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Mike Kratochvil, Ph.D.

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Professional Profile

Dr. Kratochvil specializes in polymer synthesis and soft materials fabrication characterization. He has broad experience in the areas of polymers, biomaterials, surface chemistry, drug delivery, liposomes, and biological testing of materials.

A materials chemist by training, Dr. Kratochvil is skilled in materials and polymer characterization using NMR, FTIR, UV-Vis spectroscopy, rheology, contact angle goniometry, as well as chromatography-based techniques such as GC-MS, HPLC, and LC-MS. He also has extensive experience in characterizing nanoparticles via dynamic light scattering, and zeta potential measurements. In addition to his physical science training, Dr. Kratochvil is skilled at both mammalian and bacterial cell biology techniques including tissue culture, protein expression, PCR, flow cytometry, and cell imaging techniques (e.g., fluorescence and confocal microscopy).

Dr. Kratochvil was a postdoctoral researcher at Stanford University with co-appointments in the Department of Materials Science and Engineering and Division of Infectious Diseases where he developed injectable hydrogels for drug delivery and cell transplant, and he investigated the disease-driven changes of the compositional and rheological properties of human tissues and secretions. His research leveraged bacterial protein expression, tissue culture, synthetic chemistry, and polymer characterization techniques to develop advanced therapeutic hydrogels. During his graduate training at University of Wisconsin-Madison, Dr. Kratochvil's research focused on the development biofouling-resistant thin film coatings through the application of extreme surface wetting characteristics and controlled release of anti-biofilm agents designed to interrupt bacterial colonization. Dr. Kratochvil also interned as a Ph.D. student at Procter & Gamble in the Beauty Technology division exploring novel shampoo additives for mineral deposition management.

Academic Credentials & Professional Honors

Ph.D., Chemistry, University of Wisconsin, Madison, 2016

B.A., Chemistry, Carroll College, 2010

Stanford ChEM-H (Chemical, Engineering & Medicine for Human Health) Interdisciplinary Postdoctoral training Program in Quantitative Mechanobiology Fellowship (2016-2018)

Morgridge Wisconsin Distinguished Graduate Fellow (UW-Madison; 2015-2016)

Prior Experience

Postdoctoral Fellow, Department of Materials Science and Engineering and School of Medicine-Division of Infectious Disease & Geographic Medicine (Immunology), Stanford University, 2016-2021

Ph.D. R&D Intern, Proctor & Gamble, Beauty Technology Division, 2014

Professional Affiliations

American Chemical Society (ACS)

Patents

U.S. Provisional Patent Appl 63/245076: Natural bacteriophages for environmentally-friendly protection from ultraviolet irradiation (Bollyky P.L.; Kratochvil, M.J.)

U.S. Provisional Patent Appl. PCT/US2021/036095: Dynamically crosslinked injectable hydrogels with chemically stabilized multilamellar vesicles (Heilshorn S.C.; Kratochvil M.J.)

Publications

J.D. Pourtois, M.J. Kratochvil, Q. Chen, N.L. Haddock, E.B. Burgener, G.A. De Leo, P.L. Bollyky. Filamentous Bacteriophages and the Competitive Interaction between Pseudomonas aeruginosa Strains under Antibiotic Treatment: A Modeling Study. mSystems. 2021, 6(3), e00193-21.

P.C. Cai, C.; B.A. Krajina, M. J. Kratochvil, L. Zou, A. Zhu, E.B. Burgener. P.L. Bollyky, C.E. Milla, M.J. Webber, A.J. Spakowitz, and S.C. Heilshorn. Dynamic Light Scattering Microrheology for Soft and Living Materials. Soft Matter. 2021, 17, 1929-2939.

N. Nagy, G. Kaber, M.J. Kratochvil, H.F. Kuipers, S.M. Ruppert, K. Yadava, J. Yang, S.C. Heilshorn, S.A. Long, A. Pugliese, and P.L. Bollyky. Weekly Injection of IL-2 Using an Injectable Hydrogel Reduces Autoimmune Diabetes Incidence in NOD Mice. Diabetologia. 2021, 64, 152-158.

M.J. Kratochvil, A.J. Seymour, T.L. Li, S.P. Pasca, C.J. Kuo, and S.C. Heilshorn. Engineered Materials for Organoid Systems. Nature Reviews Materials. 2019, 9, 606-622.

E.A. Shamskhou*, M.J. Kratochvil*, M.E. Orcholski, N. Nagy, G. Kaber, E. Steen, S. Balaji, K. Yuan, S. Kewani, B. Danielson, M. Gao, C. Medina, A. Nathan, A. Chakraborty, P.L. Bollyky, and V.A. De Jesus Perez. Hydrogel-based delivery of IL-10 Improves Treatment of Bleomycin-induced Lung Fibrosis in Mice. Biomaterials. 2019, 203, 52-62.

A. de la Zerda, M.J. Kratochvil, N.A. Suhar, and S.C. Heilshorn. Bioengineering Strategies to Probe T Cell Mechanobiology. APL Bioengineering. 2018, 2, 021501.

N. Nagy, A. de la Zerda, G. Kaber, P.Y. Johnson, K.H. Hu, M.J. Kratochvil, K. Yadava, W. Zhao, Y. Cui, G. Navarro, J.P. Annes, T.N. Wight, S.C. Heilshorn, P.L. Bollyky, and M.J. Butte. Hyaluronan Content Governs Tissue Stiffness in Pancreatic Islet Inflammation. Journal of Biological Chemistry. 2018, 293, 567-578.

M. J. Kratochvil, U. Manna, and D. M. Lynn. Superhydrophobic Polymer Multilayers for the Filtration- and Absorption-Based Separation of Oil/Water Mixtures. Journal of Polymer Science Part A: Polymer Chemistry. 2017, 55, 3127-3136.

M. J. Kratochvil, M. C. D. Carter, and D. M. Lynn. Amine-Reactive Azlactone-Containing Nanofibers for the Immobilization and Patterning of New Functionality on Nanofiber-Based Scaffolds. ACS Applied

Materials and Interfaces. 2017, 9, 10243-10253.

M. J. Kratochvil*, T. Yang*, H. E. Blackwell and D. M. Lynn. Nonwoven Polymer Nanofiber Coatings That Inhibit Quorum Sensing in Staphylococcus aureus: Toward New Nonbactericidal Approaches to Infection Control. ACS Infectious Diseases. 2017. 4, 271-280.

M. J. Kratochvil*, M.A. Welsh*, U. Manna, B. J. Ortiz, H. E. Blackwell and D. M. Lynn. Slippery Liquid-Infused Porous Surfaces that Prevent Bacterial Surface Fouling and Inhibit Virulence Phenotypes in Surrounding Planktonic Cells. ACS Infectious Diseases. 2016. 7, 509-517.

M. J. Kratochvil*, Y. Tal-Gan*, T. Yang, H. E. Blackwell, and D. M. Lynn. Nanoporous Superhydrophobic Coatings that Promote the Extended Release of Water-Labile Quorum Sensing Inhibitors and Enable Long-Term Modulation of Quorum Sensing in Staphylococcus aureus. ACS Biomaterials Science and Engineering. 2015. 10, 1039-1049.

Broderick, A. H.; D. M. Stacy, Y. Tal-Gan, M. J. Kratochvil, H. E. Blackwell, and D. M. Lynn. Surface Coatings that Promote Rapid Release of Peptide-Based AgrC Inhibitors for Attenuation of Quorum Sensing in Staphylococcus aureus. Advanced Healthcare Materials. 2014. 3, 97-105.

Manna, U.; M. J. Kratochvil, and D. M. Lynn. Superhydrophobic Polymer Multilayers that Promote the Extended, Long-Term Release of Embedded Water-Soluble Agents. Advanced Materials. 2013. 25, 6405-6409.

Shields, G. F.; M. J. Kratochvil. A Remnant of an Incipient Speciation Event in the Simulium arcticum Complex (Diptera: Simuliidae). The American Midland Naturalist. 166, 2011, 2, 239-251.

Conflitti, I.; M. J. Kratochvil, M. Spironello, G. F. Shields, and D. C. Currie. Good Species Behaving Badly: Apparent Non-monophyly of Black Fly Siblings in the Simulium arcticum Complex (Diptera: Simuliidae). Molecular Phylogenetics and Evolution. 2010, 57, 245-257.

*denotes co-first authorship

Presentations

June 2021 International Society for Hyaluronan Sciences (ISHAS) International Conference. Oral Presentation: Hyaluronan Contributes to the Biochemical and Biophysical Properties of Respiratory Secretions in Severe SARS-CoV-2 (COVID-19) Infections

November 2020 American Institute of Chemical Engineers (AIChE) Annual Meeting. Poster Presentation: Injectable Drug Eluting Nanodroplet (DEN) Hydrogels For Controlled Delivery

August 2020 Fall American Chemical Society (ACS) Fall National Meeting. Poster Presentation: Injectable Drug Eluting Nanodroplet (DEN) Hydrogels For Controlled Delivery

July 2018 Gordon Research Conference and Seminar (GRC & GRS)—Signal Transduction by Engineered Extracellular Matrices. Poster Presentation: Mechanosensitive of Immature Dendritic Cells in Mechanically Tunable Three-dimensional Matrices

June 2018 Federation of Clinical Immunology Societies (FOCIS) Annual Meeting. Poster Presentation: A 3D Matrix for Evaluating the Influence of the Mechanical Microenvironment on Dendritic Cell Maturation

May 2017 National Institutes of Health (NIH) Novel, Alternative Model Systems for Enteric Diseases (NAMSED) All Site Meeting. Oral “Design of Customizable & Reproducible Matrices for Organotypic Cultures”

May 2014 Chemical Biology Student Seminar Day; University of Wisconsin-Madison. Oral Presentation:

The Long and Short of It; Surface-Mediated Release of Quorum Sensing Active Peptides

May 2010 Manion Symposium; Carroll College, Helena, Montana. Oral Presentation: Speciation in the Simulium arcticum Species Complex in the Pacific Northwest

February 2010 North American Black Fly Association; Archbold Biological Station, Lake Placid, Florida. Oral Presentation: Speciation in the Simulium arcticum Species Complex in the Pacific Northwest

October 2009 M. J. Murdock Undergraduate Research Conference; Gonzaga University, Spokane Washington. Poster Presentation: Mitochondrial DNA Sequences and Y Chromosome Variation are Uncoupled in the Simulium arcticum Complex (Diptera: Simuliidae)

October 2008 M. J. Murdock Undergraduate Research Conference; University of Puget Sound, Tacoma, Washington. Poster Presentation: Cytogenetic Analysis of the Simulium arcticum Complex at the Cle Elum River, Washington State, and the Blackfoot River, Western Montana

M.J. Kratochvil*, G. Kaber*, S. Demirdjian*, P.C. Cai, E.B. Burgener, N. Nagy, G.L. Barlow, M. Popescu, M.R. Nicolls, M.G. Ozawa, D.P. Regula, A. E. Pacheco-Navarro, S. Yang, V.A. de Jesus Perez, H. Karmouty-Quintana, A.M. Peters, B. Zhao, M.L. Buja, P.Y. Johnson, R.B. Vernon, T.N. Wight, Stanford COVID-19 Biobank Study Group, C.E. Milla, A.J. Rogers, A.J. Spakowitz, S.C. Heilshorn, and P.L. Bollyky. Biochemical, biophysical, and immunological characterization of respiratory secretions in severe SARS-CoV-2 infections. JCI Insight. 7(12): e152629.