

Josip Simunovic. Ph.D. – Research Professor of Food Science, North Carolina State University (NCSU)

Education: B.S. Food Technology, Josip Juraj Strossmayer University in Osijek (Croatia) 1978.
M.S. Food Science and Human Nutrition, University of Florida, Gainesville (USA) 1983.
Ph.D. Food Science, North Carolina State University, Raleigh, NC (USA) 1998.

Professional Experience:

1984-1988 Researcher, Faculty of Food Technology, JJS University in Osijek, Croatia

1989-1990 Project Manager, IQ Integrated Information Systems – IPK Osijek, Croatia

1990-1992 Associate Director, IQ Integrated Information Systems – IPK Osijek, Croatia

1992-1998 Graduate Research Assistant, Department of Food Science, North Carolina State University, Raleigh, NC, USA

1998-2001 Postdoctoral Research Associate, Department of Food Science, North Carolina State University, Raleigh, NC, USA

2001-2008 Senior Researcher, Department of Food Science, North Carolina State University, Raleigh, NC, USA

2016-2012 Co-Founder and President, UltrAseptics, Inc. Raleigh, NC, USA

2008 – 2014 Research Associate Professor, Department of Food, Bioprocessing and Nutrition Sciences, North Carolina State University, Raleigh, NC, USA

2012-2016 Co-Founder and Chief Science Officer, Aseptia Inc, Raleigh, NC, USA

2014-Present Research Professor, Department of Food, Bioprocessing and Nutrition Sciences, North Carolina State University, Raleigh, NC, USA

2016-Present Co-Founder and Chief Science Officer, SinnovaTek Inc. Raleigh, NC, USA

2018-Present Co-Founder and Science Advisor, SinnoVita Inc. Raleigh, NC, USA

2019-Present Co-Founder and Chief Science Officer, First Wave Innovations Inc. Raleigh, NC, USA

Research Interests: Continuous flow thermal sterilization, advanced thermal processing, microwave-assisted processing, particle flow monitoring and process validation in multiphase/particulate aseptic processing, temperature and lethality measurement and validation, advanced continuous flow cooling, microwave-assisted continuous flow extraction, acoustically enhanced continuous flow extraction

Honors and Awards:

Fulbright Scholar 1981-1983, University of Florida

Phi Kappa Phi Honor Society, 1983,

Gamma Sigma Delta The Honor Society of Agriculture, 1983,

Phi Tau Sigma, The Honor Society for Food Science, 2000,

Kenneth R. Keller Award for Excellence in Research, 1999

NCSU Inventors Award, 2000, 2001, 2003, 2004, 2005, 2007, 2008, 2012, 2014, 2015, 2018

NSF 2007, 2009, 2011, 2013, 2015, 2016 Compendium of Industry-Nominated IU/CRC Technology Breakthroughs: Continuous Flow Microwave Processing

2008. American Society of Agricultural and Biological Engineers - FPSA Foundation: Food Engineering Award

2009. IFT Food Technology Industrial Achievement Award – Continuous Flow Microwave Sterilization of Low Acid Foods (Team Leader)

2010. USDA / ARS Award for Superior Efforts in Technology Transfer

2012. Institute for Thermal Processing Specialists: Marvin Tung Award for Outstanding Achievement in Preservation and Packaging of Foods

2012. North Carolina State University: Innovator of the Year Award

2014. North Carolina State University: Chancellor's Innovation Fund Award

2014. Inc. Magazine 500 Fastest Growing Private Companies: #15 Aseptia (Co-Founder and CSO)

2015. Edison Innovation Award – Gold: AseptiWave Microwave-Assisted Aseptic Processing (Inventor and Co-Founder) P

2015. IFT Food Technology Industrial Achievement Award – NCSU FBNS & Aseptia (Team Leader)

2015. IFT Food Expo Innovation Award: AseptiWave Microwave-Assisted Aseptic Processing Systems

2015. Inc. Magazine 500 Fastest Growing Private Companies: #20 Aseptia (Co-Founder and CSO)

2015. World Beverage Innovation Awards: Best Manufacturing or Processing Innovation, Finalist: AseptiWave, Aseptia

2016. Edison Innovation Award - Silver: AseptiSense Integrated Particle Flow Monitoring and Validation (Inventor and Co-Founder)

2016. IFT Research and Development Award

2018. IFT Start Up of the Year – Finalist – SinnoVita (Co-Founder)

2019. Elected IFT Fellow

2020. Global Health and Pharma Biotechnology Awards: Best Aseptic Vegetable Puree Facility - Yamco LLC – licensed commercial user of continuous flow microwave sterilization technology

2021. United States Small Business Administration: Tibbetts Award – SinnovaTek Inc.

Synergistic Activities:

46 registered inventions

Inventor of 19 issued and 5 pending U.S. patents and over 40 issued international patents

Licensed and commercialized inventions and patents, providing protected intellectual property for 7 new resulting start-up businesses

9 new advanced food, beverage and biomaterials processing plants in operation and under construction based on licensed inventions and commercialized technologies: Yamco LLC, Wright Foods/Ameriqua Aseptic, North Carolina Dairy, Covington LLC, SinnovaTek Inc., SinnoVita Inc., Ripe Revival, Panacea Nutrition, First Wave Innovations

Over 80 FDA letters of no objections/no questions for processes and products based on invented, developed and commercialized technologies and process and product safety validation protocols

More than 300 new products introduced to the industrial and consumer marketplace in the U.S., Europe, Australia and Africa, ranging from software applications, sensors and instruments, to process equipment to integrated processing and process validation systems to new food products with improved nutritional and sensory characteristics to new food ingredients with

Publications 2015-2021:

Submitted for Publication:

I. Ćorković, A. Pichler, J. Šimunović, M. Kopjar: Hydrogels: characteristics and application as delivery systems of phenolic and aroma compounds. *Foods*

M. Kopjar, I. Buljeta, I. Ćorković, V. Kelemen, J. Šimunović, Anita Pichler: Plant-based proteins as efficient encapsulating materials for glucosyl-hesperidin. *International Journal of Food Science and Technology*

M. Kopjar, I. Buljeta, I. Ivić, M. Nosić, A. Pichler, J. Šimunović: Apple fiber and disaccharides as an encapsulation material of phenolics and volatiles of blackberry juice. *Carbohydrate Polymers Technologies and Applications*

I. Ćorković, A. Pichler, I. Buljeta, J. Šimunović, M. Kopjar: Carboxymethylcellulose hydrogels: efficient delivery systems of tart cherry anthocyanins. *Current Plant Biology*

Accepted for Publication:

George N.Stoforos, Farzad Rezaei, Josip Simunovic, K.P.Sandeep 2021. Enhancement of continuous flow cooling using hydrophobic surface treatment, *Journal of Food Engineering*, Volume 300, July 2021, 110524

Published:

Vukoja, J., I. Buljeta, I. Ivić, J. Šimunović, A. Pichler, and M. Kopjar. "Disaccharide Type Affected Phenolic and Volatile Compounds of Citrus Fiber-Blackberry Cream Fillings. *Foods* 2021, 10, 243." (2021).

Vukoja, J., I. Buljeta, A. Pichler, J. Šimunović, and M. Kopjar. "Formulation and Stability of Cellulose-Based Delivery Systems of Raspberry Phenolics. *Processes* 2021, 9, 90." (2021).

Kelemen, Vanja, Anita Pichler, Ivana Ivić, Ivana Buljeta, Josip Šimunović, and Mirela Kopjar. "Brown rice proteins as delivery system of phenolic and volatile compounds of raspberry juice." *International Journal of Food Science & Technology* (2021).

Vukoja, Josipa, Ivana Buljeta, Anita Pichler, Josip Šimunović, and Mirela Kopjar. "Formulation and Stability of Cellulose-Based Delivery Systems of Raspberry Phenolics." *Processes* 9, no. 1 (2021): 90.

Simunovic, Josip and Druga, Michael 2020. Continuous Flow Microwave Processing of Foods and Beverages: From 1 to 100 liters per Minute and Back in 25 Years. In: *Proceedings of the 54th Annual Microwave Power Symposium (IMPI 54)*, International Microwave Power Institute, June 15-17, 2020, Page 11-13

Bhatia Trisha, Simunovic Josip and K.P. Sandeep 2020. Microwave-Assisted Extraction (MAE) of Anthocyanins from Different Genotypes of Purple Fleshed Sweet Potatoes (PFSP) In: *Proceedings of the 54th Annual Microwave Power Symposium (IMPI 54)*, International Microwave Power Institute, June 15-17, 2020, Page 20-22

Kopjar, Mirela, Ivana Ivić, Josipa Vukoja, Josip Šimunović, and Anita Pichler. "Retention of linalool and eugenol in hydrogels." *International Journal of Food Science & Technology* 55, no. 4 (2020): 1416-1425.

Vukoja, Josipa, Anita Pichler, Ivana Ivić, Josip Šimunović, and Mirela Kopjar. "Cellulose as a delivery system of raspberry juice volatiles and their stability." *Molecules* 25, no. 11 (2020): 2624.

Kelemen, Vanja, Anita Pichler, Josip Šimunović, and Mirela Kopjar 2019.. "Antioxidant activity of protein/glucosyl-hesperidin complexes." In *Book of Abstracts of the 12th International scientific and professional conference With Food to Health*, p. 61.

Nosić, Mario, Anita Pichler, Josip Šimunović, and Mirela Kopjar. 2019. "The influence of carbohydrates on adsorption of blackberry phenolics on apple fibers." In *Book of Abstracts of the 12th International scientific and professional conference With Food to Health*, p. 62.

Vukoja, Josipa, Anita Pichler, Josip Šimunović, and Mirela Kopjar. 2019. "Apple fibers as delivery system of chokeberry phenolics." In *Book of Abstracts of the 12th International scientific and professional conference With Food to Health*, p. 63.

Vukoja, Josipa, Anita Pichler, Ivana Ivić, Josip Šimunović, and Mirela Kopjar. 2019. "Cellulose as carrier of tart cherry phenolics and volatiles." In *Book of Abstracts of the 8th International Symposium on "Delivery of Functionality in Complex Food Systems"*, p. 118.

M. Kemal, N. Yavuz, T.K. Palazoglu, J. Simunovic 2019. Thermal Processing Of Food Products Using a Modular 2450 Mhz Continuous Microwave System, In: *Proceedings of ICAFOP 2019. 3rd International Conference on Agriculture, Food, Veterinary and Pharmacy Sciences, Trabzon, Turkey, 16-18 April 2019. Pages 645-653.*

A. Truong, Y. Thor, G. Harris, J. Simunovic & V. Truong 2019. Acid Inhibition on Polyphenol Oxidase and Peroxidase in Processing of Anthocyanin-Rich Juice and Co-product Recovery from Purple-Fleshed Sweetpotatoes, *JOURNAL OF FOOD SCIENCE*, 84(7), 1730–1736.

G. Stoforos & J. Simunovic 2017. Computer-aided design and experimental testing of continuous flow cooling of viscous foods, *JOURNAL OF FOOD PROCESS ENGINEERING*, 41(8).

Kelemen, Vanja, Anita Pichler, Josip Šimunović, and Mirela Kopjar. 2017."Complexation of brown rice and milk proteins with Raspberry phenolics." In *Book of Abstracts of the 8th International Symposium on "Delivery of Functionality in Complex Food Systems"* p. 57.

Pichler, Anita, Ivana Ivić, Josip Šimunović, and Mirela Kopjar. 2017. "Volatile compounds profile of microwave treated tart cherry purees with addition of sugars during storage." In *Book of Abstracts of the 8th International Symposium on "Delivery of Functionality in Complex Food Systems"*, p 159.

J. Diaz, I. Perez-Diaz, J. Simunovic & K. Sandeep 2016. Winterization strategies for bulk storage of cucumber pickles. *Journal of Food Engineering*, 212, 12–17.

G. Stoforos, B. Farkas & J. Simunovic 2015. Thermal mixing via acoustic vibration during continuous flow cooling of viscous food products, *Food and Bioproducts Processing: Transactions of the Institution of Chemical Engineers, Part C.*, 100, 551–559.

J. Caldwell, I. Perez-Diaz, K. Sandeep, J. Simunovic, K. Harris, J. Osborne, H. Hassan 2015. Mitochondrial DNA fragmentation as a molecular tool to monitor thermal processing of plant-derived, low-acid foods, and biomaterials, *Journal of Food Science*, 80(8), M1804–1814.

J. Caldwell, I. Perez-Diaz, K. Harris, H. Hassan, J. Simunovic & K. Sandeep 2015. Mitochondrial DNA fragmentation to monitor processing parameters in high acid, plant-derived foods, *Journal of Food Science*, 80(12), M2892–2898.

Issued US Patents 2015-2020:

United States Patent 9,332,781 Simunovic; Josip (Raleigh, NC), Drozd; James Michael (Raleigh, NC) 2016. Method for processing biomaterials

United States Patent 9,404,952 Druga; Michael (Raleigh, NC), Duff; John Alan (Holly Springs, NC), Simunovic; Josip (Raleigh, NC) 2016. Conductivity measurement of fluids

United States Patent 9,615,593 Simunovic; Josip (Raleigh, NC), Swartzel; Kenneth R. (Raleigh, NC), Truong; Van-Den (Raleigh, NC), Cartwright; Gary Dean (Apex, NC), Sandeep; Kandiyani Puthalath (Cary, NC), Parrott; David L. (Raleigh, NC), Coronel; Pablo (Cary, NC) 2017. Methods and apparatuses for thermal treatment of foods and other biomaterials, and products obtained thereby

United States Patent 9,713,340 Drozd; James Michael (Raleigh, NC), Simunovic; Josip (Raleigh, NC) 2017. Electromagnetic system

United States Patent 10,359,319 Simunovic; Josip (Raleigh, NC), Coronel; Pablo Marcelo (Apex, NC) 2019. Method for design and control of properties of simulated food particles for process monitoring and validation of aseptically processed multiphase foods and biomaterials

United States Patent 10,390,550 Simunovic; Josip (Raleigh, NC), Drozd; James Michael (Raleigh, NC) 2019. Method for processing biomaterials

United States Patent 10,502,637 Simunovic; Josip (Raleigh, NC), Coronel; Pablo Marcelo (Apex, NC) 2019. Method for design and control of properties of simulated food particles for process monitoring and validation of aseptically processed multiphase foods and biomaterials

Published US Patent Applications 2015-2021:

United States Patent Application 20160153022 Simunovic; Josip; (Raleigh, NC) ; Coronel; Pablo Marcelo; (Apex, NC), 2016. INDIVIDUALLY TRACEABLE MULTI-FUNCTIONAL CARRIER PARTICLES FOR VALIDATION OF CONTINUOUS FLOW THERMAL PROCESSING OF PARTICLE-CONTAINING FOODS AND BIOMATERIALS

United States Patent Application 20160153883 Simunovic; Josip; (Raleigh, NC) ; Coronel; Pablo Marcelo; (Apex, NC), 2016. METHOD FOR DESIGN AND CONTROL OF PROPERTIES OF SIMULATED FOOD PARTICLES FOR PROCESS MONITORING AND VALIDATION OF ASEPTICALLY PROCESSED MULTIPHASE FOODS AND BIOMATERIALS

United States Patent Application 20160165909 Simunovic; Josip; (Raleigh, US) ; Swartzel; Kenneth R.; (Raleigh, US) ; Truong; Van-Den; (Raleigh, US) ; Cartwright; Gary Dean; (Apex, US) ; Sandeep; Kandiyani Puthalath; (Cary, US) ; Parrott; David L.; (Raleigh, US) ; Coronel; Pablo; (Cary, NC), 2016 METHODS AND APPARATUSES FOR THERMAL TREATMENT OF FOODS AND OTHER BIOMATERIALS, AND PRODUCTS OBTAINED THEREBY

United States Patent Application 20160324195 Simunovic; Josip; (Raleigh, NC) ; Drozd; James Michael; (Raleigh, NC) 2016. METHOD FOR PROCESSING BIOMATERIALS

United States Patent Application 20160377568 Druga; Michael; (Raleigh, NC) ; Duff; John Alan; (Holly Springs, NC) ; Simunovic; Josip; (Raleigh, NC) 2016. Conductivity Measurement of Fluids

United States Patent Application 20170196244 Simunovic; Josip; (Raleigh, US) 2017. MODULAR DEVICES AND SYSTEMS FOR CONTINUOUS FLOW THERMAL PROCESSING USING MICROWAVES

United States Patent Application 20170273324 Simunovic; Josip; (Raleigh, NC) ; Swartzel; Kenneth R.; (Raleigh, NC) ; Truong; Van-Den; (Raleigh, NC) ; Cartwright; Gary Dean; (Apex, NC) ; Sandeep; Kandiyar Puthalath; (Cary, NC) ; Parrott; David L.; (Raleigh, NC) ; Coronel; Pablo; (Apex, NC) 2017. METHODS AND APPARATUSES FOR THERMAL TREATMENT OF FOODS AND OTHER BIOMATERIALS, AND PRODUCTS OBTAINED THEREBY

United States Patent Application 20190316971 Simunovic; Josip; (Raleigh, NC) ; Coronel; Pablo Marcelo; (Apex, NC) 2019. METHOD FOR DESIGN AND CONTROL OF PROPERTIES OF SIMULATED FOOD PARTICLES FOR PROCESS MONITORING AND VALIDATION OF ASEPTICALLY PROCESSED MULTIPHASE FOODS AND BIOMATERIALS

United States Patent Application 20190373926 DRUGA; Michael; (Raleigh, NC) ; VARGOCHIK; Amanda; (Raleigh, NC) ; SIMUNOVIC; Josip; (Raleigh, NC) 2019. SYSTEM AND METHOD FOR CONTINUOUS MICROWAVE-ASSISTED EXTRACTION OF BIOACTIVE AGENTS FROM BIOMASS

United States Patent Application 20200029611 Lila; Mary Ann; (Kannapolis, NC) ; Simunovic; Josip; (Raleigh, NC) ; Druga; Michael; (Raleigh, NC) ; Vargochik; Amanda; (Raleigh, NC) 2020. POLYPHENOL-PROTEIN COMPOSITIONS AND METHODS OF MAKING

United States Patent Application 20210000143 Druga; Michael; (Raleigh, NC) ; Simunovic; Josip; (Raleigh, NC) ; Kenner; Thomas; (Raleigh, NC) ; Giunta; Steven; (Raleigh, NC) 2021. SYSTEM AND METHOD FOR CONTINUOUS THERMAL TREATMENT OF A FLOWABLE PRODUCT