

BIOTECNOLOGÍA

Grupo de Investigación de Enfoque Estratégico:
Tecnologías Emergentes y Nutrición Molecular

Líder del Grupo de Enfoque: Jorge Welti Chanes
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Escuela a la que pertenece:
Escuela de Ingeniería y Ciencias

OBJETIVO

Dar a conocer resultados de investigación, proyectos, publicación de libros y artículos científicos, avances de tesis, así como las oportunidades de colaboración entre colegas y de vinculación con la industria.

AGENDA DE ACTIVIDADES (12:30 hrs. a 13:30 hrs.)

Todos los integrantes del grupo estarán presentes durante toda la sesión interactuando con los asistentes (estudiantes, colegas, industriales) presentando su trabajo en carteles y/o prototipos

Dr. Jorge Welti Chanes. Earned his degree in biochemical engineering (1976) and Master of Science in Food Engineering (1978) at Tecnológico de Monterrey (ITESM, Mexico). Later, he moved to Spain to perform his doctoral studies in chemistry, in the area of food technology, obtaining his degree at the University of Valencia. He was the National Director of Graduate Studies at School of Engineering and Sciences at Tecnológico de Monterrey. He is also a professor and researcher in the areas of biotechnology and food at the same institution. He started his academic activity in 1976 as a university professor of Tecnológico de Monterrey; additionally, he has been a full-professor at the National Polytechnic Institute (IPN, Mexico) and the University of the Americas-Puebla, Mexico (UDLA). He has an experience of 39 years as a professor and researcher, 20 of which were spent in combination with the development of administration work in education, science and technology. In the UDLA, he was teaching in the departments of chemistry, biology, chemical engineering and food; in the latter, he was responsible of their leadership for a year, and subsequently he became Dean of the School of Engineering (1986–1988). From January 1989 to June 2002, he was an Academic Vice Chancellor at UDLA. He has published 16 books, has over 200 scientific publications in refereed journals and books, and has given more than 250 presentations at international meetings. He is associate editor of the Journal Food Engineering Reviews and Journal of Food Science and participates as a member of the editorial boards of Journal of Food Engineering and Current Opinion in Food Science. In May 2011, he received the Life Achievement Award by the International Association for Engineering and Food (IAEF), for his career as a researcher and academic worldwide, and in January 2014, the Rómulo Garza Award from the Tecnológico de Monterrey for the impact of their research work and as recognition for being one of the most productive researchers in the life of Tecnológico de Monterrey. He has been the president of ISOPOW and IAEF, IFT Fellow, IUFOST Fellow and is the currently president of the

International Society of Food Engineering (ISFE). He is the founder of four companies related to the development of products and processes in the pharmaceutical and food areas.

Dra. Adriana Pacheco. Obtained her bachelor's degree in forestry from the Technological Institute of Costa Rica (Cartago, Costa Rica) in 1999. In 2001, she obtained a M.Sc. degree in biology at the University of Costa Rica (San José, Costa Rica), and in 2006, she completed her doctoral studies in environmental engineering sciences at the University of Florida (Gainesville, FL, USA), where she worked in bioremediation of chlorinated compounds by methanotrophic bacteria. In the latter, she did a one-year postdoctoral position at the Department of Microbiology and Cell Sciences (University of Florida), working with coenzyme biosynthesis in methanogenic archaea and methylotrophic bacteria. In January 2008, Adriana Pacheco joined the Department of Biotechnology and Food Engineering at Tecnológico de Monterrey (Monterrey campus) as an assistant professor. As a full-time research professor, Dr. Pacheco has conducted research in CO₂ capture by microalgae as a promising mitigation strategy for greenhouse gases. Her research group possesses a collection of environmental microalgae that have been acclimated to high CO₂ atmospheres and it is now studying their transcriptome to elucidate their adaptation strategy. She also works in metagenomic characterization of microbial consortia of environmental interest as for biogas production and plant-microbe beneficial interactions. Currently, she is conducting a three-year project on microbial inoculation of important agricultural cultivars of the Northeast Mexico, to develop inoculants that promote plant growth for a sustainable agriculture. She has been advisor of nine master's and three doctoral theses at Tecnológico de Monterrey, and has participated as referee in more than 20 thesis projects. In 2014, she was promoted to associate research professor. Dr. Pacheco is a member of the National Researchers Council of Mexico, currently as SNI Level 1.

Dr. Alejandro J. Álvarez Guerra. Obtained his bachelor's degree in chemical engineering from Tecnológico de Monterrey in 1989. He worked for 15 years at the chemical process industry. From 2005 to 2008, he worked as research assistant in the Particle Technology and Crystallization Center at Illinois Institute of Technology. During 2008 he participated as a visiting scientist at MIT-Novartis Center for Continuous Manufacturing at Massachusetts Institute of Technology. In 2009 he obtained a Ph.D. from Illinois Institute of Technology. From 2009 to 2010 he worked as a post-doctoral research associate at the Center for the Molecular Study of Soft Condensed Matter at IIT. In 2010, Alejandro Álvarez joined the Department of Chemical Engineering at Tecnológico de Monterrey (Monterrey campus), as a full time faculty member. He has served as chair of the undergraduate programs in Chemical Engineering, as well as chair of the Department of Chemical Engineering at Tecnológico de Monterrey. Dr. Álvarez is member of the Emerging Technologies and Molecular Nutrition Group, while conducting research in the area of bioprocess and chemical process intensification, crystal engineering with small organic molecules, and biopolymers for drug delivery applications. His recent work has included the topics of cell immobilization, crystallization, synthesis of smart polymers, green solvents applications, and integrated reaction/separation processes. He has supervised 8 graduate school theses at Tecnológico de Monterrey. In 2016 he was promoted to associate professor, and in that same year he was recognized with the National Award for Inspirational Teachers at Tecnológico de Monterrey. Dr. Álvarez belongs to the National Researchers Council, currently as Level 1.

Dra. Aurora Valdez Fragoso. Received her bachelor's degree in food engineering from Universidad Autónoma de Chihuahua (UACH), and her Master in Sciences in Food Engineering from Universidad de las Américas-Puebla, Mexico. She obtained her doctorate from the L'École Nationale Supérieure des Industries Agricoles et Alimentaires in France. Dr. Valdez Fragoso served at several public universities in Mexico before joining the School of Engineering and Sciences's staff of Tecnológico de Monterrey in 2010. Dr. Valdez Fragoso has been involved in educational, research, and science diffusion activities for more than 20 years. Dr. Valdez Fragoso has taught courses in food chemistry, technology of fruits and vegetables, selected topics of biotechnology, food product development and food packaging. She is a faculty member at the Biotechnology Graduate Program at Tecnológico de Monterrey. Her focus of research include food properties, food processing, biochemistry of foods and emerging technologies. Her areas of research also include minimal processing of food matrix by emerging technologies; biopolymers and active compound extraction from fruit wastes for biodegradable film preparations. Dr. Valdez Fragoso was recognized in 2005 and 2008 with the Award in Science and Technology in Chihuahua, as well as with an honorable mention in the XXXII National Prize in Food Science and Technology in 2008, the XXXIII National Award in Science and Food Technology in the student category in 2009 and one of the Projects Transforming Mexico in 2018. Dr. Valdez Fragoso has conducted research stays at the Dipartimento di Scienze degli Alimenti (DISA) of the Università di Bologna (Unibo) in Italy, and at the Division of Mechatronics, Biostatistics and Sensors (MeBioS) of the Katholieke Universiteit Leuven (KUL) in Belgium. Dr. Valdez Fragoso is an active member of the professional organizations AMIDIQ, ISEKI- Food Association, and the National System of Researchers (Level 1).

Dra. Carmen Hernández-Brenes. Received her Ph.D. in food science from the University of Arkansas, working on projects focused on flavor and nutritional properties of plant-based foods supported by FritoLay Inc. and Gerber Products Company. She also obtained the degrees of M.S in food science and technology from Texas A&M University, and a B.S in food engineering from Tecnológico de Monterrey, Campus Monterrey, Mexico. She holds distinctions as a level 2 scientist from the Mexican National Research System (SNI), certified food scientists (CFS) from the Institute of Food Technologists (IFT), and is also a qualified lead instructor for the Preventive Controls for Human Foods Course (FDA-FSMA requirement). Her current affiliation is with Tecnológico de Monterrey, Campus Monterrey, where she is a full professor and a researcher at the Department of Bioengineering. She teaches undergraduate courses on Sensory Evaluation, Nutrigenomics and Food Safety, and directs the research of graduate students in the field of food metabolomics and health. Her current research focuses on the development and application of emerging processing technologies to improve the safety, nutritional stability and flavor of processed foods. Her research group uses novel chemical analytical techniques, sensory evaluation and modeling tools to improve the processing and shelf-life stability of foods. One of her parallel research line involves the development of technologies to obtain natural and commercially viable alternatives to synthetic food additives. Her active projects involve the development of avocado lipids for applications in the food, pharmaceutical and cosmetic industries. Dr. Hernández-Brenes' research group holds original research articles published in prestigious peer review journals, more than 7 granted international patent applications, and has pending patent applications in various countries.

Dr. Daniel Guajardo Flores. Obtained his bachelor's degrees in law from Universidad Autónoma de Nuevo León, and in chemical engineering from Tecnológico de Monterrey, both in 2007. At the same time, he worked at NEORIS Consulting Services in the IT Department for the strategic planning and implementation of “travel expenses” tool. In 2010, he obtained a M.Sc. degree with a specialization in biotechnology from Tecnológico de Monterrey in Mexico, a diploma of Intellectual Property from Instituto Mexicano de la Propiedad Industrial (IMPI), and worked as an international business manager in Corporación Sierra Madre, S.A. de C. V. Later, he obtained the doctorate in engineering sciences from Tecnológico de Monterrey in Mexico, in 2012. He is currently finishing his MBA with specialization in international business at Universidad Regiomontana, in Mexico. In 2013, Dr. Guajardo-Flores joined the Department of Biotechnology and Food Engineering of Tecnológico de Monterrey, Campus Monterrey, where he worked as a postdoctoral research assistant at the NutriOmics Research Group. During 2014, he participated as a postdoctoral scientist at the Richardson Center for Functional Foods and Nutraceuticals in Manitoba University, in Canada. In addition, from 2015 until 2017, he participated as a postdoctoral scientist at Instituto de Investigación en Ciencias de la Alimentación CIAL in Universidad Autónoma de Madrid, and Food Technology Department in Universidad Politécnica de Valencia, both in Spain. He belongs to the National Researchers Council, currently as a level candidate. Since 2018, Dr. Guajardo-Flores has been a full-time research professor attached to Emerging Technologies Group, conducting research in the area of design of processes implementing green technologies for the extraction and purification of active ingredients and other compounds through supercritical fluids, ultrasound, enzyme hydrolysis and chromatography. He has recently worked with food, cosmetic and pharmaceutical industries to obtain metabolites as high-value active ingredients from agricultural and industrial waste. He has been working on the downstream processing of different bioproducts, such as nutraceuticals, topic creams, nanofibers and vegetables flour with phenolic, terpenes, peptides and proteins at different scales from lab to pilot plant processes. He is currently conducting joint masters and doctoral theses in Tecnológico de Monterrey with international universities, like Purdue University and Tecnológico de Costa Rica.

Dr. Hafiz Muhammad Nasir Iqbal. Full-time Research Professor at Tecnológico de Monterrey, Mexico. He completed his M.Sc. (2008) & M.Phil. (2010) degrees, both in biochemistry at the University of Agriculture Faisalabad, Pakistan. In 2011 he received the Cavendish Research Scholarship to study a Ph.D. at the University of Westminster, London, UK. He accomplished his doctoral degree in Biomedical Sciences with specialization in Applied Biotechnology & Materials Science in 2015, with a thesis centered on the development of biocomposites with novel characteristics through enzymatic grafting. Dr. Iqbal had guest edited a couple of special issues and served as an Editorial Board member for different peer-reviewed journals. He is also a member of Reviewer Panel for Research Proposals for The Research Council of Oman and Ministry of Education and Science, Almaty, Republic of Kazakhstan. Dr. Iqbal has published more than 115 scientific contributions in the form of research, reviews, book chapters, and editorial and scientific articles in various areas of science & engineering. Dr. Iqbal has an H-index = 19 along with more than 1200 citations. Dr. Iqbal has a collaborative network with national and international institutes/universities across the globe. His research interests include biomaterials with novel characteristics for bio- and non-bio sectors, antimicrobial, biocompatible and biodegradable bio-composites for bio-sectors, enzymatic grafting: composites development and characterisation,

biomedical applications of pristine and grafted materials, particularly infection-free wound healing, bio-catalysis: enzyme kinetics, purification, characterisation, immobilisation, and industrial applications of enzymes, biomaterials for bioenergy, fermentation process development, production of enzymes, and other industrial products using agro-industrial wastes and byproducts, liquid and solid waste management – (re)-valorisation of agro-industrial wastes and by-products, and bioremediation of textile dyes and effluents and other hazardous emerging pollutants.

Dra. Luz María Martínez. Graduated, with honors, from Tecnológico de Monterrey with a B.Sc. degree in chemistry; she earned her Ph.D. in chemistry from Arizona State University (ASU). Dr. Martinez has worked in the glass industry, in the development of analytical techniques to measure and control physical and chemical properties of colored glasses. During her Ph.D. at ASU she studied structural relaxation in the glass transformation range under the supervision of Dr. C. Austen Angell. Taking advantage of her experience in amorphous materials, she has developed a research line to help solving one of the biggest problems of pharmaceutical industry, which is the low solubility of most drugs administered orally, both commercially available and candidates under development. Nowadays, 70% to 90% of oral drug present low solubility and the preparation of stable active pharmaceutical ingredients in the amorphous state seems to be the most promising strategy to solve this worldwide problem. In collaboration with her research group, Dr. Martínez has prepared and characterized novel co-amorphous drug binary systems with enhanced thermal stability and solubility; her group has also recently developed a novel method of preparation of nano and microemulsions for preparation of pharmaceutical formulations, which is a very important contribution in this area. Dr. Martinez is a member of the board of CONAECQ (National Council of Education and Professional Practice of Chemical Sciences AC) and belongs to the National System of Researchers (SNI I). She has received several awards for her leadership in educational and scientific projects: national recognition as Inspiring Professor (ITESM-2016); recognition as an example of experience of institutional values (ITESM-2016), recognition for being a Distinguished Novus Professor (distinction for profile as an innovator in education). In 2015, she was promoted to Full Research Professor; she received the MUJER-TEC-2013 Award (for her work as advisor and mentor). Awarded with the 1st place for Scientific Integration in Technology Development (Vitocrisa VITRO S.A.1991).

Dra. Marion Brunck. Has a joint Bachelor of Science degree from the CERAM Sophia-Antipolis, France, and The University of Queensland in Australia, where she majored in immunology and microbiology. She joined the lab of Prof. Ian Frazer, Australian of the year 2006 and inventor of the vaccine against cervical-cancer-causing human papillomaviruses (HPV), Gardasil. Marion studied adaptive immunity requirements to the E6 and E7 HPV oncoproteins in a mouse model and graduated with Class I Honours, which allowed her to immediately integrate the Ph.D. graduate program of the Australian Institute for Bioengineering and Nanotechnology at The University of Queensland, working on the production in vitro of neutrophils from hematopoietic stem cells under the supervision of Prof. Lars Nielsen. After graduating in 2015, Marion worked as a post-doctoral fellow on pharmaceutical mobilization of hematopoietic stem cell, in the laboratory of A/Prof. Jean-Pierre Levesque, at the Translational Research Institute in Brisbane, Australia, and later spent a year as a research professor at the Universidad de Guanajuato, Guanajuato, Mexico, before joining Tecnológico de Monterrey in early 2017. Marion is opening her research line at the Centro de Biotecnología of the Tecnológico de Monterrey (Monterrey campus), in collaboration

with the Centro de Innovación y Transferencia en Salud, focusing on the use of synthetic biology to create innovative cell therapies for the treatment of hematological malignancies, and the characterization of these therapies in animal models. This translational research is supported by the fundamental investigation of mechanisms of hematopoietic stem cell mobilization into the blood, expansion, and differentiation into mature cells, such as neutrophils. In addition, Marion recently opened her research interest to include the study of human microbiomes, especially adult intestinal (gut), breastmilk, and the development of neonatal intestinal microbiota, and how these contribute in health and disease. Marion has already supervised the thesis of a master's student and is currently supervising undergraduate theses. Projects in her laboratory are open to final-year undergraduate and post-graduate students.

Dra. Rocío Díaz de la Garza. Obtained her bachelor's degree in chemical engineering in 1998 from Madero Technological Institute. Her master's degree in Biotechnology was achieved in 2001 at Universidad Autónoma de Chihuahua, and graduated in 2006 as Philosophy Doctor in the Plant Molecular and Cellular Biology Graduate Program at University of Florida, where she received the prestigious IFAS Award of Excellence for Graduate Research-Ph.D 2006. In 2007 Rocío Díaz joined the Department of Biotechnology and Food Engineering of Tecnológico de Monterrey (Monterrey campus) as assistant professor. In 2013, she was promoted to associate professor. Tecnológico de Monterrey has recognized her molecular research with the 2nd place of the Rómulo Garza Award for Research in Sciences 2010; technology, engineering and her overall work with vitamins also has been recognized as a "Transforming Projects in Mexico" (2017). Dr. Díaz work specialize on folate metabolism in plants to generate knowledge that contributes to design strategies for increasing vitamin contents in plant foods through metabolic engineering and post-harvest handling. In addition, her group studies the metabolism of functional lipids in avocado fruit to characterize their biosynthesis from scratch. Dr. Díaz group uses classical molecular biology and analytical tools for biochemistry studies and pairs them with high-throughput technologies (-omics) to know how plants make and maintain vitamin pools. The ultimate goal of her research is to contribute to a better human nutrition through the generation of knowledge that allows the increment and stabilization of vitamins and active metabolites in plant foods. Current and future projects: Role of folates in nitrogen fixation. Functional genomics for nutrition and improvement of agronomic yields, Genome Wide Association Studies (GWAS) of folates in common bean, Metabolic pathway reconstruction in avocado fruit. Lipidomics & synthetic biology of bioactive lipids, Ethylene and folate metabolic crosstalk in climacteric fruits, Biofortification of common bean with folates and other vitamins.

Dr. Roberto Parra-Saldívar Obtained his bachelor's degree in biochemical engineering from Instituto Tecnológico de Morelia (1995), followed by a master in food science and technology from Universidad Autónoma de Querétaro (2000), and doctoral degree in biotechnology from Cranfield University, UK (2004). In 2005 he was contracted in a FP6 EU funded project (SOPHIED) as a postdoc at Westminster University, London, UK. From 2017 to 2018 he was a visiting professor at Massachusetts Institute of Technology, Harvard University and Brigham Women Hospital in Boston, USA. During his professional career, he worked as project manager at ECOLAB (2000), joint to Tecnológico de Monterrey, in 2009 at the Water Center, and later in 2014 he became part of the Biotechnology Center in the Emerging Technology Group. He is currently a member of the National Researchers Council SNI Level II, and he is a member of the Mexican Academy of Science.

Dr. Parra Saldívar has been working as a PI in more than 30 national and international projects. He published more than 70 research papers in indexed journals, H-factor 20 and more than 1,200 cites. In our group we work very closely with the industry in order to provide scientifically-based solutions, and we create innovation for increasing their competitiveness on an international level. We do it by developing projects along with the industries, adapting to their needs and applying the scientific knowledge we have been generating for years.

Dra. Zamantha Escobedo Avellaneda. Obtained her bachelor's degree in food engineering from Universidad Autónoma de San Luis Potosí in 2005. Later she got her master's degree in biochemical engineering from Tecnológico de Celaya in 2008 and her doctoral degree in engineering sciences with a specialty in biotechnology from Tecnológico de Monterrey (Monterrey campus) in 2012. During her Master's degree she worked with food drying and the determination of hygroscopic properties, and since her doctoral studies, she has been working with the application of nonthermal technologies. In 2012, just after finishing her doctoral studies, she was nominated Latin-American Student Representative of the Nonthermal Processing Division of the Institute of Food Technologies (IFT). In 2013, Dr. Escobedo-Avellaneda joined the Department of Biotechnology and Food Engineering at Tecnológico de Monterrey (Monterrey campus) as a postdoctoral researcher, and participated in five research stages in Spain, twice in the Marie Curie Actions-International Research Staff Exchange Program, working in AZTI Tecnalia. Since 2016, Dra. Zamantha joined to Tecnológico de Monterrey as a full time research professor attached to emerging technologies and molecular nutrition: food, pharmaceutical and bioproducts development research group. She has taught several courses at bachelor level, like Food Engineering, Bioprocess Engineering, Food Sciences Laboratory, and others. She works in different research lines; applying non-thermal technologies like high hydrostatic pressures, pulsed electric fields, and ultrasound to inactivate spoilage enzymes, favor the preservation, extraction, and the synthesis of functional compounds, facilitate the substrate-enzyme interactions, and the modification cellular structures. She has published 15 research papers and 4 book chapters. She has participated as co-advisor of four theses in a master's program of Tecnológico de Monterrey, and she is currently conducting 2 master's theses in the same program. She belongs to the National Research Council as Level 1 since January 2014.

Dra. Carolina Senés Guerrero. Hizo su doctorado en Biología en la Universidad Ludwig-Maximilians, Múnich, Alemania). Actualmente es miembro del Sistema Nacional de Investigadores (SNI) - Nivel Candidato. Realiza investigación en el área de ecología microbiana y bioinformática de datos ómicos y asesora tesis de alumnos de pregrado y posgrado (co-asesorado 2 tesis de pregrado de alumnos internacionales y externos, y 3 tesis de maestría). Ha apoyado en la gestión y elaboración de propuestas de investigación fondeadas.

Dr. Juan Ignacio Valiente Banuet. Es Ingeniero Agrónomo en Producción por el Instituto Tecnológico y de Estudios Superiores de Monterrey- Campus Monterrey. Realizó estudios de maestría y doctorado en la Universidad de Florida especializándose en horticultura e ingeniería agrícola. Actualmente se desempeña como Profesor-Investigador en el Departamento de Agrobiotecnología y Agronegocios y es profesor asociado al Centro del Agua para América Latina y el Caribe. Su línea de trabajo e investigación se ha centrado en la aplicación de nuevas tecnologías para la producción agrícola sustentable. Actualmente dicta cursos y desarrolla investigación en la

mejora del uso del agua de riego en agricultura mediante el uso de nuevas tecnologías de manejo y uso de sensores para la optimización del riego. Adicionalmente realiza trabajos de investigación para el uso de invernaderos en la agricultura y agricultura intensiva. En el Tecnológico de Monterrey el Dr. Valiente es titular de la Cátedra de Investigación: tecnologías de agricultura intensiva y ha sido reconocido por la SAGARPA como Líder Sectorial en el área de agricultura intensiva o de Alto Valor Comercial dentro del proyecto Agro-Prospecta.