

Steven Lammers

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EDUCATION

University of Colorado Boulder	PhD - Mechanical Engineering	2009
	Dissertation: "The Role of Elastin in Pulmonary Hypertensive Conduit Artery Stiffening"	
University of Colorado Boulder	MS - Mechanical Engineering	2006
Colorado State University	BS - Chemical Engineering	2000

PROFESSIONAL EXPERIENCE

University of Colorado Denver Health Science Center

Research Instructor - Bioengineering

2015-Current

- Design, programming and fabrication of bioprinter capable of printing cells and structural proteins in 3-dimensions.
- Synthesis, selection and development of bioprintable materials.
- Tissue engineering of 3-dimensional cellularized scaffolds.
- Synthesis and scale-up to production volumes for biocompatible reverse thermal gels.
- Instructor – Cellular and Molecular Biology: BioE-3051 Spring 2015
- Instructor – Introduction to Biodesign: BioE-3090 Spring 2015 - 2019
- Instructor – Tissue Engineering: BioE-4085 Fall 2016
- Instructor – Biodesign I: BioE-4035 Fall 2016, 2017
- Instructor – Biodesign II: BioE-4035 Fall 2016 - 2019

Universal Nanotech Corp.

Startup focused on developing semiconductor nanomaterials for use in next-generation batteries

Senior Project Engineer - Co Founder

2012-2015

- Developed novel methods of large-scale semiconductor nanoparticle fabrication.
- Fabrication and characterization of silicon and germanium nanomaterials.
- Design, engineering and controls of nanoparticle reactors (LabView, SolidWorks, JMP statistics).
- Design and production of distributed multi-cycle testing platforms for long-term battery deep cycle testing (AVR microcontroller, C/C++, PCB design, electrical design).
- Electrode chemistry and battery fabrication.
- Data management including design and operation of Ruby-On-Rails servers, MySQL database backend and HTML / LabView / Python front end UI for data acquisition.

University of Colorado Denver Health Science Center

Post-Doctoral Fellow - Cardiovascular Pulmonary Research Laboratory

2009-2012

- Research - Extracellular matrix mediated pulmonary vascular stiffening in pulmonary hypertension.
- Developed new equipment, methods and software to model the structure-function relationship of collagen and elastin in soft tissue mechanics.
- Worked with a 30+ member team of medical professionals in a multi-decade, multi-disciplinary research project aimed at treating heart failure resulting from pulmonary hypertension.
- Used, improved and maintained uniaxial and biaxial mechanical testing systems for analysis of soft-tissue mechanics in diseased tissues, collagen and elastin mechanics and smooth muscle function.
- Tissue sample harvesting from human, bovine and rat.
- Histochemical, Raman, TIRF and 2-photon microscope analysis of underlying collagen and elastin structure under progressive stages of decellurization and collagen removal.
- Developed and wrote image processing algorithms using MatLab to relate collagen and elastin structural changes to mechanical stiffening of arteries.
- Authored two grants, awarded one.
- Attended and presented at numerous conferences and professional society events.
- Mentored 3 students and managed soft-tissue mechanics lab.

University of Colorado Boulder

PhD Graduate Research Assistant - Mechanical Engineering Department

2004-2009

Uniaxial artery mechanics in pulmonary hypertension 2006-2009.

- Designed novel equipment, models and methods to study the role of elastin in material property changes of conduit pulmonary arteries in response to pulmonary hypertension, primarily in hypoxic rat and bovine models. Duties similar to those listed in post-doctoral fellowship above.

Microbubble ultrasound contrast functionalization 2005-2006

- Developed and characterized functionally-labeled lipid micelle microbubbles for targeted ultrasound contrast and drug delivery.

Micro-fabricated biopsy device for early detection of oral cancer 2004

- Designed, fabricated and tested a silicon etched micro-biopsy and in-situ microscopy platform for early detection of oral cancer

Jacobs Engineering

International provider of professional engineering and technical services.

Project Manager - Process Controls Engineer

2000-2003

- Project manager for small capital projects (<\$1M)
 - Developed and managed project scope, timeline and execution
 - Lead multi-disciplinary teams in contract engineering for non-IP sensitive projects within Eastman Kodak main facility, Rochester NY.
- Process controls engineer
 - Piping, hydrodynamics, process control element selection (valves, gages, flowmeters, etc...), HVAC, hazardous waste management, materials handling
 - Implemented 3D CAD design into an existing 2D drawing environment by training coworkers on AutoCAD – significantly increased productivity and client satisfaction.

PUBLICATIONS

Peer Reviewed Articles

- Kolene E. Bailey, Christopher Pino, Mallory L. Lennon, Anne Lyons, Jeffrey G. Jacot, **Steven R. Lammers**, Melanie Königshoff, Chelsea M. Magin “*Embedding of Precision-Cut Lung Slices in Engineered Hydrogel Biomaterials Supports Extended ex vivo Culture*” American Journal of Respiratory Cell and Molecular Biology, in Press, Sept 2019
- Kolene Bailey, Michael L. Floren, Tyler D’Ovidio, **Steven R Lammers**, Kurt Stenmark, Chelsea M Magin “*Tissue-Informed Engineering Strategies for Modeling Human Pulmonary Diseases*” AJP Lung Cellular and Molecular Physiology 316(2), Nov 2018
- Howard C, **Lammers S.** “Implementation of an Undergraduate Capstone Design Experience Centered on Development of an Open Source Bioprinter.” Rocky Mountain Bioscience Symposium 2017 Conference Proceedings. Denver, CO. 2017.
- Mark Reusser, Kendall S Hunter, **Steven R Lammers**, Kurt R Stenmark: Validation of a pressure diameter method for determining modulus and strain of collagen engagement for long branches of bovine pulmonary arteries. Journal of Biomechanical Engineering 05/2012; 134(5):054501.
- Lian Tian, **Steven R Lammers**, Philip H Kao, Joseph A Albietz, Kurt R Stenmark, H Jerry Qi, Robin Shandas, Kendall S Hunter: Impact of residual stretch and remodeling on collagen engagement in healthy and pulmonary hypertensive calf pulmonary arteries at physiological pressures. Annals of biomedical engineering 01/2012; 40(7):1419-33.
- Lian Tian, **Steven R Lammers**, Philip H Kao, Mark Reusser, Kurt R Stenmark, Kendall S Hunter, H Jerry Qi, Robin Shandas: Linked opening angle and histological and mechanical aspects of the proximal pulmonary arteries of healthy and pulmonary hypertensive rats and calves. AJP Heart and Circulatory Physiology 08/2011; 301(5):H1810-8.
- Kendall S Hunter, **Steven R Lammers**, Robin Shandas: Pulmonary vascular stiffness: measurement, modeling, and implications in normal and hypertensive pulmonary circulations. Comprehensive Physiology. 07/2011; 1(3):1413-35.
- Philip H Kao, **Steven R Lammers**, Lian Tian, Kendall Hunter, Kurt R Stenmark, Robin Shandas, H Jerry Qi: A microstructurally driven model for pulmonary artery tissue. Journal of Biomechanical Engineering 05/2011; 133(5):051002.
- Philip H Kao, **Steven R Lammers**, Kendall Hunter, Kurt R Stenmark, Robin Shandas, H Jerry Qi: Constitutive Modeling of Anisotropic Finite-Deformation Hyperelastic Behaviors of Soft Materials Reinforced by Tortuous Fibers. The international journal of structural changes in solids : mechanics and applications. 04/2010; 2(1):19-29.
- Kendall S Hunter, Joseph A Albietz, Po-Feng Lee, Craig J Lanning, **Steven R Lammers**, Stephen H Hofmeister, Philip H Kao, H Jerry Qi, Kurt R Stenmark, Robin Shandas: In vivo measurement of proximal pulmonary artery elastic modulus in the neonatal calf model of pulmonary hypertension: development and ex vivo validation. Journal of Applied Physiology 04/2010; 108(4):968-75.
- **Steven R Lammers**, Phil H Kao, H Jerry Qi, Kendall Hunter, Craig Lanning, Joseph Albietz, Stephen Hofmeister, Robert Mecham, Kurt R Stenmark, Robin Shandas: Changes in the structure-function relationship of elastin and its impact on the proximal pulmonary arterial mechanics of hypertensive calves. AJP Heart and Circulatory Physiology 10/2008; 295(4):H1451-9.

Book Chapters

- **Steven Lammers**, Devon Scott, Kendall Hunter, Wei Tan, Robin Shandas, Kurt R Stenmark: Mechanics and Function of the Pulmonary Vasculature: Implications for Pulmonary Vascular Disease and Right Ventricular Function. *Comprehensive Physiology*. 01/2012; 2(1):295-319.

Conferences and Presentations:

- "Microstructural Changes in Collagen and Elastin and Their Impact on the Mechanics of the Pulmonary Artery in Hypertension" ASME Summer Bioengineering Conference, Farmington, PA, June 2011
- "Quantitative Measures of Collagen and Elastin Microstructure In Health And Pulmonary Hypertension" American Thoracic Society International Conference, Denver, CO, May 2011
- "Quantification of Elastin Residual Stretch in Fresh Artery Tissue: Impact on Artery Material Properties and Pulmonary Hypertension Pathophysiology" ASME Summer Bioengineering Conference, Lake Tahoe, CA, June 2009
- "Impact of Elastin Biomechanics on Proximal Artery Stiffness in Pulmonary Hypertension" American Thoracic Society International Conference, Toronto, Ontario Canada, May 2008
- "Hypoxia-Induced Pulmonary Hypertension Increases Proximal Artery Stiffness Through Changes in the Structure-Function Relationship of Elastin" Mountain West Biomedical Engineering Conference, Park City, UT, September 2008
- "Contribution of Elastin to the Mechanical Properties of Arterial Tissues" ASME Summer Bioengineering Conference, Keystone, CO, June 2007
- "The Effect of Pulmonary Hypertension on the Structure and Mechanical Properties of Elastin" Mountain West Biomedical Engineering Conference, Park City, UT, September 2007
- "Changes in the Structure and Function of Arterial Elastic Lamellae as a Result of Pulmonary Hypertension" ASME Summer Bioengineering Conference, Amelia Island, FL, June 2006
- "Conjugation Efficiency of Functionalized Microbubbles for Targeted Ultrasound-Based Molecular Imaging" ASME Summer Bioengineering Conference, Vail, CO, June 2005

GRANTS AND AWARDS

Grants	Advanced Industries Accelerator Colorado Clinical and Translational Sciences Institute National Institutes of Health	AIA-2018/2020 CCTSI-2012/2011 NIH T32HL717134 NIH T32HL717133 NIH P50HL84923 NIH T32HL072738 NIH K24HL081506
Awards	3rd Place, PhD Student Paper Competition	ASME Bioengineering Conference, 2005

ONLINE AND SOCIAL MEDIA

Website & CV	www.SteveLammers.com
LinkedIn	www.linkedin.com/in/SteveLammers
Research Gate	www.researchgate.net/profile/Steven_Lammers