Curriculum Vitae

ELEFTHERIOS (TERRY) PAPOUTSAKIS, PHD

Unidel Eugene DuPont Chaired Professor
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EDUCATION

Doctor of Philosophy	Chemical Engineering Purdue University	1979
Master of Science	Chemical Engineering Purdue University	1977
Diploma (BS/MS)	Chemical Engineering National Technical University of Athens	1974

RESEARCH INTERESTS

Papoutsakis's lab works on two areas of modern, molecular biotechnology and synthetic biology: higher eukaryotic biology & biotechnology now with emphasis on cell and gene therapies of the hematopoietic system, and microbial biotechnology, now with emphasis of fundamental cell-to-cell interactions of complex multicomponent systems including those of the human microbiomes. Eukaryotic biotechnology includes work in hematopoietic stem-cell differentiation, understanding of stem-cell development and clinical applications, experimental culture and assay methods, including flow cytometry and advanced microscopy methods, as well as genetic and genomic tools and experimental animal studies for examining the development of human stem and progenitor cells. A focal area is the biology of cellular microparticles and synthetic bio-nanoparticles, megakaryopoiesis, in vitro platelet production, and use of megakaryocytic microparticles for cell therapies and cargo delivery to stem cells. The microbial biotechnology activities encompass biotechnologies of both solventogenic and acetogenic clostridia, non-phototrophic CO_2 fixation, *E. coli*-based synthetic methylotrophy, and synthetic syntrophic co-cultures. An area of current interest is the study of complex microbial interactions under syntrophic conditions that give rise to previously unknown phenomena including heterologous cell fusion and the intercellular exchange of proteins and nucleic acids via naturally releases prokaryotic extracellular vesicles. The focus pertains to microbiomes of humans and animals but also environmental microbiomes. The two areas of research, although seemingly orthogonal, are complementary and synergistic in development of tools and strategies and benefit each other.

EARLY LIFE & EDUCATION

Papoutsakis was born and educated in Alexandroupolis, Greece, where he attended the 1st Experimental School of elementary education, Zarifeios Pedagogical Academy (https://www.zarifeios.gr). He subsequently attended the 1st High School of Alexandroupolis. He completed his High School education at the 8th High School of Athens prior to matriculating in the NTUA for his BS/MS education.

PROFESSIONAL HISTORY

Unidel Eugene DuPont Chair Professor	Chemical & Biomolecular Engineering University of Delaware	2007-present

Professor	Biological Sciences University of Delaware	2011-present
Professor	Chemical & Biomolecular Engineering University of Delaware	2007-present
Walter P. Murphy Professor	Chemical & Biological Engineering Northwestern University, Evanston, IL	2001-2007
Professor	Interdepartmental Biological Sciences Program, Northwestern University	1996-2007
Member	Lurie Comprehensive Cancer Center, Northwestern University Medical School, Chicago IL	1994-2007
Professor	Chemical & Biological Engineering Northwestern University, Evanston IL	1990–2007
Associate Professor	Chemical Engineering Northwestern University, Evanston IL	1987-1989
Associate Professor	Chemical Engineering Rice University, Houston, TX	1985-1987
Assistant Professor	Chemical Engineering Rice University, Houston, TX	1980-1985

PROFESSIONAL SOCIETIES

American Society for Microbiology (ASM)
American Chemical Society (ACS)
American Association for the Advancement of Science (AAAS)
American Institute of Medical & Biological Engineers (AIMBE)
Society for Biological Engineering (SBE)
American Institute of Chemical Engineers (AIChE)
European Society for Animal Cell Technology (ESACT)
International Metabolic Engineering Society (IMES)
Society for Industrial Microbiology and Biotechnology (SIMB)
Sigma Xi, the Scientific Research Honor Society
International Academy of Medical & Biological Engineering
National Academy of Inventors (NAI)

HONORARY SCIENTIFIC ACADEMIES/SOCIETIES

National Academy of Engineering (NAE)
American Academy of Microbiology (AAM)
International Academy of Medical & Biological Engineering
National Academy of Inventors (NAI)
American Institute of Medical & Biological Engineers (AIMBE)
Sigma Xi, the Scientific Research Honor Society
Fellows, American Chemical Society (ACS)
Fellows, American Association for the Advancement of Science
Fellows, American Institute of Chemical Engineers (AIChE)
Hagler Fellow, Hagler Institute for Advanced Study, Texas A&M University

ACADEMIC HONORS AND LEADERSHIP

2024	Hagler Fellow, Hagler Institute for Advanced Study, Texas A&M University
2023	Elected to Sigma Xi, the Scientific Research Honor Society
2022	William Walker Award of the American Institute of Chemical Engineers
2022	Charles Thom Award of the Society for Industrial Microbiology & Biotechnology
2021	Elected Fellow, National Academy of Inventors (NAI)
2021	Elected Fellow of the International Academy of Medical & Biological Engineering
2020	The 2020 Amer. Soc. for Microbiology (ASM) National Award in Biotechnology
2019	The Inaugural Nazmul Karim Lecture. Texas A&M University, March 22nd, 2019.
2018	**Election to the National Academy of Engineering (USA)**
2017	American Chemical Society, E. V. Murphree Award in Industrial and Engineering Chemistry
2017	Honorary life member (only 2017 life member among a total of less than 10) of European Society for Animal Cell Technology (ESACT)
2016	AIChE Division 15 Distinguished Service Award
2014	Fellow of the American Institute of Chemical Engineers
2013	DIC Wang Award for Excellence in Biochemical Engineering, Society for Biological Engineering (SBE), American Institute of Chemical Engineers (AIChE)
2012	James E. Bailey Award for Biological Engineering, Society for Biological Engineering (SBE), American Institute of Chemical Engineers (AIChE)
2011	Elected Fellow of the American Chemical Society (ACS)
2010	International Metabolic Engineering Award, 2010
2010	Elmer Gaden Award; *Biotechnology & Bioengineering*, John Wiley & Sons
2007	James M. Van Lanen Distinguished Service Award, American Chemical Society (BIOT Division)
2005	Fellow of the American Academy of Microbiology (AAM)
2005	Amgen Biochemical Engineering Award, Engineering Conferences International (ECI)
2004	Merck Cell Culture Engineering (CCE) Award, Engineering Conferences International (ECI)
2003	Alpha Chi Sigma Award of the American Institute of Chemical Engineers (AIChE)
1998	Marvin Johnson Award of the American Chemical Society, Biochemical Technology (BIOT) Division
1998	Elected Fellow of the American Association for the Advancement of Science (AAAS)
1997	Bayer Lecturer in Biochemical Engineering, University of California at Berkeley
1997	Outstanding Chemical Engineer, Purdue University1995 Food, Pharmaceutical & Bioengineering Award of the American Institute of Chemical Engineers (AIChE)
1993	Founding Fellow: American Institute of Medical and Biological Engineers (AIMBE)
1985-1990	Presidential Young Investigator Award, National Science Foundation (NSF)

Editor Positions

2018-	Associate Editor, *Science Advances*, Science/AAAS
2016-2025	Editor, *mBio*, American Society of Microbiology (ASM)(the max of 10 years allowed)
2013-	Consulting Editor, *AIChE Journal*
2011-16	Editor, *Biotechnology Advances* (Elsevier)
2012-16	Editor, *Current Opinion in Chemical Engineering*
2014-15	Guest Editor, *Current Opinion in Biotechnology*
1/1990-12/1995	Editor in Chief, *Biotechnology & Bioengineering*
1/1996-12/2002	Associate Editor, *Biotechnology & Bioengineering*

Editorial Boards:

2021-	Annual Review of Biomedical Engineering
2017- present	Applied & Environmental Microbiology (American Soc. of Microbiology, ASM)
2016- present	Applied Microbiology & Biotechnology (Springer)
2003-present	Biotechnology & Bioengineering (Wiley)
2000-present	Journal of Biotechnology (Elsevier)
1998-present	Metabolic Engineering (Elsevier)
1994-2009	Tissue Engineering (M. A. Liebert Publishers, New York)
1986-1988	Industrial and Engineering Chemistry Research (ACS)
2010-Present	Biofuels (Future Science)

Recent Significant Professional Activities

2025-	Board of Reviewers, Danish Advanced Research Academy (DARA) of the NOVO NORDISK Foundation
2025-	Committee for the selection of the Gregory Stephanopoulos senior SBE/IMES Award in Metabolic Engineering
2024-	National Academy of Engineering, Committee for the Russ Prize
2019-	DOE BETO review panels
2021	Chair, External Review Board for the Institute-wide Bioengineering PhD Program at Georgia Institute of Technology, Atlanta, GA (Sept. 27-28; work on report the next 3 weeks)
2019-24	Scientific Advisory Board of ECOVIA Renewables.
2020-23	Scientific Advisory Board of STRM BIO.
2019, 2020	DOE review panel for site annual site review visits for the Bioenergy Science Center (BESC).
2018	External Program Reviewer; UC Riverside Senate
2018-	Chair of Award Committee: the Innovation Award (only society award) of the European Society for Animal Cell Technology (ESACT)
2017	Invited Participant for workshop “Charting a ”2025 Roadmap for Industrial Biotechnology” organized by Novo Nordisk Foundation (Center for Biosustainability). Only 12 participants from throughout the world, including a Nobel Laureate, and several NAE members. Copenhagen, Denmark. Dec. 4-7, 2017.
2017	NIH Special review panel for PPG P01application
2014-	Member and Chair (since 2016) of the DIC Wang Award, Soc. for Biological Engineering (SBE)
2016-	Board of Managers, International Metabolic Engineering Society
2016	Navy Res. Labs/ARPA-E Microbial Electrosynthesis Workshop to set research agenda
2016	ARPA-E Rewiring Anaerobic Digestion Workshop to set research agenda
2016	NSF-Rice Workshop: Systems and Synthetic Biology for Designing Rational Cancer Immunotherapies
2017-2018	Scientific Committee, Cell Culture Engineering XVI, Tampa, FL, May 6-11, 2018
2016-2017	Steering Committee, Biochemical and Molecular Engineering XX, July 16-20, 2017, Newport Beach, CA
2015-2016	Scientific Committee, Cell Culture Engineering XV, Palm Springs, May 8-13, 2016
2014-2015	Steering Committee, Biochemical and Molecular Engineering XIX, July 12-16, 2015 Hyatt Ziva, Puerto Vallarta, Mexico
2013-2015	Scientific/Program Committee of the 2015 ESACT (Eur. Society for Animal Cell Technology) meeting in Barcelona, Spain, June 2015.
2013-15	Advisory Committee, Brookhaven National Lab; Environment, Biology, Nuclear Science and Technology, and Nonproliferation (EBNN) Directorate
2013	External Program reviewer; UCLA Faculty Senate
2012-14	Scientific Advisory Board, BESC (BioEnergy Science Center), DOE, Oak Ridge, TN
2011-2013	Scientific/Program Committee of the 2013 ESACT (Eur. Society for Animal Cell Technology) meeting in Lille, France, June 2013
2010 -	Member of Selection committee for the Cell Culture Engineering Award.

2010 -	Member of Selection committee for the International Metabolic Engineering Award.
2009-10	Scientific Advisory Committee: Metabolic Engineering VIII: Metabolic Engineering for Green Growth. June 13-17, 2010. Jeju Island, South Korea
2009-2011	Executive Committee of ESACT (Eur. Society for Animal Cell Technology)
2008 -	SBE (Soc. Biol. Engineering) Advisory Board
2008 -2014	Founder and President, ELCRITON, INC., Newark, DE
2008 -2014	Chair of External Advisory Board of ICDB (Inst. for Cell Dynamics & Biotechnology), Chile
2008-2009	Scientific/Program Committee of the 2009 ESACT (Eur. Society for Animal Cell Technology) meeting in Dublin, Ireland, June 2009
2008 - 2020	External Advisory Board, J. Hopkins University, Dept. of Chemical & Biomolecular Engineering
2008-2010	Scientific Advisory Board and Organizing Committee: CLOSTRIDIUM 11, October 3- 6, 2010 San Diego, CA
2006-07	Chair, Amgen Biochemical Engineering Award Committee (ECI Conferences)
2005- 2010	Institute Awards Committee, American Institute of Chemical Engineers
2006-2009	Executive Board of the Program Committee (EBPC), American Institute of Chemical Engineers
2002-04, 08-14	Chair of Selection committee for the Division 15 (Food, Pharmaceutical & Bioengineering Division) Award of the American Institute of Chemical Engineers (AIChE)
2006	Chair and 2006 Conference Programming Chair for Division 15 (Food, Pharmaceutical & Bioengineering Division) of the American Institute of Chemical Engineers (AIChE)
2006, 2007	Member, Institutional Awards Committee, American Institute of Chemical Engineers (AIChE)
2005-2010	Chair, Merck Cell Culture Engineering Award committee (Engineering Conferences International)
1998-2005	Chair: Awards of the Amer. Chemical Society, Biochemical Technology (BIOT) Division
2005- 2010	Member, Awards committee of the American Chemical Society, Biochemical Technology (BIOT) Division. Member of all BIOT Award committees
2003	Chair, Biochemical Engineering XIII conference, Boulder CO, Engineering Conferences International (ECI)
2001	Invited participant and Group chair, NSF Workshop (chaired by D.I.C. Wang and D. Ryu) on the "Future of Biochemical Engineering", Arlington, VA, November 28- 30
2000	External member of the committee for Graduate Program Review of the Chemical Engineering Department at NC State University, Raleigh, NC, April 25-26
1996-2004	Member, Awards committee for the Food, Pharmaceutical & Bioengineering Division Award of the AIChE
1999-2003	Member of the Expert Panel Review of Networks of Centers of Excellence (NCERC/MRC/SSHRC Canada.): 3 Expert Panels
1995-present	40+ NSF proposal review panels & ERC site visits, NIH study sections, and DOE review proposals.
1995-present	Organizing or on the scientific committee of 20 international conferences.

Student Training Record

70 Doctoral and 28 MS completed. 9 Doctoral in progress. 39 Postdoctoral.
99 Undergraduate students (research project/thesis supervision).

SEMINARS & INVITED TALKS

"Single-cell-protein production from one-carbon compounds: a window into biochemical engineering"

- University of Texas, Austin, Texas, Dept. of Chem. Engineering, December 2, 1980.
- National Technical University, Athens, Greece, School of Chemical Engineering, December 17, 1981.

"Equations, Calculations and Control Scenarios for Fermentations of Butyric Acid Bacteria"

- Technical University, Delft, Netherlands, Departments of Chemical Engineering and Technical Biology, July 20, 1982.
- Cornell University, School of Chem. Engineering, Ithaca, NY, November 3, 1982.

"A Fermentation Equation for Butanol/Acetone Production by Butyric - Acid Bacteria"
- University of Minnesota, Dept. Of Chem. Engineering, Minneapolis, MN, April 21, 1983.
- University of Houston, Dept. of Chem. Engineering, Houston, TX, September 30, 1983.
- University of Notre Dame, Dept. of Chem. Engineering, Notre Dame, IN, October 11, 1983.

"Fermentation Equations for Production of Oxychemicals from Sugars"
- Indian Institute of Technology, Bombay, India, March 2, 1984.
- (Indian) National Chemical Laboratory, Dept. of Chem. Engineering, Pune, India, March 5, 1984.

"Regulation Mechanisms of Product Formation in the Butanol-Acetone Fermentation"
- Louisiana State University, Dept. of Chem. Engineering, Baton Rouge, LA, Nov. 9, 1984.
- University of Pennsylvania, Dept. Of Chem. Engineering, Philadelphia, PA, March 11, 1985.

"On-Line Chromatographic Analysis and Fermentor State Characterization of Butanol/Acetone Fermentations"
- Washington University, Dept. of Chem. Engineering, St. Louis, MO, April 15, 1985.
- Pfizer, Inc., Fermentation and Recovery R&D, Groton, CT, October 4, 1985.

"Shear Requirements, Mixing, and Cell Damage in Suspension Tissue Culture Bioreactors: Shear, Wear, and Tear"
- E.I. du Pont de Nemours and Co. Inc., Wilmington, DE, January 24, 1986.
- Cetus Corporation, Emeryville, CA, August 18, 1986.
- Texas A&M University, Dept. of Chem. Engineering, College Station, TX, November 14, 1986.

"Mechanisms of Cell Damage in Agitated Microcarrier Tissue Culture Reactors: Shear, Wear, and Tear"
- Purdue University, School of Chem. Engineering, W. Lafayette, IN, January 30, 1986.

"On-Line Chromatographic Monitoring and Gateway Sensors for Complex Fermentations"
- Eastman Kodak Company, Rochester, NY, April 11, 1986.

"Transport of Substrates and Metabolites, The Membrane Protonmotive Force and Their Effect on Cell Metabolism"
- Nagoya University, Dept. of Chem. Engineering, Nagoya, JAPAN, September 30, 1986.
- Tokyo Institute of Technology, Lab. of Resources Utilization, Yokohama, JAPAN, Oct. 3, 1986.

"Regulation of Product Yields and Selectivities in Anaerobic Fermentations of Butyric-Acid Bacteria"
- California Institute of Technology, Dept. of Chemical Engineering, Pasadena, CA, January 8, 1987.
- University of Colorado, Dept. of Chemical Engineering, Boulder, CO, March 5, 1987.
- University of Florida, Dept. of Chem. Engineering, Gainesville, FL, April 3, 1987.

"Shear and Other Hydrodynamic Effects in Microcarrier Cell Culture"
- Technische Universitaet Hamburg-Harburg, (Arbeitsbereich Biotechnologie I: Prof. Dr. H. Maerkl), May 21, 1987.
- Eidgenoessische Technische Hochschule (Technish-Chemisches Laboratorium), Zuerich, Switzerland, June 5, 1987.
- Technische Universitaet Hannover, FRG (Institut fuer Technische Chemie: Prof. Dr. K. Schuegerl), June 9, 1987.
- Gesellschaft fuer Biotechnologische Forschung (Braunschweig, FRG), June 23, 1987.

"Shear Effects on Cultured Hybridoma Cells"
- Gesellschaft für Biotechnologische Forschung (Braunschweig, FRG), June 11, 1987.

"Liquid Shear Effects in Animal Cell Culture"
- Abbott Laboratories (Chem. Agric. Products Division), N. Chicago, IL, March 25, 1987.
- Codon, Brisbane, CA, April 17, 1987.

"Metabolic Regulation of Product Formation in Anaerobic Fermentations of Butyric-Acid Bacteria"
- Amoco (Biotechnol. Division), Naperville, IL, July 16, 1987

"Membrane Oxygenation and Perfusion in Animal- Cell Bioreactors"
- Questar, Charlotte NC, Aug. 8, 1987.

"Shear and Other Hydrodynamic Effects in Animal Cell Bioreactors"
- Eastman Kodak Company, Rochester, NY, Oct. 23, 1987.
- Carnegie-Mellon Univ. Dept. of Chem. Engineering, April 5, 1988.
- Michigan State Univ., Dept. of Chem. Engineering, East Lansing, MI, April 28, 1988.
- Univ. of California, Dept. of Chem. Eng., Davis, CA, June 21, 1988.
- Univ. of California, Dept. of Chem. Eng., Berkeley, CA, Nov. 7, 1988.

- Monsanto Corp., St. Louis, MO, Nov. 11, 1988.
- Univ. of Illinois, Dept. of Chem. Eng., Chicago, IL, March 3, 1989.
- Massachusetts Institute of Technology, Dept. of Chem. Eng., Cambridge, MA, March 24, 1989.
- The UpJohn Company, Kalamazoo, MI, May 25, 1989

"Regulation of Product Formation in the C. acetobutylicum Fermentation: ATP and NADH Levels, Enzyme Regulation and Cloning Studies"

- Michigan State Univ., Biotechnol. Institute, East Lansing, MI, April 29, 1988.

"Fluid-Mechanical Effects on Animal Cells in Bioreactors"

- The Pennsylvania State University, Dept. of Chem. Engineering, Univ. Park, PA, March 5, 1990.
- Illinois Institute of Technology, Dept. of Chem. Engineering, Chicago, IL, February 13, 1991.
- State Univ. of New York at Buffalo, Dept. of Chem. Engineering, Buffalo, NY, February 27, 1991.
- Washington State University, Dept. of Chem. Engineering, Pullman, WA, March 11, 1991.
- University of British Columbia, Biotechnology Lab., Vancouver, BC, Canada, March 13, 1991.
- Univ. of Maryland, Dept. of Chem. Engineering, College Park, MD, March 19, 1991.

"Analysis and Redirection of Cellular Metabolism in Anaerobic Butyric- acid Bacteria"

- Dartmouth College, Thayer School of Engineering, Hanover, NH, April, 5, 1990.

"Fluid-Mechanical Effects on Animal Cells"

- Gordon Conference: Effects of Gravity on Biosystems, Colby-Sawyer College, New London, CT, July 9-13, 1990.

"Vectors, Transformation, and Metabolic Engineering Studies of Clostridium acetobutylicum ATCC 824"

- International Workshop on The Regulation of Metabolism, Genetics, and Development of the Solvent-Forming Clostridia, Salisbury, England, August 9-11, 1990.

"Beneficial effects of reduced oxygen tension and perfusion in long-term hematopoietic (bone-marrow) cultures"

- Medical School of Dimocrition University, Dept. of Internal Medicine, Alexandroupolis, Greece, April 15, 1991.
- Eidgenoessische Technische Hochschule (Technish-Chemisches Laborat.), Zuerich, Switzerland, April, 23, 1991.

"Long-term Hematopoietic Cell Culture: Improvements from Better Defined and Controlled Hormonal and Nutritional Conditions"

- Shriners Hospital/Burns Institute/Harvard Med. School, Boston, MA, December 4, 1991.

"Cell Injury in Agitated and Aerated Bioreactors and How to Minimize It"

- 2nd US/KOREA Joint Seminar in Bioprocess Technology, Seoul, Korea, December 12-17, 1991.

"Physical and Physiological Aspects of Fluid-mechanical Injury of Freely-suspended Animal Cells in Bioreactors"

- Yale University, Chem. Eng. Dept., New Haven, CT, October 24, 1991.
- Genzyme, Inc., Framingham, MA, October 25, 1991.
- University of Patras, Greece, Chem. Eng. Dept., March 23, 1992.
- University of Wisconsin, Chem. Eng. Dept., Madison, WI, February 12, 1992.
- University of Rochester, Chem. Eng. Dept., Rochester, NY, February 19, 1992.
- Texas A&M University, Chem. Eng. Dept., College Station, TX, February 28, 1992.
- Merck Sharp & Dohme Research Laboratories, Rahway, NJ, May 8, 1992.
- University of Texas, Chem. Eng. Dept., Austin, TX, Nov. 17, 1992.

"Efficient Transformation of and Expression of Autologous Primary Metabolic Genes in Clostridium acetobutylicum ATCC 824"

- Clostridium II Symposium, Blacksburg, VA, Aug. 13, 14, 1992.

"Animal-cell Culture Biotechnology"

- 6th International Pharmaceutical Technology Symposium, Ankara, Turkey, Sept. 7-10. 1992.

"Genetic & Metabolic Engineering of Clostridium acetobutylicum"

- NIH Conference: Research opportunities in biomolecular engineering, Washington, DC, December 7, 8, 1992.

"Metabolic Engineering of Clostridium acetobutylicum"

- Univ. of Michigan, Chem. Eng. Dept., Ann Arbor, MI, March 18, 1993.

- Univ. of Iowa, Chem. Eng. Dept., Iowa City, IA, April 8, 1993.
- Institutes Nationale des Sciences Appliquees, Dep. de Genie Biochimique et Alimentaire, Toulouse, France, June 11, 1993.
- Argonne National Laboratory, Argonne, IL, May 3, 1994.

"Ex Vivo Expansion Under Perfusion Conditions of Primitive Hematopoietic Cells for Transplantation Therapies"

- John Hopkins University, Chem. Eng. Dept., Baltimore, MD, November 18, 1993.
- Univ. of California, Chem. Eng. Dept., Berkeley, CA, February 7, 1994.

"Ex Vivo Expansion of Primitive Human Hematopoietic Cells Under Perfusion Conditions"

- Keystone Symposium Tissue Engineering, Taos, NM, February 20-26, 1994.

"Ex Vivo Expansion of Bone-marrow and Other Primitive Hematopoietic Cells for Transplantation and Other Cell Therapies"

- Amer. Soc. Artif. Internal Organs, 40th Anniversary Meeting, San Francisco, CA, April 14-16, 1994.
- Abbott Laboratories, North Chicago, IL, July 14, 1994.

"Genetic Pathway Engineering of the Complex Primary Metabolism of Clostridium acetobutylicum"

- 7th International Symposium on the Genetics of Industrial Microorganisms, Montreal, Canada, June 26- July 1, 1994.

"Ex Vivo Expansion of Primitive Hematopoietic Cells Under Perfusion Conditions for Cellular Therapies"

- ESACT/JAACT Meeting 1994, Veldhoven, The Netherlands, September 12-16, 1994.

"Ex Vivo Expansion of Primitive Hematopoietic Cells under Perfusion Conditions for Transplantation Therapies"

- 44th Canadian Chemical Engineering Conference, Calgary, Canada, October 2-5, 1994 **(Keynote Lecture)**
- University of Tulsa, Chem. Eng. Dept., Tulsa, OK, March 24, 1995

"Agitation, Aeration and Cell Injury in Free-suspension Animal- cell Bioreactors"

- 8th annual meeting of the Japanese Association for Animal Cell Technology (JAACT'95), Iizuka, Japan, November 6-10, 1995.
- Bayer (USA) Biotechnology Corp., Berkeley, CA, March 20, 1996.

"Ex Vivo Expansion of Primitive Hematopoietic (blood-making) cells for somatic cell therapies"

- Ohio State University, Chem. Eng. Dept., Columbus, OH, April 17, 1996

"Cell Culture Technologies to Produce Cells for Transfusion Therapies"

- 5th World Congress of Chemical Engineering, San Diego, CA, July 14-18, 1996

"Cell Culture for Tissue Engineering and Somatic Cell Therapies"

- 10th International Biotechnology Symposium, Sydney, Australia, August 25-30, 1996

"Agitation, Aeration and Cell Injury in Free-suspension Animal-cell Bioreactors"

- Dept. of Chem. Engineering, Univ. of Queensland, Brisbane, Australia, Sept. 6, 1996

"The Genetics of Strain Degeneration and Solvent Formation in Clostridium acetobutylicum"

- **The FPBD Award Symposium**, 1996 AIChE Meeting, November 10-15, 1996, Chicago, IL.

"Cell Culture for Cell and Gene Therapies: New Opportunities for Bioengineering"

- Chemical Engineering Dept., Iowa State University, Ames, IA, October 2, 1997.

"Cell Culture for Cell and Gene Therapies: New Opportunities in Biochemical Engineering"

- The 1997 Bayer Biochemical Engineering Lecture, Univ. of California at Berkeley, Chemical Engineering Dept., October 8, 1997.

"Stoichiometric Modeling of Clostridium acetobutylicum Fermentations with Nonlinear Constraints: An important Metabolic Engineering Tool"

- 3rd (Federal) Interagency Workshop on Metabolic Engineering, Gaithersburg, MD, April 20, 1998.

"Cell Culture is Crucial for the Success of Cell and Gene Therapies"

- The 1998 Marvin Johnson Award Lecture, 1998 National Meeting of the American Chemical Society, Boston, MA, August 26, 1998.

"O2 and Its Transport in Hematopoietic Life and Death"

- Chemical Engineering Dept., Univ. of Illinois, Urbana, IL, November 10, 1998.

"Master Switches, Antisense RNA, and Clostridium acetobutylicum Fermentations"

- Metabolic Engineering II (Engineering Found. Conference), Elmau, Germany, Oct. 25-30, 1998.

"Cell Culture is Crucial for the Success of Cell and Gene Therapies"

- Lederle-Praxis Biologicals, Sanford, NC, December 1, 1998.

"Cell Culture is Crucial for the Success of Cell and Gene Therapies"
- Osiris, Inc., Baltimore, MD, December 10, 1998.

"Oxygen and its Transport in Hematopoietic Life and Death"
- Engineering Foundation Conference: Biochemical Engineering XI, Salt Lake City, UT, July 25-30, 1999.

"Metabolic Engineering of Clostridium acetobutylicum"
- 50th Anniversary Meeting of SIM (Society for Industrial Microbiology" Arlington, VA, August 1-5, 1999.

"The Genetics, Physiology, Metabolic Engineering and Biotransformation Potential of the Anaerobic Solventogenic Clostridia"
- Merck Research Laboratories, Rahway, NJ, October 14, 1999.

"O2 and Its Transport in Hematopoietic Life and Death"
- Merck Research Laboratories, West Point, PA, October 15, 1999.

"A Brief (and Biased) History of Fluid-mechanical "Injury" of Animal Cells in Bioreactors"
- School of Chemical Engineering, Cornell University, Ithaca, NY, October 25, 1999.

"O2 and Its Transport in Hematopoietic Life and Death"
- Dept. of Chemical Engineering, University of Cincinnati, Cincinnati, OH, June 1, 2000.

"Metabolic Engineering of Solvent Production" **Keynote Lecture**
- 15th Australasia Biotechnology Conference (ABA 2000), Brisbane, Australia, July 2-6, 2000.

"Haematopoietic Tissue Engineering" **Keynote Lecture**
- 15th Australasia Biotechnology Conference (ABA 2000), Brisbane, Australia, July 2-6, 2000.

"Haematopoietic and T-cell Therapies" **Keynote Lecture**
- BioFutures Conference, University of Queensland, Brisbane, Australia, July 5, 2000.

"Ex Vivo Expansion of Hematopoietic Cells for Cellular and Gene Therapies" **Keynote Lecture**
- The World Congress on Biotechnology (Biotechnology 2000), Berlin, Germany, Sept. 3-8, 2000.

"O2 and Its Transport in Hematopoietic Life and Death"
- Dept. of Chemical Engineering, University of Wisconsin, Madison, WI, October 10, 2000.

"Master Switches, Antisense RNA and Metabolic Engineering of Clostridium acetobutylicum"
- Colloquia of Microbiology, University of Chile and Catholic University, Santiago, Chile, November 2, 2000.

"Cell Culture for Cellular Therapies Based on Hematopoietic Stem, Progenitor and T-cells"
- Millenium Institute Lecture- 2000, University of Chile, Santiago, Chile, Nov. 3, 2000.

"O2and Its Transport in Hematopoietic Life and Death"
- NIDDK/NIH, Bethesda, MD, March 1, 2001.
- Dept. of Chemical Engineering, Tufts University, Medford, MA, April 30, 2001.
- Dept. of Chemical Engineering, UCLA, Los Angeles, CA, May 25, 2001.

"Metabolic Engineering of Solvent Tolerance in Anaerobic Bacteria"
- Interagency Workshop on Metabolic Engineering, Arlington, VA, June 28, 2001.

"DNA Microarrays and a Systems Approach to Biology: T-cells and Immunotherapy"
- Dept. of Chemical Engineering, Texas A&M University, College Station, TX, October 19, 2001.

"DNA Arrays, Transcriptome and Pathways"
- Bioinformatics and Genomics Plenary Session, II. Ann. AIChE meeting, Reno, NV, Nov. 4-9, 2001

"DNA Microarrays and a Systems Approach to Biology: T-cells and Immunotherapy"
- Dept. of Chemical & Biochemical Engineering, Univ. of Maryland Baltimore County, Baltimore, February 5, 2002.
- Dept. of Chemical Engineering, Johns Hopkins University, Baltimore, April 25, 2002.

"Stem Cells & Bioengineering"
- Annual Meeting of the Amer. Instit. Medical & Biological Engineering (AIMBE), Washington DC, March 1, 2002.

"DNA Microarrays and a Systems Approach to Biology & Biotechnology"
- National Center for Food Safety and Technology/IIT, Summit-Argo, IL, March 22, 2002.
- University of Chicago, Biomedical Seminars, May 21, 2002.
- Korean Adv. Institute for Science & Technology (KAIST), Taejon. Korea, July 8, 2002.

"Clostridium acetobutylicum: the Old is New"

- 9th International Symposium on the genetics of Industrial microorganisms (GIM), Gyeongju. Korea, July 1-5, 2002.

"Biochemical Engineering in the Era of Genomics, High Throughput Technologies, and Systems Biology",

- National meeting of the American Chemical Society, Boston, MA, August 18-22, 2002.

"High Throughput Analysis of Stem-cell Differentiation and T-cell Expansion" (with H. Haddad, L. T. Huang, H. Yang, and W. M. Miller)

- Metabolic Engineering IV (Eng. Foundation Conferences), Barga, Italy, October 6-11, 2002.

"Large Scale Transcriptional Analysis of Clostridium acetobutylicum Differentiation and Degeneration"

- Univ. of Iowa: 11th Annual CBB Conference "Biocatalysis, Evolution and Metabolic Engineering", Iowa City, IA, October 21-23, 2002.

"A Systems Biology Approach to Hematopoietic Stem-Cell Differentiation" (with L. T. Huang, H. Yang, and W. M. Miller)

- EMBS/BMES 2002 (IEEE Engineering in Medicine & Biology Society, Biomedical Engineering Society Annual Meeting), Houston, TX, October 23-26, 2002.

"A Systems Biology Approach to Hematopoietic Differentiation and Proliferation Using DNA Arrays" (with H. Haddad, L. T. Huang, H. Yang, and W. M. Miller),

- Wilhelm Award Symposium, Annual AIChE Meeting, Indianapolis, IN, Nov. 3-8, 2002.

"Biochemical Engineering in the Era of Genomics and Systems Biology"

- University of Colorado, Dept. of Chemical Engineering, Boulder, CO, April 22, 2003

"DNA Microarrays and a Systems Approach to Biology"

- Imperial College (University of London), Dept. of Chemical Engineering and Chemical technology & Centre for Process Systems Engineering, London, UK, May 16, 2003.

"Biochemical Engineering in the Era of Genomics, Systems Biology & Genetic Medicine"

- University of California, Riverside, Dept. of Chemical & Environmental Engineering, Riverside, CA, June 6, 2003.

"A Brief History of Fluid-mechanical "Injury" of Animal Cells in Bioreactors (and What Have We Learned from History…)"

- Cell Genesys Inc., South S. Franscisco, CA, October 7, 2003.

"DNA Microarrays and a Systems Approach to Biology"

- Clemson University, Dept. of Chemical Engineering, Clemson, SC, October 16, 2003.
- Rice University, Dept. of Chemical Engineering, Houston, TX, October 30, 2003.
- University of Illinois U-C, Dept. of Bioengineering, Urbana-Champaign, IL, November 6, 2003.
- Integrated Genomics, Inc. Chicago, IL, January 20, 2004.

"Genomic-scale Transcriptional Analysis for Deconvoluting Compex Effects in Cultured Primary T Lymphocytes"

- Biotechnology Research Institute, National Research Council Canada, Montreal, Quebec, Canada, September 9, 2004.

"Stem Cell Biotechnology. The Hematopoietic Paradigm: Lineage Commitment and Plasticity" **Keynote Lecture**

- 12th International Biotechnology Symposium, Santiago, Chile, October 17-22, 2004.

"Experimental and Computational Innovation and Quality Control in DNA-Microarray Analysis"

- Papoutsakis, E.T., Alsaker, K.V., Paredes, C.J., Fuhrken, P.G., Borden, J.R., AIChE 2004 Annual Meeting, Austin, TX, November 7-12, 2004.

"Stem Cell Biotechnology: Lineage Commitment and Plasticity"

- The Pennsylvania State University, Department of Chemical Engineering, University Park, PA, March 23, 2005.
- National Tsing Hua University, Biological Sciences Division, Hsinchu, Taiwan, April 18, 2005.

"Genomic-scale Transcriptional Analysis is Essential for Understanding and Improving Ex Vivo Expansion of human T Cells for Immunotherapy"

- National Tsing Hua University, Biological Sciences Division, Hsinchu, Taiwan, April 18, 2005.

"Biochemical Engineering in the Era of Postgenomics, Genetic Medicine, and Systems Biology"

- National Tsing Hua University, Dept. of Chemical Engineering, Hsinchu, Taiwan, April 20, 2005.

"Stem Cell Biotechnology: Lineage Commitment and Plasticity" **Keynote Lecture**

- Asia Pacific Biochemical Engineering Conference, Jeju Island, Korea, May 16, 2005.

"Understanding Butanol and Butyrate Toxicity and Tolerance in Clostridia at the Genomic Scale"
- Papoutsakis, E.T., The National Hellenic Research Foundation (E.I.E.), Institute for Bioinformatics, Athens, Greece, July 4, 2005.

"Complex Phenotypes: A Partial Genomic View"
- Amgen Award Lecture. 2005 Biochemical Engin. Conference XIV, Harrison Hot Springs, BC, Canada, July 13, 2005.

"The transcriptional program of early sporulation and stationary phase events in Clostridium acetobutylicum"
- AICHE Annual Meeting, Cincinnati, OH, Oct. 30-Nov. 4, 2005.

"The Global Transcriptional Program of Early Sporulation and Stationary Phase Events in Clostridium acetobutylicum"
- Dupont Company, Wilmington, DE, December 6, 2005.

"Complex phenotypes in the era of genomics"
- University of Delaware, Dept. of Chemical Engineering, February 13, 2006.

"A genomic view of lineage commitment & plasticity of human hematopoietic stem cells"
- Rutgers University, Dept. of Chemical & Biochemical Engineering, March 8, 2006.

"Experimental and Computational Innovation and Quality Control in DNA-Microarray Analysis"
- Princeton University, Dept. of Chemical Engineering, March 15, 2006.

"At crossroads" **Merck Cell-Culture Engineering Award Lecture**
- 2006 Cell-Culture Engineering X Conference, Whistler BC, Canada, April 24, 2006.

"Experimental and Computational Innovation and Quality Control in DNA-Microarray Analysis"
- Univ. of Massachusetts, Amherst, MA, Dept. of Chemical Engineering, May 11, 2006.

"Genomic tools in cell-culture and cell-therapy R&D"
- DECHEMA/VBU Symposium on Animal Cells: Profiling and Metabolic Engineering. Tutzing, June 13-15, 2006.

"Beyond discovery: genomic-scale analyses in bioprocess development & validation and in in clinical assessments"
- Behringer-Ingelheim Pharam Gmbh, Biberach, Germany, June 12, 2006.

"Experimental and Computational Innovation and Quality Control in DNA-Microarray Analysis"
- Texas Tech University, Lubbock, TX, Dept. of Chemical Engineering, October 20, 2006.

"A Gene-Ontology driven analysis of complex phenotypes"
- E. T. Papoutsakis, C. Paredes, K. Alsaker, C. Chen, P. Fuhrken and W.M. Miller. Blanch Fest Symposium, Annual Meeting of the AIChE, November 12-17, 2006, S. Francisco, CA.

"Biochemical Engineering for the 21sr Century" **Plenary Presentation**
- Fourth UK Biochemical Research Showcase (BERN), January 5, 2007. Birmingham, UK.

"The growth, differentiation and death of the megakaryocyte"
- Center for the Study of Systems Biology of Georgia Tech, May 10, 2007, Atlanta, GA.

"Hematopoietic stem cell differentiation in the megakaryocytic compartment: p53 & NF B, stress, apoptosis and platelets" **Plenary Presentation**
- Asia Pacific Biochemical Engineering Conference, November 6, 2007. Taipei, Taiwan.

"The transcriptional programs of clostridial sporulation and metabolite stress response"
- Department of Chemical & Biomolecular Engineering, Korea Advanced Institute of Science and Technology (KAIST). November 9, 2007. Daegeon, Korea.

"Clostridia and biofuels: potential and limitations"
- Department of Chemical & Biomolecular Engineering, Korea Advanced Institute of Science and Technology (KAIST). November 9, 2007. Daegeon, Korea.

"Of Megakaryocytes and Platelets" **R. B. Trull Lectureship**
- Dept. of Chemical Engineering. February 5, 2008. University of Texas at Austin.

"Clostridia, biofuels and biorefining: potential and problems"
- Plenary Presentation. Marie Curie Conference on Non-Pathogenic Clostridia, Febr. 24-27, 2008, Toulouse, France.

"Of Megakaryocytes and Platelets"
- National Institute of Cellular Biotechnology (N.I.C.B.). Dublin City Univ. Ireland. May 8, 2008.

"The Diversity of Niche". **Keynote Address.**
- Stem Cell Symposium. American Chemical Society. Philadelphia, PA. August 17-21, 2008.

"Metabolic Determinism, Selected Complexity or Forced Evolution for Biobased Chemicals?"
- Metabolic Engineering VII, Puerto Vallarta, Mexico. September 14-18, 2008

"Of Megakaryocytes and Platelets"
- Department of Chemical and Biological Engineering, State University of New York at Buffalo. October 15, 2008.

"Past, Present and Future of Metabolic Engineering"
- AIChE Annual Meeting (ChE Research and Technology – Past and Future). Philadelphia, PA. November 17, 2008.

"How to Find What You Do Not Know When You Do Not Even Know What to look for"
- AIChE Annual Meeting (In Honor of Doraiswami Ramkrishna's 70th Birthday). Philadelphia, PA. November 19, 2008.

"From Ethanol and Butanol Fermentations to Cell- and Tissue-Culture…and Back to Biofuels, 100 Years of Bioreactor Design, Operation and Challenges"
- AIChE Annual Meeting. (A Century of Reactor Design and Kinetics). Philadelphia, PA. November 18, 2008.

"50 Years of Bioreactor Design, Biochemical Kinetics and a Challenges, Elmer Gaden and B&B"
- Biochemical Engineering XVI: Past, Present and Future of Biochemical Engineering. Burlington, VT. July 6, 2009.

"Understanding and Engineering the Differentiation Program in Clostridia"
- Dept. of Microbiology, University of Pennsylvania School of Medicine, Philadelphia, PA, October 16, 2009.

"A Case for Differentiation Engineering: Understanding and Engineering the Differentiation Program in Clostridia"
- Invited seminar. Dept. of Chemical Engineering & Material Science", Michigan State University, East Lansing, MI, October 29, 2009.
- Invited seminar. Dept. of Chemical and Biomolecular Engineering, Rice University, Houston TX, January 14, 2010.

"With pathways and without"
- American Chemical Society. San Francisco, CA. The Elmer Gaden Award Lecture. March 21, 2010.

"25+ Years of Clostridial Biotechnology (INVITED: F. Heineken Symposium)"
- Papoutsakis ET. 239th National Meeting of the American Chemical Society (BIOT division programming), S. Francisco, CA, March 21-25, 2010.

"Microbial Alloys: Engineering Cells with Hybrid Programs and Machineries" **(INVITED Keynote presentation)**
- 2010 meeting of the SIM (Soc. of Industrial Microbiology), S. Francisco, CA. August 1-5, 2010.

"Engineering the Primary Metabolism and Differentiation in Solventogenic Clostridia" **Invited seminar**
- National Research Council (NRC; Canada), Biotechnology research Institute (BRI), Montreal, Quebec, Canada, October 25, 2010.

"To Road to Ex Vivo Platelet Production"
- Stanford University, Chemical Engineering, Stanford, CA, January 10, 2011.

"Microbial Alloys: Engineering Cells with Hybrid Machineries and Properties" **(INVITED Keynote presentation)**
- ET Papoutsakis, S Gaida, C Bi, S Nicolaou & K Zingaro. Asia Congress on Biotechnology, May 11-15, 2011, Shanghai, China.

"Systems Analysis & Differentiation Engineering of Solventogenic Clostridia"
- Chinese Acad Sci, Inst Plant Physiol & Ecol, Shanghai Inst Biol Sci, Key Lab Synthet Biol, & Shanghai Res & Dev Ctr Ind Biotechnol Shanghai, Peoples R China. May 10, 2011.

"Systems Analysis & Metabolic Engineering of Solventogenic Clostridia"
- Frontiers in Biological Sciences Lecture Series. Pacific Northwest National Laboratory, Richland, WA. June 1st 2011.

"The bioengineering of blood cells: Why and how we could possibly produce platelets and other blood cells in a factory"
- LECTURE 1 (general public). 2011-2012. Zandmer Distinguished Lecture Series. Department of Chemical and Petroleum Engineering, Univ. of Calgary, CANADA. November 17, 2011.

"To road to ex vivo platelet production: Internal & external stresses that the cells and we must manage"
- LECTURE 2 (technical; specialized). 2011-2012. Zandmer Distinguished Lecture Series. Department of Chemical and Petroleum Engineering, Univ. of Calgary, November 18, 2011.

"To road to ex vivo platelet production: Internal & external stresses that the megakaryocytic cells and we must manage"
- Physiology and Sol Sherry Thrombosis Center, Temple University School of Medicine, Philadelphia, PA, January 17, 2012.

"To road to ex vivo platelet production: Internal & external stresses that the megakaryocytic cells and we must manage"
- Institute for Medicine & Engineering. University of Pennsylvania, Philadelphia, PA, February 7, 2012.

"Systems Analysis & Metabolic Engineering of Solventogenic Clostridia"
- Brookhaven National Lab, Brookhaven, NY, March 12, 2012

"Microbial Alloys: Engineering Cells with Hybrid Machineries and Properties"
- Dept. of Chemical and Biological Engineering, Univ. of Wisconsin, Madison, WI, April 17, 2012.

"Generating Complex Biological Traits through Combinatorial and Multigenome Expansion of the Sampling Space"
- The 2012 James E. Bailey Lecture, SBE/AIChE, Pittsburgh, PA, October 30, 2012.

"Microbial Alloys: Engineering Cells with Hybrid Machineries and Properties"
- Dept. of Chemical Engineering, Texas A&M University, College Station, TX, November 7, 2012.

"Microbial Alloys: Engineering Cells with Hybrid Machineries and Properties"
- Dept. of Chemical and Biomolecular Engineering, Univ. of Houston, Houston, TX, November 9, 2012.

"To road to ex vivo platelet production: Internal & external stresses that the megakaryocytic cells and we must manage"
- Cardeza Foundation for Hematologic Research. Thomas Jefferson University (School of Medicine), Philadelphia, PA, November 28, 2012.

"Exploring the capabilities of the Geobiosphere's microbial genome"
- University of Alberta, Edmonton, Alberta, Canada, Symposium, October 22, 2013. Enabling Technologies for Engineered Biofunctionality (ETEB). May 28, 2013

"Expanding horizons for complex traits, all the way to the Geobiosphere's microbial genome"
- UC Berkeley, Energy Biosciences Institute, October 22, 2013.

"Force to death and new life, some with programming vitality"
- The 2013 DIC Wang Award Lecture. Annual Meeting of the American Institute of Chemical Engineers. S. Francisco, CA. Nov. 4, 2013.

"A role for the Aryl Hydrocarbon Receptor (AHR) on platelet function"
- Lindsey, S, Jiang, J, and Donna S. Woulfe DS and Papoutsakis ET (presenter). Invited presentation in the Symposium "Stem Cell Models for Integrated Biology: The Role of the AHR in Stem Cell Development and Lineage Specification" at the Society of Toxicology Annual meeting. Phoenix, AZ, March 23-27, 2014.

"Exploring the heterologous genomic space for building, stepwise, complex, microbial strains for large-scale bioprocessing"
- Papoutsakis, ET. The Plenary Lecture at the 3rd BioProScale Symposium. Technical University, Berlin, Germany, April 2-4, 2014.

"Microparticles as cell-to-cell communicators to empower therapies and technology: the case of megakaryocytic microparticles"
- Danish Conference on Biotechnology and Molecular Biology. May 22-23, 2014. Hotel Munkebjerg, Vejle. Denmark

"Expression of Heterologous Sigma Factors in Escherichia coli to Explore the Heterologous Genomic Space for Building, Stepwise, Complex, Multicomponent Phenotypes"
- Metabolic Engineering X. Vancouver, Canada, June 15-19, 2014.

"Microparticles as cell-to-cell communicators to empower therapies and technology: the case of megakaryocytic microparticles"
- Autonomous Univ of Barcelona, Spain. Dept of Chem. Engineering. October 3, 2014.

The 2014 William H. Schwarz Lecture "Microparticles as cell-to-cell communicators to empower therapies and technology: the case of megakaryocytic microparticles"

– Johns Hopkins University, Baltimore, MD, Nov. 6, 2014

"Megakaryocytic particles, proplatelets and microparticles"

– Delmarva Blood Bank, Newark, DE. November 11, 2014.

"The methylome and deep RNome in Clostridium: new gadgets uncover larger cellular complexity"

– EPFL (Swiss Federal Institute of Technology, Lausanne), Dept of Chemistry and Chem. Engineering. December 8, 2014

"Microparticles as cell-to-cell communicators to empower therapies and technology: the case of megakaryocytic microparticles"

– EPFL (Swiss Federal Institute of Technology, Lausanne), Dept of Bioengineering. December 12, 2014.

"The Quest for Synthetic Methylotrophy"

– ICBE15 | 5th International Conference on Biomolecular Engineering. Austin, TX, January 11-14, 2015.

"Microparticles as cellular communicators to empower therapies: the case of megakaryocytic microparticles"

– Univ. of Connecticut, Storrs, CT, March 5, 2015
– Princeton University, Princeton, NJ, April 22nd, 2015
– Univ. California, Los Angeles, CA, May 8, 2015
– Univ of Delaware, Biomedical Engineering Dept. September 14, 2015.

"Heterologous sigma factors for functional screening of the allo- and metagenomes, and building pathways & traits"

– June 19, 2015, Novo Nordisk Foundation Center for BiosustainabilityCopenhagen, Denmark

"The Importance of & a Strategy for Synthetic Methylotrophy"

– Annual Meeting of the SIMB (Society for Industrial Microbiology & Biotechnology), August 2-6, 2015, Philadelphia, PA.

"Waste gases, methanol and biomass: partners in sustainable production of chemicals"

– Chemical Heritage Foundation: Innovation Day 2015. October 6, 2015. Philadelphia, PA.

"Metabolic Engineering and Synthetic Biology for the Biological Production of Chemicals: Biomass & the New C1 Substrates"

– Plenary Presentation. Genomics, Metabolic Engineering and Bioinformatics in Biotechnological Applications. III Workshop CeBiB (Center for Biotechnology and Bioengineering). Dec. 2 - 4, 2015. Santa Cruz, Chile

"Starting and Sustaining a Biotech Company"

– Genomics, Metabolic Engineering and Bioinformatics in Biotechnological Applications. III Workshop CeBiB (Center for Biotechnology and Bioengineering). Dec. 2 - 4, 2015. Santa Cruz, Chile

"Accelerating and Enhancing CO_2 Fixation via the Wood-Ljungdahl Pathway for Electrofuel Production"

- NRL/ARPA-E Microbial Electrosynthesis Workshop, November 3 – 4, 2016
  ARPA-E headquarters, 950 L'Enfant Plaza, SW, Washington, DC

"Metabolic Engineering and Synthetic Biology for improved biotechnological production: promises and realities"

- B-Debate, International Center for Scientific Debate, Barcelona, Spain.
  INDUSTRIAL BIOTECHNOLOGY: QUESTIONS TODAY FOR TOMORROW'S NEEDS
  Barcelona, Spain, February 14, 15, 2017
- IBET/ITQB Institute, Universidade Nova de Lisboa, Portugal, March 24, 2017

"101 Years of Clostridial Biotechnologies"

- E. V. Murphree American Chemical Society National Award Lecture, April 5, ACS National Meeting, San Francisco, CA, April 2-6, 2017
- Univ. of California Riverside, CA, October 13, 2017.

"Cell-derived microparticles for cell therapy, cargo delivery"

- Universitat Autonoma de Barcelona, Spain, February 13, 2017

"Metabolic Engineering and/or Synthetic Biology for Improved Biotechnological Production: Promises and Realities"

- Keynote presentation in session "Advances in Metabolic Engineering II: Value-Added Products from Renewable Feedstocks" at the Annual Meeting of the Amer. Institute of Chemical Engineers, Nov. 2, 2017. Minneapolis, MN

"Synthetic Methylotrophy: Engineering Platform Organisms for Methane & Methanol Conversion to Fuels & Chemicals

- Advanced Bioeconomy Leadership ABLC2018 Conference, Washington, DC, Febr. 28-March 2nd, 2018.

"Synthetic, syntrophic microbial consortia for CO_2 capture and complete utilization of substrate carbon"

- Imperial College, Chemical Engineering, London, UK, April 18, 2018

"Megakaryocytic microparticles for cell- and gene-therapies"

- Imperial College, Chemical Engineering, Blood Symposium, London, UK, April 20, 2018

"Synthetic syntrophy with CO2 fixation enables complete and efficient carbon and electron utilization for metabolite production and expands the metabolite space"

- Univ of Chile, Santiago, Chile, Center for Biotechnology & Bioengineering. July 19, 2018.

"Synthetic Clostridium Syntrophic Co-Cultures Enabling Efficient Carbon and Electron Utilization"

- Keynote presentation. Clostridium XV, 18-20 September 2018, TU Munich, Freising, Germany

"Native and engineered megakaryocytic microparticles for cell- and gene-therapies"

- Dept of Chemical Engineering, Colorado School of Mines, Golden, CO, October 26, 2018.

"Native and engineered megakaryocytic microparticles for cell- and gene-therapies": the Blue & Green Seminar Michigan State University & University of Michigan. Chemical Engineering,

- November 8, 2018

"Native and engineered megakaryocytic microparticles for cell- and gene-therapies": The Alumni Lecture I.

- Dept of Chemical Engineering, University of Massachusetts, Amherst, MA, November 15, 2018.

"Metabolic Engineering AND/OR Synthetic Biology for improved biotechnological production: promises and realities": The Alumni Lecture II.

- Dept of Chemical Engineering, University of Massachusetts, Amherst, MA, November 16, 2018.

"Direct cell-to-cell exchange of matter in a synthetic *Clostridium* syntrophy enables CO_2 fixation, superior metabolite yields, & an expanded metabolic space". Invited Keynote Lecture.

- The C1net Conference 4. BBSRC, University of Nottingham, UK. January 22, 2019.

"The emerging importance of microbial consortia in the biotechnology for sustainability".

- The Inaugural Nazmul Karim Lecture. Texas A&M University, March 22nd, 2019.

"Native and engineered megakaryocytic microparticles for cell- and gene-therapies"

- Tufts University, April 22nd, 2019

"The emerging importance of microbial consortia in the biotechnology for sustainability

- EPFL, Lausanne, Switzerland, October 25, 2019.

"Syntrophic Interactions: Nature's way of "sharing".

- 2020 ASM Award Lecture for *Applied & Biotechnological Research:* ASM Microbe On Line. Summer-Fall 2020.

"Metabolic Engineering *AND/OR* Synthetic Biology for improved biotechnological production: promises and realities"

- CeBiB (Centre for Biotechnology & Bioengineering; U. Chile). Annual Meeting. XII. Bioinformatics, Metabolic Engineering and Genomics for Biotechnological Applications. 23 - 25 November 2020.

"Eliminating CO2 from Microbial Fermentations using Mixed Cultures", Annual Meeting,

- Biomass Biorefinery Network (BBNet), Networks in Industrial Biotechnology and Bioenergy (BBSRC NIBB) UK, October 13-15, 2021, Cheshire, UK

"Optimized Synthesis for the Bioeconomy: valorizing sugar and all substrates through CO_2 (re)utilization & electron sources and Raising International Support for CeBiB"

- CeBiB (Centre for Biotechnology & Bioengineering; U. Chile). Annual Meeting. XIII. Genomics, Bioinformatics and Metabolic Engineering for Biotechnological Applications. December 6-8, 2021.

"Acetogenic Mixotrophy for CO_2 Co-Utilization in Microbial Fermentations Using Syntrophic Cocultures'

- DSM, Columbia, MD, May 18, 2022

"Heterologous cell fusion in syntrophic cocultures of *Clostridium* organisms: Transfer of Proteins, RNA and DNA, and the persistence of hybrid cells and phenotypes"

- The Charles Thom Award lecture, Soc. Ind. Microb. & Biotechnology (SIMB), San Francisco, August 9, 20233

"Production of Chemicals from Mixotrophic Clostridium Cocultures Enabling CO_2 Fixation to Achieve Transformative Product Yields"
- Univ of Tennessee at Knoxville, Dept of Chemical & Biomolecular Engineering, October 18, 2022

"Native and engineered megakaryocytic extracellular vesicles for cell- and gene-therapy applications"
- BOKU University, Dept of Biotechnology, Vienna, Austria, March 28, 2023
- BELSACT (Belgian Society for Animal Cell Technology). April 5, 2023

"Heterologous cell fusion in syntrophic cocultures of clostridium organisms? Is it real?"
- Univ of Minnesota, Biotechnology Institute, St. Paul, April 13, 2023

"Engineered megakaryocytic extracellular vesicles for hematological cell and gene therapies".
- 28th Annual Conference of CBA (Chinese Biopharmaceutical Association, USA). September 30, 2023

"Microbial and Hybrid Processes for Complete Sugar-Carbon Utilization and CO_2 Fixation to Achieve Transformative Metabolite Yields"
- Texas A&M University, Dept of Chemical Engineering, November 15, 2023.

"Understanding and modeling cellular metabolism towards design-driven continuous biomanufacturing", March 19, 2024
- BOKU University, Dept of Biotechnology, Vienna, Austria, March 28, 2023

"Energy Production and Engineering Biology: *What Metabolic Engineering/Synthetic Biology Can or Cannot Do"*
- Texas A&M University, Dept of Chemical Engineering, November 15, 2023.

"Addressing the data & modeling challenges: Pseudo-perfusion experimentation illuminates CHO-cell behavior under perfusion conditions to facilitate continuous biomanufacturing"
- Japanese Association for Animal Cell Technology (AACT) 2025 Meeting (Osaka), December 8-11, 2025

"Native and engineered megakaryocytic extracellular vesicles and membranes for targeted delivery"
- Wistar Institute, Philadelphia, PA, February 25, 2026
- Texas A&M University, Dept of Biomedical Engineering, March 5, 2026

" Syntrophic cocultures of acetogenic non-photosynthetic mixotrophy for CO_2 utilization: commensalism, mutualism and heterologous cell fusion"
- Princeton University, Princeton, NJ, May 7, 2026

" CO_2 valorization: what biotechnology can do alone and with electrocatalysis and chemistry"
- Plenary Lecture: 23rd International Conference on Carbon Dioxide Utilization (ICCDU), St. Louis, MO July 6-10, 2026

"Enabling Models to Digital Twins for Therapeutic Protein Biomanufacturing & the Power of Data"
- Invited Presentation: Biochemical and Molecular Engineering XXIV "Harnessing the Power of Community for a Stronger Biotech Future", Rio Grande, Puerto Rico, July 19 – 23, 2026.

PUBLICATIONS

BOOKS

- "Foundations of Biochemical Engineering: Kinetics and Thermodynamics in Biological Systems." American Chemical Society Symposium Series No. 207 (with H.W. Blanch and G.N. Stephanopoulos), ACS, Washington, D.C., 1983, 522 pages.
- Lee, S. Y. and Papoutsakis, E. T. (Editors); "Metabolic Engineering" M. Dekker, New York, 1999. 423 pages.

325 REFERREED PUBLICATIONS.

Publications are grouped thematically but numbered chronologically

Total citations >22,500; h-index: 89 (Web of Science, All databases).

Google Scholar: Total citations: >30,000; h-index: 101
https://scholar.google.com/citations?hl=en&view_op=list_works&gmla=AJsN-F7Kpkg6W1Qvubc-uG4KShfFtFLYtvmrVSzOAHsETshlKAbbJloBB5qwSIm-_yXPdYqOmT9Tnw344wq-CS4xkzoAOR94Zg&user=Z-n8_jsAAAAJ

I. QUANTITATIVE METABOLISM & PHYSIOLOGY, INTRACELLULAR FLUXES, MODELS & ENERGETICS

1. Papoutsakis, E.T., Lim, H.C. and Tsao, G.T. 1978. Role of formaldehyde in the utilization of C1- compounds via the ribulose monophosphate cycle. Biotechnol. Bioeng. **20**: 421-442.
2. Papoutsakis, E.T., Lim, H.C. and Tsao, G.T. 1978. SCP production on C1 compounds. AIChE J. **24**: 406-417.
3. Hirt, W., Papoutsakis, E.T., Krug, E., Lim, H.C. and Tsao, G.T. 1978. Formaldehyde incorporation by a new methylotroph (L3). Appl. Environ. Microbiol. **36**: 56-62.
6. Papoutsakis, E.T., Hirt, W. and Lim, H.C. 1981.On the Bacterial utilization of pure and mixed C1 compounds for SCP production. Biotechnol. Bioeng. **23**: 235-242.
11. Papoutsakis, E.T. and Lim, H.C. 1981. SCP production on C1 compounds: the bioefficiency. Ind. Eng. Chem. Fundam. **20**: 307-314.
13. Diwan, A.R., Chu, I-M. and Papoutsakis E.T. 1983. Substrate transport and its effect on the dynamics of methylotrophic growth. Biotechnol. Lett. **5**: 579-584.
15. Papoutsakis, E.T. 1984. Equations and calculations for fermentations of butyric acid bacteria. Biotechnol. Bioeng. 26: 174-187.
16. Papoutsakis, E.T. and Meyer, C.L. 1985. Equations and calculations of product yields and preferred pathways for butanediol and mixed-acid fermentations. Biotechnol. Bioeng. 27: 50-66.
17. Papoutsakis, E.T. and Meyer, C.L. 1985. Fermentation equations for propionic- acid bacteria and for production of assorted oxychemicals from various sugars. Biotechnol. Bioeng. 27: 67-80.
19. Meyer, C.L., McLaughlin, J.K. and Papoutsakis, E.T. 1985. The effect of CO on growth and product formation in batch cultures of Clostridium acetobutylicum. Biotechnol. Lett. **7**: 37-42.
20. Roos, J.W., McLaughlin, J.K. and Papoutsakis, E.T. 1985. The effect of pH on nitrogen supply, biomass lysis and solvent production in fermentations of Clostridium acetobutylicum. Biotechnol. Bioeng. **27**: 681- 694.
21. McLaughlin, J.K., Meyer, C.L. and Papoutsakis, E.T. 1985. Gas chromatography and gateway sensors for on-line state estimation of complex fermentations (Butanol/Acetone Fermentation). Biotechnol. Bioeng. **27**: 1246-1257.
23. Huesemann, M., and Papoutsakis, E.T. 1986. Effect of acetoacetate, butyrate, and uncoupling ionophores on growth and product formation of Clostridium acetobutylicum. Biotechnol. Lett. **8**: 37-42.
24. Meyer, C.L., McLaughlin, J.K. and Papoutsakis, E.T. 1986. On-line chromatographic analysis and fermentor state characterization of butanol/acetone fermentations. Biochemical Engineering IV, Ann. N.Y. Acad. Sci., **469**: 350-363.
26. Meyer, C.L., Roos, J.W. and Papoutsakis, E.T. 1986. Carbon monoxide gasing leads to alcohol production and butyrate uptake without acetone formation in continuous cultures of Clostridium acetobutylicum. Appl. Microbiol. Biotechnol. **24**: 159-167.
28. Chu, I-M. and Papoutsakis, E.T. 1987. Growth dynamics of a methylotroph (Methylomonas L3) in continuous cultures. I. Fast transients induced by methanol pulses and methanol accumulation. Biotechnol. Bioeng. **29**: 55-64.
29. Chu, I-M. and Papoutsakis, E.T. 1987. Growth dynamics of a methylotroph (Methylomonas L3) in continuous cultures. II. Growth inhibition and comparison against an unstructured model. Biotechnol. Bioeng. **29**: 65-71.
31. Chu, I-M., Keuer, T.A. and Papoutsakis, E.T. 1987. Formate transport, growth inhibition and the membrane protonmotive force in two methylotrophs (T15 and L3). Appl. Microbiol. Biotechnol. **26**: 70-77.

32. Papoutsakis, E.T., Bussineau, C.M., Chu, I-M., Diwan, A.R. and Huesemann, M. 1987. Transport of substrates and metabolites and their effect on cell metabolism [in butyric-acid and methylotrophic fermentations]. Biochem. Engineering V, Ann. N.Y. Acad. Sci. **506**: 24-50.
33. Bussineau, C.M. and Papoutsakis, E.T. 1988. Evidence suggesting energy-dependent formaldehyde transport in an RuMP-type methylotroph (T15). Arch. Microbiol. **149**: 214-219.
37. Huesemann, M.H.W. and Papoutsakis, E.T. 1988. Solventogenesis in Clostridium acetobutylicum fermentations related to carboxylic acid and proton concentrations. Biotechnol. Bioeng. 32: 843-852.
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V. STEM-CELL & HEMATOPOIETIC-CELL BIOENGINEERING

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319. Thompson W, and Papoutsakis ET. 2023. Similar but distinct: The impact of biomechanical forces and culture age on the production, cargo loading, and biological efficacy of human megakaryocytic extracellular vesicles for applications in cell and gene therapies *Bioeng Transl Med. **8:** e10563.* *https://doi.org/10.1002/btm2.10563*
326 Das, S, Thompson W, and Papoutsakis ET. 2024. Engineered and hybrid human megakaryocytic extracellular vesicles for targeted non-viral cargo delivery to hematopoietic (blood) stem and progenitor cells. Frontiers Bioeng. Biotech. 12: Article Number1435228. DOI10.3389/fbioe.2024.1435228

VI. T-CELL BIOENGINEERING & GENOMCS FOR CELLULAR IMMUNOTHERAPY

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150. Carswell, K.S., and Papoutsakis, E.T. 2000. Culture of human T-cells in stirred bioreactors for cellular immunotherapy applications: shear, proliferation, and the IL-2 receptor. Biotechnol. Bioeng. **68**: 328-338.
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VII. COMPUTATION BIOLOGY

181. Thomas, R., Mehrotra, S., Papoutsakis, E.T., Hatzimanikatis·, V. 2004. A model-based optimization framework for the inference of gene regulatory networks from DNA array data. Bioinformatics. **20**: 3221-3235.
198. Thomas, R., Paredes, C.J, Mehrotra, S., Papoutsakis, E.T., Hatzimanikatis·, V. 2007. A model-based optimization framework for the inference of regulatory interactions using time-course DNA microarray expression data. BMC Bioinformatics **8**: 228.
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323. Reddy, JV, Leibiger, T, Singh, SK, Lee, KH, Ierapetritou, M, Papoutsakis, ET. 2025. A Novel, Site-Specific N-Linked Glycosylation Model Provides Mechanistic Insights Into the Process-Condition Dependent Distinct Fab and Fc Glycosylation of an IgG1 Monoclonal Antibody Produced by CHO VRC01 Cells. Biotechnol. Bioeng. DOI 10.1002/bit.28916

VIII. TRANSPORT MODELS, APPLIED MATHEMATICS & OTHER

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5. Papoutsakis, E.T., Ramkrishna, D. and Lim, H.C. 1980. The extended Graetz problem with prescribed wall flux. AIChE J. **26:** 779-787.
7. Papoutsakis, E.T. and Ramkrishna, D. 1981. Conjugated Graetz problems. I. General formalism and a class of solid-fluid problems. Chem. Eng. Sci. **36**: 1381-1391.
8. Papoutsakis, E.T. and Ramkrishna, D. 1981. Conjugated Graetz problems. II. Fluid-fluid problems. Chem. Eng. Sci. **36**: 1393-1399.
9. Papoutsakis, E.T. and Ramkrishna, D. 1981. Heat transfer in a capillary flow emerging from a reservoir. Trans. ASME, J. Heat Transf. **103**: 429-435.
10. Papoutsakis, E.T. 1981. Nusselt numbers near the entrance of the heat-exchange section in flow systems. AIChE J. **27**: 687-689.
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58. Papoutsakis, E.T. 1991. Developments in product recovery and purification. Chapter 13 in "Recombinant DNA Technology and Applications", A. Prokop, R. Bajpai, C. S. Ho, eds, pp. 357-412; McGraw-Hill.
133. Horner, M., Miller, W.M., Ottino, J.M., and Papoutsakiw, E.T. 1998. Transport in a grooved perfusion flat-bed bioreactor for cell therapy applications. Biotechnol. Progr. **14**: 689-699.
163. Chow, D., Miller, W.M., and Papoutsakis, E.T. 2001. Estimation of oxygen tension distributions of the bone marrow hematopoietic compartment. I. Krogh's model. Biophysical J. **81**: 675-684.
164. Chow, D., Miller, W.M., and Papoutsakis, E.T. 2001. Estimation of oxygen tension distributions of the bone marrow hematopoietic compartment. II. Modified Kroghian models. Biophysical J. **81**: 685-696.

IX. DNA COMPUTING

184. Tsaftaris S.A., Katsaggelos A.K., Pappas T.N., and Papoutsakis E.T. 2004. DNA Based Matching of Digital Signals. Proceedings of IEEE International Conference on Acoustics, Speech, and Signal Processing. **5**: 581-584.
185. Tsaftaris S.A., Katsaggelos A.K., Pappas T.N., and Papoutsakis E.T. 2004. DNA computing from a signal processing viewpoint. IEEE Signal Processing Magazine. **21** (5): 100-106.
186. Tsaftaris S.A., Katsaggelos A.K., Pappas T.N., and Papoutsakis E.T. 2004. How can DNA computing be applied to digital signal processing? IEEE Signal Processing Magazine. **21** (6): 57-61.

CONTINUED EDUCATION COURSES

1. Organized and offered (1996-2000) short course "Cell culture and separations for cell and gene therapies."
2. Above short course was later offered (with W.M. Miller) for the American Society of Mechanical Engineers Bioprocess Technology Seminars (October 2001 in Atlanta, GA; and October 2002 in San Diego, CA).
3. ESACT Shortcourse "Animal Cell Technology". Llafranch, Costa Brava (Barcelona), Spain. September/October 2011-2024.

PATENTS

I. Issued

1. Sandstrom, C., Papoutsakis, E.T., Miller, W.M., and Bender, J.G. Flow-through bioreactor with grooves for cell retention, US Patent No. 5,512,480. Issued: April 30, 1996. Assignee: Baxter Int. Inc & Northwestern Univ. Other International: WO9524464-A1; AU9520601-A; EP698085-A1; US5512480-A; EP698085-A4; JP9501324-W; IL112944-A; AU687531-B.

2. Collins, P.C., Papoutsakis, E.T., and Miller, W.M. Method of Determining Progenitor Cell Content of A Hematopoietic Cell Culture. U.S. Patent 6,077,708. Issued on June 20, 2000. Assignee: Northwestern Univ.

3. Papoutsakis, E.T., Tomas, C., Tesic, M., and J. Y. Santiago. Increased cell resistance to toxic organic substances. US Patent No. 6,960,465. Issued: Nov. 1, 2005. Assignee: Northwestern Univ.

4. Senger, R.S., Papoutsakis, E.T. Reverse Engineering Genome-Scale Metabolic Network Reconstructions for Organisms With Incomplete Genome Annotation and Developing Constraints Using Proton Flux States and numerically-Determined Sub-Systems". US patent 8,311,790. Issued: 11/13/2012. Assignee: Univ. of Delaware.

5. Papoutsakis, ET, Al-Hinai, MA, Jones, SW, Indurthi, DC, Mitchell DK, Fast A. Recombinant clostridia that fix CO2 and CO and uses thereof. US patent 8,759,070. Issued: 6/24/2014. Assignee: Univ. of Delaware.

6. Papoutsakis ET, Gaida SM. Engineering complex microbial phenotypes with transcription enhancement. US patent 9,023,618 issued 5/5/2015. Assignee: Papoutsakis ET, Gaida SM

7. Tracy, B.P., and Papoutsakis, E.T. Methods and compositions for genetically manipulating clostridia and related bacteria with homologous recombination associated proteins. US Patent 9,493,778. Issued November 15, 2016. Assignee: Elcriton, Inc.

8. Papoutsakis, E., S. Nicolaou, A. Fast, V. Falara, R. K. Bennett, W. B. Whitaker, J. Gonzalez, M. Antoniewicz. Synthetic methylotrophy to liquid fuels and chemicals. US patent 10,059,920. Issued: 8/28/2018. Assignee: Univ. of Delaware.

9. Papoutsakis, E, C-Y Kao and J. Jiang Megakaryocytic particles and microparticles for cell therapy and fate modification of stem and progenitor cells. US patent 10,538,738. Issued: 1/21/2020. Assignees: Papoutsakis, E, C-Y Kao and J. Jiang.

10. Papoutsakis, E., S., W. B. Whitaker, Bennett, R. K. Synthetic methylotrophs. US patent 10,640,746. Issued: 5/20/2020. Assignee: Univ. of Delaware.

11. Papoutsakis, E., S. Nicolaou, A. Fast, V. Falara, R. K. Bennett, W. B. Whitaker, J. Gonzalez, M. Antoniewicz. Synthetic methylotrophy to liquid fuels and chemicals. US patent 10,717,964 B2 (divisional of US patent 10,059,920). Issued 7/21/2020. Assignee: Univ. of Delaware.

12. Papoutsakis, E, C-Y Kao and J. Jiang. MEGAKARYOCYTIC PARTICLES AND MICROPARTICLES FOR IN VIVO HEMATOPOIETIC CELL AND GENE THERAPIES. US 11,820,968 B2. Date of Patent: Nov. 21, 2023

II. Utility applications under prosecution

13. ET Papoutsakis, K Charubin, AA Mitkas Syntrophic co-cultures and uses thereof - US Patent App. 16/327,695, Published 7/19/2019. PCT/US2017/048176 (August 23, 2017). WO2018039319A1 (March 1, 2018). Assignee: Univ. of Delaware.

14. Papoutsakis, E, Day, E, Winter, E, Harris, J, C-Y Kao and Das, S. BIOMEMBRANE-COVERED NANOPARTICLES (BIONPS) FOR DELIVERING ACTIVE AGENTS TO STEM CELLS. PCT/US19/63685. filed 11/24/2019. Publication of World patent WO2020113059A1 (June 4, 2020). Assignee: Univ. of Delaware.

15. Papoutsakis, E, C-Y Kao and J. Jiang. Megakaryocytic particles and microparticles for in vivo hematopoietic cell and gene therapies. Divisional application (number 16711396) filed 12/10/2019. Publication: Pub. No.: US 2020/0115681 Al (43). Pub. Date: Apr. 16, 2020. Assignees: Papoutsakis, E, C-Y Kao and J. Jiang.

16. Papoutsakis, E, & C-Y Kao. MicroRNAs Enriched in Megakaryocytic Extracellular Vesicles and Uses Thereof. Filled 10/21/2020. PCT/US20/056593. EFS ID: 40902315

17. Papoutsakis E & S. Das. Cellular membrane vesicles and uses thereof. PCT/US2020/054967, filed 10/14/2021. Assignee: Univ. of Delaware.

18. Papoutsakis ET, Seo, Y, Otten, J, Willis, N, Hill, H & Capece, S. ENGINEERED SYNTROPHIC MICROBIAL CONSORTIA AND USES THEREOF. PCT/US23/79827. Filed 11/15/2023

19. Papoutsakis E & S. Das. Cellular membrane vesicles and uses thereof. Filed 04/14/2023. US-2023-0390202-A 1

III. Provisional Patent Applications

20. Papoutsakis, E, Seo, H, Otten J, Willis NB, Hill, J. Production of Chemicals and Bioenergy From Sugars, Small 1C Molecules and Gases Using Engineered Mixotrophic Consortia for Enhanced CO2 Fixation. 11/15/2022, 63/425,554.

21. Papoutsakis ET, Das S and Belliveau, J. ENGINEERED EXTRACELLULAR VESICLES AND USES THEREOF. Filed 4/21/2023. No. *63/461,018*

22. Papoutsakis ET, Seo, Y & Willis, N. Enhancing Hydrogen and Carbon Dioxide Use In Acetogenic Monocultures and Cocultures. Filed 2/15/2024. *63/553,918*

IV. Provisional Patent Applications that were abandoned

23. Papoutsakis, E, Escobar, C, Das, S & C-Y Kao Megakaryocytic Microparticles for Targeted Delivery of Native or Synthetic Cargo Molecules to Hematopoietic Stem and Progenitor Cells for Cell and Gene Therapies. Provisional patent application No. 62970284. EFS ID: 38510770. Filed Febr. 6, 2020. Assignee: Univ. of Delaware.

24. Papoutsakis, E, C-Y Kao, & B. Dubner. Granulocytic Extracellular Vesicles for Cell and Gene Therapy Applications Targeting Blood Stem Cells. Provisional patent application No. 62/981,645. EFS ID: 38695551. Filed Febr. 26, 2020. Assignee: Univ. of Delaware.

V. Patent publications (from abandoned applications) other than those listed above

25. Lee, S.Y, Park, J.H, and Papoutsakis, E.T. Enhanced butanol producing microorganisms and method for preparing butanol using the same. WO2008/072921- A1 (WOKR2007/006525) 14 Dec 2007. Assignee: Biofuelchem Co Ltd.

26. Lee, S.Y, Papoutsakis, E.T., and Jang, Y.S. Method for preparing butanol through butyryl-CoA as intermediate using yeast. WO2008/097064-A1 (WOKR2008/000787). 11 Febr 2008. Assignee: Biofuelchem Co Ltd.

27. Papoutsakis, E. T., Lee, S.Y., and Park, J.H. Method for preparing butanol through butyryl-CoA as an intermediate using bacteria. WO2008/072920-A1 (WOKR2008/070807) 18 June 2008. Assignee: Biofuelchem Co Ltd.

28. Tracy, B.P., Paredes, C.J., and Papoutsakis, E.T. Methods and composition for generating sporulation deficient bacteria. Pub. No US 2010/0047890 A1 (Pub. Date: Febr. 25, 2010). Assignee: Northwestern Univ.

29. Sillers, R.S., and Papoutsakis, E.T. Systems and Methods for Selective Alcohol Production. Pub. No. US 2010/0151544 A1 (Pub. Date June 17, 2010). Assignee: Northwestern Univ.

30. Nicolaou S, Gaida S, Papoutsakis ET. 2011. CO-EXISTING LIBRARIES FOR DEVELOPING COMPLEX MICROBIAL PHENOTYPES. Patent No. US2011/021505. WO 2011/088443 A3. 01/18/2011. Assignee: Univ. of Delaware.

31. Papoutsakis, E.T. Hess, D. R. & Tracy. B. P. Generation of asporogenous solventogenic clostridia. Utility patent application. US2011/0256604 A1 (pub. Date: Oct 20, 2011). Assignee: University of Delaware.

32. Papoutsakis, E.T., Bi, C. and Nicolaou, S. Engineering Complex Microbial Phenotype with Successive Integrations of Exogenous DNA (SIEDNA). US2011/0300553 A1 (Dec. 8, 2011). Assignee: University of Delaware.

33. Papoutsakis, ET, Al-Hinai, M and Fast AG. Recombinant clostridium organism and method for isolation of double-crossover allelic exchange mutants. WO2013/133882 A3 PCT/US 2012/069672 (Publ. date: Dec 5, 2013). Assignee: University of Delaware.

CONFERENCES AND SESSIONS CHAIRED; PROFESSIONAL COMMITTEES

1. "Biochemical Reactor Design III: General Aspects," 182nd Annual ACS Meeting, New York, NY. (August 1981). Cosponsored by the IEC and MBT Divisions (Co-chair with H.W. Blanch).

2. "Foundations of Biochemical Engineering: Kinetics and Thermodynamics in Biological Systems," 1982 ACS/IEC Winter Symposium, Boulder, CO, (January 17-20, 1982) (Co-chair with H.W. Blanch and G.N. Stephanopoulos).
3. Organizing Committee: ACS Industrial and Engineering Chemistry Winter Symposia (1980-1982).
4. Vice-Chairman: National Meeting Program Committee of the Division of Industrial and Engineering Chemistry of ACS (1982-85).
5. "Fundamentals of Anaerobic Fermentations", 1984 Annual AIChE Meeting, San Francisco, CA, November 1984.
6. "Kinetics and Reactor Design in Anaerobic and Microaerobic Fermentations", National Meeting of the Amer. Chem. Society, Chicago, IL, Sept. 1985.
7. "Cultivation of Mammalian Cells - A State-of-the Art Review", (2 sessions), National ACS Meeting, Anaheim, CA, Sept. 7-12, 1986.
8. "Shear and Other Hydrodynamic Effects in Animal Cell Culture", (Symposium, 2 Sessions), ACS National Mtg., New Orleans, LA, (Aug.-Sept. 1987).
9. "Regulation of Growth and Product Formation in Microbial Cells", (Symposium, 2 sessions), ACS National Mtg., New Orleans, LA, (Aug.-Sept. 1987).
10. "Symposium on Animal Cell Biotechnology: Engineering", (2 sessions), ACS National Meeting, Toronto, Canada, June 5-11, 1988.
11. "Metabolic Aspects of Animal Cell Culture", Annual AIChE Meeting, Washington, D.C. (Nov. 1988).
12. "Free Forum: New and Creative Research in Chemical Engineering", Annual AIChE Meeting, San Francisco, CA, November 1989.
13. Program Coordinator: Area 15c (Biotechnology) for the 1991 Annual Meeting of the Amer. Inst. of Chem. Engineers, 1991 (23 sessions).
14. "Poster Session" Progress in Recombinant DNA Technology and Applications, Eng. Foundation Conf., Potosi, MO, June 3-8, 1990. (with G. Georgiou).
15. "Cross disciplinary Research in Biotechnology: Efforts, Problems and Successes", Annual AIChE Meeting, Chicago, IL, November 11-16, 1990.
16. "Free Forum: Unconventional or New Problems and Approaches in Chemical Engineering Research and Education", Annual AIChE Meeting, Chicago, IL, November 11-16, 1990.
17. "Molecular and Cellular Approaches in Bioengineering: Cell Responses to Different Stimuli", Annual AIChE Meeting, Los Angeles, CA, November 17-22, 1991.
18. "Prokaryotic Cellular Processes", Biochemical Engineering VIII Conference, Princeton, NJ, July 11-16, 1993.
19. "Shear and Other Environmental Effects of Cultured Cells and Their Metabolism", Annual Meeting, Amer. Inst. of Chem. Engineers, St. Louis, MO, November 7-12, 1993.
    a. 20. 20 "Fluid-Mechanical Considerations in Animal Cell Bioreactors: A Progress Report", Cell Culture Engineering IV, San Diego, CA, March 7-12, 1994.
20. Organizing Committee: RecDNA Biotechnology III (Engineering Foundation Conference), Deauville, France, October 16-21, 1994.
21. Organizer: CLOSTRIDIUM III (International Workshop), Evanston, IL, June 23-25, 1994.
22. Organizing Committee: Cell Culture Engineering V (Engineering Foundation Conference), San Diego, CA, Jan. 28-Feb. 2, 1996.
23. Session Co-Chair: "Tissue Engineering and Somatic Cell Therapies" in Cell Culture Engineering V (Engineering Foundation Conference), San Diego, CA, Jan. 28-Feb. 2, 1996.
24. Advisory Committee: 1996 ESACT (European Society for Animal Cell Technology) Meeting, Portugal, May 1996.
25. Session Co-Chair "Tissue Engineering and Biomedical Devices" in 1996 ESACT (European Society for Animal Cell Technology) Meeting, Portugal, May 1996.
26. Organizing Committee: RecDNA Biotechnology IV/Metabolic Engineering I (Engineering Foundation Conference), Danvers, MA, Oct. 6-11, 1996.
27. Organizing Committee: Biochemical Engineering X (Engineering Foundation Conference), Kananaskis, Alberta, Canada, May 18-23, 1997.

28. Session Co-Chair: "New Technologies for Health-care Products" 1997 ESACT Meeting, Tours, France, Sept. 7-12, 1997.
29. Advisory Committee: Cell Culture Engineering VI (Engineering Foundation Conference), San Diego, CA, Feb. 7-12, 1998.
30. Area Chair: Biotechnology: PAN-AMERICAN WORKSHOP TO PROMOTE COLLABORATION IN CHEMICAL ENGINEERING (NSF sponsored), Rio de Janeiro, Brazil, Aug. 2-5, 1998.
31. Organizing Committee and Session Chair: Engineering Foundation Conference on Metabolic Engineering II in Elmau, Germany, October 1998.
32. Organizing Committee and Session Chair: Engineering Foundation Conference on Biochemical Engineering XI, Salt Lake City, UT, July 25-30, 1999.
33. Advisory Committee and Session Chair: Cell Culture Engineering VII, Santa Fe, NM, Feb. 5-10, 2000.
34. Scientific Program Committee and Session Chair: BIOTECHNOLOGY 2000, THE WORLD CONGRESS ON BIOTECHNOLOGY & the 11th International Biotechnology Symposium, Berlin, Germany, Sept. 2000.
35. "Stem cells & cell-based therapeutics", Annual Meeting of the Amer. Instit. Medical & Biological Engineering (AIMBE), Washington DC, March 1, 2002.
36. "Stem cells & cell therapies (with M. Peshwa), Cell Culture Engineering VIII (Eng. Foundation Conferences), Snowmass, CO, April 1-6, 2002.
37. "Metabolic engineering", 9th International Symposium on the Genetics of Industrial microorganisms (GIM), Gyeongju, Korea, July 1-5, 2002.
38. "Stem Cell Engineering" (with P. Zandstra), EMBS/BMES 2002 (IEEE Engineering in medicine & Biology Society, Biomedical Engineering Society Annual Meeting), Houston, TX, Oct. 23-26, 2002.
39. Advisory & Program Committee: 2003 ESACT (European Society for Animal Cell Technology) Meeting, Granada, Spain, May 2003.
40. Co-Chair: Biochemical Engineering XIII (Engineering Foundation Conference), Boulder, CO, July 19-23, 2003.
41. Scientific Program Committee: Biotechnology 2004, The World Congress on Biotechnology, Santiago, Chile, Oct. 17-22, 2004.
42. Chair Elect and 2006 Conference Programming Chair for Division 15 of the American Institute of Chemical Engineers (AIChE), 2005-2006.
43. Chair: 2006 Merck Cell Culture Engineering Award Committee (2005-2006).
44. Organizing Committee, Cell Culture Engineering X, ECI, Whistler, British Columbia, Canada, April 23-28, 2006.
45. Organizing Committee, Metabolic Engineering VI Conference, ECI, Netherlands, October 2006.
46. Organizing Committee, Biochemical Engineering XV (Engineering Conferences International), Quebec City, CA, July 2007.
47. Scientific Committee & Session Co-Chair. 20th Meeting of ESACT. June 17-20, 2007. Dresden, Germany.
48. Scientific Advisory Board and Organizing Committee: CLOSTRIDIUM 11, October 3-6, 2010. San Diego, CA.
49. Advisory Committee. Metabolic Engineering VII, Health and Sustainability, September 14-19, 2008, Puerto Vallarta, Mexico.
50. Scientific Committee, European Society for Animal Cell Technology. ESACT 2009 June 7-10, 2009, Dublin, Ireland.
51. Advisory Committee. Metabolic Engineering VIII. Jeju Island, Korea. June 13-18 2010
52. Advisory Board. SBE's 2nd International Conference on Biomolecular Engineering. January 18-21, 2009. Santa Barbara, California.
53. Executive Committee of ESACT (Eur. Society for Animal Cell Technology) (2009-2011)
54. Scientific/Program Committee of the 2013 ESACT (Eur. Society for Animal Cell Technology) meeting in Lille, France, June 2013.
55. Section organizer. U.S. DOE. 2015. Lignocellulosic Biomass for Advanced Biofuels and Bioproducts: Workshop Report, DOE/SC-0170. U.S. Department of Energy Office of Science.

http://genomicscience.energy.gov/biofuels/lignocellulose/. Wrote Specialty Fuels section of this large DOE report to guide funding in the renewables area for the next 10 years.

56. Scientific Committee of the 2015 ESACT (Eur. Society for Animal Cell Technology) meeting in Barcelona, Spain, June 2015.
57. Scientific Committee of the 2015 International Biochemical Engineering Conference, Puerto Vallarta, Mexico, July 2015.
58. Scientific Committee of the 2016 CCE (Cell Culture Engineering) conference, Palm Springs, May, 2016.

RESEARCH MENTORING:

Postdoctoral, Research Associates, Visiting Professors (36)

1. Kim O'Connor (Postdoctoral): 1988-1989
2. Phillippe Soucaille (Visiting Professor): 1991-1992
3. Lee Mermelstein (Postdoctoral): 1992-1993
4. Karl Walter (Postdoctoral): 1993-1994
5. James Michaels (Postdoctoral): 1994-1995
6. Ramesh Nair (Postdoctoral): 1995-1996
7. Lars Nielsen (Postdoctoral; with W.M. Miller): 1995-1997
8. Larissa Wenning (Postdoctoral; NIH NRSA fellow; with W.M. Miller): 1997-1999
9. Anke Duebeler (Postdoctoral): 1998-99
10. Christi McDowell (Postdoctoral): 1998
11. He (Henry) Yang (Postdoctoral; with W.M. Miller): 1999-2001; (Postdoctoral): 2002-2003.
12. Ruchir Desai (Postdoctoral): 1998-2000
13. Kathleen Carswell (Postdoctoral): 1999-2000
14. Hendrik Bonarius (Postdoctoral): 2000-2002
15. Diane L. Hevehan (Postdoctoral; with W.M. Miller): 2001-02
16. Carlos Paredes (Postdoctoral): 2002-2007
17. Chris Tomas (Postdoctoral): 2003-2004
18. Ryan Senger (Postdoctoral; NIH NRSA fellow): 2006-2008
19. Stephan Lindsey (Postdoctoral; NIH NRSA fellow): 2007-2012
20. Yili Chen (Postdoctoral): 2007-2010
21. Changhai Bi (Postdoctoral): 2009-2011
22. Shawn Jones (Postdoctoral): 2011-2012
23. Yongbo Yuan (Postdoctoral): 2012-2013
24. Sergios Nicolaou (Postdoctoral): 2012-2014
25. Keerthi Prasad Venkataramanan (Postdoctoral): 2012-2014
26. Nicholas Sandoval (Postdoctoral; NIH NRSA fellow): 2012-2016
27. Vasiliki Falara (Postdoctoral): 2014-2017
28. Brian Whitaker (Postdoctoral): 2014-2017
29. Lisa Steinberg (Postdoctoral): 2014-2017
30. Young Joo Yeon (Postdoctoral): 2016
31. R. Kyle Bennett (Postdoctoral): 2018-2020.
32. Chen-Yuan Kao (Postdoctoral): 2018-2019.
33. Gwendoly Gregory (Postdoctoral): 2020- 2023.
34. Heyongmin Seo (Postdoctoral): 2021-24
35. Bapi Mandal (Postdoctoral): 2023-24
36. Chao Xu: 2024-2026
37. Otten, 10/2025-3/2026
38. Hill, 9/2025-2/2026

39. Willis, 10/2025-5/2026

Doctoral theses Completed (66)

1. I-Ming Chu, PhD. Growth dynamics and substrate oxidation and incorporation patterns of Methylomonas L3. Rice Univ., 1985.
2. Anil Diwan, PhD. Transport of methanol and formaldehyde in methylotroph L3 and methylotrophic strain T15. Rice Univ., 1985.
3. Christopher M. Bussineau, PhD. Regulation of substrate-metabolism pathways, its relation to steady-state enzyme levels, and formaldehyde transport in RuMP-Type methylotrophs L3 and T15. Rice Univ., 1987.
4. Charles L. Meyer, PhD. The effect of bioreactor conditions on ATP supply and demand, electron flow, and product formation in the acetone/butanol fermentation. Rice Univ., 1987.
5. Robert S. Cherry, PhD. Hydrodynamic mechanisms of cell damage in microcarrier bioreactors. Rice Univ., 1987.
6. Dennis P. Wiesenborn, PhD. Thiolase, phosphotransbutyrylase, and CoA transferase and their role in related formation in Clostridium acetobutylicum ATCC 824. Rice Univ., 1988.
7. Michael H.W. Huesemann, PhD. Levels of key enzymes and physiological factors involved in product formation in batch and continuous cultures of Clostridium acetobutylicum ATCC 824. Rice Univ., 1989.
8. Jon F. Petersen, PhD. Shear stress effects on cultured hybridoma cells in a rotational Couette viscometer. Rice Univ., 1989.
9. Kurt T. Kunas, PhD. Growth and injury of freely suspended animal cells in an agitated and surface-aerated bioreactor. Rice Univ., 1990.
10. Sang Yup Lee, PhD. Construction of Escherichia coli-Clostridium acetobutylicum vectors and transformation and characterization of Clostridium acetobutylicum strains using these vectors. 1991.
11. Lee Mermelstein, PhD. Development and use of tools for the genetic analysis and metabolic engineering of Clostridium acetobutylicum ATCC 824. 1992.
12. Sanjay Lakhotia, PhD. A flow cytometric evaluation of hydrodynamic damage in animal cell bioreactors. 1992
13. Manfred R. Koller, PhD. Development of a perfusion bioreactor system for the expansion of primitive human hematopoietic progenitor cells. 1992. (with W.M. Miller)
14. Karl A. Walter, PhD. Molecular characterization of Clostridium acetobutylicum genes involved in butanol and butyrate formation. 1993.
15. Michael C. Borys, PhD. Effect of extracellular pH, ammonia, and cell aggregation on the specific expression rate and N-linked glycosylation of recombinant mouse-placental lactogen proteins by Chinese hamster ovary (CHO) Cells. 1993.
16. James Michaels, PhD. Agitation and aeration damage and protective additives in freely-suspended animal-cell bioreactors. 1994. (Northwestern University)
17. R. Nair, PhD. Molecular characterization and regulation of a multifunctional aldehyde/alcohol dehydrogenase gene and its use for metabolic engineering of Clostridium acetobutylicum ATCC 824. 1995.
18. C. E. Sandstrom, PhD. Ex vivo expansion of human hematopoietic cells using better defined culture conditions. 1995. (with W.M. Miller)
19. Jennifer A. LaIuppa, PhD. Defined culture conditions for ex vivo expansion of megakaryocytes and myeloid progenitors. 1996. (with W.M. Miller)
20. Christi McDowell, PhD. The effects of agitation rate, serum concentration and external pH on receptor content and mRNA levels of HL60 cell cultured in a stirred tank reactor. 1997.
21. Todd McAdams, PhD. The characterization of extracellular pH and medium osmolality as important parameters in the culture of human hematopoietic cells. 1997.
22. Paul Collins, PhD. Development of a stirred culture system for the expansion and characterization of human hematopoietic cells. 1997.
23. Ruchir Desai, PhD. Development of metabolic flux analysis and antisense RNA technologies as tools for the metabolic engineering of Clostridium acetobutylicum ATCC 824. 1998.
24. Kathleen Carswell, PhD. Optimization of culture conditions for the ex vivo expansion of T-cells: Oxygen tension, agitation, and pH. 1999.

25. Sanjay Patel, PhD. Scale-up and optimization of hematopoietic cell cultures for clinical applications. 2000. (with W.M. Miller)
26. Sigma Mostafa, PhD. Effects of culture oxygen tension on human megakaryocytes: a phenomenological and mechanistic study. 2000. (with W.M. Miller)
27. Latonia M. Harris, PhD. Cloning and characterization of the Clostridium acetobutylicum ATCC 824 gene encoding the SpoOA transcription regulator and its role in controlling solvent formation and sporulation-specific gene expression. 2001.
28. Diane Hevehan, PhD. Regulation of ex vivo granulocytic kinetics by oxygen tension, pH and interleukin 3: experimental and model analysis. 2001. (with W.M. Miller)
29. Hadar Haddad, PhD. T-cell expansion for cellular immunotherapy: effects of reduced oxygen tension on cell growth, phenotypic markers, and gene expression kinetics. 2002.
30. Seshu Tummala, PhD. AsRNA & metabolic engineering of clostridia. 2003.
31. Dominic Chow, PhD. Hematopoietic-cell culture engineering using biomimetic supports. 2003. (with W.M. Miller)
32. Chris Tomas, PhD. Clostridia genetics and metabolic engineering using the cellular stress response. 2003.
33. Dirk Windgassen, PhD. Transcriptional program of CD4+ and CD8+ T-cells. 2005.
34. Dario Sepulveda, PhD, Embryonic stem-cell differentiation (with Juan Asenjo, PhD from the U. Chile), 2005.
35. Deborah Pascoe, PhD. Cell culture engineering based on proteome analysis. 2005. (with W.M. Miller)
36. Chris Ramsborg, PhD. Transcriptional analysis of the effects of oxygen tension, serum, and IL-15 on ex vivo T-lymphocyte culture. 2005.
37. Keith Alsaker, PhD. Genomic-scale transcriptional analysis of clostridia sporulation and stress response. 2005.
38. Li Ting Huang, PhD. Transcriptional analysis of ex vivo granulocyte (neutrophil) development. 2006. (with W.M. Miller)
39. Peter Fuhrken, PhD. Genome-Scale Transcriptional Analysis of Megakaryocytic Cell Cultures Reveals Insights into Lineage-Specific Differentiation. 2007. (with W.M. Miller)
40. Lisa Giammona, PhD. Nicotinamide Enhances Primary Human Megakaryocytic Differentiation from Hematopoietic Stem Cells: Phenotype Characterization and Mechanism of Action. 2007. (with W.M. Miller)
41. Jacob Borden, PhD. Generation and Elucidation of Complex Bacterial Phenotypes Using High- Throughput Genomic Techniques. 2007.
42. Chi Chen, PhD. Megakaryocytic transcriptional program and development plasticity. 2006. (with W.M. Miller)
43. Ryan Sillers, PhD. Increasing Butanol Titers and Selectivity in Clostridium acetobutylicum. 2008.
44. Min Wang, PhD. Genomic-Scale Transcriptional Analysis of T-Cell Activation Reveals Novel Genes and Signaling Programs. 2008.
45. Bryan Tracy, PhD. Differentiation Engineering of Clostridium acetobutylicum for Enhancing Bioprocess Characteristics. 2009.
46. Panagiotis Apostolidis, PhD. Role of Tumor Suppressor p53 in Megakaryopoiesis, Platelet Formation and Platelet Function. 2010. (with W.M. Miller)
47. Shawn Jones, PhD. Elucidating the Transcriptional Regulation of Sporulation in Clostridium acetobutylicum. 2011.
48. Swapna Panuganti, PhD. Towards large-scale production of platelets for transfusion based on ex vivo expansion of hematopoietic stem cells. 2011. (with W. M. Miller)
49. Sergios Nicolaou, PhD. Development and elucidation of complex and synergistic bacterial phenotypes with genomic libraries. 2012.
50. Mohab Ali Al-Hinai, PhD. Development and application of novel genetic tools to investigate the roles of putative sporulation-specific sigma factors in Clostridium acetobutylicum. 2013
51. Stefan Gaida, PhD. Development of genomic and genetic systems to expand the searchable genomic space for engineering complex phenotypes. 2013.
52. Kyle Zingaro, PhD. Stepwise construction of the complex, multicomponent cellular trait of microbial tolerance to toxic chemicals. 2013.
53. Jinlin Jiang, PhD. Exploring the regulation of megakaryocytic differentiation and platelet production by mechanical forces and cell-derived microparticles. 2015.

54. Stephanie Luff, PhD. Megakaryocyte maturation through shear stress-induced transcriptome modulation involves transcription factors p53 and AP-1. 2016.
55. Ellinor Carlson, PhD. Synthetic carbon fixation for improved microbial fermentation yields. 2017.
56. Alan Fast, PhD. Engineering Bacterial CO_2 Fixation to Enhance Biofuel and Biochemical Yields. 2017.
57. Kyle Bennett, PhD. Engineering a Synthetic *Escherichia coli* Methylotroph for Conversion of Methanol to Fuels and Chemicals. 2018
58. Chen-Yuan Kao. PhD. Investigate the biological functionality of extracellular vesicle from megakaryocyte (MkMPs), and developed a gene delivery system to target hematopoietic stem/progenitor cells (HSPCs). 2019.
59. Julia Rohlhill. PhD. Engineering *Escherichia coli* for growth on methanol through dynamic regulation and protein engineering. 2019.
60. Kamil Charubin, PhD. Synthetic & syntrophic Clostridium co-culture enables a superior metabolism, cell fusion, material exchange and the formation of hybrid cells. 2020.
61. Michael L. Dahle, PhD. Case Studies in Coculture Syntrophy and ^{13}C Metabolic Flux Analysis. 2022 (with Maciek Antoniewicz).
62. Hannah Streett, PhD. Elucidating the role of electron transport to improve the understanding and potential of Clostridium co-cultures. 2022.
63. Samik Das, PhD. *IN VIVO* BIOLOGICAL FUNCTION, BIODISTRIBUTION AND TARGETED GENE THERAPIES OF HEMATOPOIETIC STEM CELLS USING ENDOGENOUS AND ENGINEERED CARGO-LOADED MEGAKARYOCYTIC MEMBRANE VESICLES. 2023
64. Will Thompson. PhD. Harnessing biomechanical force and other cellular stressors in extracellular vesicle biomanufacturing. 2023.
65. Jessica Belliveau, PhD. EXTRACELLULAR VESICLES GENERATED BY CHINESE HAMSTER OVARY CELLS UNDER NORMAL AND STRESSED CONDITIONS FACILITATE LARGE-SCALE, DYNAMIC EXCHANGE OF PROTEINS AND RNAs. 2023
66. Jayanth Reddy, PhD. Modeling the effect of pH and temperature on CHO cell metabolism and N-linked glycosylation. Joint w M. Ierapetritou. 2024
67. John Hill, PhD. DISSECTING COMPLEX CELLULAR AND METABOLIC INTERSPECIES INTERACTIONS IN CLOSTRIDIAL CO-CULTURES. 2025
68. Jonathan Otten, PhD. SYNTHETIC AND SYNTROPHIC COCULTURES OF *CLOSTRIDIA* ENABLE ENHANCED PRODUCTION OF THREE-TO-SIX CARBON CHEMICALS THROUGH CARBON CAPTURE, CELL FUSION, AND METABOLITE SHARING ACROSS FERMENTATION SCALES
69. Noah Willis, PhD. MANIPULATING CARBON, ELECTRON, AND NITROGEN EXCHANGE IN SYNTROPHIC *CLOSTRIDIUM* CO-CULTURES FOR ROBUST, SCALABLE, CARBON-NEGATIVE CHEMICAL PRODUCTION

Doctoral in Progress (9)

1. Katherine Raudenbush, Experimental and CFD-based integrated modelling studies for mixing in bioreactors for cell-culture based biomanufacturing. Joint w M. Ierapetritou
2. Nikola Malinov, Experimental exploration aiming to model perfusion bioreactors for cell-culture based biomanufacturing. Joint w M. Ierapetritou
3. Sofia Capece, Syntrophic microbial consortia for sustainable manufacturing with CO_2 utilization.
4. Peter Cruciata. Extracellular vesicles in vocal cord tissue engineering. Joint w X. Jia.
5. Shivam Barodiya. Modeling the physiology of CHO cells under perfusion culture. Joint w M. Ierapetritou
6. Hong Nguyen, Extracellular vesicles in CHO biomanufacturing and delivery technology. Joint w Kelvin Lee.
7. Mason Killinger. Joint w M. Ierapetritou. CHO glycosylation analysis and modeling
8. Andrew Wiener. Joint w M. Ierapetritou. CHO metabolic analysis and modeling
9. Benson Harlan, Joint w M. Ierapetritou. Process integration for CHO-based biomanufacturing.

MS theses completed (19)

1. Joseph W. Roos, MS. Investigation of the control of metabolic pathways in Clostridium acetobutylicum by the studies of glucose and non-glucose limitation, in vivo enzyme inhibition, and intermediary compound challenges in batch and continuous cultures. Rice Univ., 1984.
2. Thomas A. Keuer, MS. Isolation, characterization and substrate-transport studies of a new, unique methylotroph. Rice Univ., 1984.
3. Joseph K. McLaughlin, MS. Gas chromatography and gateway sensors for on-line state estimation of complex fermentations (butanol/acetone fermentation). Rice Univ., 1984.
4. Sanjay Lakhotia, MS. Effect of viscosity on cell injury in microcarrier bioreactors. Northwestern Univ., 1990.
5. Michael C. Borys, MS. Factors affecting recombinant protein production by CHO cells in microcarrier bioreactors. Northwestern Univ., 1990.
6. Jennifer Tubridy, MS. Substrates for improved hematopoietic cultures. 1993. (with W.M. Miller)
7. Lourdes Bermejo, MS. Heterologous expression of Clostridium acetobutylicum genes in Escherichia coli for acetone production. 1996. (with N. E. Welker)
8. Marc Horner, MS. Transport in a grooved perfusion flat-bed bioreactor for cell therapy applications. 1998.
9. Latonia Harris, MS. Fermentation characterization of Clostridium acetobutylicum ATCC 824 recombinant strains. 1997.
10. Dominic Chow, MS. Modeling oxygen distribution in the hematopoietic compartment of bone marrow. 1999. (with W.M. Miller)
11. Seshu Tummala, MS. Reporter system for Clostridium acetobutylicum. 2000.
12. Yu Kuang, MS. Characterization of metabolic patterns of granulocytic, monocytic, erythrocytic, and megakaryocytic ex vivo expansion cultures. 2001. (with W.M. Miller)
13. Nathan Cheng, MS. The Transcriptional Program of Clostridial Sporulation. 2007.
14. Ann Duchoud, MS. Tumor suppressor protein p53 is expressed and activated during megakaryocytic differentiation. 2008.
15. Alex Jones, MS. An Investigation of the Roles of Small RNA in Solvent Tolerance and Production in *Clostridium acetobutylicum*. 2015.
16. Matthew Ralston, MS. Assembling improved gene annotations in *Clostridium acetobutylicum* with RNA sequencing. 2015.
17. Christian Escobar, MS. Human megakaryocytic microparticles target murine hematopoietic stem cells to stimulate in vivo platelet biogenesis. 2017.
18. Erica Winter, MS. Megakaryocytic membrane wrapped nanoparticles for targeted delivery to hematopoietic stem cells. 2018.
19. Hannah Street, MS. Metabolism and cell-to-cell interactions of anaerobic syntrophic clostridia co-cultures. 2018.
20.

M.S. in Biotechnology Student (with research project)(9)

1. Mohab Al-Hinai, 2005
2. Jay Cuenca, 2005
3. Eugene Soo, 2005
4. Allison Chow, 2006
5. Brandon Ang, 2006
6. Mohamed Ali, 2006
7. Aaron Kuhl, 2006
8. Nikhil Khicha, 2006
9. Jan Kemper, 2006-07

Undergraduate Research Supervision (93)

1. Clyde A. Kelly, ACS/PRF Student Fellow, 1982
2. Mark D. Durcan, 1983
3. Mary L. Brannon, 1984
4. Bradford T. Bell, 1984

5. Peter J. Campo, 1984
6. Paul Nealey, 1984
7. Todd Griffith, 1985
8. Susan Long, 1985
9. Dan Lasko, 1985
10. Arlene Yeh, 1985
11. Tim Werner, 1988-1990
12. Mitchell Cahn, 1988-1989
13. Sarah Chaudhry, 1990
14. Adam Aylor, 1990
15. Annie Wong, 1990
16. Ron Atchley, 1990-1991
17. Deborah C. Urich, 1990-1991
18. Ameet Mallik, 1992-1994
19. Jason Nowak, 1992-1993
20. Aloka Lahoti, 1992
21. Alex Saar, 1993
22. Daniel Gurovich, 1993-1995
23. Sema Ariman, 1993-1995
24. Thor-Olaf Stöver, 1994-1995
25. Ryan Carver, 1994-1995
26. Steve Kotzbauer, 1995-1996
27. Daeryun Park, 1995
28. Wen Lu, 1995
29. John Macris, 1995
30. Nancy Ekdawi, 1995-1996
31. Preetham Suresh, 1996-1997
32. Jonathan Weiss, 1997-1998
33. Mark Kiel, 1998-1999 (with W.M. Miller)
34. Mark Barney, 1998 (with W.M. Miller)
35. Chintan Sampat, 1998
36. Brooks Rabideau, 1999
37. Gerrie Liaw, 1999 (with W.M. Miller)
38. Roshandel Payam (2000-2003)
39. Shinie Shaw, 2000 (with W.M. Miller)
40. Jessica Tooredman, 2000 (with W.M. Miller)
41. Omar A. Jaffer, 2000-2002
42. Ryan Kaliney, 2000-2001
43. Jonathan Dillon, 2001-2003
44. Jeff Beamish, 2002
45. Jerry Chen, 2003-2004
46. Ryan Bruskiewicz, 2003-2004
47. Paul Balash, 2003-2005
48. Jimmy Johannes, 2003-2004 (with W.M. Miller)
49. David A. Shelley, 2003-2004 (with W.M. Miller)
50. Kinjal Shah, 2004
51. Majid Bourajerdi, 2004
52. Michael Weinstock, 2004-2006
53. John Park, 2005-2007
54. Greg Martens, 2006-2007
55. Timothy Downing, 2004-2006
56. Brenden Beatty, 2008
57. Rafael Diaz, 2009-2010

58. Keith Levedosky, 2010
59. Derek Lapiska, 2010
60. Dan Mitchell, 2010-2011
61. Yin Cheng, 2010-2011
62. Jason Coffman 2011-2012
63. Meng Ren 2010-2011
64. Rebecca Ellis, 2012-2013
65. Mason Smith. 2012
66. Theodore Groth, 2014-2017 (Honor's Thesis)
67. Pragyan Khanal, 2015
68. Michael Palmer, 2015-2016 (Honor's Thesis)
69. Samuel Schmidt, 2015-2016
70. Michael Clupper, 2015, 2016
71. Kees Baas, 2015-2016
72. Richard Egan, 2016
73. Clayton Coddington, 2016-2017
74. Alec Agee, 2017-2019 (Honor's thesis)
75. Evan Underhill, 2017-18 (Honor's thesis)
76. Anthony Marinelli, 2017-18
77. Michael Dillon, 2019-20
78. Yiannis Zerefos, 2019-2020
79. Logan Kim, 2019-2020
80. Noel Tharakan, 2019-2020
81. Peter Niverth, 2019-2020
82. Shirley Jin, 2019-2020
83. Jim Ervin, 2019-2020
84. Katie Lakofsky, 2021
85. Sam Koval, 2021-22
86. Yin Zou (honor's thesis), 2021-22
87. Dylan Tapper, 2021-22
88. Paige Bastek, 2022-2025
89. Aravind Arunachalam, 2022-2025
90. P. Henry Lindvall, 2022
91. Andrew Dalton, 2023-24
92. Joseph (Joe) Dougherty, 2022-24
93. Julia Cichowska, 2024-25
94. Alekhya Puttagunta 2025-26 (Honor's thesis)
95. Rishav Sharma, 2025-
96. Aahna Sasson, 2026-
97. Eric Senchez Hosa, 2026-
98. Rohil Cheepala, 2026-
99. Samuel Perkins, 2026