

Exponent®
Engineering & Scientific Consulting

Jessica Vargas, Ph.D.

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Professional Profile

Dr. Vargas is a chemist who specializes in compositional analysis of complex materials in support of product development, manufacturing, and root cause analyses, with an emphasis on materials for biomedical applications. She has diverse experience in the fields of polymer science, analytical chemistry, biochemistry, and drug and gene delivery.

Dr. Vargas has experience conducting chemical analysis to evaluate product compositions as well as assessing products for potential issues related to quality, contamination, stability, and biocompatibility. Her interdisciplinary training in chemistry and biochemistry enables her to support clients in applications related to pharmaceuticals, medical devices, proteins, wearables, food, cleaning products, cosmetics, aerosols, and other consumer products. She has applied her expertise to matters related to materials selection, process development and process validation, extractable and leachable assessments, product recalls, and intellectual property matters.

Dr. Vargas is experienced in designing and validating non-standard methods for chemical evaluations, and she is skilled in the techniques utilized in organic synthesis and small molecule characterization, including NMR, FTIR, and UV-Vis spectroscopy, as well as chromatography and mass spectrometry methods such as GC-MS, HPLC, LC-MS, and MALDI-TOF. She also has practical knowledge characterizing polymeric materials and nanoparticles using size-exclusion chromatography (SEC), dynamic light scattering, and zeta potential measurements.

Dr. Vargas was a National Science Foundation Graduate Research Fellow in the Department of Chemistry at Stanford University, where she developed biodegradable block copolymers for small molecule and nucleic acid drug delivery, such as pDNA, siRNA, and mRNA. Her research leveraged organocatalytic polymerization techniques to synthesize functionalized polycarbonates and polyesters. She designed cellular and in vivo assays to measure the delivery efficiency and cytotoxicity of the resulting biomaterials using fluorescence microscopy, flow cytometry, and bioluminescent imaging. She also previously interned at W.L. Gore & Associates, where she developed and qualified analytical test methods used in coated stent manufacturing.

Academic Credentials & Professional Honors

Ph.D., Chemistry, Stanford University, 2017

M.A., Education, Loyola Marymount University, 2011

B.S., Biochemistry, Loyola Marymount University, 2010

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Stanford Chemistry Safety in Teaching and Research Award, 2016

Stanford Chemistry Evelyn Laing McBain Award for significant research progress, 2016

National Science Foundation Graduate Research Fellow, 2012-2015

Scholar of the Year, Loyola Marymount University, 2010

Rhodes Scholarship Finalist, 2010

Exponent Diversity, Equity and Inclusion Advisory Committee Member

Academic Appointments

Lecturer, Department of Chemistry and Biochemistry, Loyola Marymount University, 2010-2011

Prior Experience

NSF Graduate Research Fellow, Department of Chemistry, Stanford University, 2011-2016

R&D Intern, W.L. Gore & Associates, Inc., Medical Products Division - Analytical Chemistry Lab, Summers 2008-2011

Professional Affiliations

American Chemical Society

Patents

U.S. Patent 2018/0028688 A1: Immolative Cell-penetrating Complexes for Nucleic Acid Delivery (Waymouth RM, Wender PA, Vargas JR, Blake TR, McKinlay CJ).

Publications

Reitman, M. T. F., Dimitriou, M. D., Vargas, J. R., & Madden, S. B. (2020). Why is service life prediction of polymers and plastics exposed to outdoor weathering important? An industrial perspective. In C. C. White, M. E. Nichols, & J. E. Pickett (Eds.), Service Life Prediction of Polymers and Coatings (pp. 19-32). William Andrew Publishing. https://doi.org/10.1016/B978-0-12-818367-0.00002-3

Badding, M. A., Vargas, J. R., Fortney, J., Cheng, Q. J., & Ho, C.-H. Toxicological risk assessment of bisphenol a released from dialyzers under simulated-use and exaggerated extraction conditions. Regulatory Toxicology and Pharmacology. 2020, 118, 104787. https://doi.org/10.1016/j.yrtph.2020.104787

Fernandes-Cunha, G. M.; McKinlay, C. J.; Vargas, J. R.; Jessen, H. J.; Waymouth, R. M.; Wender, P. A. Delivery of Inorganic Polyphosphate into Cells Using Amphipathic Oligocarbonate Transporters. ACS Cent. Sci. 2018, 4 (10), 1394-1402. https://doi.org/10.1021/acscentsci.8b00470.

McKinlay CJ, Vargas JR, Blake TR, Hardy JW, Kanada M, Contag CH, Wender PA, Waymouth RM. Charge-altering releasable transporters (CARTs) for delivery and release of mRNA in living animals. Proceedings of the National Academy of Science, USA 2017; 114, E448-E456.

Pavlovic I, Thakor DT, Vargas JR, McKinlay CJ, Hauke S, Anstatett P, Camuna RC, Bigler L, Gasser G, Schultz C, Wender PA, Jessen HJ. Cellular delivery and photochemical release of a caged inositol-

pyrophosphate induces PH-domain translocation in cellulo. Nature Communications 2016; 7, 10622.

Wender PA, Huttner MA, Staveness D, Vargas JR, Xu AF. Guanidinium-Rich, Glycerol-derived oligocarbonates: A new class of cell-penetrating molecular transporters that complex, deliver, and release siRNA. Molecular Pharmaceutics 2015; 12, 742-750.

Vargas JR, Stanzl EG, Teng NNH, Wender PA. Cell-penetrating, guanidinium-rich molecular transporters for overcoming efflux-mediated multidrug resistance. Molecular Pharmaceutics 2014; 11, 2553-2565.

Stanzl EG, Trantow BM, Vargas JR, Wender PA. Fifteen years of cell-penetrating, guanidinium-rich molecular transporters: basic science, research tools, and clinical applications. Accounts of Chemical Research 2013; 46, 2944-2954.

Presentations

Oelker A, Clayman N, Kratochvil M, Vargas, J. Failure Analysis of Hydrogels: Case Studies in the Biomedical Space, Society for Biomaterials, Atlanta, GA, 2026.

Anderson, J., Singh, D., Vargas, J., Schlipf, M. Evaluation of Occupational Exposure and Bioavailability of Micropowders of Polytetrafluoroethylene (PTFE): Integrated In Vivo and In Silico Approaches. Poster Presentation. Society of Toxicology 65th Annual Meeting, 2026.

Buss, H. Davis, C. Lumpkin, M. Vargas, J. Microplastics, Health & the Environment: State of Science, Challenges, and the Emerging Legal & Regulatory Landscape, 2026.

Oelker A, Kratochvil M, Vargas J. From Construction to Agriculture: Surprising Applications of Hydrogels, American Chemical Society Fall Meeting, Washington, DC, 2025.

Harrier D, Clayman N, Vargas J. Process and Aging Considerations for Polymeric Catheter Devices. SPE ANTEC, Philadelphia, 2025.

Lovald, S. Clayman, N. Razi, H. Kalyan, S. Stabler, C. Vargas, J. Clevenger. Analysis Framework for Wearable Injector Systems to Improve Functionality, Safety and Reliability. PDA Universe of Pre-Filled Syringes and Injection Devices Conference 2025.

Wilts E, Oelker A, Vargas J. In Situ Curing Polymeric Materials for Dermal Applications, Oral presentation, American Chemical Society Fall Meeting, Denver, CO, 2024.

Dalal R, Churchill E, Clayman N, Vargas J. Biocompatibility and Chemical Safety in Wearables. MDM West. Society of Plastics Engineers MiniTec, Anaheim, 2024

Dimitriou M, Gupta C, Parker SE, Streifel B, Vargas J, White C. Dripping Windows to Leaking Walls, Using Analytical Instrumentation to Solve Real-World Problems. Thermal Analysis Forum of Delaware Valley Polymer Characterization Short Course, 2021.

McKinlay CJ, Vargas JR, Blake TR, Hardy JW, Kanada M, Contag CH, Wender PA, Waymouth RM. Charge-altering releasable transporters (CARTs) deliver and release messenger RNA in living animals. William S. Johnson Symposium, Stanford, CA, October, 2016.

Capolicchio S, Cunha GM, Huttner M, McKinlay CJ, Vargas JR, Waymouth RM, Wender PA. Cell-penetrating molecular transporters: New strategies for drug, probe, and oligonucleotide delivery. William S. Johnson Symposium, Stanford, CA, October, 2015.

Clark SA, Huttner M, McKinlay CJ, Staveness D, Vargas JR, Xu AF, Wender PA. Cell-penetrating, guanidinium-rich molecular transporters for drug, probe, and siRNA delivery. William S. Johnson Symposium, Stanford, CA, October 2013.

Goodman CG, Maducdoc M, Vargas JR, Choe SWT. Solid-state photodecarbonylation reaction: Preparation of functionalized carbocyclic ring systems. 239th American Chemical Society National Meeting & Exposition, San Francisco, CA, March, 2010.

Maducdoc M, Vargas JR, Choe SWT. Green chemistry: Synthesis of bridged ketones to study photochemical decarbonylation. Loyola Marymount University Research Symposium, Los Angeles, CA, March 2009.