

Curriculum Vitae
ELEFTHERIOS (TERRY) PAPOUTSAKIS, PH.D.

Eugene DuPont Chaired Professor
Department of Chemical & Biomolecular Engineering
Professor, Biological Sciences
University of Delaware, Newark, DE 19716

www.che.udel.edu
epaps@udel.edu
papoutsakis@dbi.udel.edu
☎ 302 831 8376
<http://www.papoutsakis.org>

EDUCATION

Doctor of Philosophy	Chemical Engineering Purdue University	1980
Master of Science	Chemical Engineering Purdue University	1977
Bachelor of Science	Chemical Engineering National Technical University of Athens	1974

RESEARCH INTERESTS

"The focus of the Papoutsakis Group is to study and modify the regulatory networks that control key cellular programs such as stem-cell differentiation and plasticity or prokaryotic sporulation and stationary-phase phenomena. Its research contributes to the understanding of cellular processes of both fundamental and industrial interests-such as stem-cell bioengineering or the link between sporulation, solvent production and stress response in solventogenic clostridia-and involves interdisciplinary work in the areas of systems biology, metabolic engineering, DNA microarrays, computational genomics, stem-cell biology, and immunology. By combining the use of state-of-the-art microarray platforms and data analysis techniques with classic molecular techniques and genomic tools, the Papoutsakis Group unravels the exquisitely crafted interplay of cellular processes that allow the exploration of cells for beneficial applications from Regenerative Medicine to Industrial Biotechnology."

PROFESSIONAL HISTORY

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	2001-2007
Professor	Interdepartmental Biological Sciences Program, Northwestern University	1996-2007
Member	Lurie Comprehensive Cancer Center, Northwestern University Medical School	1994-2007
Professor	Chemical & Biological Engineering Northwestern University	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 Institute of Chemical Engineers (AIChE)
 American Chemical Society (ACS)
 American Association for the Advancement of Science (AAAS)
 American Society for Microbiology (ASM)
 American Institute of Medical & Biological Engineers (AIMBE)
 Society for Biological Engineering (SBE)
 European Society for Animal Cell Technology (ESACT)
 International Metabolic Engineering Society (IMES)

ACADEMIC HONORS AND LEADERSHIP

Faculty

2017	American Chemical Society, E. V. Murphree Award in Industrial and Engineering Chemistry
2016	AIChE Division 15 Distinguished Service Award
2014	Elected 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; <i>Biotechnology & Bioengineering</i> , John Wiley & Sons
2007	James M. Van Lanen Distinguished Service Award, American Chemical Society (BIOT Div.)
2005	Elected 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 University
1995	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

2016- Editor, mBio, American Society of Microbiology
 2013- Consulting Editor, AIChE Journal
 2011-16 Editor, Biotechnology Advances (Elsevier)
 2012-16 Section 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:

2003-present Biotechnology & Bioengineering (Wiley)
 2016- Applied Microbiology & Biotechnology (Springer)
 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

2014- Member and Chair (since 2016) of the DIC Wang Award, Soc. for Biological Engineering (SBE)
 2016- Board, International Metabolic Engineering Society
 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.
 2011- Advisory Board, Dept. of Chemical and Biomolecular Engineering, Johns Hopkins University
 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
 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 - 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	30+ 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

53 Doctoral and 24 MS completed. 7 Doctoral & 1 MS in progress. 30 Postdoctoral.
71 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 (Technisch-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 Dimocriton 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.
 - Institut National 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.
- “O₂ and 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. Fransisco, 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*”, (with Alsaker, K.V.)
- 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 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 21st 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. Daejeon, Korea.
- “Clostridia and biofuels: potential and limitations”
 - Department of Chemical & Biomolecular Engineering, Korea Advanced Institute of Science and Technology (KAIST). November 9, 2007. Daejeon, 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 Methylophony”
 - 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 Biosustainability Copenhagen, Denmark
- “The Importance of & a Strategy for Synthetic Methylophony”
 - 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 CO₂ 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

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.

275+ REFERREED PUBLICATIONS. (Publications are grouped thematically but numbered chronologically)

Total citations > 11,000; h INDEX: h=64 (ISI, Web of Science, All databases).
Google Scholar: Total citations >16,000; h index = 73

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.

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.
40. Wiesenborn, D.P. Rudolph, F.B., and E.T. Papoutsakis. 1988. Thiolase from *Clostridium acetobutylicum* ATCC 824 and its role in the synthesis of acids and solvents. *Appl. Environ. Microbiol.* **54**: 2717-2722.
41. Wiesenborn, D.P., Rudolph, F.B. and Papoutsakis, E.T. 1989. Phosphotransbutyrylase from *Clostridium acetobutylicum* ATCC 824 and its role in acidogenesis. *Appl. Environ. Microbiol.* **55**: 317-322.
42. Wiesenborn, D.P., Rudolph, F.B. and Papoutsakis, E.T. 1989. Coenzyme A transferase from *Clostridium acetobutylicum* ATCC 824 and its role in the uptake of acids. *Appl. Environ. Microbiol.* **55**: 323-329.
43. Papoutsakis, E.T. 1989. Acetone-Butanol Fermentation. Chapter 2.1.3 in *Biomass Handbook* (C.W. Hall, O. Kitani, eds.), Gordon and Breach Publishers, pp. 271-286.
45. Meyer, C.L. and Papoutsakis, E.T. 1989. Continuous and biomass recycle fermentations of *Clostridium acetobutylicum*. Part 1. ATP supply and demand determines product selectivity. *Bioproc. Eng.* **4**: 1-10.
46. Meyer, C.L. and Papoutsakis, E.T. 1989. Continuous and biomass recycle fermentations of *Clostridium acetobutylicum*. Part 2. Novel patterns in energetics and product-formation kinetics. *Bioproc. Eng.* **4**: 49-55.
48. Meyer, C.L. and Papoutsakis, E.T. 1989. Increased levels of ATP and NADH are associated with increased solvent production in continuous cultures of *Clostridium acetobutylicum*. *Appl. Microbiol. Biotechnol.* **30**: 450-459.
49. Huesemann, M.H.W. and Papoutsakis, E.T. 1989. Comparison between in vivo and in vitro enzyme activities in continuous and batch fermentations of *Clostridium acetobutylicum*. *Appl. Microbiol. Biotechnol.* **30**: 585-595.

52. Huesemann, M.H.W., and Papoutsakis, E.T. 1989. Enzymes limiting butanol and acetone formation in continuous and batch cultures of *Clostridium acetobutylicum*. *Appl. Microbiol. Biotechnol.* **31**: 435-444.
53. Welch, R.W., Rudolph, F.B. and Papoutsakis, E.T. 1989. Purification and characterization of the NADH dependent butanol dehydrogenase from *Clostridium acetobutylicum* (ATCC 824). *Arch. Biochem. Biophys.* **273**: 309-318.
61. Huesemann, M.H.W. and Papoutsakis, E.T. 1990. Effects of propionate and acetate additions on solvent production in batch cultures of *Clostridium acetobutylicum*. *Appl. Environ. Microbiol.* **56**: 1497-1500.
226. Wang M, Senger RS, Paredes C, Banik GG, Lin A, & Papoutsakis, ET. 2009. Microarray-Based Gene Expression Analysis as a Process Characterization Tool to Establish Comparability of Complex Biological Products: Scale-Up of a Whole-Cell Immunotherapy Product. *Biotechnol. Bioeng.* **104**: 796-808
227. Chen, Y., Indurthi, I., Jones, S. W. and Papoutsakis, E. T. 2011. Small RNAs of the genus *Clostridium*. *mBio* **2**(1):e00340-10. doi:10.1128/mBio.00340-10.

II. METABOLIC ENGINEERING & SYNTHETIC BIOLOGY. GENETICS & GENOMICS OF CLOSTRIDIA

39. Cary, J.W., Petersen, D.J., Papoutsakis, E.T., and Bennett, G.N. 1988. Cloning and expression of *Clostridium acetobutylicum* phosphotransbutyrylase and butyrate kinase genes in *Escherichia coli*. *J. Bacteriol.* **170**: 4613-4618.
51. Cary, J.W., Petersen, D.J., Bennett, G.N. and Papoutsakis, E.T. 1990. Methods for cloning key primary metabolic enzymes and ancillary proteins associated with the acetone-butanol fermentation of *Clostridium acetobutylicum*. *Ann. N.Y. Acad. Sci.*, **589** (Biochem. Engineering VI) (St. Barbara, CA, Oct. 1988): 67-81.
60. Cary, J.W., Petersen, D.J., Papoutsakis, E.T., and Bennett, G.N. 1990. Cloning and expression of *Clostridium acetobutylicum* ATCC 824 coenzyme A: acetate/butyrate: coenzyme A-transferase in *Escherichia coli*. *Appl. Environ. Microbiol.* **56**, 1576-1583.
68. Petersen, D.J., Welch, R.W., Walter, K.A., Mermelstein, L.D., Papoutsakis, E.T., Rudolph, F.B., and Bennett, G.N. 1991. Cloning of an NADH-dependent Butanol Dehydrogenase Gene from *Clostridium acetobutylicum*. *Ann. N.Y. Acad. Sci.* **646**, 94-98.
70. Mermelstein, L.D., Welker, N.E., Bennett, G.N. and Papoutsakis, E.T. 1992. Expression of Cloned Homologous Fermentative Genes in *Clostridium acetobutylicum* ATCC 824. *Bio/Technol.* **10**: 190-195.
75. Lee, S.Y., Bennett, G.N. and Papoutsakis, E.T. 1992. Construction of *E. coli-Clostridium acetobutylicum* shuttle vectors and transformation of *C. acetobutylicum* strains. *Biotechnol. Lett.* **14**: 427-432.
76. Lee, S.Y., Mermelstein, L.D., Bennett, G.N. and Papoutsakis, E.T. 1992. Vector construction, transformation and gene amplification in *Clostridium acetobutylicum* ATCC 824. *Ann. N.Y. Acad. Sci.* **665**: 39-51.
79. Walter, K.A., Bennett, G.N. and Papoutsakis, E.T. 1992. Molecular characterization of two *Clostridium acetobutylicum* ATCC 824 butanol dehydrogenase isozyme genes. *J. Bacteriol.* **174**: 7149-7158.
81. Mermelstein, L.D. and Papoutsakis, E.T. 1993. *In vivo* methylation in *Escherichia coli* by the *Bacillus subtilis* phage ϕ 3T I Methyltransferase to protect plasmids from restriction upon transformation of *Clostridium acetobutylicum* ATCC 824. *Appl. Environ. Microbiol.* **59**: 1077-1081.
84. Lee, S.Y., Mermelstein, L.D., Bennett, G.N., and Papoutsakis, E.T. 1993. Determination of plasmid copy number and stability in *Clostridium acetobutylicum* ATCC 824. *FEMS Microbiol. Lett.* **108**: 319-324.
86. Papoutsakis, E.T. and Bennett, G.N. 1993. Cloning, structure, and expression of acid and solvent pathway genes of *Clostridium acetobutylicum*. Chapter 8 in: *Clostridia and Biotechnology* (Woods, D. R., ed.), pp. 157-199, Butterworth-Heinemann, Stoneham, MA.
90. Mermelstein, L.D., Bennett, G.N. and Papoutsakis, E.T. 1993. Amplification of homologous fermentative genes in *Clostridium acetobutylicum* ATCC 824. In: *Bioproducts and Bioprocesses: Third Conference to Promote Japan/US Joint Projects and Cooperation in Biotechnology* (Tanner, R.D., ed.), pp. 317-343, Springer Verlag, New York.

91. Mermelstein, L.D., Papoutsakis, E.T., Petersen, D.J. and Bennett, G.N. 1993. Metabolic engineering of *Clostridium acetobutylicum* for increased solvent production by enhancement of acetone formation enzyme activities using a synthetic acetone operon. *Biotechnol. Bioeng.* **42**: 1053-1060.
92. Walter, K.A., Nair, R.V., Cary, J.W., Bennett, G.N., and Papoutsakis, E.T. 1993. Sequence and arrangement of two genes encoding enzymes of the butyrate formation pathway of *Clostridium acetobutylicum* ATCC 824. *Gene* **134**: 107-111.
93. Mermelstein, L.D., and Papoutsakis, E.T. 1993. Evaluation of macrolide and lincosamide antibiotics for plasmid maintenance in low pH *Clostridium acetobutylicum* ATCC 824 fermentations. *FEMS Microbiol. Lett.* **113**: 71-75.
94. Walter, K.A., Mermelstein, L.D., and Papoutsakis, E.T. 1994. Fermentations of recombinant *Clostridium acetobutylicum* with increased dosages of butyrate formation genes. *Ann. N.Y. Acad. Sci.* **721**: 69-72.
95. Mermelstein, L.D., Welker, N.E., Petersen, D.J., Bennett, G.N., and Papoutsakis, E.T. 1994. Genetic and metabolic engineering of *Clostridium acetobutylicum* ATCC 824. *Ann. N.Y. Acad. Sci.* **721**: 54-68.
96. Nair, R.V., Bennett, G.N., and Papoutsakis, E.T. 1994. Molecular characterization of an aldehyde/alcohol dehydrogenase gene from *Clostridium acetobutylicum* ATCC 824. *J. Bacteriol.* **176**: 871-885.
103. Nair, R.V. and Papoutsakis, E.T. 1994. Expression of plasmid encoded *aad* in *Clostridium acetobutylicum* M5 restores vigorous butanol production. *J. Bacteriol.* **176**: 5843-5846.
104. Walter, K.A., Mermelstein, L.D. and Papoutsakis, E.T. 1994. Host-plasmid interactions in recombinant strains of *Clostridium acetobutylicum* ATCC 824. *FEMS Microbiol. Lett.* **123**: 335-342.
111. Stim-Herndon, K.P., Nair, R., Papoutsakis, E.T., and Bennett, G.N. 1996. Analysis of degenerate variants of *Clostridium acetobutylicum* ATCC 824. *Anaerobe.* **2**: 11-18.
115. Green, E.M., Boynton, Z.L., Harris, L.M., Rudolph, F.B., Papoutsakis, E.T. and Bennett, G.N. 1996. Genetic manipulation of acid formation pathways by gene inactivation in *Clostridium acetobutylicum* ATCC 824. *Microbiology.* **142**: 2079-2986.
122. Cornillot, E., Nair, R., Papoutsakis, E.T., & Soucaille, P. 1997. The genes for butanol and acetone formation in *Clostridium acetobutylicum* ATCC 824 reside on a large plasmid whose loss leads to strain degeneration. *J. Bacteriol.* **179**: 5442-5447.
123. Bermejo, L.L., Welker, N.E. and Papoutsakis, E.T. 1998. Heterologous expression of *Clostridium acetobutylicum* ATCC824 genes in *Escherichia coli* for acetone production and acetate detoxification. *Appl. Environ. Microbiol.* **64**: 1079-1085.
135. Nair, R., Green E., Bennett, G.N. and Papoutsakis, E.T. 1999. Regulation of the *sol* locus genes for butanol and acetone production in *Clostridium acetobutylicum* ATCC 824 by a putative transcriptional repressor. *J. Bacteriol.* **181**: 319-330.
136. Desai, R.P. and Papoutsakis, E.T. 1999. Antisense RNA strategies for the metabolic engineering of *Clostridium acetobutylicum*. *Appl. Environ. Microbiol.* **65**: 936-945.
138. Desai, R., Nielsen, L.K., and Papoutsakis, E.T. 1999. Stoichiometric modeling of *Clostridium acetobutylicum* fermentations with nonlinear constraints. *J. Biotechnol.* **71**: 191-205.
142. Papoutsakis, E.T., and Bennett, G. N. 1999. Metabolic Engineering of *Clostridium acetobutylicum*. pp. 253-279, Chapter 11 in *Metabolic Engineering* (S.Y. Lee and E.T. Papoutsakis, Eds), Marcel Dekker.
143. Lee, S.Y. and Papoutsakis, E.T. 1999. The challenges and promise of metabolic engineering pp.1-12, Chapter 1 in "Metabolic Engineering" (S.Y. Lee and E.T. Papoutsakis, Eds), Marcel Dekker.
145. Tummala, S. B., Welker, N. E., and Papoutsakis, E.T. 1999. Development and characterization of a gene-expression reporter system for *Clostridium acetobutylicum* ATCC 824. *Appl. Environ. Microbiol.* **65**: 3793-3799.
146. Desai, R.P., Harris, L.M., Welker, N.E., Papoutsakis, E.T. 1999. Metabolic flux analysis elucidates the importance of the acid-formation pathway in regulating solvent production by *Clostridium acetobutylicum*. *Metabolic Eng.* **1**: 206-213.
147. Harris, L.M., Desai, R.P., Welker, N.E., Papoutsakis, E.T. 2000. Characterization of recombinant strains of the *Clostridium acetobutylicum* butyrate kinase inactivation mutant: need for new phenomenological models for solventogenesis and butanol inhibition? *Biotechnol. Bioeng.* **67**: 1-11.
159. Harris, L.M., Blank, L., Desai, R.P., Welker, N.E., and Papoutsakis, E.T. 2001. Analysis of recombinant strains of *Clostridium acetobutylicum* with an inactivated *solR* gene. *J. Ind. Microbiol. Biotechnol.* **27**: 322-328.

166. Tummala, S.B., Tomas, C., Harris, L.M., Welker, N.E., Rudolph, F.B., Bennett, G.N., Papoutsakis, E.T. 2001. Genetic tools for solventogenic clostridia. *Clostridia: Biotechnology and Medical Applications* (Bahl, H., Durre, P., Eds). New York, NY. John Wiley & Sons, Inc., pp 105-123.
168. Harris, L.M., Welker, N.E., and Papoutsakis, E.T. 2002. Northern, morphological and fermentation analysis of *spo0A* inactivation and overexpression in *Clostridium acetobutylicum* ATCC 824. *J. Bacteriol.* **184**: 3586-3597.
169. Yang, H., Haddad, H., Tomas, C., Alsaker, K., and Papoutsakis, E.T. 2003. A segmental nearest neighbor normalization and gene identification method gives superior results for DNA-array analysis. *Proc. Nat. Acad. Sci. (USA)*. **100**: 1122-1127.
170. Tummala, S.B., Welker, N.E., and Papoutsakis, E.T. 2003. Design of antisense RNA constructs for the downregulation of the acetone formation pathway of *Clostridium acetobutylicum*. *J. Bacteriol.* **185**: 1923-1934.
171. Tomas, C., Bonarius, H., Alsaker, K., Yang, H., Hendriksen, W., Beamish, J., Paredes, C., and Papoutsakis, E.T. 2003. DNA-array based transcriptional analysis of *Clostridium acetobutylicum* sporulation (SK01) and degenerate (M5) mutants. *J. Bacteriol.* **185**: 4539-4547.
172. Tummala, S. B., S. G. Junne, and Papoutsakis, E.T. 2003. Antisense RNA downregulation of CoA Transferase combined with alcohol/aldehyde dehydrogenase (AAD) overexpression leads to predominantly alcohologenic *Clostridium acetobutylicum* fermentations. *J. Bacteriol.* **185**: 3644-3653.
173. Tummala, S.B., Junne, S.G., Paredes, C.J., Papoutsakis, E.T. 2003. Transcriptional analysis of product concentration-driven changes in cellular programs of recombinant *Clostridium acetobutylicum* strains. *Biotechnol Bioeng.* **84**: 842-854.
174. Tomas, C., Welker, N.E., and Papoutsakis, E.T. 2003. Overexpression of *groESL* in *Clostridium acetobutylicum* results in increased solvent production and tolerance, prolonged metabolism, and changes in the cell's transcriptional program. *Appl. Environ. Microbiol.* **69**: 4951-4965.
175. Tomas, C., Beamish, J., and Papoutsakis, E.T. 2004. Transcriptional analysis of butanol stress and tolerance in *Clostridium acetobutylicum*. *J. Bacteriol.* **186**: 2006-2018.
176. Alsaker, K.V., Spitzer T.R. and Papoutsakis, E.T. 2004. Transcriptional analysis of *spo0A* overexpression in *Clostridium acetobutylicum* sporulation and its effects on the cell's response to butanol stress. *J. Bacteriol.* **186**: 1959-1971.
178. Tomas, C.A., Tummala, S.B., and Papoutsakis, E.T. 2005. Metabolic engineering of solventogenic Clostridia in *Handbook on Clostridia* (H. Bahl and P. Durre, Eds). CRC Press, New York.
179. Tummala, S.B., Tomas, C.A., and Papoutsakis, E.T. 2005. Gene analysis of clostridia in *Handbook on Clostridia* (H. Bahl and P. Durre, Eds). CRC Press, New York.
182. Paredes, C., Rigoutsos, I., and Papoutsakis, E.T. 2004. Transcriptional organization of the *Clostridium acetobutylicum* genome. *Nucleic Acid Res.* **32**: 1973-1981.
183. Zhao, Y., Tomas, C.A., Rudolph, F.B., Papoutsakis, E.T. and Bennett, G.N. 2005. Intracellular acetyl phosphate and butyryl phosphate concentrations in *Clostridium acetobutylicum* and implications for solvent formation. *Appl. Environ. Microbiol.* **71**: 530-537.
187. Borden, J.R., Paredes, C.J., and Papoutsakis, E.T. 2005. Diffusion, Mixing, and Associated Dye Effects in DNA-Microarray Hybridizations. *Biophys. J.* **89**: 3277-3284.
188. Alsaker, K., Paredes, C. and Papoutsakis, E.T. 2005. Design, optimization and validation of genomic DNA microarrays for examining the *Clostridium acetobutylicum* transcriptome. *Biotech. Bioproc. Eng.* **10**: 432-443.
189. Alsaker, K., and Papoutsakis, E.T. 2005. The transcriptional program of early sporulation and stationary phase events in *Clostridium acetobutylicum*. *J. Bacteriol.* **187**: 7103-7118.
190. Hatzimanikatis, V. and Papoutsakis, E.T. 2005. Extracting networks from expression data. *Encyclopedia of Genetics, Genomics and Bioinformatics*, Part 4, Sect. 5, <http://www.wiley.com/legacy/wileychi/ggpb/index.html>.
191. Paredes, C. J., Alsaker, K.V., and Papoutsakis, E.T. 2005. A comparative genomic view of clostridial differentiation and physiology. *Nature Reviews Microbiology.* **3**: 969-978.
197. Borden, J.R. and Papoutsakis, E.T. 2007. Dynamics of genomic-library enrichment and identification of solvent-tolerance genes in *Clostridium acetobutylicum*. *Appl. Environ. Microbiol.* **73**: 3061-3068.

199. Paredes, C.J., Senger, R.S., Borden, J.R., Sillers, R. and Papoutsakis, E.T. 2007. A general framework for designing and validating oligomer-based DNA-microarrays and its application to *Clostridium acetobutylicum*. *Appl. Environ. Microbiol.* **73**: 4631–4638.
204. Paredes, C.J., Jones, S.W., Senger, R.S., Borden, J.R., Sillers, and Papoutsakis, E.T. 2008. Molecular aspects of butanol fermentation, in *Bioenergy* (Wall, J. D., Harwood, C. S., Demain, A. (Eds). Chp.25, Pp. 323-334. American Society of Microbiology Press, Washington D.C
206. Sullivan, L., Paredes, C.J., Papoutsakis, E.T. and Bennett, G.N. 2007. Analysis of the clostridial hydrophobic with a conserved tryptophan family (ChW) of proteins in *Clostridium acetobutylicum* with emphasis on ChW14 and ChW16/17. *Enz. Microb. Technol.* **42**: 29–43.
208. Senger, R.S. and Papoutsakis, E.T. 2008. Genome-Scale Model for *Clostridium acetobutylicum*. Part 1. Reverse engineering to resolve network gaps, pathway discovery, and extrapolation to other clostridia. *Biotechnol. Bioeng.* **101**: 1036-1052 (DOI 10.1002/bit.22010).
209. Senger, R. S. and Papoutsakis, E.T. 2008. Genome-Scale Model for *Clostridium acetobutylicum*. Part 2: Development of Specific Proton Flux States and Numerically-Determined Sub-Spaces. *Biotechnol. Bioeng.* **101**: 1053-1071 (DOI 10.1002/bit.22009).
213. Jones, S.W., Paredes, C.J., Tracy, B.P., Cheng, N., Sillers, R., Senger, R. and Papoutsakis, E.T. 2008. The transcriptional program underlying the physiology of clostridial sporulation. *Genome Biology* **9**:R114 (DOI:10.1186/gb-2008-9-7-r114).
214. Sillers, R., Ali Al-Hinai, M., and E. T. Papoutsakis. 2008. Aldehyde-alcohol dehydrogenase and/or thiolase overexpression coupled with CoA transferase downregulation lead to higher alcohol titers and selectivity in *Clostridium acetobutylicum* fermentations. *Biotechnol. Bioeng.* **102**: 38-49 (2009) (DOI:10.1002/bit.22058)
215. Sillers, R., Chow, A., Tracy, B.P., and Papoutsakis, E.T. 2008. Metabolic engineering of the non-sporulating, non-solventogenic *Clostridium acetobutylicum* strain M5 to produce butanol without acetone demonstrate the robustness of the acid-formation pathways and the importance of the electron balance. *Metab. Eng.* **10**: 321-332 (2008) (doi:10.1016/j.ymben.2008.07.005).
216. Papoutsakis, E. T. 2008. Engineering solventogenic clostridia. *Curr. Opin. Biotechnol.* **19**:420–429 (doi:10.1016/j.copbio.2008.08.003).
217. Tracy, B.P., Gaida, S.M. and Papoutsakis, E.T. 2008. Development and application of flow-cytometric techniques for analyzing and sorting cultures of endospore-forming clostridia. *Appl. Environ. Microbiol.* **74**(24): 7497-7506 (2008) (doi:10.1128/AEM.01626-08).
219. Borden, J. R., Jones, S. W., Indurthi, D., Chen, Y. & Papoutsakis, E. T. A genomic-library based discovery of a novel, possibly synthetic, acid tolerance mechanism in *Clostridium acetobutylicum* involving non-coding RNAs and ribosomal RNA processing. *Metab. Engin.* **12**: 268–281 (2010) (doi:10.1016/j.ymben.2009.12.004).
220. Alsaker, K.V., Paredes, C. J., & Papoutsakis, E.T. 2010. “Metabolite Stress and Tolerance in the Production of Biofuels and Chemicals: Gene-Expression-Based Systems Analysis of Butanol, Butyrate, and Acetate Stresses in the Anaerobe *Clostridium acetobutylicum*”, *Biotechnol. Bioeng.* **105**: 1131–1147. DOI 10.1002/bit.22628.
221. Tracy, BP, Gaida, S.M. and Papoutsakis, ET. Flow cytometry for bacteria: Enabling metabolic engineering, synthetic biology and the elucidation of complex phenotypes. (INVITED). *Curr. Opin. Biotechnol.* **21**:85–99 (2010). DOI: 10.1016/j.copbio.2010.02.006.
222. Nicolaou, S., Gaida, S. and Papoutsakis, E.T. “A comparative view of metabolite and substrate stress and tolerance in microbial bioprocessing: from biofuels and chemicals, to biocatalysis and bioremediation” *Metab. Engin.* **12**: 307–331 (2010). DOI:10.1016/j.ymben.2010.03.004
227. Chen, Y., Indurthi, I., Jones, S. W. and Papoutsakis, E. T. 2011. Small RNAs of the genus *Clostridium*. *mBio* **2**(1):e00340-10. doi:10.1128/mBio.00340-10.
229. Tracy, BP, Jones, S.W. and Papoutsakis, ET. 2011. Inactivation of σ^E and σ^G in *Clostridium acetobutylicum* illuminates their roles in clostridial-cell form biogenesis, granule synthesis, solventogenesis, and spore morphogenesis. *J. Bacteriol.* **193** (6): 1414–1426 (doi:10.1128/JB.01380-10).
230. Jones, SW, Tracy, BP, Gaida, SM, and Papoutsakis, ET. 2011. Inactivation of σ^F in *Clostridium acetobutylicum* ATCC 824 blocks sporulation prior to asymmetric division, abolishes σ^E - and σ^G -

- protein expression, but does not block solvent formation. *J. Bacteriol.* **193** (10): 2429-2440 (doi:10.1128/JB.00088-11).
231. Papoutsakis ET & Alsaker KV. Towards a Synthetic Biology of the Stress-Response and the Tolerance Phenotype. Chapter 7. Pp.193-219 in: "Systems Metabolic engineering" C. Wittmann and S.Y. Lee (eds.). DOI 10.1007/978-94-007-4534-6_7. Springer Science+Business Media. Dordrecht. Germany (2012).
232. Bi, C, Jones, SW, Hess, DR, Tracy, BP, and Papoutsakis, ET. 2011. SpoIIE is necessary for asymmetric division, sporulation, and the expression of σ^F , σ^E , and σ^G , but does not control solvent production in *Clostridium acetobutylicum*. *J. Bacteriol.* **193** (19): 5130-5137 (DOI: 10.1128/JB.05474-11).
236. Crown, SB, Indurthi DC.; Ahn WK, Choi, J, Papoutsakis, ET, & Antoniewicz, MR. 2011. Resolving the TCA cycle and pentose-phosphate pathway of *Clostridium acetobutylicum* ATCC 824: Isotopomer analysis, in vitro activities and expression analysis. *Biotechnol. J.* **6**: 300-305 (DOI: 10.1002/biot.201000282).
237. Nicolaou, SA, Gaida, SM, & Papoutsakis, ET. Coexisting/Coexpressing Genomic Libraries (CoGeL) identify interactions among distantly located genetic loci for developing complex microbial phenotypes. *Nucleic Acids Research.* **39** (22): e152 (2011) (doi:10.1093/nar/gkr817).
238. Tracy, BP, Jones, SW, Fast, AG, Indurthi, DC, and Papoutsakis, ET. 2012. Clostridia: the importance of their exceptional substrate and metabolite diversity for biofuel and biorefinery applications. *Curr. Opinion Biotechnol.* **23**: 364-381 (DOI: 10.1016/j.copbio.2011.10.008).
239. Zingaro KA & Papoutsakis, ET. 2013. GroESL overexpression imparts *Escherichia coli* tolerance to i-, n-, and 2-butanol, 1,2,4-butanetriol and ethanol with complex and unpredictable patterns. *Met Eng.* **15**:196-205. DOI 10.1016/j.ymben.2012.07.009
242. Fast, AG and Papoutsakis, ET. 2012. Stoichiometric and energetic analyses of non-photosynthetic CO₂-fixation pathways to support synthetic-biology strategies for production of fuels and chemicals. *Curr Opinion in Chem Engineering.* **1**: 380-395. DOI 10.1016/j.coche.2012.07.005
243. Nicolaou, SN, Gaida, SM, & Papoutsakis, ET. 2012. Exploring the combinatorial genomic space in *Escherichia coli* for ethanol tolerance. *Biotechnology Journal.* **7**: 1337-1345. DOI 10.1002/biot.201200227.
244. Zingaro KA & Papoutsakis, ET. 2012. Towards a Semi-Synthetic Stress Response System to Engineer Microbial Solvent Tolerance. *mBio.* **3**(5): e00308-12 DOI: 10.1128/mBio.00308-12
246. Al-Hinai MA, Fast, AG and Papoutsakis ET. 2012. A novel system for efficient isolation of double-crossover recombination mutants in *Clostridium* enabling markerless chromosomal gene deletions and DNA integration. *Appl. Env. Microbiol.* **78**: 8112-8121. DOI: 10.1128/AEM.02214-12.
249. Papoutsakis, ET. 2013. Exploring the Capabilities of the Geobiosphere's Microbial Genome. *AIChe J.* **59**(3): 688-698. DOI 10.1002/aic.14032.
250. Hou, S, Jones, S, Choe, LH, Papoutsakis, ET & Lee, KH. 2013. Workflow for quantitative proteomic analysis of *Clostridium acetobutylicum* ATCC 824 using iTRAQ tags. *Methods*, **61**(3): 269-276. DOI: <http://dx.doi.org/10.1016/j.ymeth.2013.03.013>.
251. Gaida, SM, Al-Hinai, M, Indurthi, D, Nicolaou, SA & Papoutsakis, ET. 2013. Synthetic tolerance: three non-coding small RNAs, DsrA, ArcZ and RprA, acting supra-additively against acid stress. *Nucleic Acids Research.* **41**: 8726-8737. Doi:10.1093/nar/gkt651
252. Nicolaou, SN & Papoutsakis, ET. 2013. Overexpression of fetA (ybbL) and fetB (ybbM) enhances resistance to oxidative stress in *Escherichia coli*. *Appl. Environ. Microbiol.* **79**: 7210-7219. DOI: 10.1128/AEM.02322-13.
253. Nicolaou, SN, Zingaro KA & Papoutsakis, ET. 2013. Dissecting the assays to assess microbial strains for tolerance to toxic chemicals in industrial bioprocessing. *Trends in Biotechnology.* **31**:643-653. 10.1016/j.tibtech.2013.08.005
255. Wang Q, Venkataramanan, K, Huang, H, Papoutsakis, ET & Wu, CH. 2013. Transcription factors and genetic circuits orchestrating the complex, multilayered response of *Clostridium acetobutylicum* to butanol and butyrate stress. *BMC Systems Biology.* **7**:120.
256. Venkataramanan, K, Jones, SW, McCormick, KP, Kunjeti, SG, Ralston, MT, Meyers, BC, & Papoutsakis, ET. 2013. The *Clostridium* small RNome that responds to stress: the paradigm and importance of toxic metabolite stress in *C. acetobutylicum*. *BMC Genomics.* **14**:849.

257. Al-Hinai MA, Jones, S and Papoutsakis ET. 2014. σ^K of *Clostridium acetobutylicum* is the first known sporulation-specific sigma factor with two developmentally separated roles, one early and one late in sporulation. *J. Bacteriology*. 196(2): 287-299. DOI: 10.1128/JB.01103-13.
258. Zingaro, KA, Nicolaou, SA, Yuan, Y, and Papoutsakis, ET. 2014. Exploring the Heterologous Genomic Space for Building, Stepwise, Complex, Multicomponent Tolerance to Toxic Chemicals. *ACS Synthetic Biology*. 3: 476-486. dx.doi.org/10.1021/sb400156v
260. Yuan, Y, Bi, C, Nicolaou, SA, Zingaro, KA, Ralston, M, and Papoutsakis, ET. 2014. Overexpression of the *Lactobacillus plantarum* peptidoglycan biosynthesis *murA2* gene increases the tolerance of *Escherichia coli* to alcohols and enhances ethanol production. *Appl. Microbiol. Biotechnol.* 98:8399-8411.
261. Dash, S, Mueller, TJ, Venkataramanan, KP; Papoutsakis, ET, Maranas, CD. 2014. Capturing the response of *Clostridium acetobutylicum* to chemical stressors using a regulated genome-scale metabolic model. *Biotech. Biofuels*. 7 Article Number: 144
262. Al-Hinai MA, Jones, S and Papoutsakis ET. 2015. The *Clostridium* Sporulation Programs: Diversity and Preservation of Endospore Differentiation. *Microbiol. Mol. Biol. Rev.* 79:19-37. doi: 10.1128/MMBR.00025-14
263. Whitaker WB, Sandoval NR, Bennett RK, Fast AG, Papoutsakis ET. 2015. Synthetic methylotrophy: engineering the production of biofuels and chemicals based on the biology of aerobic methanol utilization. *Current Opinion in Biotechnology*, **33**: 165–175. 10.1016/j.copbio.2015.1001.1007.
264. Gaida, SM, Sandoval, N, Nicolaou, SA, Chen Y, Venkataramanan KP & Papoutsakis, ET. 2015. Expression of heterologous sigma factors enables functional screening of metagenomic and heterologous genomic libraries. *Nature Commun.* **6**:7045 doi: 10.1038/ncomms8045.
265. Venkataramanan, KP, Min, L, Hou, SH, Jones, SW, Ralston, MT, Meyers, BC, Lee, KH & Papoutsakis, ET. 2015. Complex and extensive post-transcriptional regulation revealed by integrative proteomic & transcriptomic analysis of metabolite stress response in *Clostridium acetobutylicum*. *BiotechBiofuels*. **8**: article 81.
266. Zingaro, KA and Papoutsakis, ET. 2015. Building cellular pathways and programs enabled by the genetic diversity of allo-genomes and meta-genomes. *Curr Op Biotechnol.* **36**:16–31.
267. Papoutsakis ET. 2015. Reassessing the Progress in the Production of Advanced Biofuels in the Current Competitive Environment and Beyond: What Are the Successes and Where Progress Eludes Us and Why. *Ind. Eng. Chem. Res.* **54**: 10170–10182 DOI: 10.1021/acs.iecr.5b01695.
268. Sandoval, NR, Keerthi P. Venkataramanan, KV, Groth, TS and Papoutsakis, ET. 2015. Whole-genome sequence of an evolved *Clostridium pasteurianum* strain reveals Spo0A deficiency responsible for increased butanol production and superior growth. *Biot. Biofuels*. 8:227.
269. Jones, A. J., Venkataramanan, K. P. & Papoutsakis, E. T. Overexpression of two stress-responsive small, non-coding RNAs, 6S and tmRNA, imparts butanol tolerance in *Clostridium acetobutylicum*. *FEMS Microbiol. Lett.* fnw063. 2016. doi:10.1093/femsle/fnw063
271. Lee, J, Jang, Y-S, Papoutsakis, ET & Lee, SY. 2016. Stable and enhanced gene expression in *Clostridium acetobutylicum* using synthetic untranslated regions with a stem-loop. *J. Biotechnology*, **230**: 40-43. DOI: 10.1016/j.jbiotec.2016.05.020
272. Sandoval, NR, and Papoutsakis, ET. 2016. Engineering membrane and cell-wall programs for tolerance to toxic chemicals: Beyond solo genes. *Current Opinion in Microbiology*, **33**:56-66. DOI: 10.1016/j.mib.2016.06.005
273. Jones, SW, G. Fast, AG, Carlson, ED, Wiedel, CA, Au, J, Antoniewicz, MR, Papoutsakis, ET & Tracy, BP. 2016. CO₂ fixation by anaerobic non-photosynthetic mixotrophy for improved carbon conversion. *Nature Communications*. **7**: Article 12800. DOI: 10.1038/ncomms12800.
274. Whitaker, WB, Jones JA, Bennett RK, Gonzalez, Vernacchio, VR, Collins, SM, Palmer MA, Schmidt S, Antoniewicz, MR, Koffas, MA, Papoutsakis, ET. 2017. Engineering the biological conversion of methanol to specialty chemicals in *Escherichia coli*. *Metabolic Engineering*, **39**:49-59 DOI: 10.1016/j.ymben.2016.10.015

275. Price JV, Chen L, Whitaker WB, Papoutsakis ET, Chen W. 2016. Scaffoldless engineered enzyme assembly for enhanced methanol utilization. *PNAS*, **113** (45):12691–12696. DOI: 10.1073/pnas.1601797113
276. Cho C, Choe D, Jang Y-S, Kim K-J, Kim W J, Cho B-K, Papoutsakis ET, Bennett GN, Seung DY, and Lee SY. 2016. Genome analysis of a hyper acetone-butanol-ethanol (ABE) producing *Clostridium acetobutylicum* BKM19. *Biotech J*. DOI: 10.1002/biot.201600457.

III. METABOLIC FLUX ANALYSIS: THEORY & EXPERIMENTS

12. Papoutsakis, E.T. 1983. A Useful equation for fermentations of butyric-acid bacteria”, *Biotechnol. Lett.* 5:253-258.
14. Papoutsakis, E.T. 1983. A useful equation for fermentations of butyric-acid bacteria. Scenarios for controls of solvent production. *The Acetone-Butanol Fermentation and Related Topics*, J.D. Bu'Lock and A.J. Bu'Lock, Eds. (Science and Technology Letters, London), *Fermentation Research I*, pp. 121-128.
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.
18. Chu, I-M. and Papoutsakis, E.T. 1985. Carbon oxidation and incorporation patterns in batch cultures of *Methylomonas* L3. *Biotech. Lett.* 7:15-20, 1985. *Methylomonas* L3. *Biotechnol. Lett.* 7: 15-20.
22. Chu, I-M., Bussineau, C.M. and Papoutsakis, E.T. 1985. Direct measurement of carbon-substrate oxidation and incorporation patterns in RuMP-Type methylotrophs. *Chemostatic cultures of Methylomonas* L3. *Biotechnol. Bioeng.* 27: 1623-1633.
27. Bussineau, C.M. and Papoutsakis, E.T. 1986. Intracellular reaction rates, enzyme activities and biomass yields in *Methylomonas* L3: Growth rate and substrate-composition effects. *Appl. Microbiol. Biotechnol.* 24: 435-442.
30. Bussineau, C.M., Keuer, T.A., Chu, I-M. and Papoutsakis, E.T. 1987. Effect of growth conditions on enzyme activities, intracellular kinetics and biomass yields of a new RuMP-Type methylotroph (T15). *Appl. Microbiol. Biotechnol.* 26: 61-69.
34. Meyer, C.L. and Papoutsakis, E.T. 1988. Detailed stoichiometry and process analysis” In: *Handbook on Anaerobic Fermentations* (L.E. Erickson, D.Y.C. Fung, eds.) Chp. 4, pp. 83-118, Marcel Dekker, N.Y.
35. San, K-Y., Papoutsakis, E.T. and Stephanopoulos, G.N. 1988. Measurement, data analysis, and control. pp. 441-462, Chp. 14 in *Handbook on Anaerobic Fermentations* (L.E. Erickson, D.Y.C. Fung, eds) Marcel Dekker, N.Y.
138. Desai, R., Nielsen, L.K., and Papoutsakis, E.T. 1999. Stoichiometric modeling of *Clostridium acetobutylicum* fermentations with nonlinear constraints. *J. Biotechnol.* **71**: 191-205.
142. Papoutsakis, E.T., and Bennett, G.N. 1999. *Metabolic Engineering of Clostridium acetobutylicum*. pp. 253-279, Chapter 11 in *Metabolic Engineering* (S.Y. Lee and E. T. Papoutsakis, Eds), Marcel Dekker, N.Y.
146. Desai, R.P., Harris, L.M., Welker, N.E., and Papoutsakis, E.T. 1999. Metabolic flux analysis elucidates the importance of the acid-formation pathway in regulating solvent production by *Clostridium acetobutylicum*. *Metabolic Eng.* **1**: 206-213.
147. Harris, L.M., Desai, R.P., Welker, N.E., and Papoutsakis, E.T. 2000. Characterization of recombinant strains of the *Clostridium acetobutylicum* butyrate kinase inactivation mutant: need for new phenomenological models for solventogenesis and butanol inhibition? *Biotechnol. Bioeng.* **67**: 1-11.
159. Harris, L.M., Desai, R.P., Welker, N.E., and Papoutsakis, E.T. 2001. Analysis of recombinant strains of *Clostridium acetobutylicum* with an inactivated *solR* gene. *J. Ind. Microbiol. Biotechnol.* **27**: 322-328.

208. Senger, R.S. and Papoutsakis, E.T. 2008. Genome-Scale Model for *Clostridium acetobutylicum*. Part 1. Reverse engineering to resolve network gaps, pathway discovery, and extrapolation to other clostridia. *Biotechnol. Bioeng.* **101**: 1036-52
209. Senger, R.S. and Papoutsakis, E.T. 2008. Genome-Scale Model for *Clostridium acetobutylicum*. Part 2: Development of Specific Proton Flux States and Numerically-Determined Sub-Spaces. *Biotechnol. Bioeng.* **101**: 1053-71.

IV. CELL-CULTURE ENGINEERING

25. Cherry, R.S. and Papoutsakis, E.T. 1986. Hydrodynamic effects on cells in agitated tissue culture reactors. *Bioproc. Eng.* 1: 29-41.
36. Cherry, R.S. and Papoutsakis, E.T. 1988. Physical mechanisms of cell damage in microcarrier cell culture bioreactors. *Biotechnol. Bioeng.* 32: 1001-1014.
38. Petersen, J.F., McIntire, L.V. and Papoutsakis, E.T. 1988. Shear sensitivity of cultured hybridoma cells (CRL-8018) depends on mode of growth, culture age and metabolite concentration. *J. Biotechnol.* 7: 229-246.
44. Cherry, R.S. and Papoutsakis, E.T. 1989. Modeling of contact-inhibited animal cell growth on flat surfaces and spheres. *Biotechnol. Bioeng.* 33: 300-305.
47. Cherry, R.S. and Papoutsakis, E.T. 1989. Growth and death rates of bovine embryonic kidney cells in turbulent microcarrier bioreactors. *Bioproc. Eng.* 4: 81-89.
50. Papoutsakis, E.T. and Kunas, K.T. 1989. Hydrodynamic effects on cultured hybridoma cells CRL 8018 in an agitated bioreactor in *Adv. in Animal Cell Biology and Technology for Bioprocesses.* (R. E. Spier et al., eds.). Butterworths. pp. 203-208.
54. Kunas, K.T., and Papoutsakis, E.T. 1990. The protective effect of serum against hydrodynamic damage of hybridoma cells in agitated and surface aerated bioreactors. *J. Biotechnol.* 15: 57-70.
55. Kunas, K.T., and Papoutsakis, E.T. 1989. Increasing serum concentrations decrease cells death and allow growth of hybridoma cells at higher agitation rates. *Biotechnol. Lett.* 11: 525-530.
56. Cherry, R.S. and Papoutsakis, E.T. 1990. Understanding and controlling injury of animal cells in bioreactors in *Animal Cell Biotechnology* (R.E. Spier and J.B. Griffiths, eds.), Vol. 4. Academic Press. Chp. 3: pp. 72-121.
57. Kunas, K.T., and Papoutsakis E.T. 1990. Damage mechanisms of suspended animal cells in agitated bioreactors with and without bubble entrainment. *Biotechnol. Bioeng.* 36: 476-483.
59. Petersen, J.F., McIntire, L.V. and Papoutsakis, E.T. 1990. Shear sensitivity of freely suspended animal cells in batch, fedbatch, and continuous cultures. *Biotechnol. Progr.* 6: 114-120.
62. Papoutsakis, E.T., Petersen, J.F. and McIntire, L.V. 1991. Cytoskeletal microfilament network and energy metabolism affect ability of animal cells to resist shear injury in *Production of Biologicals from Animal Cells in Culture* (Proc. of the 10th ESACT Meeting, Avignon, France, May 1990) (Spier, R.E., Griffiths J. B., and Meigner, B., eds.). Butterworths, England. pp. 229-234.
63. Michaels, J. D., Petersen, J.F., McIntire, L.V. and Papoutsakis, E.T. 1991. Protection mechanisms of freely suspended animal cells (CRL 8018) from fluid-mechanical injury. *Viscometric and bioreactor studies using serum, Pluronic F68 and polyethylene glycol.* *Biotechnol. Bioeng.* 38:169-180.
64. Michaels, J. D. and Papoutsakis, E.T. 1991. Polyvinyl alcohol and polyethylene glycol as protectants against fluid-mechanical injury of freely suspended animal cells (CRL 8018). *J. Biotechnol.* 19: 241-258.
65. Lakhotia, S. and Papoutsakis, E.T. 1992. Agitation induced cell injury in microcarrier cultures. The protective effect of viscosity is agitation-intensity dependent: Experiments and theory. *Biotechnol. Bioeng.* 39: 95-107.
66. Papoutsakis, E.T. 1991. Fluid-mechanical damage of animal cells in bioreactors (A review). *Trends in Biotechnol.* **9**: 427-437.
67. Papoutsakis, E.T. 1991. Media additives for protecting animal cells against agitation and aeration damage in bioreactors (A review). *Trends in Biotechnol.* 9: 316-324.
71. O'Connor, K.C. and Papoutsakis, E.T. 1992. Agitation effects on microcarrier and suspension CHO cells. *Biotechnol. Techn.* 6: 323-328.

73. Lakhotia, S., Bauer, K.D. and Papoutsakis, E.T. 1992. Damaging agitation intensities increase DNA synthesis rate and alter cell cycle phase distributions of CHO cells. *Biotechnol. Bioeng.* 40: 978-990.
74. Michaels, J.D., Kunas K.T. and Papoutsakis, E.T. 1992. Fluid-mechanical Damage of freely-suspended cells in agitated bioreactors: Effects of dextran, derivatized celluloses and polyvinyl alcohol. *Chem. Eng. Communic.* 118: 341-360.
78. Borys, M.C. and Papoutsakis, E.T. 1992. Formation of bridges, and large cellular clumps in CHO-cell microcarrier cultures: Effects of agitation, dimethyl sulfoxide and calf serum. *Cytotechnol.* 8: 237-248.
82. Lakhotia, S., Bauer, K.D. and Papoutsakis, E.T. 1993. Fluid-mechanical forces in agitated bioreactors reduce the CD13 and CD33 surface content of HL60 cells. *Biotechnol. Bioeng.* 41: 868-877.
83. Borys, M.C., Linzer, D.I.H., and Papoutsakis, E.T. 1993. Culture pH affects expression rates and glycosylation of recombinant mouse placental lactogen proteins by Chinese Hamster Ovary (CHO) cells. *Bio/Technol.* 11: 720-724.
85. Papoutsakis, E.T. and Michaels, J.D. 1993. Physical forces in mammalian cell bioreactors in *Physical Forces and the Mammalian Cells* (J. Frangos, ed.). Academic Press, New York. Chp. 10: pp. 291-345.
87. Borys, M.C. and Papoutsakis, E.T. 1993. 'Oxygenation', Module 8.D:1 of Part 8D: *Biochemistry of Cells in Culture. Environmental Factors in Protocols in Cell and Tissue Culture* (J. B. Griffiths, Doyle, A., and Newell, D. G., eds.). Wiley, Chichester, UK. pp. 8D1.1-8D.1.13.
88. Borys, M.C. and Papoutsakis, E.T. 1993. 'Mixing', Module 8.D:2 of Part 8D: *Biochemistry of Cells in Culture. Environmental Factors in Protocols in Cell and Tissue Culture* (J. B. Griffiths, Doyle, A., and Newell, D.G., eds.), Wiley, Chichester, UK. pp. 8D:2.1-8D.2.8.
89. Papoutsakis, E.T. 1993. 'Mechanical Protection, Module 8.D:3 of Part 8D: *Biochemistry of Cells in Culture. Environmental Factors in Protocols in Cell and Tissue Culture* (J. B. Griffiths, Doyle, A., and Newell, D.G., eds.), Wiley, Chichester, UK. pp. 8D:3.1-8D.3.8.
97. Michaels, J.D., Wasan, D., and Papoutsakis, E.T. 1994. Dynamic interfacial tension and rheological properties of cell culture media with shear protectants. in *Animal Cell Technology: Products of Today, Prospects for Tomorrow* (R. E. Spier, J. B. Griffiths, W. Berthold, eds.), Butterworth-Heinemann. pp. 389-391.
98. Borys, M.C., Linzer, D.I.H., and Papoutsakis, E.T. 1994. Culture pH and ammonia affect expression rates and glycosylation of recombinant mouse placental lactogen proteins by CHO cells. in *Animal Cell Technology: Products of Today, Prospects for Tomorrow* (R. E. Spier, J. B. Griffiths, W. Berthold, eds.), Butterworth-Heinemann. pp. 658-660.
99. Borys, M.C., Linzer, D.I.H., and Papoutsakis, E.T. 1994. Ammonia affects the glycosylation patterns of recombinant mouse placental lactogen-1 (mPL-I) by Chinese Hamster Ovary (CHO) Cells. *Biotechnol. Bioeng.* 43: 505-514.
101. Borys, M.C., Linzer, D.I.H., and Papoutsakis, E.T. 1994. Cell aggregation in a CHO microcarrier culture affects expression rates and N-linked glycosylation of recombinant mouse placenta lactogen-1 (mPL- 1). *Ann. N. Y. Acad. Sci.* 745: 360-371.
105. Michaels, J.D., Nowak, J.E., Mallik, A.K., Koczo, K., Wasan, D.T., and Papoutsakis, E. T. 1995. Analysis of cell-to-bubble attachment in sparged bioreactors in the presence of cell protecting additives against shear. *Biotechnol. Bioeng.* 47: 407-419.
106. Michaels, J. D., Nowak, J.E., Mallik, A.K., Koczo, K., Wasan, D.T., and Papoutsakis, E.T. 1995. Interfacial properties of cell culture media with cell protecting additives against shear. *Biotechnol. Bioeng.* 47: 420-430.
112. Michaels, J.D., Mallik, A.K., and Papoutsakis, E.T. 1996. Sparging and agitation induced injury of cultured animal cells: Do bubble coalescence and breakup in the bulk liquid injure cells? *Biotechnol. Bioeng.* 51: 399-409.
128. McDowell, C.L., and Papoutsakis, E.T. 1998. Decreasing extracellular pH increases CD13 receptor surface content and alters the metabolism of HL60 cells cultured in stirred tank reactors. *Biotechnol. Progr.* 14: 567-572.
129. McDowell, C.L., and Papoutsakis, E.T. 1998. Increased agitation intensity increases CD13 receptor surface content and mRNA levels, and alters the metabolism of HL60 cells cultured in a stirred tank bioreactor. *Biotechnol. Bioeng.* 60: 239-250.

130. McDowell, C.L., Carver R.T., and Papoutsakis, E.T. 1998. Effects of Methocel A15LV, polyethylene glycol, and polyvinyl alcohol on CD13 and CD33 receptor surface content and metabolism of HL60 cells cultured in stirred tank bioreactors. *Biotechnol. Bioeng.* 60: 251-258.
131. McDowell, C.L., and Papoutsakis, E.T. 1998. Serum increases the CD13 receptor expression, reduces the transduction of fluid-mechanical forces, and alters the metabolism of HL60 cells cultured in agitated bioreactors. *Biotechnol. Bioeng.* 60: 259-268.
149. McDowell, C.L., Borys, M.C. and Papoutsakis, E.T. 2000. Animal cell culture: Physicochemical effects of pH. *The Encyclopedia of Cell Technology* (R. E. Spier, Ed.). Wiley, New York. pp. 63-70.
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.
151. Carswell, K.S., Weiss, J.W. and Papoutsakis, E.T. 2000. Low oxygen tension enhances the stimulation and proliferation of human T lymphocytes. *Cytotherapy* 2: 25-37.
157. Carswell, K.S., and Papoutsakis, E.T. 2000. Extracellular pH Affects the Proliferation of Cultured Human T-cells and Their Expression of the Interleukin 2 Receptor. *J. Immunotherapy.* 23: 669-674.
161. Haddad, H, Carswell, K.S., and Papoutsakis, E.T. 2002. Ex vivo expansion of Human T lymphocytes. In *Methods in Tissue Engineering* (A. Atala & R. Lanza, Eds.), Academic Press, San Diego. Chapter 41: pp. 487-502.
162. Haddad, H, and Papoutsakis, E.T. 2001. Low oxygen tension and autologous plasma increase T-cell proliferation in serum-free media. *Cytotherapy.* 3: 435-447.
177. Haddad-Adams, H., Windgassen, D., Ramsborg C.G., Paredes, C., and Papoutsakis, E.T. 2004. Molecular understanding of oxygen-tension and patient-variability effects on Ex vivo expanded T-cells. *Biotechnol. Bioeng.* 87: 437-450.
180. Ramsborg, C.G, Windgassen, D., Paredes, C.J., and Papoutsakis, E.T. 2004. Molecular insights into the pleiotropic effects of plasma on Ex vivo expanded T-cells using DNA-microarray analysis. *Exp. Hematol.* 32: 970-990.
203. Pascoe, D.E., Arnott, D., Papoutsakis, E.T., Miller, W.M., Andersen, D.C. 2007. Proteome analysis of antibody-producing CHO cell lines with different metabolic profiles. *Biotechnol Bioeng.* 92(2):391-410.
218. Papoutsakis, ET. 2009. From CHO-Cell to Stem-Cell Biotechnology, Oxygenation, and Mixing in Animal-Cell Culture: Bioreactors, Bubbles, and Cell Injury. *Biotechnol Bioeng.* 102(4):976-979.
226. Wang M, Senger RS, Paredes C, Banik GG, Lin A, & Papoutsakis, ET. 2009. Microarray-Based Gene Expression Analysis as a Process Characterization Tool to Establish Comparability of Complex Biological Products: Scale-Up of a Whole-Cell Immunotherapy Product. *Biotechnol. Bioeng.* 104: 796-808.

V. STEM-CELL & HEMATOPOIETIC-CELL BIOENGINEERING

69. Koller, M.R., Bender, J.G., Miller, W.M. and Papoutsakis, E.T. 1992. Reduced oxygen tension increases hematopoiesis in long-term culture of human and progenitor cells from cord blood and bone marrow. *Exper. Hematol.* 20: 264-270.
72. Koller, M.R., Bender, J.G., Miller, W.M. and Papoutsakis, E.T. 1992. Effects of synergistic cytokine combinations, low oxygen, and irradiated stroma on the expansion of human cord blood progenitors. *Blood.* 80: 403-411.
77. Koller, M.R., Bender, J.G., Papoutsakis, E.T. and Miller, W.M. 1992. Beneficial effects of reduced oxygen tension and perfusion in long-term hematopoietic cultures. *Ann. N.Y. Acad. Sci.* 665: 105-116.
80. Koller, M.R., Bender, J.G., Miller, W.M. and Papoutsakis, E.T. 1993. Expansion of primitive human hematopoietic progenitors in a perfusion bioreactor system with IL-3, IL-6 and stem-cell factor. *Bio/Technol.* 11: 358-363.
100. Sandstrom, C.E., Miller, W.M. and Papoutsakis, E T. 1994. Review: serum-free media for cultures of primitive and mature hematopoietic cells. *Biotechnol. Bioeng.* 43: 706-733.
102. Koller, M.R. and Papoutsakis, E.T. 1995. Cell adhesion in animal cell culture: physiological and fluid-mechanical implications, Chapter in "Cell Adhesion: Fundamentals and Biotechnological

- Applications” (M. Hjortso, J. Roos, eds), Bioprocess Technology Series, No. 20. Marcel Dekker, New York. **20**: pp. 61-110.
107. Sandstrom, C.E., Bender, J.G., Papoutsakis, E.T., and Miller, W.M. 1995. Effects of CD34+ cell selection and perfusion on Ex vivo expansion of peripheral blood mononuclear cells. *Blood*. **86**: 958- 970.
108. Papoutsakis, E.T., McAdams, T.A., Sandstrom, C.E., Miller, W.M., and Bender, J.G. 1995. Ex vivo Expansion of Primitive Hematopoietic Cells for Cellular Therapies: An Overview. *Cytotechnology*. **18**: 133-146.
109. Sandstrom, C.E., Bender, J.G., Miller, W.M., and Papoutsakis, E.T. 1996. Development of novel perfusion chamber to retain nonadherent T-cells and its use for comparison of human “mobilized” peripheral-blood cell cultures with and without irradiated bone marrow stroma. *Biotechnol. Bioeng.* **50**: 493-504.
110. Collins, P.C., Papoutsakis, E.T., & Miller, W.M. 1996. Ex-vivo systems for hematopoietic cell therapies. *Current Opinion in Biotechnology*. **7**: 223-230.
113. McAdams, T.A., Miller, W.M., and Papoutsakis, E.T. 1996. Hematopoietic cell culture therapies: I. Cell culture considerations. *Trends in Biotechnol.* **14**: 341-349.
114. McAdams, T.A., Winter, J.A., Miller, W.M., and Papoutsakis, E.T. 1996. Hematopoietic cell culture therapies: II. Clinical aspects. *Trends in Biotechnol.* **14**: 388-396.
116. Sandstrom, C.E., Collins, P.C., McAdams, T.A., Bender, J.G., Papoutsakis, E.T., and Miller, W.M. 1996. Comparison of serum-deprived media for the Ex vivo expansion of hematopoietic progenitor cells from cord blood and peripheral blood mononuclear cells. *J. Hematotherapy*. **5**: 461-473.
117. LaIappa, J.A., Papoutsakis, E.T., and Miller, W.M. 1997. Evaluation of cytokines for the expansion of megakaryocyte and granulocyte lineages. *Stem Cells*. **15**: 198-206.
118. LaIappa, J.A., Papoutsakis, E.T., and Miller, W.M. 1997. Ex vivo expansion of hematopoietic stem and progenitor cells for transplantation. in *Blood Stem Cell Transplantation* (J. Winter, Editor), Kluwer, New York. Chp. 8: pp.159-186.
119. McAdams, T.A., Miller, W.M., and Papoutsakis, E.T. 1997. Effects of culture pH on the expansion and differentiation of hematopoietic progenitors from peripheral and cord blood. *Br. J. Haematol.* **97**: 889- 895.
120. Collins, P.C., Wong, C-K., Papoutsakis, E.T., and Miller, W.M. 1997. Real time method for determining the colony-forming cell content of human hematopoietic cell cultures. *Biotechnol. Bioeng.* **55**: 693-700.
121. LaIappa, J.A., McAdams, T.A., Papoutsakis, E.T., and Miller, W.M. 1997. Culture materials affect Ex vivo expansion of hematopoietic progenitor cells. *J. Biomed. Mat. Res.* **36**: 347-359.
124. Collins, P.C., Miller, W.M., and Papoutsakis, E.T. 1998. Stirred culture of peripheral and cord-blood hematopoietic cells offers advantages over traditional static systems for clinically relevant applications. *Biotechnol. Bioeng.* **59**: 534-543.
125. Collins, P.C., Nielsen, L.K., Patel, S.D., Papoutsakis, E.T., and Miller, W.M. 1998. Characterization of hematopoietic cell expansion, oxygen uptake and glycolysis in a controlled, stirred-tank bioreactor system. *Biotechnol. Progr.* **14**: 466-472.
126. LaIappa, J.A., Papoutsakis, E.T., and Miller, W.M. 1998. Oxygen tension alters the effects of cytokines on the megakaryocyte, erythrocyte and granulocyte lineages. *Exp. Hematol.* **26**: 835-843.
127. Nielsen, L.K., Papoutsakis, E.T., and Miller, W.M. 1998. Modeling Ex vivo hematopoiesis using chemical engineering metaphors. *Chem. Eng. Sci.* **53**: 1913-1925.
132. Collins, P.C., Patel, S.D., Miller, W.M., and Papoutsakis, E.T. 1999. Initiation, maintenance, and quantification of human hematopoietic cell cultures. in *Methods in Molecular Medicine, Vol.18: Tissue Engineering Methods* (J. R. Morgan, M. L. Yarmush, Eds), Human Press, Totowa, NJ. Chp. 22: pp. 271-292.
133. Horner, M., Miller, W.M., Ottino, J.M., and Papoutsakis, E.T. 1998. Transport in a grooved perfusion flat-bed bioreactor for cell therapy applications. *Biotechnol. Progr.* **14**: 689-699.

134. McAdams, T.A., Miller, W.M., and Papoutsakis, E.T. 1998. pH is a potent modulator of erythroid differentiation. *Br. J. Haematol.* **103**: 317-325.
137. Nielsen, L.K., Bender, J.G., Miller, W.M., and Papoutsakis, E. T. 1998. Population balance model of in vivo neutrophil formation following bone marrow rescue therapy. *Cytotechnology.* **28** (1/3): 157-162.
139. Mostafa, S.S, Hevehan, D.L., McAdams, T.A., Papoutsakis, E.T. and Miller, W.M. 1999. Hematopoietic cells for cellular and gene therapy: I. Basic assay techniques in *Animal Cell Biotechnology: Methods and Protocols* (N. Jenkins, Ed.), Humana Press. Chapter 17: pp. 211-227.
140. McAdams, T.A., Papoutsakis, E.T. and Miller, W.M. 1999. Hematopoietic cells for cellular and gene therapy: II. Expansion Protocols in *Animal Cell Biotechnology: Methods and Protocols* (N. Jenkins, Ed.), Human Press. Chapter 18: pp. 229-238.
141. Collins, P.C., Papoutsakis, E.T., Patel, S. and Miller, W.M. 1999. Nuclei size distribution as a predictor of hematopoietic cell proliferation. *Cytotherapy.* **1**: 99-110.
144. Guo, M.H., Miller, W.M., Papoutsakis, E.T., Patel, S., James, C., Goolsby, C., and Winter J.N. 1999. Ex vivo expansion of CFU-GM and BFU-E in unselected peripheral blood mononuclear cell cultures with Flt3L in enhanced by autologous plasma. *Cytotherapy.* **1**: 183-194.
148. Hevehan, D.L., Papoutsakis, E.T. and Miller W. M. 2000. Physiologically significant effects of pH and oxygen tension on granulopoiesis. *Exp. Hematol.* **28**: 267-275.
152. Patel, S.D, Guo, R., Miller, W.M., Papoutsakis, E.T., Minster, N.I., Baum, C.M., and Winter, J.N. 2000. Clinical-scale expansion of progenitor and post-progenitor cells using daniplestim, leridistim, progenipoiectin, promegapoiectin and autologous plasma. *Cytotherapy.* **2**: 85-94.
153. Patel, S.D., Miller, W.M., Winter, J.N., and Papoutsakis E.T. 2000. Cell density-dependent proliferation in frequently fed peripheral blood mononuclear cell cultures. *Cytotherapy.* **2**: 267-280.
154. Hevehan, D., Miller, W.M., and Papoutsakis, E.T. 2000. A dynamic model of Ex vivo granulocytic kinetics to examine the effects of pO₂, pH and IL-3. *Exp. Hematol.* **28**:1016-1028.
155. Patel, S.D., Papoutsakis, E.T., Winter, J.N., and Miller, W.M. 2000. The lactic acid issue revisited: novel feeding protocols to examine inhibition of cell proliferation and glucose metabolism in hematopoietic cell cultures. *Biotechnol. Progr.* **16**: 885-892.
156. Mostafa, S.S., Miller, W.M., and Papoutsakis, E.T. 2000. Oxygen tension influences the differentiation, maturation and apoptosis of human megakaryocytes. *Br. J. Haematol.* **111**: 879-889.
158. Yang, H., Papoutsakis, E.T., and Miller, W.M. 2001. Model-based estimation of myeloid hematopoietic progenitor cells using metabolic activities. *Biotechnol. Bioeng.* **72**: 144-155.
160. Mostafa, S.S., Papoutsakis, E.T., and Miller, W.M. 2001. Oxygen tension modulates the expression of cytokine receptors, transcription factors and lineage-specific markers in cultured human megakaryocytes. *Exper. Hematol.* **29**: 873-883.
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.
165. Hevehan, D. L., Miller, W.M., and Papoutsakis, E.T. 2002. Differential expression and phosphorylation of distinct STAT3 proteins during granulocytic differentiation", *Blood.* **99**: 1627-1637.
167. Yang, H., Miller, W.M., and Papoutsakis, E. T. 2002. Higher pH promotes megakaryocytic maturation and apoptosis", *Stem Cells.* **20**: 320-328.
192. Giammona, L.M., Fuhrken, P.G., Papoutsakis, E.T., and Miller, W.M. 2006. Nicotinamide (vitamin B3) increases the polyploidisation and proplatelet formation of cultured primary human megakaryocytes. *Brit. J. of Haematol.* **135**, 554-566.
193. Fuhrken, P.G., Chen, C., Miller, W.M., and Papoutsakis, E.T. 2007. Comparative, genome-scale transcriptional analysis of CHRF-288-11 and primary human megakaryocytic cell cultures provides novel insights into lineage-specific differentiation. *Exp. Hematology,* **35**: 476-489.

194. Dipankar R, Terao, Y., Fuhrken, P.G., Ma, Z-Q., DeMayo, F.J., Christov, K., Heerema, N. A., Franks, R., Tsai, S.Y., Papoutsakis, E.T., and Kiyokawa, H. 2007. Deregulated CDC25A expression promotes mammary tumorigenesis with genomic instability. *Cancer Res.* **67**: 984-991.
200. Chen, C., Fuhrken, P.G., Huang L.T., Paredes, C.J., Miller, W.M., and Papoutsakis, E.T. 2007. A systems-biology analysis of isogenic megakaryocytic and granulocytic cultures identifies new molecular components of megakaryocytic apoptosis. *BMC Genomics* **8**: 384 (doi:10.1186/1471-2164-8-384).
201. Huang, L.T., Paredes, C.J., Papoutsakis, E.T., and Miller W.M. 2007. Gene-expression analysis illuminates the transcriptional programs underlying the functional activity of ex-vivo expanded granulocytes. *Physiol Genomics.* **31**: 114-125.
202. Wang, H., Lu, Y., Huang, W., Papoutsakis, E.T., Fuhrken, P., and Eklund, E.A. 2007. HoxA10 activates transcription of the gene encoding mitogen-activated protein kinase phosphatase 2 (Mkp2) in myeloid cells. *J Biol. Chem.* **282**: 16164-76.
205. Fuhrken, P.G., Chen, C., Apostolidis, P.A., Wang, M., Miller, W.M., and Papoutsakis, E.T. 2008. Gene- Ontology driven transcriptional analysis of CD34+-cell initiated megakaryocytic cultures identifies new transcriptional regulators of megakaryopoiesis. *Physiol. Genomics.* **33** (2): 159-169.
206. Sepúlveda, D.E., Andrews, B.A., Asenjo, J.A., and Papoutsakis, E.T. 2008. Comparative transcriptional analysis of embryoid body versus two-dimensional differentiation of murine embryonic stem cells. *Tissue Eng. Part A.* **14**(10):1603-1614 (2008) (doi:10.1089/tea.2007.0331).
210. Fuhrken, P.G., Apostolidis, P.A., Lindsey, S., Miller, W.M., and Papoutsakis, E.T. 2008. Tumor suppressor protein p53 regulates megakaryocytic polyploidization and apoptosis. *J. Biol. Chem.* **283**(23): 15589-600.
223. Giammona LM, Panuganti S, Kemper JM, Apostolidis PA, Lindsey S, Papoutsakis ET, Miller WM. 2009. Mechanistic studies on the effects of nicotinamide on megakaryocytic polyploidization and the roles of NAD(+) levels and SIRT inhibition. *Exp. Hematology*, **37**: 1340-1352.
224. Panuganti S, Papoutsakis ET, Miller WM. 2010. Bone marrow niche-inspired, multi-phase expansion of megakaryocytic progenitors with high polyploidization potential. 2010. *Cytotherapy.* **12**: 767-782.
225. Sepúlveda, D.E., Andrews, B.A., Papoutsakis, E.T. and Asenjo, J.A., 2010. Metabolic Flux Analysis of Embryonic Stem Cells Using Three Distinct Differentiation Protocols and Comparison to Gene Expression Patterns. *Biotechnol. Progr.* **26**: 1222-1229.
228. Lindsey, S. and Papoutsakis, E. T. 2011. The Aryl Hydrocarbon Receptor (AhR) Transcription Factor Regulates Megakaryocytic Polyploidization. *Brit. J. of Haematol.* **152** (4): 469–484. doi:10.1111/j.1365- 2141.2010.08548.x.
233. Lindsey, S. and Papoutsakis, ET. 2011. The importance of physiologically inspired physicochemical parameters on hematopoietic stem-cell maintenance and lineage-specific differentiation in *ex vivo* cultures. Pp. 159-195. Chapter 6 in: "Stem Cells - Mechanisms and Technologies" (M. K. Stachowiak & E. S. Tzanakakis, , Editors). World Scientific Publishing and Imperial College Press.
235. Apostolidis, PA, Lindsey S, Miller, WM and Papoutsakis, ET. 2012. Role of tumor suppressor p53 in megakaryopoiesis and platelet function. *Exp. Hematol.* **40**:131-142 (doi:10.1016/j.exphem.2011.10.006).
240. Apostolidis, PA, Lindsey S, Miller, WM and Papoutsakis, ET. 2012. The proposed megakaryocytic regulon of p53: the genes engaged to control cell cycle and apoptosis during megakaryocytic differentiation. *Physiol Genomics.* **44**: 638-650 (DOI: 10.1152/physiolgenomics.00028.2012)
241. Lindsey, S. and Papoutsakis, E. T. 2012. The Evolving Role of the Aryl Hydrocarbon Receptor (AHR) in the Normophysiology of Hematopoietic Stem and Progenitor Cells. *Stem Cell Reviews and Reports.* **8**: 1223-1235. DOI 10.1007/s12015-012-9384-5).
245. Jiang, J and Papoutsakis ET. 2013. Stem-cell niche based comparative analysis of chemical and nano-mechanical material properties impacting *ex vivo* expansion and differentiation of hematopoietic and mesenchymal stem cells. *Advanced Healthcare Materials.* **2**: 25–42. DOI:10.1002/adhm.201200169

247. Konieczna, IM, Panuganti, S, DeLuca, TA, Papoutsakis, ET, Eklund, EA, Miller WM. 2013. Administration of nicotinamide does not increase platelet levels in mice. *Blood Cells, Molecules, and Diseases*. **50**: 171-176 (<http://dx.doi.org/10.1016/j.bcmd.2012.11.007>).
248. Panuganti S, Papoutsakis ET, Miller WM. 2013. "Three-stage ex vivo expansion of high-ploidy megakaryocytic cells: Towards large-scale platelet production". *Tissue Eng. A*. **19** (7-8): 998-1014. DOI: 10.1089/ten.tea.2011.0111.
254. Lindsey, S., Jiang, J., Woulfe D. and Papoutsakis, E. T. 2013. Platelets from mice lacking the aryl hydrocarbon receptor (AHR) exhibit defective collagen-dependent signaling. *Journal of Thrombosis and Haemostasis*. **12**: 383–394. DOI: 10.1111/jth.12490
259. Jiang, J, Woulfe, DS and Papoutsakis ET. 2014. Shear enhances thrombopoiesis and production of megakaryocytic (Mk) microparticles that induce Mk differentiation of stem cells. *Blood*, **124**:2094-2103
270. Luff, S. A. & Papoutsakis, E. T. Megakaryocytic Maturation in Response to Shear Flow is Mediated by the Activator Protein 1 (AP-1) Transcription Factor via Mitogen-Activated Protein Kinase (MAPK) Mechanotransduction. *J. Biol. Chem.* **291**: 7831- 7843 (2016). doi:10.1074/jbc.M115.707174
277. Jiang, J, Kao CY and Papoutsakis ET. 2017. How do megakaryocytic microparticles target and deliver cargo to alter the fate of hematopoietic stem cells? *J. Controlled Release*. **247**:1-18. DOI: 10.1016/j.jconrel.2016.12.021

VI. T-CELL BIOENGINEERING & GENOMICS FOR CELLULAR IMMUNOTHERAPY

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.
151. Carswell, K.S., Weiss, J., and Papoutsakis, E. T. 2000. Low oxygen tension enhances the stimulation and proliferation of human T lymphocytes. *Cytotherapy*. **2**: 25-37.
157. Carswell, K.S., and Papoutsakis, E.T. 2000. Extracellular pH affects the proliferation of cultured human T-cells and their expression of the interleukin 2 receptor. *J. Immunotherapy*. **23**: 669-674.
161. Haddad, H., Carswell, K.S., and Papoutsakis, E.T. 2002. Ex vivo expansion of Human T lymphocytes. in *Methods in Tissue Engineering* (A. Atala & R. Lanza, Eds.), Academic Press, San Diego. Chapter 41: pp. 487-502.
162. Haddad, H., and Papoutsakis, E.T. 2001. Low oxygen tension and autologous plasma increase T-cell proliferation in serum-free media. *Cytotherapy*. **3**: 435-447.
169. Yang, H., Haddad, H., Tomas, C., Alsaker, K., and Papoutsakis E.T. 2003. A segmental nearest neighbor normalization and gene identification method gives superior results for DNA-array analysis. *Proc. Nat. Acad. Sci. (USA)*. **100**: 1122-1127.
177. Haddad-Adams, H., Windgassen, D., Ramsborg, C.G., Paredes, C., and Papoutsakis, E.T. 2004. Molecular understanding of oxygen-tension and patient-variability effects on Ex vivo expanded T-cells. *Biotechnol. Bioeng.* **87**: 437-450.
180. Ramsborg, C.G, Windgassen, D., Paredes, C.J., and Papoutsakis, E.T. 2004. Molecular insights into the pleiotropic effects of plasma on Ex vivo expanded T-cells using DNA-microarray analysis. *Exp. Hematol.* **32**: 970-990.
195. Ramsborg, C.G., and Papoutsakis, E.T. 2007. Global transcriptional analysis delineates the differential inflammatory response interleukin-15 elicits from cultured human T cells. *Exp. Hematol.* **35**: 454-464.
211. Wang, M., Windgassen, D., and Papoutsakis, E.T. 2008. Comparative Analysis of Transcriptional Profiling of CD3+, CD4+ and CD8+ T cells Identifies Novel Immune Response Players in T-Cell Activation. *BMC Genomics*. **16**:9(1):225
212. Wang M., Windgassen, D., and Papoutsakis, E.T. 2008. A Global Transcriptional View of Apoptosis in Human T-Cell Activation. *BMC Medical Genomics* **1**:53 doi:10.1186/1755-8794-1-53.

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.
208. Senger, R.S. and Papoutsakis, E.T. 2008. Genome-Scale Model for *Clostridium acetobutylicum*. Part 1. Reverse engineering to resolve network gaps, pathway discovery, and extrapolation to other clostridia. *Biotechnol. Bioeng.* **101**: 1036-52.
209. Senger, R.S. and Papoutsakis, E.T. 2008. Genome-Scale Model for *Clostridium acetobutylicum*. Part 2: Development of Specific Proton Flux States and Numerically-Determined Sub-Spaces. *Biotechnol. Bioeng.* **101**: 1053-71.
226. Chen, Y., Indurthi, I., Jones, S. W. and Papoutsakis, E. T. 2011. Small RNAs of the genus *Clostridium*. *mBio* **2**(1):e00340-10. doi:10.1128/mBio.00340-10.

VIII. TRANSPORT MODELS, APPLIED MATHEMATICS & OTHER

4. Papoutsakis, E.T., Ramkrishna, D. and Lim, H.C. 1980. The extended Graetz problem with Dirichlet wall boundary conditions. *Appl. Sci. Res.* **36**: 13-34.
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.
25. Cherry, R.S. and Papoutsakis, E.T. 1986. Hydrodynamic effects on cells in agitated tissue culture reactors. *Bioproc. Eng.* **1**: 29-41.
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 Papoutsakis, 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. Tsiftaris 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. Tsiftaris 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. Tsiftaris 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. October 2011, 2012, 2013, 2014, 2015.

PATENTS

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 on April 30, 1996.
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.
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 on Nov. 1, 2005.
4. Tracy, B.P., and Papoutsakis, E.T. Assignee: Northwestern Univ. Methods and compositions for genetically manipulating clostridia and related bacteria with homologous recombination associated proteins. US Patent 9,493,778, Issued, November 15, 2016.
5. 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). US Patent application. Serial No.: 12/485,636 (June 16, 2009). Assignee: Northwestern Univ.
6. 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). Provisional US patent filed on July 31, 2008 (NU 28106).
7. Lee, S.Y, Park, J.H, and Papoutsakis, E.T. Preparing a recombinant mutant microorganism having high butanol productivity by deleting or attenuating a gene and introducing or amplifying the gene coding for an enzyme involved in butanol biosynthesis into the Papoutsakis, E. T., Lee, S.Y., and Park, J.H. Method for preparing butanol through butyryl-CoA microorganism. WO2008072921- A1 (WOKR006525) 14 Dec 2007 (US875145P (15 Dec 2006); US899201P (02 Feb 2007).
8. Papoutsakis, E. T., Lee, S.Y., and Park, J.H. Method for preparing butanol through butyryl-CoA as an intermediate using bacteria. WO2008072920-A1 (WOKR006524) 14 Dec 2007 (US875145P) (15 Dec 2006); US899201P (02 Feb 2007)
9. Lee, S.Y, Papoutsakis, E.T., and Jang, Y.S. Method for preparing butanol through butyryl-CoA as intermediate using yeast. WO2008097064-A1 (WOKR000787). 11 Febr 2008 (US900,248P (08 Feb 2007)).
10. 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 B2 date of patent: Nov. 13, 2012. Appl. No. 12/422,772. Filed April 13, 2009.
11. Jones, S.W., Tracy, B.P., Papoutsakis, E.T. "Generation of Solventogenic, Asporogenous Solventogenic Clostridia for Production of Butanol by Inactivating The Gene That Codes the Sporulation Factor sigF". US Provisional Patent application. USPTO Serial No.: 61/258,739 (UD reference # UD10-10) (Filed: 11-6-09).
12. Nicolaou S, Gaida S, Papoutsakis ET. 2011. Patent No. US2011/021505. WO 2011/088443 A2. 01/18/2011. Provisional application serial number 61/295,856, filed January 18, 2010. CO-EXISTING LIBRARIES FOR DEVELOPING COMPLEX MICROBIAL PHENOTYPES. Assignee: Univ. of Delaware.

13. Papoutsakis, ET, Al-Hinai, M and Fast AG. "Recombinant clostridium organism and method for isolation of double-crossover allelic exchange mutants". WO2013133882 A3 PCT/US 2012/069672 (Publ. date: Dec 5, 2013) Filing date: Dec. 14, 2012. Priority date: Dec. 16, 2011.
14. Papoutsakis ET, Gaida SM. 2012. Publication No. US 2012/0035078 A1. Feb. 9, 2012 (Provisional application No. 61/350,679, filed on Jun. 2, 2010, provisional application No. 61/484,474, filed on May 10, 2011). WO2011153344-A2; US2012035078-A1; WO2011153344-A3. ENGINEERING COMPLEX MICROBIAL PHENOTYPES WITH TRANSCRIPTION ENHANCEMENT. Assignee: University Delaware (U Del).
15. Papoutsakis, ET, Al-Hinai, MA, Jones, SW, Indurthi, DC, Mitchell DK, Fast A. Recombinant clostridia that fix CO₂ and CO and uses thereof. US Pub. No. US2012/0064587 A1 (Pub. date: March 15, 2012). Appl. No. 13/229,033 (Sep 9, 2011). Provisional patent application. USPTO Serial No.: 61/381,701 (Filed: 9-10-10)." Was allowed on February 10, 2014.
16. Papoutsakis, E.T. Hess, D. R. & Tracy. B. P. "Generation of asporogenous solventogenic clostridia". Utility patent application. PCT. Pub. No. US2011/0256604 A1 (pub. Date: Oct 20, 2011). USPTO Serial number 13/009,215 (Filed: January 19, 2011) [IWOV-RP.FID1100789].
17. Papoutsakis, E.T., Bi, C. and Nicolaou, S. Engineering Complex Microbial Phenotype with Successive Integrations of Exogenous DNA (SIEDNA). Pub. No. 2011/0300553 A1 (Dec. 8, 2011). U.S. Patent Application No. 13/151,920. Filed June 2nd, 2011 (University of Delaware UD10-48).
18. Tracy, B, and Papoutsakis, E. "Methods and composition for genetically manipulating clostridia and related bacteria with homologous recombination associated proteins". Pub. No. 2011/0117655 A1 (Pub. Date: May 19, 2011). Assignee. Elcriton, Inc.
19. Papoutsakis, E C-Y Kao and J. Jiang (11/26/2015). Megakaryocytic particles and microparticles for cell therapy & fate modification of stem and progenitor cells. International Patent: PCT WO 2015/179301 A1.
20. Papoutsakis, S. Nicolaou, A. Fast, V. Falara, R. K. Bennett, W. B. Whitaker, N. R. Sandoval, J. Gonzalez, M. Antoniewicz. Synthetic methylotrophy to liquid fuels and chemicals. WO2015108777 A1 (1/16/2014; 7/23/2015)

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. "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

1. Kim O'Connor, (Postdoctoral) 1988-89.
2. Phillippe Soucaille, (Visiting Professor) August 1991- August 1992.
3. Lee Mermelstein, (Postdoctoral), Jan. 1992 - June 1993.
4. Karl Walter, (Postdoctoral), March 1993- May 1994.
5. James Michaels, (Postdoctoral), September 1994 - March 1995.
6. Ramesh Nair, (Postdoctoral), March 1995-96.
7. Lars Nielsen (Postdoctoral; with W.M. Miller), September 1995 - August, 1997.
8. Larissa Wenning (Postdoctoral; NIH NRSA fellow. With W.M. Miller), 1997-1999.
9. Anke Duebeler (Postdoctoral), 1998.
10. Christi McDowell (Postdoctoral), 1998.
11. He (Henry) Yang (Postdoctoral; with W.M. Miller), 1999-2001; (Postdoctoral), 2002-03.
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), March 2001-December 2001.
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 – May 2010.
21. Changhai Bi: (Postdoctoral): 2009 – 2011.
22. Shawn Jones (postdoctoral): 2011- 2012.
23. Yongbo Yuan (postdoctoral): 2012-2013
24. Sergios Nicolaou (postdoctoral): 2012-14
25. Keerthi Prasad Venkataramanan (postdoctoral): 2012-2014
26. Nicholas Sandoval (postdoctoral): 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-

Doctoral and MS Completed

- a. Joseph W. Roos, “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”, M.S. Thesis, Rice Univ. (1984).
- b. Thomas A. Keuer, “Isolation, characterization and substrate-transport studies of a new, unique methylotroph”, M.S. Thesis, Rice Univ. (1984).
- c. Joseph K. McLaughlin, “Gas chromatography and gateway sensors for on-line state estimation of complex fermentations (butanol/acetone fermentation)”, M.S. Thesis, Rice Univ. (1984).
- d. I-Ming Chu, “Growth dynamics and substrate oxidation and incorporation patterns of *Methylomonas L3*”, Ph.D. thesis, Rice Univ. (1985).
- e. Anil Diwan, “Transport of methanol and formaldehyde in methylotroph L3 and methylotrophic strain T15”, Ph.D. thesis, Rice Univ. (1985).
- f. Christopher M. Bussineau, “Regulation of substrate-metabolism pathways, its relation to steady-state enzyme levels, and formaldehyde transport in RuMP-Type methylotrophs L3 and T15”, Ph.D. Thesis, Rice Univ. (1987).
- g. Charles L. Meyer, “The effect of bioreactor conditions on ATP supply and demand, electron flow, and product formation in the acetone/butanol fermentation”, Ph.D., Rice Univ. (1987).
- h. Robert S. Cherry, “Hydrodynamic mechanisms of cell damage in microcarrier bioreactors”, Ph.D., Rice Univ. (1987).
- i. Dennis P. Wiesenborn, “Thiolase, phosphotransbutyrylase, and CoA transferase and their role in related formation in *Clostridium acetobutylicum* ATCC 824”, Ph.D. Thesis, Rice Univ. (1988).

- j. Michael H.W. Huesemann, "Levels of key enzymes and physiological factors involved in product formation in batch and continuous cultures of *Clostridium acetobutylicum* ATCC 824", Ph.D, Rice Univ. (1989).
- k. Jon F. Petersen, "Shear stress effects on cultured hybridoma cells in a rotational Couette viscometer", Ph.D, Rice Univ., 1989.
- l. Kurt T. Kunas, "Growth and injury of freely suspended animal cells in an agitated and surface-aerated bioreactor", Ph.D, Rice University, 1990.
- m. Sanjay Lakhotia, "Effect of viscosity on cell injury in microcarrier bioreactors", M.S., Northwestern Univ, 1990.
- n. Michael C. Borys, "Factors affecting recombinant protein production by CHO cells in microcarrier bioreactors", M.S., Northwestern Univ., 1990.
- o. Sang Yup Lee, Ph.D., "Construction of *Escherichia coli*-*Clostridium acetobutylicum* vectors and transformation and characterization of *Clostridium acetobutylicum* strains using these vectors", December 1991.
- p. Lee Mermelstein, Ph.D., "Development and use of tools for the genetic analysis and metabolic engineering of *Clostridium acetobutylicum* ATCC 824", June 1992.
- q. Sanjay Lakhotia, Ph.D., "A flow cytometric evaluation of hydrodynamic damage in animal cell bioreactors", July 1992.
- r. Manfred R. Koller, Ph.D., "Development of a perfusion bioreactor system for the expansion of primitive human hematopoietic progenitor cells", July 1992 (with W.M. Miller).
- s. Karl A. Walter, Ph.D., "Molecular characterization of *Clostridium acetobutylicum* genes involved in butanol and butyrate formation", June 1993.
- t. Michael C. Borys, Ph.D. "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", July 1993.
- u. Jennifer Tubridy, M. S. "Substrates for improved hematopoietic cultures", June 1993 (with W.M. Miller).
- v. James Michaels, Ph.D. "Agitation and aeration damage and protective additives in freely-suspended animal-cell bioreactors", Northwestern University, August 1994.
- w. R. Nair, Ph. D., "Molecular characterization and regulation of a multifunctional aldehyde/alcohol dehydrogenase gene and its use for metabolic engineering of *Clostridium acetobutylicum* ATCC 824", March 1995.
- x. C. E. Sandstrom, Ph. D., "Ex vivo expansion of human hematopoietic cells using better defined culture conditions", April 1995 (with W.M. Miller).
- y. Jennifer A. LaLuppa, Ph.D., "Defined culture conditions for ex vivo expansion of megakaryocytes and myeloid progenitors", June 1996 (with W.M. Miller)
- z. Lourdes Bermejo, MS, "Heterologous expression of *Clostridium acetobutylicum* genes in *Escherichia coli* for acetone production, March 1996 (with N. E. Welker).
- aa. 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", July 1997.
- bb. Todd McAdams, PhD, "The characterization of extracellular pH and medium osmolality as important parameters in the culture of human hematopoietic cells", July 1997.
- cc. Paul Collins, PhD, "Development of a stirred culture system for the expansion and characterization of human hematopoietic cells", July 1997.
- dd. Marc Horner, MS, "Transport in a grooved perfusion flat-bed bioreactor for cell therapy applications", June 1998.
- ee. Latonia Harris. MS, "Fermentation characterization of *Clostridium acetobutylicum* ATCC 824 recombinant strains", December 1997.
- ff. Ruchir Desai, PhD, "Development of metabolic flux analysis and antisense RNA technologies as tools for the metabolic engineering of *Clostridium acetobutylicum* ATCC 824", December 1998.
- gg. Kathleen Carswell, PhD, "Optimization of culture conditions for the Ex vivo expansion of T-cells: Oxygen tension, agitation, and pH". December 1999.

- hh. Dominic Chow, MS, "Modeling oxygen distribution in the hematopoietic compartment of bone marrow", December 1999 (with W.M. Miller).
- ii. Sanjay Patel, PhD, "Scale-up and optimization of hematopoietic cell cultures for clinical applications", June 2000 (with W.M. Miller).
- jj. Sigma Mostafa, PhD, "Effects of culture oxygen tension on human megakaryocytes: a phenomenological and mechanistic study", December 2000 (with W.M. Miller).
- kk. Seshu Tummala, MS, "Reporter system for *Clostridium acetobutylicum*", 2000.
- ll. 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.
- mm. Yu Kuang, MS, "Characterization of metabolic patterns of granulocytic, monocytic, erythrocytic, and megakaryocytic Ex vivo expansion cultures", June 2001 (with W.M. Miller)
- nn. Diane Hevehan, PhD, "Regulation of ex vivo granulocytic kinetics by oxygen tension, pH and interleukin 3: experimental and model analysis", June 2001 (with W.M. Miller).
- oo. Hadar Haddad, PhD, "T-cell expansion for cellular immunotherapy: effects of reduced oxygen tension on cell growth, phenotypic markers, and gene expression kinetics", December 2002.
- pp. Seshu Tummala, PhD, "AsRNA & metabolic engineering of clostridia", June 2003.
- qq. Dominic Chow, PhD, "Hematopoietic-cell culture engineering using biomimetic supports", June 2003 (with W.M. Miller).
- rr. Chris Tomas, PhD, "Clostridia genetics and metabolic engineering using the cellular stress response", June 2003.
- ss. Dirk Windgassen, PhD, "Transcriptional program of CD4+ and CD8+ T-cells." December 2005.
- tt. Deborah Pascoe, PhD, "Cell culture engineering based on proteome analysis" 2005 (with W.M. Miller).
- uu. Chris Ramsborg, PhD, "Transcriptional analysis of the effects of oxygen tension, serum, and IL-15 on ex vivo T-lymphocyte culture", June of 2005.
- vv. Keith Alsaker, PhD, "Genomic-scale transcriptional analysis of clostridia sporulation and stress response", December 2005.
- ww. Li Ting Huang, PhD, "Transcriptional analysis of ex vivo granulocyte (neutrophil) development." December 2006 (with W.M. Miller).
- xx. Peter Fuhken, PhD, "Genome-Scale Transcriptional Analysis of Megakaryocytic Cell Cultures Reveals Insights into Lineage-Specific Differentiation." December 2007 (with W.M. Miller).
- yy. Lisa Giammona, PhD, "Nicotinamide Enhances Primary Human Megakaryocytic Differentiation from Hematopoietic Stem Cells: Phenotype Characterization and Mechanism of Action." December 2007 (with W.M. Miller).
- zz. Jacob Borden, PhD, "Generation and Elucidation of Complex Bacterial Phenotypes Using High-Throughput Genomic Techniques." 2007.
- aaa. Chi Chen, PhD, "Megakaryocytic transcriptional program and development plasticity." December 2006 (with W.M. Miller)
- bbb. Nathan Cheng, MS, "The Transcriptional Program of Clostridial Sporulation." June, 2007.
- ccc. Ann Duchoud, MS, "Tumor suppressor protein p53 is expressed and activated during megakaryocytic differentiation." June 2008.
- ddd. Ryan Sillers, PhD, "Increasing Butanol Titters and Selectivity in *Clostridium Acetobutylicum*." December, 2008.
- eee. Min Wang, PhD. "Genomic-Scale Transcriptional Analysis of T-Cell Activation Reveals Novel Genes and Signaling Programs." December 2008
- fff. Bryan Tracy, PhD, "Differentiation Engineering of *Clostridium acetobutylicum* for Enhancing Bioprocess Characteristics", December 2009.
- ggg. Panagiotis Apostolidis, PhD. Role of Tumor Suppressor p53 in Megakaryopoiesis, Platelet Formation and Platelet Function (with W.M. Miller). December 2010.
- hhh. Shawn Jones, PhD. Elucidating the Transcriptional Regulation of Sporulation in *Clostridium acetobutylicum*. June 2011.

- iii. Swapna Panuganti, PhD. Towards large-scale production of platelets for transfusion based on ex vivo expansion of hematopoietic stem cells (with W. M. Miller). June 2011.
- jjj. Sergios Nicolaou, PhD. Development and elucidation of complex and synergistic bacterial phenotypes with genomic libraries. 2012.
- kkk. 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
- lll. Stefan Gaida, PhD. Development of genomic and genetic systems to expand the searchable genomic space for engineering complex phenotypes. 2013.
- mmm. Kyle Zingaro. PhD. Stepwise construction of the complex, multicomponent cellular trait of microbial tolerance to toxic chemicals. 2013.
- nnn. Jinlin Jiang, PhD. Exploring the regulation of megakaryocytic differentiation and platelet production by mechanical forces and cell-derived microparticles. 2015.
- ooo. Alex Jones, MS. An Investigation of the Roles of Small RNA in Solvent Tolerance and Production in *Clostridium acetobutylicum*. 2015.
- ppp. Matthew Ralston, MS. Assembling improved gene annotations in *Clostridium acetobutylicum* with RNA sequencing. 2015

Doctoral & MS in Progress

- 1. Alan Fast, PhD. Synthetic biology in clostridia.
- 2. Stephanie Luff, PhD. Stem-cell biology
- 3. Ellinor Schmidt, PhD. Synthetic biology.
- 4. Chen-Yuan Kao, PhD, Megakaryocytic microparticles.
- 5. Kyle Bennett, PhD, synthetic methylotrophy.
- 6. Julia Rohlhill, PhD. Synthetic methylotrophy.
- 7. Kamil Charubin, PhD, Synthetic CO₂ fixation
- 8. Christian Escobar, MS, Stem-cell microparticles

Co-mentor: PhD students outside home institution

- 1. Dario Sepulveda, PhD, Embryonic stem-cell differentiation (with Juan Asenjo, U. Chile), 2003-05.

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

- 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

- 1. Clyde A. Kelly, ACS/PRF Student Fellow, Summer 1982.
- 2. Mark D. Durcan, Spring 1983.
- 3. Mary L. Brannon, Spring 1984.
- 4. Bradford T. Bell, Spring 1984.
- 5. Peter J. Campo, Spring 1984.
- 6. Paul Nealey, Fall 1984.

7. Todd Griffith, Summer, Fall 1985.
8. Susan Long, Fall 1985.
9. Dan Lasko, Fall 1985.
10. Arlene Yeh, Summer 1985.
11. Tim Werner, Summer 1988, Spring 1990.
12. Mitchell Cahn, June 1988-March 1989.
13. Sarah Chaudhry, March-Dec. 1990.
14. Adam Aylor, Summer 1990.
15. Annie Wong, June-Dec. 1990.
16. Ron Atchley, Spring, Fall 1990; Winter and Spring 1991.
17. Deborah C. Urich, Fall 1990- Spring 1991.
18. Ameet Mallik, Spring 1992- Fall 1993, Spring, Fall 1994.
19. Jason Nowak, Spring, Summer, Fall 1992, Spring 1993.
20. Aloka Lahoti, Summer 1992.
21. Alex Saar, Summer 1993.
22. Daniel Gurovich, Summer 1993, 1993-94, summer 1994, fall 1995.
23. Sema Ariman, 1993-94, summer 1994, 1994-95, summer 1995
24. Thor-Olaf Stöver, October 1994-January 1995.
25. Ryan Carver, 1994-95, summer 1995
26. Steve Kotzbauer, summer, fall 1995, summer 1996
27. Daeryun Park, summer 1995
28. Wen Lu, summer 1995
29. John Macris, summer 1995
30. Nancy Ekdawi, fall 1995, spring 1996
31. Preetham Suresh, Spring 1996 to Winter of 1997
32. Jonathan Weiss, 1997-98.
33. Mark Kiel, 1998-99 (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, 2000-02.
42. Ryan Kaliney, 2000-01.
43. Jonathan Dillon, 2001-2003.
44. Jeff Beamish, 2002.
45. Jerry Chen, 2003-2004.
46. Ryan Bruskwicz, 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, 2004-06.
53. John Park, 2005-07.
54. Greg Martens, 2006-07.
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, 2010-11
61. Yin Cheng, 2010-11
62. Jason Coffman 2011-2012
63. Meng Ren 2010-2011
64. Rebecca Ellis, 2012-13
65. Mason Smith. 2012
66. Theodore Groth, 2014-16
67. Pragyana Khanal, 2015
68. Michael Palmer, 2015-16 w Honor's Thesis
69. Michael Clupper, 2015
70. Kees Baas, 2015-16
71. Richard Egan, 2016-