MADDISON SEGAL

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EDUCATION:

Duke University, Durham, NC *Aug '22 to Current*
Ph.D. in Mechanical Engineering & Materials Science GPA: 4.0/4.0
Advisor: Dr. Matthew Becker

University of Akron, Akron, OH *Aug '18 to May '22*
B.S. in Biomedical Engineering GPA: 4.0/4.0
Minor in chemistry & specialization in biomaterials & tissue engineering

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 (μCT), degradation testing, histological analysis of *in vivo* explants
Polymer processing: digital light processing (DLP) 3D printing, continuous liquid interface production (CLIP) 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, Envison 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/anie.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*
Poster Presentation, Duke BASF Research Day *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 (99^{th} percentile) *Jan '21*

Hobbies: Dog training, hiking, baking, motorcycles, reading