# Matthew Fainor

matthewfainor.com
fleshyfutures.substack.com
mfainor@gmail.com

## EXPERIENCE

### Research Engineer

**The Gullbrand & Mauck Labs | University of Pennsylvania | Philadelphia, PA | Oct 2020 – Present**

Translated a total tissue-engineered replacement disc from the bench to preclinical large animal models. Led the development and execution of cell screening, biomaterial, and drug delivery experiments to optimize tissue maturation.

- Increased bone formation on our scaffolds by 38.02% in vivo via material and chemical modifications
- Managed lab administration for a team of 14, including safety reviews and $60,000 of annual budget
- Maintained BSL2 culture facility and 10 pieces of equipment, including the tissue processing core
- Personally mentored and trained 6 staff members with both their research projects and writing
- Edited and copyedited over 40 presentations and 6 manuscripts presenting Gullbrand Lab data
- Created a lab color-blind friendly color palette and branding guide for improved visual unity

### Biomaterials Researcher

**GELH (Grants for Experiential Learning in Health) Scholar**

**The Chow Lab | Lehigh University | Bethlehem, PA | Jan 2019 - May 2020**

Developed modular polymeric scaffolds for the regeneration of the osteochondral interface in osteoarthritic knees using solvent-cast 3D-printing of custom-synthesized peptide-polymer conjugates.

- Synthesized, fabricated, and characterized peptide-modified scaffolds for in vitro experimentation
- Standardized synthesis and click chemistry protocols for lab use and publication

### Climate Science Design Engineer

**Partnership between OSIsoft & Lehigh University's Office of Sustainability | Bethlehem, PA | May 2018 - May 2020**

Built a database to manage Lehigh University's real-time utility data for all 196 buildings on campus in order to increase efficiency for campus energy staff and educate the student body on the campus's environmentla footprint.

- Designed and created a visual interface to manage energy efficiency and tell Lehigh's energy story
- Collaborated with a leadership team of 5 to supervise a team of 40 student volunteers
- Planned 25 events annually engaging 800+ students in climate science to promote sustainable behavior changes on topics including energy use, fast fashion, plastic waste, and food systems.

## AREAS OF EXPERTISE AND SELECTED SKILLS

- Science writing
- Stem cell culture & screening
- Peptide synethesis
- Drug delivery
- Animal models
- Polymeric biomatierals
- Adobe suite
- Fusion 360
- GraphPad Prism

## EDUCATION

### BS, IDEAS (Integrated Degree in Engineering, Arts & Sciences)

**Lehigh University | Bethlehem, PA**

Concentrations: Biomechanics & Biomaterials Engineering and Art & Design
Merit Scholar, Undergraduate Student Sustainability Award (2019)

### Certificate Courses in Writing

**University of Pennsylvania | Philadelphia, PA**

# Matthew Fainor

matthewfainor.com
fleshyfutures.substack.com
mfainor@gmail.com

## PUBLICATIONS

### Academic

- Gullbrand SE, Orozco BS, **Fainor M**, Meadows K, Hilliard R, Boyes M, Mahindroo S, Mauck RL, Elliott DM, Schaer TP, Smith HE. Intervertebral Disc Degeneration Instigates Vertebral Endplate Remodeling and Facet Joint Pathology in a Large Animal Model. Under Review.
- Muir VG, **Fainor M**, Orozco BS, Hilliard R, Boyes M, Smith HE, Mauck RL, Schaer T, Burdick JA, Gullbrand SE. Injectable Radiopaque Hyaluronic Acid Granular Hydrogels for Intervertebral Disc Repair. Advanced Healthcare Materials 2023. DOI: 10.1002/adhm.202303326
- **Fainor M***, Orozco BS*, Muir VG, Mahindroo S, Gupta S, Mauck RL, Burdick JA, Smith HE, Gullbrand SE. Mechanical Crosstalk Between the Intervertebral Disc, Facet Joints, and Vertebral Endplate Following Acute Disc Injury in a Rabbit Model. JOR SPINE 2023; 6(4): e1287. DOI: 10.1002/jsp2.1287
- **Fainor M**, Mahindroo S, Betz KR, Augustin J, Smith HE, Mauck RL, Gullbrand SE. A Tunable Calcium Phosphate Coating to Drive In Vivo Osseointegration of Composite Engineered Tissues. Cells Tissues Organs 2023; 212(5): 383-398. DOI: 10.1159/000528965
- Gupta S, Xiao R, **Fainor M**, Mauck RL, Smith HE, Gullbrand SE. Level Dependent Alterations in Human Facet Cartilage Mechanics and Bone Morphometry with Spine Degeneration. Journal of Orthopaedic Research 2022; 41(3): 674-683. DOI: 10.1002/jor.25407
- Camacho P, Behre A, **Fainor M**, Seims KB, Chow LW. Biomaterials Science Emerging Investigators Issue: Spatial Organization of Biochemical Cues in 3D-Printed Scaffolds to Guide Osteochondral Tissue Engineering. Biomaterials Science 2021; 9(2): 6813-6829. DOI: 10.1039/D1BM00859E
- Camacho P, **Fainor M**, Seims KB, Tolbert JW, Chow LW. Fabricating Spatially Functionalized 3D-Printed Scaffolds for Osteochondral Tissue Engineering. Journal of Biological Methods 2021; 8(1): e146. DOI: 10.14440/jbm.2021.353

### Popular Science Writing

- **Fleshy Futures: Tissue Engineering the 21st Century** | Writer and Illustrator | 2024 - Present
  Curated news and deep explorations of tissue engineering for those who care about biotechnology's impact on people and planet.
- **Fleshy Futures Blog** | Writer and Illustrator | 2021 - 2022
- **"A good story is both foreign and familiar:" A parking lot chat with Corinne Okada Takara** | 2022 Biodesign Challenge Newsletter.

## SELECTED PRESENTATIONS

### Academic

- **Fainor M**, Bazaz A, Augustin J, Mauck RL, Smith HE, Gullbrand SE. Engineering Composite Tissues: Coupling Angiogenesis and Osteogenesis via Material and Chemical Signals. Proceedings of the Annual Meeting of the Orthopaedic Research Society. 2024. Poster Presentation.
- Gullbrand SE & **Fainor M**. Orthopaedic Research and the Quest to Repair Intervertebral Discs. La Salle University Biology Seminar Series. 2023. Invited Talk.

# Matthew Fainor

matthewfainor.com
fleshyfutures.substack.com
mfainor@gmail.com

## SELECTED PRESENTATIONS (Cont.)

### Academic

- **Fainor M**, Dulatova G, Frehner S. Smith HE, Mauck RL, Heaton WL, Gullbrand SE. Characterizing Discogenic Cell-Based Tissue-Engineered Disc Replacements. ORS PSRS Philadelphia Spine Research symposium. 2023. Poster Presentation.
- **Fainor M** & Hast MW. Engineering the Intervertebral Disc: Modulating Cell Differentiation Through Material and Chemical Signaling. Cheyney University. 2023. Invited Talk
- **Fainor M**, Augustin J, Mauck RL, Gullbrand SE. In Situ Delivery of Microspheres to Promote Local Vascularization in Composite Structures. Proceedings of the Annual Meeting of the Orthopaedic Research Society. 2023. Poster Presentation.
- Orozco BS, **Fainor M**, Muir V, Mahindroo S, Gupta S, Burdick J, Mauck RL, Smith HE, Gullbrand SE. Intervertebral Disc and Facet Crosstalk in a Rabbit Puncture Model of Disc Degeneration. Proceedings of the Annual Meeting of the Orthopaedic Research Society. 2023. Podium Presentation.
- Gullbrand SE, Orozco BS, **Fainor M**, Hilliard RL, Schaer TP, Elliott DM, Mauck RL, Smith HE. Restoration of Physiologic Loading Improves Outcomes in Engineered Disc Implanted-Spinal Motion Segments. Proceedings of the Annual Meeting of the Orthopaedic Research Society. 2023. Podium Presentation.
- **Fainor M**, Augustin J, Smith HE, Mauck RL, Gullbrand SE. Driving Osteogenesis in Composite Biomaterials Using Tunable Hydroxyapatite Surface Modifications. ORS PSRS International Spine Research Symposium. 2022. Poster Presentation.
- **Fainor M**, Betz KR, Mahindroo S, Locke RC, Smith HE, Mauck RL, Gullbrand SE. The Effects of Hydroxyapatite Coating on Poly(caprolactone) Micromechanics and Mesenchymal Stem Cell Behavior. Proceedings of the Annual Meeting of the Orthopaedic Research Society. 2022. Poster Presentation.
- **Fainor M**, Mahindroo S, Gupta S, Mauck RL, Smith HE, Gullbrand SE. Intervertebral Disc and Facet Cross-Talk in a Rabbit Puncture Model of Spine Degeneration. Proceedings of the Annual Meeting of the Orthopaedic Research Society. 2022. Poster Presentation.
- Gullbrand SE, Mahindroo S, **Fainor M**, Meadows K, Barba A, Hopster K, Schaer TP, Elliott DM, Mauck RL, Smith HE. A Large Animal Model of Motion Segment Degeneration for Evaluation of Engineered Disc Replacements. Proceedings of the Annual Meeting of the Orthopaedic Research Society. 2022. Poster Presentation.
- **Fainor M**, Camacho P, Behre A, Schaer TP, Chow LW. 3D Printing Peptide-Functionalized Scaffolds for Osteochondral Regeneration. David and Lorraine Freed Undergraduate Research Symposium. 2020. Talk.
- **Fainor M**, Camacho P, Behre A, Schaer TP, Chow LW. Characterizing Effects of Sterilization and Cell Culture on Peptide-Functionalized 3D-Printed Scaffolds. Biomedical Engineering Society Annual meeting. 2019. Poster Presentation.

## PROFESSIONAL DEVELOPMENT

- Best of Banff Science Communications Program | 2021
- Communicating Climate Change Workshop, Genspace | 2021

# Matthew Fainor

matthewfainor.com
fleshyfutures.substack.com
mfainor@gmail.com

## SELECTED PRESENTATIONS (Cont.)

### Popular Science Communication

- **Q&A with a Tissue Engineer | 2024**
  Presentation and Q&A with AP Biology students
  Skype a Scientist | Nyack Public Schools
- **Communicating Science Panel | 2022**
  University California San Diego
- **“Communicating Science Creatively” | 2021**
  Workshop with the Biotechnology Society
  King’s College London
- **“Introduction to Orthopaedic Research” | 2021**
  Presentation to Rowan undergraduates
  Rowan University

## SERVICE

### McKay DEI Committee

**McKay Orthopaedics Department | University of Pennsylvania | Philadelphia, PA | 2020 - 2023**

- Designed, wrote, and managed monthly internal department DEI newsletter
- Instituted internal community-building events for a department of 160 people
- Assisted planning 3 conference grants for funding undergraduate conference attendance