

Jeffrey J. Chalmers

EDUCATION

- B.A. Natural Science, Westmont College, 1983
Dual degree program with the University of California, Berkeley
- B.S. Chemical Engineering, Univ. of California, Berkeley, 1983; with High Honors
- Ph.D. Chemical Engineering, Cornell University, 1988
Minor: Microbiology (6 courses)
Dissertation: Studies on the continuous production and excretion of a plasmid encoded protein from *Escherichia coli* (Advisor: Michael L. Shuler; David Wilson, Co-Advisor, Department of Biochemistry)

PROFESSIONAL EXPERIENCE

- July, 2001 Director, Analytical Cytometry Shared Resource, OSU Comprehensive Cancer Center and the D. M. Davis Heart and Lung Research Institute
- July, 1999 Professor, Department of Chemical Engineering, The Ohio State University
- Oct. 1993-1999 Associate Professor, Department of Chemical Engineering, The Ohio State University
- April 1995-present Adjunct Staff, Department of Biomedical Engineering, Research Institute, Cleveland Clinic Foundation
- Jan 1988-Sept. 1993 Assistant Professor, Department of Chemical Engineering, The Ohio State University
Teaching and research in biochemical engineering
- Sept. 1983-Dec 1987 Graduate Student, Department of Chemical Engineering, Cornell University
Studying continuous production of an excreted protein using immobilized *E. coli* cells
- Sept 1982-Jun 1983 Undergraduate Research Assistant Department of Chemical Engineering, U. C. Berkeley (H. Blanch, and F. Arnold, advisors)
Separated monoclonal antibodies using gel and affinity chromatography columns and determined the equilibrium binding curve for these antibodies on hapten-sepharose gel

HONORS

- 2014, Cell Culture Engineering Award, (Engineering Conferences International)**
College of Engineering Lumley Research Award: 2011, 2006, 2001, 1997, 1993
- 2005, Fellow, American Association for the Advancement of Science**
- 2005 AIChE 15C plenary lecture**
- 2003 College of Engineering Harrison Award, (\$14,000)**
- 2001, Fellow, American Institute for Medical and Biological Engineering,**
College of Engineering Annual Research Accomplishment Award, 1998
- Distinguished Multidisciplinary Team Research Award, 1996, Ohio Agricultural Research and Development Center and The Ohio State University**
- NSF National Young Investigator Award, 1992-1997**
- Member, Tau Beta Pi, Phi Beta Kappa, Sigma Xi**

PROFESSIONAL ACTIVITIES

- Academic Editor** Scientific Reports
- Academic Editor** PlosONE
- Editorial Board** Biotechnology and Bioengineering, 2003-
- Member** American Institute of Chemical Engineers
- Member** American Chemical Society
- Member** American Institute for Medical and Biological Engineering
- Meeting Co-Chair** Cell Culture Engineering XV, Palm Springs, 2016
- Meeting Co-Chair** Cell Culture Engineering VI, San Diego, Ca, 1998
- Meeting Co-Chair** Cell Culture Engineering V, San Diego, Ca, 1996
- Session Chair, Co-Chair** Advancing manufacture of Cell and Gene Therapies VI, January 27-31, 2019; Scale-up and Manufacturing of Cell-Based Therapies IV, Cell Culture Engineering XIII session chair, 2012; ACS National Meeting, 2010; AIChE Annual Meeting, 10/31-11/3, 2005; BioChem Eng XIV, July 10-14, 2005; Harrison Hot Springs, BC, Canada., AIChE Annual Meeting, November 2004; 5th Scientific and Clinical Applications of Magnetic Carriers, May, 2004, Lyon, France; AIChE Annual Meeting, November, 2003; 3rd Scientific and Clinical

	Applications of Magnetic Carriers, May, 2000, Rostock Germany; BioChem XI, July, 1999; 217 th ACS National Meeting, March 1999; Scientific and Clinical Applications of Magnetic Carriers, May, 1998, Cleveland, OH; AIChE Annual Meeting, November 1994; AIChE November 1992; AIChE Annual Meeting, November 1992; AIChE Annual Meeting, November 1990; Cell Culture Engineering IX, Cancun, Mx 2004
Workshop Co-Chair	
Division Chair, AIChE	
15 d/e	2001 – 2003
AIMBE Fellows Selection Subcommittee	2002-2009
Whitaker Scientific Advisory Panel	2002
NIH ISD Review panel	2005, 2007, 2008,
NIH ISD (Instrument Systems Development) study section	
Standing Member;	2009 -2013
NIH CMT study section:	2019, ad-hoc
NIH IMST 15 panel	2020
NCI IMAT Review Panel	1999- current (ad hoc)
NIH CADP-SEP	2011
NIH P41 Panel	2007, 2012, 2013
NIBIB Panel	2007
NCRR Review Panel	2003, 2004, 2009, 2010
NSF Review Panel	1992 (RIG, Instrument), 1993, 1995, 1998, 1996 (CAREER); 2006 BES panel, Career 2007, Biotechnology 2011,
NSF SBIR Panel	2001, 2006, 2009, 2015-2019.
NASA Review Panel	1996 Biotechnology of Microgravity Program
Invited Lecturer	2003 -2007 The SBP Bioprocessing Institute
Invited Guest Lecturer	1994-2002 ASME Bioprocess Equipment Seminar series
Secretary	Central Ohio Section of American Institute of Chemical Engineers
Guest Co-Editor	Chemical Engineering Sciences, Special Addition for 1st International Gas-Liquid and Gas-Liquid-Solid Reaction Engineering Conference, 1992
Judge	Columbus School District City-Wide Science Fair, 1990

TESTIFYING EXPERT WITNESS MATTERS:

Applikon Biotechnology, Inc, vs United States, Case No 07-00364; January, 2011
 Genentech Inc. vs Amgen, Case No. 17-1407-CFC; February, 2019
 Regenlab USA LLC v. ESTAR TECHNOLOGIES, ECLIPSE AESTHETICS LLC, HEALEON Medical, INC., Case No. 1:16-cv-8771. July, 2019 (Deposed, and Markman hearing presentation)
 Regenlab USA LLC v. ESTAR TECHNOLOGIES, ECLIPSE AESTHETICS LLC, HEALEON Medical, INC., Case No. 1:16-cv-8771. Sept., 2019

NON-TESTIFYING EXPERT WITNESS MATTERS:

Harvest Technologies Corp. v. Cesca Therapeutics Inc. Case No. 12-1354; November 2014.
 Amgen vs. AbbVie, January, 2016.
 Samsung vs. Genentech, February, 2018.
 Amgen vs. Genentech, January, 2019.

RESEARCH GRANTS

- 1. Development of single cell magnetophoresis to analyze and isolate glioma cancer stem cells. 03/11/2020 - 02/28/2021. NCI, R21CA250118. Role: co-PI with Monica Venere**
- 2. Restricted Funding (Diversity Supplement-C. Gilbert): Fractionation of aged RBCs based on hemoglobin content. 7/12019-12/31/2019.**
- 3. A scalable platform to selectively purify engineered extracellular vesicles via self-cleaving tags. National Inst. Gen Medical Scis. R21GM126543, 7/1/2019-6/31/2021. Role: co-PI with David Wood.**

4. **Fractionation of Aged RBCs Based on Hemoglobin Content.** NHLBI, 1R01 HL131720-01A1, 1/1/17-12/31/21 (Role: co-PI with Palmer).
5. **Multi-color immunohistochemistry staining of Genentech cells.** 10/31/2015-4/31/2016.
6. **Microcarrier cell shear collaboration, Millipore Merck,** RF 60046284. 1/1/2015-10/31/2015.
7. **Role of tumor-associated endothelial cells in chaperoning tumor cells.** NCI –R21CA17864. 7/2-14-6/30/16. (Role: Investigator)
8. **Targeted delivery of miroRNA-loaded microvesicles for cancer therapy.** NIH UH2TR000914-01. 1/1/2014-12/31/2019. Role: Co-Investigator
9. **Micellular Electrospray Synthesis of Magnetic Quantum Dots.** NSF# 1206745. (PI: Jessica Winter, coPIs: Barbara Wyslouzil (OSU), Jeffrey Chalmers (OSU), Gang Ruan (OSU)), \$359,779. 7/10/2012-6/30/2015.
10. **Magnetic technologies for microalgal biofuel production.** GRT00025262 (PI of sub-contract: Chalmers). NSF Phase II SBIR awarded to Phycal, Inc. 4/31/12- 3/31/14
11. **CTC blood testing and Analysis.** Navel Health Research Center (W911QY-10-C-0235). Chalmers, P.I. \$180,000, 1/1/2011-9/29/2013.
12. **Characterization of Millipore disposable bioreactor, Millipore Corporation.** Chalmers, P.I. \$50,000. 9/1/2010-1/13/2011.
13. **Large-scale human placenta progenitor cell-derived erythrocyte production – continuous red blood cell production.** Celgene Corp./DARPA, Phase II, Chalmers P.I., \$1,000,000. 1/1/10-07/31/12.
14. **(ARRA) CellTrap: A novel solid phase platform for analysis of stem/progenitor cells.** Moldovan P.I. (RC2 AG036559) National Institute on Aging \$676,675, 9/1/2009-8/31/2010.
15. **Fluorescent-magnetic nanomanipulators for cytoskeletal mechanical investigations.** Winter P.I, Chalmers Co-P.I. NSF GRT00013770, \$313,433, 6/1/09-5/31/2012.
16. **Characterization of Millipore disposable bioreactor, Millipore Corporation.** Chalmers, P.I. \$50,000. 1/1/2009-1/31/2010.
17. **Large-scale human placenta progenitor cell-derived erythrocyte production – continuous red blood cell production.** Celgene Corp./DARPA, Chalmers P.I., \$313,739, 9/7/08- 9/7/09.
18. **CCLI: Educational materials to enhance chemical engineering curricula with applications in biological engineering.** NSF Division Undergraduate Education (DUE-0816823) Komives, P.I., Chalmers, P.I. of sub-contract. \$33,810.00, 7/1/2008-07/31/12.
19. **Commercialization of Magnetic Nanobeads for Cancer Cell Enrichment.** Columbus Nanoworks Inc subcontract from NIH, Chalmers P.I. of Subcontract. \$7,500. 7/1/08-9/30/09.
20. **Magnetic Cell Sorting and Analysis.** NIH, (2R01 CA062349-15), Zborowski, P.I., Chalmers subcontract, 2/1/11-1/30/16. \$716,118.
21. **Intracellular nanoprobe for physical manipulation of cells.** NSF Div Chem, Bioeng, Environ, & Transp S (35000309): CBET-0707969, J. Winter, P.I., Chalmers, Co-P.I. 06/15/2007 - 05/31/2008 \$129,737.
22. **Advanced Biomedical Devices for Disease Diagnosis and Therapy.** State of Ohio Third Frontier Commission, \$3,500,000, 7/1/06-6/31/09.
23. **Magnetic nanobeads for cancer cell separation,** Awarded to Columbus Nanoworks, NCI SBIR, 1R43CA116048-01, 7/1/05-12/31/05. \$37,000 to OSU
24. **Magnetic sorter flow channels for pancreatic islet isolation,** NIDDK-SBIR Phase I, R44 HL74606-02, 7/1/05-12/31/05. \$16,000 to OSU,
25. **Magnetic Sorter Channels for Stem Cells,** NHLBI-SBIR Phase II (1 R43 DK072647-01), (SHOT/Paul Todd, P.I.; Chalmers P.I. of sub-contract), 7/1/05-6/30/07. \$40,000 to OSU
26. **Algal Shear Sensitivity,** Martek Biosciences Corp. 4/1/05-4/1/07. \$50,000.
27. **NSEC Proposal for a Center for Affordable Nanoengineering of Polymer Biomedical Devices,** NSF EEC-0425626, 9/04-8/09; \$12,900,000; (P.I. Jim Lee; Chalmers, Co-P.I.).
28. **An Integrated Magnetic Cell Identification System,** DOD, subcontract from Cleveland Clinic Foundation, \$308,000, 5/04-4/07.
29. **Magnetic Separation of Liberated Islets During Isolation,** 1R01DK068757-01; 8/04-7/06. \$209,838.
30. **Cell Selection by Magnetic Flow Sorting,** NIH-NCI, RO1 CA62349, 2/04-2/08, (P.I. Zborowski, Chalmers P.I. of sub-contract to OSU), \$300,000.
31. **QMS Technology to Deplete T Cell Alloreactivity,** NIH-NIAID, 1 R01 AI056318-01, 3/04-2/09, (P.I. Farag, S., Chalmers, Co-P.I.), \$3,200,000.
32. **Magnetic Sorter Channels for Stem Cells,** NHLBI-SBIR (1 R43 HL074606-01), 7/1/03-12/31/03, (SHOT/Paul Todd, P.I.; Chalmers P.I. of sub-contract), \$6,000.
33. **Magnetic Sorter Channels for Rare Cancer Cells,** NSF SBIR (NSF 02-056; Proposal # 79440), 7/1/03-2/04, (SHOT/Paul Todd, P.I.; Chalmers P.I. of sub-contract) \$25,000.

34. **High Performance Magnetic Cell Sorting.** National Cancer Institute, 1 R01 CA97391-01A1 (PI: Chalmers) 5/03 - 4/07. \$2,098,000.
35. **The development of theoretical and experimental characterizations of the magnetophoretic mobility of immunomatically labeled cells.** National Science Foundation, (BES-0124897) 7/1/02 - 6/31/05, \$481,121 Chalmers, (P.I.); Zborowski, M., P.I. of sub-contract to CCF.
36. **Development of Quadrupole Magnetic Field-Flow Fractionation: Application to Characterization of Magnetic Colloids and Microparticles,** National Science Foundation, (CTS-0125657), 3/1/02-2/28/05, \$289,207, Williams, P.S. (P.I.), Zborowski, M., Chalmers, J. Co-P.I. (\$97,272 to O.S.U.)
37. **OSU Comprehensive Cancer Center Support Grant,** National Cancer Institute, 7/01/77-11/30/10, (5 P30 CA16058-26) Caliguiri, M. (PI), Chalmers, Investigator and Director of Analytical Cytometry Core, \$151,000/yr.
38. **Cell Selection by Magnetic Flow Sorting,** National Cancer Institute, (R01 CA62349) 1/00 - 1/31/04, \$1,440,750; Zborowski, M. (P.I.); Chalmers P.I. of subcontract to OSU.
39. **Nanostructured Biocomposites for Use as Novel Films and Coatings.** National Science Foundation, 2/00-1/02, \$100,000; Rathman, J (P.I.); Chalmers, J.
40. **Rapid Rare Cancer Cell Isolation For Molecular Diagnosis.** National Cancer Institute, (R33CA81662) 4/99 - 3/02, \$1,050,000; Chalmers, J. (P.I.); Zborowski P.I. of sub-contract to CCF.
41. **Dynamic Mixing in Stirred Vessels: An Application of Particle Tracking Velocimetry and Flow Visualization in a Convected Frame of Reference.** National Science Foundation GOALI program, 9/99-12/02, \$90,000 (\$70,000 from NSF) Brodkey, R. (P.I.); Chalmers J.J.; Guezennec, Y.
42. **Determination of Cellular Properties based on the distribution of cell velocities induced by external fields,** National Science Foundation, (BES-9731059) 9/98- 7/01 (extended to 02), \$460,180, Chalmers (P.I.), Zborowski P.I. of subcontract to CCF.
43. **Magnetic Flow Sorting for Clinical Stem Cell Isolation.** NOVAMEDICS (A Venture Capital Firm), 5/98-5/99, \$375,000. Zborowski, M., Chalmers P.I. of sub-contract of to OSU.
44. **Improved Surfactants for Cell Culture.** NIH SBIR Phase I with Anatrace Inc., 1/1/98-12/31/98, \$100,000, (\$37,500 to P.I.)
45. **Characterization of bench and pilot scale bioreactors with respect to their hydrodynamic environment.** Genentech, 10/1/97-8/31/98, \$22,360.
46. **Development of Analog Cell Separation Based on Surface Marker Density,** Whitaker Foundation, 4/1/97-4/1/98. \$66,000.
47. **Cell Selection by Magnetic Flow Sorting,** National Cancer Institute, Division of the National Institute of Health, \$514,902; Zborowski, M. (P.I.), Chalmers, J. 3/97-1/00.
48. **Ohio Bioprocessing Research Consortium,** Ohio Board of Regents, \$1,450,000, Yang, S.T. (P.I.); Chalmers, J., and contributions from Battelle and U. of Akron. 1996.
49. **Engineering Research Equipment: A Rheological Measurement System for Polymers and Composite Processing, and Rheology of Colloids, Emulsions, Polymers Solutions, and Biomaterials,** Lee, J., Zakin, J., Koelling, K., Rathman, J., Chalmers, J. National Science Foundation, \$360,000, 8/94.
50. **Dynamics of Biological Energy and Nitrogen Availability During Composting/Utilization,** Targeted Interdisciplinary Seed Grant Award, The Ohio State University Office of Research, \$84,975, 1994-96, Co-P.I.'s H.A. Hoitink, W.A. Dick, H. M. Keener
51. **Renovation of Laboratories for Biochemical and Bioprocess Engineering Research,** National Science Foundation, \$234,199 (total award with match \$468,398), 1994, Yang, S.T., Zakin, J., Chalmers, J.
52. **Continuous Magnetic Cell Sorting,** National Cancer Institute, (R01 CA62349), Zborowski, M. (P.I.), Chalmers, J., \$550,000, 1994-97.
53. **Development of a Continuous, Magnetic Cell Separator,** Whitaker Foundation, \$180,000, 12/93-12/96, Chalmers, J., (P.I.), Zborowski, M.
54. **Applications and Development of Biochemical Engineering Principles to the Production of Soil Amendments,** The Consortium for Plant Biotechnology Research, Inc., 7/93-6/95, \$95,128
55. **National Young Investigator Award,** National Science Foundation, (BCS9258004) 7/92-7/98, \$237,500.
56. **Cargill Inc.,** 5/93-6/94, \$11,000
57. **AMGEN Inc.,** 1/93, \$10,000; 12/92, \$4,500 in equipment
58. **Eli Lilly,** 5/93, \$3,500; 12/91, \$3000
59. **Chemineer,** 5/93, \$2,500
60. **Determination of the Mechanisms of Cell Adhesion to Damage from Air-Liquid Interfaces,** Principal Investigator with Dr. W.F. Hink (Entomology), National Science Foundation, 7/91- 7/93, \$137,300.
61. **DuPont Young Faculty Development Award,** 1989-1991, \$75,000, joint with Dr. S.T. Yang.

62. **Studies on the Effect of Hydrodynamic Shear Stress on Suspended Insect Cells**, 3/89 to 9/90, Seed Grant, Office of Research and Graduate Studies, Ohio State University, \$16,000.

U.S. Patents

1. Chalmers JJ, Melnik K, Lara-Velasco, OR, Tong X, Zborowski M, Moore LR, Farag S. **Biological Cell Separator and Disposable Kit**. US Patent 9,176,111; 2015
2. Sooryakumar, Ratnasingham; Henighan, Thomas Charles; Vieira, Gregory B.; Chalmers, Jeffrey J. **Magnetic platforms for biomolecule trappings, manipulations, and sorting**, Patent Number :US 08906691. December 9, 2014.
3. Sooryakumar, Ratnasingham; Sooryakumar, Dhriti; Vieira, Gregory; Chalmers, Jeffrey J. **Mobile magnetic traps and platforms for micro/nano particle manipulation**. U. S. Patent 6,623,984, March 19, 2013
4. Chalmers, J.J, Wu, W, Rathman, **Compositions for reducing cell adhesion to bubbles**. U.S. Patent 08440800 May 14, 2013.
5. Fleischman, A., Roy, S., Chalmers, J., Zborowski, M. **MEMS-BASED Integrated Magnetic Particle Identification System**. U. S. Patent 6,623,984, Sept. 2003.
6. Zborowski, M., Chalmers, J.J., Moore, L. **System and device for determining particle characteristics**. U.S. Patent 6,557,430, May 2003
7. Zborowski, M., Chalmers, J.J., Moore, L. **System and Device for determining particle characteristics**. U.S. Patent 6,412,359, October, 2002.
8. Zborowski M, Chalmers PS, Moore LR. **Continuous particle and molecule separation with an annular flow channel**, U.S. Patent 6,467,630, October 2002.
9. Zborowski, M., Chalmers, J.J. Moore, L. **System and Device for Determining Particle Characteristics**, U.S. Patent 6,082,205; 2000.
10. Zborowski, M., Chalmers, J.J. Moore, L. **Fractional cell sorter**, U.S. Patent 6,120,735, 2000.
11. Zborowski, M., Chalmers, J.J. Moore, L. **Method for determining particle characteristics**, U.S. Patent 6,142,025, 2000.
12. Zborowski, M., Chalmers, J.J. Moore, L., **Method for magnetically separating cells into fractionated flow streams**, U.S. Patent 5,968,820, 1999.
13. Zborowski, M., Chalmers, J.J. Moore, L. **Method for Determining Particle Characteristics**, U.S. Patent 5,974,901, 1999.

Publications Cited 100 or More Times

1. McCloskey, K., Chalmers, J.J., Zborowski, M., Magnetic Cell Separation: Characterization of Magnetophoretic Mobility, *Analytical Chemistry* 75(4):6868-6874. 2003. PMID:14670047.
2. Zborowski, M., Ostera, G.R., Moore, L.R., Milliron, S., Chalmers, J.J., Schechter, A.N. Red Blood Cell Magnetophoresis, *Biophysics Journal*, 84:2638-2645. 2003.
3. Zborowski, M., Sun, L., Moore, L.R., Williams, P.S., Chalmers, J.J. Continuous cell separation using novel magnetic quadrupole flow sorter, *J. of Magnetism and Magnetic Materials*. 194:224-230, 1999.
4. Lara, O., Tong, X., Zborowski, M., Chalmers, J.J. Enrichment of Rare Cancer Cells through Depletion of Normal Cells Using Density and Flow-Through, *Immunomagnetic Cell Separation*. *Experimental Hematology* Oct;32(10):891-904. 2004. PMID: 15504544
5. Yang, L., Lang, J.C., Balasubramanian, P., Jantana, K.R., Schuller, D., Agrawal, A., Zborowski, M., Chalmers, J.J. Optimization of an Enrichment process for Circulating tumor cells from the blood of Head and Neck Cancer patients through depletion of normal cells. *Biotechnol. Bioeng.* 102 (2):521-534. 2009. PMID: 18726961
6. Chalmers, J., Zborowski, M., Sun, L., Moore, L., Flow Through, Immunomagnetic Cell Separation, *Biotechnology Progress*, Vol. 14:141-148, 1998.
7. Agarwal, M., Koelling, K., Chalmers, J.J., Characterization of the Degradation of Poly-Lactic Acid in a Well-Controlled Composting System, *Biotechnology Progress*, Vol. 14:517-526, 1998.
8. Zborowski, M, Chalmers, J.J. Rare Cell Separation and Analysis by Magnetic Sorting. *Analytical Chemistry* 83(21):8050-8056. 2011. PMID:21812408; PMCID:3205221; NIHMS319811
9. Ma, N., Koelling, K., Chalmers, J.J. The Fabrication and Use of A Transient Contraction Flow Device to Quantify the Sensitivity of Mammalian and Insect Cells to Hydrodynamic Forces, *Biotechnology and Bioengineering* 80:428-437. 2002; PMID: 15296446.
10. Zborowski, M., Fuh, C.B., Green, R., Sun, L., Chalmers, J.J., Analytical Magnetophoresis of Ferritin-labeled Lymphocytes, *Analytical Chemistry*, 67(20):3702-3712, 1995
11. Chalmers, J.J., Bavarian, F., Microscopic Visualization of Insect Cell-Bubble Interactions II: The Bubble Film and Bubble Rupture, *Biotechnology Progress*, 7:151-158, 1991.

12. Chalmers, J.J., Kim, E., Telford, J.N., Shuler, M.L., Wilson, D.B., Effects of Temperature on the Stability of Escherichia coli Overproducing β -lactamase or Human Epidermal Growth Factor, *Applied and Environmental Microbiology*, 56:104-111, 1990.
13. Sun, L., Zborowski, M., Moore, L., Chalmers, J.J., Continuous, Flow-Through Immunomagnetic Cell Separation in a Quadrupole Field. *Cytometry*. 33:469-475. 1998.
14. Vieira, G., Heninghan, T., Chen, A., Hauser, A.J., Yang, Y., Chalmers, J.J., Sooryakumar, R. Magnetic wire traps and programmable manipulation of biological cells. *Physical Review Letters*, 103:128101, 2009.
15. Zborowski, M. Chalmers, J.J. Magnetic cell separation, 2011. Elsevier.
16. Jing, Ying, Moore, LR, Schneider, T., Williams, PS, Chalmers, JJ., Farag, SS, Bolwell, B., Zborowski, M. Blood progenitor cell separation from clinical leukapheresis product by magnetic nanoparticle binding and magnetophoresis *Biotechnol Bioeng*. 96(6):1139-1154, 2007. PMID: 17009321
17. Bavarian, F., Fan, L.S., Chalmers, J.J., Microscopic Visualization of Insect Cell-Bubble Interactions I: Rising Bubbles, Air-Medium, and the Foam Layer, *Biotechnology Progress*, 7:140-150, 1991.
18. Balasubramanian, P., Lang, J.C., Jatana, K., Miller, B., Schuller, D., Agrawal, A., Lustberg, M., Zborowski, M., Chalmers, J.J. Multiparameter analysis, including EMT markers, on negatively enriched blood samples from patients with squamous cell carcinoma of the head and neck. *PLoS ONE*. 7:1-11, e42048, 2012; PMID:22844540; PMCID: PMC3406036.

COMPLETE LIST OF REFEREED PUBLICATIONS

19. Gómez-Pastora, J, Mitchell Weigand; James Kim; Xian Wu; Jacob Strayer; Andre F Palmer; Maciej Zborowski; Mark Yazer; Jeffrey J Chalmers, Hyperferritinemia in critically ill COVID-19 patients - Is ferritin the product of inflammation or a pathogenic mediator? In Press in *Clinica Chimica Acta*
20. Robert Wesolowski, Daniel G Stover, Maryam Lustberg, Abigail Shoben, Meng Zhao, Ewa Mrozek, Rachel M Layman, Erin Macrae, Wenrui Duan, Jun Zhang, Nathan Hall, Chadwick L Wright, Katharina Schregel, Susan Gillespie, Michael Berger, Andrea Camp, Jeffrey J Chalmers, Prija Balasubramanian, Brandon L Miller, Peter Amaya, Eleni Andreopoulou, Joseph Sparano, Charles L Shapiro, Miguel Angel Villalona-Calero, Susan Geyer, Alice Chen, Michael R Grever, Michael V Knopp, Bhuvaneswari Ramaswamy Phase I study of veliparib on an intermittent and continuous schedule in combination with carboplatin in metastatic breast cancer: A safety and [18F]-fluorothymidine PET biomarker study, In Press in the *Oncologist*.
21. Gómez-Pastora, J, Wu, X., Sundar, N., Alawi, J., Nabar, G., Winter, J.O., Zborowski, Z., Chalmers, J.J. Self-Assembly and sedimentation of 5 nm SPIONs using horizontal, high magnetic fields and gradients, *Separation and Purification Technology*. Vol. 248, 117012, 2020.
22. Gómez-Pastora, J, Kim, J., Multane, V., Weigand, M., Walters, N.A., Reategui, E., Palmer, A.F., Yazer, M., Zborowski, Z., Chalmers, J.J. Intrinsically magnetic monocytes subtypes: Non-classical and intermediate monocytes have the strongest magnetic behavior in fresh human blood. In Press in *Analytical Chemistry*.
23. Mahajan, Kalpesh D., Ruan, Gang, Vieira, Greg, Porter, Thomas, Chalmers, Jeffrey J., Sooryakumar, Winter, Jessica O. , Biomolecular Detection, Tracking, and Manipulation using a Magnetic-Quantum Dot Platform, *Journal of Materials Chemistry B.*, 8, 3534-3541. 2020,
24. Kim J. Gómez-Pastora J., Gilbert C., Weigand M., Walters N.A., Reategui E., Palmer A.P., Yazer M., Zborowski M., Chalmers, J.J. Quantification of the mean and distribution of hemoglobin content in normal human blood using cell tracking velocimetry. *Analytical Chemistry*. 92(2):1956-1962. 2020.
25. Kim, J., Gomez-Pastora, J., Weigand, M., Polgoeter, M., Walter, N., Reategui, E., Palmer, A., Zborowski, M., Yazer, M.H., Chalmers, Jeffrey, A subpopulation of monocytes in normal human blood has significant magnetic susceptibility; quantification and potential implications. *Cytometry, part A*. 95(5):478-487. 2019.
26. Park, K., Kim, J., Testoff, T., Adams J., Poklara, M., Zborowski, M., Venere, M., Chalmers, J.J., Quantitative Characterization of the Regulation of Iron Metabolism in Glioblastoma Stem-Like Cells using Magnetophoresis. *Biotechnology and Bioengineering*. 116(7):1644-1655. 2019; PMCID: PMC6693654.
27. Kim, James, Weigand, Mitchell, Palmer, Andre F., Zborowski, M., Yazer, M.H., Chalmers, Jeffrey, Single Cell Analysis of Aged RBCs: Quantitative analysis of the aged cells and byproducts, *the Analyst*. 144(3):935-942. 2019. PMCID: PMC6506859.
28. Xue, W., Moore, L.R., Nakano, N., Chalmers, J.J., Zborowski, M. Single cell magnetometry by magnetophoresis vs. bulk cell suspension magnetometry by SQUID-MPMS – a comparison. *Journal of Magnetism and Magnetic material* 474:152-160. 2019.
29. Aljohani, HM Aljohani, M., Furgason, JM, Amaya, P., Deeb, A., Chalmers, J.J., Bahassi, E.M. The role of Nrf2-Keap1 pathway in the survival of circulating metastatic cancer cell, *Cancer Research* 78 (13 Supplement), 83-83. 2018.
30. Lustberg, M.B., Stover, D.G., Chalmers, J.J. Implementing Liquid Biopsies in Clinical Trials: State of Affairs, Opportunities, and Challenges. *The Cancer Journal* 24(2):61-64. 2018; PMCID: PMC5880324.

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<http://www.foxnews.com/story/0,2933,552917,00.html>
2. Ohio state researchers fueling Ohio's economy
http://www.ohiostatealumni.org/newscenter/economic_force.php
3. Genetic Engineering News Webnair (February 23, 2016)

INVITED WORKSHOPS

1. "Impact of stress typical of large scale systems on stem cells "Translating Cell Therapies from Lab Bench to Clinic: Manufacturing and Product Characterization. ECI Workshop, Sunday, 14th January, 2017. San Diego, CA
2. Translating Cell Therapies from Lab Bench to Clinic: Manufacturing and Product Characterization. ECI Workshop, Sunday, 18th January, 2015. San Diego, CA
3. Enhancement of Chemical Engineering Curricula with Biological Applications in Fluid Transport. NSF **CCLI Project**, August 6-8, 2009.
4. **Eighth Annual Symposium on Frontiers of Engineering**. National Academy of Engineering, Sept. 19-21, 2002 Irvine, Ca.
5. **Challenges for the Chemical Sciences in the 21st Century, Workshop on Homeland Defense & National Security**, National Academy of Engineering, Jan. 14-16, 2002, Irvine, CA
6. **Challenges for the Chemical Sciences in the 21st Century, Workshop on Health and Medicine**, National Academy of Engineering, December 2-4, 2002, Irvine, CA

INVITED PRESENTATIONS

1. Chalmers, J.J., The separation of red blood cells based solely on intrinsic magnetization: clinical and commercial implications. **Biochemical and Molecular Engineering XXI**, Mont Tremblant, Quebec, Canada July 14-18, 2019,
2. Chalmers, J.J., The separation of red blood cells based solely on intrinsic magnetization: clinical and commercial implications. **AABB**, San Antonio, TX, Oct. 19-21, 2019.
3. Chalmers, J.J. What comes around, goes around. or, I are a gear-head engineer ad proud of it! **Cell Culture Engineering XVI**, Palm Springs, May 8-13, 2016.
4. Chalmers, J.J. Separation/Isolation of cells, from fundamentals to specific research/production and clinical applications. **U. of Minnesota**, March 2, 2016
5. Chalmers, J.J. Separation/Isolation of cells, from fundamentals to specific research/production and clinical applications. **Georgia Tech**, December 8, 2015.
6. Chalmers, J.J. Exploitation of Magnetic Nanoparticles in Cell Analysis and Separation: Theoretical, Experimental, and Clinical Considerations. **Stanford University**, January 8, 2015.
7. Chalmers, J.J. Multiparameter analysis of HPV positive oropharyngeal CTCs reveals late HPV viral gene expression consistent with and active viral life cycle, **Advances in Circulating Tumor Cells (ACTC) from Basic Research to Clinical Practice**. Oct. 8-11, 2014. Crete, Greece.
8. Chalmers, J.J. Characterization of non-traditional CTCs in metastatic breast cancer linked to overall survival. **Gordon Research Conference**, Mt Holyoke College, August 3-8, 2014.

9. Chalmers, J.J., Jatana, K. Going beyond enumeration: Characterization of CTCs and cancer associated cells in *breast* and head and neck squamous cell carcinoma. **9th International Symposium on Minimal Residual Cancer**. Sept. 24-17, 2013. Pullman Paris Bercy, France.
10. Chalmers, J.J. Expanding the Definition of Traditional CTCs: Cells Associated with Cancer in the Blood of Patients with Solid Tumors. **PittCon**, March 19, 2013. Pittsburgh, PA.
11. Chalmers, J.J. Expanding the Definition of Traditional CTCs: Cells Associated with Cancer in the Blood of Patients with Solid Tumors. **Molecular Med TRI-CON 2013**. February 11-15, 2013, San Francisco, CA
12. Chalmers, J.J. Expanding the Definition of Traditional CTCs: Cells Associated with Cancer in the Blood of Patients with Solid Tumors. **Cell Tech: Circulating Tumor Cells**, January 22-23, 2013.
13. Chalmers, J.J. Separation/Isolation of rare cells, including circulating tumor cells, in patient blood: It is not the same as spiking cancer cells into normal blood! **University of Michigan**, December 4, 2012.
14. Chalmers, J.J. Mammalian Cell Fluid Mechanics and Scale-Up Considerations, **Millipore Corp**. November 13, 2012. Bedford, MA.
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17. Jatana, K, Chalmers, J.J. Identification, characterization, and clinical correlation of circulating tumor cells in patients with squamous cell carcinoma of the head and neck using a negative enrichment technology” **Advances in Circulating Tumor Cells (ACTC) from Basic Research to Clinical Practice**, September 26-29, 2012. Athens-Greece.
18. Chalmers, JJ, Mammalian Cell Fluid Mechanics and Scale-Up Considerations. **The Bioprocessing Summit**, CHI, Boston, MA August 20-23, 2012.
19. Berdugo, C., Velasco, O.L., Chalmers, J.J. Effect of Hydrodynamic Conditions on Expression of Stress Proteins, Cell Cycle, and Recombinant Protein Productivity. **Cell Culture Engineering XIII**. Scottsdale, AZ, April, 2012.
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29. Chalmers, J. Process Scale-up Considerations for Therapeutic Antibody Production. **Beijing International Healthcare Industry Forum**, October, 2010, Beijing, China.
30. Chalmers, J. Overview of Posters, **2010 ASCO-NCI-EORTC Annual Meeting on Molecular Markers in Cancer**, Hollywood, FL. Oct 18-20, 2010.
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66. Chalmers, J.J., "Development of a Reliable, Routine Process to Isolate/Enrich Cancer Cells from Bone and Peripheral Blood Samples, **INNOVATIVE MOLECULAR ANALYSIS TECHNOLOGIES PI MEETING**, Chantilly, VA July 8-10, 2002.
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69. Chalmers, J.J. "Magnetic-based Technologies", **Detection and Measurement of Occult Disease for the Prognosis of Solid Tumors**, NCI Jan 7-8, 2002.
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M.S. Advisor

<u>Student</u>	<u>Date</u>	<u>Thesis Title</u>
Bogoevski, Daniel	1989	The Effect of Glucose Concentration on the Production of Plasmid-Encoded Proteins in <i>Escherichia-coli</i>
Bae, Yong Kook	1989	Studies about Shear Stress Effects on <i>Trichoplusia ni</i> Insect Cells
Goldblum, Seth	1990	Characterization of the Protective Effects of Methylcellulose and other Polymers on Insect Cells Subjected to Laminar Shear Stress
Venkat, Raghavan	1991	Protein Phosphorylation Studies of Human Vascular Endothelium as a Response to Shear and Simulations of Complex Arterial Flows in a Simple Parallel Flow Viscometer System
Tzeng, Yi	1991	The Influence of Acetate on The High Cell Density Fermentation of <i>Escherichia coli</i>
Garcia-Briones, Miguel	1992	Computer Simulations of the Bubble Breakup at a Gas-Liquid Interface and its Implications in Animal Cell Damage in Large Scale Cultures
Trinh, Kim	1992	Quantification of Cell Damage as a Result of Bubble Rupture
Moore, Lee	1994	Continuous, Magnetic Cell Separation
Von Fahnestock, Mike	1994	Characterization of a Large Scale, In-Vessel Composting System

Hancock, Lorinda	1995	Effect of Environmental Conditions on Animal Cell Microcarrier cultures
Wheeler, Glen	1995	Supercritical extraction and biodegradation of phenolic compounds
Agarwal, Mukul	1995	Studies on the degradation of a biodegradable plastic
Rahul Vir	1996	Characterization of Non-submerged biofilms
Chen, Gho-Ha	1996	Quantification of an immunomagnetic cell deposition system
Bauer, Patricia	1996	The Effect of Surfactant Type and Concentration on Animal Cell Culture
Niki Gregoriades	1997	Characterization of Suspended and Anchorage dependent cell damage in a extensional flow device
Cesar Mauras	1997	Quantification of Biofilms using Confocal Microscopy and Image Analysis
Angela Younger	1999	The Effect of Surfactants on Animal Cells
Camella, Kristin	2001	Immunomagnetic Separations: Effects of Antibody Concentration, Effects of Antibody Concentration, and Quantitation of Antibody Binding Capacity.
Richardson, Aaron	2002	Cell Tracking Velocimetry (CTV): System Comparison Studies and Electromagnetic Integration
Garcia-Villa, Alejandra	2012	Assesment of γ -H2AX levels in circulating tumor cells enriched by negative immunomagnetic selection

Ph.D. Advisor

<u>Student</u>	<u>Date</u>	
Garcia-Briones, Miguel	1994	Quantification of the Hydrodynamics Forces on Suspended Cells in Bioreactors
Chattopadhyay, D.	1995	Thermodynamic Studies of Cell Adhesion to Gas-Liquid Interfaces
Tzeng, Yi	1995	Kinetic Studies of the Composting Process
Venkat, Raghavan	1995	Quantification of the Hydrodynamics Forces on Anchorage Dependent Animal Cells in Turbulent Bioreactors
Sun, Liping	1998	Immunomagnetic cell separation
McCloskey, Kara	2001	Theoretical and Experimental Characterization of Magnetophoretic mobility
Ma, Ninging	2002	Quantitative study of Bubble-Cell Interaction and the Mechanism of Mammalian Cell Damage from Hydrodynamic Forces
Lara, Oscar	2003	Immunomagnetic Cell Separations: Further Application of the Quadrupole Magnetic Cell Sorter
Mollet, Mike	2004	Physiological Effects of Hydrodynamic Forces on Animal Cells
Zhang, Huading	2004	Immunomagnetic cell separation: continued development of mathematical model of magnetopheric mobility and further applications
Shao, Mei	2005	Creation and Depletion of Alloreactive T-cells for Bone Marrow transplants
Mehta, Bhavya	2006	Optimization of Methodologies to digest tumor tissue
Jing, Ying	2006	Enrichment of Pluripotent Stem Cells
Hu, WeiWei	2006	Prevention of Damage to Algae cells in Commercial Bioreactors
Liyang, Yang	2007	Application of Immunomagnetic Cell Separation in Cancer Cell Detection: Development and Optimization
Shenkman, Rustin	2008	Magnetic Separation of Islets
Xiong, Ying	2008	Generation and separation of Alloreactive T-cells
Godoy, Ruben	2008	Lethal and Sub-Lethal Effects of Hydrodynamic Forces on Animal cell Culture
Xiaoxia, Jin	2009	Investigation of Intrinsic Cell Magnetophoresis for Label-less Cell Separation and Analysis and the Optimization of the CTV Instrumentation for such Studies
Berdugo, Claudia	2010	Cell Damage Mechanisms and Stress Response in Animal Cells Cultures
Jianxin Sun	2010	Intrinsic Magnetism of <i>Bacillus</i> Spores: Theoretical Studies and Potential Applications
Balasubraman, Priya	2010	Characterization and significance of circulating tumor cells in patients obtained using a negative selection technology

Xu, Jie	2012	Labeled and Label-less Magnetic Cell Separation and Analysis using Cell Tracking Velocimetry
Miller, Brandon	2013	Quantitative, Multiparameter Analysis of Fluorescently Stained, Negatively Enriched, Peripheral Blood from Cancer Patients
Wu, Youngy	2014	Multi-parameter Fluorescent Analysis of Magnetically Enriched Circulating Tumor Cells.
Deighan, Clayton	2015	Particle Balances in Therapeutic Extracellular Vesicle Development and in Depth Characterization of Fluorescence Nanoparticle Tracking Analysis
Xue, Wei	2016	Measurements of Cellular Intrinsic Magnetism with Cell Tracking Velocimetry and Separation with Magnetic Deposition Microscopy
Amaya, Peter	2017	A Multiparameter Approach to Separation and Clonal Analysis of Mammalian Cells
Kyoung-Joo, Jenny Park	2017	Multi-Parameter Fluorescent Analysis and Quantitative Magnetophoresis Study as Two Different Technologies to Detect and Characterize Cells and Its Various Applications as Biomarkers
Plencer, Eric	current	
Kim, James	current	
Weigand, Mitch	current	
Wu, Zhu	current	

Undergrad Honors Thesis

Cassandra Foltz	1995	3-D particle tracking of a 250 spinner vessel in a moving frame of reference
Todd Gibson	2000	Performance Evaluation of the Separation of HER-2/neu Cells with the Magnetic Cell Sorting Batch System
Keith Decker	2001	Flow Splitter Distortions and Cell Crossover in the Quadrupole Magnetic Flow Sorter (QMS)
Serra Elliot	2009	Cell Damage due to Hydrodynamic Stress in Fluorescence Activated Cell Sorters

Post-Doctoral Advisor

Reddy, Shirdar	1994 -1996	development of Cell Tracking Velocimetry
Nakamura, M.	1999 -2002	magnetic cell separation technology
Tong, Xiaodong	2003 –2007	magnetic cell separation technology
Lara, Oscar	2003 – 2004	magnetic cell separation technology
Zhao, Yang	2002 – 2011	CTV programming
Claudia Berdugo	2010- 2010	Cell Damage Mechanisms and Stress Response in Animal Cells Cultures

Research Associates

Melnik, Kristie	2000 - 2002; 2004 - 2006
Chosy, Julia	2000 - 2002

Courses Taught

Chemical Engineering Process Design (Chem E. 764); Experimental Cell Culture class (Chem E. 793); Mass and Energy balances (Chem. Eng. 200, 201); Heat transfer (Chem. E. 521), Kinetics (Chem. E. 610), Biochemical Engineering (Chem. E. 666, 766), Product Design (Chem. E. 762), Novel Separations: Bioseparations (Chem E 733), Graduate Heat Transfer (Chem. E. 815.05) Graduate Kinetics (Chem. E. 812)

University Committees

Search Committee member, Associate Vice President for Technology Transfer and Commercialization
Admission Committee, Ohio State Biochemistry Program

Ad Hoc Committee on Environmental Sciences and Engineering

College Committees

College of Engineering Core Curriculum Committee (2005-2006, 2006-2007, 2007-2008,)
College of Engineering Intellectual Property Advisory Committee, (2003 -)
Chair, College of Engineering Committee on Academic Affairs (2001-2002; 2002-2003, 2012-2013)
College of Engineering Committee on Academic Affairs (1992-)
College of Engineering Course Proposal Sub-Committee
College of Engineering Promotion and Tenure Committee, (02-03; 03-04)
Graduate Studies Committee, Biomedical Engineering Center
Chair, College of Engineering Chemistry Liaison Committee

Department Committees

Chair, Promotion and Tenure Committee (2003-)
Seminar Committee, 1988-1996
Special Events Committee, 1988-present
Curriculum and Accreditation, 1991-present
Computer, 1992-1995
Space and Facilities, 1991-present
Library, 1990-1995
Graduate Student Liaison, 1992-1996