

# RYAN POLING-SKUTVIK

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## EDUCATION

### 2013 – 2018 Ph.D. Chemical Engineering

University of Houston, Department of Chemical and Biomolecular Engineering

Houston, TX

Advisors: Jacinta C. Conrad and Ramanan Krishnamoorti

Thesis: "Transport of nanoparticles through complex polymeric fluids"

### 2009 – 2013 B.E. Chemical Engineering

The Cooper Union for the Advancement of Science and Art

New York, NY

## RESEARCH EXPERIENCE

### 2018 – Now Postdoctoral Researcher, University of Pennsylvania, Philadelphia, PA

Department of Chemical and Biomolecular Engineering with Chinedum Osuji

- Development of novel materials with controllable hierarchical dynamics

### 2013 – 2018 Graduate Research Assistant, University of Houston, Houston, TX

Department of Chemical and Biomolecular Engineering with Jacinta C. Conrad and Ramanan Krishnamoorti

- Developed model systems to investigate dynamics of nanoparticles in complex, polymeric fluids
- Performed neutron and x-ray scattering experiments to isolate dynamics of particles and polymers in complex fluids

## PEER-REVIEWED PUBLICATIONS (\* denotes equal contribution)

- 2019 16. Poling-Skutvik, R.; Slim, A. H.; Narayanan, S.; Conrad, J. C.; Krishnamoorti, R. Soft interactions modify the diffusive dynamics of polymer-grafted nanoparticles in solutions of free polymer. *ACS Macro Lett.* Just Accepted.
15. Poling-Skutvik, R.; Roberts, R. C.; Slim, A. H.; Narayanan, S.; Krishnamoorti, R.; Palmer, J. C.; Conrad, J. C. Structure dominates localization of tracers within aging nanoparticle glasses. *J. Phys. Chem. Lett.* **2019**, *10*, 1784-1789.
14. Chen, R.; Poling-Skutvik, R.; Howard, M. P.; Nikoubashman, A.; Egorov, S.; Conrad, J. C.; Palmer, J. C. Influence of polymer flexibility on nanoparticle dynamics in semidilute solutions. *Soft Matter* **2019**, *15* (6), 1260-1268.
- 2018 13. Goel, V.; Pietrasik, J.; Poling-Skutvik, R.; Jackson, A.; Matyjaszewski, K.; Krishnamoorti, R. Structure of block copolymer grafted silica nanoparticles. *Polymer* **2018**, *159*, 138-145.
12. Mongcopa, K. I. S.\*; Poling-Skutvik, R.\*; Ashkar, R.; Butler, P.; Krishnamoorti, R. Conformational change and suppression of the  $\Theta$ -temperature for solutions of polymer grafted nanoparticles. *Soft Matter* **2018**, *14* (29), 6102-6108.
11. Roberts, R.C.; Poling-Skutvik, R.; Palmer, J. C.; Conrad, J. C. Tracer transport probes relaxation and structure of attractive and repulsive glassy liquids. *J. Phys. Chem. Lett.* **2018**, *9* (11), 3008-3013.
10. Conrad, J. C.; Poling-Skutvik, R. Confined flow: consequences and implications for bacteria and biofilms. *Annu. Rev. Chem. Biomol. Eng.* **2018**, *9* (1), 175-200.
9. Chen, R.\*; Poling-Skutvik, R.\*; Nikoubashman, A.; Howard, M. P.; Conrad, J. C.; Palmer, J. C. Coupling of nanoparticle dynamics to polymer center-of-mass motion in semidilute polymer solutions. *Macromolecules* **2018**, *51* (5), 1865-1872.
8. Poling-Skutvik, R.; Lee, J.; Narayanan, S.; Krishnamoorti, R.; Conrad, J. C. Tunable assembly of gold nanorods in polymer solutions to generate controlled nanostructured materials. *ACS Appl. Nano Mater.* **2018**, *1* (2), 877-885.
- 2017 7. Poling-Skutvik, R.; Olafson, K. N.; Narayanan, S.; Stingaciu, L.; Faraone, A.; Conrad, J. C.; Krishnamoorti, R. Confined dynamics of grafted polymer chains in solutions of linear polymer. *Macromolecules* **2017**, *50* (18), 7372-7379.
- Featured as NSE-SNS highlight for DOE triennial review
6. Safari, M. S.; Poling-Skutvik, R.; Vekilov, P. G.; Conrad, J. C. Differential dynamic microscopy of bidisperse colloidal suspensions. *npj Microgravity* **2017**, *3* (1), 21.
5. Kim, J.; Poling-Skutvik, R.; Trabuco, J. R. C.; Kourentzi, K.; Willson, R. C.; Conrad, J. C. Orientational binding modes of reporters in a viral-nanoparticle lateral flow assay. *Analyst* **2017**, *142* (1), 55-64.

- *Artwork featured on January Cover; Designated HOT article*
- 2016 4. **Poling-Skutvik, R.**; Mongcopa, K. I. S.; Faraone, A.; Narayanan, S.; Conrad, J. C.; Krishnamoorti, R. Structure and dynamics of interacting nanoparticles in semidilute polymer solutions. *Macromolecules* **2016**, 49 (17), 6568–6577.
- 2015 3. Safari, M. S.; Vorontsova, M. A.; **Poling-Skutvik, R.**; Vekilov, P. G.; Conrad, J. C. Differential dynamic microscopy of weakly scattering and polydisperse protein-rich clusters. *Phys. Rev. E* **2015**, 92 (4), 42712.
- 2. **Poling-Skutvik, R.**; Krishnamoorti, R.; Conrad, J. C. Size-dependent dynamics of nanoparticles in unentangled polyelectrolyte solutions. *ACS Macro Lett.* **2015**, 4 (10), 1169–1173.
- 2014 1. Babaye Khorasani, F.; **Poling-Skutvik, R.**; Krishnamoorti, R.; Conrad, J. C. Mobility of nanoparticles in semidilute polyelectrolyte solutions. *Macromolecules* **2014**, 47 (15), 5328–5333.

## **AWARDS AND HONORS**

- 2018 Finalist in the Excellence in Graduate Research Symposium, American Institute of Chemical Engineers  
Finalist for the Frank J. Padden Jr. Award for Excellence in Polymer Physics Research, American Physical Society  
APS Invited Student Talk at the APS/CNM Annual User Meeting, Argonne National Lab  
Travel Award for APS/CNM Annual User Meeting, Argonne National Lab  
Research highlighted for Department of Energy triennial review, Oak Ridge National Lab
- 2017 Poster Award at Organization of Chemical Engineering Graduate Students Symposium, University of Houston  
Poster Award for Graduate Student Research, Society of Rheology  
Cullen Travel Grant to Present at Society of Rheology, University of Houston
- 2015 Poster Award at Organization of Chemical Engineering Graduate Students Symposium, University of Houston  
Travel Grant to Conduct Experiments at University of Bergen, Norway, NorTex Petroleum Cluster
- 2013 Full Tuition Scholarship (4 years 2009–2013), The Cooper Union for the Advancement of Science and Art

## **PRESENTATIONS AND POSTERS**

- 2019 **University of Pennsylvania Polymer Symposium** Philadelphia, PA  
Presentation: Relaxations in complex fluids and implications for transport
- 2018 **American Institute of Chemical Engineers Fall Meeting** Pittsburgh, PA  
Presentation: Softly confined relaxations of grafted polymers
  - *Finalist presentation in the Excellence in Graduate Polymer Research award session*
 Presentation: Tunable assembly of gold nanorods in polymer solutions to generate controlled nanostructured materials
  - ACS Colloids** Penn. State University, State College, PA  
Presentation: Tunable assembly of gold nanorods in semidilute polymer solutions
  - American Physical Society March Meeting** Los Angeles, CA  
Presentation: Softly confined relaxations of grafted polymers
    - *Finalist presentation in Frank J. Padden award session*
  - Argonne National Lab APS/CNM Annual User Meeting** Argonne National Lab, Argonne, IL  
Presentation: Polymer-induced structural changes in suspensions of gold nanorods
    - *Invited student talk in plenary session*
    - *Travel award*
- 2017 **Organization of Chemical Engineering Graduate Students Symposium** University of Houston, Houston, TX  
Poster: Polymer-induced structural changes in suspensions of gold nanorods
  - *Poster award*
  - Society of Rheology Spring Meeting** Tampa, FL  
Presentation: Dynamics of polymer-grafted nanoparticles in solutions of linear polymer: a combined neutron and x-ray scattering study  
Poster: Dynamics of concentrated suspensions of nanoparticles in semidilute polymer solutions
    - *Poster award for graduate student research and featured in UH News ([link](#))*

	<b>American Physical Society March Meeting</b> Presentation: Confined relaxations of grafted polymer in solutions of linear polymer Presentation: Dynamics of interacting particles in semidilute polymer solutions	New Orleans, LA
<b>2016</b>	<b>Organization of Chemical Engineering Graduate Students Symposium</b> Presentation: Structure and dynamics of nanoparticles dispersed in polymer solutions <b>ACS Colloids</b> Presentation: Dynamics of interacting particles in semidilute polymer solutions <b>Texas Soft Matter</b> Presentation: Dynamics of polymer-grafted nanoparticles using complementary scattering methods	<i>University of Houston,</i> Houston, TX <i>Harvard University,</i> Boston, MA <i>University of Texas –</i> Dallas, Dallas, TX
<b>2015</b>	<b>American Physical Society March Meeting</b> Presentation: Length-scale dependent diffusivity in dilute and semidilute polyelectrolyte solutions Poster: Size-dependent effects on mobility of nanoparticles through dilute and semidilute polyelectrolyte solutions <b>Graduate Research and Scholarships Projects Day</b> Poster: Transport of nanoparticles through structured materials <b>Organization of Chemical Engineering Graduate Students Symposium</b> Poster: Particle and polymer dynamics in semidilute solutions ○ <i>Poster award</i> <b>Texas Soft Matter</b> Presentation: Dynamics of nanoparticles in polymer solutions	San Antonio, TX  <i>University of Houston,</i> Houston, TX <i>University of Houston,</i> Houston, TX  <i>Rice University,</i> Houston, TX
<b>2014</b>	<b>Texas Soft Matter</b> Poster: Effect of particle size on the dynamics of nanoparticles in semidilute polyelectrolyte solutions <b>Organization of Chemical Engineering Graduate Students Symposium</b> Poster: Size-dependent coupling between particles and polymers in semidilute polyelectrolyte solutions	<i>University of Texas,</i> Austin, TX  <i>University of Houston,</i> Houston, TX

## **RELEVANT PROFESSIONAL EXPERIENCE**

### **Teaching Assistant, Houston, TX: 2014 – 2018**

- Led recitation sessions for CHEE3363 – Fluid Mechanics for Chemical Engineers

### **Pollution Prevention Intern, The Matt Brewing Company, Utica NY: Summer 2012**

- Diagnosed inefficiencies collection and processing of carbon dioxide from fermentation
- Proposed solutions that increased collections from 65% to 80% of total production and lead to self-sufficiency

### **Teaching Assistant, New York, NY: Summer 2011**

- Worked with high-school students to investigate the dissolution profile of various ibuprofen dosage forms while teaching them how to conduct research effectively
- Published conference proceedings: Lepek, D.; Wu, C.; Poling-Skutvik, R. **2013 ASEE Annual Conference & Exposition**, Atlanta, Georgia. <https://peer.asee.org/19833>