

**Stephanie Willerth Ph.D., P.Eng.**  
**Associate Professor, Canada Research Chair in Biomedical Engineering**  
**Associate Director for the Centre of Biomedical Research**  
**Department of Mechanical Engineering**  
**Division of Medical Sciences**  
**University of Victoria**  
**Affiliate appointment with the Department of Biochemistry, University of British Columbia**  
**PO Box 1700 STN CSC**  
**Victoria, British Columbia V8W 2Y2 Canada**  
**Work telephone: 250-721-7303**  
**Fax number: 250-721-6051**  
**Email: willerth@uvic.ca**

### **Focus of Research Group:**

The Willerth lab uses pluripotent stem cells, controlled drug delivery and biomaterial scaffolds for engineering neural tissue. This tissue engineering based research program is the first of its kind at the University of Victoria, providing a unique training environment with access to the resources of both the engineering and neuroscience programs.

### **Training:**

**National Institutes of Health F32 Post-Doctoral Fellowship, Departments of Bioengineering and Chemical Engineering, University of California-Berkeley, 2008-2010.**

Research topic: Next generation DNA sequencing technologies for characterizing the diversity of HIV quasispecies and embryonic stem cell differentiation. (Supervisors: Dr. David Schaffer and Dr. Adam Arkin)

**Ph.D., Biomedical Engineering, Washington University in St. Louis, 2008.**

Dissertation: The effect of controlled delivery of growth factors on embryonic stem cell differentiation inside of fibrin scaffolds. (Supervisor: Dr. Shelly Sakiyama-Elbert)

**M.S., Biomedical Engineering, Washington University in St. Louis, 2008.**

**S.B., Chemical Engineering, Massachusetts Institute of Technology, 2003.**

**S.B., Biology, Massachusetts Institute of Technology, 2003.**

### **Peer Reviewed Journal Articles:**

31. Edgar, J., Robinson, M., and Willerth, S.M. **Fibrin hydrogels induce mixed dorsal/ventral spinal neuron identities during differentiation of human induced pluripotent stem cells.** Accepted at Acta Biomaterialia.

30. Willerth, S.M. **Biomimetic strategies for replicating the neural stem cell niche.** Current Opinion in Chemical Engineering. 2017. Feb 15:8-14.

29. Willerth, S.M. **Using functionalized transcription factors to engineer personalized neural tissue.** Neural Regeneration Research. 2016 Oct 11(10):1570-1571.

- This work was an invited commentary on our 2016 Stem Cell Reviews and Reports article.

28. Agbay, A., Edgar, J., Robinson, M., Styan, T., Wilson, K., Schroll, J., Ko, J., Mohtaram, N.K. Jun, M., and Willerth, S.M. **Biomaterial strategies for delivering stem cells as a treatment for spinal cord injury.** Cells Tissues Organs. 2015/2016 202 (1-2) 42-51.

- Our work was featured on the cover of this issue.

27. Swayne, L-A., Sanchez-Arias, J., Agbay, A., and Willerth, S.M. **What are neural stem cells and why are they important?** Frontiers for Young Minds. September 2016.

- Frontiers for Young Minds is an open access journal for youth aged 8-15. This article was the first one on stem cells in the Neuroscience section.

26. Robinson, M., Chapani, P., Styan, T., Vaidyanathan, R., Willerth, S.M. **Functionalizing Ascl1 with novel intracellular protein delivery technology for promoting neuronal differentiation of human induced pluripotent stem cells.** Stem Cell Reviews and Reports. 2016 12 (4) 476- 483.
25. Mohtaram, N. K., Ko, J., Agbay, A., Rattray, D., O Neill, P., Rajwani, A., Vasandani, R., Thu, H.L., Jun, M., and Willerth, S.M. **Development of a glial cell-derived neurotrophic factor-releasing artificial dura for neural tissue engineering applications.** Journal of Materials Chemistry – Part B. 2015 Aug 3, 7974 – 7985.
24. Gomez, J.C., Edgar, J.M., Agbay, A.M., Bibault, E., Montgomery, A.L., Mohtaram, N.K., and Willerth, S.M. **Incorporation of retinoic acid releasing microspheres into aggregates of pluripotent stem cells for inducing neuronal differentiation.** Cellular and Molecular Bioengineering. 2015 Sept: 8(3) 307-319.  
• This issue featured Dr. Willerth as a Young Innovator in Cellular and Molecular Bioengineering.
23. Robinson, M., Yau, S., Sun, L., Gabers, N., Bibault, E., Christie, B.R., and Willerth, S.M. **Optimizing differentiation protocols for producing dopaminergic neurons from human induced pluripotent stem cells for tissue engineering applications.** Biomarker Insights. 2015:Suppl. 1 61-70.
22. Ko, J., Mohtaram, N. K., Lee, P., Willerth, S.M., and Jun, M. **Mathematical model for predicting topographical properties of poly ( $\epsilon$ -caprolactone) melt electrospun scaffolds in various temperature and linear transitional speed.** Journal of Micromechanics and Microengineering. 2015 March (25) 045018.
21. Montgomery, A., Wong, A., Gabers, N., and Willerth, S.M. **Engineering personalized neural tissue by combining induced pluripotent stem cells with fibrin scaffolds.** Biomaterials Science. 2015 3, 401 – 413.
20. Mohtaram, N.K., Ko, J., King, C., Sun, L., Muller, N., Jun, M., and Willerth, S.M. **Electrospun biomaterial scaffolds with varied topographies for neuronal differentiation of human induced pluripotent stem cells.** Journal of Biomedical Materials Research: Part A. 2015 Aug 103(8), 2591-601.
19. Mohtaram, N., Ko, J., Montgomery, A., Carlson, M., Sun, L., Wong, A., Robinson, M., Jun, M., and Willerth, S.M. **Multifunctional electrospun scaffolds for promoting neuronal differentiation of induced pluripotent stem cells.** Journal of Biomaterials and Tissue Engineering. 2014 Nov:4, 906-914.
18. Ko, J., Bhullar, S., Mohtaram, N., Willerth, S.M., and Jun, M. **Using mathematical modeling to control topographical properties of poly ( $\epsilon$ -caprolactone) melt electrospun scaffolds.** Journal of Micromechanics and Microengineering. 2014 April (24) 065009.
17. Agbay, A., Mohtaram, N., and Willerth S.M. **Controlled release of glial cell line-derived neurotrophic factor from poly ( $\epsilon$ -caprolactone) microspheres.** Drug Delivery and Translational Research. 2014 April.4(2): 159-170.
16. Montgomery, A., Agbay, A., Edgar, J.M., Gabers, N., Gomez, J.C., Mohtaram, N., King, C., Mitchell, A., Rajwani, A., Rattray, D., Robinson, M., Shapka, A., Sun, L., Wong, A. and Willerth, S.M. **Combining protein-based biomaterials with stem cells for spinal cord injury repair.** OA Stem Cells. 2014 Jan 18;2(1):1.
15. Ko, J., Mohtaram, N., Ahmed, F. Carlson, M., Willerth S.M. and Jun M. **Fabrication of multi-scale topographies using melt electrospinning for stem cell-based tissue engineering applications.** The Journal of Biomaterials Science, Polymer Edition. 2014 Jan 25(1):1-17.
14. Mohtaram, N., Montgomery, A., and Willerth, S.M. **Biomaterial based drug delivery systems for controlled release of neurotrophic factors.** Biomedical Materials. 2013 Feb 8;(2):1-13.
13. Kolehmainen, K. and Willerth, S.M. **Preparation of 3D fibrin scaffolds for stem cell culture applications.** Journal of Visualized Experiments: Bioengineering. 2012 Mar 2;(61):e3641

12. Ko, J., Kolehmainen, K., Ahmed, F., Jun, M. B-G. and Willerth, S.M. **Towards high throughput tissue engineering: Development of chitosan-calcium phosphate scaffolds for engineering bone tissue from embryonic stem cells.** American Journal of Stem Cells. 2012 Jan 1; 1(1):81-89.
11. Willerth, S.M. **Neural tissue engineering using embryonic and induced pluripotent stem cells.** Stem Cell Research and Therapy. 2011 Apr 15; 2(2):17.
  - 3rd most accessed article for Stem Cell Research and Therapy for May 2011 with 593 downloads
10. Willerth, S.M., Pedro, H., Pachter, L., Humeau, L., Arkin, A. and Schaffer, D. **Development of an unbiased method for characterizing viral populations using next generation sequencing technology.** PLoS One. 2010 Oct 22; 5(10):e13564.
  - This work featured in several newspapers including the National Post and Vancouver Sun along with being highlighted on the CBC radio show "As it happens".
9. Xie, J., MacEwan, M.R., Willerth, S.M., Li, X., Moran, D.W., Sakiyama-Elbert, S.E., Xia, Y. **Conductive core-sheath nanofibers and their potential application in neural tissue engineering.** Advanced Functional Materials. 2009. Jul; 19(14): 2312-2318.
8. Willerth, S.M., and Sakiyama-Elbert, S.E. **Kinetic analysis of neurotrophin-3 mediated differentiation of embryonic stem cells into neurons.** Tissue Engineering: Part A. 2009. Feb; 15(2): 307-318.
  - Republished as a book chapter in "Advances in Tissue Engineering, Volume 2: Stem Cells"
7. Xie, J., Willerth, S.M., Li, X., MacEwan, M.R., Rader, A., Sakiyama-Elbert, S. and Xia, Y. **The differentiation of embryonic stem cells seeded on electrospun nanofibers into neural lineages.** Biomaterials. 2009 Jan; 30(30): 354-62.
  - This paper was featured as one of the 25 hottest articles in Biomaterials for October to December 2008.
6. Willerth, S.M., Rader, A. and Sakiyama-Elbert, S.E. **The effects of controlled growth factor release on embryonic stem cell differentiation inside of fibrin scaffolds.** Stem Cell Research. 2008 Sept; 3(1):205-18.
  - This paper was featured by Cell Therapy News as an article of interest and as one of the 25 hottest articles in Stem Cell Research for July to September 2009.
5. Willerth, S.M., and Sakiyama-Elbert, S.E. **Cell therapy for spinal cord regeneration.** Advanced Drug Delivery Reviews. 2008 Jan; 60(2):263-76.
4. Willerth, S.M., Fixel, T., Gottlieb, D.I. and Sakiyama-Elbert, S.E. **The effects of soluble growth factors on embryonic stem cell differentiation inside of fibrin scaffolds.** Stem Cells. 2007 Sept; 9(25):2235-44.
  - One of the 10 most frequently read articles in the journal "Stem Cells" from May 2008 through April 2009
3. Willerth, S.M. and Sakiyama-Elbert, S.E. **Approaches to neural tissue engineering using scaffolds for drug delivery.** Advanced Drug Delivery Reviews. 2007 May; 49(5): 325-338.
2. Willerth, S.M., Johnson, P.J., Maxwell, D.J., Parsons, S.R., Doukas, M.E., and Sakiyama-Elbert, S.E. **Rationally designed peptides for controlled release of nerve growth factor from fibrin matrices.** Journal of Biomedical Materials Research: Part A. 2007 Jan; 80(1):13-23.
1. Willerth, S.M., Arendas, K., Gottlieb, D.I. and Sakiyama-Elbert, S.E. **Optimization of fibrin scaffolds for differentiation of murine embryonic stem cells into neural lineage cells.** Biomaterials. 2006 Dec; 27(36):5990-6003.

## **Book**

1. Willerth, S.M. "Neural tissue engineering using stem cells". I am under contract with Elsevier and I have written 7 of the 8 chapters for this book, which has an anticipated publication date of Fall 2017. The book proposal underwent both external peer review as well as through the international internal review process.

### **Book Chapters:**

7. de la Vega, L., Thomas, M., and Willerth, S.M. **Biomaterials for regeneration of the nervous system.** Invited chapter for publication in Biomaterials for Cell Delivery: Vehicles in Regenerative Medicine. Francis and Taylor. Anticipated publication date: June 2017.

6. Schaffer, D.V. and Willerth, S.M. **Biomaterial-based scaffolds for promoting the differentiation of human embryonic stem cells.** Comprehensive Biomaterials Volume II. (Updated version of previous chapter). Elsevier. Anticipated publication date: June 2017.

5. Willerth, S.M. **Melt electrospinning in tissue engineering.** Invited chapter for publication in Electrospun materials for tissue engineering and biomedical applications: research, design and commercialization. Elsevier. Anticipated publication date: August 2017.

4. Mohtaram, N.K., Montgomery, A.L., Gomez, J.C., Agbay, A. and Willerth, S.M. **Neural tissue engineering applications.** Encyclopedia of Biomedical Polymers and Polymeric Biomaterials. Published in April 2015. CRC Press.

3. Willerth, S.M., and Schaffer, D.V. **Biomaterial scaffolds for human embryonic stem cell culture and differentiation.** The Biomedical Engineering Handbook, Fourth Edition, Published September 2013 and Stem Cell Engineering: Principles and Practices, Published September 2013. CRC Press.

2. Willerth, S.M., and Schaffer, D.V. **Biomaterial-based scaffolds for promoting the differentiation of human embryonic stem cells.** Comprehensive Biomaterials, Published in August 2011. Elsevier.

1. Willerth, S.M. and Sakiyama-Elbert, S.E. **Combining stem cells and biomaterial scaffolds for constructing tissues and cell delivery.** Published in Stembook during 2008. The Harvard Stem Cell Institute.

### **Non-refereed Articles:**

3. Willerth, S.M. **UVic biomedical engineers training for key medical roles.** Guest column published in the Victoria News, Sannich News, and Oak Bay News. May 2013.

2. Rawicz, A., Chan, A., Jaggi, B., Kwok, E., Laszlo, C., McEwen, J., Willerth, S.M. **A short history of biomedical education in British Columbia.** Innovation Magazine: The official publication of the Association of Professional Engineers and Geoscientists of British Columbia (APEGBC) January/February 2013.

1. Willerth, S.M. **New program will contribute to medical training and research opportunities in BC.** Innovation Magazine: The official publication of the Association of Professional Engineers and Geoscientists of British Columbia (APEGBC) May/June 2012.

### **Invited Presentations:**

36. **Tools for engineering personalized neural tissue.** University of British Columbia's Department of Cellular & Physiological Sciences seminar series, March 2016.

35. **Tools for engineering personalized neural tissue.** Weldon School of Biomedical Engineering Distinguished Lecture series at Purdue University, November 2016.

34. **Engineering patient specific neural tissue using cell permeable transcription factors.** Invited presentation at the 5<sup>th</sup> International Conference on Stem Cell Engineering, October 2016.

33. **Tools for engineering personalized neural tissue.** Presentation as part of the University of Wisconsin-Madison's Campus Stem Cell lab meeting series, September 2016.

32. **Tools for engineering personalized neural tissue. Presentation** as part of the University of Wisconsin-Madison's Biomedical Engineering seminar series, September 2016.
31. **Using melt electrospinning to make 3D substrates for stem cell differentiation.** Invited keynote at the 2016 CAD conference, June 2016.
30. **Engineering personalized neural tissue.** Presentation as part of Northwestern University's Biomedical Engineering seminar series, March 2016.
29. **Engineering personalized neural tissue.** Presentation as part of the University of British Columbia's Department of Biochemistry and Microbiology seminar series, December 2015.
28. **Biomaterial-based tools for engineering neural tissue.** Presentation at the American Chemical Society's Polymers in Medicine and Biology Meeting, September 2015.
27. **Bio-inspired strategies for engineering neural tissue.** Presentation at Starfish Medical, June 2015.
26. **Engineering personalized neural tissue.** 2015 Bioengineering and Stem Cell Symposium, Rensselaer Polytechnic Institute, June 2015.
25. **Bio-inspired strategies for engineering neural tissue.** Presentation at the University of Saskatchewan, June 2015.
24. **Bio-inspired strategies for engineering neural tissue.** Presentation at the University of Toronto, May 2015.
23. **Engineering personalized neural tissue by combining induced pluripotent stem cells with fibrin scaffolds.** Invited oral presentation at the 2014 Biomedical Engineering Society Annual Meeting, October 2014.
22. **Biomaterial-based tools for engineering neural tissue.** Presentation at STEMCELL Technologies Differentiation of Human ES Cells and iPS Cells to Neural Progenitor Cells Training Course, June 2014.
21. **Engineering reproducible neural tissue from pluripotent stem cells.** Presentation at the 97<sup>th</sup> Annual Canadian Chemistry Conference, June 2014.
20. **Engineering reproducible neural tissue from pluripotent stem cells.** Presentation at BioConferenceLive's Neuroscience Event, March 2014 - sponsored by Biocision.
19. **Next generation DNA sequencing for tissue engineering applications.** Presentation at the Biomedical Engineering Workshop at the University of Victoria, July 2013.
18. **Engineering reproducible neural tissue from pluripotent stem cells.** Presentation at the British Columbia Cancer Agency, April 2013.
17. **Engineering reproducible neural tissue from pluripotent stem cells.** Presentation at Washington University, March 2013.
16. **Quantitative analysis of signaling pathways associated with cell fate.** Presentation for the Mathematical Biology seminar series at the University of Victoria, March 2013.
15. **Biomaterial scaffolds for engineering neural tissue from pluripotent stem cells.** Presentation at the British Columbia Stem Cell and Regeneration Medicine Initiative, January 2013.

14. **Development of hybrid biomaterial scaffolds for controlling stem cell behavior.** Presentation at the Neural Tissue Engineering Workshop at the University of Victoria, June 2012.
13. **Development of hybrid biomaterial scaffolds for controlling stem cell behavior.** Presentation at Simon Fraser University, April 2012.
12. **Development of hybrid biomaterial scaffolds for controlling stem cell behavior.** Presentation at the Till and McCulloch Annual Meeting, April 2012.
11. **Development of hybrid biomaterial scaffolds for controlling stem cell behavior.** Presentation at Canadian Biomaterials Society - University of British Columbia student chapter's Annual workshop, March 2012.
10. **Development of hybrid biomaterial scaffolds for controlling stem cell behavior.** Presentation at the Pacific Centre for Advanced Materials and Microstructures (PCAMM) Annual Meeting, December 2011.
9. **Engineering neural tissue through the use of stem cells.** Presentation to the University of Victoria's Department of Biochemistry and Microbiology, November 2011.
8. **Engineering neural tissue by combining induced pluripotent stem cells with fibrin scaffolds.** Platform presentation at the 2011 Canadian Biomaterials Society Meeting, June 2011
7. **Engineering neural tissue through the use of stem cells.** Presentation to the Neuroscience program at the University of Victoria, April 2011.
6. **Combining biomaterial scaffolds with embryonic stem cells for engineering neural tissue.** Presentation at the International Collaboration on Repair Discoveries (iCORD) annual meeting, February 2011.
5. **Engineering approaches to biological problems.** Presentation to the Vancouver Island Branch of the Engineer's Institute of Canada, February 2011.
4. **Combining biomaterial scaffolds with embryonic stem cells for tissue engineering applications.** Presentation at the University of British Columbia Biomedical Engineering Workshop, November 2010.
3. **Engineering approaches to biological problems.** Presentation to the Engineering Associates group. November 2010.
2. **Tissue engineering using stem cells.** Presentation at the Centre for Advanced Materials and Related Technologies. November 2010.
1. **Development of a low bias method for characterizing viral populations using next generation sequencing.** Webinar presented at the NuGEN Corporation – available online at nugen.com, March 2010.

**Conference Presentations (\* indicates trainee presentation):**

38. **Engineering patient specific neural tissue using cell permeable transcription factors.** Poster presentation at the International Society for Stem Cell Research Annual meeting, June 2016.
37. **Engineering patient specific neural tissue using cell permeable transcription factors.** Oral presentation at the 2016 World Biomaterials Congress in May 2016.
36. **Genipin crosslinked fibrin as a potential bioscaffold for delivering spinal motor neurons derived from human induced pluripotent stem cells.** Poster presentation at the 2016 World Biomaterials Congress in May 2016.\*

35. **Differentiation of human induced pluripotent stem cells into neuronal subtypes by small molecule releasing microspheres.** Poster presentation at the 2016 World Biomaterials Congress in May 2016.\*
34. **Differential Gene Expression and Phenotype During Motor Neuron Differentiation of Human Induced Pluripotent Stem Cells in 3D Fibrin Scaffolds.** Poster presentation at the 2016 World Biomaterials Congress in May 2016.\*
33. **Using a Mathematical Model to Investigate the Growth and Neuronal Differentiation of Human Induced Pluripotent Stem Cells Seeded on Engineered Melt Electrospun Scaffolds.** Oral presentation at the 2016 World Biomaterials Congress in May 2016.\*
32. **Learning and Teaching Strategies for Professional Faculties.** Roundtable discussion with Jane Gair and Yvonne Coady at the 2015 Canada's Collaboration for Online Higher Education and Research (COHERE) Conference in October 2015.
31. **Incorporation Of Retinoic Acid Releasing Microspheres Into Aggregates Of Pluripotent Stem Cells For Inducing Neuronal Differentiation.** Platform Presentation at the 2015 Biomedical Engineering Society Annual Meeting in October 2015.
30. **Does The Availability Of Recorded Lectures Improve Student Success Rate?** Poster Presentation at the 2015 Biomedical Engineering Society Annual Meeting in October 2015.
29. **Using a Mathematical Model to Study the Neuronal Differentiation of Human Induced Pluripotent Seeded on Melt Electrospun Biomaterial Scaffolds.** Platform presentation at the 2015 Annual Meeting of the Canadian Biomaterials Society, May 2015.\*
28. **Glial cell-derived neurotrophic factor-releasing nanofibers with varied topographies for neural tissue engineering applications.** Platform presentation at the 2015 Annual Meeting of the Canadian Biomaterials Society, May 2015.\*  
•Nima was awarded a Best Presentation prize for this talk.
27. **Incorporation of retinoic acid releasing microspheres into aggregates of pluripotent stem cells for inducing neuronal differentiation.** Poster Presentation at the 2014 Biomedical Engineering Society Annual Meeting in October 2014.
26. **Encapsulated polymeric microspheres for promoting neural differentiation of pluripotent stem cells.** Platform presentation at the 2014 Annual Meeting of the Canadian Biomaterials Society, June 2014.\*
25. **Melt electrospun microfiber scaffolds with novel architecture for neuronal differentiation of human induced pluripotent stem cells.** Platform presentation at the 2014 Annual Meeting of the Canadian Biomaterials Society, June 2014.\*  
•Nima was awarded a Best Presentation prize for this talk.
24. **Neuronal differentiation of human induced pluripotent stem cells seeded on melt electrospun microfibers.** Paper presentation at the 37<sup>th</sup> Annual Canadian Medical and Biological Engineering Society meeting, May 2014.\*
23. **Controlled release of glial cell-derived neurotrophic factor from biodegradable poly ( $\epsilon$ -caprolactone) microspheres.** Poster Presentation at the Biomedical Engineering Society Conference, September 2013.\*
22. **Neural differentiation of induced pluripotent stem cells in 3D matrices.** Poster Presentation at the Biomedical Engineering Society Conference, September 2013.\*
21. **Engineering reproducible neural tissue from induced pluripotent stem cells.** Poster presentation at the International Society for Stem Cell Research Annual meeting, June 2013.

20. **Fabrication and characterization of hybrid biomaterial nerve conduits for neural differentiation of induced pluripotent stem cells.** Platform presentation at the 2013 Canadian Biomaterials Annual Meeting, May 2013.\*
19. **Parametric studies of melt electrospinning poly  $\epsilon$  (caprolactone) fibers for tissue engineering Applications.** Presentation the International Conference on Micro-Manufacture 2013, March 2013.\*
18. **Nanofabrication of electrospun fibers for controlled release of retinoic acid.** Presentation to the International Conference on Micro-Manufacture 2013, March 2013.\*
17. **Multifunctional electrospun scaffolds for promoting neural differentiation of embryonic and induced pluripotent stem cells.** Lightning round session participant and Poster Presentation at the British Columbia Stem Cell and Regeneration Medicine Initiative, January 2013.\*
16. **Multifunctional electrospun scaffolds for promoting neural differentiation of induced pluripotent stem cells.** Poster Presentation at the Biomedical Engineering Society Conference, October 2012.\*
15. **Neural tissue engineering using induced pluripotent stem cells.** Oral presentation at 9th Annual World Biomaterials Congress in Chengdu, China, June 2012.
14. **Using electrospun poly ( $\epsilon$ -caprolactone) nanofibers to promote the differentiation of induced pluripotent stem cells into neural phenotypes.** Poster presentation to the Society for Biological Engineering's 3rd Annual Stem Cell Engineering Conference in Seattle Washington, May 2012.\*
13. **Development of micro and nano-structured scaffolds for neural tissue engineering.** Poster Presentation at the Pacific Centre for Advanced Materials and Microstructures (PCAMM) Annual Meeting, December 2011.\*
12. **Electrospinning of nonaligned and aligned polycaprolactone fibers for bone tissue engineering.** Conference paper at the 2012 International Conference on Micro-Manufacture, March 2012.\*
11. **Engineering neural tissue by combining induced pluripotent stem cells with fibrin scaffolds.** Poster presentation at the Biomedical Engineering Society Conference, October 2011.
10. **Deep sequencing analysis of clinical HIV samples.** Poster presentation at the Biomedical Engineering Society Conference, October 2010.
9. **Development of a low bias method for characterizing viral populations using next generation sequencing.** Poster presentation at the Annual Illumina Users Meeting, June 2010.
8. **Development of a low bias method for characterizing viral populations using next generation sequencing.** Poster presentation at the American Society for Gene and Cell Therapy Annual Meeting, May 2010.
7. **Controlled growth factor release on embryonic stem cell differentiation inside fibrin scaffolds.** Platform presentation at Biomedical Engineering Society Conference, September 2007.
6. **Tissue engineered scaffolds for treatment and repair of spinal cord injury.** Poster presentation at the Kentucky Spinal Cord and Head Injury Research Trust Symposium, June 2007.
5. **The effects of soluble growth factors on embryonic stem cell differentiation inside of fibrin scaffolds.** Platform presentation at Society for Biomaterials Annual Meeting, April 2007.
4. **The effects of soluble growth factors on embryonic stem cell differentiation inside of fibrin scaffolds** Platform presentation at Biomedical Engineering Society Conference, September 2006.



**3. The effects of soluble growth factors on embryonic stem cell differentiation inside of fibrin scaffolds**  
Poster presentation at International Society for Stem Cell Research Meeting, July 2006.

**2. The effects of soluble growth factors on embryonic stem cell differentiation inside of fibrin scaffolds**  
Platform presentation at Regenerate Meeting, April 2006.

**1. Development of rationally designed affinity based peptides for the local delivery of nerve growth factor.**  
Platform presentation at Biomedical Engineering Society Conference, September 2005.

### **Workshops:**

Invited participant for the upcoming International Research Roundtable “**Printing the Future of Therapeutics in 3D**”, to be held May 3-5, 2017 at the Peter Wall Institute for Advanced Studies, University of British Columbia, Vancouver, Canada

Participated in Fundica’s “Women in Tech” Fireside chat on April 13<sup>th</sup>, 2016.

Participated in the University of Victoria’s “Let’s Talk Teaching” Workshop held on September 2<sup>nd</sup> and 3<sup>rd</sup>, 2015.

Participated in the NSERC workshop entitled “**Partnering for Success**” held on March 24<sup>th</sup>, 2015

Participated in a panel discussion on teaching practices during the Faculty of Engineering’s workshop entitled **Innovative Teaching: Effectiveness for Current Enrolments** held May 14<sup>th</sup>, 2014.

Participated in the 4<sup>th</sup> **Integrating the Physical and Applied Sciences into Health Research Workshop** presented by the Canadian Institutes of Health Research (CIHR), June 10 – 11, 2011 in Ottawa, Ontario.

Participated in the **Rice ADVANCE Junior Faculty Development Workshop** in Houston, Texas, April 17<sup>th</sup>, 2010.

### **Funding:**

31. **Stem Cell Network Commercialization Impact Program:** 3D bioprinting of neural tissue from human pluripotent stem cells. Amount awarded: \$100,000 (September 2016-August 2017).

30. **NSERC Engage Grant:** Validation of a sampling system for biomarkers. Amount awarded: \$25,000 (August 2016- January 2017).

29. **ICORD International Travel Award:** Collaborations in neural tissue engineering using stem cells for the repair of spinal cord injury at the Wisconsin Institute for Discovery. Amount awarded: \$15,000. (July 2016-December 2016).

28. **NSERC Engage Grant:** Evaluation of bioinks for 3D printing human induced pluripotent stem cells. Amount awarded: \$25,000 (May 2016- October 2016).

27. **NSERC Connect Grant:** Collaborations in protein engineering and drug delivery. Amount awarded: \$1,880. (May 2016 - August 2016).

26. **NSERC Engage Plus Grant:** Engineering cell permeable proteins for controlling pluripotent stem cell behavior. Amount awarded: \$25,000 (February 2016 - July 2016).

25. **NSERC Connect Grant:** Collaborations in tissue engineering. Amount awarded: \$1,650. (May 2015-June 2015).

24. **NSERC Engage Grant:** Engineering cell permeable proteins for controlling pluripotent stem cell behavior. Amount awarded: \$25,000 (May 2015- October 2015).

23. **NSERC Interaction Grant:** Collaborations in protein engineering and drug delivery. Amount awarded: \$875. (November 2014-January 2015).

22. **International Collaboration on Repair Discoveries Seed Grant Program:** Engineered tissues for the repair of traumatic spinal cord injury. Amount awarded: \$20,000. (July 2014- June 2015).

21. **British Columbia Innovation Council StartSmart Services Program:** Support for “Affordable, long term detection of water quality using a modular microsphere based system. Amount awarded: \$8,000 (July 2014 – October 2014).

20. **Grand Challenges Canada:** Affordable, long term detection of water quality using a modular microsphere based system. Amount awarded: \$100,000 (April 2014 – January 2016).
19. **NSERC Interaction Grant:** Collaborations in developing novel biomaterials and drug delivery systems. Amount awarded: \$2,000. (May 2014-July 2014).
18. **British Columbia Knowledge Development Fund:** Matching funds for "Next Generation" High Throughput DNA Sequencing Facility for Analyzing Stem Cell Behavior. Amount awarded: \$70,000 (April 2014 - present)
17. **British Columbia Knowledge Development Fund:** Matching funds for the Prometheus Project (Joint grant awarded to UVic, UBC, Simon Fraser University and the British Columbia Institute of Technology - UVic Lead PI: Alexandre Brolo). Amount allocated: \$100,000 out of \$ 1,800,000 awarded to UVic out of a total of \$7,700,000 for the entire project
16. **NSERC Engage Grant:** Development of a Grb78 enzyme linked immunosorbent assay. Amount awarded: \$25,000 (October 2013- June 2014).
15. **NSERC Engage Grant:** Reproducible isolation of RNA from single human pluripotent stem cells. Amount awarded: \$25,000 (October 2013- March 2014).
14. **Canadian Foundation for Innovation Leaders Opportunity Fund:** "Next Generation" High Throughput DNA Sequencing Facility for Analyzing Stem Cell Behavior. Amount awarded: \$70,000 (June 2013- present)
13. **Canada Research Chair Program:** Canada Research Chair in Biomedical Engineering. Amount awarded: \$500,000 (May 2013- present).
12. **NSERC Interaction Grant:** Collaborations in Biomaterials and Tissue Engineering. Amount awarded: \$1,800. (May 2013-July 2013).
11. **Centre for Advanced Materials and Technology Collaborative Research Stipend** (with Dr. Martin Jun): Graduate student support. Amount awarded: \$5,000 (December 2012-April 2013).
10. **Canadian Foundation for Innovation** Leading Edge Fund - Prometheus Project (Joint grant awarded to UVic, UBC, Simon Fraser University and the British Columbia Institute of Technology - UVic Lead PI: Alexandre Brolo). Amount allocated \$100,000 out of \$ 1,800,000 awarded to UVic out of a total of \$7,700,000 for the entire project.
9. **British Columbia Knowledge Development Fund:** Matching funds for Laboratory for stem cell based tissue engineering. Amount awarded: \$121,909 (September 2012-present).
8. **NSERC Engage Grant:** Engineering reproducible neural tissue from embryonic and induced pluripotent stem cells. Amount awarded: \$25,000. (April 2012- November 2012)
7. **Victoria Heritage Foundation:** Fellowships for graduate students in the area of biomedical and neuroscience. Amount awarded: \$6,000 (January 2012-June 2012).
6. **NSERC Engage Grant:** Formulations for controlled release of glial derived neurotrophic factor (GDNF). Amount awarded: \$25,000 (October 2011- March 2012).
5. **Canadian Foundation for Innovation Leaders Opportunity Fund:** Laboratory for stem cell based tissue engineering. Amount awarded: \$121,909 (November 2011-present)
4. **NSERC Discovery Grant:** Tissue engineered scaffolds for controlling induced pluripotent stem cell behavior. Amount awarded: \$125,000 (April 2011 through March 2016).
3. **NSERC Early Career Supplement:** Tissue engineered scaffolds for controlling induced pluripotent stem cell behavior. Amount awarded: \$25,000 (April 2011- March 2016)
2. **NSERC Research Tools and Instruments Grant:** Quantitative Stem Cell Analysis Facility. Amount awarded: \$127,573 (April 2011- March 2013).
1. **University of Victoria Start-up Funding.** Amount awarded: \$50,000.

### **Awards and Honors:**

**Woman of Innovation (one of 20 leading women in Canada who have influenced engineering) – 2016**  
**Featured as part of the Ontario Chair for Women in Science and Engineering's Inspire: Women Bringing Technology to Medicine - 2016**  
**ICORD International Travel Award – 2016**  
**Young Innovator in Cellular and Molecular Bioengineering – 2015**  
**Outstanding Contribution to reviewing for the Journal Acta Biomaterialia – 2015**  
**Outstanding Contribution to reviewing for the Journal Colloids and Surfaces B: Biointerfaces – 2015**  
**American Association for Clinical Chemistry – Outstanding Speaker Award – 2014**  
**University of Victoria – Faculty of Engineering Award for Excellence in Teaching - 2014**

**National Institutes of Health F32 Post-Doctoral Fellowship** - “Developing novel deep sequencing techniques for studying HIV evolution” – Awarded in May 2010.

**Biomedical Engineering Society Travel Award** for the presentation “Controlled Growth Factor Release on Embryonic Stem Cell Differentiation Inside Fibrin Scaffolds.” - September 2007.

**Tau Beta Pi member**, Massachusetts Beta Chapter – 2003.

**Sigma Xi member**, Massachusetts Institute of Technology – 2003.

**Harvard-MIT Health Sciences and Technology Biomedical Engineering Industrial Internship Scholarship** - 2003.

**Robert C. Byrd Scholarship** – 1999-2003.

**Highly Qualified Personnel (\*indicates current trainee):**

**Ph.D. Students:** Nima Khadem Mohtaram (UVic), Nithya Jesuraj (WU)

**Masters Students:** Laura de la Vega (UVic), Michaela Thomas (UVic), Andrew Agbay (UVic)\*, Amy Montgomery (UVic), Jose Gomez (UVic), Meghan Hall (UVic, co-supervised with Dr. Edwards), Tracy Fixel (WU), Allison Rader (WU)

**Medical Students:** Seth Kendler (WU)

**Undergraduate Students:** Tara Styan (UVic, double Co-op), Sarah Wong (UVic, double Co-op), Krista Wilson (UVic, NSERC USRA awardee), Brendon Restall (UVic, co-op), Tia Sojonky (UVic, NSERC USRA awardee), Brock Hay, Armin Bay, Julian Schroll, Daniel Pedde (UVic, Honors thesis and NSERC USRA), Otto Neuman (UVic, Honors thesis), John Edgar (UVic, NSERC USRA awardee, CIHR Computational Biology awardee, J.Cura scholar, Honors thesis, APEGBC Gold Medal in Biomedical Engineering),\* Laura de la Vega (MITACS Globalink), Megan Robinson (UVic – double Co-op and Honors thesis)\*, Emma Bibault (UVic Co-op)\*, Parv Chapani (UVic Co-op)\*, Tara Styan (UVic Co-op)\*, Brianna Carrels (UVic)\*, Josef Svorkdal (UVic), Hien Thu Luong (MITACS Globalink), Angie Qu (University of Toronto), Simon Diemert (UVic), Alix Wong (UVic), Alexandra Shapka (UVic, Honors Thesis), Craig King (UVic, NSERC USRA awardee, J. Cura Scholar), David Rattray (UVic), Rishi Vasandani (UVic), Azra Rajwani (UVic – Honors thesis), Nathan Muller (UVic, NSERC USRA), Paul O'Neill (UVic), Katie Smith (UVic), Aliya Mitchell (UVic), Scott Roebuck (UVic), Andrew Agbay (UVic, NSERC USRA awardee, Honors Thesis), Michael Carlson (UVic), Nicole Gabers, (UVic), Colleen Chau (UBC), Martika Rodgers (McGill), Chris Ward (UVic), Stephanie Morrison (NSERC USRA awardee and J. Cura Scholar, UVic), Barbara Gauthier (UVic), Darcy Ippolito (UVic), Kathleen Kolehmainen (UVic), Richard Schmitz (NSERC USRA awardee, UVic) Katrina Rogers (WU), Maria Doukas (WU)

**Teaching Experience:**

**MECH483/BME483: Mechanics and Energy Conversion for Living Cells**, Professor, University of Victoria – Summer 2015.

**MECH510: Living Cells and their Molecules: Mechanics & Thermodynamics**, Professor, University of Victoria – Summer 2015.

**Island Medical Program:** Tutored the Gastrointestinal block of Problem Based Learning – Fall 2014. Tutored neuroscience block – Spring 2016.

**BME200: Molecular and Cellular Physiology for Engineers**, Professor, University of Victoria – Fall 2012, 2013, 2015.

**MECH481/BME481: Biomaterials and Tissue Engineering**, Professor, University of Victoria – Spring 2012, 2013, 2014, 2015.

**MECH580: Biomaterials and Tissue Engineering**, Professor, University of Victoria – Spring 2012, 2013, 2014, 2015.

**MECH390: Energy Conversion**, Professor, University of Victoria – Spring 2011, Spring 2012.

**MECH240: Thermodynamics**, Professor, University of Victoria – Fall 2011.

**BME 511: Biotechnology Techniques for Engineers**, Teaching Assistant, Washington University –Spring 2006.

**BME 530: Molecular Cell Biology for Engineers**, Teaching Assistant, Washington University – Fall 2005.

Awarded a University of Victoria Learning and Teaching Development Grant for studying the Scholarship of Teaching and Learning (in collaboration with Dr. Struchtrup) entitled “Does the availability of recorded lectures improve student success rate?” in June 2014. Amount: \$1500. This work lead to a follow up study recording lectures for Engr141.

Served as founding coordinator for the Biomedical Engineering undergraduate major, which was the first undergraduate program of its kind in Western Canada. Our initial class was 25 students which grew to 35 students for the following intakes. Admission is selective based on GPA. This program was featured in Maclean's magazine as a stand out program in Fall 2015. This program was accredited in Spring 2016 for 3 years (maximum possible for a new program).

### **Professional Activities:**

#### **Review Panel Service (9 total)**

**Review Panel member for** Saskatchewan Health Research Fund Collaborative Innovation Development Grants Committee: Biomedical.

**Review Panel member** for the Ontario Research Fund – Molecular Medicine Panel – served in May 2016.

**Review Panel member** for the Ontario Research Fund - Large Infrastructure Advanced Health Technologies Panel – served in December 2015.

**Review Panel member** for the Michael Smith Foundation for Health Research Trainee Competition in June 2015 and May 2016.

**Review Panel member** for the “Developing and Testing Retrievable Devices and Scaffolds for Beta Cell Replacement Therapies” call issued by JDRF in Spring 2016.

**Review Panel member** for the NY Department of Health Spinal Cord Injury Research Board's 2016 Cellular Regeneration and Therapeutic competition

**Reviewer for** Medicine by Design Program (University of Toronto – CFREF competition) in May 2016.

**Review Panel member** for the NY Department of Health Spinal Cord Injury Research Board's 2016 Post-Doctoral Fellow competition

**Grant Reviewer** for the following programs (**16 total**): Canada Research Chairs Program, NSERC Discovery Grants Program (Chemical Engineering and Chemistry Evaluation Groups), Nova Scotia Health Research Fund, French National Research Agency SightRepair Program, ETH Zurich Research Commission, Biotechnology and Biological Sciences Research Council, Medical Research Council (UK), Human Frontier Science Program, NSERC Idea to Innovation Program, NSERC Strategic Grants Program, NSERC Collaborative Research and Development Grants Program, Wellcome trust/DBT India Alliance Fellowship MITACS, the Research Council of KU Leuven, France-Canada Research Fund (2014, 2015) and the Neurological Foundation of New Zealand.

**Ad Hoc Reviewer** for the following journals (**63 total**): ACS Applied Materials & Interfaces, ACS Biomaterials Science and Engineering, ACS Nano, Acta Biomaterialia, Advances in Polymer Technology, Annals of Biomedical Engineering, Artificial Cells Nanomedicine and Biotechnology, Biochemistry and Cell Biology, Bioengineering and Translational Medicine, Biofabrication, Biomacromolecules, Biomaterials, Biomaterials Science, Biomedical Materials, Biotechnology and Bioengineering, Biotechnology Progress, Biotechnology Journal, Cells Tissues Organs, ChemComm, Colloids and Surfaces B: Biointerfaces, Computers in Biology and Medicine, Current Pharmaceutical Design, Current Tissue Engineering, Data in Brief, Expert Opinion on Drug Delivery, Fibers, Fibers and Polymers, Frontiers in Bioengineering and Biotechnology and Materials: Biomaterials, Frontiers in Cellular Neuroscience, Frontiers in Materials, International Journal of Development Neuroscience, International Journal of Molecular Science, International Journal of Nanomedicine, IUBMB Life, Journal of Applied Polymer Science, Journal of Biomedical Materials Research: Part A, Journal of Materials Chemistry B, Journal of Biomaterials and Tissue Engineering, Journal of Controlled Release, Journal of Materials, Journal of Medical and Biological Engineering, Journal of Neurotrauma, Journal of Neural Engineering, Journal of 3D Printing in Medicine, Journal of Tissue Engineering and Regenerative Medicine, Journal of Visualized Experiments, Lab on a Chip, Materials, Neural Regeneration Research, Organic and Biomolecular Chemistry, Polymers, Pharmaceutics, Progress in Polymer Science, RSC Advances, Scientific Reports, SpringerPlus, Stem Cell Reports, Stem Cell Research, Stem Cells and Development, Stem Cell Research and Therapy, Tissue and Cell, Tissue Engineering: Part A, and World Journal of Gastroenterology.

**Reviewer** for CRC Handbook on Biomedical Engineering, book proposals for Elsevier S&T books and book proposals from Bentham Science Publishers.

**President-Elect of the Canadian Biomaterials Society (2016-2018)**

**Member of the Board of Directors** for the Canadian Biomaterials Society (2011-2013, 2013-2015)  
**Review Editor** for Frontiers in Bioengineering and Biotechnology and Materials: Biomaterials  
**Associate Editor** for the American Journal of Stem Cells  
**Uniquely Qualified Reviewer, Travel Award Reviewer, Symposium Session Reviewer and Session Chair**  
for the 2016 World Biomaterials Congress  
**Track Chair, Stem Cell Engineering** for the 2015 Biomedical Engineering Society Annual Meeting.  
**Organizer, Poster Session Judging** for the 2015 Biomedical Engineering Society Annual Meeting.

**Session Chair at the** 2016 5<sup>th</sup> International Conference on Stem Cell Engineering.  
**Poster Judge** for the 2016 International Society for Stem Cell Research Annual Meeting  
**Session Chair and Poster Session Judge** for the 2015 ACS Polymers in Medicine and Biology Meeting.  
**Session Chair and Member** of the scientific advisory committee for the Canadian Biomaterials Society Annual Meeting in 2011, 2013, 2014, and 2015.  
**Abstract Reviewer and Session Chair** for the 2012, 2013, 2014, and 2015 Biomedical Engineering Society Annual Meeting.  
**Session Chair** at the 2013 International Conference on Micromachining.  
**Abstract Reviewer** for the 37<sup>th</sup> Annual Meeting of the Canadian Medical and Biological Engineering Society.  
**Stakeholder** consulted by the Standards Council of Canada on the proposal "Cell Combined Medical Product"

### **Professional Memberships:**

Society of Biomaterials – 2005- 2008.  
Biomedical Engineering Society – 2005- present.  
Canadian Society for Biomaterials – 2011- present.  
Centre for Advanced Materials and Related Technology at University of Victoria – 2010-present.  
Centre for Biomedical Research at the University of Victoria – 2010-present.  
International Collaboration on Repair Discoveries (ICORD) – 2011-present.  
Association of Professional Engineers and Geoscientists of British Columbia – 2011-present.  
Brain Research Centre – 2012-present.  
International Society for Stem Cell Research – 2013- present.

### **Community Outreach Activities:**

Participated in St. Michael's University School Career Day – January 2016

Selected by the NSERC/Pratt & Whitney Canada Chair for Women in Science and Engineering to be featured as part of CWSE Inspire: Women Bringing Technology to Medicine in 2016

I spoke at the March 2016 "Let's talk science" Women in Science Career day.

My lab was featured in APEGBC's Innovation magazine (Jan/Feb 2016 issue) in the article entitled "Devising biomedical solutions in British Columbia".

I gave the keynote speech and hosted lab tours at the January 2016 "Let's talk science" event

My lab hosted a group of St. Michael's students interested in engineering in November 2015 and January 2016.

I was featuring in the Fall 2015 EngineerRing newsletter.

My lab hosted the Canadian Foundation for Innovation during their biannual visit in September 2015.

My lab hosted lab tours all summer for Science Ventures in 2015.

Presented on careers in Biomedical Engineering at the "Let's talk science" Career Day Panel to 80 students from St. Margaret's in April 2015

Co-op student Emma Bibault was featured in the Engineering newsletter – March 2015

Graduate student Jose Gomez was featured in the Spring ICORD newsletter – March 2015

Hosted lab tours for the general public as part of “Research around the Ring” during Ideafest in March 2014.

Nominated for Confederation of University Faculty Associations of British Columbia Early in Career Award in 2013 and 2014.

Presented on careers in Biomedical Engineering at the “Let’s talk science” Career Day Panel to 80 students from St. Margaret’s in February 2014.

Gave a presentation on the Biomedical Engineering Program to high school students during Engineering Tours in February 2014.

Served on the “Women in Engineering” Panel at St. Michael’s University School in January 2014.

Gave a presentation on the Biomedical Engineering Program to high school students during November 2013.

Nominated for the Provost’s Advocacy and Activism Award in November 2013 based on increasing the number of females in our undergraduate engineering population.

Presented on my research activity at the Island Medical Program’s “Lunch and Learn” seminar series in November 2013.

Hosted 27 Biomedical Engineers from the University of British Columbia including a presentation and lab tour in July 2013.

Gave a presentation to Engineering Associates regarding the status of the Biomedical Engineering program in March 2013.

Gave a research presentation as part of Pecha Kucha Biomedica during Ideafest to the general public in March 2013.

Gave two 1 hour lectures entitled “Engineering replacement organs – From stem cells to reality” to 45 students at the University of Victoria’s Fresh Minds Symposium, a popular and exciting one-day conference for grade 9 and 10 students from all around British Columbia.

Hosted an event including a lab tour for the Victoria chapter of Canadian Association for Girls in Science in February 2013

Gave an invited presentation “Engineering replacement organs: From stem cells to reality” at the Western Engineering Competition held in Victoria, January 2013.

My research has been featured on the ICORD and Advanced Microscopy Lab websites.

Gave an invited presentation “Engineering replacement organs: From stem cells to reality” at the “Ideas that will change the world” symposium in honor of the University of Victoria’s 50<sup>th</sup> anniversary celebration in September 2012.

Participated in the following activities: Taste of UVic networking Luncheon in February 2012, Rick Hansen Institute Spinal Cord Injury Showcase to the British Columbia Legislature February 2012 and 2014, Experience UVic 2012.

Was the subject of a KnowEDGE profile published in the Times-Colonist ("Cells of Hope").

Interviewed by the UVic Newspaper The Martlet for the article "Can UVic attract more female engineers?" in August 2012.

Gave an invited presentation on the new Biomedical Engineering program to 20 students at North Island College in March 2012.

Gave an invited presentation "Engineering replacement organs: From stem cells to reality" to the local Café Scientifique held at the Strathcona Hotel, October 2011.

Hosted two 1 hour workshops on stem cells in my laboratory for the winners of the BC and Yukon Science Fairs as part of the Innovation Exploration in October 2011.

Was featured as part of B.C.'s Year of Science as one the of health researchers they profiled for their Science in Our Lives series in 2011.

Gave an invited presentation "Engineering tissues from stem cells" along with lab tours to approximate 30 young girls at the request of Science Ventures in March 2011.