# Renato Samuel (Sam) Navarro, Ph.D.

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## EDUCATION

2020 Ph.D. Macromolecular Science and Engineering
**University of Michigan**, Ann Arbor, MI
Mentor: Peter X. Ma
Thesis title: Tissue engineering simplified: Biodegradable polymers and biomimetic scaffolds made easy, tailorable, and economical

2014 M.S. Chemistry
**Texas State University**, San Marcos, TX
Mentor: Tania B. Betancourt
Thesis title: Click-chemistry based synthesis of molecularly responsive hydrogels as biodegradable scaffolds for three-dimensional cell-culture

2012 B.S. Biochemistry
**St. Mary's University**, San Antonio, TX

## RESEARCH EXPERIENCE

08/20 – Present Postdoctoral Fellow, Dept. of Materials Science and Engineering
**Stanford University**, Stanford, CA 94305
Mentor: Sarah C. Heilshorn

08/14 – 08/20 Graduate Research Assistant, Dept. of Materials Science and Engineering
**University of Michigan**, Ann Arbor, MI 48109

08/12 – 08/14 Graduate Research Assistant, Dept. of Chemistry
**Texas State University**, San Marcos, TX 78665

## OTHER LEADERSHIP EXPERIENCE

07/06 – 08/14 Staff Sergeant, Decontamination Platoon
U.S. Army Reserve, Houston, TX

07/01 – 07/06 Sergeant, Chemical Specialist NCOIC
U.S. Army, Bamberg, Germany

## AWARDS and HONORS

2023 **Postdoc Leadership Institute,** Society for Advancement of Chicanos & Native Americans in Science
2023 – 2028 **NIH NHLBI K99/R00**, HL169844-01, Stanford University
2023 **Bio-X Travel Award**, Stanford University
2022 **NSF-AGEP Research University Alliance**, Stanford University
2021 **Bio-X Star Mentor Award**, Stanford University
2022 – 2023 **American Heart Association Postdoctoral Fellowship**, Stanford University
2019 **Rackham Travel Grant**, University of Michigan
2018 **Rackham Candidate Graduate Research Grant**, University of Michigan
2018 **Rackham Travel Grant**, University of Michigan
2018 – 2020 **NIH T32 Tissue Engineering and Regeneration Training Grant**, University of Michigan
2017 **NextProf Future Faculty**, University of Michigan
2016 **Rackham Pre-Candidate Graduate Research Award**, University of Michigan
2016 **Charles G. Overberger Conference Travel Award**, University of Michigan
2014 – 2015 **Rackham Merit Two-Year Fellowship**, University of Michigan
2008 **Phi Theta Kappa International Honor Society Scholarship**, St. Mary's University
2007 **Phi Theta Kappa International Honor Society of the Two-Year College**, San Antonio College

## GRANTSMANSHIP

2023 **NIH NIBIB R01 Research Proposal**, R01 HL173056-01, Funding pending (PI: Heilshorn, S.C.)
"Catheter-Injectable, Engineered Biomaterial for Sustained Neuregulin-1 Delivery to the Myocardium"
Contribution of data, design, and writing of motivation, Aim 3, and vertebrate animal sections

2022 **NIH MOSAIC Postdoctoral Career Transition Award**, K99/R00 HL169844-01, Funded
"Catheter-Injectable System for Local Drug Delivery after Myocardial Infarct"

2021 **American Heart Association Postdoctoral Fellowship**, 903771, Funded
"Injectable Gene Therapy Hydrogel for Myocardial Infarction Treatment"

2018 **NIH NIDCR T32 Training Program**, T32 DE00007057-40, Funded
Scholar in the Tissue Engineering and Regeneration Training Grant

2017 **Rackham Graduate Research Grant**, Training Grant, Funded
"Biological Functionalization of Tubular Scaffold for Small Diameter Tissue Engineering"

## PUBLICATIONS

[#] Denotes equal contribution

1. Hefferon M.E., Huang M.S., Liu Y., **Navarro R.S.**, De Paiva Narciso N., Zhang D., Rodriguez G.A., Heilshorn S.C. "Cell microencapsulation within engineered hyaluronan elastin-like protein (HELP) hydrogels." ***Current Protocols,*** Accepted, 2023.

2. Seymour A.J., Kilian D., **Navarro R.S.**, Hull S., Heilshorn S.C. "3D printing microporous scaffolds from modular bioinks containing sacrificial, cell-encapsulating microgels." ***Biomaterials Science***, Accepted, 2023.

3. Roth J.G.[#], Huang M.S.[#], **Navarro R.S.**, Akram J.T., LeSavage B.L., Heilshorn S.C. "Tunable hydrogel viscoelasticity modulates human neural maturation." ***Science Advances***, Accepted, 2023.

4. De Paiva Narciso N.[#], **Navarro R.S.**[#], Gilchrist A., Trigo M.L.M., Aviles Rodriguez G., Heilshorn S.C. "Design parameters for injectable biopolymeric hydrogels with dynamic covalent chemistry crosslinks." ***Advanced Healthcare Materials***, 2023, 10.1002/adhm.202301265

5. Shayan M., Huang M.S., **Navarro R.S.**, Chiang G., Hu C., Orepeza B.P., Johansson P.K., Suhar R.A., Foster A.A., LeSavage B.L., Zamani M., Enejder A., Roth J.G., Heilshorn S.C, Huang N.F. "Elastin-like protein hydrogels with controllable stress relaxation rate and stiffness modulate endothelial cell function." ***Journal of Biomedical Materials Research Part A***, 111, 2023, 10.1002/jbm.a.37520

6. Hull S.M., Lou J., Lindsay C., **Navarro R.S.**, Cai B., Brunel L., Westerfield A.D., Xia Y., Heilshorn S.C. "3D bioprinting of dynamic hydrogel bioinks enabled by small molecule modulators." ***Science Advances,*** 9, 2023, 10.1126/sciadv.ade7880

7. **Navarro R.S.**[#], Huang M.S.[#], Roth J.G., Hubka K.M., Long C., Enejder A., Heilshorn S.C. "Tuning polymer hydrophilicity to regulate gel mechanics and encapsulated cell morphology." ***Advanced Healthcare Materials***, 2022, 10.1002/adhm.2022000011

8. **Navarro R.S.**[#], Jiang L.[#], Ouyang Y., Luo J., Liu Z., Yang Y., Qiu P., Kuroda K., Chen Y.E., Ma P.X., Yang B. "Biomimetic tubular scaffold with tunable conjugation of heparin and modulated degradation for rapid *in situ* regeneration of a small diameter neoartery." ***Biomaterials***, 274, 2021, 10.1016/j.biomaterials.2021.120874

## WORKS in PROGRESS

[#] Denotes equal contribution

*Works Submitted*

1. Suhar R.A., Huang M.S., **Navarro R.S.**, Aviles Rodriguez G., Heilshorn S.C. "A library of tunable elastin-like proteins for *in vitro* 3D neural cell culture." **Biomacromolecules**, Submitted, 2023.

2. Tevlin R., Griffin M.F., Liang N.E., Parker J.B., Valencia C., Morgan A., Downer M., Meany E.L., Guo J.L., Henn D., **Navarro R.S.**, Nguyen D., Heilshorn S.C., Januszyk M., Appel E.A., Momeni A., Wan D.C., Longaker M.T. "Osteopontin reduces foreign body response in humans and mice." ***Nat. Biomedical Engineering***, Submitted, 2023.

3. Salimi-Jazi F., Fell G., Thomas A.L, Rafeeqi T., Nguyen J.A., Lopez N., Suhar R.A., **Navarro R.S.**, De Paiva Narciso N., Heilshorn S.C., Dunn J. "Submucosal hydrogel for spring-mediated intestinal lengthening." Submitted, 2023.

*Works in Preparation*

1. **Navarro R.S.**[#], Huang M.S.[#], Brunel L., Roth J.G., De Paiva Narciso N., Aviles Rodriguez G., Hull S.M., Hubka K.M., Heilshorn S.C. "Dynamic covalent hydrogels with viscoelasticity and enhanced stability as bioinks."
2. De Paiva Narciso N.[#], **Navarro R.S.**[#], Baugh N., Trigo M.L.M., Aviles Rodriguez G., Heilshorn S.C. "Injectable hydrogels to deliver gene therapy for myocardial infarct."
3. **Navarro R.S.**, Rambhia K., Kannan R., Swanson W.B., Zhang Z., Adiwidjaja A., Rieland J., Ma P.X. "Fabrication of biomimetic scaffolds from poly(exomethylene-co-lactic acid) for facile and click-chemistry like functionalization."
4. Doleyres Y.[#], **Navarro R.S.**[#], Zhang Z., Xiang Y., Awada M., Adler N., Ma P.X. "Characterization and evaluation of 2-methylene-1,3,6-trioxocane (MTC) hydrogels for tissue engineering application."

## PATENTS

1. Thomas A., Salimi-Jazi F., Suhar R.A., De Paiva Narciso N., **Navarro R.S.**, Heilshorn S.C., Dunn J., "Hydrogel injection for intestinal lengthening." U.S. Serial No. 63/463,782
2. **Navarro R.S.**, Huang M.S., Roth J.G., Hubka K.M., Heilshorn S.C., "Dynamic recombinant hydrogels with degradation-independent relaxation kinetics." U.S. Serial No. 63/380,486
3. **Navarro R.S.**, Ma P.X., "Biodegradable Polymers and Nanofibrous Scaffold Thereof." US Patent App. 17/919,834

## UPCOMING and SELECTED PRESENTATIONS

1. **Navarro R.S.**, De Paiva Narciso N., Gilchrist A., Trigo M.L.M., Aviles Rodriguez G., Heilshorn S.C. "Design parameters for injectable biopolymeric hydrogels with dynamic covalent chemistry crosslinks," American Institute of Chemical Engineers Annual Meeting. Orlando, FL, Nov. 2023. **Faculty Candidates II.**
2. **Navarro R.S.**, De Paiva Narciso N., Gilchrist A., Trigo M.L.M., Aviles Rodriguez G., Heilshorn S.C. "Design parameters for injectable biopolymeric hydrogels with dynamic covalent chemistry crosslinks," Society for the Advancement of Chicanos and Native Americans in Science. Portland, OR, Oct. 2023. **Public Health, Life Sciences, and Engineering.**
3. **Navarro R.S.**, De Paiva Narciso N., Gilchrist A., Trigo M.L.M., Aviles Rodriguez G., Heilshorn S.C. "Design parameters for injectable biopolymeric hydrogels with dynamic covalent chemistry crosslinks," Biomedical Engineering Society Annual Meeting. Seattle, WA, Oct. 2023. **Nurturing Nature's Wisdom.**
4. **Navarro R.S.**, Huang M.S., Brunel L., Hull S. Roth J.G., De Paiva Narciso N., Aviles Rodriguez G., Hubka K.M., Heilshorn S.C. "Dynamic covalent hydrogels with viscoelasticity and enhanced stability as bioinks," American Chemical Society Fall Meeting. San Francisco, CA, Aug. 2023. **New Concepts in Polymeric Materials.**
5. **Navarro R.S.**, Huang M.S., Roth J.G., De Paiva Narciso N., Aviles Rodriguez G., Hubka K.M., Heilshorn S.C. "Dynamic recombinant hydrogels with degradation-independent relaxation kinetics," American Institute of Chemical Engineers Annual Meeting. Phoenix, AZ, Nov. 2022. **Biomimetic Materials I.**
6. **Navarro R.S.**, De Paiva Narciso N., Heilshorn S.C. "Hydrogel delivery of statin-eluting nanoparticles for myocardial infarction therapy," American Institute of Chemical Engineers Annual Meeting. Phoenix, AZ, Nov. 2022. **Biomaterials for Drug Delivery 2: Hydrogels and Macroscopic Platforms.**
7. **Navarro R.S.**, De Paiva Narciso N., Gilchrist A.E., Suhar R.A., Heilshorn S.C. "Catheter-injectable hydrogel for the delivery of a minicircle encoding SDF1a as therapy for myocardial infarction," American Heart Society Annual Meeting. Chicago, IL, Nov. 2022.
8. **Navarro R.S.**, De Paiva Narciso N., Gilchrist A.E., Heilshorn S.C. "Injectable hydrogels for mechanically active tissues," Biomedical Engineering Society Annual Meeting. San Antonio, TX, Oct. 2022. **Latinx Voices in Biomedical Engineering.**
9. **Navarro R.S.**, De Paiva Narciso N., Heilshorn S.C. "Nanoparticle-crosslinked hydrogels as an injectable myocardial infarction therapy," Materials Research Society Spring Meeting. Honolulu, HI, May 2022.
10. **Navarro R.S.,** Huang M.S., Roth J.G., Hubka K.M., Long C., Enejder A., Heilshorn S.C. "Protein hydrophilicity regulates mechanical properties in engineered hydrogels," Society for Biomaterials Annual Meeting. Baltimore, MD, April 2022. **Black, Latinx, Indigenous, and Persons of Color in Biomaterials.**

11. **Navarro R.S.**, Huang M.S., Roth J.G., Hubka K.M., Long C., Enejder A., Heilshorn S.C. "Protein hydrophilicity regulates mechanical properties in engineered hydrogels," Society for Biomaterials Annual Meeting. Baltimore, MD, April 2022. **Biomimetic Hydrogels for Drug Delivery and Tissue Engineering.**
12. **Navarro R.S.**, Yang O., Jiang L., Qiu P., Liu Z., Yang B., Chen Y.E., Ma P.X. "Biological functionalization of tubular scaffold for small diameter tissue engineering," TERMIS World Congress. Kyoto, Japan, Sep. 2018.
13. **Navarro R.S.**, Beaven K., McKinzie J., Betancourt T. "Click-chemistry based molecularly responsive hydrogels as biodegradable scaffolds for 3D cell culture," Biomedical Engineering Society Annual Meeting. San Antonio, TX, Oct. 2014.
14. **Navarro R.S.**, Beaven K., McKinzie J., Betancourt T. "Click-chemistry based synthesis of responsive poly(ethylene glycol) hydrogels that serve as intelligent degradable scaffolds," Fifth Annual International Conference for Graduate Student Research. San Marcos, TX, Nov. 2013.
15. **Navarro R.S.**, Beaven K., Betancourt T. "Click-chemistry based synthesis of molecularly responsive hydrogels as biodegradable scaffolds for 3D cell culture," Collaborative Basic & Translational Research in the Sciences. San Antonio, TX, Oct. 2013.
16. **Navarro R.S.**, Beaven K., Betancourt T. "Synthesis of hydrogels for 3D cell culture via copper free click chemistry," Biomedical Engineering Society Annual Meeting. Seattle, WA, Sep. 2013.
17. **Navarro R.S.**, Betancourt T. "Click-chemistry based synthesis of molecularly responsive gels as biodegradable scaffolds for 3D cell culture," HSI Research Symposium. San Marcos, TX, March 2013.

## MENTORING

| | |
|---|---|
| 2021 – Present | **Narelli de Paiva Narciso**, Ph.D., Materials Science and Eng., Stanford University |
| 2022 – Present | **Giselle Aviles-Rodriguez**, Undergraduate, Science Learning Institute, Foothill Community College |
| 2022 – 2023 | **Miriam Trigo**, Undergraduate, Materials Science and Eng., Stanford University |
| 2022 | **Isabelle Hong**, Undergraduate, Science Learning Institute, Foothill Community College |
| 2022 | **Hugo Chacon**, REU, Summer Undergraduate Research Fellowship, Stanford University |
| 2022 | **Alexis Pacheco**, REU, Summer Undergraduate Research Fellowship, Stanford University |
| 2021 | **Coco Sanabria**, Undergraduate, Materials Science and Eng., Stanford University |
| 2018 – 2020 | **Nicholas Adler**, M.S., Biomedical Engineering, University of Michigan |
| 2018 – 2020 | **Aaron Adiwidjaja**, M.S., Biomedical Engineering, University of Michigan |
| 2017 – 2018 | **Bryce Kriegman**, M.S., Macromolecular Science and Engineering, University of Michigan |
| 2016 – 2018 | **Julie Rieland**, Ph.D., Macromolecular Science and Engineering, University of Michigan |
| 2016 – 2017 | **Nisha Hollingsworth**, Ph.D., Macromolecular Science and Engineering, University of Michigan |
| 2016 – 2017 | **Guadalupe Salazar**, Undergraduate, Materials Science and Eng., University of Michigan |
| 2016 – 2017 | **Rachel Schiffman**, M.S., Macromolecular Science and Engineering, University of Michigan |
| 2016 | **Tyrone Edwards**, Undergraduate, Biomedical Engineering, University of Michigan |
| 2013 – 2014 | **Ron Hall**, Undergraduate, Chemistry, Texas State University |
| 2013 | **Katie Beaven**, REU, Chemical Engineering, Texas State University |

## TEACHING EXPERIENCE

**Stanford University**

*Guest Lecturer: Adapted and presented lecture content*
MATSCI 81N: Bioengineering of Materials to Heal the Body
Biomaterials Techniques, Spring 2023
Biomaterials for Gene Therapy, Spring 2023

*Guest Lecturer: Adapted and presented lecture content*
MATSCI/BIOE 381/361: Materials for Regenerative Medicine
Introduction to Protein-Engineered Biomaterials, Spring 2021
Introduction to Protein-Engineered Biomaterials, Spring 2022

**University of Michigan**
*Teaching Assistant: Developed and presented lecture content and weekly quizzes*
CHEM 125: General Chemistry Laboratory, Fall 2015

**University of Michigan**
*Teaching Assistant: Developed and presented lecture content and weekly quizzes*
CHEM 125: General Chemistry Laboratory, Spring 2016

**Texas State University – San Marcos**
*Teaching Assistant: Developed and presented lecture content and weekly quizzes*
CHEM 1341: General Chemistry Laboratory, Spring 2013 - Fall 2014

## LEADERSHIP EXPERIENCE and SERVICE

**American Institute of Chemical Engineers**
2023 Biomimetic Materials Session Chair
2022 Poster Judge: Graduate and Postdoc Poster Session

**Biomedical Engineering Society**
2023 Abstract Judge: Graduate and Postdoc Oral and Poster Session
2022 Abstract Judge: Graduate and Postdoc Oral and Poster Session

**Society for the Advancement of Chicanos/Hispanics and Native Americans in Science**
2022 Abstract Judge: Graduate and Postdoc Oral and Poster Session
2022 Travel Scholarship Judge: Undergraduate and Graduate Applicant Judge

**Stanford University Postdoc Latinx Association**
2021 – Present Board Member

**39th Annual Symposium: "Polymers and their Biomedical Applications," University of Michigan**
2018 Planning Committee: Responsible for selection of speakers, scheduling, and introducing speakers

**Society for the Advancement of Chicanos/Hispanics and Native Americans in Science, Texas State University**
2013 – 2014 Treasurer

## DIVERSITY and INCLUSION

2023 **PREM Career Paths in Materials Science and Engineering**
MRS-NSF PREM Research Scholars Summit Panelist

2021 – 2023 **Stanford University Postdoc Latinx Association**
Increase visibility and advocate for Latinx Stanford postdocs

2022 **Stanford University Summer Undergraduate Research Fellowship (SURF)**
Provided learning opportunities and lower barriers to entry for underrepresented minorities in STEM

2022 **Foothill Community College and Beyond**
Summer Learning Institute Panel on Stem Careers, Position: *Panelist*

2021 – 2023 **Stanford Postdoctoral Recruitment Initiative in Sciences and Medicine (PRISM)**
Engaged with potential postdocs at Stanford in an effort to increase diversity

2017 – 2018 **University of Michigan MACRO Outreach Program**
Recognition Award Committee

2013 – 2014 **Society of Chicanos and Native Americans in Science**
Provided learning opportunities and lower barriers to entry for underrepresented minorities in STEM

## PROFESSIONAL AFFILIATIONS

Society for Biomaterials (**SFB**)
Biomedical Engineering Society (**BMES**)
American Institute of Chemical Engineers (**AIChE**)
Materials Research Society (**MRS**)
American Chemical Society (**ACS**)