency.

32) H. Juretić<sup>†</sup>, S. Dobrović, N. Ružinski, J. Lovrić, M. Pećarević, J. Mikuš, M. Crnčević, E. J. Marčelja, M. M. Rajčić, S. Širac; W. J. Coope, **D. Grewell**, J. (Hans) van Leeuwen. Studies of Ozonation for Inactivation of *Artemia salina* Nauplii in Ballast Water, *Ozone: Science & Engineering*., 1547-6545, Sci. & Eng. 33(1) 3-13. 1, 2011

Role: Provided technical support on this project in terms of free radical measurements.

Concept 25%, Writing 25%, Editing 25%

Significance: This paper provides details on how ozone can be used to reduce cross contamination of organisms through ship ballast water discharge. This has the potential to reduce the environmental impact of international shipping.

31) **D. Grewell**<sup>†</sup>, D. Fuchs, K. Rajan, M. Schemme, P. Karlinger, M. R. Kessler, Vacuum Infusion Processing of Self-Healing Composites with Reinforcement Bound Microcapsules, *Journal of Plastics Technology*, 2011/01, 2-16.

Role: Served as advisor of David Fuchs during his study abroad program to ISU from the University of Paderborn, Germany.

Concept 20%, Writing 25%, Editing 75%

Significance: This paper details that micro-spheres filled with self-healing chemistries are not damaged during infusion of resin into self-healing composites. This knowledge gives manufacturers insight into novel manufacturing techniques for self-healing composites.

30) J. Vogel, **D. Grewell**<sup>†</sup>, M. Kessler, D. Drummer, and M. Menacher. Ultrasonic and impulse welding of polylactic acid films. *Polymer Engineering & Science*, 51(6), pp. 1059-1067, 2011.

Role: Served as advisor of Vogel and provided direct supervision of his work. Dr. Grewell also proposed the work of studying the welding of PLA.

Concept 50%, Writing 25%, Editing 50%

Significance: This paper is the first study on a PLA, a bio-degradable bio-renewable plastic. The paper details the conditions required to achieve full strength welding of PLA and resulting strength. This knowledge will promote the use of PLA by industry, thereby potentially reducing environmental impacts of petrochemical plastics.

29) M. Montalbo-Lomboy<sup>†</sup>, S. K. Khanal, J. (Hans) van Leeuwen, D. R. Raman, L. Dunn Jr., **D. Grewell**, Ultrasonic pretreatment of corn slurry for saccharification: A comparison of batch and continuous systems, *Ultrasonics Sonochemistry*, 17 (5):939-946; 2010.

Role: Was advisor of M. Montalbo-Lomboy during her PhD study which was origin of this research. In addition, Dr. Grewell supervised Dr. Montalbo-Lomboy during her post-doctoral work and the preparation of this paper.

Concept 20%, Writing 25%, Editing 50%



Significance: This paper is the first study on using ultrasonics saccharification of corn starch in a continuous treatment method. This is one of the first papers that details the possibility of scaling this technology to meet industrial needs and reviews the financial justifications.

28) M. Baboi, **D. Grewell**<sup>†</sup>, Evaluation of Amplitude Stepping in Ultrasonic Welding, *Welding Journal*, 89, 8,161-165s, August 2010.

Role: Supervised Dr. Baboi during this research and was major committee member.

Concept 35%, Writing 25%, Editing 50%

Significance: This paper details how amplitude profiling can be used to produce better aluminum welds. The study was funded by Ford Motor Company to develop assembly technologies for aluminum cars that would be more efficient reducing the generation of greenhouse gases.

27) M. Baboi, **D. Grewell**<sup>†</sup>, Comparison of Control Algorithms for Ultrasonic Welding of Aluminum, *Welding Journal*, **89**,243-2, November 2010.

Role: Was the advisor of Baboi and provided direct supervision of her work. Dr. Grewell also proposed the concept of comparing various control algorithms for ultrasonic metal welding.

Concept 35%, Writing 25%, Editing 50%

Significance: This paper details that various control modes can affect the quality of aluminum welds. The paper details which modes are most effect and quantifies the quality of the welds. The study was funded by Ford Motor Company to develop assembly technologies for aluminum cars that would be more efficient reducing the generation of greenhouse gases

26) W. Wu-Haan<sup>†</sup>, C. Hearn, R. Burns, **D. Grewell**, Effect of Ultrasonic Pretreatment on Methane Production Potential from Corn Ethanol Coproducts, *Transactions of the ASABE*. 53(3): 883-890, 2010.

Role: Committee member of Wu-Haan and provided technical support on high power ultrasonics as well as major advisor of Hearn.

Concept 35%, Writing 25%, Editing 50%

Significance: This paper details enhancement of anaerobic digestion of a wide range of corn to ethanol co-products for the production of methane gas as a source of biofuel. The detailed technology has the potential to offset the use fossil fuels reducing greenhouse gas production and reliance of foreign oil dependence.

25) W. Wu-Haan<sup>†</sup>, R. Burns, L. Moody, **D. Grewell**, R. Raman. Effect of ultrasonic pretreatment on anaerobic digestion of different animal manures. *Transactions of the ASABE*. 53(2): 577-583, 2010.

Role: Committee member of Wu-Haan and provided technical support on high power ultrasonics.

Concept 35%, Writing 25%, Editing 50%

Significance: This paper details enhancement of anaerobic digestion of a wide range of manures for the production of methane gas generation as a source of biofuel. The detailed technology has the potential to offset the use fossil fuels reducing greenhouse gas production and reliance of foreign oil dependence.

24) P. Chand, C. Reddy, J. Verkade, **D. Grewell**<sup>†</sup>, Enhancing Biodiesel Production from Soybean Oil Using Ultrasonics, *Energy and Fuels*, 24, 2010-2015, 2010.

Role: Advisor for Chand and provided direct supervision of her work. Dr. Grewell also proposed the concept of using ultrasonics to enhance bio-diesel production

Concept 90%, Writing 50%, Editing 50%

Significance: This paper is the first paper that details the use of very high intensity ultrasonic energy to enhance bio-diesel production. The paper details the conditions required to reduce oil to bio-diesel production time from 45 minutes to less than 1 minute with less energy requirements, making bio-diesel production more efficient.

23) S. Vengasandra, Y. Cai, **D. Grewell**, J. Shinar, R. Shinar<sup>†</sup>, Polypropylene CD-organic light emitting diode biosensing platform, Lab on a Chip, Royal Society of Chemistry, Lab Chip 10, 1051 – 1056, 2010.

Role: Advisor for S. Vengasandra and provided technical support on micro-fabrication and polymer processing.

Concept 50%, Writing 10%, Editing 15%

Significance: This paper reviews characterization of computer CD's fabricated so that they could perform various chemical assays with standard CD players. This technology enables inexpensive, disposable lab on a CD device so that rapid and high frequency testing can be performed for a wide range of pathogens and contaminations.

22) M. Helgeson<sup>†</sup>, W. R. Graves, **D. Grewell**, G. Srinivasan. Zein-based bioplastic containers alter root-zone chemistry and growth of geranium. *Journal of Environmental Horticulture*, 28(2), 74-80, June 2010.

Role: Committee member of Helgeson and provided technical support on polymer processing of bioplastics for pot manufacturing as well as material characterization.

Concept 50%, Writing 10%, Editing 20%

Significance: This paper compares the performance of self-fertilizing bio-based pots made from plant protein to petrochemical-based pots. Plant growth was compared between various pots and soil conditions. This paper allows users of the pots to determine the benefits of bio-based pots compared to petrochemical-based pots and gain insight into how corn protein pots effect plant growth.

21) B. Karki<sup>†</sup>, B. Lamsal, S. Jung, J. van Leeuwen, **D. Grewell**, A. Pometto III, S. Khanal, Enhancing Protein and Sugar Release from Defatted Soy Flakes using Ultrasound Technology, *Journal of Food Engineering*, 96, 270–278, 2010.

Role: Served as a committee member for B. Karki who conducted the research. In addition, Dr. Grewell provided technical support on high-power ultrasonics and its effects on protein structures

Concept 50%, Writing 30%, Editing 30%

Significance: This paper details the effect of pretreating defatted soy flakes with ultrasound on soy protein isolate (SPI) yield and functionality. It was found that ultrasonics improved the recovery of sugar and protein yields. This technology can improve food production of soy protein.

20) M. Montalbo-Lomboy, L. Johnson, S. Khanal, J. van Leeuwen, **D. Grewell**<sup>†</sup>, Sonication of Sugary-2 Corn: A Potential Pretreatment to Enhance, *Bioresource Technology*, 101(1), 351-358, 2009.

Role: Advisor for M. Montalbo-Lomboy who conducted the research as part of her Ph.D. thesis. In addition, Dr. Grewell proposed the concept and managed the research.

Concept 50%, Writing 50%, Editing 20%

Significance: This work shows that sugary corn can be used as feed stock for biofuel production and that ultrasonics can enhance the conversion of the starch in the corn to fermentable sugars. This enhancement increases the overall efficiency of the production of biofuels and improves the engineering and economics of the production of biofuels.

19) **D. Grewell**<sup>†</sup>, G. Harmon, S. Vengasandra, Zero Flash Ultrasonic Micro Embossing on Foamed Polymer Substrates: A Proof of Concept, *Polymer Engineering and Science*, 49(11) 2204-2211, August 2009.

Role: Advisor for Harmon and Vengasandra. In addition, Grewell proposed the concept and has a patent application for the concept of zero flash.

Concept 100%, Writing 25%, Editing 100%

Significance: This paper reviews a novel technology (patent pending) of producing micro-features by ultrasonic embossing on thermoplastic substrates without producing flash, a common problem prior to this technology. This technology enables a new manufacturing technology (ultrasonic embossing) which is fast and economically superior compared to conventional techniques.

18) B. Karki, B. Lamsal **D. Grewell**, A. Pometto III, J. van Leeuwen, S. Khanal, S. Jung<sup>†</sup>, Functional Properties of Soy Protein Isolates Produced from Ultrasonicated Defatted Soy Flakes, *Journal of the American Oil Chemists' Society*, 86,1021-102, July 2009.

Role: Co-advisor of Karki and provided technical support on high-power ultrasonics and its effects on protein structures.

Concept 50%, Writing 20%, Editing 20%

Significance: This paper studies the effect of pretreating defatted soy flakes with ultrasound on soy protein isolate (SPI) yield and functionality. It was found that ultrasonics improved the recovery of soy protein isolate from defatted soy flakes while only slightly modifying some functional properties including solubility and emulsification and foaming capacities. This technology can improve food production of soy protein.

17) M. Helgeson<sup>†</sup>, W.R. Graves, **D. Grewell**, G. Srinivasan, Degradation and Nitrogen Release of Zein-based Bioplastic Containers. *Journal of Environmental Horticulture*. 27(2)123-127, June 2009.

Role: Committee member for Helgeson and provided technical support on polymer processing of bioplastics for pot manufacturing as well as material characterization.

Concept 75%, Writing 10%, Editing 10%

Significance: This paper compares the performance of self-fertilizing bio-based pots made from plant protein to petrochemical-based pots. Plant growth was compared between various pots and soil conditions. This paper allows users of the pots to determine the benefits of bio-based pots compared to petrochemical-based pots.

16) P. Chand, C. Reddy, J. Verkade, T. Wang, **D. Grewell**<sup>†</sup>, Thermogravimetric Quantification of Biodiesel Produced via Alkali Catalyzed Transesterification of Soybean oil, *Energy and Fuels*, 23(1) 989-992, January 2009.

Role: Advisor for Chand and provided direction, supervision and guidance of this research. Dr. Grewell proposed the use of thermogravimetric analysis for the characterization of biodiesel.

Concept 75%, Writing 75%, Editing 50%

Significance: This paper details a novel, quick, low-cost method for determining the extent of transesterification. This will allow biodiesel production facilities to quickly and inexpensively monitor the manufacturing process. This will assure quick process optimization and correction leading to better biodiesel production efficiency.

15) M. Baboi, **D. Grewell**<sup>†</sup>, Evaluation of Copper and Zinc Buffer Sheets in Ultrasonic Welding of Aluminum, *Welding Journal*, 88(4)86s-91s, April 2009.

Role: Advisor for Baboi and supervised the experimental design and provided technical support on process optimization. This work built on Dr. Grewell's experience with ultrasonic welding of plastics, which resulted in numerous papers and patents.

Concept 100%, Writing 50%, Editing 100%

Significance: This paper will allow manufacturers to use ultrasonic welding to join aluminum products with maximum strength and cosmetic appearance. Because aluminum has low electrical resistivity, it is difficult to join with conventional spot welding. The novel technology presented in this paper resolves this issue and will allow industries, such as the automotive industry, to use lower weight, high efficiency materials such as aluminum.

14) **D. Grewell**<sup>†</sup>, A. Benatar, Comparison of Orbital and Linear Frictions Welding, *Polymer Engineering and Science*, 49(7)1410-1420, July 2009.

Role: Supported developing new theoretical models for orbital welding of plastics in this paper and led the preparation of this paper. These models were verified with data generated during his work at Emerson Electric over 10 years prior to the preparation of this paper.

Concept 100%, Writing 75%, Editing 50%

Significance: This paper developed and verified novel models based on the fundamental heating mechanisms. These models give engineers and manufacturers insight into process fundamentals and process optimization.

13) S. Nitayavardhana, S. Rakshit, J. van Leeuwen, **D. Grewell**, S. Khana<sup>†</sup>, Ultrasound Pretreatment of Cassava Chip Slurry to Enhance Sugar Release for Subsequent Ethanol Production, *Biotechnology and Bioengineering*, 101(3)487-496, October 2008.

Role: Served as a technical advisor for this work relating to high-power ultrasonics and tooling design. Dr. Grewell helped with equipment setup, experimental design, and interpretation of the results.

Concept 50%, Writing 10%, Editing 15%

Significance: This paper details that ultrasonics can increase the release of reducing sugar yield at the completion of a reaction twofold higher compared to the control groups. This paper shows that the integration of ultrasound into a cassava-based ethanol plant may significantly improve the overall ethanol yield.

12) **D. Grewell**<sup>†</sup>, A. Benatar, Semi-Empirical Coupled Heat Flow, Squeeze Flow and Intermolecular Diffusion Model – Part 2: Model Verification Using Laser Micro-welding, *Polymer Engineering and Science*, 48(8)1542-1549, August 2008.

Role: Designed and fabricated the experimental equipment as well as developed the experimental design and conducted all experiments. Dr. Grewell also developed novel models for molecular diffusion and verified these models with experimental data.

Concept 50%, Writing 100%, Editing 50%

Significance: This paper details novel models for molecular diffusion based on the fundamentals of heat flow, molecular motion and squeeze flow. This paper is the first paper in polymer processing that shows activation energy values are temperature dependent, a theory previously not widely accepted. This paper provides future researchers models for processes that include interfacial healing, such as injection molding and welding.

11) S. Khanala, M. Montalbo, J. van Leeuwen, G. Srinivasan, **D. Grewell**<sup>†</sup>, Ultrasound Enhanced Glucose Release from Corn in Ethanol Plants, *Biotechnology and Bioengineering*, 98(5)978-985, December 2007.

Role: Served as advisor for Montalbo and Srinivasan. Grewell served as key technical advisor on ultrasonics and data analysis as well as supervised the overall project.

Concept 50%, Writing 50%, Editing 25%

Significance: This paper details that ultrasonics can increase the overall efficiency of ethanol production from corn. The paper details the processing conditions and energy balance so that industry can directly adopt this technology. The increased efficiency will reduce greenhouse emissions and wastes during the production of ethanol from corn.

10) **D. Grewell**<sup>†</sup>, A. Benatar, Diffractive Optics As Beam Shaping Elements For Plastics Laser Welding, *Optical Engineering*, 46(11): pgs. 118001-1 – 118001-10, November 2007.

Role: Proposed the novel technology developed and demonstrated in the paper. Dr. Grewell designed, conducted and interpretation all experiments.

Concept 100%, Writing 75%, Editing 75%

Significance: This paper details a novel use of diffractive optics to reshape high-powered laser beams into complex patterns for industrial applications, including welding and cutting. This new technology allows single element optics to replace rotating mirrors and complex lens systems.

9) M. Vlad, G. Srinivasan, **D. Grewell**<sup>†</sup>, J. Jane, Improvement of the Mechanical Properties of Soy Protein Isolate-based Plastics through Formulation and Processing, *International Polymer Processing Journal*, 12(5)489-496, November 2007.

Role: Supervised this work and was the major professor of the lead researcher (M. Vlad). Grewell was the main editor and was the corresponding author.

Concept 50%, Writing 50%, Editing 75%

Significance: This paper reviews a technology for improving the water stability of soy protein plastics. This technology helps resolve one of the key issues with soy protein plastics, which is water stability. This will help promote the adoption of these plastics by industry and reduce fossil carbon usage for plastics.

8) B. Akin, S. Khanal<sup>†</sup>, S. Sung, **D. Grewell**, J. van Leeuwen, Ultrasound Pre-treatment of Waste Activated Sludge, *Water Science and Technology*, 6(6)35-42, 2006.

Role: Provided technical support in the area of high-power ultrasonics and helped guide the experiments and interpret the data.

Concept 25%, Writing 25%, Editing 25%

Significance: This paper reviews the use of high-power ultrasonics to enhance anaerobic digestion of municipal waste. This technology has the potential of allowing methane recovery from waste treatment, reducing the usage of fossil-based carbon.

7) A. Yi<sup>†</sup>, Y. Chen, F. Klocke, G. Pongs, A. Demmer, **D. Grewell**, A. Benatar, A High-Volume Precision Compression Molding Process of Glass Diffractive Optics by Use of Micromachined Fused Silica Wafer Mold and Low Tg Optical Glass, *Journal of Micromechanics and Micro-engineering*, 16(10)2000–2005, August 2006.

Role: Provided technical support for design and fabrication of diffractive elements for use with high-powered laser system. Dr. Grewell used complex Fourier Transfer Functions to manipulate spatial images into diffractive images and guided the fabrication of these elements with novel micro-machining techniques.

Concept 100%, Writing 20%, Editing 25%

Significance: This paper demonstrates that diffractive optical elements can be fabricated with micro-molding of glass. This technology is much faster than standard diffractive optic fabrication, such as photolithography, which requires expensive master masks and clean-room facilities.

6) A Yi<sup>†</sup>, Y. Huang, **D. Grewell**, A. Benatar, Y. Chen, Fabrication of Diffractive Optics by Use of Slow Tool Servo Diamond Turning Process, *Optical Engineering*, 45(11)1134011, November 2006.

Role: Provided technical support for the design and fabrication of diffractive elements for the use with high-powered laser systems. Dr. Grewell used complex Fourier Transfer Functions to manipulate spatial

images into diffractive images and guided the fabrication of these elements with novel micro-machining techniques.

Concept 50%, Writing 20%, Editing 25%

Significance: This paper demonstrates that diffractive optical elements can be fabricated with micro-machining. This technology is much faster than standard diffractive optic fabrication, such as photolithography, which requires expensive master masks and clean-room facilities. In addition, this technique is highly versatile in that the pattern can be quickly and easily reprogrammed.

5) **D. Grewell**<sup>†</sup>, A. Benatar, Semi-Empirical Coupled Heat Flow, Squeeze Flow and Intermolecular Diffusion Model – Part 1: Determination of Model Parameters, *Polymer Engineering and Science*, 48(5) 860-867, May 2008.

Role: Directed and conducted the experiments in this work. In addition he developed novel fundamental models on heat flow, mass transfer and molecular diffusion.

Concept 80%, Writing 50%, Editing 25%

Significance: This paper presents novel fundamental models that describe coupled heat and mass transfer along with molecular diffusion to describe polymer interfacial healing. These models are applicable to injection mold, extrusion as well as other polymer processing techniques. This gives engineers and researchers insight into process physics.

4) **D. Grewell**<sup>†</sup>, A. Benatar, Welding of Plastics, Fundamentals and New Developments, *International Polymer Processing Journal*, XXII(1)43-60, March 2007

Role: Proposed developing a review paper on the technology of joining of plastics, a technology where he has made significant contributions.

Concept 100%, Writing 75%, Editing 50%

Significance: This paper reviews the current technology of welding of plastics in a single concise resource. The paper reviews the new technologies as well as new fundamental research, including molecular healing and heat flow models.

3) S. Khanal<sup>†</sup>, **D. Grewell**, S. Sung, J. van Leeuwen, Ultrasound Applications in Wastewater Sludge Pretreatment: A Review, *Critical Reviews in Environmental Science and Technology*, 37(4)277-313, 2007.

Role: Served a technology advisor in the area of high-power ultrasonics. He provided information on equipment design and new technologies and developments.

Concept 25%, Writing 25%, Editing 20%

Significance: This paper reviews the current technology of using ultrasonics in wastewater pretreatment in a single concise resource. The paper reviews the municipal waste industry, high powered ultrasonics and the current technology of ultrasonic equipment. The paper also reviews the economics of several municipal waste treatment plants that currently use ultrasonics for pretreatment.

2) C. Lu<sup>†</sup>, **D. Grewell**, J. Lee, Avraham Benatar, Analysis of Laser/IR-Assisted microembossing, *Polymer Engineering and Science*, 45(6)661-666, May 2005.

Role: Conducted the research using laser-based systems that he designed and fabricated. He also designed and conducted the experimental designs as well as interpreted the resulting data.

Concept 25%, Writing 25%, Editing 25%

Significance: This paper reports on a novel method of embossing thermoplastics by localized heating with infrared lasers. The technology was demonstrated by embossing micro-features on several thermoplastics but can be used to produce larger features as well. This technology allows the fabrication of fluidic and micro-fluidic devices at lower costs and with the complexity compared to traditional methods, such as lithography.

1) **D. Grewell**, P. Rooney, V. Kagan<sup>†</sup>, Relationship Between Optical Properties and Optimized Processing Parameters for Through-transmission Laser Welding of Thermoplastics, *Journal of Reinforced Plastics and Composites*, The American Society for Composites, 23(3)239-247, 2004.

Role: Served as technical consultant on the optical properties of thermoplastics in the near- infrared region. He helped explain optical diffusion in crystalline thermoplastic as well absorption variations across a spectrum of wavelengths.

Concept 25%, Writing 50%, Editing 50%

Significance: This paper reports on the absorption, diffraction and refraction of near-infrared radiation in the welding of thermoplastics. This information is critical in order to effectively weld plastics with lasers, which is a growing technology due to the precision of its process control.

#### **Refereed Trade Journals (4)**

4) **D. Grewell<sup>†</sup>**, Bioplastics from Portein, *Bioplastics Magazine*, 04/2012, July/Agugust 2012.

Role: Dr. Grewell served as primary investigator at ISU on protein-based plastics.

Concept 100%, Writing 100%, Editing 100%

Significance: This article details how environmentally friendly plastics can be produced from protein that are multi-functional. These plastics are biorenewable, biodegradable, and inherently produce fertilizers in the soil during decomposition.

3) Julius Vogel, **D. Grewell<sup>†</sup>**, Weldability of Bioplastics, *Plastics Decorating*, 55(2)33-36, February 2011.

Role: Dr. Grewell served as the major advisor of Julius Vogel and proposed the research topic.

Concept 100%, Writing 75%, Editing 100%

Significance: This is the first paper that details the weldability of various bioplastics. This knowledge will help promote the adoption of bioplastics and reduce greenhouse gas generation as well as other landfilling of plastics.



2) **D. Grewell**, A Prototype “Expert” System for Ultrasonic Welding of Plastics, *Plastics Engineering*, 55(2)33-36, February 1999.

Role: Dr. Grewell served as primary investigator and pioneer of this technology and has a sole-inventor patent related to this work.

Concept 100%, Writing 100%, Editing 100%

Significance: This paper reviews the first of its kind artificial intelligence software developed by Dr. Grewell. The paper reviews the design as a hybrid between an expert system with built in knowledge and a neural network that is able to modify this knowledge through a learning process. The paper also reviews the performance of the system in industrial applications. This allows users without experience to operate a complex system. The system is able to self-adjust and optimize as well as troubleshoot.

1) **D. Grewell**<sup>†</sup>, "IR-Schweissen mit 'gutartigen Pigmenten'", *Kunststoffe/Plast Europe*, 88(10)1839-1842, Munich Germany, November 1998.

Role: Dr. Grewell served as primary investigator and pioneer of this technology and has several patents related to this work.

Concept 100%, Writing 100%, Editing 100%

Significance: This paper reviews a technology pioneered by Dr. Grewell that has become an industrialized process. The process uses near-infrared radiation to penetrate through plastics to produce heat and weld below the surface. This technology has several economic and engineering advantages over traditional methods, such as speed, zero movement during assembly and no production of particulates.

### **BOOKS (3)**

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- 18) P. Chand<sup>†</sup>, **D. Grewell**, C. Reddy, J. Verkade, Novel Characterization Method Of Biodiesel Produced From Soybean Oil Using Thermogravimetric Analysis, ASABE Annual International Meeting (AIM), Rhode Island, June 29-July 2, 2008.
- 17) S. Khanal<sup>†</sup>, B. Akın, S. Sung, **D. Grewell**, J. van Leeuwen, Facing Sludge Diversities: Challenges, Risks, And Opportunities, IWA2007 Sludge Conference Antalya, Antalya, Turkey, 28-30 March, 2007.
- 16) S. Khanal<sup>†</sup>, M. Montalbo, J. van Leeuwen, G. Srinivasan, **D. Grewell**, Enhanced Glucose Release from Corn in Ethanol Plants by Ultrasonic Pretreatment, International Conference on "21st Century Challenges to Sustainable Agri-food Systems Biotechnology, Environment Nutrition, Trade and Policy" 15-17 March 2007, Bangalore, India.
- 15) S. Khanal<sup>†</sup>, M. Montalbo, J. van Leeuwen, G. Srinivasan, **D. Grewell**, Ultrasonic Enhanced Liquifaction and Saccharification of Corn for Biofuels, ASABE Annual International Meeting (AIM), June 17-20, 2007, Minneapolis, MN.
- 14) M. Montalbo<sup>†</sup>, R. Raman, **D. Grewell**, Influence of Ultrasonics in Ammonia Steeped Switchgrass for Enzymatic Hydrolysis, ASABE Annual International Meeting (AIM), June 17-20, 2007, Minneapolis, MN.
- 13) B. Karki, B. Lamsal, **D. Grewell**, J van Leeuwen, S. Khanal<sup>†</sup>, Ultrasonication in Soy Processing for Enhanced Protein and Sugar Yields and Subsequent Bacterial Nisin Production, ASABE Annual International Meeting (AIM), June 17-20, 2007, Minneapolis, MN.

- 12) **D. Grewell**<sup>†</sup>, M. Kessler, M. Vlad, G. Srinivasan, Enhancing Plastic from Naturally Occurring Proteins, SPG Media Group PLC, Brunel House, London W2 1LA, UK, 2006.
- 11) **D. Grewell**<sup>†</sup>, A. Benatar, Coupled Temperature, Diffusion and Squeeze Flow Model for Interfacial Healing Predictions, Topcon (2006), Society of Plastic Engineers, Brookfield, CT
- 10) **D. Grewell**<sup>†</sup>, A. Benatar, Beam Shaping with Spatial Modulators for Laser Micro-Welding of Plastics, *Topcon* (2006), Society of Plastic Engineers, Brookfield, CT
- 9) M. Vlad<sup>†</sup>, J. Jane, P. Mungara, **D. Grewell**, Mechanical Properties of Soy Protein Isolate/Soy Hydrolysate Plastics, GPEC 2006 Conference, Society of Plastics Engineers, Brookfield, CT
- 8) **D. Grewell**<sup>†</sup>, A. Benatar, D. Ditmer, D. Hansford, Beam Shaping With Diffractive Optics For Laser Micro-Welding Of Plastics, Proceedings of Annual Conference (2005), The American Society for Precision Engineering, Raleigh, NC
- 7) **D. Grewell**<sup>†</sup>, A. Benatar, Modeling Heat Flow for a Distributed Moving Heat Source in Micro-Laser Welding of Plastics, Proceedings of the 8th International Conference on Numerical Methods in Industrial Forming Processes, American Institute of Physics (2003), College Park, MD
- 6) **D. Grewell**<sup>†</sup>, A. Benatar, Comparison of DVS Weld Sample and AWS Weld Sample, International Institute of Welding Document (1997)
- 5) **D. Grewell**<sup>†</sup>, Laser Vibrometers in Ultrasonic Welding of Thermoplastics, 1<sup>st</sup> International Conference on Vibration Measurements by Laser Techniques Conference Proceeding (1994), Italian Association of Laser Velocimetry, Ancona , Italy
- 4) **D. Grewell**<sup>†</sup>, Welding of Thermoplastics, IBM/Windows-based Artificial Intelligence Software for Selecting a Joining Technique for Thermoplastics, Columbus, OH (1993)
- 3) **D. Grewell**<sup>†</sup>, Guidelines for Hot Plate Welding, The Plastic Distributor, January/February 1992, Riverside IL
- 2) **D. Grewell**<sup>†</sup>, Improving Ultrasonic Welding for Industry, Presentation at 23<sup>rd</sup> Annual Ultrasonic Industry Association (1992), Columbus OH
- 1) **D. Grewell**<sup>†</sup>, R. Grimm, Engineering Thermoplastics as Bonding Agents, Research Report B9102, Edison Welding Institute, Columbus, OH, (March 1991)

#### PRESENTATIONS (40)

- 40) **D. Grewell**, D. Webster, Sustainable Plastics and the Center for Bioplastics and Biocomposites, American Coatings Show and Conference, Indianapolis, IN, April 6, 2022
- 39) **D. Grewell**, L. Narayanan, R. Quader, Strengthening 3D printed (FDM) parts through application of ultrasonic vibration, 50<sup>th</sup> Ultrasonic Industrial Assoc., April 25-27, 2022, Warwick, England
- 38) **D. Grewell**, Bioplastic and Agricultural Products, 2<sup>nd</sup> World Biopolymers and Polymers Chemistry Congress, Nov. 17, 2021, Miami, FL

- 37) C. Covelli<sup>†</sup>, **D. Grewell**, Vibration welding of Wood, International Institute of Welding Annual Assembly, July 2021
- 36) **D.Grewell**, IUCRC Boot Camp -Teaching team – NSF, Webinar, November 12, 2019
- 35) **D. Grewell**, Interfacial Healing and Transport Phenomena Modeling of Biopolymers, Global Biopolymers and Polymer Chemistry Congress, Las Vegas, Nov 12-13, 2019
- 34) **D.Grewell**, NSF IUCRC Bootcamp Webinar Series: In the Trenches-Industry/University Engagement Center for CB2-Dr. David Grewell, Center Directors, April 4, 2019
- 33) **D.Grewell**, IUCRC Best Practices, ATOMIC: An NSF Industry-University Cooperative Research Center Webinar Webinar, March 29, 2019
- 32) **D. Grewell**, E. Cochran, T. Wang, T. Martin, J. Zhang, Biobased adhesive for construction applications, 7th International Conference and Exhibition on Biopolymers and Bioplastics, San Francisco CA, October 19, 2017
- 31) **D.Grewell**, IUCRC Planning Meeting Boot Camp panel discussion, webinar, Venturewell, Dec 10, 2018
- 30) **D. Grewell**, Bioplastics and Biocomposites and NSF Center on Bioplastics, 103<sup>rd</sup> Annual Technical Conference for the Society of Plastic Engineers Proceedings (2015), Society of Plastic Engineers, Brookfield, CT, May 2016
- 29) **D. Grewell**, E. Cochran, T. Wang, T. Martin, J. Zhang, Biobased Adhesives and Coatings, American Coating Show, Indianapolis, IN, April 11-13, 2016
- 28) **D. Grewell**, Production Heat Sealing Technologies, Packaging Basics Workshop, October 2015, Ames, IA
- 27) **D. Grewell**, Sustainable materials for horticultural film application, International industry conference on silage, mulch, greenhouse and tunnel films used in agriculture, September, 2015 Barcelona, Spain
- 26) **D. Grewell**, Sustainable Plastics and the Center for Bioplastics and Biocomposites, Agricultural Plastics Recycling Conference & Trade Show, August 2015 San Francisco, CA
- 25) **D. Grewell**, Bioplastics in Cropping Systems, Agricultural Plastics Recycling Conference & Trade Show, San Diego, CA, August 2015
- 24) **D. Grewell**, S. Devlin Process Parameters and Product Strength for Fused Deposition Modeling, International Institute of Welding Annual Conference, June 30, 2015, Helsinki, Finland
- 23) **D. Grewell**, Examining the latest development and innovations in bioplastics, Washington State University, October 2012, Pullman Washington
- 22) **D. Grewell**, High powered ultrasonics, July 2013, Chung Yuan Christian University Taiwan
- 21) **D. Grewell**, Sustainability, July 2013, Chung Yuan Christian University, Taiwan

- 20) **D. Grewell**, J. Reidt, Ultrasonic Welding of Plastic, Films, UIA Conference FL, April 2013
- 19) **D. Grewell**, High powered ultrasonics, July 2012, Chung Yuan Christian University Taiwan
- 18) **D. Grewell**, Sustainability, July 2012, Chung Yuan Christian University, Taiwan
- 17) J. Schrader<sup>†</sup>, G. Srinivasan, **D. Grewell**, W. Graves, Fertilizer Effects of Soy-plastic Containers during Production and Transplant Establishment of Tomato and Pepper, American Society of Horticultural Science, August 2012, Miami FL
- 16) V. Akumar, S. Jung, **D. Grewell**, S. Clark. Poster presentation. Effects of thermosonication on total plasmin and characteristics of skim milk and cream. Annual Mtg. Institute of Food Technologists (IFT), Las Vegas, NV. 2012. Sakthi placed 5th in Dairy Foods Division graduate poster competition
- 15) **D. Grewell**<sup>†</sup>, Gowrishankar Srinivasan, Energy efficient depolymerization of post-consumer polylactic acid with ultrasonics, Annual International Polymer Processing Society Conference, Morocco, Marrakech, July 2011.
- 14) **D. Grewell**<sup>†</sup>, Julius Vogel, Calculation of the Activation Energy for Self-Diffusion and Molecular Healing in PLA Films, Annual International Polymer Processing Society Conference, Banff, Canada, July 2010.
- 13) J. (Hans) van Leeuwen<sup>†</sup>, D. Mitra, P. Chand, **D. Grewell**, J. Verkade, V. Chintareddy, T.H., Kim, C. Ziel, M. Montalbo-Lomboy, S. Beattie, A Fungal Route to Produce Biodiesel from Lignocellulosics AOCS, MycoInnovations, May 2010, conference, Phoenix, AZ
- 12) **D. Grewell**<sup>†</sup>, T. Brumm, C. Hurburgh, Bio-fuels Unit Operations Course Development, NACTA conference, June 2010, Happy Valley. PA
- 11) **D. Grewell**, J. Vogel<sup>†</sup>, R. Anex, Comparison of Life Cycle Greenhouse Gas and Energy profiles of bio-plastics and petroleum-based plastics, GPEC 2010 Conference, Orlando, FL, Society of Plastics Engineers, Brookfield, CT
- 10) **D. Grewell**, J. Verkade, H. Leeuwen, C. Reddy, Ultrasonic Enhancement of Sustainable Fuel Production, Pacific Rim Summit, Honolulu, HI, November 2009
- 9) **D. Grewell**, M. Baboi, G. Srinivasan, M. Kessler, R. Larock, Investigation of processability of protein-based plastics and composites for industrial applications Pacific Rim Summit, Honolulu, HI, November 2009
- 8) **D. Grewell**<sup>†</sup>, The Technology of Bioplastics, Bioplastic Container Cropping Systems Conference, Iowa State University, January 2009
- 7) J. Vogel<sup>†</sup>, **D. Grewell**, Ultrasonic Welding of Polylactic Acid Films, Poster, Ultrasonics Industrial Association Annual Conference, Vancouver, British Columbia, Canada March 2009
- 6) S. Vengasandra<sup>†</sup>, Y. Cai, **D. Grewell**, J. Shinar, R. Shinar, Design and Analysis of OLED Based Lab-on-CD for Multianalyte Biosensing, SPIE Conference, 2009

- 5) **D. Grewell**<sup>†</sup>, The Technology of Bioplastics and Applications, Engineers for a Sustainable World meeting, ISU, January 2009
- 4) **D. Grewell**<sup>†</sup>, G. Srinivasan, M. Baboi, M. Kessler, W. Graves, M. Helgeson, Plant-Based Plastics and Applications, Iowa State University, Bioplastics/Biocomposites Workshop, Ames, IA 2008
- 3) **D. Grewell**<sup>†</sup>, Blends of Zein and Soy Plastics, Materials Discovery and Design: Conference by the NSF –CoSMIC-Intl. Materials Institute and the Indo-US Science and Technology Foundation. October 29-31, 2007, Indian Institute of Science, Bangalore India.
- 2) **D. Grewell**<sup>†</sup>, Beam Shaping with Spatial Modulators for Laser Micro-Welding of Plastics, On-line presentation February 2007, Society of Plastic Engineers, Brookfield, CT
- 1) **D. Grewell**<sup>†</sup>, W. Nijenhuis, TIR Welding of Aliphatic Polyketone, Society of Plastic Engineers, IIR Annual Assembly (July 2000), Florence, Italy

#### INVITED LECTURES (56)

- 56) **D. Grewell**, C. Annand, R. Montazmi, Sonication of agave fiber bagasse: A potential pretreatment to enhance sugar release, PacifiChem Conference, Dec 2021, Online
- 55) **D. Grewell**, N. Yodo, C. Mile, W. Graves, Bioplastic and Agricultural Products, World Biopolymers and Polymer Chemistry Congress, November 17, 2021
- 54) **D. Grewell**, D. Mielewski, Aligning Technologies and Business Practices to Ensure a Sustainable Future, Panel discussion, Oct. 11, 2021, Altair Webinar
- 53) **D. Grewell**, Welding of PLA, 6<sup>th</sup> PLA World Conference, Oct 8 , 2020, Munich Germany (virtual)
- 52) **D. Grewell**, Bioplastics and Biocomposites, Conference on Nano-Micromaterials for Circular economy and Sustainability, Funded by NSF, Singapore, Aug 29- Sept 1, 2019
- 51) **D. Grewell**, **D. Grewell**<sup>†</sup>, K. Lebron, L. Klinstein, J. Frantz, Interfacial and Transport Phenomena of Biopolymers, Bioenvironmental Polymer Society (BEPS), Clemson, Greenville, SC, June 5-7, 2019
- 50) **D. Grewell**<sup>†</sup>, E. Cochran, C. Williams, K. Rosentrater, G. Kraus, Biobased adhesive for construction applications, Association for the Advancement of Industrial Crops, Ames, IA September 10-13, 2017
- 49) **D. Grewell**<sup>†</sup>, K. Lebron, L. Klinstein, J. Frantz, Interfacial healing of PLA, Bioenvironmental Polymer Society (BEPS), Western Regional Research Center in Albany, CA, September 20-22, 2017
- 48) **D. Grewell**<sup>†</sup>, E. Cochran, C. Williams, K. Rosentrater, G. Kraus, Biobased adhesive for construction applications, Bioenvironmental Polymer Society (BEPS), Western Regional Research Center in Albany, CA, September 20-22, 2017
- 47) **D. Grewell**<sup>†</sup>, K. Allen, E. Cochran, C. Williams, T. Roark, Bio-Based Construction Adhesives, IIR 70<sup>th</sup> Annual Assembly, June 25-30, 2017 Shanghai, China
- 46) **D. Grewell**<sup>†</sup>, K. Allen, E. Cochran, C. Williams, Bio-Based Construction Adhesives, 104<sup>th</sup> Annual Technical Conference for the Society of Plastic Engineers Proceedings (2017) Society Fellow Forum, Society of Plastic Engineers, Brookfield, CT, May 2017

- 45) **D. Grewell**, Sustainable plastics and the center for bioplastics and biocomposites, 3<sup>rd</sup> International Conference and Exhibition on Biopolymers and Bioplastics, San Antonio TX, Sept 12-14, 2016
- 44) **D. Grewell**, Bioplastics and Biocomposites and NSF Center on Bioplastics, Seminar, University of Auckland, New Zealand, July 26, 2016
- 43) **D. Grewell**, Keynote, Bioplastics and Biocomposites and NSF Center on Bioplastics, International Symposium on Bioplastics, Biocomposites and Biorefining, May 31-June 3, 2016, Guelph, Ontario, Canada
- 42) **D. Grewell**, G. Kraus, M. Montalbo, K. Lebron, C. Annandarajah, Ultrasonic Assisted Dissolution of Switchgrass using Active Specific Designed Ionic Liquid, Pacificchem 2015 Jan 2015, Honolulu, HI
- 41) **D. Grewell** Bioplastics and Biocomposites and Applications, North Dakota State University, Fargo, ND, May 2015
- 40) **D. Grewell** Bioplastics and Biocomposites, Clemson University, Clemson, SC, April 29, 2015
- 39) **D. Grewell** Bioplastics and Biocomposites, Ames Rotary Club, Ames, IA, April 24, 2015
- 38) **D. Grewell**, Sustainable materials, formulations, applications and impacts, 30<sup>th</sup> Polymer Technology Seminar, March 14-29, 2014, Engelberg, Switzerland
- 37) **D. Grewell**, Sustainable materials, Iowa Engineering Society, Muscatine, IA, February 2014
- 36) **D. Grewell**, Examining innovations in bioplastics, 13th International Symposium on Bioplastics, Biocomposites and Biorefining, May 19th to 24<sup>th</sup>, 2014 in Guelph, Ontario, Canada
- 35) **D. Grewell**, M. Montalbo-Lomboy, P. Chand, Enhancing biofuel production by ultrasonics, Acoustical Society of America, Montreal, Canada, July 2-7, 2013
- 34) **D. Grewell**<sup>†</sup>, J. Schrader, M. Kessler, W. Graves, G. Srinivasan<sup>1</sup>, Multifunctional Sustainable Plastics for Agricultural Applications, (Research Institute for Plastics and Rubber), International Colloquium, March 15-18, 2013, Medellin, Colombia
- 33) **D. Grewell**<sup>†</sup>, J. Schrader, J. Cooper, Examining the latest development and innovations in bioplastics derived from plant protein, WestPack, Anaheim, CA, February 12-13, 2013
- 32) **D. Grewell**<sup>†</sup>, J. Vogel Welding of PLA, 65th IIW Annual Assembly, in Denver, Colorado, USA July 8 - 14, 2012
- 31) **D. Grewell**<sup>†</sup>, High Powered Ultrasonics, Chung Yuan Christian University, July 13, 2012, 3-hour lecture
- 30) **D. Grewell**<sup>†</sup>, Sustainability, Chung Yuan Christian University, July 25, 2012, 3-hour lecture
- 29) **D. Grewell**<sup>†</sup>, W. Graves, J. Schrader, G. Srinivasan Using Water-Soluble, Plant Protein Plastics for Agricultural Products, Aug 7, 2012, United Soybean Board, Thermoplastics & Fibers TAP meeting, Charlotte, NC

- 28) **D. Grewell**<sup>†</sup>, G. Srinivasan, M. Baboi, Investigation of Net Shape Forming of Protein Based Plastics for Industrial Applications, 103rd AOCS Annual Meeting & Expo in Long Beach, California, May 2012
- 27) **D. Grewell**<sup>†</sup>, G. Srinivasan, Protein based plastics and applications, Corn Utilization & Technology Conference, Indianapolis, June 4, 2012
- 26) **D. Grewell**<sup>†</sup>, Fundamentals of additive manufacturing, Erlangen, University of Erlangen, Germany, May 2012
- 25) **D. Grewell**<sup>†</sup>, Bioplastics and Renewable Fuels, POET, Sioux Falls, SD, October 2011
- 24) **D. Grewell**<sup>†</sup>, M. Baboi, G. Srinivasan, Investigating Protein Based Plastic Composites for Industrial Applications, 18<sup>TH</sup> International Composites Conference, Jeju Island, South Korea, August 21, 2011
- 23) **D. Grewell**<sup>†</sup>, W. Graves, J. Schrader, G. Srinivasan Using Water-Soluble, Soy-based Plastic for Horticulture Crop Containers, Aug 2, 2011, United Soybean Board, Thermoplastics & Fibers TAP meeting, Charlotte, NC
- 22) **D. Grewell**<sup>†</sup>, Welding of Bioplastics, Annual meeting at International Institute of Welding, Chennai India July 18, 2011
- 21) **D. Grewell**<sup>†</sup>, High Powered Ultrasonics, Chung Yuan Christian University, July 25, 2011, 3-hour lecture
- 20) **D. Grewell**<sup>†</sup>, Lecture of returning to academia, AE 585 Seminar, Iowa State University November 2010.
- 19) **D. Grewell**<sup>†</sup>, High Power Ultrasonics in the Food Industry, Food Science Seminar, September 2010, Iowa State University
- 18) **D. Grewell**<sup>†</sup>, Welding of Bio-Plastics, Tune into Innovation, Decorating and Assembly Division, SPE, June 15-16, 2010, Franklin, TN
- 17) **D. Grewell**<sup>†</sup>, M. Baboi, S. Carolan, G. Srinivasan, Water Solubility of Soy Protein Plastics, August 10-11, 2010, United Soybean Board, Thermoplastics & Fibers TAP meeting, Charlotte, NC
- 16) **D. Grewell**<sup>†</sup>, Enhanced Sustainability with High Power Ultrasonics: Fuels and Materials, Case Western Reserve, February 2010, Cleveland OH
- 15) **D. Grewell**<sup>†</sup>, K. Rajan, D. Fuchs, M. Kessler, M. Schemme, P. Karlinger, VARTM Processing of Self-Healing Composites with Reinforcement Bound Microcapsules, Second International Conference on Self-Healing Materials - 2nd ICSHM, 2009, Chicago IL
- 14) **D. Grewell**<sup>†</sup>, M. Baboi, G. Srinivasan, Investigation of processability of protein-based plastics and composites, May 19-20, 2009, United Soybean Board, Thermoplastics & Fibers TAP meeting, Charlotte, NC
- 13) **D. Grewell**<sup>†</sup>, Ultrasonic Enhancement of Bio-Fuels, Keynote speaker, Ultrasonics Industrial Association Annual Conference, Vancouver, British Columbia, Canada March 2009

12) **D. Grewell**<sup>†</sup>, G. Srinivasan, M. Baboi, M. Kessler, W. Graves, M. Helgeson, Plant-Based Plastics and Applications, ICIPC (Research Institute for Plastics and Rubber), International Colloquium, February 27 - 29, 2008, Medellin, Colombia

11) **D. Grewell**<sup>†</sup>, Ultrasonic Enhancement of Biorenewable Fuels, June 2008, RWTH University, Aachen, Germany

10) **D. Grewell**<sup>†</sup>, M. Baboi, G. Srinivasan, Soy Protein-based Plastics and their Applications, August 29, 2008, Thermoset Plastics TAP, United Soybean Board, Charlotte, NC

9) **D. Grewell**<sup>†</sup>, S. Vengasandra, Y. Cai, J. Shinar, R. Shinar, Micro-fabrication of Polymer Substrates for  $\mu$ -Lab Applications, June 2008, University of Erlangen Germany

8) **D. Grewell**<sup>†</sup>, G. Srinivasan, M. Baboi, M. Kessler, W. Graves, M. Helgeson, Plant Based Plastics and Applications, SAMPE 2008 Fall Technical Conference, September 8-11, 2008, Memphis, TN (peer reviewed)

7) M. Kessler, R. Larock, **D. Grewell**<sup>†</sup>, *Structural Composites From Agricultural Oils and Proteins*, International Conference on Natural Polymers, Biopolymers, Biomaterials, their Composites, Blends, IPNs, and Gels: Macro to Nano Scales (ICNP – 2007). November 19-21, 2007, Kottayam; Kerala, India

6) **D. Grewell**<sup>†</sup>, *High Power Ultrasonics: Equipment, Key Concepts and Applications*, Conference Innovative Treatment Technologies for Water, Wastewater, Sludge and Contaminated Waters, Conference May 2007, Cairo, Egypt

5) **D. Grewell**<sup>†</sup>, *Ultrasonic and its Application in Environment, Energy and Biotechnology*, Asian Institute of Technology Thailand 2006

4) **D. Grewell**<sup>†</sup>, Weldability Of Biorenewable Ultrasonic Exfoliated Nanocomposites, 2006, BASF, Ludwigshafen, Germany

3) **D. Grewell**<sup>†</sup>, Ultrasonic Enhancement of Biorenewable Fuels, 2006 Emerson Electric, Frankfurt, Germany

2) **D. Grewell**<sup>†</sup>, Fabrication with Polymers for Today's Technological Demands; Fundamentals, Modeling and Micro-Fabrication, 2006, University of Erlangen, Germany, 2-day seminar

1) **D. Grewell**<sup>†</sup>, Fabrication with Polymers for Today's Technological Demands; Fundamentals, Modeling and Micro-Fabrication, 2006, University of Paderborn, Germany

#### **SOFTWARE (4)**

4) Polymer Economical Calculator- PEC, 2012

3) I-BOS<sup>TM</sup> – Interactive Biofuel Operation Simulation, Simulator for biofuel plants, 2009.

2) B-PLCA<sup>TM</sup> – Bioplastics Life Cycle Assessment, Bioplastics environmental impact predictor, 2009.

1) BEST<sup>®</sup> – Branson Expert Setup and Trouble Shooting: Hybrid Artificial Intelligent Expert System, 2003.



**TEACHING**

Courses focus on manufacturing with an emphasis on polymer processing, including process optimization, troubleshooting, and modeling. Courses also cover graduate classes focused on heat flow, fluid dynamics, material modeling, engineering fundamentals, and engineering and globalization.

Grad	Under-Grad	Title	Credit hours	Semesters	# Students	Grewell effectiveness score	TSM* /Dept avg.
WE 594 (OSU) <sup>†</sup>		Engineering and Globalization	1	W04	8	NA	NA
	ITEC 130 <sup>†</sup>	Introduction to Non-metallic Manufacturing Materials and Processes	3	F05	60	2.13 <sup>‡</sup>	1.74 <sup>‡</sup>
	ITEC 231	Introduction to Metallic Materials and Processes	3	F06	60	4.02	4.17
	TSM 240 <sup>†</sup>	Introduction to Manufacturing Processes	3	F06	60	3.60	3.92
				S07	60	3.83	3.93
				F07	40	3.76	3.81
				S08	40	3.61	3.89
				F08	40	4.29	3.90
				S09	40	4.23	3.96
				F09	40	4.10	3.92
				S10	38	4.13	3.86
				F10	40	4.25	3.88
				S11	22	4.06	3.84
				F11	60	3.73	3.89
				S12	40	3.93	3.87
				F12	60	4.15	3.93
				S13	40	4.21	3.92
				F13	80	4.19	4.03
				S14	60	4.34	3.98
				F14	80	4.25	4.05
				S15	80	4.56	3.80
				F15	90	4.12	4.12
				S16	90	4.41	4.07
				F16	90	4.31	4.16
				S17	90	4.08	4.06
				F17	90	4.27	4.06
				S18	90	4.08	4.19
	TSM 443 <sup>†</sup>	Statics and Strengths of Materials	3	S08	22	4.58	3.89
				S09	33	3.76	3.96
				S10	39	3.63	3.86
				S11	40	2.91	3.84
				S12	40	3.73	3.87
				S13	44	3.98	3.92
				S14	50	3.82	3.98
				S15	80	2.67	3.80
AE 590 <sup>†</sup>		High Power Ultrasonic	3	F07	10	4.61	3.81

	AE 536 <sup>†</sup>	Introduction into bioplastics	3	S15	7	4.38	3.80
	TSM 593 <sup>†</sup>	Applied Math for Engineers	3	S10	15	4.25	3.86
	TSM 401	Senior Seminar	1	F08	40	N/A	3.90
	AE 546x	Introduction into Bioplastics and Biocomposites and Numerical Methods	3	S17	10	N/A	4.06
	IME 435	Plastic and Injection Molding	3	S19	16	4.1	4.0
	IME 435	Plastic and Injection Molding	3	S19	10	4.4	3.9
	IME 111	Introduction into Industrial Engineering	3	S20	80	N/A	N/A
				S21 <sup>‡</sup>	40	4.25	4.11
				S22	52	TBD	TBD
	IME 330	Introduction into Manufacturing Processes <sup>†</sup>	3	F20	130	Q1/Q4 4.04	Q1/Q4 4.20
				S21	50	4.40	4.11
				F21	140	4.46	4.24
				S22	48	4.70	4.44
	IME 430/ 630	Process Engineering <sup>†</sup>	3	F21	43/0	4.42	4.24
				F22	32/0	TBD	TBD

<sup>†</sup>Developed new class or rebuilt existing class, \*Technology Systems Management  
(5=is outstanding and 1=unacceptable, <sup>‡</sup> reversed scoring scale F05 only)

## OTHER TEACHING POSITIONS

*Teaching Assistant*, The Ohio State University, Welding Engineering 620-Engineering Analysis for Design and Simulations. Laboratory setup with ANSYS, substitute lecturer and general class assistant. (2004)

*Instructor*, The Ohio State University, Welding Engineering 694-Communications for Engineers. **Developed course** and **was Instructor** of class; prepared class syllabus, lectures, class notes, homework webpage and exams, and graded students. The class covered proposals, presentation techniques, **patent law**, market analysis, product planning and international project management. Had very positive feedback from student evaluations. (2004)

*Teaching Assistant*, The Ohio State University, WE 706-Welding of Plastics and Composites. Laboratory setup and general class assistant. Had very positive feedback from student evaluations. (2003)

*Instructor*, Seminar on Plastics Welding. September 2000, 2 days, Madison WI. The Madison Group and Rauwendaal Extrusion Engineering

*Instructor*, Seminar on Plastics Welding, including exams and certification. June 1998, 2-day, Detroit MI. Techtrax LLC.

*Instructor*, Seminar on Plastics Welding. September 1996, 3 days, Detroit MI. Society of Manufacturing Engineers.

### GRADUATE STUDENTS (30)

Major Advisor in order of graduation: †Co-Major Advisor

No.	Student	Degree	Graduated	Thesis	Current position
1	Greg Harmon	MS	W06	Elimination Of Flash - A Novel Microembossing Technique	Martin Mariette
2	Julius Vogel†	MS	S07	Charakterisierung aus dem Ethanol-Prozess gewonnener Protein Polymere	Engineering firm in Germany
3	Gowrishankar Srinivasan (ABE)	MS	S07	Improvement of Mechanical properties and water stability of vegetable protein based plastics	Program Director-CIRAS, ISU
4	Maria Vlad (Baboi)	PhD	S07	Ultrasonic welding of aluminum: a practical study in consistency part marking and control modes	Advanced Learning and Research Polymer Scientist II & Faculty Virginia Tech
5	Mellissa Montalbo	PhD	F08	Ultrasonic enhancement of ethanol	Lecturer-Rowan University
6	Priyanka Chand	MS	F08	Biodiesel Enhancement	India
7	Srikanth Vengasandra	PhD	F09	Lab on a CD	Emerson Electric
8	Cody Hearn	MS	S09	Ultrasonic Enhancement of Bio-Methane	Lockheed
9	Gowrishankar Srinivasan (MSE)	MS	S10	Soy Based Bioplastics	CIRAS/ISU
10	Gowrishankar Srinivasan	PhD	S11	Soy Based Bioplastics	CIRAS/ISU
11	Julius Vogel	PhD	S11	Protein Based Bioplastics	Consultant
12	Steve Devlin	PhD	F18	Modeling of Rapid Prototyping-3D printing	Dean at University Missouri
13	Joe Vanstrom	MS	S12	Mechanical Properties of PLA	Pella Windows

14	Priyanka Chand	PhD	Dropped	Biodiesel Enhancement	Left ISU for family reason
15	Brian Demmer	MS	S11	Biobased products	All Steel
16	Jessica Riedl	MS	S13	Welding of plastic films	John Deere
17	Kendra Allen	PhD	Dropped	Soy based rubber	Left ISU
18	Kendra Allen	MS	S14	Soy based rubber	PhD
19	Cindu Annandarajah	MS	S15	Ultrasonic milk pasteurization	PhD
20	Sara Underwood	MS	S17	Ultrasonic cutting	John Deere
21	Jake Behrens	MS	S16	Bioplastics	ISU
22	Mitch Michel	MS	S18	Biocomposites	ISU
23	Karla Lebron	MS	F19	Welding of PLA	Dukane
24	Cindu Annandarajah <sup>†</sup>	PhD	S20	Bioplastics	Samsung
25	Curtis Covelli	PhD	S22	Welding of wood	Penn State Center of Materials Research
26	Joe Vanstrom	PhD	S20	Modeling of metal 3D printing	Pella Window
27	Sunny Prashant	MS	F20	Modelign of pulse heating	Anderson Windows
28	Phattara	PhD	S22	AI learning methods	Assist. Prof.
29	Abdulah Al Rahim	MS	F21	Review of wheat protain plastics	Phillips-Medisize
30	Rahman, Md Mahbubar	PhD	S23	LCA of soy and corn based plastics	In study

**SERVED AS COMMITTEE MEMBER (25)**

No.	Student	Degree	Program	Thesis
25	Bijaya Kumar Uprety	PhD	Lakehead University-Biotechnology	Conversion of crude glycerol from the biodiesel industry to value added products
24	Nicholas Flax	MS	Horticulture	Bio-based pots
23	Roopa Rani M	PhD	Anna University, Chennai India	Investigations on the Design and Analysis of Horns for Ultrasonic Plastic Welding
22	Raihan Quader	MS	IME	Bioplastics welding
21	Lily Benner	MS	Food Science and Human Nutrition	Ultrasonics and Milk Stabilization
20	Peng Li	MS	ME	Properties of agave fiber reinforced thermoplastic composites
19	Simge Cinar	MS	MSE	Rheology of ceramic nanopowder suspensions
18	Kristi R. Korkowski	MS	ME	Ultrasonic insertion for bone repair

17	Vivay Kumar	PhD	MSE	Synthesis and Characterization of Natural Fibers Based Polymer Composites
16	Gauri Ramasubramanian	MS	MSE	Carbon Fiber from Lignin
15	Chaoqun Zhang	PhD	MSE	Biorenewable Polyols and Polyurethanes Prepared from Epoxidized Soybean Oil and Castor Oil
14	Yuzhan Li	PhD	MSE	Liquid crystalline epoxy resin
13	Keke Chen	MS	MSE	Lignin graphite fibers
12	Hongchao Wu	MS	MSE	TBD
11	Hongyu Cui	PhD	MSE	Glass fiber reinforced biorenewable polymer composites and the fabrication with pultrusion process
10	Sakthi Vijayakumar	MS	Food Science	Ultrasonic treatment of Milk
9	Mingliang Chen	PhD	MSE, ME external reviewer Queen's University Canada	Gap Bridging in Laser Transmission Welding of Thermoplastics
8	Mark Kasia	MS	IGS	Plastic welding
7	Lloyd Snell In study	PhD	ABE	Advanced Linear Pulse Tree Shaker using Magnetostrictive Materials
6	Xia Sheng In study	PhD	MSE	Cyanate Ester Nanocomposites For The Repair Of High Temperature Composites
5	Bishnu Karki Graduated 2009	PhD	CCEE	Ultrasonic Pretreatment of Defatted Soy Flakes to enhance Sugar and Protein Yield and Subsequent Characterization of Functional Properties of Soy Protein Isolates
4	Jeony Wonje Graduated 2009	PhD	MSE	Rubber Composite For Tire Tread
3	Shinnosuke Onuki Graduated 2008	PhD	CCEE	Purification and Quality Enhancement of Fuel Ethanol to Produce Industrial Alcohols with Ozonation and Activated Carbon
2	Will Goertzen Graduated 2007	PhD	MSE	Cyanate Ester Polymer Matrix Composites for High-Temperature Structural Repair Applications Involving Metallic Substrates
1	Sergio Domenico Sgro Graduated 2007	PhD	ABE	The Efficacy of Teaching Oxyacetylene Welding Prior to GMA Welding for Introductory Materials and Process Courses in Industrial Technology

**SUPERVISED (15)**

- 1) Laboratory Coordinator, Jake Behrens, 2016-2017
- 2) Center Coordinator, Yijing Ding, 2015-2018
- 3) Post-Doc, Mellissa Montalbo, 2008-2012
- 4) Post-Doc, Gowrishankar Srinivasan, 2011-2014
- 5) Research Scientist, Maria Baboi (PhD), 2007-2011
- 6) Research Scientist, Kyle Haubrich, 2012
- 7) Assistant to the chair, Beth Dahl, 2018-present
- 8) Business Development office, Ben Deetz, 2019-2021
- 9) Instructor, Chuck Choate, 2018-2023
- 10) Instructor, Armon Myrick, 2018-2022
- 11) Business Development office, Mike Sylkar, 2022-present
- 12) I-Corp Assist. Director / I-Corp Hub Coordinator, Jared Hineman, 2022-Present
- 13) Project Manager, I-Corp Hub Coordinator, TBD, 2023
- 14) Outreach Specialist, I-Corp Hub Coordinator, TBD, 2023
- 15) Laboratory Manager, Dan Whitney, 2022-Present

**RESEARCH ACTIVITIES**  
**GRANTS AND CONTRACTS**

**PROJECTS FUNDED AS LEAD-PI (\$8,167,238 INCLUDING STARTUP)**

**External (\$7,236,170)+ 145,416 (not including NDSU)**

**Project title:** Multi-functional Biodegradable Mulch for Specialty Crop Production  
**Name of grantor:** North Dakota Corn Utilization Council  
**Cooperating faculty:** **D. Grewell**, N. Yodo  
**Grant amount:** \$31,164  
**Matching funds:** \$0  
**Effective dates:** 2022-2023  
**Role:** Principal investigator

**Project title:** NSF/IUCRC Center for Bioplastics and Biocomposites- Phase II  
**Name of grantor:** National Science Foundation  
**Cooperating faculty:** **D. Grewell**, D. Webster, C. Ulven, A. Kallmeyer  
**Grant amount:** NSF Industry  
\$755,000 (5 years) \$4,000,000 (\$800,000/year)  
\$4,775,000 (total)  
**Matching funds:** \$0  
**Effective dates:** 2021-2026  
**Role:** Principal investigator

**Project title:** Rumen Roughage Replacement for Ruminant Species Based on Wet Milling Co-Products  
**Name of grantor:** Cargill  
**Cooperating faculty:** **D. Grewell**, Chad Ulven  
**Grant amount:** \$336,593  
**Matching funds:** \$0  
**Effective dates:** 2020-2022  
**Role:** Principal investigator

**Project title:** Multi-functional biodegradable mulch for specialty crop production

Name of grantor: North Dakota Corn Council  
 Cooperating faculty: **D. Grewell, Nita Yodo**  
 Grant amount: \$145,416  
 Matching funds: \$0  
 Effective dates: 2019-2021  
 Role: Principal investigator

**Project title:** Use of Pelleted Biomass to Reduce Pretreatment Severity

Name of grantor: North Central Regional Sun Grant Center/USDA-NIFA  
 Cooperating faculty: **D. Grewell**  
 Grant amount: \$49,425  
 Matching funds: \$0  
 Effective dates: 2016-2018  
 Role: Principal investigator

**Project title:** NSF/IUCRC Center for Bioplastics and Biocomposites-Supplemental budget

Name of grantor: National Science Foundation  
 Cooperating faculty: **D. Grewell, E. Cochran, R. Raman, D. Jarboe, M. Kessler** (Washington State University),  
 Grant amount: \$20,000  
 Matching funds: \$0  
 Effective dates: 2016-2018  
 Role: Principal investigator

**Project title:** Collaborative Research: I/UCRC: CB2 – REU/Veterans support

Name of grantor: National Science Foundation  
 Cooperating faculty: **D. Grewell**  
 Grant amount: \$18,000  
 Matching funds: \$0  
 Effective dates: 2016-2019  
 Role: Principal investigator

**Project title:** NSF/REU Research Experience for Undergraduates

Name of grantor: National Science Foundation  
 Cooperating faculty: **D. Grewell**  
 Grant amount: \$153,485  
 Matching funds: \$0  
 Effective dates: 2016-2019  
 Role: Principal investigator

**Project title:** NSF/IUCRC Center for Bioplastics and Biocomposites-Supplemental budget

Name of grantor: National Science Foundation  
 Cooperating faculty: **D. Grewell, E. Cochran, R. Raman, D. Jarboe, M. Kessler** (Washington State University),  
 Grant amount: \$20,000  
 Matching funds: \$0  
 Effective dates: 2016-2017  
 Role: Principal investigator

**Project title:** Soy Based Lawn, Field & Horticultural Products-Soy flour binder for biochar.

Name of grantor: United Soy Board  
 Cooperating faculty: **D. Grewell, W. Graves, J. Schrader**  
 Grant amount: \$51,590  
 Match amount: \$0  
 Effective dates: 2015-2016  
 Role: Principal investigator

**Project title:** NSF/IUCRC Center for Bioplastics and Biocomposites

Name of grantor: National Science Foundation  
 Cooperating faculty: **D. Grewell, E. Cochran, R. Raman, D. Jarboe, M. Kessler** (Washington State University),  
 Grant amount: NSF Industry  
 \$657,500 (5 years) \$2,850,000 (\$570,000/year)  
 \$3,507,500  
 Matching funds: \$0  
 Effective dates: 2014-2019  
 Role: Principal investigator

**Project title:** NSF/IUCRC Center for Bioplastics and Biocomposites-Supplemental budget

Name of grantor: National Science Foundation  
 Cooperating faculty: **D. Grewell, E. Cochran, R. Raman, D. Jarboe, M. Kessler** (Washington State University),  
 Grant amount: \$20,000  
 Matching funds: \$0  
 Effective dates: 2015-2016  
 Role: Principal investigator

**Project title:** Development of adhesives, paint and coatings from acrylated glycerol

Name of grantor: USDA, National Institute of Food and Agriculture  
 Cooperating faculty: **D. Grewell, E. Cochran, C. Williams, J Chen, S. Madbouly**  
 Grant amount: \$1,008,700  
 Matching funds: \$0  
 Effective dates: 2014-2017  
 Role: Principal investigator

**Project title:** Soy Based Lawn and Field Products-Soy Flour Binder for Biochar.

Name of grantor: United Soy Board  
 Cooperating faculty: **D. Grewell, W. Graves, J. Schrader**  
 Grant amount: \$91,534  
 Match amount: \$0  
 Effective dates: 2014-2015  
 Role: Principal investigator

**Project title:** Development of soy rubber

Name of grantor: United Soy Board  
 Cooperating faculty: **D. Grewell, S. Madbouly**



Grant amount: \$56,063  
 Match amount: \$0  
 Effective dates: 2013-2014  
 Role: Principal investigator

**Project title:** Corn protein plastics for agricultural products

Name of grantor: MN Corn Board  
 Cooperating faculty: **D. Grewell, W. Graves, J. Schrader**  
 Grant amount: \$125,632  
 Match amount: \$0  
 Effective dates: 2013-2015  
 Role: Principal investigator

**Project title:** I/UCRC for Bioplastics and Biocomposites

Name of grantor: National Science Foundation  
 Cooperating faculty: **D. Grewell, M. Kessler, D. Jarboe**  
 Grant amount: \$15,940  
 Match amount: \$0  
 Effective dates: 2012-2013  
 Role: Principal investigator

**Project title:** Soy-based lawn and field products

Name of grantor: United Soy Board  
 Cooperating faculty: **D. Grewell, Mike Kessler, William Graves, James Schrader**  
 Grant amount: \$67,031  
 Match amount: \$0  
 Effective dates: 2012-2013  
 Role: Principal investigator

**Project title:** Development of soy-based rubber and soy rubber composites

Name of grantor: United Soy Board  
 Cooperating faculty: **D. Grewell, Mike Kessler**  
 Grant amount: \$82,631  
 Match amount: \$0  
 Effective dates: 2012-2013  
 Role: Principal investigator

**Project title:** Ultrasonic Compostability Testing Services

Name of grantor: USDA Office of Energy Policy and New Uses  
 Cooperating faculty: **D. Grewell**  
 Grant amount: \$81,264  
 Match amount: \$0  
 Effective dates: 2011-2012 (~\$25,000 expended, this project was terminated after 4 months)  
 Role: Principal investigator

**Project title:** Using water-stable, soy-based plastic for lawn care products

Name of grantor: United Soy Board

Cooperating faculty: **D. Grewell**, William Graves, James Schrader  
 Grant amount: \$77,797  
 Match amount: \$0  
 Effective dates: 2011-2012  
 Role: Principal investigator

**Project title:** Bench Mark Compostability Testing Services  
 Name of grantor: USDA Office of Energy Policy and New Uses  
 Cooperating faculty: **D. Grewell**  
 Grant amount: \$89,942  
 Match amount: \$0  
 Effective dates: 2011-2011  
 Role: Principal investigator

**Project title:** Food Packing Sealing  
 Name of grantor: Burke Corp./CIRAS  
 Cooperating faculty: **D. Grewell**  
 Grant amount: \$18,746  
 Match amount: \$9,000 (CIRAS-Center for Industrial Research and Service))  
 Effective dates: 2010-2011  
 Role: Principal investigator

**Project title:** Surface Energy Modification of LLDPE  
 Name of grantor: Plastics Professionals/CIRAS  
 Cooperating faculty: **D. Grewell**  
 Grant amount: \$21,028  
 Match amount: \$10,000 (CIRAS-Center for Industrial Research and Service))  
 Effective dates: 2010-2011  
 Role: Principal investigator

**Project title:** Using water-stable, high-strength soy-based plastic for horticulture crop containers  
 Name of grantor: United Soy Board  
 Cooperating faculty: **D. Grewell**, William Graves, James Schrader  
 Grant amount: \$60,023  
 Match amount: \$0  
 Effective dates: 2010-2011  
 Role: Principal investigator

**Project title:** Comparison of Plastics from Corn Zein  
 Name of grantor: POET Biorefining  
 Cooperating faculty: **D. Grewell**  
 Grant amount: \$53,092  
 Match amount: \$20,000 IPERT, 13,092  
 Effective dates: 2010-2011  
 Role: Principal investigator

**Project title:** Application of a Continuous Ultrasonic Welding Using a Radial Tool for Sealing of PLA Plastic Films

Name of grantor: USDA Office of Energy Policy and New Uses  
 Cooperating faculty: **D. Grewell**  
 Grant amount: \$63,306  
 Match amount: \$0  
 Effective dates: 2010-2011  
 Role: Principal investigator

**Project title:** Recycling and recovery of Lactic acid from postconsumer PLA products utilizing energy efficient ultrasonic depolymerizing system

Name of grantor: USDA Office of Energy Policy and New Uses (Continuation of grant\*)  
 Cooperating faculty: **D. Grewell**  
 Grant amount: \$61,721  
 Match amount: \$0  
 Effective dates: 2010-2011  
 Role: Principal investigator

**Project title:** Characterization of commercial Biodegradable Plastics for Biodegradation and Compostability\*

Name of grantor: USDA Office of Energy Policy and New Uses  
 Cooperating faculty: **D. Grewell**  
 Grant amount: \$83,179  
 Match amount: \$0  
 Effective dates: 2009-2010  
 Role: Principal investigator

**Project title:** Ultrasonic Sealing and Cutting of Bioplastic Films

Name of grantor: USDA Office of Energy Policy and New Uses  
 Cooperating faculty: **D. Grewell**  
 Grant amount: \$77,771  
 Match amount: \$0  
 Effective dates: 2009-2010  
 Role: Principal investigator

**Project title:** Soy Protein Plastics Formulation Development for Enhanced Mechanical Strength and Reduced Water Solubility

Name of grantor: United Soy Board  
 Cooperating faculty: **D. Grewell, M. Baboi (Collaborator)**  
 Grant amount: \$61,887  
 Match amount: \$0  
 Effective dates: 2009-2010  
 Role: Principal investigator

**Project title:** PLA Mechanical test

Name of grantor: USDA Office of Energy Policy and New Uses  
 Cooperating faculty: **D. Grewell**  
 Grant amount: \$24,584  
 Match amount: \$0  
 Effective dates: 2009  
 Role: Principal investigator

**Project title:** Life Cycle Cost Model Development of Bioplastics

Name of grantor: USDA Office of Energy Policy and New Uses  
 Cooperating faculty: **D. Grewell**  
 Grant amount: \$141,460  
 Match amount: \$0  
 Effective dates: 2007-2008  
 Role: Principal investigator

**Project title:** Biofuels Unit Operations Course Development

Name of grantor: USDA  
 Cooperating faculty: **D. Grewell**, T. Brumm, C. Hurburgh  
 Grant amount: \$281,427  
 Match amount: \$140,992 (\$112,957 cash + \$28,035 in-kind)  
 Crown Iron (\$33, 924 cash)  
 Emerson Electric (\$4,750 cash)  
 Bio-economic Institute/Cargill Donation funds (\$48,387 cash)  
 IPERT (\$4,981 cash)  
 CALS (\$15,000 cash)  
 ISU (\$5,915 cash + 28,035 in-kind)  
 Effective dates: 2008-2013  
 Role: Principal investigator

**Project title:** Soy Protein Plastics Formulation Development to Reduce Water Solubility

Name of grantor: United Soy Board  
 Cooperating faculty: **D. Grewell**, M. Kessler (Co-PI), K. Rajan (Collaborator)  
 Grant amount: \$60,000  
 Match amount: \$0  
 Effective dates: 2008-2009  
 Role: Principal investigator

**Project title:** Feasibility Study of the Use of DDGs Plastic Composites for Structural Components in Window Framing

Name of grantor: Pella Corporation  
 Cooperating faculty: **D. Grewell**  
 Grant amount: \$39,745  
 Match amount: \$24,578 (\$15,000 cash + \$9,578 in-kind)  
 IPERT (\$15,000 cash + \$9,578 in-kind)  
 Effective dates: 2007  
 Role: Principal investigator

**Project title:** Scale-up and Technology Transfer of Protein Based Plastic Products

Name of grantor: SoyWorks Corporation/ Department of Energy  
 Cooperating faculty: **D. Grewell**  
 Grant amount: \$125,000  
 Match amount: \$0  
 Effective dates: 2007-2008  
 Role: Principal investigator

**Project title:** Ultrasonic Metal Welding

Name of grantor: Branson Ultrasonic  
 Cooperating faculty: **D. Grewell**  
 Grant amount: \$153,910

Match amount: \$0  
 Effective dates: 2005-2007  
 Role: Principal investigator

**Internal (\$925,068)**

**Project title:** Biopolymers and Biocomposites

Name of grantor: Leading the BioEconomy Initiative  
 Cooperating faculty: **D. Grewell**  
 Grant amount: \$250,000  
 Match amount: \$0  
 Effective dates: 2013-2015  
 Role: Principal investigator

**Project title:** Naturally Controlled Gelatinization of Corn Starches

Name of grantor: Iowa Grow Value Fund  
 Cooperating faculty: **D. Grewell**  
 Grant amount: \$75,581  
 Match amount: \$41,077 (\$10,000 cash + \$31,078 in-kind)  
 Grain Processes Corp. (\$5,000 cash+20,000 in-kind)  
 Emerson Electric (\$5,000 cash + \$5,000 in-kind)  
 ISU (\$6,078 in-kind)  
 Effective dates: 2009-2010  
 Role: Principal investigator

**Project title:** Retooling Ethanol Industries: Integrating Ultrasonics into Dry Corn Milling to Enhance Ethanol Yield

Name of grantor: Grow Iowa Value Fund  
 Cooperating faculty: **D. Grewell, S. Khanal, J. van Leeuwen**  
 Grant amount: \$175,018  
 Match amount: \$94,500 (\$72,500 cash/equipment + \$22,000 in-kind)  
 Emerson Electric (\$12,500 cash + \$60,000 equipment)  
 Midwest Grain Processors (\$10,000 in-kind)  
 Lincoln Way Energy (\$12,000 in-kind)  
 Effective dates: 2005-2008  
 Role: Principal investigator

**Project title:** Ultrasonic Assisted Exfoliation of Biorenewable Polymer Nanocomposites with Micro-Cellular Structures

Name of grantor: Grow Iowa Value Fund  
 Cooperating faculty: **D. Grewell, M. Kessler, H. Auken**  
 Grant amount: \$142,682  
 Match amount: \$70,500 (\$4,000 equipment + \$66,500 in-kind)  
 Emerson Electric, Trexel (\$4,000 equipment + \$34,500 in-kind)  
 Vermeer (\$10,000 in-kind)  
 Creative Composites (\$10,000 in-kind)  
 ISU (\$12,000 in-kind)  
 Effective dates: 2006-2007  
 Role: Principal investigator

**Project title:** Protein Polymer Product Development

Name of grantor: Grow Iowa Value Fund  
 Cooperating faculty: **D. Grewell**, M. Kessler, W. Graves, K. Rajan, H. Van Auken  
 Grant amount: \$281,787  
 Match amount: \$203,335 (\$130,865 cash + \$72,470 in-kind)  
 Soy Works (\$85,865 cash + \$10,000 in-kind)  
 Creative Composites (\$20,000 cash + \$10,000 in-kind)  
 Freeman Industries (\$20,000 cash + \$8,000 in-kind)  
 Pella (\$5,000 cash + \$5,000 in-kind)  
 Vermeer (\$10,000 in-kind)  
 ISU (\$29,470 in-kind)  
 Effective dates: 2008-2010  
 Role: Principal investigator

### PROJECTS FUNDED AS CO-PI (\$23,945,437)

#### **Project Title:** Great Plans Region I-Coprs

Name of grantor: NSF  
 Cooperating faculty: M. Kessler, D. Grewell  
 Grant amount: \$14,000,000  
 Match amount: \$0  
 Effective dates: 2023-2028  
 Role: Director, Co-Principal Investigator

#### **Project Title:** Improving Physicochemical Properties and Ingredient Functionality of Proteins with High-Power Sonication

Name of grantor: USDA/ NIFA  
 Cooperating faculty: B. Lamsal, D. Grewell, M. Hojilla-Evangelista  
 Grant amount: \$426,860  
 Match amount: \$0  
 Effective dates: 2018-2021  
 Role: Co-Principal Investigator

#### **Project Title:** Microalgae-based Fertilizer for Nitrogen and Phosphorus Loss Reduction

Name of grantor: Leopold Center (ISU)  
 Cooperating faculty: D. Jarboe, **D. Grewell**, J. Schrader, Z. Wen,  
 Grant amount: \$100,000  
 Match amount: \$0  
 Effective dates: 2016-2017  
 Role: Co-Principal Investigator

#### **Project Title:** Ultrasonic Milk Treatment

Name of grantor: Dairy Research Institute and Midwest Dairy Association  
 Cooperating faculty: S. Clark, **D. Grewell**, S.Jung, A. Mallarino, J. Sawyer  
 Grant amount: \$99,486  
 Match amount: \$0  
 Effective dates: 2013-2014  
 Role: Co-Principal Investigator

#### **Project Title:** High-Frequency Ultrasound Extraction of Lipids from Microalgae

Name of grantor: ConocoPhillips  
 Cooperating faculty: T. Bigelow, L. Dong, M. Spalding, **D. Grewell**, T. Wang

Grant amount: \$298,539  
 Match amount: \$0  
 Effective dates: 2011-2013  
 Role: Co-Principal Investigator

**Project Title:** Bioplastic Container Cropping Systems: Green Technology for the Green Industry

Name of grantor: USDA, Specialty Crop Research Initiative  
 Cooperating faculty: W. Graves, **D. Grewell**, M. Kessler, J. Schrader, B. Kirwan (University of Illinois), H. Kratsch (University of Nevada), H. Mathers (The Ohio State University), Ryan Stewart (University of Illinois)

Grant amount: \$4,200,221  
 Match amount: \$2,106,086  
 Effective dates: 2011-2015  
 Role: Co-Principal Investigator

**Project Title:** Biopolymers & Biocomposites Workshop

Name of grantor: Iowa Department of Economic Development  
 Cooperating faculty: D. Jarboe, **D. Grewell**

Grant amount: \$5,000  
 Match amount: \$0  
 Effective dates: 2011-2012  
 Role: Co-Principal Investigator

**Project Title:** REU Site: Sustainable Production and Processing for Biomass-Derived Fuels of the Future Components

Name of grantor: NSF  
 Cooperating faculty: A. Bhandari, **D. Grewell**, R. Raman, R. Anax, M. Darr, M. Sopuir  
 Grant amount: \$311,492  
 Match amount: \$0  
 Effective dates: 2010-2013  
 Role: Collaborator

**Project Title:** Advanced Carbon Fibers from Lignin for Wind Turbine Applications

Components

Name of grantor: IAWIND  
 Cooperating faculty: M. Kessler, R. Larock, **D. Grewell**  
 Grant amount: \$100,000  
 Match amount: \$100,000 (\$50,000 cash Siemens+\$50,000 ISU in-kind)  
 Effective dates: 2010-2013  
 Role: Co-Principal Investigator

**Project title:** Evaluating Strategies for Clean Fractionation of Algae Oil, Protein, and Cell Wall Components

Name of grantor: ConocoPhillips  
 Cooperating faculty: T. Wang, L. Johnson, S. Beattie, S. Jung, B. Lamsal, **D. Grewell**  
 Grant amount: \$122,574  
 Match amount: \$0  
 Effective dates: 2010-2011  
 Role: Co-Principal Investigator

**Project title:** Manufacturing of Bio-based (Zein) Insulation with Creative Composites for Iowa State University's Solar Decathlon House

Name of grantor: IPRT Company Assistance Technology Commercialization Group  
 Cooperating faculty: M, Muecke, **D. Grewell**, Ulrike Passe  
 Grant amount: \$8,167  
 Match amount: \$0  
 Effective dates: 2009  
 Role: Co-Principal Investigator

**Project title:** Iowa Biotechnology Consortium

Name of grantor: USDA  
 Cooperating faculty: Robert Brown, **D. Grewell**, et al  
 Grant amount: \$1,640,491  
 Match amount: \$0  
 Effective dates: 2006-2009  
 Role: Co-Principal Investigator

**Project title:** Ultrasonication in Soy Processing for Enhanced Sugar Yields and Subsequent Nisin Production

Name of grantor: Iowa Grow Value Fund  
 Cooperating faculty: S. Khanal, B. Lamsal, S. Jung, **D. Grewell**, J. (Hans) van Leeuwen  
 Grant amount: \$158,977  
 Match amount: \$77,000 (\$77,000 in-kind)  
 Cargill (\$15,000 in-kind)  
 ADM (\$7,000 in-kind)  
 P&G (\$10,000 in-kind)  
 Emerson Electric (\$45,000 in-kind)  
 Effective dates: 2006-2008  
 Role: Co-Principal Investigator

**Project title:** Iowa State Solar Decathlon 2009 - Interlock House

Name of grantor: DOE/NREL  
 Cooperating faculty: Ulrike Passe, Mike Mikesch, **D. Grewell**  
 Grant amount: \$100,000  
 Match amount: \$0  
 Effective dates: 2007-2010  
 Role: Co-Principal Investigator

**Project title:** Degradable pots for plants

Name of grantor: Horticultural Research Institute  
 Cooperating faculty: William Graves, **D. Grewell**  
 Grant amount: \$14,000  
 Match amount: \$0  
 Effective dates: 2006-2009  
 Role: Co-Principal Investigator

**PATENTS (20)****ISSUED PATENTS (17)**

17) *Closed loop 3D printing*, US Patent 10,442,118, Oct 15, 2019, D. Grewell



- 16) *Biodegradable Fertilizer*, US Patent 9,988,318 B2, June 5, 2018, **D. Grewell**, J. Schrader, W. Graves
- 15) *Depolymerization of Polylactic Acid*, US Patent 8,895,778, November 25, 2014, G. Srinivasan, **D. Grewell**
- 14) *Apparatus and Method for Ultrasonic Debulking of Composite Laminates*, US Patent 7,892,372, Feb 22, 2011, **D. Grewell**, A. Benatar, E. Lee
- 13) *Laser Beam Shaping Using Liquid Crystals*, US Patent 6,867,388, 2003, March 15, 2005, **D. Grewell**
- 12) *Light Guide for Laser Welding*, US Patent 6,528,755, 2003, March 4, 2003, **D. Grewell**, J. Bickford D. Lovett, P. Rooney
- 11) *Transparent Pressure Bladder*, US Patent 6,486,433, 2002, November 26, 2002, **D. Grewell**, D. Lovett
- 10) *Distance Mode Control for Laser Welding*, US Patent 6,329,629, December 11, 2001, **D. Grewell**
- 9) *Laser Diode Array*, US Patent 6,205,160, March 20, 2001, **D. Grewell**
- 8) *Welding Method and Apparatus*, US Patent 6,064,798, May 16, 2000, D. Lovett, **D. Grewell**
- 7) *Welding Method and Apparatus*, US Patent 5,949,959, September 7, 1999, D. Lovett, **D. Grewell**
- 6) *Simultaneous Amplitude and Force Profiling During Ultrasonic Welding of Thermoplastic Workpieces*, U.S. Patent 5,855,706, January 5, 1999, **D. Grewell**
- 5) *Method for Processing Workpieces by Ultrasonic Energy*, U.S. Patent 5,846,377, December 8, 1998, J. Frantz, **D. Grewell**
- 4) *Method of Determining the Collapse of Plastic Parts*, U.S. Patent 5,788,791, August 4, 1998, **D. Grewell**
- 3) *Welding System and Method of Setting Welding Machine Parameters*, U.S. Patent 5,772,814, June 30, 1998, **D. Grewell**
- 2) *Method and Apparatus for Processing Workpieces by Ultrasonic Energy*, U.S. Patent 5,658,408, August 19, 1997, J. Frantz, **D. Grewell**
- 1) *Thermoplastic Welding*, U.S. Patent 5,313,034, May 17, 1994, R. Grimm, **D. Grewell**, M. St.John

#### **PATENT APPLICATIONS (4)**

- 1) *Plastic Composition with Spent Diatomaceous Earth Filler*, United States Provisional Application Number 62/700,401, filed July 19, 2018, S. Gandikota, J. Underwood, **D. Grewell**.
- 2) *Thermal compounding of fully bio based degradable plastic with natural insecticide functionality*, Disclosure November 2017, ISURF 04719, **D. Grewell**, C. Xiang, C. Annandarajah

3) Special die design: 3D printed fiber extrusion die with special opening shapes with minimal die swell, Disclosure November 2017, ISURF 04720, **D. Grewell**, C. Xiang, C. Annandarajah

4) U.S. Provisional Patent Application Serial No. 62/668,655, filed May 8, 2018, for THERMOPLASTIC POLY ACRYLATED GLYCEROL ADHESIVES USEFUL IN CELLULOSIC PRODUCTS  
Inventors: Cochran et al. ISURF Reference No.: 04635, LR Reference No.: 29609.1100

### **HONORS/AWARDS (27)**

27) **Fellow**, National Academy of Inventors, 2020

26) Mid-Career Achievement in Research Award, College of Life Science Agriculture, ISU, **D. Grewell**, 2018

25) Team Award, College of Life Science Agriculture, W. Graves, J. Schrader, **D. Grewell**, D. Jarboe, C. Currey, K. Rosentrater, 2017

24) Student Recruitment Award, College of Life Science Agriculture, **D. Grewell**, 2014

23) Emerging Leaders Academy, 2015

22) V. Akumar, S., S. Jung, **D. Grewell**, S. Clark. Poster presentation. Effects of thermosonication on total plasmin and characteristics of skim milk and cream. Annual Mtg. Institute of Food Technologists (IFT), Las Vegas, NV. 2012. 5th in Dairy Foods Division graduate poster competition

21) Elected President to Osborn Club, The Scientific Research Society, 2012

20) Sigma Xi, The Scientific Research Society, 2011

19) College of Agricultural and Life Science, Iowa State University, International Award, **D. Grewell**, 2011

18) Autodesk Scholarship, 2011, Attend Autodesk University for 1 week, 2011

17) W. Wu-Haan, R. Burns, L. Moody, **D. Grewell**, R. Raman, Evaluation of Ultrasonic Pretreatment of Anaerobic Digestion of Different Animal Manures, American Society of Agricultural and Biological Engineers Honorable Mention Paper Award, August 2011

16) United States Expert/Delegate for the International Institute of Welding Commission 16, Welding of Plastics and Adhesives Technology, July 16-22, 2011, Chennai India

15) D. Mitra, P.Chand, A. Frankowska, V.Chintareddy, J. Vekade, **D. Grewell**, J. (Hans) van Leeuwen Corn Utilization and Technology Conference, Atlanta, June 7-9, 2010, 2<sup>nd</sup> prize in poster competition

14) College of Agricultural and Life Science, Iowa State University, Early Achievement in Research Award, **D. Grewell**, 2010

13) 2009 R&D 100 Awards, J. van Leeuwen T. Kim, **D. Grewell**, S. Beattie, D. Mitra, C. Ziel, V. Chintareddy, P. Chand, M. Montalbo-Lomboy, J. Verkade, 2009

12) **Grand Prize for University Research from the American Academy of Environmental Engineers**, Single cell bio-oil from an integrated fungal lignocellulosic biorefinery, J. (Hans) van Leeuwen, S. Beattie, T. Kim, **D. Grewell**, L. Johnson, E. Hammond, A. Pometto III, D. Iassonova, P. Shrestha, M. Vincent, 2009

11) **Fellow**, Society of Plastics Engineers, 2008

10) Newcomer Research Award, America Society of Agricultural and Biological Engineers (ASABE), 2007

9) Faculty position, University of Erlangen, 2007

8) *Osborn Research Club*, Faculty Honor Society, 2007

7) *Best Paper Award*, Annual Technical Meeting (ANTEC) 2006, Society Plastics Engineers, Joining of Plastics and Composites Special Interest Group, Brookfield CT

6) *Best Paper Award*, Annual Technical Meeting (ANTEC) 2004, Society Plastics Engineers, Joining of Plastics and Composites Special Interest Group, Brookfield CT

5) Phi Kappa Phi OSU Honors Society, 2003, Baton Rouge, LA

4) Procter and Gamble Graduate Research Award, 2001

3) *Best Paper Award*, Annual Technical Meeting (ANTEC) 1997, Society Plastics Engineers, Joining of Plastics and Composites Special Interest Group, Brookfield, CT

2) *Significant Contribution Award*, Branson Ultrasonic Corporation, a monetary award for identifying market opportunities and developing expert system, 1996

1) *Significant Contribution Award*, Branson Ultrasonic Corporation, a monetary award for identifying a solution to plastic related problem on ultrasonic cleaners, 1994

### **STUDENT'S HONORS (3)**

1) *Best Student Paper Award*, Srikanth Vengasandra, ANTEC 2008, Society Plastics Engineers, Medical Plastics Division, Brookfield CT

2) *Graduate Research of Excellence Award*, ISU, Melissa Montalbo-Lomboy, 2008

3) Ethicon Endo-surgery, Inc. Graduate Research Award, Melissa Montalbo-Lomboy 2008

### **OUTREACH ACTIVITIES**

- K-Show 2016 tradeshow, 200,000 attendees, organized booth, Dusseldorf, Germany, 2016
- NPE 2015 tradeshow, 75,000 Attendees, organized booth with 110 ton press and robot, Orlando, FL, 2016
- Work with Rewall on recycled composites (2012-2013)
- Work with Burke Corporation on plastic production sealing application (2010-2012)
- Work with Plastics Professionals on surface energy modifications (2010-2012)
- Work with Insite on bioplastic ground cover (2011-2012)

- Work with Creative Composites on lubrication product (2011-2012)
- Work with Seigwerk Ink Corp. on ultrasonic to reduce particle size of dies (2011-2012)
- Work with Connect-the-Docks on surface energy issues (2010)
- Participated in Workshop for Iraqi Borlaug Fellows and Mentors, International Center for Agricultural Research in Dry Area, May 23-26, 2010, Aleppo, Syria
- Developed novel polymer composite formulation for Pella Corp.
- Characterized and solved plastic issue for Plastics Unlimited Corp.
  - Work resulted in peer-reviewed conference paper on resolved problem
  - Solution was instrumental in saving over 90 jobs in Iowa
- Developing biofuel plant operation simulation software
  - Development resulted in a peer-reviewed conference paper
  - Development resulted in software package to be web-based
- Developing bioplastics life cycle costs software
  - Development resulted in a peer-reviewed conference paper and conference poster
  - Development resulted in software package to be web-based
- Chair of ISU Bioplastics, Biocomposite Research Team
  - Organized bioplastics workshop for Iowa companies, ISU, 2008, 2010, 2012
  - Organizer of booth at National Plastics Exposition, 2009, 2012
  - Applied research projects (Funded as PI)
- Conducted study on ultrasonic metal welding for Emerson Electric
- Pioneer on retooling ethanol industries with ultrasonics
  - Developed protein polymer product for SoyWorks Corp.
- Testing of PLA mechanical properties for Iowa based company (US Packaging)
- Co-Organizer of Bioplastic Container Cropping System Conference, ISU, 2009
- 14 US patents
- Developed novel heating models for orbital welding of plastics
- Developed new product line for Emerson Electric based on lasers and light guides
  - Development resulted in multiple publications
  - +\$10,000,000 annual sales
  - Developed new optical system for light guide system that allowed new product line to be cutting edge and cost effective
  - ISU representative on NC-1031USDA Nanotechnology and Biosensors
  - Implantation of beta-site testing of bio-materials for Creative Composites Corp.
- Featured in:
  - Prairie Pulse TV, Bioplastics and CB<sup>2</sup> January 29, 2002
  - Prairie Public Radio, Main Street, Bioplastics Research at NDSU, Sept. 24, 2019
  - AgWeek, TV KNBN/WDAY/WDAZ and Radio KTTW/WDAY, Bioplastics and NDSU, Sept. 28, 2019
  - MN Public Radio, Sept 27, 2019, Bioplastics at NDSU
  - CBC News, Greener straws? Bacteria help turn food waste into compostable plastic Oct 29, 2018
  - Iowa Public Radio, Bioplastics June 12, 2018
  - KHOI Public Radio Interview on Bioplastics, July 27, 2018
  - SPI newsletter, *Member Spotlight: Center for Biopolymers and Biocomposites (CB2)*, 2016
  - *The Guardian*, A car made from tequila? Ford Motor Co says it's good for the planet, 2016

- *Stories*, Welding Industry Tech to Students Opportunities, Iowa State University, 2016
- *Adhesives and Sealants*, Iowa State University in Glycerin-Based Adhesives R&D Update, Dec, 2014
- *Green Chemical Blog*, Iowa State University in glycerin-based adhesives R&D, Dec 2014
- *AG Professional*, ISU to lead new center for bioplastics and biocomposites (Dec 5, 2014)
- *High Plains/Midwest Ag Journal*, ISU to lead new Center for Bioplastics and Biocomposites (Dec 2014)
- *Cultivation Corridor*, ISU to lead new Center for Bioplastics and Biocomposites (Dec 2014)
- *Prairie Farmer*, ISU to lead new Center for Bioplastics and Biocomposites (Dec 2014)
- Iowa State Daily, bio-adhesives (Dec. 2014)
- Radio interview IPR, Bioplastics center, River to River (Dec. 2014)
- Iowa State Daily, Bioplastics (Nov. 2014)
- Iowa State Daily, LCA Software (June 2014)
- Article in Lab Manager, *Researchers Use the Power of Sound Waves to Improve Biofuels Production* (June 2013)
- Article in Biomass Magazine, *Ultrasound 'making waves' for enhancing biofuel production*, (June 2013)
- Article in The Green Car, *Ultrasound used to enhance biofuel production* (June 2013)
- Article in Gaianews, *Gli ultrasuoni accorciano i tempi di produzione del biocarburante* (June 2013)
- Article in Iowa Farmer Today, *Proposed Iowa State bioplastics center receives grant* (February 2013)
- Article in Plastics News, *Iowa State wins grant for new bioplastics center* (February 2013)
- Article in Plastics News, *Iowa State University expanding bio-container research* (May 2012)
- Article in *In the Hopper*, SPI, *Software to Compare Bioplastics, Traditional Resins Coming Online Soon* (April 2012)
- Article in *Plastics Today*, *Green Matter: Let the numbers tell the tale* (April 2012)
- Article in *bioplastics*, *The Biopolymers and Biocomposites Research Team (BBRT)* (January 2012)
- Article in *Composites Manufacturing online*, *Iowa Professor Turns Crops Into Composites* (January 2012)
- Article in *Plastics News*, *Iowa State to develop plant-based containers* (October 2011)
- Article in *Biofuels Journal*, *Iowa State University Engineer and Partners Develop Interactive Biorefinery Operations Simulator* (April 2011)
- Article in *ScienceDaily*, *Learn to Run a Biorefinery in a Virtual Control Room* (April 2011)
- Article in *Earth Teaching*, *A Nintendo for Biofuel Nerds* (April 2011)
- Article in *Ethanol Producer Magazine*, *Nintendo for Biofuel Nerds* (June 2011)
- Front cover of *PlasticsNews* (August 2009)
- Iowa Farm Bureau Spokesman (June 10, 2009)
- Iowa State Daily (June 18, 2009)
- Farm Journal, *Smithsonian* (February 2008)
- *BusinessWeek* (July 3, 2006)
- *Bioplastics Magazine* (February 2007)

- *Ceramic Industry* (September 2007)
- Radio interview KRNV (July 2006)
- *Materials World* (December 2006)

## **SERVICE**

### **PROFESSIONAL SERVICE**

President NDSU National Academy of Inventors, 2019-present  
 IIW Commission 16 Chair, 2017-Present  
 Member, American Association for the Advancement of Science, 2016-current  
 Co-Organizer 13<sup>th</sup> International Symposium on Bioplastics, Biocomposites and Biorefining, May 19th to 24th, 2014 in Guelph, Ontario, Canada  
 Member of Board of Directors, SPE-Biosplastics SIG, 2014-present  
 Member of Acoustical Society of America, 2013  
 Member of Sigma Xi, 2011-present  
 President of Osborn Club, 2012-2013  
 International Scientific Committee of the 13<sup>th</sup> International Symposium on Bioplastics, Biocomposites and Biorefining in 2014  
 IIW Commission 16 Vice-Chair, 2012, 2013, 2014, 2015, 2016  
 IIW Commission 16 US representative, 2011, 2012, 2013, 2014, 2015, 2016, 2017  
 Moderator, Pacific Rim Summit, Honolulu, HI, November 2009  
 Moderator, Society of Plastics Engineer Annual Technical Conference, 1999, 2001-2009  
 Member of Board of Directors, Ultrasonic Industrial Association, 2009-present  
 Editorial Board Member of Journal of Plastics Technology, 2008-present  
 Member of International Polymer Processing Society, 2005-present  
 Member of American Society of Agricultural Biological Engineers, 2006-present  
 Society of Plastic Engineers Technical Chairperson to Special Interest Group Joining of Plastics and Composites, 2001-2003  
*Laser Safety Officer*, Trained by Rockwell Laser Institute, April 1999  
 Society of Plastic Engineers Vice-Chairperson to Special Interest Group Joining of Plastics and Composites, 1999-2001  
 Society of Plastic Engineers Secretary to Special Interest Group Joining of Plastics and Composites, 1997-1999  
 Program Organizer and Chairman for Materials Week '95 on plastics joining sessions sponsored by ASM International and TMS, 1995  
 ASM International, Chairman of plastics joining committee, 1995  
 AWS member on plastics G1 committee, 1990-present  
 Program Organizer and Chairman for Materials Week '91 on plastics joining sessions sponsored by ASM International and TMS, 1991

### **INSTITUTIONAL SERVICE**

North Dakota State University, CoE, DEI committee member 2020-present  
 North Dakota State University, CoE, Search committee member for VPR 2021  
 North Dakota State University, CB<sup>2</sup>, Search committee Chair for center coordinator, 2021  
 North Dakota State University, CB<sup>2</sup>, Search committee Chair for center coordinator, 2018  
 Iowa State University, ABE, Research Council committee member 2017-current  
 Iowa State University, VPR Office, Biotechnology Council committee member 2016-current

Iowa State University, VPR Office, Faculty Review Board committee member 2015-current  
Iowa State University, President's Office Council committee member 2014-current  
Chair of Awards Committee, Agricultural and Biosystems Engineering, 2015-current  
Iowa State University, President's Office Council 2014-current  
College of Agricultural and Life Science, Student Recruitment committee, 2012-current  
Member of Search Committee, Food Scientist, Food Science and Human Nutrition, 2013  
Program Director for Study Abroad Program, International Industrial/Academic Leadership Experience, Taiwan, Chung Yuan Christian University 2010, 2011, 2012, 2013  
Chair of Search Committee, Comm. Specialist, Agricultural and Biosystems Engineering, 2013  
Chair of ABE webpage committee, 2012, 2013  
Member of Scholarship Committee, Manufacturing Facility, Agricultural and Biosystems Engineering, 2012, 2013  
Faculty Advisor of ATMEA student group, Agricultural and Biosystems Engineering 2007-2011  
Faculty in charge of student recruitment in I-Tec program, Agricultural and Biosystems Engineering 2011-present  
Chair of Bioplastics Biocomposites Research Team, CCUR, 2008-present  
Member of Graduate Committee, Agricultural and Biosystems Engineering, 2011-2012  
Awards Committee, Agricultural and Biosystems Engineering, 2010-2011  
Search Committee, Manufacturing Technology and Engineering Agricultural and Biosystems Engineering, 2012  
Co-Chair Curriculum Committee ITec Program, Agricultural and Biosystems Engineering, 2010-2012  
Curriculum Committee ITec Program, Agricultural and Biosystems Engineering, 2007-2012  
Chair of Search Committee, Research Scientist, Agricultural and Biosystems Engineering, 2009  
Member of Search Committee, Manufacturing Technology and Engineering Agricultural and Biosystems Engineering, 2009  
Chair of Search Committee, Teaching Laboratory Coordinator, Agricultural and Biosystems Engineering and Aerospace Engineering, 2009  
Member of Search Committee, Manufacturing Technology and Engineering Agricultural and Biosystems, 2010  
Member of Search Committee, Fermentation/Industrial Microbiology, Food Science and Human Nutrition, 2009  
Member of Search Committee, Food Processing, Food Science and Human Nutrition, 2010  
Co-Organizer of Bioplastic Container Cropping System Conference, ISU, 2009  
Graduate Seminar, Presentation on Ultrasonic, Food Science and Human Nutrition, ISU, Fall 2010  
Graduate Seminar, Civil and Construction Engineering, ISU, Fall 2008  
Search Committee, Food Science and Human Nutrition, 2008  
USDA-DOE, Bio-Mass Grant Proposal reviewer, 2008  
Member of Editorial Board for *Journal of Plastics Technology*, Nuremburg Germany 2008-present  
Organizer of Bioplastics Workshop/Conference, Bioplastics Biocomposites Research Group, ISU, 2008  
Chair of Search Committee, Agricultural and Biosystems Engineering, 2009  
American Society of Agricultural and Biological Engineering, 2007-present  
Member of Plant Science Institute, 2007- present

Member of Ames Laboratory, 2007-present  
 Search Committee, Agricultural and Biosystems Engineering, 2007  
 Society of Plastics Engineers Student Chapter Advisor 2006-2007  
 Member of Center for Crops utilization research, 2006-present  
 NC1031-USDA Nanotechnology and Biosensors committee member, 2006-present  
 National Association of Industrial Technology (now ATMEA) Student Chapter Advisor 2005-2014  
 Society of Plastic Engineers to Special Interest Group Joining of Plastics and Composites, 2001-present

#### **JOURNAL/BOOK TECHNICAL REVIEWER/EDITOR (68)**

Book chapter, Springer publications, PLA Processing (2017) 1  
 Editorial Board of the Journal of Plastics Technology (2012-present)  
 Journal of Biobased Materials and Bioenergy (2013) 1  
 Journal of Applied Polymer Science (2013) 1  
 International Institute of Welding Journal (2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019,2020, 2021) 1,2,2,1,3,2,1,1,2,2,1  
 Editor (2013, 2014, 2017, 2018, 2019, 2021) 1, 4, 3, 6, 5, 5,  
 Journal of Science of Food and Agriculture (2012)1  
 AAE (2006) 1  
 Biomacromolecules (2010) 1  
 Chemical and Biochemical Eng. Quarterly (2010) 1  
 Journal of the American Oil Chemists (2010, 2013) 2  
 Journal of Materials Science (2014) 1  
 ACS Nano (2010) 1  
 Bioresources and Technology (2009, 2012) 1,1  
 Energy and Fuels (2009, 2009, 2010, 2011) 1,1,1,1  
 Polymer Engineering and Science (2009, 2010, 2014, 2015, 2017, 2018) 1,1,1,1,1,1  
 Physics Procedia (2014) 3  
 Fuel Processing Technology (2009, 2011) 2  
 Industrial and Engineering Chemistry Research (2011, 2011) 2  
 Transactions of America Society of Agricultural and Biosystems Engineering (2009) 1  
 Journal of Agricultural and Food Chemistry (2008) 1  
 Biotechnology and Bioengineering (2007, 2007) 1,1  
 International Agricultural Engineering Journal (2007) 1  
 Journal of International Polymer Processing Society (2007, 2007, 2012, 2016) 1,1,1,2  
 Composites A, (2007) 1  
 Journal of Polymer and the Environment (2007)1  
 Journal of Manufacturing Engineering (2006) 1  
 Journal of Vinyl and Additive Technology (2006) 1  
 Ultrasonics Sonochemistry (2011, 2012, 2017) 1,1,2

#### **CONFERENCE PAPER REVIEWER (105)**

Annual Technical Conference for Society of Plastics Engineers (1999-2017) 60  
 International Polymer Processing Society (2012, 2013) 40, 5



**GRANT TECHNICAL REVIEWER (19)**

- Canada Research Chairs Tier II Chair Nomination (2016) 1
- U. S. Army Research Office (2016) 1
- USDA/NIFA Biofuels and Biobased Products (2016) 1
- USDA/NIFA Chair of reviewing committee (2015) 1
- USDA/NIFA Ad Hoc reviewer (2015) 1
- Czech Science Foundation, Czech Republic (2014) 1
- The Ministry of Business, Innovation and Employment of New Zealand (2012), 1
- Natural Sciences and Engineering Research Council of Canada (2011, 2012, 2104, 2017), 4
- Iowa Department of Economic Development (Aug 2011) 1
- NSF/ Process and Reaction Engineering (2010) review panel, 8 proposals, (2012) review panel 2
- NSF/ Ad Hoc reviewer (2012, 2013) 1,1
- USDA/DOE Biomass (2007) 1
- USDA/EPP-Bio/NIFA (2013, 2014) 1,1
- College of Engineering, Iowa State University (2006) 1