

# Sebastián L. Vega, Ph.D.

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## Education

### **Rutgers University**

**Doctor of Philosophy in Chemical and Biochemical Engineering** (2014)

### **Carnegie Mellon University**

**Bachelor of Science in Chemical Engineering** (2006)

### **Carnegie Mellon University**

**Bachelor of Science in Biomedical Engineering** (2006)

## Research Appointments

### **Cooper Medical School of Rowan University**

**Assistant Professor** (2023 – Present)  
Department of Orthopaedic Surgery

### **Rowan University**

**Assistant Professor** (2018 – Present)  
Department of Biomedical Engineering

### **University of Pennsylvania**

**Postdoctoral Researcher** (2015 – 2018)  
Department of Bioengineering  
Advisor: Jason A. Burdick, Ph.D.

### **University of Twente**

**Visiting Scientist** (2014)  
Department of Tissue Regeneration  
Advisor: Jan de Boer, Ph.D.

### **Rutgers University**

**Graduate Research Assistant** (2008 – 2014)  
Department of Chemical and Biochemical Engineering  
Advisors: Prabhas V. Moghe, Ph.D. & Joachim Kohn, Ph.D.

## Industry Experience

### **Samsung Austin Semiconductor**

Process Engineer (2006 – 2008)

### **L'Oreal USA**

Research and Development Intern (2005)

### **Westinghouse Electric Corporation**

Risk Assessment Intern (2004)

## Awards

- NSF CAREER Award (2023)
- NEBEC New Innovator Award (2023)
- CMBE Young Innovator Award (2022)
- ORS NIRA Finalist (2022)
- Frances R. Lax Fund for Faculty Development (2019)
- MIT Rising Star in Biomedical Engineering and Science (2017)
- SFB STAR Award (2017)

- Compact for Faculty Diversity Travel Award (2016)
- NSF STEM Cell IGERT International Travel Award (2014)

## **Publications**

### *In Preparation*

3. M Recktenwald, T Torres, H Jankowski, N Shah, M Lowe, MM Benmassaoud, **SL Vega**. Engineered cell-cell mimetic peptides attenuate matrix mechanosensing on mechanically defined hydrogels. *Annals of Biomedical Engineering*, **In Preparation**.
2. SA Love, M Sims, MC Sozio, KE Byrne, **SL Vega**. Recent advances in injectable Diels-Alder hydrogels for biomedical applications. *Biomaterials Science*, **In Preparation**.
1. D Ball, E Alvino, M Sozio, L Kim, G Ibbott, **SL Vega**. Injectable hydrogels that can measure radiation at body temperature. *PLOS ONE*, **In Preparation**.

### *In Progress*

2. M Recktenwald, R Bhattacharya, MM Benmassaoud, J MacAulay, V Chauhan, L Davis, E Hutt, MM Staehle, PA Galie, NM Daringer, RJ Pantazes, **SL Vega**. Extracellular peptide-ligand dimerization actuator (EPDA) receptor design for reversible and spatially dosed 3D cell-material communication. *ACS Synthetic Biology*, **In Preparation**.
1. LN Davis, E Hutt, M Recktenwald, S Patel, M Briggs, M Dunsmore, **SL Vega**, PA Galie, MM Staehle, NM Daringer. Harnessing split fluorescent proteins in engineered phosphorylation networks for dynamic cellular sensing in theranostic cells. *Small*, **Under Review**.

### *Published*

37. M Recktenwald, M Kaur, MM Benmassaoud, A Copling, T Khanna, M Curry, D Cortes, G Fleischer, VJ Carabetta, **SL Vega**. Antimicrobial peptide screening for designing custom bactericidal hydrogels. *Pharmaceutics*, **Under Review**.
36. JR Davis, J Solowiej-Wedderburn, **SL Vega**, JA Burdick, C Dunlop, N Tapon. Monolayer force generation and transmission is dictated by focal adhesion distribution. *BioRxiv* **2024**.
35. A Simon, GV Gilbert, AH Fisher, PH Johnsen, B Herb, **SL Vega**, E Bodofsky, DA Fuller. A comparison of 2 versus 5 epineural sutures to achieve successful polyethylene glycol (PEG) nerve fusion in a rat sciatic nerve repair model. *Surgical Neurology International* **2024**.
34. SA Pucha, M Hasson, H Solomon, GE McColgan, JL Robinson, **SL Vega**, JM Patel. Revealing early spatial patterns of cellular responsivity in fiber-reinforced microenvironments. *Tissue Engineering Part A* **2024**.
33. M Recktenwald, MM Benmassaoud, S Dalwadi, N Belanger, M Tang, M Deleg, V Beachley, **SL Vega**. Facile method for covalently binding peptides onto polycaprolactone films and nanofibers. *Materials Letters* **2024**.
32. US Jalloh, A Gsell, KA Gultian, J MacAulay, A Madden, J Smith, L Siri, **SL Vega**. Synthesis and photopatterning of synthetic thiol-norbornene hydrogels. *Gels* **2024**.
31. M Recktenwald, E Hutt, L Davis, J MacAulay, NM Daringer, PA Galie, MM Staehle, **SL Vega**. Engineering transcriptional regulation for cell-based therapies. *SLAS Technology* **2024**.
30. SA Love, KA Gultian, US Jalloh, A Stevens, TWB Kim, **SL Vega**. Mesenchymal stem cells enhance targeted bone growth from injectable hydrogels with BMP-2 peptides. *Journal of Orthopaedic Research* **2024**.
29. AH Fisher, PH Johnsen, A Simon, CJ Burns, V Romiyo, EB Bodofsky, **SL Vega**, DA Fuller. Fibrin glue neurorrhaphy acutely blocks distal muscle contraction after confirmed polyethylene glycol nerve fusion: an animal study. *Plastic and Reconstructive Surgery – Global Open* **2024**.
28. L Paone, MM Benmassaoud, A Curran, **SL Vega**, PA Galie. A 3D printed blood-brain barrier model with tunable topology and cell-matrix interactions. *Biofabrication* **2023**.

27. A Copling, M Akantibila, R Kumaresan, G Fleisher, D Cortes, RS Tripathi, VJ Carabetta, **SL Vega**. Recent advances in antimicrobial peptide hydrogels. *International Journal of Molecular Sciences* **2023**.
26. KA Gultian, R Gandhi, TWB Kim, **SL Vega**. Self-forming norbornene-tetrazine hydrogels with independently tunable properties. *Macromolecular Bioscience* **2023**.  
**\*\*Selected as Feature Cover.**
25. DE Mason, M Goeckel, **SL Vega**, PH Wu, D Johnson, SJ Heo, D Wirtz, JA Burdick, L Wood, BY Chow, AN Stratman, JD Boerckel. Mechanotransductive feedback control of endothelial cell motility and vascular morphogenesis. *eLife* **2023**.
24. K Driscoll, MS Butani, KA Gultian, A McSweeny, JM Patel, **SL Vega**. Plant tissue parenchyma and vascular bundles selectively regulate stem cell mechanosensing and differentiation. *Cellular and Molecular Bioengineering 2022 Young Innovators Special Issue* **2022**.  
**\*\* CMBE Young Innovator Award.**
23. KA Gultian, R Gandhi, K DeCesari, V Romiyo, EP Kleinbart, K Martin, PM Gentile, TWB Kim, **SL Vega**. Injectable hydrogel with immobilized BMP-2 mimetic peptide for local bone regeneration. *Frontiers in Biomaterials Science* **2022**.
22. KA Gultian, R Gandhi, K Sarin, M Sladkova-Faure, M Zimmer, GM de Peppo, **SL Vega**. Human induced mesenchymal stem cells display increased sensitivity to matrix stiffness. *Scientific Reports* **2022**.
21. DE Mason, M Goeckel, **SL Vega**, PH Wu, D Johnson, SJ Heo, D Wirtz, JA Burdick, L Wood, BY Chow, AN Stratman, JD Boerckel. Mechanotransductive feedback control of endothelial cell motility and vascular morphogenesis. *BioRxiv* **2022**.
20. M DiCerbo, MM Benmassaoud, **SL Vega**. Porous scaffold-hydrogel composites spatially regulate 3D cellular mechanosensing. *Frontiers in Medical Technology* **2022**.
19. AP Liu, EA Appel, PD Ashby, BM Baker, E Franco, L Gu, K Haynes, NS Joshi, AM Kloxin, PHJ Kouwer, J Mittal, L Morsut, V Noireaux, S Parekh, R Shulman, SKY Tang, MT Valentine, **SL Vega**, W Weber, N Stephanopoulos, O Chaudhuri. The 'living interface': a bridge between synthetic biology and biomaterials. *Nature Materials* **2022**.
18. S Trujillo, **SL Vega**, KH Song, AS Félix, MJ Dalby, JA Burdick, M Salmeron-Sanchez. Engineered full-length fibronectin-hyaluronic acid hydrogels for stem cell engineering. *Advanced Healthcare Materials* **2020**.
17. MM Benmassaoud, KA Gultian, M DiCerbo, **SL Vega**. Hydrogel screening approaches for bone and cartilage tissue regeneration. *Annals of the New York Academy of Sciences* **2020**.
16. **SL Vega**, V Arvind, P Mishra, J Kohn, NS Murthy, PV Moghe. Substrate micropatterns produced by polymer demixing regulate focal adhesions, actin anisotropy, and lineage differentiation of stem cells. *Acta Biomaterialia* **2018**.
15. MY Kwon, **SL Vega**, WM Gramlich, M Kim, RL Mauck, JA Burdick. Dose and timing of N-cadherin mimetic peptides regulate MSC chondrogenesis within hydrogels. *Advanced Healthcare Materials* **2018**.
14. **SL Vega**, MY Kwon, KH Song, C Wang, L Han, RL Mauck, JA Burdick. Combinatorial hydrogels with biochemical gradients for screening 3D cellular microenvironments. *Nature Communications* **2018**.
13. YC Yeh, EA Corbin, SR Caliarì, L Ouyang, **SL Vega**, R Truitt, L Han, KB Margulies, JA Burdick. Mechanically dynamic PDMS substrates to investigate changing cell environments. *Biomaterials* **2017**.
12. AM Rosales, **SL Vega**, FW DelRio, JA Burdick, KS Anseth. Hydrogels with reversible mechanics to probe dynamic cell microenvironments. *Angewandte Chemie* **2017**.

11. **SL Vega**, E Liu, V Arvind, J Bushman, HJ Sung, ML Becker, S Lelièvre, J Kohn, PA Vidi, PV Moghe. High-content image informatics of the structural protein NuMA parses trajectories for stem/progenitor cell lineages and oncogenic transformation. *Experimental Cell Research* **2017**.
  10. **SL Vega**, MY Kwon, JA Burdick. Recent advances in hydrogels for cartilage tissue engineering. *European Cells and Materials* **2017**.
  9. E Liu, **SL Vega**, A Dhaliwal, MD Treiser, HJ Sung, PV Moghe. High-resolution fluorescence imaging of cell-biomaterial interactions. In *Comprehensive Biomaterials II*, Elsevier, **2017**.
  8. SR Caliarì\*, **SL Vega**\*, MY Kwon, EM Soulas, JA Burdick. Dimensionality and spreading influence MSC YAP/TAZ signaling in hydrogel environments. *Biomaterials* **2016**.
  7. **SL Vega**, MY Kwon, RL Mauck, JA Burdick. Single cell imaging to probe mesenchymal stem cell N-cadherin mediated signaling within hydrogels. *Annals of Biomedical Engineering* **2016**.
  6. **SL Vega**\*, A Dhaliwal\*, V Arvind, PJ Patel, NRM Beijer, J de Boer, NS Murthy, J Kohn, PV Moghe. Organizational metrics of interchromatin speckle factor domains: integrative classifier for stem cell adhesion & lineage signaling. *Integrative Biology* **2015**.
  5. SD Sommerfeld, Z Zhang, M Costache, **SL Vega**, J Kohn. Enzymatic surface erosion of high tensile strength polycarbonates based on natural phenols. *Biomacromolecules* **2014**.
  4. YJ Lee, **SL Vega**, PJ Patel, KA Aamer, PV Moghe, MT Cicerone. Quantitative, label-free characterization of stem cell differentiation at the single-cell level by broadband coherent anti-Stokes Raman scattering microscopy. *Tissue Engineering Part C: Methods* **2013**.
  3. JJ Kim, **SL Vega**, PV Moghe. A high content imaging-based approach for classifying cellular phenotypes. *Methods in Molecular Biology* **2013**.
  2. **SL Vega**\*, E Liu\*, PJ Patel, AB Kulesa, AL Carlson, Y Ma, ML Becker, PV Moghe. High-content imaging-based screening of microenvironment-induced changes to stem cells. *Journal of Biomolecular Screening* **2012**.
- \*\*Selected as Feature Cover.**
1. E Liu, **SL Vega**, MD Treiser, HJ Sung, PV Moghe. Fluorescence imaging of cell-biomaterial interactions. In *Comprehensive Biomaterials*, Elsevier, **2011**.

\* Authors contributed equally

## **Patents**

4. **SL Vega**, VJ Carabetta, M Recktenwald. Hydrogel compositions comprising synergistic antimicrobial peptides (AMPs) and methods of making same. *US Provisional Patent Application 63/598,782* filed on November 2023.
3. **SL Vega**, KA Gultian, TWB Kim. Hydrogels and methods of using the same. *US Provisional Patent Application 63/391,422* filed on July 2022; *International Patent Application PCT/US2023/70731* filed on July 2023.
2. **SL Vega**, KA Gultian, L Kim, I Malajovich, GS Ibbott. Injectable dosimeter compositions and methods of using same. *US Provisional Patent Application 63/348,920* filed on June 2022; *International Patent Application PCT/US2023/24285* filed on June 2023.
1. V Beachley, **SL Vega**, D Jao. Synthetic aligned tissue grafts and methods of using same. *US Provisional Patent Application 63/194,316* filed on May 2021; *International Patent Application PCT/US2022/031429* filed on May 2022; *US Patent Application 18/251,166* filed on April 2023.

## **Presentations**

93. H Jankowski\*, M Recktenwald, **SL Vega**. Effects of stiffness and cell-cell mimetic peptides on stem cell phenotype and matrix mechanosensing. *Biomedical Engineering Society (BMES) Annual Meeting*, Oct. 2024, Baltimore, MD.

92. Y Cardona Torres\*, SA Love, E Dedkov, TWB Kim, **SL Vega**. Peptide-functionalized injectable hydrogels for long bone regeneration in critical-sized segmental defects. *BMES Annual Meeting*, Oct. 2024, Baltimore, MD.
91. N Shah\*, US Jalloh, **SL Vega**. Effects of the BMP-2 mimetic peptide sequence and concentration on 3D stem cell spreading and osteogenic differentiation. *BMES Annual Meeting*, Oct. 2024, Baltimore, MD.
90. S Yilmaz\*, US Jalloh, JM Patel, **SL Vega**. Understanding 3D cell-matrix interactions using microfiber-hydrogel composite materials. *BMES Annual Meeting*, Oct. 2024, Baltimore, MD.
89. US Jalloh\*, A Gsell, A McSweeny, **SL Vega**. BMP-2 (bone morphogenetic protein-2) peptide-functionalized hydrogels to study 3D mechanosensing and osteogenic differentiation. *BMES Annual Meeting*, Oct. 2024, Baltimore, MD.
88. M Recktenwald\*, R Bhattacharya, J MacAulay, NM Daringer, RJ Pantazes, **SL Vega**. Peptide-ligand responsive receptors that enable 3D cell-material communication. *BMES Annual Meeting*, Oct. 2024, Baltimore, MD.
87. **SL Vega**\*. Injectable hydrogels for biomedical applications. *University of Pennsylvania Orthopaedic Research Club*, May 2024, Philadelphia, PA.
86. A Gsell\*, US Jalloh, KA Gultian, J MacAulay, A Madden, J Smith, L Siri, **SL Vega**. Synthesis and photopatterning of synthetic thiol-norbornene hydrogels. *Northeast Bioengineering Conference (NEBEC)*, Apr. 2024, Hoboken, NJ.
85. **SL Vega**\*. Design of extracellular peptide-ligand dimerization actuator receptors for programming cell behavior. *Temple University Bioengineering Seminar*, Mar. 2024, Philadelphia, PA.
84. **SL Vega**\*. Injectable hydrogels that direct stem cell fates and induce targeted bone formation. *Carnegie Mellon University Biomedical Engineering Seminar*, Feb. 2024, Pittsburgh, PA.
83. SA Pucha\*, **SL Vega**, JL Robinson, JM Patel. Revealing spatial responsivity in fiber-reinforced micro-environments for meniscus tissue engineering. *Orthopaedic Research Society (ORS) Annual Meeting*, Feb. 2024, Long Beach, CA.
82. **SL Vega**\*. Injectable hydrogels for biomedical applications. *Rutgers University Biomedical Engineering Seminar*, Jan. 2024, Piscataway, NJ.
81. SA Love\*, M Recktenwald, **SL Vega**. Facile method to functionalize injectable hyaluronic acid hydrogels with BMP-2 mimetic peptides. *Penn Center for Musculoskeletal Disorders Symposium*, Nov. 2023, Philadelphia, PA.
80. US Jalloh\*, A McSweeny, A Gsell, **SL Vega**. The effect of bone morphogenetic protein-2 peptides on 3D stem matrix mechanosensing. *Penn Center for Musculoskeletal Disorders Symposium*, Nov. 2023, Philadelphia, PA.
79. T Torres\*, M Recktenwald, **SL Vega**. Effects of stiffness and cell-cell mimetic peptides on stemness and matrix mechanosensing. *BMES Annual Meeting*, Oct. 2023, Seattle, WA.
78. J MacAulay\*, M Recktenwald, **SL Vega**. Evaluation of transmembrane extracellular ligand dimerization actuator (ELDA) receptors activated by stimulatory ligand peptides. *BMES Annual Meeting*, Oct. 2023, Seattle, WA.
77. KE Byrne\*, MC Sozio, M Patel, SA Love, **SL Vega**. Evaluating the effects of extrusion parameters on injectable hydrogel dispersion within osteoporotic analogs. *BMES Annual Meeting*, Oct. 2023, Seattle, WA.
76. A Gsell\*, US Jalloh, **SL Vega**. Evaluating the effects of enzymatic degradation and BMP-2 peptides on 3D adult stem cell morphology and bone differentiation. *BMES Annual Meeting*, Oct. 2023, Seattle, WA.
75. M Recktenwald\*, N Daringer, **SL Vega**. Evaluating receptor-ligand communication between programmed cells with synthetic transmembrane receptors and orthogonal peptide ligands conjugated to hyaluronic acid hydrogels. *BMES Annual Meeting*, Oct. 2023, Seattle, WA.

74. SA Love\*, MC Sozio, KE Byrne, TWB Kim, **SL Vega**. Injectable hydrogels that locally strengthen bones prone to fragility fractures. *Carnegie Mellon Forum on Biomedical Engineering*, Sept. 2023, Virtual.
73. M Recktenwald\*, J MacAulay, **SL Vega**. Engineering transmembrane ELDA (Extracellular Ligand Dimerization Actuator) receptors activated by peptide ligands. *Carnegie Mellon Forum on Biomedical Engineering*, Sept. 2023, Virtual.
72. M Recktenwald\*, **SL Vega**, N Daringer. Engineering synthetic transmembrane receptor-peptide ligand interactions in programmed Mammalian cells. *Synthetic Biology: Engineering, Evolution & Design (SEED) Symposium*, May 2023, Los Angeles, CA.
71. KA Gultian, TWB Kim, **SL Vega**\*. Injectable hydrogels with BMP-2 mimetic peptides for targeted bone formation. *NEBEC*, Mar. 2023, Philadelphia, PA.  
**\*\*NEBEC New Innovator Award Recipient.**
70. M Recktenwald\*, **SL Vega**, N Daringer. Evaluating synthetic transmembrane receptor-peptide ligand interaction in programmed Mammalian cells. *NEBEC*, Mar. 2023, Philadelphia, PA.
69. N Belanger\*, B Herb, J Carter, S Dalwadi, **SL Vega**, V Beachley. Effects of aligned nanofiber/hydrogel composite scaffolds on single cell morphology. *NEBEC*, Mar. 2023, Philadelphia, PA.
68. A Pucha\*, GE McColgan, **SL Vega**, JM Patel. Micro-scale cellular and mechano-response in composite scaffolds for meniscus replacement. *ORS Annual Meeting*, Feb. 2023, Dallas, TX.
67. KA Gultian, GS Ibbott, LH Kim\*, **SL Vega**. An injectable dosimeter for real-time, in vivo verification of MR-guided radiation therapy: proof of concept. *The 9<sup>th</sup> MR in RT Symposium*, Feb. 2023, Los Angeles, CA.
66. **SL Vega**\*. Plant tissue parenchyma and vascular bundles selectively regulate stem cell mechanosensing and differentiation. *BMES Annual Meeting*, Oct. 2022, San Antonio, TX.  
**\*\*CMBE Young Innovator Award Recipient.**
65. **SL Vega**\*. Injectable hydrogels for biomedical applications. *George Mason University Biomedical Engineering Seminar*, Sept. 2022, Fairfax, VA.
64. B Herb\*, S Dalwadi, N Belanger, V Beachley, **SL Vega**. Hydrogel thickness and nanofiber connectivity influence cell alignment and morphology in hydrogel-nanofiber composites. *Society for Biomaterials (SFB) Annual Meeting*, April 2022, Baltimore, MD.
63. MM Benmassaoud\*, N Belanger, M Tang, M Deleg, V Beachley, **SL Vega**. Norbornene-modified polycaprolactone for covalent peptide photopatterning. *SFB Annual Meeting*, April 2022, Baltimore, MD.
62. N Belanger\*, B Herb, C Burns, J Carter, S Dalwadi, G Gilbert, D Fuller, **SL Vega**, V Beachley. Aligned nanofiber/hydrogel composite scaffolds for peripheral nerve regeneration. *SFB Annual Meeting*, April 2022, Baltimore, MD.
61. K Gultian, R Gandhi, K DeCesari, TWB Kim, **SL Vega**\*. Injectable hydrogel with immobilized BMP-2 mimetic peptides and stem cells for local bone regeneration. *ORS Annual Meeting*, Feb. 2022, Tampa, FL.  
**\*\*New Investigator Recognition Award (NIRA) Finalist.**
60. K Gultian\*, R Gandhi, TWB Kim, **SL Vega**. Self-forming hydrogels for tissue engineering applications. *BMES Annual Meeting*, Oct. 2021, Orlando, FL.
59. R Gandhi\*, K Gultian, K Sarin, M Sladkova, GM de Peppo, **SL Vega**. Assessing the morphology and mechanosensing ability of induced pluripotent stem cells. *BMES Annual Meeting*, Oct. 2021, Orlando, FL.
58. M Butani\*, K Driscoll, **SL Vega**. Decellularized plant tissue microtopography regulates stem cell behavior. *BMES Annual Meeting*, Oct. 2021, Orlando, FL.

57. K Driscoll\*, M Butani, **SL Vega**. Decellularized plant tissues for biomedical applications. *BMES Annual Meeting*, Oct. 2021, Orlando, FL.
56. A Pacheco Benitez\*, B Herb, **SL Vega**. 3D light-degradable hydrogels to study dynamic cell environments. *BMES Annual Meeting*, Oct. 2021, Orlando, FL.
55. M Benmassaoud\*, V Carabetta, **SL Vega**. Antimicrobial peptide screening to develop Staphylococcal-resistant films. *The 2021 New York Bacillus Interest Group Annual Symposium*, June 2021, New York, NY.
54. **SL Vega\***. Self-forming hyaluronic acid hydrogels for biomedical applications. *Center for Engineering MechanoBiology Seminar*, May 2021, Philadelphia, PA.
53. M Dicerbo, M Benmassaoud, K Gultian, S Miskiel, TWB Kim, **SL Vega\***. Porous scaffold-hydrogel composite for osteochondral tissue engineering. *Society for Biomaterials World Biomaterials Congress 2020*, Dec. 2020, Virtual.
52. **SL Vega\***. Peptide-functionalized hydrogels for biomedical applications. *Cooper Medical School of Rowan University Seminar*, Nov. 2020, Virtual.
51. K Driscoll\*, M Butani, **SL Vega**. Stem cell behavior and osteogenic differentiation in plant tissue scaffold materials. *BMES Annual Meeting*, Oct. 2020, Virtual.
50. N Belanger\*, C Burns, **SL Vega**, V Beachley. Creating aligned polycaprolactone nanofiber hydrogel composites through layer-by-layer assembly. *BMES Annual Meeting*, Oct. 2020, Virtual.
49. R Gandhi\*, K Gultian, TWB Kim, **SL Vega**. Gelatin-based bioactive hydrogels for bone tissue engineering applications. *BMES Annual Meeting*, Oct. 2020, Virtual.
48. **SL Vega\***. Stem cell therapy: Basic science and current regulations overview. *Regenerative Medicine and Orthobiologics Symposium*, Sept. 2020, Cherry Hill, NJ.
47. **SL Vega\***. Hydrogel-based engineering of cellular microenvironments. *Cooper Cancer Research Showcase*, March 2020, Camden, NJ.
46. K Gultian, A Quinones, S Miskiel, TWB Kim, **SL Vega\***. Osteogenic biomarker expression of mesenchymal stem cells in response to substrate dimensionality and stiffness. *ORS Annual Meeting*, Feb. 2020, Phoenix, AZ.
45. M Dicerbo, M Benmassaoud, S Miskiel, TWB Kim, **SL Vega\***. Scaffold-hydrogel composite for osteochondral tissue engineering. *ORS Annual Meeting*, Feb. 2020, Phoenix, AZ.
44. **SL Vega\***. Hydrogels to investigate stem cell-material interactions. *New York Stem Cell Foundation Seminar*, Oct. 2019, New York, NY.
43. K Gultian\*, **SL Vega**. Injectable gelatin-based hydrogels for biomedical applications. *BMES Annual Meeting*, Oct. 2019, Philadelphia, PA.
42. M Benmassaoud\*, K Driscoll, GM de Peppo, **SL Vega**. Differences in mechanosensing between MSCs and iPSC derived MSCs. *BMES Annual Meeting*, Oct. 2019, Philadelphia, PA.
41. CJ Robinson\*, ME Lowe, M Benmassaoud, **SL Vega**. Stiffness-mediated changes in cell-to-nuclear area of mesenchymal stem cells. *BMES Annual Meeting*, Oct. 2019, Philadelphia, PA.
40. A Quinones\*, K Gultian, S Miskiel, TWB Kim, **SL Vega**. Effects of dimensionality and stiffness on osteogenic biomarker expression of mesenchymal stem cells. *BMES Annual Meeting*, Oct. 2019, Philadelphia, PA.
39. S Naranjo\*, A Venkatakrisnan, **SL Vega**, D Jariwala. Graphene-based microdevices to probe effects of electrical stimulation on stem cell behavior. *BMES Annual Meeting*, Oct. 2019, Philadelphia, PA.
38. DE Mason\*, **SL Vega**, SJ Heo, R Daniels, ED Bonnevie, JA Burdick, RL Mauck, JD Boerckel. Transcriptional control of cytoskeletal remodeling and cell motility. *BMES Annual Meeting*, Oct. 2019, Philadelphia, PA.

37. DE Mason\*, **SL Vega**, SJ Heo, R Daniels, ED Bonnevie, JA Burdick, RL Mauck, JD Boerckel. Transcriptional control of cytoskeletal remodeling and cell motility. *Society of Engineering Science Annual Meeting*, Oct. 2019, St. Louis, MO.
36. K Gultian\*, A Quinones, S Miskiel, TWB Kim, **SL Vega**. Single-cell osteogenic biomarkers to evaluate biomaterials for bone tissue engineering. *Life Sciences Future – BioPharm*, Oct. 2019, King of Prussia, PA.
35. M Dicerbo\*, M Benmassaoud, S Miskiel, TWB Kim, **SL Vega**. Biomaterial composite to recreate the osteochondral interface. *Carnegie Mellon Forum on Biomedical Engineering*, Sept. 2019, Pittsburgh, PA.
34. K Gultian\*, A Quinones, S Miskiel, TWB Kim, **SL Vega**. Evaluating the progression of mesenchymal stem cell osteogenic biomarker expression in response to biomaterial properties. *Carnegie Mellon Forum on Biomedical Engineering*, Sept. 2019, Pittsburgh, PA.
33. **SL Vega**\*. Hydrogels for bone and cartilage tissue engineering. *Cooper Bone and Joint Institute Research Day*, June 2019, Camden, NJ.
32. JH Galarraga\*, **SL Vega**, MY Kwon, JA Burdick. Combinatorial screening of 3D printable bioinks for cartilage repair. *SFB Annual Meeting*, April 2019, Seattle, WA.
31. S Furman\*, S Naranjo, K Gultian, A Loneker, RG Wells, **SL Vega**. Effects of substrate stiffness and cell-cell contact area on stem cell signaling. *NEBEC*, March 2019, Piscataway, NJ.
30. **SL Vega**\*. Gelatin-based hydrogels for musculoskeletal tissue engineering. *NEBEC*, March 2019, Piscataway, NJ.
29. **SL Vega**\*. Engineering stem cell microenvironments for tissue engineering applications. *Society of Hispanic Professional Engineers (SHPE) Engineering Science Symposium*, Nov. 2018, Cleveland, OH.
28. AM Rosales\*, **SL Vega**, FW DelRio, JA Burdick, KS Anseth. Reversible control of hydrogel mechanics with irreversible photo-mediated reactions. *American Institute of Chemical Engineers (AIChE) Annual Meeting*, Oct. 2018, Pittsburgh, PA.
27. **SL Vega**\*, JA Burdick. Engineering stem cell microenvironments for cartilage repair. *7th Annual Musculoskeletal Repair and Regeneration Symposium*, Oct. 2018, New York, NY.
26. **SL Vega**\*. Hydrogels formed by click chemistry for investigating cellular microenvironments. *Advancing Research in Camden: A Rowan University-Wide Research Symposium*, Oct. 2018, Camden, NJ.
25. **SL Vega**\*. A hydrogel screening platform for cartilage tissue engineering. *2018 Cartilage Repair Symposium*, Sept. 2018, Philadelphia, PA.
24. J Galarraga, **SL Vega**, L Ouyang, C Highley, JA Burdick\*. Extrusion-based 3D printing of biodegradable hydrogels. *8th World Congress of Biomechanics*, July 2018, Dublin, Ireland.
23. AM Rosales\*, **SL Vega**, FW DelRio, JA Burdick, KS Anseth. Recapitulating physical changes in the extracellular matrix with dynamic hydrogels. *SFB Annual Meeting*, April 2018, Atlanta, GA.
22. **SL Vega**\*, MY Kwon, J Durel, KH Song, C Wang, RL Mauck, L Han, JA Burdick. A hydrogel platform to probe the influence of engineered microenvironments on stem cell fate. *NEBEC*, March 2018, Philadelphia, PA.
21. **SL Vega**\*, J Durel, MY Kwon, RL Mauck, JA Burdick. Combinatorial hydrogels with biochemical gradients for probing cell-ECM interactions. *Penn Center for Musculoskeletal Disorders Symposium*, Nov. 2017, Philadelphia, PA.
20. L Chin\*, **SL Vega**, AE Loneker, JA Burdick, PA Janmey, RG Wells. Mechanics and hepatocyte behavior in non-alcoholic fatty liver disease. *Physical Sciences-Oncology Network Annual Investigators Meeting*, Oct. 2017, Boston, MA.
19. J Durel\*, **SL Vega**, JA Burdick. High-throughput single-cell analysis of MSC mechanosensing. *BMES Annual Meeting*, Oct. 2017, Phoenix, AZ.



18. S Trujillo\*, **SL Vega**, JA Burdick, MJ Dalby, M Salmerón-Sánchez. Fibronectin-based hydrogel systems as new 3-dimensional microenvironments for tissue regeneration. *Federation of European Biomedical Societies Workshop: Biological Surfaces and Interfaces*, July 2017, Catalonia, Spain.
17. **SL Vega**\*, KH Song, C Wang, L Han, JA Burdick. Combinatorial hydrogels and rapid single cell imaging to investigate chondrogenesis in 3D." *Penn Orthopaedics Cartilage Repair Symposium*, April 2017, Philadelphia, PA.
16. **SL Vega**\*, KH Song, JA Burdick. Combinatorial hydrogels for deciphering the role of cell-hydrogel interactions in MSC chondrogenesis. *SFB Annual Meeting*, April 2017, Minneapolis, MN.
15. YC Yeh\*, SR Caliarì, **SL Vega**, L Ouyang, L Han, JA Burdick. Modulation of cellular response using mechanically dynamic PDMS substrates. *SFB Annual Meeting*, April 2017, Minneapolis, MN.
14. **SL Vega**\*, KH Song, C Wang, L Han, JA Burdick. Combinatorial hydrogels and rapid single cell imaging to investigate chondrogenesis in 3D. *Penn Center for Musculoskeletal Disorders Symposium*, Nov. 2016, Philadelphia, PA.
13. **SL Vega**\*, KH Song, C Wang, L Han, JA Burdick. A combinatorial hydrogel platform to probe stem cell chondrogenesis in 3D. *New Jersey Center for Biomaterials Symposium*, Oct. 2016, Iselin, NJ.
12. **SL Vega**\*, KH Song, JA Burdick. Development of a combinatorial hydrogel platform for screening 3D cell-biomaterial interactions. *BMES Annual Meeting*, Oct. 2016, Minneapolis, MN.
11. **SL Vega**\*, SR Caliarì, JA Burdick. Cell spreading in 3D hydrogels regulates YAP localization. *Society for Biomaterials World Biomaterials Congress*, May 2016, Montreal, Canada.
10. V Arvind\*, **SL Vega**, L McCabe, PV Moghe, NS Murthy, J Kohn. Modulating stem cell-substrate interactions and differentiation by controlling substrate topography via microphase separation. *Society for Biomaterials World Biomaterials Congress*, May 2016, Montreal, Canada.
9. **SL Vega**\*, MY Kwon, JA Burdick. Single cell imaging to probe early stem cell chondrogenesis in hydrogels. *Penn Center for Musculoskeletal Disorders Symposium*, Nov. 2015, Philadelphia, PA.
8. **SL Vega**\*, MY Kwon, JA Burdick. Fluorescent imaging to probe MSC chondrogenesis and matrix production in hydrogels. *BMES Annual Meeting*, Oct. 2015, Tampa, FL.
7. MY Kwon\*, **SL Vega**, RL Mauck, JA Burdick. Influence of N-cadherin peptide dose and timing on MSC chondrogenesis in 3D HA hydrogels. *BMES Annual Meeting*, Oct. 2015, Tampa, FL.
6. **SL Vega**\*, PJ Patel, A Freitag, NS Murthy, PV Moghe, J Kohn. Modulating the cellular response by controlling substrate topography via demixing. *New Jersey Center for Biomaterials Symposium*, Oct. 2012, New Brunswick, NJ.
5. E Liu\*, **SL Vega**, A Kulesa, H-J Sung, M Becker, J Kohn, PV Moghe. High content imaging-based mapping of stem cell phenotypes. *Stem Cells & Regenerative Medicine World Congress*, Jan. 2011, San Diego, CA.
4. **SL Vega**\*, E Liu, S Gordonov, PV Moghe. Parsing stem cell behaviors in complex microenvironments via high content imaging and modeling. *BMES Annual Meeting*, Oct. 2010, Austin, TX.
3. **SL Vega**\*, P Patel, S Gordonov, J Kim, J Kohn, PV Moghe. Utilizing early high-content nuclear features to elucidate downstream stem cell behaviors. *New Jersey Center for Biomaterials Symposium*, Oct. 2010, Bridgewater, NJ.
2. S Gordonov\*, **SL Vega**, J Kohn, PV Moghe. Investigation of mesenchymal stem cell proliferation, viability, and differentiation in 3D polymeric scaffolds for tissue regeneration. *Annual National Conference on Undergraduate Research*, April 2010, Missoula, MN.
1. **SL Vega**\*, S Gordonov, M Treiser, D Cohen, I Androulakis, J Kohn, CS Chen, PV Moghe. Cytoskeleton-based early parsing of human mesenchymal stem cell lineage fates on biomaterials. *BMES Annual Meeting*, Oct. 2009, Pittsburgh, PA.

\* Presenting author

## **Funding**

### *Current*

4. **Foundation Venture Capital Group**  
Hydrogels for Targeted Bone Formation  
PI: **SL Vega** Co-PI: TWB Kim  
September 2024 to September 2025.
3. **New Jersey Health Foundation (PC 67-24)**  
Evaluating Efficacy of Injectable BMP-2 Hydrogels in Healing Non-Union Femur Fractures  
PI: **SL Vega**  
February 2024 to February 2025.
2. **National Science Foundation (2239922)**  
Understanding the Effects of Mechanical Dosing on Mesenchymal Stem Cell Identity  
PI: **SL Vega**  
(CAREER) NSF Division of Civil, Mechanical & Manufacturing Innovation  
April 2023 to March 2028.
1. **The Cooper Foundation (402860)**  
Injectable Hydrogels with Immobilized Peptides and Stem Cells for Local Orthopedic Tissue Regeneration.  
PI: **SL Vega** Co-PI: TWB Kim  
August 2022 to July 2025.

### *Previous*

4. **National Institutes of Health (R21DC018818)**  
Handheld 3D Bioprinting of Self-Healing Hydrogels for Vocal Fold Reconstruction  
PI: A Miri Co-PI: **SL Vega**  
(R21) National Institute of Deafness and Other Communication Disorders  
August 2020 to July 2024.
3. **National Science Foundation (2037055)**  
Peptide-Functionalized Hydrogels that Communicate with Preprogrammed Cells  
PI: **SL Vega** Co-PI: NM Daringer  
(EAGER) NSF Division of Materials Research  
September 2020 to June 2023.
2. **Graduate School of Biomedical Sciences Seed Funding**  
Development of Novel Biofilm-Resistant Hydrogel Coatings  
PI: VJ Carabetta Co-PI: **SL Vega**  
November 2021 to October 2022.
1. **Camden Health Research Initiative**  
Injectable Hydrogels for Delivering Biologics to Reduce the Incidence of Osteoporosis-Related Hip Fractures  
PI: **SL Vega** Co-PI: TWB Kim  
January 2019 to June 2022.

## **Teaching and Mentoring Experience**

### **Courses at Rowan University**

**Professor**, Chemical Foundations in Biomedical Engineering (BME 11.201)

Fall 2022, Summer 2023, Fall 2023, Summer 2024, Fall 2025

**Professor**, Biological Transport Phenomena (BME 11.610)

Fall 2018, Fall 2019, Fall 2020, Spring 2022, Spring 2024

**Professor**, Introduction to Stem Cell Engineering (BME 11.490)

Spring 2020, Fall 2020, Fall 2021

**Professor**, Advanced Stem Cell Engineering (BME 11.590)

Spring 2020, Fall 2020, Fall 2021

### **Courses at Rutgers University**

**Teaching Assistant**, Chemical Engineering Design & Economics I (CBE 14.155.427) (2010)  
Instructor: Alkis Constantinides, Ph.D.

**Teaching Assistant**, Thermodynamics I (CBE 14.155.208) (2010)  
Instructor: Silvina Tomassone, Ph.D.

### **Postdocs & Graduate Students mentored at Rowan University**

#### *Current*

- Stacy Love, BME Postdoctoral Trainee (2022 – Present)
- Myranda Sims, BME Ph.D. (2023 – Present)
- Matthias Recktenwald, BME Ph.D. (2023 – Present)
- Umu Jalloh, BME Ph.D. (2022 – Present)

#### *Past*

- Daniel Ball, BME M.S. (2022 – 2024)
- Kirstene Gultian, BME Ph.D. (2018 – 2022)
- Mehdi Benmassaoud, BME Ph.D. (2018 – 2022)
- Matthew Lowe, BME M.S. (2021 – 2022)
- Sarah Furman, BME M.S. (2020 – 2021)
- Matthew DiCerbo, BME M.S. (2018 – 2021)

### **Undergraduate Students mentored at Rowan University**

#### *Current*

- Christian Torres, BME B.S. (2024 – Present)
- Shishir Patel, BME B.S. (2024 – Present)
- Niva Shah, BME B.S. (2024 – Present)
- Sabriye Yilmaz, BME B.S. (2023 – Present)
- Yeisanai Cardona, BME B.S. (2023 – Present)
- Tyler Torres, BME B.S. (2023 – Present)
- Hayley Jankowski, BME B.S. (2023 – Present)
- Josh de Guzman, BME B.S. (2022 – Present)
- Marissa Pestrutto, BME B.S. (2022 – Present)
- Raaha Kumaresan, BME B.S. (2022 – Present)

#### *Past*

- Mackenzie Sozio, Biological Sciences B.S. (2023 – 2024)
- Tulika Khanna, Biological Sciences B.S. (2022 – 2024)
- Arielle Gsell, BME B.S. (2022 – 2024) **2024 da Vinci Medallion for Excellence Award**
- James MacAulay, BME B.S. (2022 – 2024)
- Abigail McSweeny, BME B.S. (2021 – 2024)
- Aryanna Copling, Translational Biomedical Sciences B.S. (2021 – 2024)
- Shrey Dalwadi, BME B.S. **Class of 2023 Valedictorian** (2020 – 2023)
- Kayla DeCesari, BME B.S. (2021 – 2022)
- Abby Madden, BME B.S. (2021 – 2022)
- Katie Driscoll, BME B.S., **2020 Goldwater Scholar; 2022 da Vinci Medallion for Excellence Award** (2018 – 2022)
- Matthew Lowe, BME B.S. (2019 – 2021)
- Gatha Adhikari, BME B.S. (2019 – 2021)
- Roshni Gandhi, BME B.S. (2019 – 2021) **2021 da Vinci Medallion for Excellence Award**
- Khushi Sarin, BME B.S. (2019 – 2021)
- Sarah Furman, BME B.S. (2018 – 2020)
- Sebastian Naranjo, BME B.S. (2018 – 2020)
- Jennifer Depka (Summer 2023)
- Katherine Byrne (Summer 2023)
- Alexis Pacheco Benitez, NSF REU (Summer 2021)
- Antonio Quinones, NSF REU (Summer 2019)

### **High School Students mentored at Rowan University**

- Daniella Concha-Ortiz, RISER Summer Scholar (2024)
- Divya Prajapati, RISER Summer Scholar (2024)
- Aabha Pokar, RISER Summer Scholar (2024)
- Misha Patel, RISER Summer Scholar (2023)
- Maya Butani, Research Assistant (2019 – 2022)
- Leila Quatorze, Summer Volunteer (2021, 2022)
- Jillian Smith, Summer Volunteer (2021, 2022)
- Misha Patel, RISER Summer Scholar (2023)
- Gavi Melman, RISER Summer Scholar (2022)
- Luke Siri, Summer Volunteer (2021)
- Matthew Rondinella, RISER Summer Scholar (2019)
- Roshan Patel, RISER Summer Scholar (2019)

### **Students mentored at the University of Pennsylvania**

- John Durel, NSF Center for Engineering MechanoBiology REU Program (2017)
- Sara Trujillo-Muñoz, Visiting Scholar, BME graduate at University of Glasgow (2016)
- John Bricker, NSF Research Experience for Teachers Program (2016)
- Evan Herlihy, BE M.S. (2015)

### **Students mentored at Rutgers University**

- Alejandra Aguilar, NSF REU (2013)
- Varun Arvind, BME B.S. (2012 – 2014)
- Erica Harris, NSF REU (2012)
- Adam Freitag, CBE B.S. (2011 – 2012)
- Gabriel Suarez, NSF REU (2011)
- Parth Patel, BME B.S. (2010 – 2012)
- Anthony Kulesa, BME B.S. (2010 – 2012)
- Simon Gordonov, BME B.S. (2008 – 2010)

## **Professional Service**

### **Institutional & Organizational Appointments**

**Treasurer**, BMES Council of Diversity (2023 – present)

**Executive Committee Member**, U-RISE (Undergraduate Research Training Initiative for Student Enhancement) (2022 – 2023)

**BME Representative**, Diversity, Equity, and Inclusion (DEI) Steering Committee (2022 – present)

**Committee Member**, Office of Health Professions (2020 – 2024)

**Committee Member**, Institutional Animal Care and Use Committee (IACUC) (2019 – 2024)

### **Academic Outreach**

**Chair**, BME Outreach & Community Engagement (2020 – present)

**Founder & Program Director**, BEAM (BioEngineering And Me) Program (2021 – present)

**Program Director**, RISER (Research Immersion in biomedical Science and Engineering at Rowan) Program (2019 – present)

### **Conference Organization & Service**

**Session chair & organizer**, SFB World Biomaterials Congress Meeting (2020)

**Session co-chair**, BMES Annual Meeting (2019, 2020, 2021, 2022, 2023, 2024)

**Session co-chair**, SFB Annual Meeting (2017)

**Abstract Reviewer**, BMES & ORS Annual Meetings (2019 – present)

### **Editorial Boards**

**Review Editor**, Frontiers in Biomaterials Science (2021 – present)

**Guest Editor**, JoVE Methods Collection “Recent Advances in Hydrogel Design and Imaging-Based Analysis to Probe Cell-Material Interactions” (2020 – present)

### **Proposal Reviewer**

VA Scientific Merit Reviewer (2024)  
DoD CDMRP Peer Reviewed Medical Research Program (PRMRP) Reviewer (2023, 2024)  
NIH Reviewer (2023, 2024)  
NSF Reviewer (2021, 2023, 2024)

### **Journal Reviewer**

ACS Applied Bio Materials (2021 – present)  
ACS Applied Materials & Interfaces (2019 – present)  
ACS Biomaterials Science & Engineering (2018 – present)  
Acta Biomaterialia (2017 – present)  
Advanced Biology (2023 – present)  
Advanced Healthcare Materials (2022 – present)  
Advanced Materials (2022 – present)  
Annals of Biomedical Engineering (2022 – present)  
Biomacromolecules (2023 – present)  
Biomaterials (2024 – present)  
Chemical Reviews (2021 – present)  
Communications Materials (2021 – present)  
Current Opinion in Biomedical Engineering (2021 – present)  
Drug Delivery and Translational Research (2021 – present)  
Frontiers in Bioengineering and Biotechnology (2021 – present)  
Frontiers in Biomaterials Science (2023 – present)  
Frontiers in Materials (2024 – present)  
Frontiers in Medical Engineering (2023 – present)  
Frontiers in Medical Technology (2022 – present)  
Journal of Biomedical Materials Research Part A (2024 – present)  
Journal of Cellular Physiology (2020 – present)  
Journal of Materials Chemistry B (2020 – present)  
Materials Horizons (2020 – present)  
Materials Science & Engineering C (2020 – present)  
RSC Advances (2019 – present)  
Scientific Reports (2024 – present)

### **Professional Memberships**

**Affiliate Member**, Center for Engineering MechanoBiology (CEMB)  
**Affiliate Member**, Penn Center for Musculoskeletal Diseases (PCMD)  
**Member**, Biomedical Engineering Society (BMES)  
**Member**, Society for Biomaterials (SFB)  
**Member**, Orthopaedic Research Society (ORS)  
**Member**, American Institute of Chemical Engineers (AIChE)  
**Member**, American Chemical Society (ACS)

### **Professional Development**

- Biomedical Engineering Educational Summit (2024)  
Newark, NJ
- NSF Square-Table 2: Programmable Interfaces Workshop (2019)  
Arlington, VA
- NSF ENG CAREER Proposal Writing Workshop (2019)  
Organized by Kansas State University, Arlington, VA
- National Effective Teaching Institute (2019)  
Organized by ASEE, San Diego, CA
- Faculty Development Symposium (2018)  
Organized by SHPE, Cleveland, OH
- Rising Stars in Biomedical Workshop (2017)  
MIT, Boston, MA
- Institute on Teaching and Mentoring (2016)  
Organized by Compact for Faculty Diversity, Tampa, FL

- Future Faculty Career Exploration Program (2013)  
RIT, Rochester, NY