

Dharmendra K. Mishra, Ph.D.

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West Lafayette, IN 47907

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EDUCATION**Ph.D., Biosystems and Agricultural Engineering**

2013

Michigan State University, East Lansing, MI

- Dissertation: A rapid testing instrument to estimate thermal properties of food materials at elevated temperatures during nonisothermal heating
- GPA: 3.78
- Advisor: Dr. Kirk D. Dolan
- Synopsis: Modeling kinetics of thermal degradation of nutrients for food quality or kinetics of microbial reduction for food safety requires reliable estimates of the thermal properties. Thermophysical properties, especially thermal conductivity and specific heat, are important in establishing thermal processes for food manufacturing, especially at higher processing temperatures. Hence, in this study, a novel instrument (TPCell) was designed and developed using principles of intrinsic verification and inverse heat conduction. With the instrument, thermal conductivity can be measured from room temperature to higher processing temperature of 140 °C. The experimental time with TPCell is less than a minute, as compared to 5-6 hours with quasi-isothermal method employed by currently available instruments. TPCell has advantages over traditional methods, as it avoids the decomposition of materials that result when achieving the quasi-isothermal state at higher temperatures. Temperature-dependent thermal properties were used to estimate the kinetic parameters of nutrient degradation during aseptic and conventional retort processing. Vitamin C and thiamin were selected as model nutrients for degradation study. Sweet potato puree was used as a food matrix.

M.S., Biosystems and Agricultural Engineering

2008

Michigan State University, East Lansing, MI

- Thesis: Estimation of kinetic parameters for degradation of anthocyanins in grape pomace
- GPA: 3.73
- Advisor: Dr. Kirk D. Dolan
- Synopsis: Degradation of nutraceuticals in low- and intermediate-moisture foods heated at high temperature (>100 °C) is difficult to model because of the nonisothermal condition. Isothermal experiments above 100 °C are difficult to design because they require high pressure and small sample size in sealed containers. Therefore, a Nonisothermal method was developed to estimate the thermal degradation kinetic parameter of nutraceuticals and determine the confidence intervals for the parameters and the predicted concentration. Thermal conductivity (k) and specific heat (Cp) were estimated as quadratic functions of temperature using Comsol and nonlinear regression. The k and Cp functions were then used to predict temperature inside the grape pomace during retorting and degradation rate constant and activation energy were estimated using nonlinear regression. These methods are useful for thermal processing design for nutraceutical products.

B.S., Agricultural Engineering

2004

Tamil Nadu Agricultural University, India

- Capstone project: Performance Testing of Diesel Engine Using Bio-Diesel (Jatropha)
- GPA: 3.68
- Advisor: Dr. Divaker Durairaj
- Synopsis: Renewable form of energy is the need of today's world and bio-based energy sources can be forefront of such initiatives. This project was designed to extract oil from a plant source

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jatropa seed and test its performance on tractor engine. This form of extracted oil was called bio-diesel. The performance of the tractor engine was compared with regular diesel oil and the bio-diesel. The results of the study concluded that there was no significant difference in engine performance. However, further research is needed to prove if this result is true for the usable life of the engine.

EXPERIENCE

Assistant Professor, Purdue University, West Lafayette, IN Aug. 2016-Present

- Extension work includes helping growers and food processors on topics related to food safety and quality, thermal processing of food materials, equipment design and validation.
- Research Interests: Biological and mathematical validation techniques for novel thermal processing. Degradation kinetics of nutrients and microorganisms during thermal processing. Thermal properties of food materials at elevated temperatures. Smart sensors for food processing applications. Process modeling and parameter estimation.

Sr. Process Engineer, Mead Johnson Nutrition, Evansville, IN Oct. 2014-Aug. 2016

- Responsible for developing new aseptic processing technology for manufacturing baby formula, a \$40M project. It includes sustainable manufacturing by keeping the use of utilities to a minimum by recycling water and energy.
- Responsible for leading a team of 18 people for aseptic liquid filling technology from different disciplines including, process engineering, packaging, product development, regulatory, supply chain and operations
- Development of pilot plant capabilities for aseptic processing and packaging (\$5M including small scale ultra-high temperature system, aseptic bag filler, laminar flow hood filler, training equipment, microthermics® system and clean-in-place system)
- Commercialization of the technology developed in pilot facility
- Working with the cross functional team to define robust design of experiments for development of predictive model for nutrient degradation

Co founder, Thermetrics Inc., East Lansing, MI 2013-Present

- Co-founded a company, Thermetrics, based on my Ph.D. research
- Leading the device design and manufacturing to measure thermal properties at elevated temperatures
- Working on development of sensors based on multiphysics modeling, parameter estimation, and inverse problems

Aseptic Thermal process Authority, Nestle Nutrition, PTC Fremont, MI Mar. 2013-Oct. 2014

- Responsible for validation of \$140M project for commercialization of novel particulate aseptic system for Gerber baby food products
- Developed a model for microbial validation of multiphase products in aseptic system
- Thermal process authority for aseptic processing and responsibilities included designing and managing microbial validation work for the aseptic processing systems
- Led interactions with Food and Drug Administration (FDA) for the commercialization of the novel aseptic processing and providing details of validation protocol and filing documents
- Led the HACCP validation work for the new aseptic line and prepared documents to be filed with FDA
- Led the validation work for aseptic bag filler, aseptic form-fill-seal liquid filler
- Developed a patented rheological sensor to measure viscosity of multi-phase product

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- Provided technical assistance to Nestle factories in the area of thermal processing and spoilage incident investigation
- Retort and hot-fill process establishment and FDA filing
- In-house expert on mathematical modeling of processes and statistical designs

- Sr. Associate Process Engineer, Nestle Nutrition, PTC Fremont, MI** Jan. 2010-Mar. 2013
- Responsible for pilot aseptic line and aseptic filler validation, a \$10M project to investigate the viability of commercialization of baby food products
 - Led the filing of products with FDA and got approval for novel aseptic processing technology
 - Worked as a process engineer on developing and implementing new processing technologies including aseptic processing. Also worked on mathematical modeling of processes and statistical designs.
 - Developed HACCP plan for novel pilot aseptic system
 - Worked with team in designing hygienic guidelines for the aseptic system

- Statistical Consulting Center, MSU, East Lansing, MI** 2009-2010
- Worked as a statistical consultant for faculty and graduate students at Michigan State University
 - Provided statistical experimental design for conducting research experiments
 - Assisted with data analysis and statistical inferences for the project

INTERNSHIP & PROFESSIONAL DEVELOPMENT

- Co-Op, Nestle Nutrition, PTC Fremont, MI** Aug. 2008-Jul. 2009
- Worked in New Science and Technology department on the aseptic processing; determination of thermophysical and rheological properties that can be used in the mathematical modeling of aseptic processing. Worked on the biological validation of product that is processed aseptically.

- Co-Op, Campbell Soup Company, Camden, NJ** Jul. 2007- Dec. 2007
- Worked as process engineer on: aseptic processing of soup with particulates, and determination of its physical properties for process filing; continuous blending of beverages (V8, splash, and V8 fusion); new business development for premium soups; and biological validation studies for new aseptic filler. Worked on flow meters to ensure accurate and consistent delivery of ingredients.

Graduate Research Assistant, Michigan State University May 2005-Dec. 2009
Kinetic parameter estimation for the degradation of nutraceutical compounds in low-moisture and high-temperature processed foods. Used inverse problems to estimate thermal properties at elevated temperatures.

HACCP Certification Course at Michigan State University Oct. 2006
Successfully completed a one-week short course program in Food Safety - HACCP

Research and Extension Activities

Assistant professor at Department of Food Science, Purdue University with 8 years of professional experience in complex global food companies. My expertise is in the development and validation of traditional thermal, aseptic and novel processes to ensure product safety and quality. Extensive experience in research and manufacturing environments for experiment design, inverse problems and parameter estimation, bench development, pilot, commercialization and team leadership. Particular strength in retort, hot-fill, aseptic system, mathematical modeling, system design and installation for various packaging and

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manufacturing processes and also serves as a Process Authority and provide FDA filings for food manufacturers.

Extension Activities

1. **Aseptic Workshop**
Director for the internationally recognized aseptic workshop that is organized annually at West Lafayette campus
2. **Better Process Control School**
Director for the BPCS workshop and helps the food industry professional in getting certified to work at food manufacturing facilities
3. **FDA Workshop**
Director for the training of FDA inspectors. A 4-year grant was received in 2019 to train the inspectors
4. **Validation Workshop**
Director for the validation workshop geared towards food industry for new manufacturing installations or re-validation of old manufacturing lines
5. **New Entrepreneurs**
Due to growing demand in information related to commercializing food products, my lab assists food entrepreneurs to help them understand the basics of food manufacturing and commercialization

Research Activities

1. **Biological and mathematical validation techniques for novel thermal processing**
Development of mathematical model of processes and establishment of validation methodologies for novel and challenging processes to remove barriers to commercialization
2. **Degradation kinetics of nutrients and microorganisms during thermal processing**
Kinetics of nutrients and microorganisms in dynamic processes
3. **Thermal and viscous properties of food materials at elevated temperatures**
Smart sensors for food processing applications to monitor product behavior during processing
4. **Process modeling and parameter estimation**
Inverse problems for parameter estimation in food processing and packaging systems

PEER REVIEWED PUBLICATIONS

1. Muramatsu, Y., Dolan, K.D., Mishra, D.K., 2019. Factors influencing estimation of thermal inactivation parameters in low-moisture foods using a test cell. *Journal of Food Engineering* 262, 100-108.
2. Samsudin, H., Auras, R., Mishra, D., Dolan, K., Burgess, G., Rubino, M., Selke, S., Soto-Valdez, H., 2018. Migration of antioxidants from polylactic acid films: a parameter estimation approach and an overview of the current mass transfer models. *Food Research International* 103, 515-528.
3. Muramatsu, Y., Greiby, I., Mishra, D.K., Dolan, K.D., 2017. Rapid Inverse Method to Measure Thermal Diffusivity of Low-Moisture Foods. *Journal of Food Science* 82(2), 420-428.
4. Mishra, D.K., Dolan, K.D., Beck, J.V., Ozadali, F., 2017. Use of Scaled Sensitivity Coefficient Relations for Intrinsic Verification of Numerical Codes and Parameter Estimation for Heat Conduction. *Journal of Verification, Validation and Uncertainty Quantification* 2(3), 031005.

5. Greiby, I., Mishra, D.K., Dolan, K.D., Siddiq, M., 2017. Inverse method to estimate anthocyanin degradation kinetic parameters in cherry pomace during non-isothermal heating. *Journal of Food Engineering* 198, 54-62.
6. Mishra, D.K., Dolan, K.D., Beck, J.V., Ozadali, F., 2016. A novel instrument for rapid measurement of temperature-dependent thermal properties of conduction-heated food up to 140 °C. *Journal of Food Engineering* 191, 19-27.
7. Cattani, F., Dolan, K., Oliveira, S., Mishra, D., Ferreira, C., Periago, P., Aznar, A., Fernandez, P., Valdramidis, V., 2016. One-step global parameter estimation of kinetic inactivation parameters for *Bacillus sporothermodurans* spores under static and dynamic thermal processes. *Food Research International* 89, 614-619.
8. Greiby, I., Mishra, D.K., Dolan, K.D., 2014. Inverse method to sequentially estimate temperature-dependent thermal conductivity of cherry pomace during nonisothermal heating. *Journal of Food Engineering* 127, 16-23.
9. Sulaiman, R., Dolan, K.D., Mishra, D.K., 2013. Simultaneous and sequential estimation of kinetic parameters in a starch viscosity model. *Journal of Food Engineering* 114(3), 313-322.
10. Dolan, K.D., Mishra, D.K., 2013. Parameter Estimation in Food Science. *Annual review of food science and technology* 4, 401-422.
11. Dolan, K., Valdramidis, V., Mishra, D., 2013. Parameter estimation for dynamic microbial inactivation: which model, which precision? *Food Control* 29(2), 401-408.
12. Mishra, D., Dolan, K., Yang, L., 2011. Bootstrap confidence intervals for the kinetic parameters of degradation of anthocyanins in grape pomace. *Journal of Food Process Engineering* 34(4), 1220-1233.
13. Mishra, D., Dolan, K., Yang, L., 2008. Confidence intervals for modeling anthocyanin retention in grape pomace during nonisothermal heating. *Journal of Food Science* 73(1), E9-E15.

BOOK CHAPTERS

1. Anderson, N., Benyathiar, P., Mishra, D.K., 2019. *Aseptic Processing*. Food Process Engineering. Springer.
2. Dolan, K., Habtegebriel, H., Valdramidis, V., Mishra, D., (2015). Thermal processing and kinetic modeling of inactivation. In: Fryer SBKJ, editor. *Modeling Food Processing Operations*. Woodhead Publishing, pp. 37-66.
3. Matella, N.J., Mishra, D.K., Dolan, K.D., 2012. Hydration, blanching, and thermal processing of dry beans. In: *Dry Beans and Pulses Production, Processing and Nutrition* (eds: M. Siddiq, M. A. Uebersax), pp. 129-154. Wiley-Blackwell, Ames, Iowa.
4. Ahmed, J., Dolan, K., Mishra, D., 2012. Chemical reaction kinetics pertaining to foods. In: *Handbook of Food Process Design* (Eds: J. Ahmed, M.S. Rehman), pp. 113-165. Wiley-Blackwell, Ames, Iowa.
5. Dolan, K. D., Mishra, D. K. 2012. Parameter identification under dynamic temperature conditions in inactivation kinetics. In: *Progress on Quantitative Approaches of Thermal Food Processing* (Eds: V. P. Valdramidis, J. F. Van Impe). pp. 165-207. Nova Science Publishers, New York, NY.
6. Mishra, D.K., Sinha, N.K., Hui, Y., 2010. Principles of Vegetable Canning. *Handbook of Vegetables and Vegetable Processing*, 243-258.

PATENTS

1. Mishra D. K., Ozadali F., Benyathiar P., Muniandy A. (2018). Innovative technology for shelf life prediction of food and beverages.
2. Mishra, D. K., Ozadali, F., Bruce M. A., Fernanda S. M. (2017). Innovative Rapid Cooling Technology for Thermally Processed Food
3. Ozadali, F., Mishra, D.K., Sulaiman, R., (2017). Mixer sensors and methods for using same. US Patent 9,612,184.
4. Mishra, D.K., Dolan, K.D., Beck, J.V., Ozadali, F., 2016. A novel instrument for rapid measurement of temperature-dependent thermal properties of conduction-heated food up to 140° C. *Journal of Food Engineering* 191, 19-27.
5. Brannan, M.R., Chappell, R.L., Dzikowicz, A.E., Mann, J.E., Mishra, D.K., Peterson, S.D., Sarachman, M.J., (2016). Systems and methods for manufacturing multi-compartment products containing wet and dry components. US Patent 9,434,527.
6. Chappell, R.L., Dzikowicz, A.E., Mann, J.E., Mishra, D.K., Peterson, S.D., Sarachman, M.J., (2013). Multi-compartment products containing wet and dry food components. US Patent App. 13/733,564.

INVITED TALKS

1. Mishra, D.K. 2019. Advancing Food manufacturing. Process Authority Benchmarking, West Lafayette, IN.
2. Mishra, D.K. 2019. Aseptic design (piping/ valves/ engineering) with respect to regulations and guidance. IFTPS, San Antonio, TX, Feb. 26-28, 2019.
3. Mishra, D.K. 2018. Future directions of IFTPS, IFTPS meeting, Chicago
4. Mishra, D.K. 2018. Utilization of modeling tools for aseptic process optimization. Aseptipak, Dallas, TX.
5. Mishra, D.K. 2018. Application of temperature variable thermal properties in food industry. IFTPS, San Antonio, TX.
6. Mishra, D.K. 2018. Filing considerations for low acid particulate aseptic products. Aseptipak, Queretaro, Mexico.
7. Mishra, D.K. 2017. Filing considerations for low acid particulate aseptic products. Aseptipak, Queretaro, Mexico, Feb. 7-8 2018.
8. Mishra, D.K. 2017. Use of Process Modeling and Microbiological Validation in Food Manufacturing. Presented at the Kasetsart University invited seminar to Department of Food Science and Technology. Bangkok, Thailand. Nov 6, 2017.
9. Mishra, D.K. 2017. Filing considerations for low acid particulate aseptic products. Aseptipak, Itasca, Illinois, June 20-21 2017.
10. Mishra, D.K. 2017. Applications of temperature variable thermal properties in food industry. IFTPS, San Antonio, TX, March 2017.
11. Mishra, D.K. 2017. Importance of a Product Development Course. IFT, Las Vegas, June 25-28 2017.

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12. Mishra, D.K. 2016. Parameter Estimation and Predictive Modeling in Dynamic Food Processes. FS 684 Seminar Class, Department of Food Science, Purdue University.
13. Dolan, K.D., Mishra, D.K., Valdramidis, V. 2016. Predictive modeling under dynamic conditions in food processing environments. *European Society for Modelling and Simulation, Ghent, Belgium.*
14. Mishra, D.K. 2014. "Food safety: How to address shelf stable and perishable foods?". Michigan Environmental Health Association (MEHA), Big Rapids, MI.
15. Mishra, D.K. 2013. Keynote presentation, "A novel instrument for rapid estimation of temperature-dependent thermal properties up to 140°C". Inverse Problems Symposium (IPS), Huntsville, AL.
16. Mishra, D.K. 2013. "Inverse problems and parameter estimation as it applies to modeling". Institute of Thermal Processing Specialists (IFTPS), San Antonio, TX.
17. Mishra, D.K. 2012. "Why validate controls for aseptic systems?". Institute of Thermal Processing Specialists (IFTPS), San Antonio, TX.
18. Dolan, K.D., Valdramidis, V., Mishra, D.K. 2011. Parameter estimation for dynamic microbial inactivation; which model, which precision? *The 7th Intl. Conf. on Predictive Modelling of Food Quality and Safety, Dublin, Ireland.*

PAPERS/POSTER PRESENTATIONS FOR LEARNED PROFESSIONAL ORGANIZATIONS AND SOCIETIES

1. Muniandy A., San Martin F., Ozadali F., Mishra D.K. 2019. Temperature-Dependent Thermal Properties Increases the Accuracy of thermal Process Simulation. February 2019. Industrial Associates Meeting. Purdue University, West Lafayette, IN.
2. Mehta, H., Varney, M., Dolan, K.D., Beck, J.V., Mishra, D.K., 2019. Impact of Complementary Experiments on the Measurement and Accuracy of Dynamic Thermal Properties. IFT Annual Meeting, New Orleans, LA.
3. Cantarero, F., Mishra, D.K., Ozadali, F., 2019. Minimizing Food Loss in Aseptic Food Manufacturing by Using a Non-Intrusive Continuous Sensor (NICS). IFT Annual Meeting, New Orleans, LA.
4. Cruz, J., Mishra, D.K., Ozadali, F., 2019. Innovative Design Enhancements for Cooling Heat Exchangers in Continuous Flow Food Manufacturing Systems. IFT Annual Meeting, New Orleans, LA.
5. Muniandy A., San Martin F., Ozadali F., Mishra D.K. 2019. Temperature-Dependent Thermal Properties Increases the Accuracy of Thermal Process Simulation. IFT Annual Meeting, New Orleans, LA.
6. Mehta, H., Mishra, D.K., Beck, J.V., 2019. Impact of complementary transient experiments on measurement and accuracy of dynamic thermal properties. Inverse Problems Symposium (IPS), West Lafayette, IN.
7. Cantarero, F., Mishra, D.K., 2019. Inverse estimation of the thermal conductivity of food products in aseptic processes. Inverse Problems Symposium (IPS), West Lafayette, IN.
8. Muniandy, A. San Martin-Gonzalez, M.F., Ozadali, F., Mishra, D.K., 2019. Improving the accuracy of thermal process simulation using temperature- dependent thermal properties. Inverse Problems Symposium (IPS), West Lafayette, IN.

9. Chapa, J., Mishra, D.K., Coronel, P., Simunovic, J., 2017. Simplification of the Validation of Aseptic Processing of Multiphase Particulate Foods through the use of Conservative Simulated Particles. IFT Annual Meeting, Chicago, IL.
10. Samsudin H, Auras R, Dolan KD, Mishra DK, Soto-Valdez H. 2015. Comparison between Two and Three-Parameter Models to Describe a Migration Study. Inverse Problems Symposium. East Lansing, USA.
11. Samsudin H, Auras R, Dolan KD, Mishra DK, Soto-Valdez H. 2014. Application of parameter estimation to predict migration in antioxidant films. Shelf Life International Meeting. New Jersey, USA.
12. Mishra DK, Dolan KD. 2014. Estimation of microbial kinetic parameters under dynamic thermal processes targeting on the inactivation of *Bacillus sporothermodurans* spores. International Conference on Inverse Problems in Engineering. Cracow, Poland.
13. Marzola A, deMonte F, Mishra DK. 2014. An efficient technique for computing sensitivity coefficients of solid materials for thermal property measurements. International Conference on Inverse Problems in Engineering. Cracow, Poland.
14. Greiby I, Dolan KD, Mishra DK. 2014. Inverse methods to estimate anthocyanin degradation kinetic parameters in cherry pomace during non-isothermal heating. International Conference on Advances in Business and Economics. Istanbul, Turkey.
15. Dolan KD, Gumudavelli V, Mishra DK, Subbiah J, Thippareddi H, Velugoti PR, G F. 2014. Inverse method to estimate microbial growth parameters under dynamic temperature conditions for *Salmonella Enteritidis* in egg yolk. International Conference on Inverse Problems in Engineering. Cracow, Poland.
16. Mishra DK. 2013. A rapid testing instrument to estimate thermal properties of food materials at elevated temperatures during Nonisothermal heating. [Ph.D.]: Michigan State University, USA.
17. Dolan KD, Mishra DK. 2013. A user-friendly software interface for parameter estimation in the food industry. Inverse Problems Symposium (IPS). Alabama, USA.
18. Mishra DK, Dolan KD, Beck JV. 2012. Sequential estimation of kinetic parameters for nutraceutical degradation using the Arrhenius model. Conference of Food Engineering (CoFE). Virginia, USA.
19. Greiby I, Mishra DK, Dolan KD. 2012. Estimation of thermal properties and anthocyanin retention in cherry pomace at different moisture contents during non-isothermal heating. Inverse Problems Symposium (IPS) East Lansing, MI, USA.
20. Dolan KD, Valdramidis VP, Mishra DK. 2012. Parameter estimation for dynamic microbial estimation: which model, which precision? . Inverse Problems Symposium (IPS). East Lansing, MI, USA.
21. Dolan KD, Valdramidis VP, Mishra DK. 2012. Towards the modeling of sublethal/adaptive microbial responses under dynamic conditions. Institute of Food Technologists Annual Meeting (IFT). Las Vegas, NV, USA.
22. Greiby I, Mishra DK, Dolan KD, Siddiq M. 2011. Estimation of temperature-dependent thermal diffusivity and anthocyanin retention in cherry pomace during nonisothermal heating. Institute of Food Technologists Annual Meeting (IFT). New Orleans, FL, USA.
23. Greiby I, Mishra DK, Dolan KD. 2011. Sequential estimation of temperature-dependent thermal diffusivity in cherry pomace during non-isothermal heating. Comsol Users Conference Boston, USA.

24. Dolan KD, Valdramidis VP, Mishra DK. 2011. Parameter estimation for dynamic microbial estimation: which model, which precision? International Committee of Predictive Modeling in Food (ICPMF). Dublin, Ireland.
25. Mishra DK, Dolan KD, Benyathiar P, Harte B. 2010. Sequential estimation of parameters in the Gompertz microbial growth model. Institute of Food Technologists Annual Meeting (IFT). Chicago, IL, USA.
26. Mishra DK, Dolan KD. 2010. Sequential estimation of microbial inactivation Arrhenius parameters for non-isotherm heating processes. Inverse Problems Symposium (IPS). East Lansing, MI, USA.
27. Mishra DK, Dolan KD, Yang L. 2009. Multi-parameter estimation and parameter confidence regions for degradation of anthocyanins in grape pomace. Graduate Academic Conference (GAC). East Lansing, MI, USA.
28. Mishra DK, Dolan KD, Beck JV. 2009. Sequential estimation of kinetic parameters for nutraceutical degradation using the Arrhenius model. Conference of Food Engineering (CoFE). Ohio, USA.
29. Mishra DK, Dolan KD, Beck JV. 2009. Modeling microbial growth in fresh asparagus packed in modified atmosphere packaging and vacuum skin packaging microwaveable trays. Inverse Problems Symposium (IPS). East Lansing, MI, USA.
30. Mishra DK, Dolan KD, Beck JV. 2009. Sequential estimation of kinetic parameters for nutraceutical degradation using the Arrhenius model. Inverse Problems Symposium (IPS). East Lansing, MI, USA.
31. Mishra DK, Dolan KD, Beck JV. 2009. Optimal experimental design to estimate thermal degradation kinetic parameters for nutraceuticals in intermediate-moisture foods. American Society of Agricultural and Biological Engineers (ASABE). Reno, NV, USA.
32. Breen P, Mishra DK, Dolan KD. 2009. Estimation of thermal diffusivity of cherry pomace at high temperatures. Institute of Food Technologists Annual Meeting (IFT). Anaheim, CA, USA.
33. Tanojo A, Mishra DK, Dolan KD. 2008. Modeling thermal degradation of encapsulated food-grade β -carotene in wheat flour. Institute of Food Technologists Annual Meeting. New Orleans, FL, USA.
34. Mishra DK, Dolan KD, Benyathiar P, Harte B. 2008. Modeling microbial growth in fresh asparagus packed in modified atmosphere packaging and vacuum skin packaging microwaveable trays. International Association of Packaging Research Institutes (IAPRI) World Conference on Packaging. Bangkok, Thailand.
35. Mishra DK, Dolan KD. 2008. Kinetic parameter estimation for degradation of anthocyanins in grape pomace. International Short Course "Food Processing, Packaging, and Value-addition" MI, USA.
36. Bornhorst G, Mishra DK, Dolan KD. 2008. Quantifying thermal degradation of anthocyanins in black bean flour (*Phaseolus vulgaris* L.). Institute of Food Technologists Annual Meeting. New Orleans, FL, USA.
37. Mishra DK, Dolan KD, Yang L. 2007. Bootstrap confidence intervals for kinetic degradation of anthocyanins in grape pomace. Inverse Problems Symposium. East Lansing, MI, USA.
38. Mishra DK, Dolan KD, Yang L. 2007. Bootstrap confidence interval for the kinetic parameters for degradation of anthocyanins in grape pomace. Institute of Food Technologists Annual Meeting. Chicago, IL, USA.

39. Mishra DK, Dolan KD, Yang L. 2006. Estimation of kinetic parameters for degradation of anthocyanins in grape pomace. Institute of Food Technologists Annual Meeting. Orlando, FL, USA.
40. Mishra DK, Dolan KD. 2006. Use of comsol to estimate the thermal properties and kinetic parameters for the degradation of anthocyanins in grape pomace. Comsol Users Conference Boston, USA.

ORAL PRESENTATIONS (*Presenter)

1. *Sawale, M., Mishra, D.K., 2019. Validation of pre-production and packaging material sterilization of aseptic fillers. Process Expo, Chicago, IL.
2. *Sawale, M., Mishra, D.K., 2019. Microbiological Validation of aseptic fillers. International Society of Beverage Technologists (ISBT), Charlotte, NC.
3. *Mehta, H., Varney, M., Dolan, K.D., Beck, J.V., Mishra, D.K., 2019. Impact of Complementary Experiments on the Measurement and Accuracy of Dynamic Thermal Properties. IFT Annual Meeting, New Orleans, LA.
4. Huang, J., Campanella, O., Corvalan, C., *Mishra, D.K., Carroll, N., 2019. Innovative Green Clean-in-Place Technology with Micro-bubbles. IFT Annual Meeting, New Orleans, LA.
5. *Mishra, D.K., 2019. Welcome introduction to participants of IPS conference. Inverse Problems Symposium (IPS), West Lafayette, IN.
6. *Mehta, H., Mishra, D.K., Beck, J.V., 2019. Impact of complementary transient experiments on measurement and accuracy of dynamic thermal properties. Inverse Problems Symposium (IPS), West Lafayette, IN.
7. *Muniandy, A. Benyathiar, P., Ozadali, F., Mishra, D.K., 2019. Inverse problems approach for shelf life prediction of food and beverage. Inverse Problems Symposium (IPS), West Lafayette, IN.
8. *Mehta, H., Beck, J.V., Mishra, D.K., 2019. Impact of complementary transient experiments on measurement and accuracy of dynamic thermal properties. Inverse Problems Symposium (IPS), West Lafayette, IN.
9. *Muniandy A., Mishra D.K. 2019. Application of Temperature-Dependent Thermal Properties for Product Development in the Food Industry. March 2019. 6th Agricultural and Biological Engineering Industrial Research Symposium. Purdue University, West Lafayette, IN.
10. *Mehta H., Varney M., Beck J. V., Mishra D.K. 2018. Estimation of Thermal Diffusivity of Heaters for Food Processing Applications using Inverse Method. IPS, East Lansing, MI.
11. *Chapa J., Mehta H., Mishra D.K. 2018. Inverse Estimation of Fluid to Particle Heat Transfer Coefficient in Aseptic Processing. IPS, East Lansing, MI.
12. *Mishra D.K., Mehta H. 2018. Dynamic temperature experiments using a pressurized device for microbial inactivation. CoFE, Minneapolis, MN.
13. *Beck, J.V., Mishra, D.K., Dolan, K.D., 2017. Utilization of Generalized Transient Heat Conduction Solutions in Parameter Estimation. Inverse Problems Symposium (IPS), Canada.
14. *Mishra D.K., Dolan K.D., Beck J. V., Ozadali F. 2017. Kinetics of ascorbic acid degradation in aseptic and conventional thermal processing of sweet potato puree. Shelf Life International Meeting (SLIM). Bangkok, Thailand. Nov 1-3, 2017.
15. *Benyathiar P., Selke S., Auras R., Harte B., Mishra D.K. 2017. Effect of irradiation sterilization on polylactic acid film during storage. Shelf Life International Meeting (SLIM). Bangkok, Thailand. Nov 1-3, 2017.

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16. *Beck JV., Mishra DK, Dolan KD. 2017. Utilization of Generalized Transient Heat Conduction Solutions in Parameter Estimation. Inverse Problems Symposium (IPS).
17. *Dolan KD, Mishra DK, Valdramidis VP. 2016. Predictive Modeling Under Dynamic Conditions in Food Processing Environments. FOODSIM'2016, April 3-7, 2016, Catholic University Leuven, Ghent, Belgium.
18. *Samsudin, H., Auras, R., Dolan, K. D., Mishra, D. 2015. Assessing the kinetics of a migration study by estimating a two or three-parameter models. Inverse Problems Symposium, East Lansing, MI.
19. *Dolan, K.D., Gumudavelli V., Mishra D.K., Subbiah J., Thippareddi H., Velugoti P.R., Froning G. 2014. Inverse method to estimate microbial growth parameters under dynamic temperature conditions for Salmonella Enteritidis in egg yolk. Intl. Conf. on Inverse Problems in Engineering, Cracow, Poland.
20. *Dolan, K.D., Cattani F., Mishra D., Oliveira S.D., Ferreira C.A.S., Periago P.M., Aznar A., Fernandez P.S., Valdramidis V.P. 2014. Estimation of microbial kinetic parameters under dynamic thermal processes targeting on the inactivation of Bacillus sporothermodurans spores. Intl. Conf. on Inverse Problems in Engineering, Cracow, Poland.
21. *Mishra, D.K., Dolan, K.D. 2013. Use of scaled sensitivity coefficient relations for intrinsic verification of numerical codes and parameter estimation. Inverse Problems Symposium, Huntsville, AL.
22. *Mishra, D.K., Dolan, K.D. 2013. A Novel Instrument for Rapid Estimation of Temperature-Dependent Thermal Properties up to 140°C. *Inverse Problems Symposium, Huntsville, AL.*
23. Greiby, I., *Dolan, K.D., Mishra, D.K. 2013. Inverse Method to estimate anthocyanin degradation kinetic parameters in cherry pomace during non-isothermal heating. *Inverse Problems Symposium, Huntsville, AL.*
24. *Dolan, K.D., Mishra, D., Valdramidis, V. 2013. A decision support tool for multi-quality forward and inverse commercial food problem. *Intl. Conf. on Predictive Modelling in Food, Paris, France.*
25. *Dolan, K.D., Mishra, D.K. 2011. Estimation of Salmonella inactivation nonisothermal kinetic parameters. *Intl. Conf. on Inverse Problems in Engineering, Orlando, FL.*
26. *Mishra, D.K., Dolan, K.D., Yang, L. 2008. Multi-parameter estimation and parameter confidence regions for degradation of anthocyanins in grape pomace. IFT Annual Meeting, New Orleans.
27. *Mishra DK, Dolan KD, Yang L. 2008. Thermal and kinetic parameter estimation and sensitivity analysis for the degradation of anthocyanins in grape pomace. American Institute of Chemical Engineers (AIChE). Chicago, IL, USA
28. *Dolan, K.D. Mishra, D.K., Yang, L. 2007. Nonlinear method to estimate thermal kinetic parameters for degradation of anthocyanins in grape pomace. Inverse Problems Symposium, East Lansing, MI.

GRANTS**1. Agency: FDA**

Title: Training and Pilot Processing Laboratory Services for Food Processing Technology

Duration of Funding: 09/24/2018 - 09/23/2022

Total amount of award: \$686,674

Role: PI

2. Agency: Ingenieria Procesos Termicos QTech

Title: Low Acid aseptic processing of banana puree

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- Duration of Funding:** 10/15/2018 - 02/14/2019
Total amount of award: \$10,000
Role: PI
3. **Agency: FDA**
Title: Training and Pilot Processing Laboratory Services for Food Processing Technology
Duration of Funding: 09/24/2017 - 09/23/2018
Total amount of award: \$122,447
Role: PI
4. **Agency: FDA**
Title: Training and Pilot Processing Laboratory Services for Food Processing Technology
Duration of Funding: 09/24/2016 - 09/23/2017
Total amount of award: \$119,485
Role: PI
5. **Agency: Purdue Research Foundation**
Title: An innovative technology for shelf life prediction of food and beverages
Duration of Funding: 05/10/2018 - 09/14/2020
Total amount of award: \$30,144.00
Role: PI
6. **Agency: Mead Johnson Nutritionals**
Title: Computational Fluid Dynamic Simulation of a horizontal tank with agitator
Duration of Funding: 08/09/2018 - 11/30/2018
Total amount of award: \$7,200
Role: PI
7. **Agency: NSF STTR**
Title: A Device for Rapid Estimation of Temperature Dependent Thermal Properties for Food Processing Systems
Duration of Funding: 07/01/2017 - 09/30/2018
Total amount of award: \$225,000.00
Role: Co-PI
If Co-PI, for how much of the total funding are you directly responsible for: \$81,169.00
8. **Agency: USDA NIFA**
Title: Innovative Green Clean-in-Place Technology with Micro-bubbles
Duration of Funding: 03/15/2018 - 03/14/2021
Total amount of award: \$892,000.54
Role: Co-PI
If Co-PI, for how much of the total funding are you directly responsible for: \$181,739.00
9. **Agency: Nestle Nutrition**
Title: Nutritional Values of Food Materials and Predictive Modeling of Degradation During Thermal Processing
Duration of Funding: 01/10/2010-12/31/2013
Total amount of award: \$135,000
Role: Written and proposed by D. Mishra, PI; Kirk Dolan, Michigan State University

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10. Agency: Agency: MSU Research Foundation

Title: A Rapid Instrument for Thermal Property Measurement

Duration of Funding: None

Total amount of award: \$27,000

Role: Co-PI

Unrestricted Gifts**1. Agency: Heartland Food Products Group**

Duration of Funding: none

Total amount of award: \$17,500.00

Role: PI

2. Agency: Heartland Food Products Group

Duration of Funding: none

Total amount of award: \$13,000.00

Role: PI

3. Agency: Amcor

Duration of Funding: none

Total amount of award: \$9,400.00

Role: PI

4. Agency: AmeriQual Group LLC.

Duration of Funding: none

Total amount of award: \$15,500.00

Role: PI

5. Agency: Mead Johnson Nutritionals

Title: Donation of HPLC system

Duration of Funding: none

Total amount of award: \$137,926.46

Role: PI

6. Agency: Yakibou Inc.

Title: Donation of anaerobic chamber

Duration of Funding: none

Total amount of award: \$3000.00

Role: PI

EDITORIAL BOARD

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2. Journal of Food Engineering
3. Food Control
4. Mathematical Modelling and Applications

Professional Awards and Honors

- 2013 Fitch H. Beach award for outstanding graduate research, Michigan State University
- 2013 Outstanding BAE research fellowship, Michigan State University
- 2012 Institute of Thermal Processing Specialists (IFTPS) PhD scholarship, IFT Feeding Tomorrow program
- 2010 Diversity scholarship, Great Lakes Section of Institute of Food Technologists
- 2009 Diversity scholarship, Great Lakes Section of Institute of Food Technologists
- 2009 NASA MUST (Motivating Undergraduates in Science and Technology) program
- 2008 AE endowment fellowship, Michigan State University
- 2008 Ph.D. achievement award, Institute of Food Technologist-Great Lakes Section
- 2007 Bill and Rita Stout scholarship, Michigan State university
- 2006 Merle and Catherine Esmay scholarship, Michigan State University
- 2004 Gold Medalist award, Tamil Nadu Agricultural University, India
- 2004 Best Student award, Tamil Nadu Agricultural University, India

ORGANIZATIONS AND AFILIATIONS

- The Institute of Food Technologist (IFT), 2005 - present
- Institute of Thermal Processing Specialists, 2008 - present
- American Institute of Chemical Engineers, 2009
- International Association of Packaging Research Institutes (IAPRI), 2008

TEACHING EXPERIENCE

- Fall 2019 – present: FS 442 – Food Processing II (3 credits)
- Spring 2017 – present: FS 535 – Aseptic Processing and Packaging (1 credits)
- Fall 2017 – present: FS 161 – Science of Food (3 credits) – guest speaker
- Spring 2017 - 2019: FS 443 – Capstone Senior Design (3 credits)
- 2010-2015: Aseptic processing lecture for better process control school (BPCS), Michigan State University
- 2006 – 2008: Retort lab for food engineering: fluids, Michigan State University (guest speaker)
- 2006 – 2007: Retort lab and dehydration for food processing: fruits and vegetables (guest speaker)
- 2010 – 2012: Assisted with course development of modeling methods in biosystems engineering, Michigan State University