

# SAMANTHA G. ZAMBUTO, Ph.D.

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**Postdoc:** T32 Clinical Outcomes Research Training Program in Female Lower Urinary Tract Disorders  
**Washington University in St. Louis**  
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## EDUCATION

Postdoc Department of Obstetrics and Gynecology & Department of Biomedical Engineering  
**Washington University in St. Louis**, St. Louis, MO  
Mentors: Michelle Oyen, Ph.D. and Jerry Lowder, M.D.

MPHS Master of Population Health Sciences, expected 2024  
**Washington University School of Medicine**, St. Louis, MO

PhD Bioengineering, 2022  
**University of Illinois Urbana-Champaign**, Urbana, IL  
Thesis title: *Biomaterial-based Models of the Endometrium and Trophoblast Invasion to Investigate Early Pregnancy*  
Advisor: Brendan Harley, Sc.D.

ScM Biomedical Engineering, 2017  
**Brown University**, Providence, RI  
Thesis title: *Advancing Tissue Engineered Neural Platforms to Explore Sex Differences in Ischemic Stroke and Traumatic Brain Injury*  
Advisor: Diane Hoffman-Kim, Ph.D.

BS Biological Engineering, 2015  
Minor Fields: Biomedical Engineering, French  
**Cornell University**, Ithaca, NY

## ADDITIONAL CREDENTIALS

2022 Artificial Intelligence in Medicine Certificate

2020 Professional Skills for Careers in Biosciences Certificate

2020 Certificate of Mentorship

## RESEARCH INTERESTS

Tissue engineering, regenerative medicine, & biomaterials science  
Female reproductive health, human pregnancy, & menopause  
Cell-cell interactions, cellular microenvironment, & biomechanics

## PROFESSIONAL EXPERIENCE

8/2022 – Present Postdoctoral Research Scholar, **Washington University in Saint Louis**, St. Louis, MO

- Synthesizing and characterizing advanced biomaterial platforms for tissue engineering applications
- Designing a tissue engineered model of the vagina to study vaginal tearing
- Performing a systematic review and meta-analysis on the effect of antenatal vaginal dilators on birth injury

8/2017 – 8/2022 Graduate Research Assistant, **University of Illinois Urbana-Champaign**, Urbana, IL

- Developed endometrial models using gelatin methacryloyl
- Designed 3D invasion assays to monitor trophoblast invasion in hydrogels
- Optimized microfluidic platforms and biomaterial systems to model neurodegenerative disorders

9/2015 – 5/2017 Graduate Research Assistant, **Brown University**, Providence, RI

- Established 3D cortical spheroid models of ischemic stroke and traumatic brain injury
- Investigated sex differences and neuroprotective effects of sex steroid hormones

- 6/2015 – 8/2015 R&D Engineering Intern, **AngioDynamics**, Marlborough, MA
- Wrote and edited technical documents and reports for drainage catheters and introducers
  - Designed and implemented test methods to test mechanical and material properties of medical devices
- 6/2012 – 5/2015 Undergraduate Research Assistant, **Cornell University**, Ithaca, NY  
Dept. of Biomedical Engineering: Zipfel-Williams Lab
- Cloned and purified fusion protein construct to reduce toxicity of pyrene ruthenium, a phosphorescence-based oxygen sensor
  - Investigated potential of using the cancer drug Irinotecan as contrast agent for tumor detection using microscopy techniques
  - Synthesized fluorescence-enhancing Spinach aptamer

## MAJOR AWARDS

- 2022 NIH Extramural Loan Repayment Program for Contraception and Infertility Research
- 2022 T32 Clinical Outcomes Research Training Program in Female Lower Urinary Tract Disorders (NIH 1T32DK120497-01A1)
- 2020 – 2022 T32 Tissue Microenvironment (TiMe) Training Program Trainee (NIH T32EB019944)

## CONFERENCE AWARDS

- 2023 NIH New Investigator Travel Award for 2023 International Federation of Placenta Associations (IFPA) Meeting
- 2022 STAR (Student Travel Achievement Recognition) Award Society for Biomaterials (SFB) Annual Meeting
- 2022 Graduate College Conference Travel Award
- 2021 2022 Graduate Student Travel Award BMES-Cell and Molecular Bioengineering (CMBE) Conference
- 2021 STAR (Student Travel Achievement Recognition) Award Society for Biomaterials (SFB) Annual Meeting
- 2019 2019 Constance Campbell Research Award–Oral Presentation
- 2019 Graduate College Conference Travel Award
- 2019 Biomedical Engineering Society (BMES) Career Development Award

## HONORS

- 2021 Campus Nominee (University of Illinois) Regeneron Prize for Creative Innovation
- 2021 HumaScholar Grant Recipient
- 2019 Best Oral Presentation, BIOE Graduate Research Symposium, University of Illinois at Urbana-Champaign
- 2018, 2017 Scott H. Fisher IGB Graduate Student Research Fund Recipient
- 2015, 2014 Dean's List, Cornell University
- 2014 Engineering Global Fellow, Cornell University College of Engineering  
Study Abroad: Cornell in Turin, Turin, Italy. June 2014.
- 2013 Engineering Learning Initiatives Undergraduate Research Grant, Cornell University

## PROFESSIONAL ACTIVITIES

- 2023 BME UNITE Future Faculty Seminar Series Scholar
- 2022 Scholar: Rising BME Scholars Regional Conference, Washington University in St. Louis

2022	Scholar: WiscProf Future Faculty in Engineering Workshop, University of Wisconsin-Madison
2020 – 2022	Illinois Scholars Undergraduate Research (ISUR) Program Mentor
2019 – 2020	Mavis Future Faculty Fellow, University of Illinois Urbana-Champaign

### PEER-REVIEWED PUBLICATIONS

1. R. M. McLaughlin, A. Laguna, I. Top, C. Hernandez, L.L. Livi., L. Kramer, S.G. Zambuto, D. Hoffman-Kim, 'Cortical Spheroid Model for Studying the Effects of Ischemic Brain Injury,' *In vitro models*, 2023. <https://doi.org/10.1007/s44164-023-00046-z>
2. S.G. Zambuto, I. Jain, K.B.H. Clancy, G.H. Underhill, B.A.C. Harley, 'The role of extracellular matrix biomolecules on endometrial epithelial cell attachment and cytokeratin 18 expression on gelatin hydrogels,' *ACS Biomaterials Science & Engineering*, 2022. doi: <https://doi.org/10.1101/2021.10.24.465574>
3. S.G. Zambuto, S. Rattila, G. Dveksler, B.A.C. Harley, 'The role of pregnancy-specific glycoproteins on trophoblast motility in three-dimensional gelatin hydrogels,' *Cellular and Molecular Bioengineering*, 2022. doi: 10.1007/s12195-021-00715-7  
**News:** This article was featured on the cover of [Cellular and Molecular Bioengineering](#)
4. S.G. Zambuto, K.B.H. Clancy, B.A.C. Harley, 'Tuning trophoblast motility in a gelatin hydrogel via soluble cues from the maternal-fetal interface,' *Tissue Engineering*, 2020. doi: 10.1089/ten.tea.2020.0097
5. S.G. Zambuto\*, J.F. Serrano\*, A.C. Vilbert, Y. Lu, B.A.C. Harley, S. Pedron, 'Response of neuroglia to hypoxia-induced oxidative stress using enzymatically crosslinked hydrogels,' *MRS Communications*, 2019. doi: 10.1101/799692 \*These authors contributed equally to this work  
**News:** This article was featured on the cover of [MRS Communications](#)
6. S.G. Zambuto, K.B.H. Clancy, B.A.C. Harley, 'A Gelatin Hydrogel to Study Endometrial Angiogenesis and Trophoblast Invasion,' *Interface Focus*, 2019. doi:10.1098/rsfs.2019.0016

### PREPRINTS/MANUSCRIPTS IN PREPARATION

7. S.G. Zambuto, H. Theriault, I. Jain, C. Crosby, I. Pintescu, N. Chiou, J. Zoldan, G.H. Underhill, K.B.H. Clancy, B.A.C. Harley, 'Endometrial decidualization status modulates endometrial perivascular complexity and trophoblast outgrowth in gelatin hydrogels,' *bioRxiv*, 2022. <https://doi.org/10.1101/2022.11.08.515680>
8. S.G. Zambuto, A.K. Scott, A. Hardi, M.L. Oyen, S. Sutcliffe, J.L. Lowder MD, 'The Effect of Antenatal Vaginal Dilators on Birth Injury: A Systematic Review and Meta-analysis,' *PROSPERO 2023 CRD42023411199*: [https://www.crd.york.ac.uk/prospERO/display\\_record.php?ID=CRD42023411199](https://www.crd.york.ac.uk/prospERO/display_record.php?ID=CRD42023411199).
9. S.G. Zambuto, I. Jain, H. Theriault, G.H. Underhill, B.A.C. Harley, 'Cell Chirality of Micropatterned Endometrial Microvascular Endothelial Cells,' *in preparation*.
10. S.G. Zambuto, S.S. Kolluru, E. Ferchichi, H.F. Rudewick, D.M. Fodera, K.M. Meyers, S.P. Zustiak, M.L. Oyen, 'Systematic evaluation of gelatin bloom strength on gelatin methacryloyl hydrogel properties,' *in preparation*.
11. S.G. Zambuto, S.S. Kolluru, A.M. Mascot, A. Hamdaoui, J.L. Lowder, M.L. Oyen, 'Composite elastin nanofiber-gelatin methacryloyl hydrogels for vaginal tissue engineering,' *in preparation*.
12. S.G. Zambuto, A.K. Scott, M.L. Oyen, 'Beyond 2D: Novel Biomaterial Approaches for Modeling the Placenta,' *invited review manuscript for Trophoblast Research in preparation*.
13. S.G. Zambuto, B.A.C. Harley, M.L. Oyen, 'Gelatin methacryloyl materials and strategies for trophoblast research,' *in preparation for special edition of Trophoblast Research Methods*.

### CONFERENCE PRESENTATIONS

1. S.G. Zambuto (podium), S.S. Kolluru, A.M. Mascot, E. Ferchichi, S.P. Zustiak, J.L. Lowder, M.L. Oyen, "Composite elastin nanofiber-gelatin methacryloyl hydrogels for vaginal tissue engineering," Biomedical Engineering Society 2023 Annual Meeting, Seattle, WA, 10/2023.

2. S.G. Zambuto (podium and poster), S.S. Kolluru, M.L. Oyen, “*Trophoblast-mediated spatial changes in hydrogel matrix properties*,” 2023 International Federation of Placenta Associations Meeting, Rotorua, New Zealand, 9/2023. **Award:** NIH New Investigator Travel Award
3. S.G. Zambuto (poster), E. Ferchichi, S. Zustiak, M.L. Oyen, “*Systematic evaluation of gelatin bloom strength on gelatin methacryloyl hydrogel properties*”, Society for Biomaterials Annual Meeting, San Diego, CA, 4/2023.
4. S.G. Zambuto (podium), C.O. Crosby, K.B.H. Clancy, J. Zoldan, B.A.C. Harley, “*Hormone-Responsiveness of an Endometrial Perivascular Niche in Gelatin Hydrogels*,” Society for Biomaterials Annual Meeting and Exposition, Baltimore, MD, 4/2022. **Award:** STAR (Student Travel Achievement Recognition) Award
5. S.G. Zambuto (podium), I. Jain, G.H. Underhill, K.B.H. Clancy, B.A.C. Harley, “*Methacrylamide-Functionalized Gelatin Hydrogel Models of the Endometrium and Trophoblast Motility*,” Cellular and Molecular Bioengineering Conference, Palm Springs, CA, 1/2022. **Award:** 2022 Graduate Student Travel Award
6. S.G. Zambuto (podium), I. Jain, G.H. Underhill, K.B.H. Clancy, B.A.C. Harley, “*Three-Dimensional Hydrogels for Modeling the Endometrium and Trophoblast Motility*,” Society for the Study of Reproduction Annual Meeting, Saint Louis, MO, 12/2021.
7. S.G. Zambuto (podium), I. Jain, G.H. Underhill, K.B.H. Clancy, B.A.C. Harley, “*Biomaterial Tools for Modeling the Endometrium and Trophoblast Invasion*,” Biomedical Engineering Society Annual Meeting, Orlando, FL, 10/2021.
8. S.G. Zambuto (podium), I. Jain, G.H. Underhill, K.B.H. Clancy, B.A.C. Harley, “*A Gelatin Hydrogel Model of the Endometrium and Trophoblast Invasion*,” Society for Biomaterials Annual Meeting and Exposition, Virtual, 4/2021. **Award:** STAR (Student Travel Achievement Recognition) Award
9. S.G. Zambuto (poster), I. Jain, I. Pintescu, G.H. Underhill, K.B.H. Clancy, B.A.C. Harley, “*Gelatin Hydrogel Platforms to Model the Endometrium and Trophoblast Invasion in Three-Dimensions*”, Society for the Study of Reproduction Annual Conference, 2020 Virtual Poster Session, 7/2020.
10. S.G. Zambuto (poster), I. Jain, G.H. Underhill, K.B.H. Clancy, B.A.C. Harley, “*3D Gelatin Hydrogels for Modeling the Endometrium and Trophoblast Invasion*,” Cellular and Molecular Bioengineering Conference, Rio Grande, Puerto Rico, 1/2020.
11. S.G. Zambuto (poster), K.B.H. Clancy, B.A.C. Harley, “*Kinetics of Trophoblast Invasion in Gelatin Hydrogels*,” Biomedical Engineering Society Annual Meeting, Philadelphia, PA, 10/2019. **Award:** Biomedical Engineering Society (BMES) Career Development Award
12. S.G. Zambuto (poster), K.B.H. Clancy, B.A.C. Harley, “*Designing in vitro Gelatin Hydrogel Platforms for Monitoring Endometrial Function and Trophoblast Invasion*,” Society for the Study of Reproduction Annual Conference, San Jose, CA, 7/2019.
13. S.G. Zambuto (podium), B.A.C. Harley, “*Development of a Biomaterial Model of the Decidualized Endometrium*,” Society for Biomaterials Annual Meeting, Seattle, WA, 4/2019.

## SEMINARS AND SYMPOSIA

1. S.G. Zambuto (podium), “*Gelatin-Based Biomaterials for Modeling the Maternal-Fetal Interface*” CRM Stem Cells and Organoids Work in Progress Meeting, Washington University School of Medicine, St. Louis, MO, 7/2023.
2. S.G. Zambuto (podium), I. Jain, G.H. Underhill, K.B.H. Clancy, B.A.C. Harley, “*Engineering the endometrial microenvironment using methacrylamide-functionalized gelatin hydrogels*,” Virtual Symposium on Bioengineering ECM, Virtual, 6/2020.
3. S.G. Zambuto (podium), I. Jain, G.H. Underhill, K.B.H. Clancy, B.A.C. Harley, “*Gelatin-based biomaterials for modeling the endometrium and trophoblast invasion*,” Illinois Symposium on Reproductive Science, Chicago, IL, 11/2019. **Award:** 2019 Constance Campbell Research Award–Oral Presentation

4. S.G. Zambuto (podium), “*Bioengineering strategies for modeling the endometrium and trophoblast Invasion*,” Reproductive Physiology Seminar, University of Illinois at Urbana-Champaign, Urbana, IL, 11/2019.
5. S.G. Zambuto (podium), K.B.H. Clancy, B.A.C. Harley, “*Gelatin-Based Biomaterials for Modeling Early Pregnancy*,” Fall 2019 BIOE Graduate Student Seminar Series, University of Illinois at Urbana-Champaign, Urbana, IL, 9/2019.
6. S.G. Zambuto (podium), K.B.H. Clancy, B.A.C. Harley, “*A Gelatin Hydrogel to Study Endometrial Angiogenesis and Trophoblast Invasion*,” BIOE Graduate Research Symposium, University of Illinois at Urbana-Champaign, Urbana, IL, 5/2019. **Award:** Best Oral Presentation
7. S.G. Zambuto (poster), K.B.H. Clancy, B.A.C. Harley, “*A Gelatin Hydrogel to Study Endometrial Angiogenesis and Trophoblast Invasion*.”
  - University of Illinois Tissue Microenvironment Training Program Symposium, University of Illinois at Urbana-Champaign, Urbana, IL, 4/2019.
  - IGB Fellows Symposium, University of Illinois at Urbana-Champaign, Urbana, IL, 5/2019.
8. S.G. Zambuto (podium), “*Development of a 3D in vitro Ischemic Stroke Model*,” Biomedical Engineering and Biotechnology Department Seminar, Brown University, Providence, RI, 12/2016.
9. S. Zambuto (poster) and D. Hoffman-Kim, “*Assessing the Neuroprotective Effects of 17 $\beta$ -Estradiol on Female Three-Dimensional Cortical Microtissues Exposed to Ischemic Conditions*.”
  - Mind Brain Research Day, Brown University, Providence, RI, 3/2017.
  - Young Scholar’s Conference: Mechanisms of Disease Intervention, Brown University, Providence, RI, 9/2016.
  - Biomedical Engineering/Biotechnology Program Retreat, Brown University, Providence, RI, 9/2016.
10. S.G. Zambuto (podium), “*Development of a 3D in vitro Model to Study Traumatic Brain Injury*,” Biomedical Engineering and Biotechnology Department Seminar, Brown University, Providence, RI, 3/2016.
11. S. Zambuto (poster), M. Yuan, A. Singh, R. Williams, and W. Zipfel, “*Development of a Fusion Protein Probe for Quantitative Measurement of Oxygen Concentrations in vivo*,” Engineering Learning Initiatives Poster Session, Cornell University, Ithaca, NY, 4/2013.

## GUEST LECTURES

1. S.G. Zambuto, “Tissue Engineering Strategies for the Female Reproductive System,” Guest Lecture for “Tissue Engineering and Regenerative Medicine” at University of California Santa Barbara Department of Bioengineering, Virtual, 11/2023.
2. S.G. Zambuto, “*An Engineer’s Perspective: Modeling the Female Reproductive Tract*,” Guest Lecture for “Menstruation: Biology and Culture” at Tulane University Department of Anthropology, Virtual, 11/2022.

## TEACHING

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|------------------|---|
| 1/2019 – 5/2020  | Bioengineering Graduate Teaching Assistant, University of Illinois at Urbana-Champaign<br>Course: BIOE202 Cell & Tissue Engineering Lab   |
| 1/2017 – 5/2017  | Graduate Teaching Assistant, Brown University<br>Course: ENGN0930A Appropriate Technology   |
| 9/2016 – 12/2016 | Graduate Teaching Assistant, Brown University<br>Course: ENGN0130 The Engineer's Burden: Why Changing the World is Difficult<br>Graded student papers on various topics in engineering ethics |
| 1/2015 – 5/2015  | Undergraduate Teaching Assistant, Cornell University<br>Course: BEE3650 Properties of Biological Materials  |

## **MENTORING**

### Undergraduates

Abir Hamdaoui (WashU)  
Hannah Rudewick (WashU)  
Annabella Mascot (WashU)  
Noah Chiou (UIUC)  
Allison Kojima (UIUC)  
Ioana Pintescu (UIUC)

### High School Students

Deeksha Kanag  
Arya Catna

## **WRITING (Non-Technical)**

S.G. Zambuto, "[Performing Inclusive Research in the Lab](#)," Lab Crunches Bio-Rad, 2020.

## **SERVICE (Discipline)**

### **Membership in Professional Associations**

Biomedical Engineering Society (BMES); Society for Biomaterials (SFB); Society for the Study of Reproduction (SSR); Society for Reproductive Investigation (SRI); International Federation of Placenta Associations (IFPA)

### **Organization of Sessions and Symposia**

5/2024 Organizer and Chair: World Biomaterials Congress 2024 Biomaterials for the Maternal-Fetal Interface Session

10/2023 Chair: Biomedical Engineering Society (BMES) Uterine Pathologies Session

9/2023 Organizer and Chair: International Federation of Placenta Associations (IFPA) Meeting 2023 Beyond 2D-Novel Culture Approaches to Improve the Way We Study the Placenta

10/2022 Panelist: Biomedical Engineering Society (BMES) 2022 Gender Equity in BME Luncheon

10/2022 Chair: Biomedical Engineering Society (BMES) 2022 Pregnancy / Reproductive Health Technologies Session

### **Conference Activities**

2022, 2023 Biomedical Engineering Society (BMES) Abstract Reviewer

7/2019 Society for the Study of Reproduction Volunteer

### **SERVICE (Campus: University of Illinois Urbana-Champaign)**

8/2021 – 5/2022 Sloan University Center of Exemplary Mentoring (UCEM) Peer Mentor

9/2019 Speaker, Cancer Scholars Program Lecture: "How to Read a Scientific Paper"

7/2019 Speaker, researchHStart Workshop: "How to Read a Scientific Paper"

2/2019 – 5/2020 Mentoring Undergraduates in Science and Engineering (MUSE) Mentor

### **SERVICE (Public Outreach)**

9/2019 – 9/2020 Letters to a Pre-Scientist Pen Pal

6/2019 Speaker, ARCS Foundation Presentation "Modeling Pregnancy in the Lab": Four at Four Fun at Five