

Ryan James Gilbert, Ph.D.

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EDUCATION

- Ph.D.** January 2006, in Biomedical Engineering, Case Western Reserve University, Advisor Dr. Ravi V. Bellamkonda
Dissertation Title: *Central nervous system injury changes the glycosaminoglycan character of chondroitin sulfate proteoglycans.*
- B.S.E.** December 1997, in Chemical Engineering, University of Michigan
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PROFESSIONAL EMPLOYMENT

- Assistant Professor** – Department of Biomedical Engineering, *Michigan Technological University*, Houghton, MI, November 2005 – Present
- Graduate Research Assistant** – Department of Biomedical Engineering, *Georgia Institute of Technology*, Atlanta, GA, August 2003 – November 2005
- Graduate Research Assistant** – Department of Biomedical Engineering, *Case Western Reserve University*, Cleveland, OH, September 1999 – August 2003
- Production Shift Supervisor** – Holcim, Dundee, MI, 1999
- Quality Assurance Technician** – Aastrom Biosciences, Inc., Ann Arbor, MI, 1998
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PROFESSIONAL AWARDS AND SERVICE ACTIVITIES

- Professional Awards
 - Whitaker Foundation Traineeship: (May 2000 – December 2002)
- Manuscript Reviewer for the following Journals:
Acta Biomaterialia, Journal of Biomedical Materials Research A, Journal of Neural Engineering, Tissue Engineering
- Professional Societies
 - American Society for Engineering Education (ASEE)
 - Biomedical Engineering Society (BMES)
- Short Courses and Workshops
 - Spinal Cord Injury Research Training Program Participant – 2006; NIH: NINDS – The Ohio State University

- Inducted into the Academy of Teaching Excellence – Michigan Technological University – 2008; Finalist: Distinguished Teaching Award in the Lecturer, Professor of Practice, or Assistant Professor Category

TEACHING EXPERIENCE

Instructor/Coordinator for the following courses at Michigan Technological University

- BE 2100 – Undergraduate Biomedical Engineering Seminar, Fall 2006, Fall 2007
- BE 2600 – Introduction to Biomedical Engineering, Spring 2007, Spring 2008
- BE 4110 – Neuroengineering, Spring 2007, Fall 2008
- BE 4930 – Drug and Gene Delivery, Fall 2007

Faculty Mentor (Senior Design)

- BE 4901/BE 4910 – Biomedical Design Project I and II
2006 Project: Design and Development of a CPR Mattress
1st Place Undergraduate Expo Award – Senior Design Projects
2007 Project: Modification of Spin Bike for Active Adults and Large Frame Riders

RESEARCH INTERESTS

- Hydrogel Drug Delivery within Injured Spinal Cord
- Hydrogel Development for Artificial Cartilage
- Coating Materials for Central Nervous System Probes/Sensors
- Scaffold Guides within Central and Peripheral Nervous Systems

CURRENT RESEARCH SUPPORT

Department of Energy, “Center for Fundamental and Applied Research in Nanostructured and Lightweight Materials,” May 2008-April 2009, Co-PI: Ryan Gilbert

Michigan Universities Commercialization Initiative, “Development of a Drug Releasing Hydrogel Blend that Solidifies Quickly at Physiological Temperatures,” June 2008-July 2009, PI: Ryan Gilbert

PAST RESEARCH SUPPORT

State of Michigan – Research Excellence Fund, “Development of Polymeric Nerve Guides for Neural Tissue Engineering Applications within the Central Nervous System,” July 2006 – June 2007, PI: Ryan Gilbert

NASA, Michigan Space Grant Consortium, “Use of Hydrogels to Reduce Osteoarthritic Outcomes within Articular Knee Cartilage,” Aug. 2007-July 2008, PI: Ryan Gilbert

State of Michigan – Research Excellence Fund, “Mentoring Program to Analyze Biomaterial Release of Therapeutic Agents in Modulating Inflammation and Improving Regeneration with the Injured Spinal Cord,” July 2007-June 2008, PI: Ryan Gilbert

LIST OF PUBLICATIONS

1. Martin, B.C., Minner, E.J., Wiseman, S.L., Klank, R.L., Gilbert, R.J., 2008, "Agarose and methylcellulose hydrogel blends for nerve regeneration applications," *Journal of Neural Engineering*, Vol. 5, No. 2, pp. 221-231.
2. Delvaux, A.B., Trombley, M.T., Rivet, C.J., Dykla, J.J., Jensen, D., Smith, M.R., Gilbert, R.J., 2008, "Design and development of a CPR mattress," *Journal of Critical Care Medicine*, Accepted.
3. Gilbert, R.J., McKeon, R.J., Darr, A., Calabro, A., Hascall, V.C., Bellamkonda R.V., 2005, "CS-4,6 is differentially upregulated in glial scar and is a potent inhibitor of neurite extension," *Molecular and Cellular Neuroscience*, Vol. 29, No. 4, pp. 545-558.
4. Zhong, Y., Yu, X., Gilbert, R., Bellamkonda, R.V., 2001, "Stabilizing electrode-host interfaces: a tissue engineering approach," *Journal of Rehabilitation Research and Development*, Vol. 38, No. 6, pp. 627-632.
5. Huelke, D.F., Gilbert, R.J., Schneider, L.W., "Upper extremity injuries from steering wheel deployments." Society for Automotive Engineers Technical Paper: 970493.
6. Heulke, D.F., Schneider, L.W., Reed, M.P., Gilbert, R.J., "Facial, periorbital, and ocular injuries related to steering-wheel airbag deployments," Society for Automotive Engineers Technical Paper: 970490.

• **Journal Papers in Review:**

7. Wang, H.B., Mullins, M.E., Cregg, J.M., Hurtado, A., Oudega, M., Trombley, M.T., Gilbert, R.J., "Creation of highly aligned electrospun poly-L-lactic acid fibers for nerve regeneration applications," *Journal of Neural Engineering*, Submitted.
8. Pap, M.M., Minner, E.J., Gilbert, R.J., "Positively charged dextran facilitates faster gelation of agarose/methylcellulose hydrogel blends," *Biomacromolecules*, Submitted.
9. Minner, E.J., Gilbert, R.J., "Glutathione released from an agarose/methylcellulose hydrogel blend rescues neurons from free radical induced damage," *Free Radical Biology and Medicine*, Submitted.

• **Journal Papers in Preparation:**

10. Cregg, J.M., Wiseman, S.L., Pietrzak, N.M., Smith, M.R., Jaroch, D.B., Clupper, D.L., Gilbert, R.J., "A statistically reproducible, quantitative method for measuring neurite outgrowth on two-dimensional biomaterial surfaces," *Journal of Neuroscience Methods*, In revision after review.
11. Cregg, J.M., Wang, H.B., Mullins, M.E., Gilbert, R.J., "Polymer film substrate stabilizes electrospun fiber morphology and allows for construction of implantable 3D scaffolds," *Biomedical Materials*, In preparation.

12. Johnson, B.M., Rivet, C.J., Gilbert, R.J., "Glucosamine released from a hydrogel blend affects *in vitro* human chondrocyte behavior," *Annals of Biomedical Engineering*, In Preparation.
13. McIntyre, S.K., Cregg, J.M., Wang, H.B., Mullins, M.E., Gilbert, R.J., "Application of a laminin-1 gradient to aligned microfibers to enhance the rate of directed neurite outgrowth," *Journal of Biomedical Materials Research A*, In Preparation.
14. Jaroch, D.B., Wiseman, S.L., Pietrzak, N.M., Clupper, D.L., Rickus, J.L., Gilbert, R.J., "Characterization of hybrid organo/inorganic sol-gel glasses that support neuronal adhesion and promote neurite extension," *Biomaterials*, In Preparation.

- **Conference Papers Accepted by Peer Review:**

1. Hurtado, A., Wang, H.B., Cregg, J.M., Mullins, M.E., Gilbert, R.J., Oudega, M., 2008, "Axonal guidance conduits containing aligned PLLA fiber implanted into the transected adult rat spinal cord," Biomedical Engineering Society Fall Meeting, Oct. 2-4, St. Louis, MO. USA.
2. Wang, H.B., Cregg, J.M., Hurtado, A., Oudega, M., Mullins, M.E., Gilbert, R.J., 2008, "Axonal guidance conduit containing aligned electrospun PLLA fibers direct *in vitro* neurite outgrowth," Biomedical Engineering Society Fall Meeting, Oct. 2-4, St. Louis, MO. USA.
3. Minner, E.J., Kigerl, K.A., Tovar, C.A., Guan, Z., Popovich, P.G., Gilbert, R.J., 2008, "Hydrogel system delivers glutathione and interleukin-10 to mitigate secondary injury following spinal cord damage," Biomedical Engineering Society Fall Meeting, Oct. 2-4, St. Louis, MO. USA.
4. Rausch, M., Wiseman, S., Tefft, D., Gilbert, R.J., 2008, "Developing coating techniques to apply drug carrying silica sol-gels to neural electrodes," Biomedical Engineering Society Fall Meeting, Oct. 2-4, St. Louis, MO. USA.
5. Cregg, J.M., Wang, H.B., Hurtado, A., Oudega, M., Mullins, M.E., Gilbert, R.J., 2008, "Migration of Schwann cells into PLLA channels containing aligned, electrospun fibers," Biomedical Engineering Society Fall Meeting, Oct. 2-4, St. Louis, MO. USA.
6. Pap, M.M., Minner, E.J., Gilbert, R.J., 2008, "Positively-charged dextran decreases gelation time of agarose/methylcellulose blend," Biomedical Engineering Society Fall Meeting, Oct. 2-4, St. Louis, MO. USA.
7. Minner, E.J., Gilbert, R.J., "Methylcellulose/agarose hydrogel system to release therapeutic agents," April 15-17, 2008, Design of Medical Devices Conference, Minneapolis, MN.
8. Cregg, J.M., Wang, H.B., Mullins, M.E., Gilbert, R.J., "Development of polymeric nerve guidance conduits that contain anisotropic cues including aligned microfiber gradients of adsorbed laminin-1," April 15-17, 2008, Design of Medical Devices Conference, Minneapolis, MN.
9. Rivet, C.J., Johnson, B.M., Gilbert, R.J., 2007 "Controlled Release of glucosamine affects chondrocyte activity *in vitro*." Michigan Space Grant Consortium 12th Annual Fall Conference, October 20th, Ann Arbor, MI. USA.

10. Cregg, J.M., Gilbert, R.J., 2007 "Anisotropic Micro-fibrous Scaffolds for Nerve Regeneration Applications," Biomedical Engineering Society Fall Meeting, Sept. 26-29, Los Angeles, California, USA.
11. Klank, R.L., Gilbert, R.J., 2007 "Characterizing the Release of Interleukin-10 from Agarose/Methylcellulose Hydrogels for Suppression of the Secondary Injury Response Following Spinal Cord Injury," Biomedical Engineering Society Fall Meeting, Sept. 26-29, Los Angeles, California, USA.
12. Minner, E.J., Gilbert, R.J., 2007 "Hydrogel Blend Regulates Glutathione Release to Neutralize Free Radicals within Neuronal Cultures," Biomedical Engineering Society Fall Meeting, Sept. 26-29, Los Angeles, California, USA.
13. Wang, H.B., Mullins, M.E., Trombley, M.T., Gilbert, R.J., 2007 "Optimizing Electrospinning Parameters to Create Aligned Fibers for Nerve Regeneration Applications," Biomedical Engineering Society Fall Meeting, Sept. 26-29, Los Angeles, California, USA.
14. Wiseman, S.L., Jaroch, D.B., Clupper, D.C., Dykla, J., Tefft, D., Gilbert, R.J., 2007 "Development of Novel Sol-Gel Glasses that Facilitate Neural Adhesion and Neurite Extension *in Vitro*," Biomedical Engineering Society Fall Meeting, Sept. 26-29, Los Angeles, California, USA.
15. Martin, B.C., Wiseman, S.L., Klank, R.L., Gilbert, R.J., 2006 "Novel Agarose and Methylcellulose Hydrogel Blends for *in Vivo* Injection into Injured Spinal Cord," Biomedical Engineering Society Fall Meeting, Oct. 11-14, Chicago, Illinois, USA.
16. Thazhath, R., Gilbert, R.J., McKeon, R., Zhong, Y., Bellamkonda, R.V., 2005 "Analysis of the Expression Profiles of Chondroitin Sulfate Sulfotransferases in Cell Culture *in Vitro*, in Adult Cortex, Immature Cortex, and Astroglial Scar *in Vitro*," Society for Neuroscience, Nov. 12-16, Washington, DC, USA.
17. Lee, H., Gilbert, R.J., Bellamkonda, R.V., 2005 "A Nanoparticle Mediated, Minimally Invasive Method of chABC Delivery to Treat Spinal Cord Injury," Society for Neuroscience, Nov. 12-16, Washington, DC, USA.
18. Gilbert, R.J., McKeon, R.J., Bellamkonda, R.V., 2005 "Chondroitin Sulfate Glycosaminoglycan Content within Injured Cortex Differs Between Immature and Mature Injured Brain Samples," Society for Neuroscience, Nov. 12-16, Washington, DC, USA.
19. Gilbert, R.J., Darr, A., Calabro, A., Hascall, V.C., McKeon, R.J., Bellamkonda, R.V., 2004 "Upregulated Sulfated GAGs in Glial Scar Inhibit Neurite Outgrowth in a Three Dimensional *in Vitro* Culture System," Society for Neuroscience, Oct. 23-27, San Diego, California, USA.
20. Gilbert, R.J., Bellamkonda, R.V., 2004 "A Tissue Engineering Approach in Understanding Regenerative Failure in the Central Nervous System," 7th World Biomaterial Congress, Sydney, Australia.
21. Gilbert, R.J., Bellamkonda, R.V., 2003 "Protein-deficient Chondroitin Sulfate Glycosaminoglycans Inhibit DRG Neurites," Society for Neuroscience, Nov. 8-12, New Orleans, Louisiana, USA.

22. Yu, X., Gilbert, R.J., Dodla, M., Jain, A., Bellamkonda, R.V., 2002 "A Tale of Bridges and Dams: Tissue Engineering in the Peripheral and Central Nervous Systems," Biomed 2002, 9th International Symposium on Biomedical Science and Technology, Ankara, Turkey.
23. Gilbert, R.J., Calabro, T., Hascall, V., LaPlaca, M., Bellamkonda, R.V., 2002 "Covalently-coupled Chondroitin Sulfate Glycosaminoglycans Inhibit DRG Growth Cones in a Novel Three-dimensional Culture System," Society for Neuroscience, Orlando, Florida, USA.
24. Gilbert, R.J., Corlette, S., Yu, X., Balgude, A., Bellamkonda, R.V., 2000 "E9 Chick Dorsal Root Ganglion Neurite Extension Dynamics within Three Dimensional Agarose Gels," Materials Research Society, Boston, Massachusetts, USA.
25. Gilbert, R.J., Corlette, S., Yu, X., Bellamkonda, R.V., 2000 "Growth Characterization of E9 Chick Dorsal Root Ganglion Neurite Expansion within Three-dimensional Agarose Gels," Kentucky Spinal Cord and Head Injury Research Symposium – 6th Annual Meeting, Lexington, Kentucky, USA.

PATENTS

1. Provisional Patent: "Development of methylcellulose/agarose blends that solidify quickly at physiological temperatures," Filed 4/16/07.
2. Utility Patent: "CPR Facilitating Mattress," In Preparation

INVITED LECTURES AND PRESENTATIONS

1. Gilbert, R.J., 2008, "Developing Novel Nerve Guidance Channels for Directed Nerve Regeneration," Mayo Clinic, Rochester, MN.
2. Gilbert, R.J., 2008, "Hybrid organo/inorganic Sol-gel Glasses Capable of Supporting Neuronal Attachment and Cellular Growth," University of Tennessee, Knoxville, TN.
3. Gilbert, R.J., 2007, "Development of Multiple Biomaterials to Repair the Injured Spinal Cord" Department of Biomedical Engineering, Syracuse University, Syracuse, NY.
4. Gilbert, R.J., 2006, "Developing Better Hydrogels for Nerve Regeneration Applications" Department of Chemistry, Michigan Technological University, Houghton, MI.
5. Gilbert, R.J., 2006, "Development of Biomaterials for Tissue Engineering Applications" Department of Chemical Engineering, Michigan Technological University, Houghton, MI.
6. Gilbert, R.J., 2005, "Hydrogels for Tissue Engineering Applications" Department of Biomedical Engineering, Michigan Technological University, Houghton, MI.

POST-DOCTORAL, GRADUATE, and UNDERGRADUATE STUDENTS SUPERVISED

Post-Doctoral Fellows

- Dr. Han Bing Wang (August 2008 - present)

Graduate Students

- Eric Minner, (August 2006 – Present) Ph.D. Student
- Han Bing Wang (August 2006 – May 2008) Awarded Ph.D. Chemical Engineering

Undergraduate Students

- Shobhika Dhingra (June 2005 – August 2005) B.S. from Georgia Institute of Technology
- Kellie McConnell (June 2005 – August 2005) B.S. from Mercer University REU
- Josh Dykla (June 2006 – August 2006; June 2007) B.S. from Michigan Tech.
- Chris Rivet (June 2006 – August 2006; June 2007 – August 2007) B.S. from Michigan Tech.
- Andrew Delvaux (June 2006 – August 2006), B.S. from Michigan Tech
- Matthew Trombley (June 2006 – August 2006), B.S. from Michigan Tech
- Rebecca Klank (June 2006 – August 2006; June 2007 – August 2007) SURF Award
- Sherri Wiseman (June 2006 – August 2006; June 2007 – August 2007), B.S. from Michigan Tech
- David Tefft (June 2006 – August 2006), B.S. from Michigan Tech
- Jared Cregg (June 2007 – Present)
- Brandon Johnson (June 2007 – August 2007), B.S. from Michigan Tech
- Kevin Kruse (June 2007 – August 2007) Joint Supervised with Dr. Keat Ghee Ong
- Nicole Pietrzak (June 2007 – August 2007), B.S. from Michigan Tech
- Sarah McIntyre (January 2008 – Present)
- Matt Pap (May 2008 – August 2008), B.S. from Michigan Tech
- Matt Rausch (May 2008 – Present)