

Joseph W. Krumpfer

Curriculum Vitae

Department of Chemistry and Physical Sciences
Dyson College of Arts and Sciences
Pace University - Pleasantville
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PROFESSIONAL POSITIONS

Pace University - Pleasantville, NY 2015-Present
Assistant Professor of Inorganic and Polymer Chemistry

EDUCATION

University of Massachusetts Amherst - Amherst, MA 2007-2012
Doctorate of Philosophy in Polymer Science and Engineering (July 2012)
Master of Science in Polymer Science and Engineering (May 2008)
Advisor: Professor Thomas J. McCarthy

Seton Hall University - South Orange, NJ (GPA 3.9/4.0) 2003-2007
Bachelor of Science in Chemistry and Biochemistry, ACS Certification (May 2007)
Bachelor of Arts in Classical Studies
Minor Concentration in Physics

CURRENT RESEARCH

Assistant Professor of Chemistry, underlined researchers are undergraduates
Pace University - Pleasantville, NY, Sept. 2015-current

- Preparation silicone artistic media (paints) via compositing with classical inorganic dyes. Silicone paints exhibit identical properties to traditional oil-based paints, but are instantly curable via thermally induced hydrosilylation reactions (Taylor Longenberger)
- Ring-opening polymerizations (ROP) of cyclic siloxanes from inorganic oxide surfaces via reactions at the solid-vapor interface. Evaluation of surface properties thereof through ellipsometric measurements and dynamic contact angles. (Kaleigh Ryan)
- Investigation on the motivators for women faculty in STEM fields. Semi-structured interviews are performed focusing on the reasons why women enter faculty positions in these fields, as well as methods to make these positions more assessable and desirable
- The anti-bacterial and anti-microbial properties of silicone and silicone-hybrid films is investigated. Correlations between mechanical and chemical properties to their abilities to resist microbial growth is examined. Treatment of the silicone-air interface leads to different functional moieties which directly impact biofilm growth (William Bender)
- Surface modification of silicones via acid-catalyzed equilibration reactions with chlorosilanes. (Dymin Morillo)
- Design of organic-inorganic "hybrid" polymers via hydrosilylation of functional monomers. This entails the synthesis of α,ω -divinyl monomers and the subsequent reaction with multi-functional hydridosilanes. Effects of siloxane and monomer chain length on the resulting physical properties are examined. (Joshua Kreitler)

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COLLABORATIONS

Prof. Ron D'Amelia, Hofstra University, Hempstead, NY

- Investigation of polymer structure-property relationships of silicone-based polymers prepared by step-growth hydrosilylation reactions

Prof. Dr. Klaus Müllen, Max Planck Institute for Polymer Research, Mainz, Germany

Prof. Dr. Michael R. Buchmeiser, Universität Stuttgart, Stuttgart, Germany

- Preparation of carbon fiber precursor polymers

PREVIOUS RESEARCH

Alexander von Humboldt Post-doctoral Research Fellow, Prof. Dr. Klaus Müllen

Max Planck Institute for Polymer Research, Mainz, August 2012 - June 2015

- Design, synthesis and processing of carbon fiber precursor polymers, including poly(methyl vinyl ketone), poly(ethyl vinyl ketone) and poly(ethyl-3-oxo-4-pentenoate), which yield high carbon materials via chemical (Aldol) reactions rather than high temperature treatments
- Development of heterocyclic polymers via the post-polymerization cyclization of polyazomethines using Povarov's reaction. Inclusion of biphenyl units in the polymer backbone was found to greatly improve the solubility and thermal properties
- Study of the static and dynamic surface tension properties of multi-arm fluorosurfactants

Research Assistant, Prof. Thomas J. McCarthy

University of Massachusetts - Amherst, Sept. 2007 - July 2012

- Synthesized and characterized hydrophobic inorganic oxide surfaces using poly(dimethylsiloxane)s. Evaluated the effects of molecular weight on the thickness and wetting properties of the grafted layer, and demonstrated the versatility of this technique using silica, alumina, titania, and nickel oxide. Prepared a simple, reproducible method for the synthesis of surfaces exhibiting low contact angle hysteresis using this technique.
- Examined the mechanism of dewetting on superhydrophobic post surfaces using ionic liquid probe fluids. Observed the presence of microdroplets pinned on the top of these posts through a capillary bridge rupture mechanism. Deposited single nanogram salt crystals on the tops of superhydrophobic pillared surfaces.
- Synthesized nickel micro-particles and wires for the fabrication of silicone composite films with controllable conductivity.

Research Assistant, Prof. Alexander Y. Fadeev

Seton Hall University, South Orange, Sept. 2003 - August 2007

- Synthesized mixed functional surfaces on silica using an equilibrium displacement. By exposing covalently-attached monolayers on silica surfaces to silane solutions for various times, the wetting characteristics of surfaces were found to be carefully controlled.
- Evaluation of the nature of the water-hydrophobic surface interface via ellipsometry
- Synthesized porous SBA silica for controlled release studies in drug delivery systems.

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TEACHING EXPERIENCE

Pace University, Pleasantville, NY, Sept. 2015 - current

- CHE 111 - General Chemistry I Lecture and Lab (Fall '15, '16)
- CHE 112 - General Chemistry II Lecture and Lab (Spring '16, '17)
- CHE 330 - Advanced Inorganic Chemistry (Spring '16, '17)
- CHE 340 - Polymer Chemistry (Fall '17)
- CHE 480 - Research in Chemistry

Mount Holyoke College, South Hadley, MA Sept. 2010 - March 2011

- CHEM 202 - Organic Chemistry Lab I (Sept. 2010)
- CHEM 302 - Organic Chemistry Lab II (Jan. 2011)

AWARDS AND PRESENTATIONS

- Alexander von Humboldt Post-doctoral Research Fellowship 2013-2015
- Seton Hall University Regent's Scholar Award 2003-2007
- NJ Edward J. Bloustein Distinguished Scholars Award 2003-2007
- National Merit Scholarship – BOC Group, Inc. 2003-2007
- Seton Hall University, Summa Cum Laude 2007
- Seton Hall University, Chemistry Honors Award 2007
- Eta Sigma Phi – Latin and Greek Honors Society 2007

- 228th ACS National Convention, Philadelphia 2004
 - Reactions of Displacement of Organosilicon Monolayers Supported on Si
- 37th Middle Atlantic Regional Meeting of ACS, New Brunswick, 2005
 - Displacement of Organosilicon Monolayers Supported on Si
- 80th ACS Colloids and Surface Science Symposium, Boulder 2006
 - Characterization of Water-Hydrophobic Interface by Ellipsometry
- 238th ACS National Convention, Washington D.C. 2009
 - Modification of Titania Surfaces with Poly(hydridomethylsiloxane)s
- 241st ACS National Convention, Anaheim 2011
 - Reactions of "Unreactive" Silicones and Inorganic Oxide Surfaces
- 250st ACS National Convention, Boston 2015
 - Poly(methyl vinyl ketone) as a carbon fiber precursor (Oral)
- 44th Middle Atlantic Regional Meeting (MARM) of ACS, Riverdale, 2016
 - Silicone chemistry in undergraduate laboratory and research courses (Oral) - Co-chair
- Invited Talk: Analytical Topical Group of the New York Section of ACS, Feb. 16, 2017
 - Ellipsometric and Dynamic Contact Angle Analysis of Inorganic Oxide Surfaces Modified by Siloxane Equilibration Reactions (Oral)
- PittCon 2017, Chicago, March 2017
 - Hydrophobization of Inorganic Oxide Surfaces via Siloxane Equilibration
- 254th ACS National Convention, Washington D.C., 2017
 - Hydrophobization of inorganic oxide surfaces via siloxane equilibration reactions (Oral) - COLL - Session Chair
 - Silicones at the crossroads: Uniting physical and chemical properties with the artistic and material (Oral)
 - Modification of Inorganic Oxide Surfaces via Vapor-Solid Ring-Opening Polymerizations of Cyclic Siloxanes
 - Silicones in undergraduate research: Examine the surface and material properties of silicones at interfaces

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STUDENT AWARDS

- Dyson Society of Fellows Plenary Award 2017 - Taylor B. Longenberger
 - Preparation and Applications of Silicone Composites as an Artistic Medium

FUNDING

- Pace University Scholarly Research Award (3/2016)
- Dyson College Student-Faculty Research Award, Taylor Longenberger (6/2016)
- Pace University Student-Faculty Research Award, Kaleigh Ryan and William Bender (9/2016)
- Pace University - Innovative Teaching Grant (\$11,000) (11/2016)
- NSF- EHR Core Research Grant (PI) - (\$396,532 - in review)

UNIVERSITY SERVICE

- WFC Executive Committee (11/16-current)
- Library Affairs Committee (9/2015-current)
- WFC Nominations Committee (11/2016-12/2016)
- Dyson Committee on Sabbatical Leaves (5/2016-current)
- Dyson Academic Appeals Committee (1/2017-current)
- Dyson Probation Committee (7/2017-current)
- Faculty Partner - Transfer Student Living Learning Community in Elm Hall (9/2016-current)
- ACS Student Chapter Faculty Advisor (9/2016-current)

LANGUAGES

- English (native speaker)
- Latin
- German (intermediate, A2/3)

EXTRACURRICULAR ACTIVITIES

- Omega House (Pace Science Club)
- American Chemical Society (ACS) - New York Section (NYACS)
- Council for Undergraduate Research (CUR)
- ACS Student Chapter Faculty Advisor (2016-present)
- Marathon Running
- Guitar Playing

PUBLICATIONS (by date)

Peer-Reviewed (underlined are undergraduate students):

1. Ryan, K.M., Krumpfer, J.W., "Covalent attachment of 'reactive' cyclic siloxane vapor at metal oxide surfaces via ring-opening polymerization," in preparation.
2. Longenberger, T.B., Ryan, K.M., Bender, W.Y., Krumpfer, A-K., Krumpfer, J.W., "The art of silicones: bringing siloxane chemistry to the undergraduate curriculum," *J. Chem. Educ.*, **2017**, DOI: 10.1021/acs.jchemed.6b00769.
3. Krumpfer, J.W., Giebel, E., Müller, A., Ackermann, L.M., Nardi Tironi, C., Unold, J., Klapper, M., Buchmeier, M.R., Müllen, K., "Polymerization, Fiber Formation, and Cyclization Carbonization of Poly(methyl vinyl ketone) as a carbon fiber precursor alternative," *Chem Mater.*, **2017**, 29, 780-788.

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4. Brüller, S., Liang, H-W., Kramm, U.I., Krumpfer, J.W., Feng, X., Müllen, K., "Bimetallic porous porphyrin polymer-derived non-precious metal electrocatalysts for oxygen reduction reactions," *J. Mater. Chem. A*, **2015**, 3, 23799-23808.
5. Nietzel, S., Joe, D., Krumpfer, J.W., Schellenberger, F., Alsaygh, A.A., Klapper, M., Müllen, K., "Organic nanoparticles as fragmentable support for Ziegler-Natta catalysts," *J. Polym. Sci. A*, **2015**, 53, 15-22.
6. Schuster, T., Golling, F., Krumpfer, J.W., Klapper, M., Müllen, K., "Polyisobutylene nanoparticles via cationic polymerization in non-aqueous emulsions," *Macromol. Rapid Comm.*, **2015**, 36, 204-210.
7. Schuster, T., Krumpfer, J.W., Schellenberger, S., Friedrich, R., Klapper, M., Müllen, K., "Effects of chemical structure on the dynamic and static surface tensions of short-chain, multi-arm, nonionic fluorosurfactants," *J. Colloid Interface Sci.*, **2014**, 248, 276-285.
8. Klapper, M., Joe, D., Nietzel, S., Krumpfer, J.W., Müllen, K., "Olefin polymerization with supported catalysts as an exercise in nanotechnology," *Chem. Mater.*, **2014**, 26, 802-819.
9. Krumpfer, J.W., Schuster, T., Klapper, M., Müllen, K., "Make It Nano - Keep It Nano," *Nano Today*, **2013**, 8, 417-438.
10. Lin, Y., Wang, L., Krumpfer, J.W., Watkins, J.J., McCarthy, T.J., "Hydrophobization of Inorganic Oxide Surfaces Using Dimethylsilanediol," *Langmuir*, **2013**, 29, 1329-1332.
11. Krumpfer, J.W., McCarthy, T.J., "Rediscovering Silicones. 'Unreactive' Silicones React with Inorganic Surfaces," *Langmuir*, **2011**, 27, 11514-11519.
12. Krumpfer, J.W., McCarthy, T.J., "Dip-Coating Crystallization on Superhydrophobic Surfaces: A Million Mounted Crystals in a 1cm² Array," *J. Am. Chem. Soc.*, **2011**, 133, 5764-5766.
13. Krumpfer, J.W., Bian, P., Zheng, P., Gao, L., McCarthy, T.J., "Contact Angle Hysteresis on Superhydrophobic Surfaces: An Ionic Liquid Probe Fluid Offers Mechanistic Insight," *Langmuir*, **2011**, 27, 2166-2169.
14. Krumpfer, J.W., McCarthy, T.J., "Contact angle hysteresis: a different view and a trivial recipe for low hysteresis hydrophobic surfaces," *Faraday Discuss.*, **2010**, 146, 103-111.
15. Krumpfer, J.W., Fadeev, A.Y., "Displacement Reactions of Covalently Attached Organosilicon Monolayers on Si," *Langmuir*, **2006**, 22, 8271-8272.

Book Chapters:

1. Krumpfer, J.W.; Gao, L.; Fadeev, A.Y.; McCarthy, T.J.; "Using Surface-Attached Organosilanes to Control and Understand Hydrophobicity and Superhydrophobicity". In *Silicone Surface Science*; Dvornic, P.R., Owen, M.J., Eds.; Springer: Dordrecht, **2012**.

PATENTS

1. Krumpfer, J.W.; Longenberger, T.B., Silicone-Based Oil Paints for Artistic Media, U.S. Patent, in progress.