



Nombre
Dr. Enrique Jaime
Herrera López

Adscripción
Centro de Investigación y
Asistencia en Tecnología y
Diseño del Estado de Jalisco,
A.C. (CIATEJ)

Puesto
Investigador Titular C

**Línea y sublínea de
investigación**
Biología Industrial
Bioelectrónica

Expediente CVU
224336

Nivel y área SNII
I
Ingenierías y Desarrollo
Tecnológico

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Semblanza

Ingeniero en Electrónica por la UNIVA, Maestro en Electrónica Industrial por el ITESO y Doctor en Ingeniería Eléctrica con especialidad en Control Automático por el CINVESTAV, GDL.

Desde 1997, labora en la Unidad de Biología Industrial del Centro de Investigación y Asistencia en Tecnología y Diseño del Estado de Jalisco A.C., (CIATEJ).

Está a cargo de la sublínea de investigación en Bioelectrónica y del Laboratorio para la Innovación en Bioelectrónica e Inteligencia Artificial



Enfocado al

- *Modelado matemático, instrumentación y control de bioprocesos*
- *Diseño de sensores no convencionales, sistemas SIA sensores enzimáticos at-line, espectroscopía NIR portátil*
- *Manufactura aditiva, micro-máquinado biorreactores*
- *Diseño aplicaciones móviles para el área Biológica.*
- *Análisis de datos vía Inteligencia Artificial*

Pertenece al Sistema Nacional de Investigadores desde 2009 y actualmente es Nivel I.

Ha dirigido proyectos de investigación de Ciencia Básica, Frontera, Infraestructura, Fomix regionales y con la iniciativa privada que le han permitido generar patentes, publicaciones y capítulos de libros en revistas internacionales y editoriales reconocidas. Ha formado recursos humanos a nivel licenciatura, maestría y doctorado.



Institución de adscripción	Centro de Investigación y Asistencia en Tecnología y Diseño del Estado de Jalisco, A.C. Unidad Zapopan
Datos postales	Camino Areno 1227, El Bajío, 45019, Zapopan, Jal. México
Línea y sublínea de investigación	Biología Industrial Bioelectrónica
Temas de interés en investigación	- Modelado matemático bioprocesos - Instrumentación, (bio)sensores y control de bioprocesos. - Diseño de sensores análisis de inyección secuencial, NIR portátil, quimiometría - Diseño aplicaciones móviles área Biotecnológica - Manufactura aditiva 3D y micro-máquinado para diseño de micro-biorreactores - Análisis de datos vía I.A., M.L., y D.L.
Áreas de la industria en que se relaciona o aplican los temas de investigación	- Instrumentación y automatización de procesos - Industria 4.0 - Diseño de aplicaciones móviles - Sistemas portátiles NIR, quimiometría - Sistemas robotizados de escaneo en fermentación - Microbiorreactores, micromáquinado - Cámaras de incubación cultivos vegetales
Cuerpos académicos	Posgrado Biología Industrial
Redes de colaboración	- IPICYT, Dr. Alejandro Ricardo Femat Flores - UMSNH, Dr. Juan Anzures Marín - USON, Dr. Nun Pitalúa Díaz

Formación académica	Doctorado en Ingeniería Eléctrica, especialidad en Control automático: Centro de Investigación y de Estudios Avanzados del I.P.N., unidad Guadalajara, CINVESTAV. Obtención del grado 27 de abril de 2007. Tesis: Sobre el problema de la observación y control de un modelo difuso para un proceso fermentativo conmutado. Maestría en Electrónica Industrial: Instituto de Estudios Superiores de Occidente, ITESO. Obtención del grado en septiembre de 1998. Tesis: Instrumentación y estimación de las concentraciones de biomasa y cantidades del pigmento Astaxantina, producido por la levadura <i>Phaffia rhodozyma</i> cultivado en un biorreactor, mediante redes neurales artificiales. Ingeniería Electrónica. Universidad del Valle de Atemajac, UNIVA. 1990-1993. Titulado en diciembre de 1996. Diplomado Programación Java. Instituto Tecnológico y de Estudios Superiores de Occidente, (ITESO). 2020-2021. Duración 120 h.
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	Cursos de especialización: - Machine Learning applied to Industry. Centre de perfectionnement, Université de Montréal. 22 a 25 de noviembre, 2022. - Microfluidics Professional Course. Centre for microfluidics systems, University of Toronto. 3 days workshop. 2018.
Experiencia profesional	Centro de Investigación y Asistencia en Tecnología y Diseño del Estado de Jalisco, A.C. (CIATEJ). - División de Biotecnología Industrial 1997 a la fecha
Proyectos de investigación	- Maduración tecnológica de un sistema de escaneo robotizado para monitorear y controlar un biorreactor multi-charolas de fermentación de medio sólido, proyecto 11008-2023. Convocatoria De la Ciencia al Mercado-Proyectos 2024-2025. - Diseño potencial de compuertas bioelectrónicas lógicas digitales enzimáticas mediante el modelado de biocatalizadores, proyecto 319269. Convocatoria Ciencia de Frontera, modalidad paradigmas y controversias de la Ciencia 2022. Vigencia 2022 – 2024. - Fortalecimiento de la sublínea en bioelectrónica a través del diseño de equipos de monitoreo y control del estado fisiológico de microorganismos con aplicación potencial en biomedicina y bioprocesos a nivel académico e industrial, proyecto 295458. Convocatoria Apoyo al fortalecimiento de la infraestructura científica y tecnológica. Vigencia 2018 - 2019. - Primer coloquio para la divulgación, investigación y fortalecimiento de la biología sintética y la bioelectrónica en la región occidente de México, proyecto 293271. Programa de apoyos para actividades científicas, tecnológicas y de innovación. Vigencia 2018. - Diseño de un biosensor enzimático para detectar el proceso de descomposición en leche, proyecto 189950. Convocatoria 2012-07 Fondo FOMIX del Estado de Jalisco. Vigencia 2013 - 2015. Estudio sobre estrategias para monitorear y controlar la selectividad y actividad de enzimas lipolíticas, proyecto 128894. Convocatoria de Investigación Científica Básica 2009. Vigencia 2010 - 2015. - Estrategias para monitorear la producción de lipasas y pectinasas por fermentación de estado sólido utilizando residuos agrícolas del Estado de Nayarit, proyecto 92071. Convocatoria 2008 CO2 Fondo Mixto CONACYT-Gobierno del Estado de Nayarit. Vigencia 2008 - 2010. - Monitoreo y control inteligente de la producción de la proteína recombinante ESAT-6 en un cultivo por lote alimentado: aproximación basada en métodos ópticos, 79987. Convocatoria de Investigación Científica Básica 2007. Vigencia 2008 – 2009.
Publicaciones relevantes	Libros 01- The Science of Tequila. Ed. Anne Gschaedler Mathis, Melchor Arellano Plaza, Manuel Kirchmayr, Enrique J. Herrera-López. Academic Press Elsevier. Capítulos de libro 04.- García-Arellano AG, Calderón-Soto LF, Pereyra-Laguna E, Amaya-Delgado L, Herrera-López EJ (2023) Sensors and model-based approaches applied for phospholipase activity detection. Phospholipases in Physiology and Pathology, 335-357. 03.- Láinez M, García-Béjar JA, Flores-Cosío G, Herrera-López EJ, Amaya-Delgado L (2022) Advances in fermentative systems for the production of ethanol from lignocellulosic biomass. In Innovations in Fermentation and Phytopharmaceutical Technologies (pp. 47-74). Elsevier.



- 02.- Sandoval G, Herrera-López EJ (2018) **Lipase, phospholipase, and esterase biosensors**. *Lipases and Phospholipases: Methods and Protocols*, 391-425.
- 01.- Herrera-López EJ (2012) **Lipase and phospholipase biosensors: a review**. *Lipases and Phospholipases: Methods and Protocols*, 525-543.

Artículos científicos

- 37.- Sergio Erick García-Barrón, Georgina González-Hemon, Enrique J. Herrera-López, Rosa Pilar Carmona-Escutia, Doris Arianna Leyva-Trinidad, Anne Gschaedler-Mathis. **Prediction of the consumption of a traditional fermented beverage via an expanded model of the theory of planned behaviour**. *British Food Journal*, aceptado.
- 36.- Sergio Erick García-Barón, Rosa Pilar Carmona-Escutia, Enrique J. Herrera-López, Doris Arianna Leyva-Trinidad, Anne Gschaedler-Mathis. **2025 Consumers' Drivers of Perception and Preference of Fermented Food Products and Beverages: A Systematic Review**. *Foods* 14,713.
- 35.- Ojeda-Castillo, V., Murillo-Tovar, M.A., Hernández-Mena, L., Saldarriaga-Noreña, H., Vargas-Amado, M.E., Herrera-López, E.J.; Díaz, J. 2025 **Tropospheric NO₂: Anthropogenic Influence, Global Trends, Satellite Data, and Machine Learning Application**. *Remote Sens.* 17, 49.
- 34.- Edwin J. Barbosa-Hernández, Jorge E. Pliego-Sandoval, Anne Gschaedler-Mathis, Javier Arrizon-Gaviño, Alejandro Arana-Sánchez, Ricardo Femat, Enrique J. Herrera-López. (2023). **Monitoring β -fructofuranosidase Activity by *Kluyveromyces marxianus* in Bioreactor Using a Lab-Made Sequential Analysis System**. *Fermentation*, 9, 963.
- 33.- P.M. Mondragón-Cortez, E.J. Herrera-López, E. Arriola-Guevara, G.M. Guatemala-Morales (2022) **Application of Fourier Transform Infrared Spectroscopy (FTIR) in combination with Attenuated Total Reflection (ATR) for rapid analysis of the tequila production process**. *Revista Mexicana de Ingeniería Química*. 21(3). Alim2806.
- 32.- Jaubert-Garibay, S, Hernández-Varela, JD, Chanona-Pérez, JJ, Cárdenas-Pérez, S, Herrera-López, EJ, Gutiérrez-López, GF (2022) **Assessing the product quality of mango slices treated with osmotic and microwave drying by means of image, microstructural, and multivariate analyses**. *Drying Technology*, 1-15.
- 31.- Claudia Alvarado, Diego M. Cortez-Valladolid, Enrique J. Herrera-López, Ximena Godínez, José Martín Ramírez. (2021). **Metal Bioaccumulation by Carp and Catfish Cultured in Lake Chapala, and Weekly Intake Assessment**. *Applied Sciences*, 11(6087):1-15.
- 30.- Alejandro Torres-Haro Alejandro Torres-Haro, Anne Gschaedler, Juan C. Mateos-Díaz, Enrique J. Herrera-López, Rosa M. Camacho-Ruiz, Melchor Arellano-Plaza. (2021). **Improvement of a specific culture medium based on industrial glucose for carotenoids production by *Xanthophyllomyces dendrorhous***, *Processes*, 9, 42930.
- 29.- EJ Herrera-López, N Pitalúa-Díaz, JE Pliego-Sandoval, R Femat, LE Velazquez-Contreras, NE Munigua-Vega, A González-Angeles (2021) **A control approach to regulate formaldehyde concentrations indoors a gross anatomy laboratory via a switched fuzzy logic system**. *Building and Environment*, 188
- 28.- G. Flores-Cosío, EJ Herrera-López, M Arellano-Plaza, A Gschaedler-Mathis, M Kirchmayr, L Amaya-Delgado (2020) **Application of dielectric spectroscopy to unravel the physiological state of microorganisms: current state, prospects and limits**. *Applied Microbiology and Biotechnology*, 104, 6101:6113.
- 27.- Misael Sebastián Gradilla-Hernández, Alejandro García-González, Anne Gschaedler, Enrique J. Herrera-López, Marisela González-Ávila, Ricardo García-Gamboa, Carlos Yebra Montes, Rita Q. Fuentes-Aguilar (2020) **Applying differential neural networks to characterize microbial interactions in an Ex vivo gastrointestinal gut simulator**. *Processes*, 8, 593: 1-28.
- 26.- Claudia Alvarado, Jose Martin Ramirez, Enrique J. Herrera-Lopez, Diego Cortez-Valladolid, Gerardo Ramirez (2019) **Bioaccumulation of heavy metals in cultured carp (*Cyprinus carpio*) from Lake Chapala, Mexico**. *Biological Trace Element Research*, 195: 226-283



- 25.- G. Flores-Cosío, E.J. Herrera-Lopez, M. Arellano-Plaza, A. Gschaedler-Mathis, A. Sánchez, L. Amaya-Delgado. (2019). **Dielectric property measurements as a method to determine the physiological state of *Kluyveromyces marxianus* and *Saccharomyces cerevisiae* with furan aldehydes.** Applied Microbiology and Biotechnology, 103(23-24): 9633-9642.
- 24.- Nun Pitalúa-Díaz, Fernando Arellano-Valmaña, Jose Antonio Ruz-Hernandez, Yasuhiro Matsumoto, Hussain Alazki, Enrique J. Herrera-López, Jesús Fernando Hinojosa-Palafox, A. García-Juárez and Enrique Fernando Velázquez-Contreras (2019) **An ANFIS based modeling comparison study for photovoltaic power at different geographical places in Mexico.** Energies, 12: 2662
- 23.- José Antonio Ruz-Hernández, Yasuhiro Matsumoto, Fernando Arellano-Valmaña, Nun Pitalúa-Díaz, Rafael Enrique Cabanillas-López, José Humberto Abril-García, Enrique J. Herrera-López and Enrique Fernando Velázquez-Contreras (2019) **Meteorological Variables' Influence on Electric Power Generation for Photovoltaic Systems Located at Different Geographical Zones in Mexico.** Applied Sciences, 9(8): 1649
- 22.- LF Calderón-Soto, EJ Herrera-López, G Lara-Cisneros, R Femat (2019) **On unified stability for a class of chemostat model with generic growth rate function: Maximum yield as control goal.** Journal of Process Control, 77: 61-75
- 21.- LJ Farias-Álvarez, A Gschaedler-Mathis, AF Sánchez-Ortiz, R Femat, J Cervantes-Martínez, M Arellano-Plaza, C. Zamora-Pedraza, E. Amillastre, G. Ghommidh, E.J. Herrera-López (2018) ***Xanthophyllomyces dendrorhous* physiological state determination using combined measurements from dielectric and Raman spectroscopies, a cell counter system and fluoresce flow cytometry.** Biochemical Engineering Journal, 136:1-8
- 20.- Z Escalante-García, J.H. Gómez-Angulo, G. Flores-Cosio, J. Arreola-Enriquez, E.J. Herrera-López, A. Gschaedler, L. Amaya-Delgado (2017) **Cloning, expression and hydrolytic characterization of the new xylanase NSI XYN11A from *Neurospora sitophila* BDJ11.** Revista Mexicana de Ingeniería Química. 16(2):385-397.
- 19.- L.F. Calderón-Soto, J.M. Méndez-González, E.J. Herrera-López, C. Ghommidh, R. Femat (2017) **Determination of experimental and mathematical oscillatory conditions for *Zymomonas mobilis* with different death rates for viable and VBNC cells.** Chemical Engineering Research and Design, 123:407-415.
- 18.- L. Virgen-Navarro, E.J. Herrera-López, H. Espinosa Andrews, G.M. Guatemala-Morales, R.I. Corona-González, Enrique Arriola-Guevara. (2016). **Estimación del coeficiente de difusividad durante el tostado de café en un lecho fuente utilizando un modelo difuso.** Revista Mexicana de Ingeniería Química, 15(2):513-524.
- 17.- Guillermo Hernández-Cortés, Juan Octavio Valle-Rodríguez, Enrique J. Herrera-López, Dulce María Díaz-Montaño, Yolanda González-García, Héctor B. Escalona-Buendía, Jesús Córdova (2016) **Improvement on the productivity of continuous tequila fermentation by *Saccharomyces cerevisiae* of Agave tequilana juice with supplementation of yeast extract and aeration.** Applied Microbiology and Biotechnology Express, 6(47):1-12.
- 16.- Luis Virgen-Navarro, Enrique J. Herrera-López, Rosa I. Corona-González, Enrique Arriola-Guevara, Guadalupe M. Guatemala-Morales. (2016). **Neuro-fuzzy model based on digital images for the monitoring of coffee bean color during roasting in a spouted bed.** Expert Systems With Applications, 54: 162-169.
- 15.- Hazael Ballesteros, Enrique J. Herrera-López, Juan Anzures-Marín (2015) **Fuzzy model-based observers for fault detection in CSTR,** ISA TRANSACTIONS, 59:325-333.
- 14.- Adolfo Flores-Saiffe Farías, Enrique Jaime Herrera López, Cristopher Jorge Moreno Vázquez, Wentian Li, Ernesto Prado Montes de Oca. (2015). **Predicting functional regulatory SNPs in the human antimicrobial peptide genes DEFB1 and CAMP in tuberculosis and HIV/AIDS.** Computational Biology and Chemistry, 59:117-125.
- 13.- Nun Pitalúa-Díaz, Enrique J. Herrera-López, Guillermo Valencia-Palomo, Álvaro González-Ángeles; Ricardo A. Rodríguez-Carvajal and Nohe R. Cazarez-Castro (2015) **Comparative Analysis Between Conventional PI and Fuzzy Logic PI Controllers for Indoor Benzene Concentrations.** Sustainability 7(5):5398-5412.



	12.- Jorge Pliego, Juan Carlos Mateos, Jorge Rodríguez, Francisco Valero, Mireia Baeza, Ricardo Femat, Rosa Camacho, Georgina Sandoval, Enrique J. Herrera-López (2015) Monitoring lipase/esterase activity by stopped flow in a sequential injection analysis system using p-nitrophenyl butyrate. <i>Sensors</i> 15(2):2798-2811. 11.- Valentín Flores-Payán, Enrique J. Herrera-López, Javier Navarro-Laboulais, Alberto López-López (2015) Parametric sensitivity analysis and ozone mass transfer modeling in a Gas-Liquid reactor for advanced water treatment. <i>Journal of Industrial and Engineering Chemistry</i> 21:1270-1276. 10.- Carlos Enrique Hiraes Casillas, José Miguel Flores Fernández, Eduardo Padilla Camberos, Enrique J. Herrera López, Gisela Leal Pacheco, Moisés Martínez Velázquez. (2014). Current status of circulating protein biomarkers to aid the early detection of lung cancer. <i>Future Oncology</i> 10(8):1501-1513. 09.- José Axel-Flores, A Gschaedler, L Amaya-Delgado, EJ Herrera-López, M Arellano Plaza, Javier Arrizon (2013) Simultaneous saccharification and fermentation of Agave tequilana fructans by <i>Kluyveromyces marxianus</i> yeast for bioethanol and tequila production. <i>Bioresource Technology</i> 146:267-273. 08.- L Amaya-Delgado, EJ Herrera-López, Javier Arrizon, M Arellano Plaza, A Gschaedler (2013) Performance evaluation of <i>Pichia kluyveri</i>, <i>Kluyveromyces marxianus</i> and <i>Saccharomyces cerevisiae</i> at industrial tequila fermentation. <i>World Journal of Microbiology and Biotechnology</i> 29:875-881. 07.- Jorge Pliego-Sandoval, Lorena Amaya-Delgado, Juan Carlos Mateos-Díaz, Jorge Rodríguez, Jesús Córdova, Abiel Alba, Sergio Jaubert and Enrique Jaime Herrera-López. (2012). Multiplex gas sampler for monitoring respirometry in column-type bioreactors used in solid-state fermentation. <i>Biotechnology & Biotechnological Equipment</i> 26(3):3031-3038. 06.- Herrera-López EJ, Castillo-Toledo B, Femat R (2012) Fuzzy servo controller for CSTB with substrate inhibition kinetics. <i>Journal of Process Control</i>, 22:959-967. 05.- José Miguel Flores-Fernández, Enrique J. Herrera-López, Francisco Sánchez-Llamas, Antonio Rojas-Calvillo, Paula Anel Cabrera-Galeana, Gisela Leal-Pacheco, María Guadalupe González-Palomar, R. Femat, Moisés Martínez-Velázquez. (2012). Development of an optimized multi-biomarker panel based on principal component analysis and artificial neural network modeling for the detection of lung cancer. <i>Expert Systems with Applications</i>. 39:10851-10856. 04.- J. Villalpando-Guzmán, E.J. Herrera-López, L. Amaya-Delgado, M. A. Godoy-Zaragoza, J. C. Mateos-Díaz, J. Rodríguez-González, S. Jaubert-Garibay. (2011). Effect of complementary microwave drying on three shapes of mango slices. <i>Revista Mexicana de Ingeniería Química</i>, 10(2):281-290. 03.- Luna Flores C, Pelayo Ortiz C, Femat R, Ramírez Córdova J, Herrera López E. (2010) Batch and fed-batch modeling of carotenoids production by <i>Xanthophyllomyces dendrorhous</i> using <i>Yucca fillifera</i> date juice as substrate. <i>Biochemical Engineering Journal</i>, 53(1):131-136. 02.- Hernández Cortés G, Córdova López J, Herrera López EJ, Moran Marroquí A, Juan O Valle-Rodríguez, Díaz Montaña DM (2010) Effect of pH, aeration and feeding Non-sterilized Agave Juice in a Continuous agave juice fermentation. <i>Journal of Science of Food and Agriculture</i>, 90(9):1423:1428. 01.- Pinal L, Cornejo E, Arellano M, Herrera E, Nuñez L, Arrizon J, Gschaedler A (2009) Effect of Agave tequilana age, cultivation field location and yeast strain on tequila fermentation process. <i>Journal of Industrial Microbiology & Biotechnology</i>, 36:655:661.
Patentes	Solicitadas: MX/a/2021/001011, MX/E/2017/094206 Otorgadas: MX/a/2014/008843, MX/a/2014/008843, MX/a/2014/008845.
Principales logros y distinciones	• SNII pertenencia desde 2009, actualmente nivel I



	- Beca Sabático Nacional CONACyT 265160, IPICYT 01/03/2016 al 28/02/2017, bajo la supervisión del Dr. Alejandro Ricardo Femat Flores. Departamento de matemáticas aplicadas, San Luis Potosí. - Estancia de Investigación doctoral del 15/05/2006 al 15/08/2006, bajo la supervisión del profesor Eugenio C. Ferreira. Departamento de Ingeniería Biológica, Braga, Portugal. Beca Mixta CONACyT.
Experiencia académica, Formación de recursos humanos	Profesor de las asignaturas - Sistemas de Monitoreo y Control de Bioprocesos (CIATEJ) - I.A. con Python para biotecnología (CIATEJ) - Biosensores y Control Analítico (ITESO) Recursos Humanos Posdoctorado - Elsa Pereyra Laguna Doctorado - Dirigidos (2), codirigidos (2), asesor (3) Maestría - Dirigidos (4), codirigidos (4), asesor (8)
Temas para asesoría de tesis	- Diseño e implementación de sensores para fermentación en medio sólido - Diseño e implementación de sensores para determinar estados fisiológicos en cultivos celulares

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Web of Science ResearcherID	https://www.webofscience.com/wos/author/record/3200530 ADN-0404-2022
Research Gate	https://www.researchgate.net/profile/Enrique-J-Herrera-Lopez?ev=hdr_xprf
Google académico	https://scholar.google.com/citations?user=Dti-yXwAAAAJ&hl=es&oi=ao
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**Name**

**Dr. Enrique Jaime
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Affiliation

Centro de Investigación y
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Diseño del Estado de Jalisco,
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Position

Senior Researcher C

**Line and sub-line of
research**

Industrial Biotechnology
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SNII area and Level

Engineering and
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Level I

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Brief Biography

Electronics Engineer (UNIVA University), Master's in Industrial Electronics (ITESO University), and Doctorate in Electrical Engineering, specialized in Automatic Control, CINVESTAV GDL Research Center.

Since 1997, he has worked in the Industrial Biotechnology Unit of the Center for Research and Assistance in Technology and Design of the State of Jalisco A.C., (CIATEJ).

He leads the research subline in Bioelectronics and the Laboratory for Innovation in Bioelectronics and Artificial Intelligence.

**Aimed at**

- *Mathematical modeling, instrumentation and control of bioprocesses*
- *Design of non-conventional sensors, SIA systems, at-line enzymatic sensors, portable NIR spectroscopy*
- *Additive manufacturing, micro-machining of bioreactors*
- *Design of mobile applications for the Biotechnology area.*
- *Data analysis via Artificial Intelligence*

He has been a member of the National System of Researchers since 2009 and is currently at Level I.

He has directed research projects in Basic Science, Frontier Science, Infrastructure, Fomix, regional and private initiatives, allowing him to generate patents, publications and book chapters in international journals and recognized editorials. He has trained human resources at the bachelor's, master's, and doctoral levels.



Affiliation	Center for Research and Assistance in Technology and Design of the State of Jalisco (Centro de Investigación y Asistencia en Tecnología y Diseño del Estado de Jalisco) • Zapopan facilities
Address	Camino Arenero 1227, El Bajío, 45019, Zapopan Jalisco, Mexico
Line and sub-line of research	Industrial Biotechnology • Bioelectronics
Topics of research interest	• Mathematical modeling of bioprocesses • Instrumentation, (bio)sensors, and bioprocess control. • Design of sequential injection analysis sensors, portable NIR, chemometrics • Design of mobile applications in the Biotechnology area • 3D additive manufacturing and micro-machining for micro-bioreactor design • Data analysis via A.I., M.L., and D.L.
Industry fields related to the research line	• Instrumentation and process automation • Industry 4.0 • Mobile application design • Portable NIR systems, chemometrics • Robotic scanning systems in fermentation • Microbioreactors, micromachining • Incubation chambers for plant crops
Academic groups	Postgraduate Industrial Biotechnology
Collaboration networks	• IPICYT, Dr. Alejandro Ricardo Femat Flores • UMSNH, Dr. Juan Anzures Marín • USON, Dr. Nun Pitalúa Díaz

Academic background	PhD in Electrical Engineering, specialized in Automatic Control: Center for Research and Advanced Studies of the I.P.N., Guadalajara unit, CINVESTAV. Thesis: On the problem of observation and control of a fuzzy model for a switched fermentation process. Master's Degree in Industrial Electronics: Instituto de Estudios Superiores de Occidente, ITESO. Thesis: Instrumentation and estimation of biomass concentrations and quantities of the pigment Astaxanthin, produced by the yeast <i>Phaffia rhodozyma</i> grown in a bioreactor, using artificial neural networks. Electronic Engineering. University of the Valley of Atemajac, UNIVA. 1990-1993.
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	Training ship - Machine Learning applied to Industry. Centre de perfectionnement, Université de Montréal. November 22-25, 2022. - Java Programming (Diploma). Instituto Tecnológico y de Estudios Superiores de Occidente, (ITESO). 2020-2021. 120 h. - Microfluidics Professional Course. Centre for microfluidics systems, University of Toronto. 3 days workshop. 2018.
Professional experience	Center for Research and Assistance in Technology and Design of the State of Jalisco (Centro de Investigación y Asistencia en Tecnología y Diseño del Estado de Jalisco) - Industrial Biotechnology 1997 to date
Research projects	- Technological maturation of a robotic scanning system to monitor and control a multi-tray solid medium fermentation bioreactor, project 11008-2023. Call From Science to the Market - Projects 2024-2025. - Potential design of enzymatic digital logic bioelectronic gates through biocatalyst modeling, project 319269. Frontier Science Call, paradigms and controversies of Science 2022 modality. Validity 2022 - 2024. - Strengthening of the bioelectronics subline through the design of monitoring and control equipment for the physiological state of microorganisms with potential application in biomedicine and bioprocesses at academic and industrial levels, project 295458. Call for Support for the strengthening of scientific and technological infrastructure. Validity 2018 - 2019. - First colloquium for the dissemination, research and strengthening of synthetic biology and bioelectronics in the western region of Mexico, project 293271. Support program for scientific, technological and innovation activities. Validity 2018. - Design of an enzymatic biosensor to detect the decomposition process in milk, project 189950. Call 2012-07 FOMIX Fund of the State of Jalisco. Validity 2013 - 2015. Study on strategies to monitor and control the selectivity and activity of lipolytic enzymes, project 128894. Call for Basic Scientific Research 2009. Validity 2010 - 2015. - Strategies to monitor the production of lipases and pectinases by solid-state fermentation using agricultural waste from the State of Nayarit, project 92071. Call 2008 CO2 Mixed Fund CONACYT-Government of the State of Nayarit. Validity 2008 - 2010. - Intelligent monitoring and control of the production of the recombinant protein ESAT-6 in a fed-batch culture: approach based on optical methods, 79987. Call for Basic Scientific Research 2007. Validity 2008 - 2009.
Relevant publications	Books 01- The Science of Tequila. Ed. Anne Gschaedler Mathis, Melchor Arellano Plaza, Manuel Kirchmayr, Enrique J. Herrera-López. Academic Press Elsevier. Book chapters 04.- García-Arellano AG, Calderón-Soto LF, Pereyra-Laguna E, Amaya-Delgado L, Herrera-López EJ (2023) Sensors and model-based approaches applied for phospholipase activity detection. Phospholipases in Physiology and Pathology, 335-357. 03.- Láinez M, García-Béjar JA, Flores-Cosío G, Herrera-López EJ, Amaya-Delgado L (2022) Advances in fermentative systems for the production of ethanol from



lignocellulosic biomass. In Innovations in Fermentation and Phytopharmaceutical Technologies (pp. 47-74). Elsevier.

- 02.- Sandoval G, Herrera-López EJ (2018) **Lipase, phospholipase, and esterase biosensors.** Lipases and Phospholipases: Methods and Protocols, 391-425.
- 01.- Herrera-López EJ (2012) **Lipase and phospholipase biosensors: a review.** Lipases and Phospholipases: Methods and Protocols, 525-543.

Peer review papers

- 37.- Sergio Erick García-Barrón, Georgina González-Hemon, Enrique J. Herrera-López, Rosa Pilar Carmona-Escutia, Doris Arianna Leyva-Trinidad, Anne Gschaedler-Mathis. **Prediction of the consumption of a traditional fermented beverage via an expanded model of the theory of planned behaviour.** British Food Journal, aceptado.
- 36.- Sergio Erick García-Barón, Rosa Pilar Carmona-Escutia, Enrique J. Herrera-López, Doris Arianna Leyva-Trinidad, Anne Gschaedler-Mathis. 2025 **Consumers' Drivers of Perception and Preference of Fermented Food Products and Beverages: A Systematic Review.** Foods 14,713.
- 35.- Ojeda-Castillo, V., Murillo-Tovar, M.A., Hernández-Mena, L., Saldarriaga-Noreña, H., Vargas-Amado, M.E., Herrera-López, E.J.; Díaz, J. 2025 **Tropospheric NO₂: Anthropogenic Influence, Global Trends, Satellite Data, and Machine Learning Application.** Remote Sens. 17, 49.
- 34.- Edwin J. Barbosa-Hernández, Jorge E. Pliego-Sandoval, Anne Gschaedler-Mathis, Javier Arrizon-Gaviño, Alejandro Arana-Sánchez, Ricardo Femat, Enrique J. Herrera-López. (2023). **Monitoring β -fructofuranosidase Activity by *Kluyveromyces marxianus* in Bioreactor Using a Lab-Made Sequential Analysis System.** Fermentation, 9, 963.
- 33.- P.M. Mondragón-Cortez, E.J. Herrera-López, E. Arriola-Guevara, G.M. Guatemala-Morales (2022) **Application of Fourier Transform Infrared Spectroscopy (FTIR) in combination with Attenuated Total Reflection (ATR) for rapid analysis of the tequila production process.** Revista Mexicana de Ingeniería Química. 21(3). Alim2806.
- 32.- Jaubert-Garibay, S, Hernández-Varela, JD, Chanona-Pérez, JJ, Cárdenas-Pérez, S, Herrera-López, EJ, Gutiérrez-López, GF (2022) **Assessing the product quality of mango slices treated with osmotic and microwave drying by means of image, microstructural, and multivariate analyses.** Drying Technology, 1-15.
- 31.- Claudia Alvarado, Diego M. Cortez-Valladolid, Enrique J. Herrera-López, Ximena Godínez, José Martín Ramírez. (2021). **Metal Bioaccumulation by Carp and Catfish Cultured in Lake Chapala, and Weekly Intake Assessment.** Applied Sciences, 11(6087):1-15.
- 30.- Alejandro Torres-Haro Alejandro Torres-Haro, Anne Gschaedler, Juan C. Mateos-Díaz, Enrique J. Herrera-López, Rosa M. Camacho-Ruíz, Melchor Arellano-Plaza. (2021). **Improvement of a specific culture medium based on industrial glucose for carotenoids production by *Xanthophyllomyces dendrorhous*.** Processes, 9, 42930.
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- 28.- G. Flores-Cosío, EJ Herrera-López, M Arellano-Plaza, A Gschaedler-Mathis, M Kirchmayr, L Amaya-Delgado (2020) **Application of dielectric spectroscopy to unravel the physiological state of microorganisms: current state, prospects and limits.** Applied Microbiology and Biotechnology, 104, 6101:6113.
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Patent	In evaluation: MX/a/2021/001011, MX/E/2017/094206 Granted: MX/a/2014/008843, MX/a/2014/008843, MX/a/2014/008845.



Main achievements and distinctions	• SNII membership since 2009, currently level I • CONACyT National Sabbatical Grant 265160, IPICYT 01/03/2016 to 28/02/201, under the supervision of Dr. Alejandro Ricardo Femat Flores. Department of Applied Mathematics, San Luis Potosí. • Doctoral Research Stay from 2006/15/05 to 2006/08/15, under the supervision of Professor Eugenio C. Ferreira. Department of Biological Engineering, Braga, Portugal. CONACyT Mixed Scholarship.
Teaching experience, and graduated students	Teaching experience • Bioprocess Monitoring and Control Systems (CIATEJ) • A.I. with Python for biotechnology (CIATEJ) • Biosensors and Analytical Control (ITESO) Graduated students Posdoctorate students • Elsa Pereyra Laguna PhD • Supervised (2), co-tutored (2), advised (3) Master • Supervised (4), co-tutored (4), advised (8)
Thesis topics available	1. Design and implementation of sensors for solid state fermentation 2. Design and implementation of sensors to determine physiological states in cell cultures

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Google scholar	https://scholar.google.com/citations?user=Dti-yXwAAAAJ&hl=es&oi=ao
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