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Engineering & Scientific Consulting

Jessica Vargas, Ph.D.

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Professional Profile

Dr. Vargas specializes in polymer synthesis and characterization, with an emphasis on materials for biomedical applications. She has diverse experience in the fields of organocatalysis, biodegradable polymers, drug delivery, and in vitro and in vivo testing of biopolymers.

A chemist by training, Dr. Vargas is skilled in organic synthesis and small molecule characterization using NMR, FTIR, and UV-Vis spectroscopy, as well as chromatography and mass spectrometry techniques such as GC-MS, HPLC, LC-MS, and MALDI-TOF. She also has practical knowledge characterizing polymeric 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. Her research leveraged organocatalytic polymerization techniques to access 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 analytical testing 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

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. Provisional Patent Appl. 62/376,555: Immolative Cell-penetrating Complexes for Nucleic Acid Delivery, July 2016 (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

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.