

MADDISON SEGAL

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EDUCATION:

Duke University, Durham, NC

Ph.D. in Mechanical Engineering & Materials Science

Advisor: Dr. Matthew Becker

Aug '22 to Current

GPA: 4.0/4.0

University of Akron, Akron, OH

B.S. in Biomedical Engineering

Minor in chemistry & specialization in biomaterials & tissue engineering

Aug '18 to May '22

GPA: 4.0/4.0

Relevant Coursework:

Mechanical Engineering: Calculus, differential equations, physics, statistics, mechanics of solids, dynamics, thermodynamics, human factors engineering, rheology

Materials Science: Biomaterials, polymeric material science, modern materials, nanobiomechanics

Biomedical Engineering: Biomedical engineering design, human anatomy & physiology, biology, biomedical computing, transport fundamentals, mechanics of biological tissues, biomedical ethics, biophysical measurements, drug delivery, FDA regulation & reimbursement

Chemistry: Inorganic chemistry, organic chemistry, biochemistry, polymer chemistry, bioconjugations

Soft Skills: Interdisciplinary project management, communicating research, business fundamentals, narrative design, mentoring

TECHNICAL SKILLS:

Polymer synthesis: Schlenk line, cannulation, distillation, sublimation, precipitation, liquid-liquid extraction, rotary evaporation, column chromatography, dialysis

Polymer characterization: nuclear magnetic resonance (NMR), thermogravimetric analysis (TGA), differential scanning calorimetry (DSC), gel permeation chromatography (GPC)/size exclusion chromatography (SEC), matrix assisted laser desorption/ionization time of flight (MALDI TOF), Fourier transform infrared (FT-IR) spectroscopy, rheology, tensile testing, compression testing, mylar loop testing, dynamic mechanical analysis (DMA), micro computed tomography (μ CT), degradation testing, histological analysis of *in vivo* explants

Polymer processing: digital light processing (DLP) 3D printing, fused filament fabrication (FFF) 3D printing, direct ink write (DIW) 3D printing, compression molding, film casting

Software: nTop, SOLIDWORKS, Autodesk Inventor, MestReNova, TRIOS, Prism Graphpad, Envision One RP, Carbon, Zotero, EndNote, MATLAB, Markdown, Microsoft Excel, Microsoft Word, Microsoft PowerPoint

PUBLICATIONS:

A.P. Dhand, R.H. Bean, V. Chiaradia, A.J. Commisso, D. Dranseike, H.E. Fowler, J.M. Fraser, H. Howard, T. Kaneko, J. Kim, J.M. Kronenfeld, K.S. Mason, C.J. O'Dea, F. Pashley-Johnson, D.H. Porcincula, **M.I. Segal**, S.Yu, M.A. Saccone, Advances in vat photopolymerization: early-career researchers shine light on a path forward, *RSC Applied Polymers*, 2025, DOI: 10.1039/D5LP00010F

N.G. Judge, **M. Segal**, R.O. Silzer, C.S. Dziewior, Y.M. Chan, S.J. Grovogel, M.L. Becker, Semiaromatic Polyester-Ethers with Tunable Degradation Profiles, *ACS Macro Lett.*, 2024, DOI: 10.1021/acsmacrolett.4c00617

M. Segal, A.J. Bahnick, N. Judge, M.L. Becker, Synthesis and Solvent Free DLP 3D Printing of Degradable Poly(Allyl Glycidyl Ether Succinate), *Angew Chem. Int. Ed.*, 2024, DOI: 10.1002/adhm.202414016

A.J. Bahnick, C.S. Dziewior, Y. Li, A. Chou, **M. Segal**, E.K. Augustine, R. Ji, M.L. Becker, Controlled Transdermal Delivery of Dexamethasone for Pain Management via Photochemically 3D-Printed Bioresorbable Microneedle Arrays, *Advanced Healthcare Materials*, 2024, DOI: 10.1002/adhm.202402113

G. Pacheco, J.A.Gomes, K. Cho, D.L. Morris, **M. Segal**, K.R. Adkins-Travis, E. Stancliffe, G.J. Patti, C.J. Ziegler, L.P. Shriver, Iron Accumulation and Metabolic Alterations in Aneurysmal Subarachnoid Hemorrhage, *Stroke: Vascular and Interventional Neurology*, 2024, DOI: 10.1161/SVIN.123.000848

K. Poon, **M. Segal**, A. Bahnick, Y.M. Chan, B. Gao, M.L. Becker, C.K. Williams, Digital Light Processing to Afford High Resolution and Degradable CO₂-Derived Copolymer Elastomers, *Angew Chem. Int. Ed.*, 2024, DOI: 10.1002/anie,202407794

D. Ortiz-Ortiz, A.H. Mokarizadeh, **M. Segal**, F. Dang, M. Zafari, M. Tsige, A. Joy, Synergistic Effect of Physical and Chemical Crosslinkers Enhances Shape Fidelity and Mechanical Properties of 3D Printable Low Modulus Polyesters, *Biomacromolecules*, 2023, DOI: 10.1021/acs.biomac.3c00684

PATENTS:

M.L. Becker, R. Thompson, **M. Segal**, Self-Polymerizing, Radiopaque Resin for Percutaneous Vertebroplasty Aug '24
M.L. Becker and **M. Segal**, Solvent Free Resorbable Resin for 3D Printing Aug '23

PRESENTATIONS:

Poster Presentation, Polymers Gordon Research Conference June '25
Oral Presentation, RadTech UV & EB Technology Conference May '25
Oral Presentation, Duke GradX Symposium Apr '25
Oral Presentation, 3 Minute Thesis (3MT) Competition at the Conference of Southern Graduate Schools Mar '25
Poster Presentation, Duke Chemistry Recruitment Feb '25
Poster Presentation, Duke Mechanical Engineering & Materials Science 2024 Research Symposium Feb '25
Oral Presentation, Carolina Science Symposium Nov '24
Guest Lecture on Polymer Additive Manufacturing in Polymer Synthesis & Processing Class Oct '24
Poster Presentation, Duke Materials Initiative Signature Lecture Poster Session Sept '24
Poster Presentation, Additive Manufacturing of Soft Materials Gordon Research Conference Aug '24
Oral Presentation, Duke 3 Minute Thesis (3MT) Final Competition Aug '24
Oral Presentation, Duke 3 Minute Thesis (3MT) Preliminary Competition July '24
Guest Speaker, Duke STEM Academy June '24
Oral Presentation, Duke Mechanical Engineering & Materials Science 2024 Research Symposium Feb '24
Oral Presentation, Duke Materials Research Society Symposium Nov '23
Guest Lecture on Polymer Additive Manufacturing in Characterization of Polymeric Materials Class Sept '23
Guest Speaker, University of Akron Phi Delta Epsilon Feb '23
Poster Presentation, University of Akron BME Research Day 2022 Feb '22
Poster Presentation, University of Akron NSF REU Poster Session 2021 Aug '21

AWARDS AND RECOGNITIONS:

2025 RadLaunch Award Apr '24
RadTech UV & EB Association Award for innovative applications of UV technology
Best Teaching Assistant Award Dec '24
Duke Mechanical Engineering & Materials Science Department Award for outstanding TA performance
Carolina Science Symposium Student Oral Presentation First Prize Nov '24
First Place Student Speaker Award at the 2024 Carolina Science Symposium
Duke 3 Minute Thesis (3MT) First Place Award Aug '24
First Place Award in Duke School of Medicine & Pratt School of Engineering 3MT Final Competition
Duke 3 Minute Thesis (3MT) Top 10 Preliminary Competitor July '24
Top 10 Presenter in Duke School of Medicine & Pratt School of Engineering 3MT Preliminary Competition

NSF Graduate Research Fellowship Program (GRFP) Honorable Mention*March '24*

Recognition for an outstanding application to the NSF GRFP

Pratt Gardner Fellowship*Aug '22*

Duke University Pratt School of Engineering fellowship for outstanding PhD applicants

Summa Cum Laude*May '22*

University of Akron 2022 summa cum laude graduate

Student Commencement Speaker*May '22*

University of Akron College of Engineering & Polymer Science 2022 commencement student speaker

Outstanding BME Student Award*May '22*

University of Akron biomedical engineering student department award

Top Ten Senior Award*May '22*

University of Akron Williams Honors College award

Williams Honors College Graduate*May '22*

University of Akron honors college requirement completion including a senior honors capstone project

President's List*May '22*

University of Akron award for maintenance of a 4.000 GPA for entire undergraduate career (ten semesters)

Best Senior Capstone Engineering Project Award*Apr '22*

University of Akron 2022 Senior Capstone Day award for best project, poster, and presentation

Karen M. Mudry Achievement Award*Feb '22*

University of Akron BME Research Day 2022 award for outstanding undergraduate research

Best Design Award*Dec '18*

University of Akron Introduction to BME Design course award

Buckingham Orr Scholarship*Aug '18*

University of Akron full scholarship including undergraduate tuition, housing, and meal plan for four years

Williams Honors College*Aug '18*

University of Akron honors college acceptance

Valedictorian*May '18*

General McLane High School class of 2018 valedictorian

Summa Cum Laude*May '18*

General McLane High School class of 2018 summa cum laude

Student Commencement Speaker*May '18*

General McLane High School class of 2018 commencement student speaker

EXTRACURRICULARS:**MEMS Graduate Student Committee, Communications Director***Aug '22 to Current*

Duke University, Mechanical Engineering & Materials Science (MEMS) Department

- Created posters, calendar invites, and emails to advertise department events
- Assisted in planning of department social, volunteering, and educational events
- Initiated programming specifically for underserved graduate student populations
- Assisted in annual department PhD student recruitment events

Duke Engineering Graduate Ambassadors, Communications Liaison*Aug '23 to May '25*

Duke University, Pratt School of Engineering

- Mentored prospective graduate students by answering questions about graduate school and editing application materials
- Updated and maintained the organization's website
- Planned mentoring workshops for Duke graduate students serving as mentors
- Completed all external communication on behalf of the organization

Duke Developing Project Management Trainees (DEVELPMNT)*Feb '25 to Apr '25**Duke University*

- Formal workshops focused on project management topics and tools
- Expanded project management network through interactions with guest speakers
- Gained insight into careers in project management

THRIVE at Duke*Sept '23 to Dec '23**Duke University, Pratt School of Engineering*

- Duke University mentorship program for engineering PhD students
- Fostered diversity, equity, and inclusion across students from a variety of engineering disciplines

Duke Design Health*Aug '23 to Dec '23**Duke University*

- Identified unmet needs and areas of opportunity for innovation in medicine, focusing on upper airway stenosis
- Worked in an interdisciplinary team with backgrounds in engineering, medicine, and business

MEMS Mentoring Network, Lead student*Aug '22 to May '23**Duke University, Mechanical Engineering & Materials Science (MEMS) Department*

- Organized and led all mentoring network meetings including coffee chats, garden walks, and campus outings

Senior Engineering Capstone Project, Team Captain*Aug '21 to May '22**University of Akron, Biomedical Engineering Department*

- Used FDA medical device design process to create a hands-free fitted shoe for people with mobility issues
- Organized and led all team meetings as well as completed all external communication on behalf of team
- Presented periodic progress reports to mentors and poster presentations to the public
- Maintained an online design history file (DHF)

Phi Delta Epsilon, President, Secretary, and Risk Management Officer*Jan '19 to May '22**University of Akron*

- Organized and led weekly meetings for nearly sixty members
- Organized and led executive board meetings to plan for chapter weekly meetings
- Communicated with national office to complete chapter paperwork
- Enforced membership policies such as attendance and etiquette
- Wrote weekly newsletters sent to all members to ensure a coherent understanding of future plans and expectations

Volunteer*Sept '18 to Mar '20**Cleveland Clinic Akron General Hospital*

- Volunteered in the Transportation, Heart & Vascular, and Discharge Departments to improve patient care
- Volunteered over 165 hours prior to the COVID-19 pandemic

EMPLOYMENT:**Polymer Science Graduate Research Assistant***Aug '22 to Current**Duke University, Mechanical Engineering & Materials Science (MEMS) Department*

- Focused on the development of novel polymeric materials that are biocompatible, 3D printable, and degradable
- Gained technical expertise in the areas of polymer synthesis, polymer characterization, 3D printing, mechanical testing, and animal modeling
- Assisted fellow researchers with 3D printing, mechanical testing, and histological analysis of materials
- Mentored undergraduate students and early career graduate students

Polymer Science Teaching Assistant*Aug '23 to Dec '24**Duke University, Mechanical Engineering & Materials Science (MEMS) Department*

- Lectured on molecular weight distribution, polymer architecture, and 3D printing of polymers
- Reviewed all homework problems in weekly office hours
- Created exam review guides, worksheets, and practice problems prior to midterm & final exams
- Graded all homework assignments and assisted with exam grading

Organic Chemistry Learning Assistant*Jun '20 to May '22**University of Akron, Department of Student Success*

- Lectured on review content for up to eighty students for four hours per week
- Created exam review sheets and practice problems for students
- Maintained a private YouTube channel with recorded lectures for student use

STEM Tutor*Jan '19 to May '21**University of Akron, Department of Student Success*

- Tutored individuals and small groups of undergraduate students in algebra, calculus, physics, biology, anatomy, chemistry, and organic chemistry

OTHER:

MCAT Score: 522 (99th percentile)*Jan '21***Hobbies:** Dog training, hiking, baking, motorcycles, reading