BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Gormley, Adam Joseph

eRA COMMONS USER NAME (credential, e.g., agency login): ADAMGORMLEY

POSITION TITLE: Assistant Professor, Biomedical Engineering

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
Lehigh University, Bethlehem, PA	B.S.	05/2006	Mechanical Engineering
University of Utah, Salt Lake City, UT	Ph.D.	12/2012	Bioengineering
Imperial College London, London, United Kingdom	Postdoctoral	10/2015	Biomaterials
Karolinska Institute, Stockholm, Sweden	Postdoctoral	12/2016	Biomaterials and Biophysics

A. Personal Statement

In January 2017 I transitioned into an independent position as Assistant Professor of Biomedical Engineering at Rutgers University. This critical step has happened at an excellent time. Having spent the previous ten years training in world renowned laboratories of Prof. Hamid Ghandehari (PhD) and Prof. Molly Stevens (postdoc), my perspective has matured, and I am able to conceptualize new fields of research. Recent advances in **combinatorial polymer chemistry**, **robotics**, and **artificial intelligence / machine learning (AI/ML)** provides new data-driven opportunities to study the nano-bio interface in new and unexplored ways.

The main goal of my laboratory is to develop bioactive nanomaterials that directly engage and sometimes manipulate proteins (i.e., cell receptors and therapeutic proteins). This nano-bio interface is incredibly complex to engineer, and human rational design is limited by its capacity to fully comprehend the entire structure-function landscape. To address this shortcoming, we have been developing a fully automated self-driving lab for combinatorial structure-activity processing and data-driven design (**Contributions to Science #1 & 2**). These techniques build on the discovery of air tolerant and combinatorial polymer chemistry by myself and collaborators since 2014 (**Contributions to Science #3**). I strongly believe that fully trained AI/ML models are ideal tools to engineer the complex nano-bio interface because they are able to incorporate nuanced and diverse structure-activity information that may hold the key to unlocking the full potential of bioactive materials.

C.E. Miles, S.L. Fung, N.S. Murthy, **A.J. Gormley**, 2022. Polymer texture influences cell responses in osteogenic microparticles. ***Cellular and Molecular Bioengineering***. 15: 409-423.

C.E. Miles, A.D. Bernstein, T.M.O. Popp, N.S. Murthy, A.J. Nieuwkoop, **A.J. Gormley**, 2021. Control of drug release from microparticles by tuning their crystalline textures: A structure–activity study. ***ACS Applied Polymer Materials***. 3: 6548-6561.

M.J. Tamasi, **A.J. Gormley**, 2022, Biologic formulation in a self-driving biomaterials lab. ***Cell Reports Physical Science***. 3: 101041.

M. Tamasi, R.A. Patel, C.H. Borca, S. Kosuri, H. Mugnier, R. Upadhya, N.S. Murthy, M.A. Webb, **A.J. Gormley**, 2022. Machine learning on a robotic platform for the design of polymer-protein hybrids. ***Advanced Materials***. 34: 2201809.

Ongoing Research Support

NSF MFB, 2226816
Gormley (co-PI) 09/01/2022-08/31/2025
Title: MFB: Targeting the dark proteome by machine-learning-guided protein design
The goal of this collaborative project is to develop a novel intrinsically disordered protein targeting framework using machine learning-design proteins.

NSF DMREF, 2118860
Gormley (PI) 10/01/2021-09/30/2025
Title: Collaborative research: DMREF: Machine learning and robotics for the data-driven design of protein-polymer hybrid materials
The major goal of this project is to develop a generalizable machine learning model that will assist with the design of polymer-protein hybrid materials used in commercial and industrial applications.

NIH NIGMS, R35GM138296
Gormley (PI) 09/01/2020-08/31/2025
Title: Tuning multivalency for optimized ligand presentation
The major goal of this project is to tune the multivalency of peptides presented from polymer scaffolds so that we can program receptor organization and cell behavior at the nano-bio interface.

NSF CBET, 2009942
Gormley (PI) 07/01/2020-06/30/2023
Title: Semi-automated discovery of synthetic polymers with protein features
The major goal of this project is to characterize the size, flexibility, compactness, and assembly of single-chain polymer nanoparticles and use them to make hierarchical organized materials.

Completed Research Support

NSF I-Corps, 2037751
Gormley (PI) 08/05/2020-01/31/2023
Title: I-Corps: Software to enable use of robotic liquid handlers to produce synthetic polymers
The goal of this project is to participate in the NSF National I-Corps program to undertake a customer discovery process so that a business model is developed for a future startup.

New Jersey Commission on Spinal Cord Research
Gormley (Co-I) 06/01/2018-06/30/2021
Title: Microencapsulated nanoparticles and genetically modified MSC for treatment of SCI
The goal of this study us to modify and encapsulate MSCs that can secrete stabilized enzyme for spinal cord injury repair.

New Jersey Health Foundation Innovation Award
Gormley (PI) 09/11/2018-09/10/2019
Title: Polymer synthesis automation
The goal of this innovation award was to develop a robotic platform to synthesize polymers.

New Jersey Health Foundation Research Grant
Gormley (PI) 09/11/2018-09/10/2019
Title: EPoC-MD
The goal of this award was to develop a point-of-care diagnostic to differentiate between bacterial and viral infections.

American Cancer Society – Institutional Research Grant Early Investigator Pilot Award
Cancer Institute of New Jersey (CINJ)
Gormley (PI) 08/02/2017-08/01/2018
Title: Discovery of anticancer synthetic protein mimics as bioactive nanomedicines
The purpose of this one-year grant was to use discover synthetic mimetics of the anticancer protein TRAIL.

B. Positions, Scientific Appointments, and Honors

Positions and Employment

2023-	Executive Editor, Advanced Drug Delivery Reviews
2020-	CEO and Founder, Plexymer, Inc.
2017-	Assistant Professor, Department of Biomedical Engineering, Rutgers University, New Brunswick, NJ
2017-	Co-Director, Graduate Admissions, Department of Biomedical Engineering, Rutgers University

Other Experience and Professional Memberships

2020	Special Issue Editor, Advanced Drug Delivery Reviews (ADDR)
2019-	Member, American Chemical Society (ACS)
2019-	Member, Society for Biomaterials (SFB)
2017-	Associate Member, Cancer Institute of New Jersey (CINJ)
2012-	Member, Biomedical Engineering Society (BMES)
2009-	Member, Controlled Release Society (CRS)

Federal Peer Review Panels

2023	NIDCR ZDE1, NIH
2022	Cellular and Biochemical Engineering, CBET, NSF
2021-2022	NCI ZCA1, NIH
2021	Harnessing the Data Revolution (HDR) Institutes, NSF
2019	Early Career Reviewer (ECR), Nanotechnology (NANO), NIH
2019	Biomaterials and Biointerfaces (BMBI), NIH

Honors

2022	Young Innovator Award, Cellular and Molecular Bioengineering
2022	Rising Star, Advanced Materials
2019	A. Walter Tyson Assistant Professorship Award
2017	2nd Place Overall: MGH Technology Prize for Primary Care
2016	**Marie Skłodowska-Curie Research Fellowship, Mentor: Professor Molly Stevens - Europe's most prestigious research fellowship**
2012	Invited Speaker: Cost Action TD1004 Annual Meeting, London, UK
2012	**Whitaker International Postdoctoral Scholarship, Mentor: Professor Molly Stevens**
2012	Semi-Finalist: Controlled Release Society Sung Wan Kim Postdoctoral Fellowship
2012	Invited Speaker: Department of Biology Seminar, University of Utah
2012	Polymer Therapeutics Poster Prize, International Symposium on Polymer Therapeutics
2012	Travel Award, International Symposium on Polymer Therapeutics
2011	Invited Speaker: Science Movie Night Host, Natural History Museum of Utah
2011	Poster Award, International Nanomedicine & Drug Delivery (NanoDDS) Symposium
2011	Poster Award, NanoUtah Conference
2011	Bioengineering Department Service Award, University of Utah
2010	**DOD Congressionally Directed Medical Research Program (CDMRP) Predoctoral Fellowship, Mentor: Professor Hamid Ghandehari**
2010	Poster Award, NanoUtah Conference
2006	High Honors, Lehigh University

C. Contributions to Science

1. **Automated and High Throughput Polymer Chemistry:** Leveraging our discovery of air tolerant RAFT polymer chemistry in well plates (**Contributions to Science #3**), we have developed a fully automated platform for polymer chemistry and materials testing. This allows us to synthesize and test a very wide diversity of material characteristics for any given application. Our automated capability includes liquid handling robotics for material synthesis and assay implementation, a robotic arm to transfer samples between

instruments, a custom lightbox for photoinitiation, a heater/shaker, and a connected UV-Vis plate reader. As a result, we can implement very high throughput experiments for data-driven design.

a. J. Lee, P. Mulay, M.J. Tamasi, J. Yeow, M.M. Stevens, **A.J. Gormley**, 2023. A fully automated platform for photoinitiated RAFT polymerization. ***Digital Discovery***. In Press. Impact Factor: NA

b. M. Tamasi, S. Kosuri, J. DiStefano, R. Chapman, **A.J. Gormley**, 2020. Automation of controlled/living radical polymerization. ***Advanced Intelligent Systems***. 2: 1900126. Impact Factor: 7.30

c. Z. Li, S. Kosuri, H. Foster, J. Cohen, C. Jumeaux, M.M. Stevens, R. Chapman, **A.J. Gormley**, 2019. A dual wavelength polymerization and bioconjugation strategy for high throughput synthesis of multivalent ligands. ***Journal of the American Chemical Society (JACS)***. 141: 19823-19830. Impact Factor: 16.38

d. R. Upadhya, S. Murthy, C.L. Hoop, S. Kosuri, V. Nanda, J. Kohn, J. Baum, **A.J. Gormley**, 2019. PET-RAFT and SAXS: High throughput tools to study compactness and flexibility of single-chain polymer nanoparticles. ***Macromolecules***. 52: 8295-8304. Impact Factor: 5.99

2. **Data-Driven Structure-Activity Testing:** With these combinatorial and high throughput tools in place, my lab is very interested in data-driven design of materials. This is distinctly different from high throughput screening experiments that were popular in the 1990's and 2000's as these experiments were only searching for 'hits' and did not use all of the data to populate predictive models. By combining machine learning with automation, we can develop a fully automated and self-driving platform for mapping structure-function behavior.

a. R. Upadhya, M.J. Tamasi, E. Di Mare, N.S. Murthy, **A.J. Gormley**, 2022. Data-driven design of protein-like single-chain polymer nanoparticles. ***ChemRxiv***. DOI: 10.26434/chemrxiv-2022-sl8d0

b. S. Kosuri, C.H. Borca, H. Mugnier, M. Tamasi, R.A. Patel, I. Perez, S. Kumar, Z. Finkel, R. Schloss, L. Cai, M.L. Yarmush, M.A. Webb, **A.J. Gormley**, 2022. Machine-assisted discovery of chondroitinase ABC complexes towards sustained neural regeneration. ***Advanced Healthcare Materials***. 11: 2102101. Impact Factor: 11.09

- Also featured in Rising Stars and Hot Topic Special Issues

c. M. Tamasi, R.A. Patel, C.H. Borca, S. Kosuri, H. Mugnier, R. Upadhya, N.S. Murthy, M.A. Webb, **A.J. Gormley**, 2022. Machine learning on a robotic platform for the design of polymer-protein hybrids. ***Advanced Materials***. 34: 2201809. Impact Factor 32.09.

d. **A.J. Gormley**, M.A. Webb, 2021. Machine Learning in combinatorial polymer chemistry. ***Nature Reviews Materials***. 6: 642-644. Impact Factor: 76.68

3. **Air Tolerant Polymer Chemistry – A Paradigm Shift:** My collaborators and I were the first to discover a fully oxygen tolerant RAFT polymerization. This unique and serendipitous finding was totally unprecedented and ultimately led us to develop combinatorial synthesis of well-defined polymers in open well plates. In these studies, we show it is possible for the first time to prepare a library of well-defined, water-soluble polymers (polydispersity < 1.15) in low volumes with greater than 90% monomer-to-polymer conversion. Since these discoveries, more than 200 papers have published on this newly established field.

a. S. Atta, J. Cohen, J. Kohn, **A.J. Gormley**, 2021. Ring opening polymerization of ε-caprolactone through water. ***Polymer Chemistry***. 12: 159-164. Impact Factor: 5.58

b. **A.J. Gormley**, J. Yeow, G. Ng, O. Conway, C. Boyer, R. Chapman, 2018. An oxygen tolerant PET-RAFT polymerization for screening structure-activity relationships. ***Angewandte Chemie***. 130: 1573-1578. Impact Factor: 16.82

c. R. Chapman, **A.J. Gormley**, M.H. Stenzel, M.M. Stevens, 2016. Combinatorial low-volume synthesis of well-defined polymers by enzyme degassing. ***Angewandte Chemie***. 128: 4576-4579. Impact Factor: 16.82

d. R. Chapman*, **A.J. Gormley***, K.L. Herpoldt, M.M. Stevens, 2014. Highly controlled open vessel RAFT polymerizations by enzyme degassing. ***Macromolecules***. 47: 8541-8547. Impact Factor: 5.99

4. **Drug Delivery from Nano/Microparticles:** In my PhD, I developed a laser guided approach for drug delivery to prostate tumors using light absorbing gold nanorods and polymer-drug conjugates. During my post doctorial training, I developed self-assembling drug carriers held together by coiled-coil crosslinks. In my lab at Rutgers University, we are loading bioactive proteins into biodegradable poly(ester-arylate) and PLGA microparticles for sustained protein delivery.

    a. C.E. Miles, S.L. Fung, N.S. Murthy, **A.J. Gormley**, 2022. Polymer texture influences cell responses in osteogenic microparticles. ***Cellular and Molecular Bioengineering***. 15: 409-423. Impact Factor: 2.32

        - Young Innovator Award, Special Issue

    b. R. Upadhya, A. Punia, M.J. Kanagala, L. Liu, M. Lamm, T.A. Rhodes, **A.J. Gormley**, 2021. Automated PET-RAFT towards pharmaceutical amorphous solid dispersion development. ***ACS Applied Polymer Materials***. 3: 1525-1536. Impact Factor: 4.86

    c. C.E. Miles, A.D. Bernstein, T.M.O. Popp, N.S. Murthy, A.J. Nieuwkoop, **A.J. Gormley**, 2021. Control of drug release from microparticles by tuning their crystalline textures: A structure–activity study. ***ACS Applied Polymer Materials***. 3: 6548-6561. Impact Factor: 4.86

    d. C.E. Miles, C. Gwin, K. Zubris, **A.J. Gormley**, J. Kohn, 2021. Tyrosol derived poly(ester-arylate)s for sustained drug delivery from microparticles. ***ACS Biomaterials Science & Engineering***. 7: 2580-2591. Impact Factor: 5.13

Complete List of Published Work in Pub Med or Google Scholar