






# Santiago Correa

## CONTACT

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## EDUCATION

**Massachusetts Institute of Technology**, Cambridge, MA

**Ph.D. in Biological Engineering** (Sept. 2012-Aug. 2018); Doctoral Advisor: Dr. Paula T. Hammond

Thesis: *Engineering layer-by-layer nanoparticles for the targeted delivery of drugs to ovarian cancer*

**Yale University**, New Haven, CT

**Bachelor of Science, Biomedical Engineering** (Aug. 2008-May 2012)

Distinction in Biomedical Engineering, Molecular Engineering Track

## RESEARCH MISSION

My lab develops nanotechnology that reprograms an individual's own immune system to cure challenging diseases. We engineer biomaterials that mimic how the immune system naturally communicates with the body. Using this bio-inspired approach, our technology orchestrates immune responses to fight drug-resistant infection, metastatic cancer, neurodegeneration, and other difficult conditions.

## PROFESSIONAL EXPERIENCE

**Assistant Professor**

(Jan. 2023-Present)

*Department of Biomedical Engineering, Columbia University*

*Herbert Irving Comprehensive Cancer Center, Columbia University*

**NIH F32 Postdoctoral Fellow**

(Oct. 2018-Dec. 2022)

*Department of Materials Science & Engineering, Stanford University*

Postdoctoral Advisor: Dr. Eric A. Appel

## SELECTED FELLOWSHIPS, AWARDS, & RECOGNITIONS (OUT OF 16)

Herbert Irving Cancer Center: <i>Emerging Leader Development Program</i>	2023
<i>Cell Press: Matter</i> Feature: <i>35+1 Under 35 in Materials Science</i>	2023
Stanford University: <i>Justice Equity Diversity &amp; Inclusion (JEDI) Champion</i>	2022
Northwestern University: <i>Rising Stars in Biomedical Engineering</i>	2021
Princeton University & University of Delaware: <i>Soft Matter for All Early Career Speaker</i>	2021
Biomedical Engineering Society: <i>UNITE Future Faculty Scholar</i>	2021
American Chemical Society: <i>POLY/PMSE Future Faculty Scholar</i>	2021
Columbia University: <i>Rising Stars in Engineering in Health</i>	2020
National Cancer Institute: <i>Ruth L. Kirschstein F32 NRSA Postdoctoral Fellowship</i>	2019
Siebel Foundation: <i>Siebel Scholar</i>	2018
Alfred P. Sloan Foundation: <i>Sloan University Centers for Exemplary Mentoring Scholar</i>	2016
National Science Foundation: <i>Graduate Research Fellowship</i>	2012
MIT: <i>Lemelson Engineering Presidential Fellowship</i>	2012
MIT: <i>Dean's Diversity Fellowship</i>	2012
Yale University: <i>Science, Technology and Research Scholar</i>	2010

**FIRST AND CO-FIRST AUTHORED PUBLICATIONS** (*†* Indicates co-first authors)

1. Correa S et al. *Injectable Nanoparticle-Based Hydrogels Enable the Safe and Effective Deployment of Immunostimulatory CD40 Agonist Antibodies*. *Advanced Science*. 2022.
2. Correa S<sup>†</sup> & Grosskopf AK<sup>†</sup> et al. *Injectable Liposome Based Supramolecular Hydrogels for the Programmable Release of Multiple Protein Drugs*. *Matter*. 2022.
3. Correa S et al. *Translational Applications of Hydrogels*. *Chemical Reviews*. 2021.
4. Correa S et al. *Tuning Nanoparticle Interactions with Ovarian Cancer through Layer-by-Layer Modification of Surface Chemistry*. *ACS Nano*. 2020.
5. Boehnke N<sup>†</sup> & Correa S<sup>†</sup> & Hao L<sup>†</sup> et al. *Theranostic Layer-by-Layer Nanoparticles for Simultaneous Tumor Detection and Gene Silencing*. *Angewandte Chemie*. 2020.
6. Correa S<sup>†</sup> & Boehnke N<sup>†</sup> et al. *Solution Conditions Tune and Optimize Loading of Therapeutic Polyelectrolytes into Layer-by-Layer Functionalized Liposomes*. *ACS Nano*. 2019.
7. Correa S<sup>†</sup> & Dreaden EC<sup>†</sup> et al. *Engineering Nanolayered Particles for Modular Drug Delivery*. *Journal of Controlled Release*. 2016.
8. Correa S et al. *Highly Scalable, Closed-Loop Synthesis of Drug-Loaded, Layer-by-Layer Nanoparticles*. *Advanced Functional Materials*. 2016.

**PATENTS**

- Correa S, Grosskopf AK, Klich JH, Appel EA (2021). *Polymer Liposome Hydrogel*. U.S. Patent Application No. 63/177373.
- Grosskopf AK, Appel EA, Correa S (2020). *Materials for Tumor Inoculation in Murine Mouse Models and Uses Thereof*. U.S. Patent Application No. 63/094716.
- Barberio AE, Correa S, Melo MB, Tokatlian T, Dreaden EC, Hammond PT, Irvine DJ (2019). *Layer-by-Layer Nanoparticles for Cytokine Therapy in Cancer Treatment*. U.S. Patent Application No. 16/175,311.
- Appel EA, Agmon G, Gale E, Correa S, Davis, MM (2019). *Injectable Hydrogels for Controlled Release of Immunomodulatory Compounds*. International Application No. PCT/US2019/054070.

**SELECTED CO-AUTHORED PUBLICATIONS (OUT OF 16)**

- Grosskopf AK, Labanieh L, Klysz DD, Roth G, Xu P, Adebowale O, Gale EC, Jons CK, Klich JH, Yan J, Maikawa CL, Correa S, Ou B, d'Aquino AI, Cochran JR, Chaudhuri O, Mackall CL, Appel EA. *Delivery of CAR-T Cells in a Transient Injectable Stimulatory Hydrogel Niche Improves Treatment of Solid Tumors*. *Science Advances*. 2022;8(14):eabn8264.
- Seo J-W, Fu K, Correa S, Eisenstein M, Appel EA, Soh HT. *Real-time monitoring of drug pharmacokinetics within tumor tissue in live animals*. *Science Advances*. 2022 Jan 7;8(1):eabk2901.
- Grosskopf AK, Correa S, Baillet J, Maikawa CL, Gale EC, Brown RA, Appel EA. *Consistent Tumorigenesis with Self-Assembled Hydrogels Enables High-powered Murine Cancer Studies*. *Communications Biology*. 2021 Aug 19;4(1):1-7.
- Meis CM, Grosskopf AK, Correa S, Appel EA. *Injectable Supramolecular Polymer-Nanoparticle Hydrogels for Cell and Drug Delivery Applications*. *Journal of Visualized Experiments*. 2021 Feb 7;168:e62234.
- Silva AS, Shopsowitz KE, Correa S, Morton SW, Dreaden EC, Casimiro T, Aguiar-Ricardo A, Hammond PT. *Rational Design of Multistage Drug Delivery Vehicles for Pulmonary RNA Interference Therapy*. *International Journal of Pharmaceutics*. 2020 Oct 26;119989.
- Smith AA, Gale EC, Roth GA, Maikawa CL, Correa S, Yu AC, Appel EA. *Nanoparticles Presenting Potent TLR7/8 Agonists Enhance Anti-PD-L1 Immunotherapy in Cancer Treatment*. *Biomacromolecules*. 2020 Aug 20;21(9):3704-12.
- Barberio AE, Smith SG, Correa S, Nguyen C, Nhan B, Melo M, Tokatlian T, Suh H, Irvine DJ, Hammond PT. *Cancer Cell Coating Nanoparticles for Optimal Tumor-Specific Cytokine Delivery*. *ACS Nano*. 2020 Jul 21;14(9):11238-53.

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## INVITED/AWARD PRESENTATIONS & SEMINARS

- Correa S. *Integration of nanotechnology into tissue scaffolds for precise immune signaling*. **Oral** presentation at **Immunoengineering Gordon Research Conference**. 2024. Luca, Italy. **(Invited short talk)**
- Correa S. *Self-Assembling Nanotechnologies for Precision Biomaterials*. **Oral** presentation at **Northwestern's Rising Stars in Biomedical Engineering Series**. 2021. Evanston, IL. **(Invited talk)**
- Correa S. *Precisely coordinating the power of the immune system through supramolecular soft biomaterials*. **Oral** presentation at the **Soft Matter for All Symposium**. 2021. Virtual. **(Award talk)**
- Correa S. *Self-Assembling Nanotechnologies for Precision Immuno-Engineering*. **Oral** presentation at the **Biomedical Engineering Society's UNITE Future Faculty Webinar**. 2021. Virtual. **(Award talk)**
- Correa S. *Self-Assembling Nanotechnologies for Precision Biomaterials*. **Oral** presentation at **Northwestern University's Department of Materials Science**. 2021. Virtual. **(Invited talk)**
- Correa S. *Locoregional Immunostimulation with Injectable Hydrogels Provides Safer and More Effective Cancer Immunotherapy*. **Oral** presentation at the **Columbia University School of Engineering Rising Stars in Engineering in Health**. 2020. Virtual. **(Award talk)**
- Correa S. *Immunomodulatory Hydrogels for Safe and Effective Cancer Immunotherapy*. **Oral** presentation at the **University of Minnesota's Department of Biomedical Engineering Seminar Series**. 2020. Virtual. **(Invited talk)**

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## SELECTED PRESENTATIONS & SEMINARS

- Correa S. *Orthogonal Modes of Immunomodulatory Protein Release from Injectable Liposomal Nanocomposite Hydrogels*. **Oral** presentation at the **Society for Biomaterials Meeting**. 2022. Baltimore, MD.
- Correa S. *Rewiring the Tumor Immune Microenvironment via Immunomodulatory Injectable Nanoparticle-Based Hydrogels*. **Oral** presentation at the **Society for Biomaterials Meeting**. 2022. Baltimore, MD.
- Correa S. *Injectable Nanoparticle-Based Hydrogels Improve the Safety and Efficacy of Potent Immunostimulatory CD40 Agonist Antibodies*. **Oral** presentation at the **Materials Research Society Meeting**. 2021. Boston, MA.
- Correa S. *Injectable Nanoparticle-Based Hydrogels Enable Safe and Effective Deployment of Immunostimulants*. **Oral** presentation at the **Biomedical Engineering Society Meeting**. 2021. Orlando, FL.
- Correa S. *Orthogonal Modes of Immunomodulatory Protein Release from Injectable Liposomal Nanocomposite Hydrogels*. **Oral** presentation at the **Biomedical Engineering Society Meeting**. 2021. Orlando, FL.
- Correa S. *Local immunostimulation with injectable hydrogels provides safer and more effective cancer immunotherapy*. **Oral platform talk** at the inaugural **LatinX in BME Symposium**. 2021. Virtual.
- Correa S, Gale EC, Mayer AT, Xiao Z, Mann JL, Appel EA. *CD40 Agonists Delivered via Injectable Hydrogel Reservoirs Safely Stimulate Anticancer Immune Response*. **Oral** presentation at the **World Biomaterials Congress**. 2020. Virtual.
- Correa S, Gale EC, Mayer AT, Xiao Z, Mann JL, Appel EA. *Injectable Hydrogel Reservoirs Alter CD40 Agonist Antibody Pharmacokinetics to Improve Safety and Efficacy*. **Oral** presentation at the **Materials Research Society Fall Meeting**. 2020. Virtual.
- Correa S, Gale EC, Mayer AT, Xiao Z, Mann JL, Appel EA. *Injectable Hydrogel Reservoirs Alter CD40 Agonist Antibody Pharmacokinetics to Improve Safety and Efficacy*. **Poster** at the **Keystone eSymposia: Advances in Cancer Immunotherapy**. 2020. Virtual.
- Correa S, Boehnke N, Barberio A, Quadir MA, Dreaden EC, Hammond PT. *Drug Delivery for Ovarian Cancer: The Role of Surface Chemistry and Administration Route for Targeting Therapeutics with Layer-by-Layer Nanoparticles*. **Oral** presentation at 256th **American Chemical Society National Meeting & Exposition**. 2018; Boston, MA.

## LEADERSHIP, SERVICE & OUTREACH

### Columbia University

- **Herbert Irving Comprehensive Cancer Center, *Emergin Leaders Program***, 2023-Present
- **Biomedical Engineering Department, *Faculty Search Committee***, 2023-Present
- **Biomedical Engineering Department, *Undergraduate Education Committee***, 2023-Present
- **Biomedical Engineering Department, *Faculty Meeting Secretary***, 2023-Present

### Biomedical Engineering Society

- **Session Chair**, 2023 Annual Meeting - "*Engineered Immune Models*"
- **Session Chair**, 2023 Annual Meeting - "*Cellular Immunoengineering*"
- **Session Chair**, 2023 Annual Meeting - "*Transforming BME Training to Ensure Equity & Justice*"
- **Session Chair**, 2022 Annual Meeting - "*Biomimetic Micro- and Nanosystems for Biomedicine*"

### Society for Biomaterials

- **Moderator & Co-organizer**, 2022 Annual Meeting - "*Underrepresented Voices Session*"
- **Webinar Panelist**, 2022 - "*Creating Impactful Figures*"
- **Webinar Panelist**, 2022 - "*Queer Scientist Career Panel*"

### National Science Foundation

**NSF Graduate Research Fellowship Program Reviewer**, 2022

### LatinXinBME

**Advisory Board**, 2022-Present)

- Provide insight and guidance to the current Executive Board along with two other faculty members.

**Professional Development Chair**, 2021-22

- Designed professional development content for LatinX biomedical engineers focusing on time management, writing habits, visual communication, and project management.
- Organized a panel on PhD paths outside of academia, introducing members to panelists in venture capital, scientific publishing, science policy, sociology, and biotech start-ups.

### Other Service

**Rising Stars in Engineering in Health Workshop**, **Columbia, Johns Hopkins, Cornell, Boston University**, 2021-Present

- The goal of workshop series is to identify rising star postdocs from diverse backgrounds and provide them with training to increase the likelihood of their success on the faculty job market.
- I am an alumnus of this program and have been returning since 2021 to serve as a mentor to new participants.
- Since joining the Faculty, I am now a co-organizer and assist with candidate selection and facilitating professional development sessions.

**Queer Scientist Career Panel**, **University of Virginia**, 2022

**Diverse Perspectives Seminar Series**, **Stanford University**, 2019-22

- Part of a 5-member team that raised funds and organized a seminar series to bring a trainee nominated speaker to share their research and their experience with diversity and inclusion in STEM.
- Expanded the event's reach to bring in students from primarily undergraduate institutions and community colleges to meet with our keynote speaker and with Stanford graduate students and postdocs.

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## TEACHING EXPERIENCE

### **BMEN4000 Immunoengineering with Biomaterials and Nanotechnology, Columbia** (2023-Present)

- Designed from scratch a comprehensive interdisciplinary course for undergraduates and graduate students to teach the fundamentals of immunoengineering using materials science as a tool.
- Course integrates a condensed immunology bootcamp as well as seminar-based modules on (1) Engineering vaccines, (2) Nanobiomaterials for Cancer Immunotherapy, and (3) Material Approaches for Autoimmune Disease.
- To enhance the interdisciplinary nature of the course I personally recruited two faculty from the the Microbiology & Immunology Department and the Center for Translational Immunology to guest lecture.

### **Design of a Virtual Research Internship, Stanford (Summer 2020)**

- Developed an 8-week virtual program for First-Generation Research Interns during the pandemic.
- Designed and led a weekly immuno-engineering workshop that provided a crash course in immunobiology, cancer biology, immuno-oncology, biomaterials, how materials interface with the body and the immune system, adoptive cell therapies, and immuno-modulatory materials.
- Incorporated online programming from the National Center for Faculty Development & Diversity to help students develop a daily writing habit and time management skills.
- Organized one-on-one meetings and panels with grad students and postdocs to expose interns to what life in academia is like and to demystify the process of applying for and completing a PhD.
- Guided students as they developed and presented a pitch for a novel research project.

### **Guest lecturer**

#### *MATSCI 385/BIOE385: Biomaterials for Drug Delivery, Stanford* (Fall 2019; Winter 2021)

- Planned and taught the "Engineering immunity with nanomaterials" lecture for undergrad and graduate students, discussing the interdisciplinary interface of materials science and immunology.

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## MENTORSHIP

### **Postdoctoral**

- Dr. Robert Hincapie, Postdoctoral Researcher, Columbia University (September 2023-)

### **Doctoral**

- James Wang, **NSF Graduate Research Fellow**, Columbia University (September 2023-)
- Artemis Margaronis, **NSF Graduate Research Fellow**, Columbia University (September 2023-)
- Ryan Hosn, **Van C. Mow Graduate Research Fellow**, Columbia University (September 2023-)
- Sarah Bortel, Columbia University (September 2023-)
- Satya Nayagam (**co-advised**), Columbia University (May 2023-)

### **Masters**

- Jeremy Cheng, Columbia University (January 2023-)
- Victor Felipe Medeiros Pereira, Columbia University (January 2023-May 2023)

### **Undergraduate**

- Alejandro Salazar, **UCLA**; Emerson Collective First Gen Internship (Summer 2020, virtual)
- Aria Shi, **MIT**; Undergraduate Research Opportunity Program (UROP) (2014-18)
- Mariam Ahmed, **UCSD**; MIT Summer Research Program (MSRP) (Summer 2017)
- Benjamin Oberlton, **MIT**; UROP (2016-17)
- Esperanza Hernandez, **University of Utah**; MSRP (Summer 2016)
- Elana Ben-Akiva, **MIT**; UROP (2014-15)