CV – KASPARS MALECKIS

PERSONAL DATA

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EDUCATION

2017 **Ph.D. Biomedical Engineering**, University of Nebraska-Lincoln
Dissertation title: "Towards precision nanomanufacturing for mechanical design: from individual nanofibers to mechanically biomimetic nanofibrillary vascular grafts".

2012 **M.S. Engineering Mechanics**, University of Nebraska-Lincoln, dual degree with:

2012 **M.S. Materials Engineering**, University of Rouen, France
Thesis title: "Mechanical properties and structure of DNA and collagen nanofilaments"

2010 **B.S. Civil Engineering**, Riga Technical University, Latvia.
Thesis title: "Analysis of pre-stressed timber-FRP composite beam performance"

PROFESSIONAL EXPERIENCE

2017-now **Postdoctoral Research Associate**, CASEA laboratory, University of Nebraska Medical Center, Omaha, Nebraska

- Developed mechanically biomimetic nanostructured vascular graft material that shows improved surgical handling and regeneration *in vivo*
- Characterized and analyzed mechanical properties of endovascular stents and stent grafts
- Developed biomimetic small and large diameter vascular grafts and stent-grafts
- Evaluated occlusion and burst events for ER-REBOA and Coda endovascular balloons in over 50 human cadaveric abdominal and thoracic aortas
- Studied vascular smooth muscle cell interactions with biomimetic nanofibrillar materials under physiological deformations
- Performed biaxial mechanical analysis of human and animal soft tissues

2012-2017 **Graduate Research Assistant**, Dr. Yuris Dzenis laboratory of advanced nanomaterials and nanomanufacturing, University of Nebraska-Lincoln, Lincoln, Nebraska

- Developed and tested non-linear and anisotropic nanostructured vascular graft materials
- Manufactured and characterized individual biological and synthetic nanofibers
- Planned and managed undergraduate student research projects
- Collaborated with scientists from US and international universities, national labs, and other institutions
- Developed grant proposals

2006-2010 **Construction Designer**, JMR-Frame Ltd., Riga, Latvia.

- Designed timber and steel structures for civil and industrial buildings
- Developed and altered technical projects of civil buildings
- Collaborated with architects and engineers
- Supervised on-site and factory assembly processes

RESEARCH INTERESTS

- Nanostructured materials
- Development of biomimetic cardiovascular materials and devices
- Biological and biocompatible polymers

EXPERIMENTAL EXPERTISE

Cardiovascular Device and Material Development and Characterization

- Development and characterization of biomimetic nanostructured vascular grafts and stent grafts
- Mechanical evaluation and optimization of NiTi endovascular stents, stent-grafts, and NiTi material properties
- Occlusion and burst event characterization for resuscitative endovascular balloon occlusion of aorta (REBOA) catheter balloons in human and pig aortas

Tissue and Cell Experiments

- Cell isolation from human and animal tissue
- Static and mechanically stimulated cell culture
- Mechanical characterization of human and animal soft tissues

Manufacturing of Nanostructured Materials

- Electrospinning of biological and synthetic polymer nanofiber materials for biomedical applications
- Development of hierarchical nanomaterials

Structural Characterization Techniques for Polymer-Based Materials and Nanomaterials

- Polarized Raman spectroscopy
- Electron microscopy – SEM, TEM, ED, and HRTEM
- Polarized light microscopy
- X-ray diffraction
- Thermal analysis – TGA, DSC
- Fluorescence microscopy

Mechanical testing

- Nanomechanical testing
- Uniaxial tensile, three-point bending, uniaxial compression, torsion, and fatigue testing
- Biaxial tensile testing
- Dynamical mechanical testing
- In-situ SEM tensile testing

HONORS AND AWARDS

2015 **Carl Klason Award** at PolyChar 23rd World Forum on Advanced Materials, Lincoln, NE.

2013 **NSF Travel Award** for ASME-IMECE conference, San Diego, CA.

2013 **NSF Travel Award** for NRF-NSF Advanced Manufacturing Workshop, Seoul, Korea.

2010 **Mobility and Accommodation Grant** for EU-US Atlantis program.

2010 **Prizewinner of 51st Student Scientific Conference**, Riga Technical University, section of Building Constructions.

2000 **President of Latvia Award** for excellence in Nikolai Rubinstein's 5th international pianist competition in Paris, France.

PATENTS AND INVENTIONS

2018 Windkessel-preserving aortic stent-graft. Provisional patent application. April 2018.

2018 Manufacturing Technology of Biaxially Non-Linear and Anisotropic Nanofiber-based Vascular Graft Materials. Provisional patent application. January 2018.

MEMBERSHIPS IN PROFESSIONAL SOCIETIES

2017-now Society of Mechanics of Biomaterials and Tissues.

2017-2018 Biomedical Engineering Society.

2016-2017 American Heart Association.

2013-2014 American Society of Mechanical Engineers.

2012-2013 Materials Research Society.

ORAL PRESENTATIONS AND WORKSHOPS AT NATIONAL AND INTERNATIONAL MEETINGS

2017 **Oral presentation** at 7th International Conference on Mechanics of Biomaterials and Tissues, symposium: Biomedical materials. Waikoloa, HI.

2015 **Oral presentation** at PolyChar 23rd World Forum on Advanced Materials, symposium: Biomaterials, Drug Delivery, and Tissue Engineering. Lincoln, NE.

2013 **Oral presentation** at ASME-IMECE, symposium: Advanced Nanomanufacturing and Mechanics of Structural Nanomaterials, San Diego, CA.

2013 **Student participant** in US delegation of NRF-NSF Advanced Manufacturing Workshop, Seoul, South Korea.

2012 **Oral presentation** at SES 49th annual technical meeting symposium of Nanoengineering for Regenerative Medicine and Tissue Engineering, Atlanta, GA.

2012 **Oral presentation** at MRS spring meeting, symposium: DNA nanotechnology. San Francisco, CA

POSTER PRESENTATIONS AT NATIONAL AND INTERNATIONAL MEETINGS

2017 **Poster presentation** at BMES/FDA Medical Devices Conference. Washington, DC.

2013 **Poster presentation** at ASME-IMECE, symposium: Advanced Nanomanufacturing and Mechanics of Structural Nanomaterials, San Diego, CA.

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SCIENTIFIC PUBLICATIONS

2018 **K**. **Maleckis**, E. Anttila, P. Aylward, W. Poulson, A. Desyatova, J. MacTaggart, A. Kamenskiy: "Nitinol Stents in the femoropopliteal artery: a mechanical perspective on material, design, and performance", published in Annals of Biomedical Engineering

2018 J. MacTaggart, W. Poulson, A. Seas, P. Deegan, C. Lomneth, A. Desyatova, **K. Maleckis**, A. Kamenskiy: "Stent Design Affects Femoropopliteal Artery Deformation", published in Annals of Surgery.

2017 **K**. **Maleckis**, P. Deegan, W. Poulson, C. Seviers, A. Desyatova, J. MacTaggart, A. Kamenskiy: "Comparison of femoropopliteal artery stents under axial and radial compression, axial tension, bending, and torsion deformations", published in Journal of the Mechanical Behavior of Biomedical Materials.

2017 A. Desyatova, W. Poulson, P. Deegan, C. Lomneth, A. Seas, **K. Maleckis**, J. MacTaggart, A. Kamenskiy: "Limb flexion-induced twist and associated intramural stresses in the human femoropopliteal artery", published in the Journal of the Royal Society Interface.

2013 **K. Maleckis***, D. Papkov*, Y. Zou, M. N. Andalib, A. Goponenko, and Y. A. Dzenis: "Nano to Macro: Mechanical Evaluation of Macroscopically Long Individual Nanofibers", published in Society for Experimental Mechanics (conference), Costa Mesa, CA, USA

ARTICLES IN PREPARATION FOR PUBLICATION IN SCHOLARLY JOURNALS

2018 **K. Maleckis**, Y. Dzenis: "Continuous DNA nanofibers with extraordinary mechanical properties and high molecular orientation", under review.

2018 **K. Maleckis**, J. MacTaggart, E. Lichter, B. Deegan, Y. Dzenis, A. Kamenskiy: "Development and in-vivo evaluation of biomimetic nanofibrillar peripheral arterial vascular graft material", in preparation.

2018 **K. Maleckis**, P. Deegan, T. Kalil, J. MacTaggart, A. Kamenskiy: "Benchtop evaluation of occlusion and burst parameters of endovascular REBOA balloons in human cadaveric aortas. Part I", in preparation.

PUBLISHED ABSTRACTS

2018 **K. Maleckis**, P. Deegan, T. Kalil, J. MacTaggart, A. Kamenskiy: "Safe Balloon Occlusion Pressures and Volumes for Resuscitative Endovascular Balloon Occlusion of the Thoracic and Abdominal Aorta", Military Health System Research Symposium (MHSRS).

2017 **K. Maleckis**, Y. Dzenis, A. Kamenskiy, J. MacTaggart: "Biomimetic Nanofiber-Based Graft Material for Vascular Applications", 7th International Conference on Mechanics of Biomaterials and Tissues.

2017 **K. Maleckis**, P. Deegan, C. Sievers, A. Desyatova, J. MacTaggart, A. Kamenskiy: Mechanical Evaluation of Peripheral Artery Stents", BMES/FDA Frontiers in Medical Devices Conference.

SYNERGISTIC ACTIVITIES

2016-2017 Member of the Graduate Research Association at the University of Nebraska-Lincoln, Lincoln, Nebraska