Renxuan (Ren) Xie

Email: Renxuan.Xie@asu.edu Phone: (602) 543-4479

EDUCATION:

Oct 2018 **Doctor of Philosophy, Chemical Engineering**
The Pennsylvania State University, University Park, PA
Dissertation title: Connecting Fundamental Properties of Conjugated Polymers to Mechanical Performances in Stretchable Electronics

May 2013 **Bachelor of Materials Science and Engineering**
May 2012 **Bachelor of Chemical Engineering**
The University of Minnesota, Twin Cities, MN

RESEARCH EXPERIENCE:

Aug. 2021–present **Assistant Professor,** The Arizona State University
Chemical Engineering, School for Engineering of Matter, Transport & Energy
Biodesign Center for Sustainable Macromolecular Materials and Manufacturing
Research theme: utilize rheology and fundamental polymer physics to develop sustainable polymers and processing methods.

2018–2021 **Postdoctoral Scholar,** The University of California, Santa Barbara
Advisors: Dr. Michael L. Chabinyc and Dr. Christopher M. Bates
Devised a generic network model of UV-curable super-soft bottlebrush elastomers for capacitive pressure sensing with high sensitivity
Developed room-temperature 3D printing of super-soft and solvent-free elastomers by leveraging the unique self-assembly of bottlebrush statistical copolymer
Investigated roles of structural ordering, chain architectures and dispersity in the yield-stress fluid behavior of microphase-separated polymers

2013–2018 **Graduate Research Assistant**, The Pennsylvania State University
Advisors: Dr. Ralph H. Colby and Dr. Enrique D. Gomez
Established an unambiguous method to determine glass transition temperatures of conjugated polymers with different molecular weights and sidechain regioregularities
Predicted glass transition temperatures directly from chemical structures of alkylated conjugated polymers based on a novel and simple group contribution method
Revealed that local chain alignment via nematic ordering reduces chain entanglement in conjugated polymers
Modeled entanglement dynamics of semiflexible conjugated polymers with various sidechain and backbone structures

2011–2013 **Undergraduate Research Assistant**, The University of Minnesota at Twin Cities
Advisor: Dr. Christopher W. Macosko
Discovered rheology fingerprint of chewing gum: critical gel fluid with high extensibility
Investigated coarsening evolution of co-continuous polymer blends with addition of silica nanoparticles and graphite for membrane applications

HONORS and AWARDS:

2020 ACS Polymeric Materials: Science and Engineering Future Faculty Scholar

2018 Selected speaker for Gordon Research Seminar in Polymer Physics

2016 Materials Research Society Fall Meeting Poster Award Finalist

2012 Departmental CEMS Scholarship at University of Minnesota

2010 Board of Trustees Academic Scholarship at Saint Louis Community College

PUBLICATIONS: (21 total, 7 first-author)

21. **R. Xie**, S. Mukherjee, A. E. Levi, J. Self, H. Wang, M. L. Chabinyc, C. M. Bates. "Yielding Behavior of Bottlebrush and Linear Block Copolymers" *Macromolecules*, **2021**, 54, 12, 5636–5647.
20. U H. Choi, T. L. Price Jr., D. V. Schoonover, **R. Xie**, H. W. Gibson, and R. H. Colby, "Role of Chain Polarity on Ion and Polymer Dynamics: Molecular Volume-Based Analysis of the Dielectric Constant for Polymerized Norbornene-Based Ionic Liquids" *Macromolecules*, **2020**, 53, 10561−10573.
19. **R. Xie***, S. Mukherjee*, A. E. Levi, V. G. Reynolds, H. Wang, M. L. Chabinyc, C. M. Bates, "Room-Temperature 3D Printing of Super-Soft and Solvent-Free Elastomers" *Science Advances*, **2020**, 6 (46), eabc6900. https://doi.org/10.1126/sciadv.abc6900. ***: co-first authors**
18. V. G. Reynolds, S. Oh, **R. Xie**, and M. L. Chabinyc, "Model for the Electro-Mechanical Behavior of Elastic Organic Transistors" *Journal of Materials Chemistry C*, **2020**, 8, 9276-9285.
17. B. H. Smith, **R. Xie**, W. Lee, D. Adhikari, N. J. Podraza, E. D. Gomez, "Characterization of Chain Alignment at Buried Interfaces using Mueller Matrix Spectroscopy" *MRS Communications*, **2020**, 10 (2), 292-297.
16. J. L. Self, C. S. Sample, A. E. Levi, K. Li, **R. Xie**, J. Read de Alaniz, C. M. Bates, "Dynamic Bottlebrush Polymer Networks: Self-Healing in Super-Soft Materials" *Journal of the American Chemical Society*, **2020** 142 (16), 7567-7573.
15. **R. Xie,** A. R. Weisen, Y. Lee, M. A. Aplan, A. M. Fenton, A. E. Masucci, F. Kempe, M. Sommer, C. W. Pester, R. H. Colby, E. D. Gomez, "Glass Transition Temperature from the Chemical Structure of Conjugated Polymers" *Nature Communications*, **2020**, 11, 893. https://doi.org/10.1038/s41467-020-14656-8
14. S. Mukherjee*, **R. Xie***, V. G. Reynolds, T. Uchiyama, A. E. Levi, E. Valois, H. Wang, M. L. Chabinyc, C. M. Bates, "Universal Approach to Photo-Crosslink Bottlebrush Polymers" *Macromolecules*, **2020**, 53, 3, 1090-1097. ***: co-first authors**
13. V. Reynolds, S. Mukherjee, **R. Xie**, A. E. Levi, A. Atassi, T. Uchiyama, H. Wang, M. Chabinyc, C. M. Bates, "Super-Soft Solvent-Free Bottlebrush Elastomers for Touch Sensing", *Materials Horizons*, **2020**, 7, 181-187

12. W. Zhang, J. H. Bombile, A. R. Weisen, **R. Xie**, R. H. Colby, M. J Janik, S. T. Milner, E. D. Gomez, "Thermal Fluctuations Lead to Cumulative Disorder and Enhance Charge Transport in Conjugated Polymers", *Macromolecular Rapid Communications*, **2019**, 40, 1900134
11. T. L. Price Jr., U. H. Choi, D. V. Schoonover, M. Arunachalam, **R. Xie**, S. Lyle, R. H. Colby, H. W. Gibson, "Ion Conducting ROMP Monomers Based on (Oxa)norbornenes with Pendant Imidazolium Salts Connected via Oligo(oxyethylene) Units and with Oligo(ethyleneoxy) Terminal Moieties", *Macromolecules*, **2019**, 52, 4, 1371-1388
10. T. L. Price Jr., U. H. Choi, D. V. Schoonover, D. Wang, J. R. Heflin, **R. Xie**, R. H. Colby, H. W. Gibson, "Studies of Ion Conductance in Polymers Derived from Norbornene Imidazolium Salts Containing Ethyleneoxy Moieties", *Macromolecules*, **2019**, 52, 4, 1389-1399
9. **R. Xie**, M. Aplan, N. Caggiano, T. Su, C. Müller, M. Segad, R. H. Colby, E. D. Gomez, "Local Chain Alignment via Nematic Ordering Reduces Chain Entanglement in Conjugated Polymers," *Macromolecules*, **2018**, 51, 24, 10271-10284
8. **R. Xie**, R. H. Colby, E. D. Gomez, "Connecting the Mechanical and Conductive Properties of Conjugated Polymers," *Advanced Electronic Materials*, **2018**, 4, 10, 1700356
7. Y. Lee, M. P. Aplan, Z. D. Seibers, **R. Xie**, T. E. Culp, C. Wang, A. Hexemer, S. M. Kilbey, Q. Wang, E. D. Gomez "Random Copolymers Allow Control of Crystallization and Microphase separation in Fully Conjugated Block Copolymers", *Macromolecules*, **2018**, 51, 21, 8844-8852.
6. P. Zhan, W. Zhang, I. E. Jacobs, D. M. Nisson, **R. Xie**, A. R. Weisen, A. J. Moule, S. T. Milner, J. K. Maranas, E. D. Gomez, "Side Chain Length Affects Backbone Dynamics in Poly(3-alkylthiophene)s", *Journal of Polymer Science Part B: Polymer Physics*, **2018**, 56, 17 1193-1202.
5. J. Bartolai, **R. Xie**, T. W. Simpson, "Predicting Strength of Additively Manufactured Thermoplastic Polymer Parts Produced using Material Extrusion," *Rapid Prototyping Journal*, **2018**, 24 (2), 321-332.
4. J. S. Price, B. Wang, T. Kim, A. J Grede, J. M Sandoval, **R. Xie**, Y. Shen, D. R Adams, M. J Eller, A. Sokolov, S. Mukhopadhyay, P. Trefonas, E. D. Gomez, E. A. Schweikert, N. C. Giebink, "Fluoropolymer-Diluted Small Molecule Organic Semiconductors with Extreme Thermal Stability", *Applied Physics Letters*, **2018**, 113, 26, 263302
3. **R. Xie**, Y. Lee, M. Aplan, N. Caggiano, C. Müller, R. H. Colby, E. D. Gomez, "Glass Transition Temperature of Conjugated Polymers by Oscillatory Shear Rheometry," *Macromolecules*, **2017**, 50, 5146-5154.
2. S. Wang, **R. Xie**, S. V. Kesava, E. D. Gomez, E. W. Cochran, M. L. Robertson, "Close-Packed Spherical Morphology in an ABA Triblock Copolymer Aligned with Large-Amplitude Oscillatory Shear," *Macromolecules*, **2016**, 49, 4875−4888.
1. L. Martinetti, A. M. Mannion, W. E. Voje Jr., **R. Xie**, R. H. Ewoldt, L. D. Morgret, F. S. Bates, C. W. Macosko, "A critical gel fluid with high extensibility: The rheology of chewing gum," *Journal of Rheology*, **2014**, 58, 821-838

PATENTS:

1. Michael L. Chabinyc; Christopher Bates; Veronica Reynolds; Sanjoy Mukherjee; Adam E. Levi; Renxuan Xie; Jeffrey Self. "CAPACITIVE PRESSURE SENSOR WITH BOTTLEBRUSH ELASTOMER DIELECTRIC LAYER FOR LOW PRESSURE SENSING". Non-Provisional Application. Filling date: 2020/5/13. 30794.0698USU1

2. Renxuan Xie; Sanjoy Mukherjee; Adam E. Levi; Veronica Reynolds; Michael L. Chabinyc; Christopher Bates. “ROOM TEMPERATURE THREE DIMENSIONAL PRINTING OF A SUPER-SOFT AND SOLVENT FREE ELASTOMER”. PCT Application. Filling date: 3/10/2021. 30794.0764WOU1

PRESENTATIONS:

13. **Invited Presentation**. “Room-Temperature 3D Printing of Super-Soft and Solvent-Free Elastomers,” **R. Xie**, S. Mukherjee, A. E. Levi, V. G. Reynolds, C. M. Bates, M. L. Chabinyc, **Young Macromolecular Researcher Webinar**, The University of Warwick, Coventry, United Kingdom, April 2021.
12. **Invited Presentation**. “Room-Temperature 3D Printing and Universal Photo-Crosslinking of a Super-Soft and Solvent-Free Elastomer,” **R. Xie**, S. Mukherjee, A. E. Levi, V. G. Reynolds, C. M. Bates, M. L. Chabinyc, **Future Faculty Scholar** Symposium, American Chemical Society, San Francisco, California, August 2020.
11. Oral Presentation. “General Approach to Photo-Crosslink Bottlebrush Polymers,” **R. Xie**, S. Mukherjee, V. G. Reynolds, C. M. Bates, M. L. Chabinyc, American Physical Society, Denver, Colorado, March 2020.
10. Poster Presentation. “Glass Transition Temperature from the Chemical Structure of Conjugated Polymers,” **R. Xie**, E. D. Gomez, R. H. Colby, American Physical Society, Denver, Colorado, March 2020.
9. **Invited Presentation**. “Connecting Fundamental Properties of Conjugated Polymers to Mechanical Performance of Stretchable Electronics,” **R. Xie**, E. D. Gomez, R. H. Colby, **Gordon Research Seminar in Polymer Physics**, Mount Holyoke College, Massachusetts, July 2018. Poster Presentation at accompanying GRC.
8. Oral Presentation. “Towards Establishing Design Rules of Conjugated Polymers for Stretchable Electronics,” **R. Xie**, E. D. Gomez, R. H. Colby, American Chemical Society, New Orleans, Louisiana, March 2018.
7. Oral Presentation. “Towards Connecting Fundamental Properties of Conjugated Polymers with Performance in Electronic Devices,” **R. Xie**, E. D. Gomez, R. H. Colby, American Physical Society, Los Angeles, California, March 2018.
6. Poster Presentation. “Glass Transitions and Melting of Liquid Crystalline Phases in Conjugated Polymers Measured by Oscillatory Shear Rheometry,” **R. Xie**, E. D. Gomez, R. H. Colby, Materials Research Society, Boston, Massachusetts, December 2017.
5. Oral Presentation. “Chain Entanglement in Conjugated Polymers,” **R. Xie**, E. D. Gomez, R. H. Colby, American Physical Society, New Orleans, Louisiana, March 2017.
4. Poster Presentation. “Thermal Transitions of Conjugated Polymers,” **R. Xie**, E. D. Gomez, R. H. Colby, Materials Research Society, Boston, Massachusetts, December 2016. **Nominated for Best Poster Award**
3. Poster Presentation. “Using Linear Viscoelasticity to Probe Entanglement and the Glass Transitions of Conjugated Polymers,” **R. Xie**, Y. Lee, E. D. Gomez, R. H. Colby, Gordon Research Seminar in Polymer Physics, Mount Holyoke College, Massachusetts, July 2016.
2. Oral Presentation. “Regio Regularity Effects on Chain Mobility and Entanglement for Poly (3-hexylthiophene),” **R. Xie**, E. D. Gomez, R. H. Colby, American Physical Society, Baltimore, Maryland, March 2016.
1. Poster Presentation. “Regio Regularity Effect on Chain Mobility for Poly(3-hexylthiophene-2,5-dyl),” **R. Xie**, E. D. Gomez, R. H. Colby, Society of Rheology Conference, Baltimore, Maryland, August 2015.

PROFESSIONAL SERVICES:

- Peer reviewer for *Journal of Rheology*, *Journal of Applied Polymer Science*, *Journal of Polymer Science*, and *Polymer International*
- Discussion leader for 2020 Virtual Gordon Research Seminar Polymer Physics

PROFESSIONAL AFFILIATIONS:

- Society of Rheology
- Materials Research Society
- American Physical Society
- American Chemical Society