Melissa J. Mahoney

Professional Experience

Professor Adjunct Chemical and Biological Engineering	August 2024 -Present
Part-time Teaching Professor Chemical and Biological Engineering	August 2022 - February 2024
Part-time Senior Instructor Chemical and Biological Engineering	August 2018 - 2022
Part-time Instructor Chemical and Biological Engineering	August 2014-2018
Part-time Lecturer, Chemical and Biological Engineering	August 2011-2014
Research Assistant Professor, Chemical and Biological Engineering	August 2009-2011
Assistant Professor, Chemical and Biological Engineering Engineering	Jan 2005 – 2009
Post-Doctoral Research Fellow, HHMI and University of Colorado	Dec 2002 – Dec 2004
Post-Doctoral Research Fellow, HHMI and Duke University	Sep 2001 – Sep 2002
Fellow, Neurobiology Course at Woodshole Marine Biology Laboratory	Jun 2001 – Aug 2001

Education

Ph.D. in Chemical Engineering, Cornell University *Ithaca, NY*	May 2000
B.S. in Chemical Engineering, Northwestern University *Evanston, IL*	May 1995

Honors and Awards

CU-Chemical & Biological Engineering Outstanding Undergraduate Teaching Award	2007
TR35 MIT Technology Review's Top Innovators under age 35	2005
University of Colorado, Junior Faculty Development Award	2005
BMES Rita Schaffer Memorial Young Investigator Award	2003
Professor Demetrios Papahadjopoulos Award for excellence in drug delivery research	1999
NASA Graduate Student Researchers Program Fellowship	1996-1999
Abel Wolman Graduate Student Fellowship	1995-1996

Mentored Student Awards

Ryan Soderquist, *Poster Award*, Rocky Mountain Regional Neuroscience Group Meeting, Denver, CO, 2008.

Teaching

CHEN 3220 Separations and Mass Transfer (2 sections)
CHEN 2820 Foundations of Bioengineering (3 sections)
CHEN 4838 Tissue Engineering and Medical Devices (5 sections)
CHEN 4130 Chemical Engineering Laboratory 2 (1 section)
CHEN 2810 Biology for Engineers (7 sections)
CHEN 4810 Senior Biological Engineering Laboratory (22 sections)

Publications

Research papers

Amer LD, Holtzinger A, Keller G, **Mahoney MJ**, Bryant SJ. "Enzymatically degradable poly(ethylene glycol) hydrogels for the 3D culture and release of human embryonic stem cell derived pancreatic

precursor cell aggregates." ActaBiomaterial 22:103-10 (2015). PubMed PMID: 25913222; PubMed Central PMCID: PMC4503244.

Mooney R, Haeger S, Lawal R, Mason M, Shrestha N, Laperle A, Bjugstad K, **Mahoney M**. "Control of neural cell composition in poly(ethylene glycol) hydrogel culture with soluble factors". Tissue Engineering Part A, 17:205-15 (2011).

Lampe KJ, Kern DS, **Mahoney MJ**, Bjugstad KB. "The administration of BDNF and GDNF to the brain via PLGA microparticles patterned within a degradable PEG-based hydrogel: Protein distribution and the glial response." J Biomed Mater Res A. 96:595-607 (2011).

Lampe KJ, Mooney RG, Bjugstad KB, **Mahoney MJ**. "Effect of macromer weight percent on neural cell growth in 2D and 3D nondegradable PEG hydrogel culture." J Biomed Mater Res A. 94(4):1162-71 (2010).

M Mason and **MJ Mahoney** "Inhibition of gamma-secretase activity promotes differentiation of rat embryonic pancreatic precursor cells into functional islet-like clusters in PEG hydrogel culture" in press, Tissue Engineering 16(8):2593-603 (2010).

M Mason and MJ Mahoney "A novel composite construct increases the vascularization potential of PEG hydrogels through the incorporation of large fibrin ribbons" J Biomed Mater Res A. 95(1):283-93 (2010).

RG Soderquist and **MJ Mahoney** "Microparticle Mediated Delivery for Long-Term Treatment of Neuropathic Pain Following a Single Injection" *Pharmaceutical Research*, 27:841-54 (2010).

K Lampe and **MJ Mahoney** "Impact of degradable macromer content in a PEG Hydrogel on neural cell metabolic activity, redox state, proliferation, and differentiation." *Tissue Engineering Part A*, 16:1857-66 (2010).

RG Soderquist, ED Milligan, J Harrison, RA Chavez, KW Johnson, LR Watkins and **MJ Mahoney**, "PEGylation of interleukin-10 for the mitigation of enhanced pain states" *Journal of Biomedical Materials Research A*, 93:1169-79 (2010).

MN Mason, Arnold CA, and **MJ Mahoney** "Entrapped collagen type 1 promotes differentiation of embryonic pancreatic precursor cells into glucose-responsive beta-cells when cultured in three-dimensional PEG hydrogels" *Tissue Engineering Part A*, 15:3799-808 (2009).

KJ Lampe, Namba RM, Silverman TR, Bjugstad KB, and **MJ Mahoney**, "Impact of Lactic Acid on cell proliferation and free-radical induced cell death in monolayer cultures of neural precursor cells." *Biotechnology and Bioengineering*, 103:1214-23 (2009).

Namba, RM, Cole AA, Bjugstad KB, and **Mahoney MJ**, "Development of porous PEG hydrogels that enable efficient, uniform cell-seeding and permit early neural process extension." *Acta Biomaterialia*, 5:1884-97 (2009).

Seiler MJ, Aramant RB, Seeliger M, Bragadottir R, **Mahoney M**, Narfstrom K, "Functional and structural assessment of retinal sheet allograft transplantation in feline hereditary retinal degeneration." *Veterinary Ophthalmology*, 12:158-69 (2009).

MN Mason and **MJ Mahoney**, "Selective beta-cell differentiation of dissociated embryonic pancreatic precursor cells cultured in synthetic polyethylene glycol hydrogels." *Tissue Engineering Part A*, 15:1343-52 (2009).

R. Soderquist, E. Milligan, L. Watkins, and **MJ Mahoney** "Controlled PEGylation of brain derived neurotrophic factor for preserved biological activity and enhanced delivery to the central nervous system." *Journal of Biomedical Materials Research*, 91:719-29 (2009).

Bjugstad KB, Redmond DE Jr, Lampe KJ, Kern DS, Sladek JR Jr, **Mahoney MJ**, "Biocompatibility of PEG-based hydrogels in primate brain." *Cell Transplant*, 17:409-15 (2008).

Seiler MJ, Thomas BB, Chen z, Arai S, Chadalavada S, **Mahoney MJ**, Sadda SR, Aramant RB, "BDNF-Treated Retinal Progenitor Sheets Transplanted to Degenerate Rats: Improved Restoration of Visual Function." *Experimental Eye Research,* 86:92-104 (2008).

MJ Mahoney and KS Anseth, "Contrasting effects of collagen and bFGF-2 on neural cell function in degradable synthetic PEG hydrogels." *J Biomed Mater Res A*, 81: 269-78 (2007).

Milligan ED, Soderquist RG, Malon SM, Mahoney JH, Hughes TS, Langer SJ, Sloane EM, Maier SF, Leinwand LA, Watkins LR, **Mahoney MJ**, "Intrathecal polymer-based interleukin-10 gene delivery for neuropathic pain." *Neuron Glia Biol*, 2:293-308 (2006).

Mahoney MJ, Miller J, Saltzman WM, "Impact of cell type and density on nerve growth factor distribution and bioactivity in 3-dimensional collagen gel cultures." *Tissue Engineering,* 12:1915-27 (2006).

M.J. Mahoney and K.S. Anseth, "Direct Visualization of Tissue Development and Function in Three Dimensional Materials by Confocal Microscopy." *Biomaterials*, 27: 2265-74 (2006).

Milligan ED, Sloane EM, Langer SJ, Hughes TS, Jekich BM, Frank MG, Mahoney JH, Levkoff LH, Maier SF, Cruz PE, Flotte TR, Johnson KW, **Mahoney MJ**, Chavez RA, Leinwand LA, Watkins LR, "Repeated intrathecal injections of plamsid DNA encoding interleukin-10 produce prolonged reversal of neuropathic pain" *Pain*, 126: 294-308 (2006).

Mahoney MJ and Saltzman WM, "Transplantation of brain cells assembled around a programmable, synthetic microenvironment." *Nature Biotechnology*, 19: 934-939 (2001).

Mahoney MJ and Saltzman WM. "Millimeter-scale positioning of a nerve-growth-factor source and biological activity in the brain." *Proceedings of the National Academy of Sciences*, 96:4536-39 (1999).

Saltzman WM, Mak MW, **Mahoney MJ**, Duenas ET, and Cleland JL. "Intracranial delivery of recombinant nerve growth factor: release kinetics and protein distribution from three delivery systems." *Pharmaceutical Research*, 16:232-240 (1999).

Mahoney MJ and Saltzman WM. "Cultures of cells from fetal rat brain: methods to control composition, morphology, and biochemical activity." *Biotechnology and Bioengineering*, 62:461-467 (1999).

Books

Milligan, ED, Soderquist, RG, and **Mahoney MJ**. Gene therapy via spinal neuroimmune interactions: new targets for clinical pain control. *In*: Synaptic Plasticity in Pain, Malgangio, M. (Ed), Springer, New York (2009), pp367-386. ISBN:978-1-4419-0225-2.

Rickman DW and **Mahoney MJ**. Targets for Neuroprotection. *In* Intraocular Drug Delivery, G.J. Jaffe, P.A. Pearson (Ed.), Marcel Decker, Inc. (2004).

Saltzman WM and **Mahoney MJ**. Cell structure and motion: a) extracellular matrix and cell adhesion. *In* Encyclopedia of Animal and Plant Cell Technology, Spier R (Ed.), Wiley, New York, p. 481-495 (2000).

Review articles

Milligan ED, Penzkover KR, Soderquist RG, **Mahoney MJ.** "Spinal interleukin-10 therapy to treat peripheral neuropathic pain." Neuromodulation. 2012 Nov-Dec;15(6):520-6; discussion 526. doi: 10.1111/j.1525-1403.2012.00462.x. Epub 2012 Jun 1. Review.

Amer LD, **Mahoney MJ**, Bryant SJ. "Tissue engineering approaches to cell-based type 1 diabetes therapy." Tissue Eng Part B Rev. 2014 Oct;20(5):455-67. doi: 10.1089/ten.TEB.2013.0462. Epub 2014 Apr 22.

RG Soderquist and **MJ Mahoney** "Intrathecal delivery of large molecular weight therapeutics" Expert Opinion on Drug Delivery, *Expert Opinion in Drug Delivery*, 7:285-293 (2010).

Alsberg E, von Recum H and **Mahoney MJ**, Environmental cues to guide stem cell fate decision for tissue engineering applications, *Expert Opinion on Biological Therapy*, 6:847-866 (2006).

Mahoney MJ and Saltzman WM, Controlled release of proteins to tissue transplants for the treatment of neurodegenerative disorders, *Journal of Pharmaceutical Science*, 85:1276-1281 (1996).

Intellectual property

1. Methods and compositions for the treatment of neuropathic pain. Patent Application filed through CU (2009).

Professional activities

Principles of Biomanufacturing: Using Biotechnology to Manufacture Medicines, MIT xPro (May 2024)
Scientific advisor, Xalud Therapeutics (2011 San Francisco, Ca)

Ongoing Support

Engineering Excellence Fund Major Proposal March 2024 "COVID Vaccine Production: A Learning Tool for Nanomedicine Manufacturing" ($44,567.34).

Completed Research Support

Engineering Excellence Fund Proposal Fall 2022 "Exploring Encapsulated Enzyme Kinetics in Batch and Continuous Processes" ($7549.41).

Engineering Excellence Fund Proposal (co-PI with Wendy Young) Spring 2018 "New Chemical and Biological Engineering Undergraduate Lab Experiments" ($11,695.55).

Engineering Excellence Fund Proposal November 2017 "Visualizing Fluorescent Probes in Cells" ($3000).

Engineering Excellence Fund Proposal (co-PI with Wendy Young and Learn ChemE) March 2014 "Developing the Next Generation Undergraduate Labs" in Chemical & Biological Engineering ($35,000).

Co-PI, NIH R01 "Spinal Neuroimmune Mechanisms Underlying IL-1 Gene Therapy for Pain Control" $225,020, 7/10– 7/15 (collaborator: Dr. Erin Milligan, University of New Mexico).

Co-PI, NIH R01 "Reconstruction of Nigrostriatal Pathway by Photopolymerized Neurotrophin Releasing Degradable Gels" $343,000 4/30/06 – 4/30/09 (collaborator: Dr. Kim Bjugstad, UCHSC).

Co-PI, Beta Cell Biology Consortium U01, "Generation of functional beta cells from stem and progenitor cells" $723,643, 1/11-6/14 (collaborator: Dr. Gordon Keller, University of Toronto).

PI, Beta Cell Biology Consortium Seed Grant "Photopolymerized Hydrogels for Pancreatic Precursor Cell Differentiation" $118,623 11/1/08 – 11/1/10.