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RESEARCH INTERESTS: Cellular and metabolic engineering, plant biotechnology, cell encapsulation

EDUCATION

- 1998 Cornell University, Ithaca, NY
Ph.D., Chemical Engineering; minor in Biochemistry; Advisor: Michael L. Shuler
Thesis: Engineering metabolism (biosynthesis, release, degradation) in plant cell tissue cultures for optimizing production of the anti-cancer agent Taxol[®]
- 1992 Worcester Polytechnic Institute, Worcester, MA
Chemical Engineering with high distinction; concentration in Biomedical Engineering

PROFESSIONAL APPOINTMENTS

- 2005-present *Director*, Institute for Cellular Engineering, University of Massachusetts Amherst.
- 2005-present *Associate Professor*, Department of Chemical Engineering, University of Massachusetts Amherst.
- 1998-2005 *Assistant Professor*, Department of Chemical Engineering, University of Massachusetts Amherst.
- 1992-1998 *Graduate Research Assistant*, Department of Chemical & Biomolecular Engineering, Cornell University, Ithaca, NY.
- 1991-1992 *Research Assistant*, Drug Delivery Group, Genetics Institute, Andover, MA (summers).

AWARDS AND HONORS

- Commercial Ventures and Intellectual Property Technology Development Fund Award (2010)
- Outstanding Teaching Award, UMass College of Engineering (2010)
- Selected as participant for the first National Academy of Engineering Frontiers in Engineering Education Workshop (2009)
- Research Leadership in Action Award, UMass Office of the Vice Provost (2006)
- Selection as Faculty Ambassador, UMass Amherst (2006)
- Outstanding Junior Faculty Award, UMass College of Engineering (2003)
- Selection as Engineering Faculty Commencement Speaker (2002)
- Minority in Engineering Program Recognition Award, UMass College of Engineering (2002)
- Women in Engineering Program Recognition Award, UMass College of Engineering (2001)
- UMass ChE Department “Celebration for Teaching” Awardee (2001)
- CAREER Award, National Science Foundation (2000)
- Outstanding Advisor Service Award, UMass College of Engineering (2000)
- AAUW Educational Foundation Engineering Dissertation Fellowship (1996-97)
- Head TA Fellow for College of Engineering TA Development, Cornell University (1995-97)
- Department of Defense ASEE Graduate Research Fellowship (1993-96)
- Whitaker Foundation Graduate Fellowship (1993, declined)
- Provost’s Major Qualifying Project Award for Most Outstanding Senior Research Project (1992)
- AIChE Most Outstanding Senior Student Award (1992)
- American Institute of Chemists (AIC) Annual Achievement Award (1992)
- Boston Chapter AIChE Scholarship Award (1991)

- Two Towers Prize – Most Outstanding Junior Student at WPI (1991)
- Tau Beta Pi and Phi Lambda Upsilon honor societies

PUBLICATIONS

Peer-Reviewed Manuscripts (indicates corresponding author)*

1. Stoppel, W.L., White, J.C., Horava, S.D., Henry, A., Roberts, S.C., and Bhatia*, S.R. “Sterilization of alginate-Pluronic F68 composite hydrogels,” in preparation for submission October 2011.
2. McPartland, T.J., Patil, R.A., Malone, M.F., and Roberts*, S.C. “Liquid-liquid extraction for recovery of paclitaxel from plant cell culture: Solvent evaluation for partitioning and selectivity and utilization of reactive agents,” in preparation for submission October 2011.
3. Lenka, S.K., Boutaoui, N., Paulose, B., Vongpaseuth, K., Normanly, J., Roberts, S.C., and Walker*, E.L. “Identification and expression analysis of methyl jasmonate responsive ESTs in paclitaxel producing *Taxus cuspidata* suspension culture cells,” *BMC Genomics*, under review
4. White, J.C., Stoppel, W.L., Roberts, S.C., and Bhatia*, S.R. “Mechanical and transport properties of alginate hydrogels containing a synthetic oxygen carrier,” *Biomacromolecules*, under review.
5. Patil, R.A., Kolewe, M.E., Normanly, J.N., Walker, E.L., and Roberts*, S.C. “Taxane biosynthetic pathway gene expression in *Taxus* suspension cultures with different bulk paclitaxel accumulation patterns – a molecular approach to understand variability in paclitaxel accumulation,” *Biotechnology Journal*, under review, invited contribution for Emerging Frontiers of Biochemical Engineering issue.
6. Naill, M., Kolewe, M.E., and Roberts*, S.C. (2011) “Paclitaxel uptake and transport in *Taxus* cell suspension cultures,” *Biochemical Engineering Journal*, in revision.
7. Lenka, S.K., Nims, E., Vongaseuth, K., Roberts, S.C., and Walker*, E.L. (2011) “TcJAMYC: A bHLH transcription factor that activates paclitaxel biosynthetic pathway genes in yew,” *Journal of Biological Chemistry*, in revision.
8. Wilson, S.A., and Roberts*, S.C. (2011) “Recent advances towards development and commercialization of plant cell culture processes for synthesis of biomolecules,” *Plant Biotechnology Journal*, accepted for publication.
9. Kolewe, M.E., Roberts, S.C., and Henson*, M.A. (2011) “A population balance equation model of aggregation dynamics in *Taxus* suspension cell cultures,” *Biotechnology and Bioengineering*, Aug 31. doi: 10.1002/bit.23321. [Epub ahead of print].
10. Stoppel, W.L., White, J.C., Horava, S.D., Bhatia, S.R., and Roberts*, S.C. (2011) “Transport of biological molecules in surfactant-alginate composite hydrogels,” *Acta Biomaterialia*, July 14 [Epub ahead of print].
11. Kolewe, M.E., Henson, M.A., and Roberts*, S.C. (2011) “Analysis of aggregate size as a process variable affecting paclitaxel accumulation in *Taxus* suspension cultures,” *Biotechnology Progress*, May 27. doi: 10.1002/btpr.655. [Epub ahead of print].
12. Gaurav, V., and Roberts*, S.C. (2011) “A statistical approach to optimize production of single cells from *Taxus cuspidata* plant cell aggregates for flow cytometry applications,” *Preparative Biochemistry and Biotechnology*, 41(3): 219-235.
13. Choudhary, S., White, J.C., Stoppel, W.L., Roberts, S.C., and Bhatia*, S.R. (2011) “Gelation behavior of polysaccharide-based interpenetrating polymer network (IPN) hydrogels,” *Rheologica Acta*, 50(1): 39-52.
14. Kolewe, M. and Roberts*, S. (2010) “Plant natural products from cultured multipotent cells,” *Nature Biotechnology*, 28(11): 1175-1176.
15. Kolewe, M.E., Henson, M.A., and Roberts*, S.C. (2010) “Characterization of aggregate size in plant cell tissue culture,” *Plant Cell Reports*, 29(5): 485-494.
16. Kolewe, M.E., Gaurav, V., and Roberts*, S.C. (2008) “Pharmaceutically-active natural product synthesis and supply via plant cell culture technology,” *Molecular Pharmaceutics*, 5(2): 243-256.
17. Chin, K., Khattak, S., Bhatia, S., and Roberts*, S.C. (2008) “Hydrogel-perfluorocarbon composite scaffold promotes oxygen transport to immobilized cells,” *Biotechnology Progress*, 24, 358-366.
18. Roberts*, S.C. (2007) “Production and engineering of terpenoids from plant cell cultures,” *Nature Chemical Biology*, 3, 387-395.
19. Vongpaseuth, K., Nims, E., StAmand, M., Walker, E.L., and Roberts*, S.C. (2007) “Development of a par-

- title bombardment-mediated transient transformation system for *Taxus* spp. cells in culture,” *Biotechnology Progress*, **23**: 1180-1185.
20. Khattak, S.F., Chin, K.S., Bhatia, S.R., and Roberts*, S.C. (2007) “Enhancing oxygen tension and cellular function in alginate cell encapsulation devices through the use of perfluorocarbons,” *Biotechnology and Bioengineering*, **96**: 156-166.
 21. Vongpaseuth, K., and Roberts*, S.C. (2007) “Advancements in the understanding of paclitaxel metabolism in tissue culture,” *Current Pharmaceutical Biotechnology*, **8**, 219-236.
 22. McEntee, M.K.E., Bhatia, S.K., Tao, L., Roberts, S.C., and Bhatia*, S.R. (2007) “Tunable transport of glucose through ionically-crosslinked alginate gels: Effect of alginate and calcium concentration,” *Journal of Applied Polymer Science*, **107**, 2956-2962.
 23. Nims, E., Dubois, C.P., Roberts*, S.C., and Walker, E.L. (2006) “Expression profiling of genes involved in paclitaxel biosynthesis for targeted metabolic engineering,” *Metabolic Engineering*, **8**: 385-394.
 24. Naill, M., and Roberts*, S.C. (2006) “Culture of isolated single cells from *Taxus* suspensions for the propagation of superior cell populations,” *Biotechnology Letters*, **27(21)**: 1725-1730.
 25. Khattak, S., Spataro, M., Roberts, L., and Roberts*, S.C. (2006) “Application of colorimetric assays to assess viability, growth and metabolism of hydrogel-encapsulated cells,” *Biotechnology Letters*, **28(17)**: 1361-1370.
 26. Naill, M., and Roberts*, S.C. (2005) “Cell cycle analysis of *Taxus* suspension cultures at the single cell level as an indicator of culture heterogeneity,” *Biotechnology and Bioengineering*, **90(4)**: 491-500.
 27. Naill, M., and Roberts*, S.C. (2005) “Flow cytometric identification of paclitaxel accumulating subpopulations,” *Biotechnology Progress*, **21**: 978-9834.
 28. Khattak, S., Bhatia, S.R., and Roberts*, S.C. (2005) “Pluronic F127[®] as a cell encapsulation material: Utilization of membrane stabilizing agents,” *Tissue Engineering*, **11(5-6)**: 974-983.
 29. Bhatia*, S.R., Khattak, S., and Roberts, S.C. (2005) “Polyelectrolytes for cell encapsulation,” *Current Opinion in Colloid and Interface Science*, **10**: 45-51.
 30. Agrawal, S.K., Chin, K.S., Sanabria-Delong, N., Aamer, K.A., Sardinha, H., Tew, G.N., Roberts, S.C., and Bhatia*, S.R. (2005) “Rheology and biocompatibility of Poly(lactide)-poly(ethylene oxide)-poly(lactide) hydrogels,” *MRS Symp. Proc.* v. **844** – Mechanical Properties of Bio-Inspired and Biological Materials, Y9.8.1-Y.9.8.6.
 31. Roberts*, S. (2005) “A successful introduction to chemical engineering first-semester course focusing on connection, communication and preparation” *Chemical Engineering Education*, **summer 2005**: 222-227.
 32. Naill, M., and Roberts*, S.C (2005) “Flow cytometric analysis of protein content in *Taxus* protoplasts and single cells as compared to aggregated suspension cultures,” *Plant Cell Reports*, **23(8)**: 528-533.
 33. Naill, M., and Roberts*, S.C. (2004) “Preparation of single cells from aggregated *Taxus* suspension cultures for population analysis,” *Biotechnology and Bioengineering*, **86(7)**: 817-826.
 34. McAuliffe, G., Roberts, L.A., and Roberts*, S. (2003) “The influence of environmental conditions on the encapsulation of HepG2 liver cells in alginate,” *JURIBE*, **3(1)**: 70-75.
 35. Roberts*, S., Naill, M., Gibson, D., and Shuler, M. (2003) “A simple method for enhancing paclitaxel release from *Taxus canadensis* cell suspension cultures utilizing cell wall digesting enzymes,” *Plant Cell Reports* **21**: 1217-1220.
 36. McAuliffe, G., Roberts, L., and Roberts*, S. (2002) “Paclitaxel administration and its effects on clinically relevant human cancer and noncancer cell lines,” *Biotechnology Letters* **24**: 959-964.
 37. Matthew, J., Nazario, Y., Roberts, S., and Bhatia*, S. (2002) “Effect of mammalian cell culture medium on the gelation properties of Pluronic[®]F127,” *Biomaterials* **23**: 4615-4619.
 38. Roberts, S., and Shuler*, M. (1997). “Large-scale plant cell culture,” *Current Opinion in Biotechnology* **8**:154-159.
 39. Srinivasan, V., Roberts, S., and Shuler*, M. (1997) "Combined use of six-well polystyrene plates and thin layer chromatography for rapid development of optimal plant cell culture processes: Application to taxane production by *Taxus* sp.," *Plant Cell Reports* **16(9)**: 600-604.
 40. Pestchanker, L., Roberts, S., and Shuler*, M. (1996) "Kinetics of Taxol production and nutrient use in suspension cultures of *Taxus cuspidata* in shake flasks and in a Wilson-type bioreactor," *Enzyme and Microbial*

Technology **19**: 256-260.

41. Srinivasan, V., Pestchanker, L., Moser (Roberts), S., Hirasuna, T., Taticcek, R., and Shuler*, M. (1995) "Taxol production in bioreactors: Kinetics of biomass accumulation, nutrient uptake, and Taxol production by cell suspensions of *Taxus baccata*," *Biotechnology and Bioengineering* **47**: 666-676.

Book Chapters (* indicates corresponding author)

1. Patil, R.A., and Roberts*, S.C. (2011) "Implications of cellular heterogeneity on plant cell culture performance" in *Biotechnology for Medicinal Plants*, Eds. Chandra, S., Lata, H., and Varma, A., Springer, invited contribution, to be submitted October 2011.
2. Stoppel, W.L., and Roberts*, S.C. (2011) "Oxygen supply for tissue engineering" in *Engineering Biomaterials for Regenerative Medicine*, Ed. S. Bhatia, Springer, invited contribution, in press.
3. Gaurav, V., Kolewe, M.E., and Roberts*, S.C. (2010) "Flow cytometric methods to investigate culture heterogeneities for plant metabolic engineering" in *Plant Secondary Metabolism Engineering: Methods and Applications*, *Methods in Molecular Biology*, Vol. 643, Ed. Fett-Neto, A., Springer, 243-262.
4. Roberts, S., and Shuler*, M. (1998) "Strategies for Bioproduct Optimization in Plant Cell Tissue Cultures" in *BioHydrogen*, Ed. Zaborsky, E., Plenum Press, New York, 483-492.

Non-reviewed Published Abstracts and Proceedings

1. Roberts, S., Passonno, S., and Bhatia, S. (2009) "Interdisciplinary Training in Cellular Engineering at UMass Amherst: The Institute for Cellular Engineering (ICE) REU Summer Site," *Proceedings of the IEEE: 35th Annual Northeast Bioengineering Conference*, 323-324.
2. Passonno, S., Bhatia, S., and Roberts, S. (2009) "Interdisciplinary Training in Cellular Engineering at UMass Amherst: The Institute for Cellular Engineering (ICE) IGERT Program at UMass Amherst," *Proceedings of the IEEE: 35th Annual Northeast Bioengineering Conference*, 268-269.
3. Matthew, J., Bhatia, S. and Roberts, S. (2002) "Pluronic F127 gels as materials for mammalian cell encapsulation," *Polymer Preprints*, **43(2)**: 769-770.
4. Roberts, S., Roberts, L.A., and McAuliffe, G. (2001) "Paclitaxel metabolism by clinically relevant cell lines and its effects on cell metabolism *in vitro*," *FASEB*, **15(5)**: A919-A919, Part 2.
5. Roberts, S., and Fisher, R. (2000) "The role of transport phenomena on efficacy, stability and hysteresis in encapsulated cellular systems," *Proceedings of the IEEE 26th Annual Northeast Bioengineering Conference*, **April 8-9**: 21-22.
6. Roberts, S. (2000) "A successful introduction to chemical engineering first-semester course focusing on connection, communication and preparation," pp. 406-411. In: *Millennium Topical Conference Proceedings from the AIChE Annual Meeting 2000, Session T3009: Chemical Engineering in the Lower Levels*.
7. Fisher, R., Roberts, S., Peattie, R., and Bronzino, J. (2000) "Characterization of a spinning cone contactor as a tissue engineering bioreactor," *Annals of Biomedical Engineering*, **T12.38**: S-123.
8. Fisher, R., Roberts, S., and Peattie, R. (2000) "Controlling tissue microenvironments with encapsulating membranes: Efficacy, stability and hysteresis," *Annals of Biomedical Engineering*, **T12.39**: S-123.
9. Fisher, R., Weiss, R., Roberts, S., Peattie, R., and Bronzino, J. (2000) "Evaluating encapsulation hydrogels for tissue engineering applications: Transport and property characterization studies," *Annals of Biomedical Engineering*, **T2.58**: S-23.
10. Roberts, S., Fisher, R, and Roberts, L. (2000) "Development of an *in vitro* cell culture system for the study of drug metabolism using encapsulation technologies: Paclitaxel as a model drug," *Annals of Biomedical Engineering*, **T7.19**: S-82.
11. Ghanem, A., and Roberts, S. (1999) "Group self-assessment surveys as a tool to improve teamwork," *29th ASEE/IEEE Frontiers in Education Conference*, **11a2**: 24.
12. Roberts, S., Hollar, K., and V. Carlson (1997). "Looking back: Lessons learned from ten years of training teaching assistants," *Proceedings of the ASEE Annual Conference*.

PRESENTATIONS

Invited Talks and Seminars

1. Cornell University, Ithaca, NH (April 2012)
2. Progress in Biotechnology Series, UC Davis (October 2011)
3. Society of Industrial Microbiology, New Orleans, LA (July 2011)
4. First Annual Conference of the American Council for Medicinally Active Plants (ACMAP), New Brunswick, NJ (July 2010)
5. National Academy of Engineering Frontiers in Engineering Education Workshop (November 2009)
6. HHMI-NIH Graduate Training Program Workshop, Panel on Building an Interdisciplinary Community, HHMI Conference Center, Chevy Chase, MD (September 2009)
7. Bioactives: New Production Technologies, ACS National Meeting (August 2009)
8. Biochemical Engineering XVI, Burlington, VT (July 2009)
9. Rensselaer Polytechnic Institute (June 2009)
10. Path of Professorship, Massachusetts Institute of Technology (October 2008)
11. The Coulter Principle: Foundations and Advanced Applications, Harvard Medical School, Boston, MA (October 2008)
12. Optimizing Cell Culture Development, Cambridge Healthcare Institute, Boston, MA (September 2008)
13. Bioorganic Chemistry Gordon Conference, Andover, NH (June 2008)
14. Preparing STEM Workforce for the Commonwealth, UMass Amherst (June 2008)
15. UMass Amherst, Medical Device Conference, Polymer Science & Engineering (May 2008)
16. University of Delaware, Chemistry-Biology Interface Program (September 2007)
17. Dartmouth College, Thayer School of Engineering (April 2007)
18. Mt. Holyoke College, Leadership and Career Conference (February 2006)
19. UMass Amherst, Third Annual Symposium in Plant Biology (October 2005)
20. UMass Amherst, First Annual Cellular Engineering Symposium (May 2005)
21. Exelixis Plant Sciences, Portland, OR (February 2005)
22. Interagency Conference on Metabolic Engineering, Interagency Metabolic Engineering Working Group (NSF, NIH, DOE, DOD, USDA, NIST, NASA, EPA), National Science Foundation (February 2005)
23. Texas A&M University, Department of Chemical Engineering (December 2004)
24. UMass Amherst, Department of Exercise Science (April 2004)
25. UMass Amherst, Department of Plant and Soil Sciences (March 2004)
26. UMass Amherst-UCSB, Process Design Center Consortium, Santa Barbara, CA (June 2003)
27. Biophex 2002 Conference and Exhibition for Biopharmaceutical R&D, Processing & Manufacturing (October 2002)
28. UMass Amherst, Department of Polymer Science and Engineering, CUMIRP Meeting (May 2002)
29. Syracuse University, Department of Chemical Engineering (April 2002)
30. University of Delaware, Department of Chemical Engineering (February 2002)
31. Worcester Polytechnic Institute, AIChE meeting (March 2001)
32. Worcester Polytechnic Institute, Department of Biotechnology (November 2000)
33. UMass Amherst, Department of Chemistry (September 2000)
34. UMass Medical Center, Worcester, MA (April 2000)
35. Baystate Medical Center, Springfield, MA (December 1999)
36. UMass Amherst, Plant Biology Graduate Program (September 1998)
37. Cereon Genomics, Cambridge, MA (March 1998)

Contributed to National/International Meetings

1. Paulose, B., Keshiri, S., Patil, R., Roberts, S., Walker, E., and Normanly, J. (speaker) "Identification and characterization of *Taxus* genes involved in paclitaxel accumulation" Plant Metabolic Engineering Gordon Conference (2011), Waterville Valley, NH (poster).

2. Kolewe, M.E. (speaker), and Roberts, S.C. "Development of plant cell culture processes to produce natural product pharmaceuticals: Characterization, analysis and modeling of plant cell aggregation" Biochemical and Molecular Engineering XVII (2011), Seattle, WA (poster).
3. Kolewe, M.E. (speaker), and Roberts, S.C. "Green pharmaceuticals: Renewable production of natural product cancer drugs" NSF IGERT National Poster Competition (2011), online.
4. Gaurav, V. (speaker), and Roberts, S.C. "Plant cell culture process development: Use of flow cytometry for creation of specialized cell lines" ACS National Meeting (2010), Division of Biochemical Technology, Session on Upstream Processes, San Francisco, CA.
5. Kolewe, M., Henson, M.A., and Roberts, S.C. "Population dynamics in plant cell culture" Pacific Biocomputing Symposium (2010), Kohala, HI (poster).
6. Stoppel, W. (speaker), Brown, M., Schneyer, A., and Roberts, S.C. "Improved alginate formulation for microencapsulation of islets" Engineering Biomaterials for Regenerative Medicine, paper RR3.53, Materials Research Society (2009), Boston, MA (poster).
7. White, J. (speaker), Luu, X., Wu, P., Lee, P., Roberts, S.C., and Bhatia, S.R. "Expediting the wound healing process using an improved alginate wound dressing" Engineering Biomaterials for Regenerative Medicine, paper RR3.52, Materials Research Society (2009), Boston, MA (poster).
8. Kolewe, M. (speaker), Henson, M.A., and Roberts, S.C. "A phenomenological model of aggregation dynamics in *in vitro* plant cell culture systems" Modeling Approaches to Examine Fundamental Issues in Life Sciences II, paper 375c, AIChE Annual Meeting (2009), Nashville, TN.
9. Patil, R. (speaker), and Roberts, S.C. "Gene expression analysis of *Taxus* cell culture subpopulations for targeted metabolic engineering of secondary metabolite accumulation" Advances in Metabolic Engineering II, paper 235d, AIChE Annual Meeting (2009), Nashville, TN.
10. Gaurav, V. (speaker), and Roberts, S.C. "Isolation and propagation of high secondary metabolite-accumulating plant cells cultures" Advances in Cell Culture II, paper 681b, AIChE Annual Meeting (2009), Nashville, TN.
11. Stoppel, W. (speaker), Brown, M., Schneyer, A., and Roberts, S.C. "Improving cellular function of microencapsulated cells using an improved alginate formulation" Biomaterials III, paper 646d, AIChE Annual Meeting (2009), Nashville, TN.
12. White, J. (speaker), Luu, X., Wu, P., Lee, P., Roberts, S.C., and Bhatia, S.R. "Expediting the wound healing process using an improved alginate wound dressing" Biomaterials II, paper 646b, AIChE Annual Meeting (2009), Nashville, TN.
13. Kolewe, M. (speaker), and Roberts, S.C. "Plant cell culture: Sustainable production of bioactive natural products" ACS National Meeting (2009), Washington, D.C.
14. Kolewe, M. (speaker), Henson, M.A., and Roberts, S.C. "Aggregation dynamics in plant cell culture as an approach to optimize natural product synthesis" Biochemical Engineering XVI (2009), Burlington, VT (poster).
15. Gaurav, V. (speaker), and Roberts, S.C. "Diterpenoid bio-synthesis in plant cells: Assay development, optimization and quantification" ACS National Meeting (2009), Division of Organic Chemistry, Session on Biologically-Related Molecules and Processes, Salt Lake City, UT.
16. Gaurav V. (speaker), and Roberts S. C. "Development of a live cell-based immunofluorescent assay for the detection of pharmaceutically-relevant secondary metabolites in plant cells" ACS National Meeting (2009), Salt Lake City, UT (poster).
17. Kolewe, M. (speaker), Henson, M.A., and Roberts, S.C. "Aggregation dynamics in plant cell culture" Advances in Cell Culture II, paper 263b, AIChE Annual Meeting (2008), Philadelphia, PA
18. Gaurav, V. (speaker), Patil, R., and Roberts, S.C. "A FACS-based approach to characterizing culture heterogeneity based on accumulation of the anti-cancer agent paclitaxel in plant cell suspension cultures" Engineering Fundamentals in Life Sciences, paper 572bf, AIChE Annual Meeting (2008), Philadelphia, PA.
19. Roberts, S.C (speaker), and Roberts, L.A. "A novel interdisciplinary biotechnology process engineering laboratory course at the University of Massachusetts Amherst" Truly Interdisciplinary Activities, paper 516b, AIChE Annual Meeting (2008), Philadelphia, PA.

20. Vongaseuth, K. (speaker), Nims, E., Walker, E., and Roberts, S. "Novel systems for functional characterization of *Taxus* genes related to paclitaxel metabolism in plant cell culture" Banff Conference for Plant Metabolism (2008), Alberta, Canada (note: first place in poster competition).
21. Vongpaseuth, K. (speaker), Nims, E., Walker, E., and Roberts, S. "Development of a novel gene characterization system for paclitaxel-related genes" Plant Metabolic Engineering Gordon Conference (2007), Tilton, NH (poster).
22. Nims, E. (speaker), Dubois, C., Roberts, S., and Walker, E. "Regulation of Taxol metabolism in suspension cell culture" Plant Metabolic Engineering Gordon Conference (2007), Tilton, NH.
23. Nims, E. (speaker), Dubois, C., Roberts, S., and Walker, E. "Regulation of Taxol metabolism in suspension cell culture" New England American Society of Plant Biologists (2007), Syracuse, NY (poster).
24. Chin, K. (speaker), Bhatia, S., and Roberts, S. "Perfluorocarbons for enhanced oxygen transport in tissue engineering devices" paper 191e, AIChE Annual Meeting (2005), Cincinnati, OH.
25. Roberts, S. (speaker), Nims, E., Dubois, C., Boutaoui, N., Vongpaseuth, K., and Walker, E. "Molecular approaches for identification of metabolic engineering targets for enhanced paclitaxel accumulation" paper 196f, AIChE Annual Meeting (2005), Cincinnati, OH.
26. Nims, E., Boutaoui, N., Dubois, C., Roberts, S., and Walker, E. (speaker) "Expression profiling of genes involved in biosynthesis of paclitaxel" American Society of Plant Biologists Annual Meeting (2005), Seattle, WA.
27. Nims, E. (speaker), Boutaoui, N., Dubois, C., Roberts, S., and Walker, E. "Expression profiling of genes involved in biosynthesis of paclitaxel," Plant Metabolic Engineering Gordon Conference (2005), Tilton, NH (poster).
28. Naill, M. (speaker), Nims, E., Walker, E., and Roberts, S. "Metabolic control of taxane accumulation at the mRNA level" paper 479b, AIChE Annual Meeting (2004), Austin, TX.
29. Khattak, S. (speaker), Chin, K., Bhatia, S., and Roberts, S. "Improved oxygen supply in cell encapsulation systems" paper 463g, AIChE Annual Meeting (2004), Austin, TX.
30. McPartland, T, Malone, M. (speaker), and Roberts, S. "Liquid-liquid extraction for recovery of paclitaxel from plant cell culture: Solvent evaluation for partitioning and selectivity and the utilization of reactive agents" paper 464f, AIChE Annual Meeting (2004), Austin, TX.
31. Dubois, C. (speaker), Esclassan, J., and Roberts, S. "Paclitaxel stability and conversion through metabolite analysis in *Taxus* cell suspension cultures" paper 87, Third International Congress on Plant Metabolomics (2004), Ames, Iowa (poster).
32. Naill, M. (speaker), Nims, E., Walker, E., and Roberts, S. "Correlation of metabolite profiling and gene expression in paclitaxel-accumulating *Taxus* cell suspension cultures" paper 88, Third International Congress on Plant Metabolomics (2004), Ames, Iowa (poster).
33. Khattak, S. (speaker), Spataro, M, Bhatia, S., and Roberts, S. "Perfluorocarbon oxygen carriers in cell encapsulation" paper 384a, AIChE Annual Meeting (2003), San Francisco, California.
34. Naill, M. (speaker), and Roberts, S. "Flow cytometric analysis of *Taxus* cell suspension cultures" paper 469c, AIChE Annual Meeting (2003), San Francisco, California.
35. Naill, M. (speaker), and Roberts, S. "Investigating cell subpopulation dynamics of *Taxus* cell suspension cultures: A single cell method" paper 383, ACS Annual Meeting (2003), New Orleans, Louisiana.
36. Khattak, S. (speaker), and Roberts, S. "Designing an *in vitro* cell culture model to predict drug pharmacokinetics and stability" paper 12, ACS Annual Meeting (2003), New Orleans, Louisiana.
37. Matthew, J., Bhatia, S., and Roberts, S. (speaker) "PEO-PPO-PEO gels as materials for mammalian cell encapsulation" paper 298a, AIChE Annual Meeting (2002), Indianapolis, Indiana.
38. Roberts, S. (speaker) "Initiatives to establish bioengineering and bioinformatics at the University of Massachusetts" paper 165c, AIChE Annual Meeting (2002), Indianapolis, Indiana.
39. Roberts, S., Laurence, R., and Conner, W. (speaker) "Unit operations laboratory: A moveable feast" paper 166a, AIChE Annual Meeting (2002), Indianapolis, Indiana.
40. Naill, M. (speaker), and Roberts, S. "Characterization of plant cell culture variability via flow cytometry" paper 304a, AIChE Annual Meeting (2001), Reno, Nevada.

41. Bhatia, S. (speaker), and Roberts, S. "Development of communication skills in beginning engineering students" paper 222c, AIChE Annual Meeting (2001), Reno, Nevada.
42. Esclassan, J., Naill, M. (speaker), and Roberts, S. "Paclitaxel stability in plant cell suspension cultures" paper 300ak, AIChE Annual Meeting (2001), Reno, Nevada (poster).
43. McAuliffe, G. (speaker), Roberts, L., and Roberts, S. "Development of an *in vitro* system to study the effects of the anti-cancer drug Taxol on mammalian cell cultures" paper 300aj, AIChE Annual Meeting (2001), Reno, Nevada (poster).
44. Lovy Wheeler, A. (speaker), and Roberts, S. "The study of Taxol trafficking and release using TEM and fluorescence microscopy" Northeast Section of the American Society of Plant Biologists, Worcester Polytechnic Institute (May 4-5, 2001), Worcester, Massachusetts (poster).
45. Esclassan, J. (speaker), Michon, J., and Roberts, S. "Study of the taxane biosynthetic pathway and the degradation of paclitaxel in plant cell suspension cultures" Northeast Section of the American Society of Plant Biologists, Worcester Polytechnic Institute (May 4-5, 2001), Worcester, Massachusetts (poster).
46. Roberts, S. (speaker), McAuliffe, G., Fisher, R., and Roberts, L. "Paclitaxel metabolism by clinically relevant cell lines and its effects on cell metabolism *in vitro*" paper 713.8, Experimental Biology Annual Meeting (2001), Orlando, Florida (poster).
47. Roberts, S. (speaker) "A successful introduction to chemical engineering first-semester course focusing on connection, communication and preparation" paper 62e, AIChE Annual Meeting (2000), Los Angeles, California; proceedings available.
48. Naill, M., and Roberts, S. (speaker) "Variability in paclitaxel accumulation in *Taxus* cell suspension cultures" paper 295b, AIChE Annual Meeting (2000), Los Angeles, California.
49. Roberts, S. (speaker), Fisher, R., and Roberts, L. "Development of an *in vitro* cell culture system for the study of drug metabolism using encapsulation technologies: Paclitaxel as a model drug" BMES Annual Meeting (2000), Seattle, Washington; published abstract, *Annals Biomedical Engineering*, T7.19.
50. Fisher, R., Roberts, S., Peattie, R. (speaker), and Bronzino, J. "Characterization of a spinning cone contactor as a tissue engineering bioreactor" BMES Annual Meeting (2000), Seattle, Washington; published abstract, *Annals Biomedical Engineering*, T12.38.
51. Roberts, S. (speaker), and Fisher, R. "Efficacy, stability and hysteresis in encapsulated cellular systems" IEEE Northeast Regional Biomedical Engineering Conference (2000), Storrs, Connecticut; proceedings available.
52. Ghanem, A. (speaker), and Roberts, S. "Group self-assessment surveys as a tool to improve teamwork" Frontiers in Engineering Annual Conference (1999), San Juan, Puerto Rico; proceedings available.
53. Roberts, S. (speaker) "Development of experimental and mathematical techniques for the characterization of the biosynthetic pathways of valuable plant products" Consortium for Plant Biotechnology Research, Inc. (1999), Washington D.C. (poster).
54. Roberts, S. (speaker), and Shuler, M. "Characterization of Taxol release from plant cell tissue cultures" IEEE Northeast Regional Biomedical Engineering Conference (1999), Hartford, Connecticut.
55. Roberts, S. (speaker), Brincat, M., Gibson, D., and Shuler, M. "The study of secondary metabolite biosynthetic pathways in plant cell tissue cultures: Paclitaxel as a model compound" paper 267d, AIChE Annual Meeting (1998), Miami Beach, Florida.
56. Roberts, S. (speaker), and Shuler, M. "The effect of methyl jasmonate on the kinetics of paclitaxel production, taxane distribution, and degradation in plant cell cultures" AIChE Annual Meeting (1997), Los Angeles, California.
57. Roberts, S. (speaker), and Shuler, M. "Strategies for bioproduct optimization in plant cell tissue cultures" Biohydrogen Conference (June 1997), Kona, Hawaii.
58. Roberts, S. (speaker), Hollar, K., and Carlson, V. "Looking back: Lessons learned from 10 years of training teaching assistants" ASEE Annual Meeting (1997), Milwaukee, Wisconsin; proceedings available.
59. Roberts, S. (speaker), and Shuler, M. "Formulation of a metabolic model for the fate of Taxol after synthesis in plant cell cultures" paper 158g, AIChE Annual Meeting (1996), Chicago, Illinois.

TEACHING ACTIVITIES

Courses developed and taught

Engin 110 Introduction to Chemical Engineering (UG, freshmen): Redesigned course to provide a rigorous introduction to chemical engineering for first-semester students covering mass balances, process design and research approaches; Taught Fall 1998, 1999, 2000, 2002

ChE 120 Fundamentals of Chemical Engineering (UG, freshmen): Taught Spring 2002, 2005

ChE 230H Sophomore Honors Colloquium (UG, sophomore): Developed and organized this new colloquium to provide our honors students the opportunity to learn about departmental research and choose a research advisor to complete both independent study and thesis research; Taught Spring 2003, 2004, 2005

ChE 320 Reaction Engineering (UG, junior): Taught honors component Spring 2000

ChE 401 Unit Operations Laboratory (UG, senior): Taught Fall 2001, 2003, 2004, 2007; designed and implemented a new laboratory experiment in fermentation

ChE 401H Senior Honors Colloquium (UG, senior): Developed and organized this new colloquium to allow our senior level honors students access to departmental seminars to broaden their knowledge of cutting edge chemical engineering research; Taught Fall 2004, 2005

ChE 590A/Biochem 590A Biotechnology Process Engineering Laboratory (UG, senior interdisciplinary): Developed this new core laboratory course where students work in interdisciplinary teams (50:50 ChE and Biochemistry) to design a process to supply a high-value product. Molecular biology tools are used to engineer cells lines to express the protein of interest; cells are cultivated in bioreactors with designed process strategies; the protein product is recovered and purified using a variety of techniques; the final protein product is characterized in terms of protein quality and function; Taught Spring 2008, 2009, 2010, 2011

ChE 592B Introduction to Biochemical Engineering (G/UG): Developed the first elective course in bioengineering at UMass Amherst, focused on the application of chemical engineering and biochemistry principles to the design and optimization of processes in the food, pharmaceutical and medical industries; Taught Spring 1999, 2001, 2004, 2006 and Fall 2007, 2008, 2009, 2011

ChE 797A and Chem 797J Ethical Conduct of Research (G): Developed a module on data fabrication, plagiarism and credit; Taught Spring 2004, 2005, 2006

ChE 690F Fundamentals of Cellular Engineering (G, interdisciplinary): Developed and coordinated the core course for the IGERT Program in Cellular Engineering that involves ~15 faculty and provides an overview of cellular engineering fundamental and applied research areas, including applied systems biology, plant biotechnology, cytoskeleton, protein folding and engineering, stem cells and cancer, and membranes and delivery.; Taught Fall 2008, 2009, 2011

ChE 797D ICE IGERT Graduate Seminar (G, interdisciplinary): Coordinated for the IGERT Program in Cellular Engineering; this seminar series is a compilation of campus seminars relevant to cellular engineering offered across multiple departments and interdisciplinary graduate programs; Coordinated Spring 2008-2011, Fall 2008-2010

ChE 797S ICE IGERT Journal Club (G, interdisciplinary): Developed and coordinated for the IGERT Program in Cellular Engineering; this is a student run journal club entitled Classic and Current Papers at the Interface of Engineering and the Life Sciences that exposes students to a diverse array of interdisciplinary research topics in a relaxed environment that promotes peer networking, communication across disciplines and deeper insights into research and techniques not typically encountered in home department studies; Coordinated Spring 2010, 2011

Biochem 690A Topics in Plant Biology Research (G, interdisciplinary): Developed lectures on plant secondary metabolism and metabolic engineering; Taught Fall 2007, 2008, 2009

Biotech 385 Agricultural and Biotechnology Laboratory (UG, senior interdisciplinary): Developed a laboratory module on plant cell culture including callus culture initiation, suspension culture cultivation, growth analysis and protein analysis through gel electrophoresis and Western blotting; Taught Spring 2000, 2001, 2002

Workshops Designed/Coordinated

- Modeling Cellular Metabolism and Processes (laboratory module for IGERT Program; co-developed with M. Henson), UMass Amherst, summer 2008, 2010 (10 participants)
- MICELS: Mentoring Individuals for Careers in Engineering and the Life Sciences, bioengineering group meet-

- ing with outside speakers, UMass Amherst, 2002- present
- Teaching Problem Solving in Engineering and the Sciences (part of the campus-wide TA training effort), UMass Amherst, Start of fall semester 1999-2005 (~35 participants each year)
- Discovery Methods in Chemistry and Chemical Engineering, workshop designed for K-12 educators illustrating simple experiments to demonstrate important concepts in Chemistry and Chemical Engineering (2001), co-instructor with J. Fermann (UMass Amherst Department of Chemistry)
- Teaching in the Laboratory: Chemistry Department TA Orientation, UMass Amherst, Start of fall semester 1999-2002 (~30 participants each year)
- Biochemical Engineering and the Supply of Anticancer Medications, Smith College Summer Science Program, 7/2/2001 – 7/13/2001, 80 contact hours (16 participants)
- Preparing for Graduate School, UMass Amherst, Fall 1998 (15 participants)
- Laboratory: Kinetics of Wine Making, UMass Amherst, Fall 1998 (6 participants)

PROFESSIONAL ACTIVITIES AND SERVICE

National and International

- Proposal Referee:
 - National Science Foundation panels: SBIR (2001, 2003), BES CAREER (2001, 2003, 2004, 2005), BES POWRE (2000), BES Large-Request Proposals (2000), CBET proposal review (2007, 2009), DGE IGERT full proposal review (2008)
 - National Institutes of Health: ad-hoc panel for the Roadmap Initiative in Natural Products Chemistry (2008), ad-hoc member of Synthetic and Biological Chemistry B (SBCB) review panel (2010)
 - Connecticut Innovations (Rocky Hill, CT) proposal review (1999, 2000)
 - Department of Energy site review team for BioEnergy Science Center (BESC) (2011)
- American Institute of Chemical Engineers (AIChE)
2001-2005 Session co-chair for annual Meeting (Multiple sessions in Areas 4 and 15)
- Biomedical Engineering Alliance and Consortium (BEACON), CT
Session Chair for Northeast Bioengineering Conference (1999, 2000)
Planning Committee for Drug Discovery, Design and Delivery Symposium (1999)
- Journal referee: *Science*, *Nature Biotechnology*, *PNAS*, *Biotechnology Progress*, *Enzyme and Microbial Technology*, *Metabolic Engineering*, *Journal of Bioscience and Bioengineering*, *Food Biotechnology*, *Plant Cell Reports*, *Biotechnology and Bioengineering*, *Nature Chemical Biology*, *Biomaterials*, *Tissue Engineering*, *Biotechnology Letters*, *Biochemical Engineering Journal*, *Biophysical Journal*
- Book Referee: McGraw-Hill, Oxford and Elsevier
- Professional Societies: AIChE, BEACON, American Chemical Society (ACS), Biomedical Engineering Society (BMES), American Society for Engineering Education (ASEE), American Association of University Women (AAUW)

University and College Service

- NLSB Planning Committee (2009-present)
- NSF IGERT on Cellular Engineering, Director (2007-present)
- NSF REU on Cellular Engineering, co-Director (2007-present)
- Genomics Research Community Forum Planning (2007-present)
- Distinguished Faculty Lecture Selection Committee (2006-2008)
- Institute for Cellular Engineering, Director (2005-present)
- UMass Amherst Flow Cytometry Facility, co-Director (2005-2010)
- Department of Chemistry Faculty Search Committee (2004, 2010)
- College of Engineering Community, Diversity, and Social Justice (CDSJ) Committee, co-Chair (2004-2006)
- College of Engineering ELAB II Building Dedication Committee (2004-2005)
- Integrated Sciences Building Committee (2003-2005)
- NIH Chemistry-Biology Interface Executive Committee (2002-present)

- NIH Chemistry-Biology Interface Curriculum Committee (2002-2006)
- Plant Biology Graduate Program Steering Committee (2002-present)
- College of Engineering Freshmen Program Committee (2002-2005)
- Life Sciences Steering Committee (2001-2005)
- College of Engineering Diversity Committee (2000-2002)
- College of Engineering Freshmen Engineering Program: co-coordinated Freshmen Majors Night for Chemical Engineering Department (Spring and Fall, 2000 & 2002)
- University TA Development Program, workshop instructor (1999-2005)
- Women in Engineering Program Representative (1998-present)
- College of Engineering Freshmen Orientation Advisor (1998-present)

Chemical Engineering Departmental Service

- Faculty Search Committee (2000-2002, 2003-2004, 2005-2007, 2008-2009, 2009-2010)
- Personnel Committee (2005-2006, 2007-2008, 2009-2010)
- Alumni Outreach Committee (2007-2008)
- Department Head Search Committee (2004-2005)
- Departmental Honors Coordinator (Fall 2002; Fall 2003-Fall 2005)
- Undergraduate Program Committee (2002-2005, 2007-2008)
- Graduate Program Committee (2004-2005, 2011-2012)
- Website Design Committee (2002)
- Senior Laboratory Committee, chair (2002)
- AIChE Student Chapter, faculty advisor (1998-2001)
- Graduate Seminar Series, coordinator (1999-2002)
- Ph.D. Qualifying Exam Committee, member (2005-present)
- Ph.D. Qualifying Exam Committee in Kinetics, member or chair (1999, 2001, 2002, 2003, 2004)
- Women in Chemical Engineering Group, faculty advisor (2000-2003)
- Class Advisor (2001-2003)

Public Service (Professional, Community and K-12)

- Exelixis Plant Sciences, Inc., consultant (2004-2006)
- Women in Engineering Career Day Event (high school), faculty panel (1998, 1999, 2000), invited speaker (2001, 2002)
- Minority in Engineering Career Day Event (high school), poster display and laboratory tour (2000, 2001), invited speaker (2002)
- High School Outreach, visits to local public schools (e.g., Chicopee Comp. High School)
- Discovery Methods in Chemistry and Chemical Engineering, workshop designed for K-12 educators illustrating simple experiments to demonstrate important concepts in Chemistry and Chemical Engineering (2001), co-instructor with J. Fermann (UMass Amherst Department of Chemistry)
- Smith Summer Science and Engineering Program (high school girls), instructor (2001)
- Interview for “Every Woman” series on local NBC affiliate (WWLP, TV 22); goal was to increase public awareness of the extraordinary role of women in the community and to encourage young girls to pursue their dreams (1999)

PROFESSIONAL DEVELOPMENT WORKSHOPS ATTENDED

- COACH (Committee on the Advancement of Women Chemists) Workshop on “Coaching Strong Women in the Art of Strategic Persuasion,” AIChE Annual Meeting, Reno (2001)
- NSF Engineering Education Scholars Workshop, Carnegie Mellon University, Pittsburgh (1997)