

Shelly R. Peyton, PhD

University of Massachusetts, Amherst

Chemical Engineering

## Curriculum Vitae

**Shelly R. Peyton, PhD**

University of Massachusetts

Department of Chemical Engineering

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## PROFESSIONAL EXPERIENCE

- 9/21-present      **Professor**, Department of Chemical Engineering, University of Massachusetts Amherst, Amherst, MA 01003
- 7/20-present      **Armstrong Development Professor**, University of Massachusetts Amherst
- 9/16-present      **Graduate Program Director**, Department of Chemical Engineering, University of Massachusetts Amherst
- 1/11-present      **Graduate Program Faculty**, Molecular and Cell Biology Graduate Program, University of Massachusetts Amherst
- 1/20-present      **Adjunct Faculty Member**, Department of Biomedical Engineering, University of Massachusetts Amherst
- 6/16-present      **Co-Director**, Models to Medicine, Institute for Applied Life Sciences, University of Massachusetts Amherst
- 9/16-present      **Co-PI**, Biotechnology Training Program (NIH T32), University of Massachusetts Amherst
- 3/19-present      **Co-PI**, PREP Program (NIH R25), University of Massachusetts Amherst
- 9/16-8/21          **Associate Professor**, Department of Chemical Engineering, University of Massachusetts Amherst
- 1/11-9/16          **Assistant Professor**, Department of Chemical Engineering, University of Massachusetts Amherst

## EDUCATION AND TRAINING

- Post-doc 2007-10    Massachusetts Institute of Technology, Biological Engineering, Advisors Drs. Douglas Lauffenburger and Linda Griffith
- Ph.D., 2007          University of California, Irvine, Chemical and Biochemical Engineering, Advisor Dr. Andrew Putnam
- M.S., 2004          University of California, Irvine, Chemical and Biochemical Engineering
- B.S., 2002          Northwestern University, Chemical Engineering

## HONORS AND AWARDS

Conti Fellow (2022-23)

BMES Fellow (2021)

Armstrong Professorship (2020)

AIMBE fellow (2020)

Kavli Fellow (2019)

Mellichamp Lecturer, Purdue University Chemical Engineering (2018)

Shelly R. Peyton, PhD

University of Massachusetts, Amherst

Chemical Engineering

UMass College of Engineering Outstanding Teaching Award (2018)

Cellular and Molecular Bioengineering Young Innovator Award (2015)

National Science Foundation CAREER Award (2015-20)

UMass Award for Outstanding Accomplishments in Research and Creative Activity (2014)

UMass College of Engineering Barbara and Joseph Goldstein Outstanding Junior Faculty Award (2014)

National Institutes of Health New Innovator Award (2013-18)

Pew Biomedical Scholar (2013-17)

Barry and Afsaneh Siadat Career Development Fellow (2012-17)

Society for Physical Regulation of Cell Biology Rising Star Award (2012)

National Institutes of Health/Ruth L. Kirchstein (NIGMS) Postdoctoral Fellow (2008-10)

Graduate Assistantship in Areas of National Need (GAANN) Fellow (2006-2007)

National Achievement Rewards for College Scientists (ARCS) Foundation, Inc. Fellow (2004-06)

Biomedical Engineering Society Outstanding Graduate Student Research Award (2005)

### **PROFESSIONAL MEMBERSHIPS (current only)**

NIH BTSS Study Section (Standing member) 2017-2021

AIChE 2004-present

BMES 2004-present

AACR 2012-present

Biotech Training Grant Program, Co-PI, UMass-Amherst 2015-present

Chemistry-Biology Interface Training Grant Program, UMass-Amherst 2011-present

### **PEER-REVIEWED PUBLICATIONS**

**\*corresponding author**

1. Dougan, C.E., Song, Z., Fu, H., Crosby, A.J., Cai, S., Peyton, S.R.\* (in revision) "Cavitation induced fracture of intact brain tissue", *Biophysical Journal* DOI: 10.1101/2022.03.15.484522
2. Pritchard, J.R., Lee, M.J., and Peyton, S.R.\* (2022) "Materials-driven approaches to understand extrinsic drug resistance in cancer", *Soft Matter* DOI:10.1039/D2SM00071G
3. Jansen, L.E., McCarthy, T., Lee, M., and Peyton, S.R.\*, (2022) "A poly(ethylene glycol) three-dimensional bone marrow hydrogel", *Biomaterials* doi: <https://doi.org/10.1016/j.biomaterials.2021.121270>
4. Schwartz, A.D., Adusei, A., Tsegaye, S., Moskaluk, C.A., Schnedier, S.S., Platt, M.O., Seifu, D., Peyton, S.R.\*, and Babbitt, C.C.\*, (2021) "Genetic Mutations Associated with Hormone-Positive Breast Cancer in a Small Cohort of Ethiopian Women," *Annals of Biomedical Engineering* <https://doi.org/10.1007/s10439-021-02800-4>.
5. Mijailovic, A.S., Galarza, S., Raayai-Ardakani, S., Birch, N.P., Schiffman, J.D., Crosby, A.J., Cohen, T., Peyton, S.R.\*, and Van Vliet, K.J.\*, (2021) "Localized characterization of brain tissue mechanical properties by needle induced cavitation rheology and volume controlled cavity expansion," *Journal of the Mechanical Behavior of Biomedical Materials* doi: 10.1016/j.jmbbm.2020.104168

6. King, M.R., Peyton, S.R., and Simon, S.I., "The 2020 Young Innovators of Cellular and Molecular Bioengineering," (2020) *Cellular and Molecular Bioengineering* <https://doi.org/10.1007/s12195-020-00659-4>
7. Tiwari, S., Kazemi-Moridani, A., Zheng, Y., Barney, C.W., McLeod, K., Dougan, C.E., Crosby, A.J., Tew, G.N., Peyton, S.R., Cai, S., and Lee, J-H.\* (2020) "Seeded laser-induced cavitation for studying high-strain-rate irreversible deformation of soft materials," *Soft Matter* doi: 10.1039/D0SM00710B
8. Hasnain, Z., Fraser, A.K., Georgess, D., Choi, A., Macklin, P., Bader, J.S., Peyton, S.R., Ewald, A., and Newton, P.K.\*, (2020), "OrgDyn: feature- and model-based characterization of spatial and temporal organoid dynamics" *Bioinformatics* doi: 10.1093/bioinformatics/btaa096
9. Barney, C.W., Dougan, C.E., McLeod, K.R., Kazemi-Moridani, A., Zheng, Y., Ye, Z., Tiwari, S., Sacligi, I., Riggelman, R.A., Cai, S., Lee, J-H., Peyton, S.R., Tew, G., and Crosby, A.J.\* (2020), "Cavitation in soft matter" *PNAS* doi: 10.1073/pnas.1920168117
10. Bittner, K.R., Jimenez, J.M., and Peyton, S.R.\*, (2020) "Vascularized biomaterials to study cancer metastasis" *Advanced Healthcare Materials*. doi: 10.1002/adhm.201901459
11. Barney, L.E., Hall, C.L., Schwartz, A.D., Parks, A.N., Sparages, C., Galarza, S., Platt, M.O., Mercurio, A.M., and Peyton, S.R.\* (2020) "Tumor cell-organized fibronectin is required to maintain a dormant breast cancer population", *Science Advances* doi: <https://doi.org/10.1101/686527>
12. Galarza, S., Crosby, A.J., Pak, C.H., and Peyton, S.R.\*, (2020) "Control of Astrocyte Quiescence and Activation in a Synthetic Brain Hydrogel" *Advanced Healthcare Materials*. DOI: 10.1101/785683
13. Angelou, C.C., Wells, A.C., Vijayaraghavan, J., Dougan, C.E., Lawlor, R., Iverson, E., Lazarevic, V., Kimura, M.Y., Peyton, S.R., Minter, L.M., Osborne, B.A., Pobezinskaya, E.L., Pobezinsky, L.A.\* (2020) "Differentiation of Pathogenic Th17 Cells is Negatively Regulated by Let-7 MicroRNAs in a Mouse Model of Multiple Sclerosis", *Frontiers in Immunology* doi: 10.3389/fimmu.2019.03125.
14. Lele, T.P., Brock, A., and Peyton, S.R. (2020) "Emerging concepts and tools in cell mechanomemory", *Annals of Biomedical Engineering* doi: 10.1007/s10439-019-02412-z
15. Galarza, S., Kim, H., Atay, N., Peyton, S.R.\*, and Munson, J.M.\*, (2019) "2D or 3D? How *in vitro* cell motility is conserved across dimensions, and predicts *in vivo* invasion", *Bioengineering & Translational Medicine* doi: 10.1002/btm2.10148
16. Brooks, E.A., Galarza, S., Gencoglu, M.F., Cornelison, R.C., Munson, J.M.\*, Peyton, S.R.\*, (2019) "Applicability of drug response metrics for cancer studies using biomaterials", *Philosophical Transactions of the Royal Society B* doi: <https://doi.org/10.1098/rstb.2018.0226>
17. Brooks, E.A., Gencoglu, M.F., Corbett, D.C., Stevens, K.R., Peyton, S.R.\*, (2019) "An omentum-inspired 3D PEG hydrogel for identifying ECM drivers of drug resistant ovarian cancer", *APL Bioengineering* doi: 10.1063/1.5091713
18. Zhu, P., Tseng, N.-H., Xie, T., Li, N., Fitts-Sprague, I., Peyton, S.R., Sun, Y., (2019) "Biomechanical microenvironment regulates fusogenicity of breast cancer cells", *ACS*

*Biomaterials Science and Engineering*, doi: 10.1021/acsbiomaterials.8b00861

19. Carpenter, R.A., Kwak, J-G., Peyton, S.R., Lee, J.\*, (2018) "Implantable pre-metastatic niches for the study of microenvironmental regulation of disseminated human tumour cells" *Nature Biomedical Engineering* doi: 10.1038/s41551-018-0307-x
20. Polio, S., Kundu, A., Dougan, C., Birch, N., Aurien-Blajeni, D.E., Schiffman, J., Crosby, A., and Peyton, S.R.\*, (2018) "Cross-platform mechanical characterization of lung tissue" *PLOSOne* DOI: 10.1371/journal.pone.0204765
21. Landry, B.D., Leete, T., Richards, R., Cruz-Gordillo, P., Schwartz, H.R., Honeywell, M.E., Ren, G., Schwartz, A.D., Peyton, S.R., Lee, M.J.\*, (2018) Tumor-stroma interactions differentially alter drug sensitivity based on the origin of stromal cells, *Molecular Systems Biology* doi: 10.15252/msb.20188322
22. Jansen, L.E., Amer, L.D., Chen, E.Y-T., Nguyen, T.V., Saleh, L., Emrick, T.S., Liu, W.F., Bryant, S.J., Peyton, S.R.\*, (2018) "Zwitterionic PEG-PC hydrogels modulate the foreign body response in a modulus-dependent manner" *Biomacromolecules* DOI: 10.1021/acs.biomac.8b00444
23. Luzhansky, I.D., Schwartz, A.D., MacMunn, J.P., Cohen, J.D., Barney, L.E., Jansen, L.E., and Peyton, S.R.\*, (2018) "Anomalous diffusion as a descriptive model of cell migration" *APL Bioengineering* doi: 10.1063/1.5019196
24. Schwartz, A.D., Hall, C.L., Barney, L.E., Babbitt, C.C., and Peyton, S.R.\*, (2018) "Mechanosensing of Integrin  $\alpha 6$  and EGFR Converges at Calpain 2" *Biomaterials* doi: 10.1016/j.biomaterials.2018.05.056.
25. Lee, J.V., Berry, C.T., Kim, K., Sen, P., Kim, T., Carrer, A., Trefely, S., Zhao, S., Fernandez, S., Barney, L.E., Schwartz, A.D., Peyton, S.R., Snyder, N.W., Berger, S.L., Freedman, B.D., and Wellen, K.\*, (2018) "Acetyl-CoA promotes glioblastoma cell adhesion and migration through  $\text{Ca}^{2+}$ -NFAT signaling", *Genes and Development*, doi: 10.1101/gad.311027.117
26. Jansen, L.E., Negron-Pineiro, L., Galarza, S., Peyton, S.R.\* (2018) "Control of Thiol-Maleimide Reaction Kinetics in PEG Hydrogel Networks" *Acta Biomaterialia* doi: <https://doi.org/10.1016/j.actbio.2018.01.043>
27. Brooks, E.A., Jansen, L.E., Gencoglu, M.F., Yurkevich, A.M., and Peyton, S.R.\* (2018) "Complementary, semiautomated methods for creating multidimensional PEG-based biomaterials" *ACS Biomaterials Science and Engineering*, doi: 10.1021/acsbiomaterials.7b00737.
28. Gencoglu, M.F., Barney, L.E., Hall, C.L., Brooks, E.A., Schwartz, A.D., Corbett, D.C., Stevens, K.R., and Peyton, S.R.\* (2018) "Comparative Study of Multicellular Tumor Spheroid Formation Methods and Implications for Drug Screening" *ACS Biomaterials Science and Engineering*, DOI: 10.1021/acsbiomaterials.7b00069
29. Tran, Y.H., Rasmuson, M.J., Emrick, T.S., Klier, J.\*, and Peyton, S.R.\* (2017) "Strain-stiffening gels based on latent crosslinking" *Soft Matter* DOI: 10.1039/C7SM01888F
30. Schwartz, A.D., Barney, L.E., Jansen, L.E., Nguyen, T.V., Hall, C.L., Meyer, A.S., and Peyton, S.R.\* (2017) "A Biomaterial Screening Approach to Reveal Microenvironmental

- Mechanisms of Drug Resistance" *Integrative Biology*. doi: 10.1039/C7IB00128B
31. Galarza, S., Perry, S.L., and Peyton, S.R.\* (2017) "A Student-Created, Open Access, Living Textbook" *Chemical Engineering Education* (51) 1.
  32. Wilder, C.L., Walton, C., Watson, V., Stewart, F.A.A., Johnson, J., Peyton, S.R., Payne., C.K., Odero-Marah, V., Platt, M.O.\* (2016) "Differential cathepsin responses to inhibitor-induced feedback: E-64 and cystatin C elevate active cathepsin S and suppress active cathepsin L in breast cancer cells" *The International Journal of Biochemistry & Cell Biology*. DOI: 10.1016/j.biocel.2016.08.030
  33. Yoshii, T., Geng, Y., Peyton, S.R.\*, Mercurio, A.M.\*, Rotello, V.M.\* (2016), "Biochemical and biomechanical drivers of cancer cell metastasis, drug response and nanomedicine" *Drug Discovery Today*. DOI: 10.1016/j.drudis.2016.05.011.
  34. Barney, L.E., Jansen, L.E., Galarza, S., Polio, S.R., Lynch, M.E., and Peyton, S.R.\* (2016), "The predictive link between matrix and metastasis" *Current Opinion in Chemical Engineering*. PMID: 26942108
  35. Jansen, L.E., Birch, N.P., Schiffman, J.D., Crosby, A.J., and Peyton, S.R.\* (2015) "Mechanics of intact bone marrow" *Journal of the Mechanical Behavior of Biomedical Materials*, 50:299-307, DOI:10.1016/j.jmbbm.2015.06.023.
  36. Kolewe, K.W., Peyton, S.R., and Schiffman, J.D.\* (2015) "Fewer bacteria adhere to softer hydrogels" *ACS Applied Materials and Interfaces*. 9;7(35):19562-9. DOI: 10.1021/acsami.5b04269.
  37. Herrick, W.G., Rattan, S., Nguyen, T.V., Grunwald, M.S., Barney, C.W., Crosby, A.J., and Peyton, S.R.\* (2015) "Smooth muscle stiffness sensitivity is driven by soluble and insoluble ECM chemistry" *Cellular and Molecular Bioengineering*, DOI: 10.1007/s12195-015-0397-4.
  38. Birch, N.P., Barney, L.E., Pandres, E., Peyton, S.R., and Schiffman, J.D.\* (2015) "Thermal-responsive behavior of a cell compatible chitosan:pectin hydrogel" *Biomacromolecules*, 16(6):1837-1843, DOI: 10.1021/acs.biomac.5b00425.
  39. Barney, L.E., Dandley, E.C., Jansen, L.E., Reich, N.G., Mercurio, A.M., and Peyton, S.R.\* (2015) "A cell-ECM screening method to predict breast cancer metastasis" *Integrative Biology*, 7:198-212, DOI: 10.1039/C4IB00218K.
  40. Nguyen, T.V., Sleiman, M., Moriarty, T. Herrick, W.G, and Peyton, S.R.\* (2014) "Sorafenib resistance and JNK signaling in carcinoma during extracellular matrix stiffening" *Biomaterials*, 35(22):5749-5759, DOI: 10.1016/j.biomaterials.2014.03.058.
  41. Page, S.M., Parelkar, S., Gerasimenko, A., Shin, D.Y., Peyton, S.R., and Emrick, T.S.\* (2014) "Promoting cell adhesion on slippery phosphorylcholine hydrogel surfaces" *Journal of Materials Chemistry B*, 2(6):620-624, DOI: 10.1039/C3TB21493A.
  42. Minsky, B., Nguyen, T.V., Peyton, S.R., Kaltashov, I., and Dubin, P.\* (2013) "A heparin decamer bridges a growth factor and an oligolysine by different charge-driven interactions" *Biomacromolecules*, 14(11):4091-98, DOI: 10.1021/bm401227p.
  43. Herrick, W.G, Nguyen, T.V., Sleiman, M., McRae, S., Emrick, T.S. and Peyton, S.R.\* (2013) "PEG-Phosphorylcholine hydrogels as tunable and versatile platforms for mechanobiology" *Biomacromolecules*, 14(7):2294-2304, DOI: 10.1021/bm400418g.

44. Kim, H-D. and Peyton, S.R. (2012) "Bio-inspired materials for parsing matrix physicochemical control of cell migration" *Integrative Biology*, Jan;4(1):37-52, DOI: 10.1039/C1IB00069A.

### Before Arrival at UMass

45. Peyton, S.R., Kalcioğlu, Z.I., Cohen, J.D., Runkle, A.P., VanVliet, K.J., Lauffenburger, D.A., and Griffith, L.G.\* (2011) "Marrow-derived stem cell motility in 3D synthetic scaffold is governed by geometry along with adhesivity and stiffness" *Biotechnology and Bioengineering*, May;108(5):1181-93, DOI: 10.1002/bit.23027.
46. Williams, C.M., Mehta, G., Peyton, S.R., Zeiger, A.S., VanVliet, K.J., and Griffith, L.G.\* (2011) "Autocrine-controlled formation and function of tissue-like aggregates by primary hepatocytes in micropatterned hydrogel arrays" *Tissue Engineering Part A*, Apr;17(7-8):1055-68, DOI: 10.1089/ten.tea.2010.0398.
47. Kim, P.D., Peyton, S.R., VanStrien, A.J., and Putnam, A.J.\* (2009) "The influence of ascorbic acid, TGF- $\beta$ 1, and cell-mediated remodeling on the bulk mechanical properties of 3-D PEG-fibrinogen constructs" *Biomaterials*, Aug;30(23-24):3854-64, DOI: 10.1016/j.biomaterials.2009.04.013.
48. Khatiwala C.B., Kim, P.D., Peyton, S.R., and Putnam, A.J.\* (2009) "ECM compliance regulates osteogenesis by influencing MAPK signaling downstream of RhoA and ROCK" *Journal of Bone and Mineral Research*, May;24(5):886-98, DOI: 10.1359/jbmr.081240.
49. Peyton, S.R., Kim, P.D., Ghajar, C.M., Seliktar, D., and Putnam, A.J.\* (2008) "The effects of matrix stiffness and RhoA on the phenotypic plasticity of smooth muscle cells in a 3-D biosynthetic hydrogel system" *Biomaterials*, Jun;29(17):2597-607, DOI: 10.1016/j.biomaterials.2008.02.005.
50. Khatiwala C.B., Peyton, S.R., and Putnam, A.J.\* (2007) "The regulation of osteogenesis by ECM rigidity in MC3T3-E1 cells requires MAPK activation," *Journal of Cellular Physiology*, 211: 661-672, DOI: 10.1002/jcp.20974.
51. Peyton, S.R., Ghajar, C.M., Khatiwala C.B., and Putnam, A.J.\* (2007) "The emergence of ECM mechanics and cytoskeletal tension as important regulators of cell function" *Cell Biochemistry and Biophysics*, Apr;47(2):300-320, DOI: 10.1007/s12013-007-0004-y.
52. Ghajar, C.M., Suresh, V., Peyton, S.R., Raub, C.B., Meyskens Jr., F.L., George, S.C., and Putnam, A.J.\* (2007) "A novel 3-D model to quantify metastatic melanoma invasion" *Molecular Cancer Therapeutics*, Feb;6(2):552-561, DOI: 10.1158/1535-7163.MCT-06-0593.
53. Peyton, S.R., Raub, C.B., Keschrumrus, V.P., and Putnam, A.J.\* (2006) "The use of poly(ethylene glycol) hydrogels to investigate the impact of ECM chemistry and mechanics on smooth muscle cells" *Biomaterials*, Oct;27(28):4881-93, DOI: 10.1016/j.biomaterials.2006.05.012.
54. Khatiwala C.B., Peyton, S.R., and Putnam, A.J.\* (2006) "The effects of the intrinsic mechanical properties of the extracellular matrix on the behavior of pre-osteoblastic MC3T3-E1 cells" *AJP-Cell Physiology*, 290(6):C1640-50, DOI: 10.1152/ajpcell.00455.2005.

55. Peyton, S.R. and Putnam, A.J.\* (2005) "Extracellular matrix rigidity governs smooth muscle cell motility in a biphasic fashion" *Journal of Cellular Physiology*, 204(1):198-209, DOI: 10.1002/jcp.20274.

## BOOKS AND CHAPTERS

1. Kim, H., Huber, R., Das Mahapatra, R., Tseng, N-H., and Peyton, S.R., (2021) Tumor dormancy and relapse regulated by the extracellular matrix. Included in Book: Cancer metastasis through the lymphovascular system. Springer.
2. Peyton, S.R., Gencoglu, M.F., Galarza, S., and Schwartz, A.D. (2018) Biomaterials in Mechano-oncology: Means to tune materials to study cancer. Included in Book: Biomechanics in Oncology, 253-287. Springer.
3. Oyen, M.L., Peyton, S.R., and Stein, G.E. (2012). Book editors. Biomimetic, Bio-inspired and Self-Assembled Materials for Engineered Surfaces and Applications. MRS Symposium Proceedings, Volume 1498, MRS Fall Meeting. Cambridge Press.

## PATENTS

1. Crosslinkable polymer composition; Peyton, Klier, Tran, and Emrick. Patent number 10968369. Filed July 26<sup>th</sup>, 2018, awarded April 6<sup>th</sup>, 2021.
2. 3D synthetic tissue hydrogels; UMA 17-008/Lauren Jansen/UMass Amherst - SLW: 3724.031US1 U.S. Patent Application Serial No.: 15/895,710, filed February 13, 2018
3. Polymer composition and pressure sensitive adhesive; US62537130/Yen Tran/UMass Amherst filed July 2017

## SEMINARS AND INVITED OR KEYNOTE CONFERENCE PRESENTATIONS

### *Seminars and Invited Talks*

1. Tissue-inspired synthetic biomaterials. **April 2022**. University of Washington Department of Biengineering.
2. Tissue-inspired synthetic biomaterials. **March 2022**. Northwestern University Department of Chemical Engineering.
3. Tissue-inspired synthetic biomaterials. **December 2021**. Cornell Department of Biomedical Engineering Seminar Series.
4. Tissue-inspired synthetic biomaterials. **December 2021**. University of Pennsylvania Department of Bioengineering Seminar Series.
5. Tissue-inspired synthetic biomaterials. **November 2021**. LSU Department of Chemical Engineering Seminar Series.
6. Tissue-inspired synthetic biomaterials. **June 2021**. EPFL Seminar Series.
7. Tissue-inspired synthetic biomaterials. **February 2021**. Vanderbilt Department of Chemical and Biomolecular Engineering Seminar Series.

8. Novel hydrogels and their applications in cancer. **December 2019**. Smith College Seminar Series.
9. Novel hydrogels. **November 2019**. University of Cincinnati Chemistry Seminar Series.
10. Identifying solutions efficiently using high-throughput technologies. **October 2019**. SelectBio *Invited Talk*. Washington, DC.
11. Tissue-inspired environments to study breast cancer drug responses and dormancy. **October 2019**. Pennsylvania State University Department of Bioengineering Seminar Series.
12. Tissue-inspired environments to study breast cancer drug responses and dormancy. **September 2019**. Duke Bioengineering Seminar Series.
13. Tissue-inspired environments to study breast cancer drug responses and dormancy. **September 2019**. UCLA Bioengineering Seminar Series.
14. Hydrogel environments for drug screening applications, and tissue-specific designs. **June 2019**. SelectBio *Invited Talk*. Rotterdam, NL.
15. In vitro gels to study breast cancer dormancy and drug resistance. **March 2019**. AACR *Invited Talk*. Models of Tumor Dormancy session, Atlanta, GA.
16. Tissue specific hydrogel design. **November 2018**. UC Berkeley Bioengineering Seminar Series.
17. Biomaterials design to understand breast cancer metastasis and drug resistance. **October 2018**. Virginia Tech University BEAM Seminar Series.
18. Tissue guided hydrogel design. **October 2018**. Purdue University School of Chemical Engineering *Mellichamp Lecture*.
19. Biomaterials design to understand breast cancer metastasis and drug resistance. **September 2018**. University of Pittsburgh School of Pharmacy Seminar Series.
20. Hydrogel environments and applications in breast cancer drug response and metastasis. **June 2018**. *Invited Speaker*. Forces in cancer: interdisciplinary approaches in tumor mechanobiology. The Royal Society, London, UK.
21. A biomaterial screening approach to reveal microenvironmental mechanisms of drug resistance. **June 2018**. *Invited Speaker*. Nanotechnology in Medicine II, Albufeira Portugal.
22. A.D. Schwartz\*, L.E. Barney, L.E. Jansen, T.V. Nguyen, C.L. Hall, A.S. Meyer, and S.R. Peyton, Multi-dimensional biomaterial screening reveals microenvironmental mechanisms of drug resistance. **June 2018**. *Invited Speaker*. World preclinical congress: tumoroids in oncology, Boston, MA.
23. Biomaterial *models*: utility in understanding breast cancer dormancy and drug response. *Invited Speaker*. **May 2018**. Cancer Evolution and Ecology: Theory and Clinical Practice, St. Petersburg, FL
24. Tissue-guided hydrogel environments to understand drug resistance in metastatic breast cancer. **April 2018**. Huntsman Cancer Institute at the University of Utah, Salt Lake City, UT.
25. Tissue-guided hydrogel design. **March 2018**. *Invited Speaker*. The 5<sup>th</sup> international conference on cellular and molecular bioengineering, Singapore.



26. Inclusion of LGBTQ+ in STEM. **March 2018**. Panelist on NSF-funded workshop, Georgia Tech University. Atlanta, GA.
27. Biomaterials Day *Invited Speaker*. **February 2018**. Society for Biomaterials, University of Florida, Gainesville, FL.
28. Tissue guided hydrogel design. **January 2018**. *Invited Speaker*. Cellular and Molecular Bioengineering Conference. Key Largo, FL.
29. Tissue guided hydrogel design. **October 2017**. West Michigan Regional Undergraduate Science Research Conference *Keynote Speaker*. Van Andel Research Institute, Grand Rapids, MI.
30. Tissue guided hydrogel design. **July 2017**. *Invited Speaker*. Gordon Research Conference on Biomaterials and Tissue Engineering. Holderness, NH
31. Synthetic tissue design and applications to pre-clinical drug screening. **June 2017**. US-Australia NCI-sponsored workshop. Arlington, VA.
32. Engineered tumor microenvironments and applications in metastasis and dormancy. **March 2017**. Van Andel Research Institute Seminar Series.
33. Putting cancer cells to sleep with synthetic materials. **January 2017**. Department of Chemical Engineering Seminar, Arizona State University.
34. Dynamics of Fibronectin Assembly and Tumor Cell Latency. **January 2017**. Keystone Conference on Cell Plasticity in the Tumor Microenvironment, Big Sky, MT.
35. Synthetic environments to understand cancer metastasis and drug resistance. **October 2016**. NanoGE CellMatrix Symposia, Berlin, DE.
36. A Soft Materials Approach to Tackle Breast to Bone Metastasis. **April 2016**. Department of Chemical Engineering Seminar, University of Minnesota.
37. Bioengineering Models of Metastasis, Dormancy, and Drug Resistance. **April 2016**. *Invited Talk*, Systems Approaches to Cancer Biology, Woods Hole, MA.
38. Bioengineering Approaches toward Metastasis, Dormancy, and Drug Response. **March 2016**. Department of Biomedical Engineering Seminar, Charlottesville, VA.
39. Bioengineering Approaches toward Metastasis, Dormancy, and Drug Resistance. **February 2016**. *Invited Talk*, Physical Sciences in Oncology Network, NIH.
40. Soft Biomaterials to Study Cell Mechanotransduction. **January 2016**. IMCE conference, Kyushu University. *Invited Talk*.
41. Biomaterials to Understand Cancer Metastasis and Drug Resistance. **November 2015**. Notre Dame University Department of Chemical and Biomolecular Engineering Seminar, South Bend, IN.
42. Biomaterials to Understand Cancer Metastasis and Drug Resistance. **October 2015**. University of Illinois Department of Bioengineering Seminar, Urbana, IL.
43. Biomaterials to Understand Cancer Metastasis and Drug Resistance. **September 2015**. Rice University Department of Bioengineering Seminar, Houston, TX.
44. Biomaterials to Understand Cancer Metastasis and Drug Resistance. **September 2015**. University of Delaware Department of Chemical and Biomolecular Engineering Seminar, Newark, DE.

45. Biomaterials to Understand Cancer Metastasis and Drug Resistance. **April 2015**. Northwestern University Department of Chemical and Biological Engineering Seminar, Evanston, IL.
46. Seeds, soils, stem cells, and cancer. **April 2015**, NEBEC Conference, Keynote Presenter.
47. Biomaterials to Understand Cancer Metastasis and Drug Resistance. **April 2015**. City College of New York Department of Biomedical Engineering Seminar, New York, NY.
48. Engineered Environments to Understand Breast Cancer Spread and Drug Resistance. **November 2014**. Brown University Biomedical Engineering Seminar, Providence, RI.
49. Engineered Environments to Understand Breast Cancer Spread and Drug Resistance. **November 2014**. Northeastern University Biomedical Engineering Seminar, Boston, MA.
50. Seeds, Soils, Stem Cells, and Cancer. **October 2014**. University of Wisconsin, Madison Biomedical Engineering Seminar, Madison, WI.
51. Soft Gels for Rapid Drug Screening. **October 2014**. Boston University Soft Matter Agora Seminar, Boston, MA.
52. Engineered Tissues to Quantify Tumor Spread and Drug Resistance. *Invited Talk*. **July 2014**. World Congress of Biomechanics, Boston, MA.
53. Cell Migration and Cancer Metastasis. *Invited Talk*. **July 2014**. Gordon Research Conference on Signal Transduction in Engineered Extracellular Matrices, Waltham, MA.
54. Seeds, Soils, Stem Cells, and Breast Cancer. **March 2014**. Georgia Tech University Biomedical Engineering Department Seminar, Atlanta, GA.
55. Bioengineered Substrates to Understand and Treat Metastatic Breast Cancer. *Keynote Talk*. NEAGAP Science Days. **February 2014**. University of Puerto Rico, Mayaguez.
56. Engineering Tissues to Understand Breast Cancer Spread and Drug Resistance. **January 2014**. University of Massachusetts Medical School, Molecular Medicine Program Seminar, Worcester, MA.
57. Tropism and Drug Resistance in Engineered Microenvironments. **March 2013**. Breast Cancer Research Symposia, University of Massachusetts Medical School Seminar, Worcester, MA.
58. Tissue Tropism and Metastasis. *Invited Talk*. **July 2012**. Gordon Conference on Signal Transduction in Engineered Matrices.
59. Breast Cancer Metastasis and Tissue Tropism in Engineered Materials. *Rising Star Talk*. **January 2012**. 2nd Conference on Cellular and Molecular Bioengineering, Hosted by BMES-SPRBM, San Juan, PR.
60. Tissue Models to Investigate Cell-Matrix Interactions in Cancer. *Invited Talk*. **November 2011**. Predictive Functional Human Tissue Models Conference, Hosted by the Cambridge HealthTech Institute, Boston, MA.
61. Tissue Models to Investigate Cell-Matrix Interactions in Cancer. **November 2011**. Pioneer Valley Life Sciences Institute Seminar, Springfield, MA.
62. Geometric Control of 3D Stem Cell Motility. **May 2011**: Young Investigators in Materials Research, Hosted by the NSF MRSEC at the University of Massachusetts, Amherst.

**RESEARCH SUPPORT**

\*For simplicity, all funding below is "Total funding" (direct + indirect cost, when applicable)

1. WellcomeLeap, R3-2021-3327974764, A flow transcription device for high purity / low cost mRNA manufacturing. PI: Martin (Co-PIs Perry and Peyton). \$1,613,557. 1/1/22-12/31/24.
2. National Institutes of Health, 1U01CA265709-01, Personalization and Failure Testing of Dual Switch Gene Drives in Lung Cancer. PI: Pritchard (Co-PIs Peyton and Lee). \$2,312,095. 9/10/21-8/31/26.
3. National Science Foundation, REU Site: MURALS (Materials-focused Undergraduate Research Applied to the Life Sciences) at UMass Amherst. DMR-2150075. PI: Peyton. \$391,761. 4/1/22-3/31/25.
4. National Science Foundation, Cryptic Hydrogels. PI: Peyton. \$594,117. 7/1/19-6/30/23.
5. Army Research Offices Contract, W911NF1910388 Force-Activated, Mechanically Adaptive Soft Materials: Harnessing Cryptic Bonds in Synthetic Systems. PI Peyton (Co-PIs Klier, Emrick, and Balazs (UPitt)). \$657,303 (\$151,251 to Peyton lab). 7/26/19-7/25/22.
6. National Institutes of Health PREP (R25). Multi-PIs Peterson, Thompson, and Peyton. \$2,130,564 (\$0 to Peyton lab). 3/1/2019-2/29/2024.
7. National Institutes of Health, T32 Training Grant. Multi-PIs Osborne, Hardy, and Peyton. \$704,224 (\$0 to Peyton lab). 7/1/2020-6/30/2025.
8. Jayne Koskinas Ted Giovanis Foundation for Health and Policy, Foundation Grant: Eradicating metastatic breast cancer cells by overcoming their tissue-specific drug responses. PI: Peyton. \$438,000 (\$172,147 to Peyton lab). 9/1/20-8/31/23.
9. Armstrong Professorship (UMass Alumni). Peyton. Approximately \$300,000 total to Peyton lab. 7/1/20-6/30/23.

***Completed Research Funding***

10. National Science Foundation, CAREER: Mechanisms of Drug Resistance in a Responsive Biomaterial Platform. PI: Peyton. \$500,160. 7/1/15-6/30/20.
11. Office of Naval Research, Multi-PIs Crosby, Lee, Peyton, Tew, Cai, and Riggelman. \$2,650,000 (\$441,667 to Peyton lab). 1/2/2017-1/1/2021.
12. Manning Award, UMass. PI: Peyton. \$100,000. 1/1/20-12/31/20
13. National Institutes of Health, R21 Award. PI: Peyton. \$322,118. 7/1/18-6/30/20.
14. AMIGOS grant, co-funded by the JKTG foundation and BCRF. Multi-PIs Heiser, Meyer, Peyton, Nie, and Levy). \$450,000 (\$90,000 to Peyton lab). 1/2/2017-1/1/2020.
15. AMIGOS grant, co-funded by the JKTG foundation and BCRF. Multi-PIs Ewald, Newton, Macklin, Peyton, and Bader). \$450,000 (\$15,000 to Peyton lab). 1/2/2017-1/1/2020.
16. National Institutes of Health, R21 Award. Multi-PIs Hayward and Peyton. \$438,626 (\$219,313 to Peyton lab). 9/1/16-8/31/18.
17. National Institutes of Health, New Innovator Award. *Tissue-specific stem cells and breast cancer tissue tropism*. PI: Peyton. \$2,385,000. 9/30/13-6/30/18.
18. National Institutes of Health, Diversity Supplement for New Innovator Award. Awarded to support Sualyneth Galarza in Peyton lab. PI: Peyton. \$230,286. 7/1/15-6/30/18.

19. Barry and Afsaneh Siadat, Early Career Award (Private Donors). PI: Peyton. \$150,000. 2012-17.
20. Pew Charitable Trusts, Research Scholar Award. *Tissue-specific stem cells and breast cancer tissue tropism in bioengineered microenvironments*. PI: Peyton. \$240,000. 8/1/13-7/31/18.
21. UMass President's Office Science and Technology Initiatives Fund. Integrating Physical Sciences and Oncology. PI: Rotello and Mercurio. \$134,000. (\$23,000 to Peyton lab). 7/1/15-6/30/17.
22. Armstrong Fund for Science, University of Massachusetts, Amherst. *Nanomechanics, Biofilms, and Cystic Fibrosis*. PI: Schiffman. \$30,000. (\$0 to Peyton lab). 8/1/14-7/31/16.
23. National Science Foundation REU Supplement (BMAT). PI: Peyton. \$9,000. 6/1/14-9/1/14.
24. National Science Foundation REU Supplement (BMAT). PI: Peyton. \$4,000. 6/1/15-9/1/15.
25. National Science Foundation Conference funding (BMAT for MRS Fall 2013 Meeting). PI: Peyton (sponsored by MRS). \$4,000. November 2013.
26. American Heart Association, Grant-in-Aid. *Smooth Muscle Stiffness Sensing in Atherosclerosis*. PI: Peyton. \$198,000. 7/1/13-6/30/16.
27. National Science Foundation and National Cancer Institute, PESO Special Call: Materials and Multivariable Models to Predict Tissue Tropism in Metastasis. Co-Funded from NCI and NSF (BMAT, CBET, and CMMI). PI: Peyton. \$590,000. (Co-PI: Reich, \$554,955 to Peyton lab). 9/1/12-8/31/15.
28. National Science Foundation, MRSEC Seed Award. PI: Peyton. \$65,000 in funding for Peyton Laboratory. 2012-14.
29. National Science Foundation, MRSEC on Polymers. PI: Emrick. Funding for Peyton Laboratory 2011: \$15,000; 2015: \$40,000.

***Graduate student fellowships and awards while in Peyton lab.***

These funding dollars are excluded from the figure generated by Peyton above.

Akaansha Rampal: UMass BTP NIH-funded Trainee 2021-23.

Rebecca Huber: NSF GRFP 2020-23, NSF GRFP mentorship travel grant (2021).

Adrian Lorenzana: UMass Chemistry-Biology Interface NIH-Funded Trainee (T32 GM008515)2020-2022, Spaulding-Smith Fellowship (2020), NOBCCChE First place poster award in materials science category (2020), SACNAS Registration/Travel Scholarship (2021), CoE Teaching Fellow (2021).

Carey Dougan: UMass Chemistry-Biology Interface NIH-Funded Trainee (T32 GM008515) 2019-2021, Spaulding-Smith fellow 2018-2023, SACNAS travel scholarship (2021), UMass Graduate School travel grant (2020 and 2021), CBI travel grant (2020), SWE Collegiate Leadership Institute award (2020), College of Engineering Teaching Fellow (2021), UMass 3MT finalist (2020)

Hyuna Kim: UMass BTP NIH-funded Trainee 2018-20, IDGP Travel award (2019 and 2020), BTP travel award (2019), NOBCCChE Advancing Science Conference Grant (2019), UMass Molecular and Cellular Biology Graduate Program Leadership Scholarship (2019).

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Aritra Nath Kundu: UMass BTP NIH-funded Trainee 2017-19, Travel grant for National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (NOBCCChE) Annual Meeting (2018), Travel grant for winning UMass Chemical Engineering Recruitment Weekend poster competition (2019), BTP travel grant (2021 and 2020).

Ning-Hsuan Tseng: UMass BTP NIH-funded Trainee 2016-18.

Elizabeth Brooks: UMass Chemistry-Biology Interface NIH-Funded Trainee (T32 GM008515), 2016-2018

Sualyneth Galarza: GEM4 Summer Program (2015, competitive admittance), GEM4 2015 Poster Award Winner.

Alyssa Schwartz: NSF GRFP 2014-17, UMass Chemistry-Biology Interface Travel Award

Lauren Jansen: Excellence in TA-ing Travel Award, University of Massachusetts Amherst, 2014, NSF GRFP Honorable Mention, 2014, Institute for Cellular Engineering Student Training Grant, UMass Amherst, Fall 2013, Two-time winner of Dissertation Research Grants, UMass Amherst, Spring 2013, Fall 2013, UMass Chemistry-Biology Interface Travel Award

Lauren Barney: UMass Chemical Engineering Best Graduate Student Seminar Award, 2015, BMES CMBE Student/Fellow Award, 2015, BMES Graduate Design and Research Award, 2014, Signal Transduction by Engineered Extracellular Matrices GRC, Poster Award, 2014, Signal Transduction by Engineered Extracellular Matrices GRS, Invited Speaker, 2014, Models to Medicine: Challenges and Opportunities A Symposium Poster Competition Award, 2014, UMass Chemistry-Biology Interface NIH-Funded Trainee (T32 GM008515), 2014-2016, Chemical Engineering Outstanding Graduate Student Research Award (poster competition winner, year 1-3 students), 2013, Institute for Cellular Engineering Student Training Grant, 2013, UMass Department of Chemical Engineering Travel Grant, 2013

Thuy Nguyen: MRSEC Travel Award (2012)

William Herrick: UMass ICE IGERT Traineeship: 2011-13, ICE Training grant (2)

## **COLLABORATORS**

### *Graduate and Postdoctoral Mentors*

Putnam, A.J. University of Michigan, Biomedical Engineering

Lauffenburger, D.A. Massachusetts Institute of Technology, Biological Engineering

Griffith, L.G. Massachusetts Institute of Technology, Biological Engineering

## **TEACHING**

### *Undergraduate Courses Taught*

**ChemEng 290B:** Experimental Methods in Chemical Engineering. Fall 2018-present. I designed course, details in Teaching Statement available upon request.

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**ChemEng 220** (renumbered from ChemEng 290B): Chemical Engineering Principles of Biological Systems. Fall 2011-17. I designed course, details in Teaching Statement available upon request.

**ChemEng 575** (renumbered from ChemEng 590B): Tissue Engineering. Spring 2012-17. I designed course, details in Teaching Statement available upon request.

### *Graduate Courses Taught*

**ChemEng 610** (renumbered from ChemEng 690A): Fundamentals of Intelligent Theses. Spring 2018-present.

I designed course, details in Teaching Statement available upon request.

I have also taught summer modules, workshops, journal clubs, and supervised many teaching assistants. Details available upon request.

### *Current PhD Advisees*

Akaansha Rampal (Molecular and Cell Biology). Co-advised with Richard Vachet. *Mass-spectrometry imaging of networks and tissues*. Expected completion: 2024.

Adrian Lorenzana (Chemical Engineering). Co-advised with John Klier *Mechanosensitive polymers and gels*. Expected completion 2024.

Rebecca Huber (Chemical Engineering). *Astrocyte activation in hydrogels*. Expected completion 2024.

Carey Dougan (Chemical Engineering). *Brain Mechanics and TBI*. Expected completion 2023.

Hyuna Kim (Molecular and Cell Biology). *Mechanisms of breast cancer drug resistance*. Expected completion: 2022.

Aritra Kundu (Chemical Engineering). *Lung Metastasis*. Expected completion: 2022.

Katie Bittner, MD (Molecular and Cell Biology). *Vascularizing Tumor Models*. Expected completion: 2022.

### *Current MS Advisees*

Anna Wirastapura (Chemical Engineering). *Tumor dormancy*. Expected completion: 2023.

Bakthavachalam Kannadasan (Chemical Engineering). *3D Printing of Soft Materials*. Expected completion 2023.

### *Post-doctoral Advisees and other Professional Staff*

Sonu Kizhakkepura, PhD (Post-doc, Chemistry PhD from JNCASR India). *Cryptic Hydrogels*

### *PhD Student Alumni*

Ning-Hsuan Tseng (Molecular and Cell Biology). *Tumor Evolution*. May 2015-May 2022

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Yen Tran (Chemical Engineering). *Cryptic Materials*. November 2013-December 2019.

Inha Baek (Chemical Engineering) *Breast cancer dormancy*. Joined lab in November of 2018, left lab before completion of degree in summer of 2019.

Sualyneth Galarza (Chemical Engineering). *In vitro Models of Breast to Brain Metastasis*. November 2014 – June 2019

Elizabeth Brooks (Chemical Engineering). *Drug resistance in breast cancer*. November 2013-December 2018

Alyssa Schwartz (Chemical Engineering). *Rapid screening systems to predict cancer spread and drug response*. November 2013-September 2018

Lauren Jansen (Chemical Engineering). *Breast cancer metastasis to bone marrow in model systems*. November 2012-August 2017

Lauren Barney (Chemical Engineering). *Engineered microenvironments to study tissue tropism in metastatic breast cancer*. November 2011-September 2016

Thuy Nguyen (Chemical Engineering). *Using high throughput technologies to study drug resistance in carcinoma*. November 2010-December 2015.

William Herrick (Chemical Engineering). *Smooth muscle cell stiffness sensing in atherosclerosis*. November 2010-October 2014.

#### ***Former Post-doctoral Scholars and other Professional Staff***

Christopher Hall, PhD (Research Assistant Professor, Cancer Biology PhD from UT-Houston Health Science Center). *Prostate cancer dormancy*

Sam Polio, PhD (Post-doc, Biomedical Engineering PhD from Boston University). *Breast to Lung Metastasis*. 2014-16.

Maria Gencoglu, PhD (Post-doc, Chemical Engineering PhD from Michigan Tech University). *Biomaterial systems to screen ovarian cancer drug resistance*.

Carey Dougan, BS (Lab Manager/Technician, Chemical Engineering BS from University of Arkansas). *Tissue Mechanics*.

Rita Das Mahapatra PhD (Post-doc, Chemistry PhD from IIT Kharagpur). *Hydrogel start-up company*

#### ***Masters Degrees Completed***

Igor Luzhansky (Chemical Engineering). *Drug resistance and dormancy in bone marrow*. November 2015-September 2016.

Dannielle Ryman (Molecular and Cellular Biology). *Using patterned polymer microlenses to study stiffness sensing in metastatic breast cancer cells*. January 2011-August 2013.

Marcos Manangare (Molecular and Cellular Biology). *Cell-stiffening synthetic hydrogels for cardiovascular applications*. July 2014-July 2015.

Yinghong (Lily) Liu (Chemical Engineering). Co-advised with John Klier. *Ultrasound-activated networks*. 2019-2021.

#### ***Former Post-bach/PREP students***

Lenny Negrón-Piñero (PREP student). *Cancer metastasis and drug resistance*. 2015-16.

Jamiu Giwa-Otusajo (PREP student). *Cathepsin hydrogels*. 2017-18.

Nathan Colon (PREP student). *Mechanical properties of hydrogels*. 2011-12

### ***Former Undergraduate Researchers (worked as research assistants in Peyton lab)***

Undergrads have gone on to PhD programs (NC State, Penn, UCSB, Berkeley) and lucrative industry jobs in the biotech/pharmaceuticals arena. \*denotes peer-reviewed publication while in Peyton lab. # denotes member of honors college.

|                                  |         |                             |           |
|----------------------------------|---------|-----------------------------|-----------|
| Jaelyn Somadelis <sup>#</sup>    | 2011-12 | Cierra Cotton               | 2014      |
| Erinn Dandley*                   | 2011-12 | Shayna Nolan                | 2013-15   |
| Tyler Vlass <sup>#</sup>         | 2011-12 | Thomas McCarthy             | 2014-16   |
| Prateek Katti <sup>#</sup>       | 2011-12 | John MacMunn                | 2014-16   |
| Maxsimillyan Nowack <sup>#</sup> | 2011-13 | Michael Fitman              | 2014-15   |
| Jonathan Chiang                  | 2011-12 | Ari Gilman                  | 2014-16   |
| Venkata Yelleswarapu             | 2011    | Luka Catipovic              | 2015      |
| Elyse Hartnet                    | 2012-13 | Marisa Souza                | 2017      |
| Danielle LaValley                | 2012    | Adam Selsman                | 2015-2018 |
| Chaz Cuckler                     | 2012    | Chris Sparages*             | 2015-2018 |
| Aidan Gilchrist <sup>#</sup>     | 2012-13 | Annali Yurkevich            | 2015-2018 |
| Isaac Han                        | 2012-13 | Dave Podorefsky             | 2015-2018 |
| Matthew Crotty                   | 2012-13 | Matt Rasmuson               | 2015-2018 |
| Patrick Colleton                 | 2012-13 | Jessica Belliveau           | 2015-2018 |
| Peggy Yuen                       | 2013    | Ian Kilcoyne                | 2016-2018 |
| Robert Gunther                   | 2013    | Sarah Duquette <sup>#</sup> | 2016-2019 |
| David Gallagher                  | 2013    | Eric Blanchard              | 2016-2019 |
| Jason Awerman                    | 2014    | Samantha Downs              | 2018-2019 |
| Nicholas Koenig                  | 2014    | Allie Triozzi               | 2018-2019 |
| Timothy Moriarty*                | 2012-13 | Jacob Ong                   | 2017-2020 |
| Marianne Sleiman <sup>**#</sup>  | 2012-15 | Bryan Kennedy               | 2018-2020 |
| Justine Jesse <sup>#</sup>       | 2012-15 | Jenna Elsner                | 2018-2020 |
| Mariusz Rdotokoski <sup>#</sup>  | 2012-15 | Samuel Tipps <sup>#</sup>   | 2019-2021 |
| Michel Grunwald*                 | 2014-15 | Maxwell Hayward             | 2020-2021 |
| Megan Renny                      | 2014    | Sean Corriveau              | 2020-2021 |
| Elizabeth Swanson                | 2014    |                             |           |

### ***Current Undergraduate Researchers***

|                  |       |                  |       |
|------------------|-------|------------------|-------|
| Jennifer Esteves | 2020- | Alexi Panagiotou | 2022- |
| Alara Kilic      | 2020- | Benjamin Pepper  | 2022- |
| Diana Barr       | 2021- | Dimitraq Nikolla | 2022- |
| Gary Ren         | 2021- |                  |       |



***High school students (from NSF "Engineering the Cell" Program)***

As part of my NSF-NCI PESO grant (awarded in 2012), I initiated a 5-week summer program titled "Engineering the Cell: A Bioengineering Experience for Women". This program gives \$2500 to two high school female students, from underrepresented groups, typically underperforming in the classroom, to participate in summer research in the Peyton lab.

Participants: Valerie Gonzalez, Katherine Mora (2013); Maia Haiman, Christina Manson (2014); Kassie Frazier, Alexandria Triozzi (2015); Natalia Lopez, Mary-Catherine Whalen (2016); Jacqueline Seddon, Amayia Lanuesse (2017); Amanda Dee, Danielle Beason (2018)

**SERVICE**

***Grant review***

NIH BTSS Standing Study Section Member, July 2017-present

NCI Special Emphasis Panels (*ad hoc*, several)

NSF (*ad hoc*, several) BBBE, BMAT, and GRFP

American Heart Association, Bioengineering (*ad hoc*, several)

***National Organizations, Conference Organization***

***BMES***

I will be serving as meeting chair for the BMES annual meeting in 2021 with co-chair Manu Platt.

***AIChE***

Of particular note is that I have been elected to lead 15D/E for the AIChE annual meeting in 2016, and I have been elected as 1 of 2 Materials Engineering and Sciences Division (MESD) directors of AIChE for 2015-17 (two year term) and as programming chair for AIChE division 15 (2019-2020).

***GRC***

Chair of the GRC meeting on Signal Transduction in Extracellular Matrices (STEEM) in 2022 (moved to 2024 due to COVID).

***Departmental***

Activities at UMass: My most significant contribution to department service has been serving as Graduate Program Director since 2016. My notable contributions here have been increasing the diversity of our graduate student body, and initiating a new MS thesis degree program for the department (some excellent guidelines provided by Prof. Jeff Davis). I have also served on the DPC (x4), and have either chaired or served on several faculty search committees. UMass-wide, I am co-director of the Models 2 Medicine Center for the Institute of Applied Life Sciences (with Peter Chien and Jeanne Hardy), co-PI on the NIH T32 training grant on Biotechnology (PI Jeanne Hardy), co-PI on the UMass PREP program (co-PIs Sandy Petersen and Lynmarie Thompson),

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and have served on several committees: notably the Engineering Dean search committee 2019, BME Head search committee co-chair 2017, Graduate School Dean search committee 2020, and the Chancellor-Appointed University task force on sexual harassment (2019-20).

Seminar Coordinator. I served as the seminar coordinator for the Chemical Engineering department, from 2012-15. This position includes soliciting names from colleagues, inviting faculty to visit our department, and ensuring proper scheduling of visits.

Undergraduate Academic Advising. In Chemical Engineering at UMass I typically advise 20-25 undergraduates, meeting with them at least twice per year. With a few of them I meet more often, to help them with curriculum planning and discuss their summer REU or internship applications. I have also participated several times in summer student advising for the College of Engineering.

Undergraduate Program Committee Member. I served as a member of the undergraduate program committee, from 2012-14.

Graduate Program Committee Member. I served as a member of the graduate program committee, from 2014-15. This committee met approximately monthly, discussing TA assignments, curriculum requirements, admissions, and the qualifying examination.

Graduate Admissions Director. I was director of graduate admissions for two years, organizing, recruiting, and admitting graduate students for the incoming class. In 2015, this job included the review of 261 applicants, working with other faculty members to help with the review, and recommending 35 students for admittance into the PhD program. This service assignment also includes organizing the graduate recruiting weekend in March.

Member of By-Laws Committee. During the 2012-13 academic year, I was a member of the by-laws committee for the department. Our charge was to draft a set of by-laws for the department concerning personnel actions, hiring, department head review, etc. We met approximately bi-monthly, and drafted several documents together to help legislate faculty voting issues. Other members of the committee were Neil Forbes (chair), Susan Roberts, Mike Henson, Curt Conner, and Paul Dauenhauer.

Chemical Engineering Senior Seminar Speaker. Nearly every year I give an approximately 50 minute lecture/discussion to the seniors on preparation for graduate school applications, the roles and responsibilities of being a PhD student, and career opportunities for PhD level chemical engineers.

“CRIB” Design Committee. I worked with Paul Dauenhauer, T.J. Mountziaris, and Amity Lee in the Chemical Engineering office to remodel a student study space for our chemical engineering undergraduates. This effort essentially doubled the amount of space our undergraduates have to study and work in groups, includes 2-3 person cubbies for small group work, has updated computers and software in all cubbies, and also contains a large group area with conference tables and a projector. It is an immensely popular study area for our students.

*College, University*

Engineering Search Committees. I have served on College of Engineering search committees in Mechanical Engineering and Biomedical Engineering.

IALS Director Search Committee. I served on the search committee to find a director for the IALS, the Institute for Applied Life Sciences in 2014.

MRSEC Internal Advisory Board. Appointed by Todd Emrick, I served as a member of the internal advisory board for the MRSEC. Duties include leading IRG efforts, preparing for MRSEC applications, and offering scientific input on the next directions of the UMass MRSEC.

Pew Biomedical Scholars Internal Review Committee. I have helped the office of research and development at UMass to select the internal nominees for the Pew biomedical scholars program.

Thesis Committee Member. I have served as a committee member for PhD and MS Dissertations and ORPs for several students outside of my own lab:

Dissertations:

Andreas Kourouklis, Chemical Engineering  
Genevieve Abbruzzese, Molecular and Cell Biology  
Jan Panteli, Chemical Engineering  
Ngoc Le, Chemistry  
Yujie Liu, Polymer Science and Engineering  
Catera Wilder, Biomedical Engineering  
Georgia Tech University  
Kris Kolowe, Chemical Engineering  
Ryan Carpenter, Chemical Engineering  
Vishnu Raman, Chemical Engineering  
Jordan Elliott, Chemistry  
Coralie Backlund, Polymer Science and Engineering  
Uma Nudurupati, Chemistry  
Laura Lanier, Polymer Science and Engineering  
Qi Lu, Polymer Science and Engineering  
Sarah Ward, Polymer Science and Engineering  
Ziwen Jiang, Chemistry  
Allison Sirois, Molecular and Cell Biology  
Vishnu Raman, Chemical Engineering

Paige Liu (MS), Chemical Engineering  
Whitney Blocher, Chemical Engineering  
Boyuan Liu, Mechanical Engineering  
Alexandria Wells, Molecular and Cell Biology  
Andrew Shockey, Biomedical Engineering  
Georgia Tech University  
Gerardo Narez, Biomedical Engineering  
Peiran Zhu (MS), Mechanical Engineering  
Natthapong Sueviriyapan, Chemical Engineering  
Joshua Hall, Mechanical Engineering  
Dipika Nandi, Veterinary and Animal Sciences  
Yongkuk Park, Chemical Engineering  
Autumn Mineo, Polymer Science and Engineering  
Sydney Foster (MS), Chemical Engineering  
Nathan Kuhlman, Molecular and Cell Biology  
Yu-Lin (Cynthia) Wang, Polymer Science and Engineering

ORP Committee:

Di Huang, Molecular and Cell Biology  
Emily Tetrault, Molecular and Cell Biology  
Heather Bisbee, Molecular and Cell Biology  
Olivia Macrorie, Molecular and Cell Biology  
Dilay Ayhan, Molecular and Cell Biology  
Karthik Chandiran, Molecular and Cell Biology

*Journal Review Service*

|   |                                    |
|---|------------------------------------|
| ACS Biomaterials Science and Engineering    | Journal of Cell Science            |
| Acta Biomaterialia                          | Journal of Functional Biomaterials |
| APL Bioengineering                          | Journal of Materials Chemistry     |
| BMC Cancer                                  | Journal of Materials Science       |
| Biomacromolecules                           | Journal of Polymer Science A       |
| Biomaterials                                | Journal of Visualized Experiments  |
| Biophysical Journal                         | Langmuir                           |
| Biotechnology and Bioengineering            | Molecular Oncology                 |
| Cell Adhesion and Migration                 | Nature                             |
| Cellular and Molecular Bioengineering       | PLoS One                           |
| Integrative Biology                         | PNAS                               |
| Interface Focus                             | Rheologica Acta                    |
| International Journal of Molecular Sciences | Science Advances                   |
| Journal of Biomaterials Science             | Soft Matter                        |
| Journal of Biomedical Materials Research    | Tissue Engineering                 |

**DIVERSITY, EQUITY, AND INCLUSION**

Increasing diversity in the graduate program:

Our graduate program, as of the summer of 2014, consisted of 55 PhD students, 19 of whom were womxn, with zero students from underrepresented groups. The department has done an excellent job increasing the number of female graduate students, but we have historically struggled with targeted, department-wide efforts to increase the diversity of our graduate program along other axes. My focus as Graduate Program Director in Chemical Engineering has been to engage womxn and students from underrepresented minority (URM) groups into the department. I have helped lead a department-wide effort to increase recruitment and retention of students from URM groups to the department with proactive DEI strategies (detailed below and summarized here: <https://che.umass.edu/che-diversity-equity-inclusion>). The proportion of students from URM groups in our program has continued to grow since I became GPD.

Second, I am co-PI with Jeanne Hardy on the Biotechnology (BTP) NIH T32 program. I am the chair of the DEI committee for this program, and my major efforts here have been to lead the outreach to URM conferences (SACNAS, NoBCChE, and ABRCMS). I have also been attending the weekly IDGP DEI meetings run by Pat Wadsworth as a representative of the IDGP community from the College of Engineering, but also as a representative of both BTP and CBI (the other NIH T32 program run by Lynmarie Thompson).

Third, I am a co-PI on the recently awarded PREP program at UMass, which brings students from URM groups to UMass for a 1-year post-BS study to help prepare them for graduate school.

Fourth, I was recently appointed as chair of the DEI committee for the Chemical Engineering Department. My appointment is in response to the fact that I initiated regular meetings for our department on social justice issues in response to the murders of George Floyd, Breonna Taylor, and countless others by the police in recent years. Our department did have a DEI website, but it consisted of relatively vague statements rather than the specific action items we are taking to address DEI. I called for all faculty members interested to join in DEI discussions, starting on June 24<sup>th</sup>, 2020. We met every Friday from 3-4pm, through August 14<sup>th</sup>, 2020. At that point, we had agreed on our first ten action items that we submitted to the College of Engineering, and these are now published on our department's DEI website alongside recent data related to DEI (similar to Figure 1). I worked with the Interim Department Head (Mike Henson) to name the rest of the official DEI committee, to continue our work. Our most immediate action items were to complete a DEI mission statement (10 action items, listed in detail here: <https://che.umass.edu/che-diversity-equity-inclusion>), with several more to come in the following few months.

#### Conference Leadership:

**SACNAS:** Alongside Drs. Madeleine Bartlett (Biology) and Sibongile Mafu (Biochemistry), I am running a special session at the SACNAS (Society for Advancement of Chicanos/Hispanics and Native Americans in Science) national conference in the fall of 2020 on mentoring (virtual due to COVID-19). We have recruited several post-docs, industry professionals, and young faculty members to speak at our special session panel to talk about mentorship (being a great mentor, finding mentors, and networking) - with a focus on womxn from underrepresented groups in STEM.

**BMES:** At the Biomedical Engineering Society (BMES) national meeting, I have organized and spoken at special sessions on DEI topics over the last two years. These special sessions were on Women's Health and Global Health Approaches and Technologies in 2019 and 2020. In 2021, I will be running the full conference with my co-organizer Manu Platt (Georgia Tech). We are currently working with the BMES board of directors to transition these two DEI-related special session topics to permanent scientific tracks for the meeting.

**LGBTQIA+ Advocacy at National Societies:** I have been an advocate, particularly in the BMES society, for LGBTQIA+ persons and issues for several years. I joined the Diversity Committee in BMES in 2014, and that year, alongside Naomi Chesler (Wisconsin) started the LGBTQIA+ and Friends dessert social at the national meeting. This has been immensely successful, with prominent speakers at the event every year. The BMES Diversity committee did a nice write-up/video of this event earlier this year as part of Pride month, found here: <https://www.youtube.com/watch?v=e6hNaw0-TJA&feature=youtu.be>. I have more recently become involved with LGBTQIA+ events at the Chemical Engineers national society (AIChE), and they recently did a small write-up of me as well: <https://www.aiche.org/chenected/2020/06/shelly-peyton-featured-lgbtq-cheme-professional>.

Increasing diversity of the engineering pipeline:

Starting in the summer of 2013, I used funding from my first NSF grant to form an educational outreach program titled: **“Engineering the Cell: A Bioengineering Experience for Young Womxn.”** This program brings female high school students from URM groups to my lab to do bioengineering research and what is necessary to be a successful bioengineer. Projects are integrated within my lab and include using common techniques to ask questions about how cells respond to physical and chemical stimuli. More importantly, students learn how to use the scientific method, how to plan and run a successful experiment, and work with a diverse group of people.

I provide students with a stipend of \$2500 for their participation in the program that runs five days per week for five weeks. I provide a stipend so that students from areas of economic need will be able to participate, instead of having to find a summer job. Students apply with a short essay and a recommendation from a teacher. I choose students that specifically are not the highest performers in the classroom, but, rather, those whom the teacher feels will most benefit. My goal is to grow their confidence, demonstrating that science, math, and engineering are attainable career goals for such students. Successful implementation, growth, and longevity of this program will be one mechanism by which UMass can encourage more participation of womxn in bioengineering and related fields. This program is guaranteed to continue through at least 2023, as I have earned funding from my NSF CAREER grant and a more recent NSF grant on hydrogels to continue this program. I started partnering with The Collaborative in Northampton, MA to increase the number of students I could fund – bringing the size of the program to six in 2019, which I hope will only continue to grow!