# Rachel M. Schek, Ph.D.

## Qualification Summary

## Doctoral scientist with experience performing interdisciplinary research and in teaching in both online and on-ground teaching environments. Demonstrated abilities in problem solving, management of large projects, and collaborating with individuals from a variety of backgrounds. Experience developing curriculum and creating materials for written and oral presentation.

## Experience

### Assistant Professor, Trident University, Cypress, CA 2005-present

* Instruct students in mathematics and basic science at the introductory college level, moderate online discussions, provide individual assistance and communication, and grade assignments

### Contract Technical Writer and Editor, Burlington, VT 2010-2012

* Worked with 89 North, Inc. to produce white papers, marketing materials, user manual for new light source for biological research, and winning applications to the 2011 Vermont Governor’s Award for Environmental Excellence and the 2012 SPIE Prism Awards
* Served as an editor at American Journal Experts to prepare papers written by non-native English speakers for publication in scientific journals

### Post-doctoral Associate, University of Vermont, Burlington, VT 2009-2010

Advising Faculty: James Iatridis

* Developed a novel biocompatible patching material for the repair of spinal discs; optimized formulation and evaluated both biological and mechanical properties; material and methods currently patent pending
* Investigated differentiation of mesenchymal stem cells as potential regenerative agents for degenerate intervertebral discs

### Lead Engineer, Tissue Regeneration Systems, Ann Arbor, MI 2008-2009

* Independently managed product development projects at an early stage start-up; collaborated with an interdisciplinary team of medical device salespeople, regulatory consultants, clinicians, and engineers
* Wrote and served as Primary Investigator on a successful Phase I SBIR grant that brought in $100,000 to advance the use of fabrication technology for mandibular reconstruction
* Developed new rapid prototyping manufacturing process to produce resorbable polymer implants with patient-specific geometry for bone repair, targeting spine and craniomaxillofacial applications; optimized process parameters to produce mechanical properties consistent with bone tissue
* Supervised pre-clinical study to evaluate long-term degradation profile and tissue response to resorbable devices
* Managed engineering interns and developed supplier relationships; created documentation in preparation for regulatory review

### Graduate Researcher, University of Michigan, Ann Arbor, MI 2001-2004

* Completed doctoral research in a hard tissue engineering laboratory; performed independent research at the intersection of co-advisor’s expertise in bone biology and computational mechanical engineering; assisted with training and mentoring of junior students
* Thesis work focused on the combined use of designed, solid freeform fabricated scaffolds and gene therapy to engineer bone; experiments included *in vitro* cell culture work, scaffold manufacturing, animal surgeries, and evaluation of bone generation using histological, radiographic, and mechanical testing methods
* Developed novel methods for manufacture of porous biomaterial scaffolds and delivery of biofactors from designed scaffold; awarded patent for manufacturing method

## Technical Skills

*Life Sciences*- Mammalian cell culture, dissection and isolation of cells from whole tissue, gene insertion via viral infection, DNA and RNA isolation, flow cytometry, quantitative PCR, transmitted-light and fluorescence microscopy, histological staining and evaluation, rodent survival surgery and supervision of preclinical studies

*Engineering and material science*- Rapid prototyping/solid free form fabrication, mechanical testing, microcomputed tomography, image reconstruction and analysis, fabrication of scaffolds from polymers and ceramics, statistical design of experiments, failure mode analysis

*Software-*Microsoft Office, Microsoft Project, Solidworks, Magics, Matlab

## Education

### Ph.D., Biomedical Engineering, University of Michigan, Ann Arbor, MI 2001-2004

* **Advising Faculty**: Scott Hollister and Paul Krebsbach

### M.S.E., Biomedical Engineering/Biotechnology, University of Michigan, Ann Arbor, MI 1999-2001

* **Coursework included:** Quantitative Cell Biology, Instrumentation, Numerical Methods, Biostatistics, Tissue Engineering, Cellular Molecular Biomechanics, Tissue Mechanics, Quantitative Physiology

### B.S.E., Chemical Engineering with biology minor, Purdue University, West Lafayette, IN 1995-1999

## Papers

Taboas, J.M., Maddox, R.D., Krebsbach, P.H. and Hollister, S.J., Indirect Solid Free Form Fabrication of Local and Global Porous, Biomimetic and Composite 3D Polymer-Ceramic Scaffolds, Biomaterials, 24:181-194, 2003

Hollister, S.J., Maddox, R.D., and Taboas, J.M., Optimal Design and Fabrication of Scaffolds to Mimic Tissue Properties and Satisfy Biological Constraints, Biomaterials, 23:4095-4103, 2002.

Schek, RM, Hollister, SJ, Krebsbach, PH. Delivery and Protection of Adenoviruses using Biocompatible Hydrogels for Localized Gene Therapy. Molecular Therapy, 9:130-138, 2004.

Schek, RM, Taboas, JM, Segvich, SJ, Hollister, SJ, Krebsbach, PH. Engineered Osteochondral Grafts Using Bipahsic Composite Solid Free Form Fabricated Scaffolds. Tissue Engineering, 10:1376-1385, 2004.

 †Lin, C-Y, †Schek, RM, Mistry, AS, Shi, X, Mikos, AG, Krebsbach, PH, Hollister, SJ. Functional Bone Engineering Using Ex vivo Gene Therapy and Topology Optimized, Biodegradable Polymer Composite Scaffolds. Tissue Engineering. 11:1589-1598, 2005. *†These authors contributed equally to this manuscript.*

Williams, JM, Adewunmi, A, Schek, RM, Flanagan, CL, Krebsbach, PH, Feinberg, SE, Hollister, SJ, Das, S. Bone Tissue Engineering using Polycaprolactone Scaffolds Fabricated via Selective Laser Sintering. Biomaterials, 26:4817-27, 2005*.*

Schek, RM, Wilke, EN, Hollister, SJ, Krebsbach, PH. Combined use of Designed Solid Scaffolds and Adenoviral Gene Therapy for Skeletal Tissue Engineering. Biomaterials. 27:1160-1166, 2006.

Purmessur, D, Schek, RM, Abbott, RD, Ballif, BA, Godburn, KE, Iatridis, JC. Notochordal conditioned media as a method for pre-differentation of mesenchymal stem cells toward a nucleu pulposus phenotype for cell therapy. Arthritis Research & Therapy. 13(3):R81, 2011.

†Schek, RM, †Michalek, A, Iatridis, JC. Genipin crosslinked fibrin hydrogels for repair of the intervertebral disc. European Cells and Material Journal. 21:373-83, 2011. *†These authors contributed equally to this manuscript.*