

CURRICULUM VITAE

Nina C. Shapley

Associate Professor
Department of Chemical and Biochemical Engineering
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Educational Background

Harvard University	Physics	A.B., 1993
Massachusetts Institute of Technology	Chemical Engineering	Ph.D., 2000
University of California, Davis	Chemical Engineering	1999 – 2002

Professional Positions

2008 – Present	Associate Professor, Department of Chemical and Biochemical Engineering, Rutgers University, Piscataway, NJ.
2002 – 2008	Assistant Professor, Department of Chemical Engineering, Columbia University, New York, NY.
1999 – 2002	Postdoctoral Researcher, Department of Chemical Engineering and Materials Science, University of California, Davis, CA. Advisors: Robert L. Powell, Ronald J. Phillips and Stephanie R. Dungan
1993 – 1999	Research Assistant, Department of Chemical Engineering, Massachusetts Institute of Technology, Cambridge, MA. Ph.D. thesis title: <i>Laser Doppler velocimetry measurements of particle velocity fluctuations in a concentrated suspension.</i> Advisors: Robert C. Armstrong and Robert A. Brown

Honors and Awards

Professional

2004 – 2006	James D. Watson Investigator Award, NYSTAR (New York State Office of Science, Technology and Academic Research)
1995 – 2001	Sigma Xi Research Society

Student

1992	Rowland Foundation Summer Research Fellowship
1992	Lawrence Livermore National Laboratory Summer Student Fellowship

Research Interests

- Complex geometry flows of concentrated suspensions and imaging (MRI)
- Biopolymer hydrogel particles, structured particles and micro/nanoencapsulation for health and environmental applications
- Filtration of catalyst materials

Refereed Publications

(⁺ Supervised graduate student, [^] Supervised undergraduate student, * Corresponding author)

1. C. Leung,⁺ J. Adler, **N. Shapley**, T. A. G. Langrish and B. J. Glasser, “Fluidized bed drying of supported catalysts: Effect of process parameters,” *Chemical Engineering Science* **282**, 119280 (2023).
2. P. Mirbod and **N. C. Shapley**, “Particle migration of suspensions in a pressure-driven flow over and through a porous structure,” *Journal of Rheology* **67**, 417 (2023).
3. A. Potanin and **N.C. Shapley**, “Heel estimate during pressure-driven drainage of gels from tanks,” *Chemical Engineering Science* **230**, 116158 (2021).
4. A. Chaturbedi,⁺ S. Patil,⁺ R. Ramachandran and **N. C. Shapley**,* “Adsorption of positively and negatively charged heavy metal ions from wastewater by heteroaggregates of biopolymer particles,” *Colloids and Surfaces A* **602**, 124789 (2020).
5. A. Chaturbedi,⁺ C. Pathak,⁺ K. Deshpande,⁺ **N. C. Shapley** and R. Ramachandran, “Population balance model development and experimental validation for the heteroaggregation of oppositely charged micro- and nano-particles,” *Chemical Engineering Research and Design* **113**, 96-111 (2016).
6. K. G. Steeley⁺, B. Kuestermeyer,[^] C. Stanton,[^] J. Yu,[^] K. Morabito, D. Li, C. Mello, P. Calvert, A. Tripathi, and **N. C. Shapley**,* “Uniform polymer particles formulated with ultraviolet protective materials for the protection of UV sensitive molecules,” *Dyes and Pigments* **105**, 12-22 (2014).
7. K. Yu,⁺ J. Ho,[^] E. McCandlish, B. Buckley, R. Patel, Z. Li⁺ and **N. C. Shapley**,* “Copper ion adsorption by chitosan nanoparticles and alginate microparticles for water purification applications,” *Colloids and Surfaces A* **425**, 31– 41 (2013).
8. G. Azadi, M. Seward, M.U. Larsen,⁺ **N.C. Shapley** and A. Tripathi, “Improved antimicrobial potency through synergistic action of chitosan microparticles and low electric field,” *Applied Biochemistry and Biotechnology Part A: Enzyme Engineering and Biotechnology*, **168** 531-541 (2012).

Refereed Publications, continued

9. D. Li, P. Calvert, C. Mello, K. Morabito, A. Tripathi, **N. Shapley** and K. Gilida,⁺ “Stabilization of natural dyes by high levels of antioxidants,” *Advanced Materials Research* **441**, 192-199 (2012).
10. K. Morabito, K. G. Steeley,⁺ **N. C. Shapley**, C. Mello, D. Li, P. Calvert and A. Tripathi, “Proximal effects of ultraviolet light absorbers and polymer matrix in the photostability of beta-carotene,” *Dyes and Pigments* **92**, 509-516 (2012).
11. K. Morabito, **N. C. Shapley**, K. G. Steeley⁺ and A. Tripathi, “Review of sunscreen and the emergence of non-conventional absorbers and their applications in ultraviolet protection,” *International Journal of Cosmetic Science* **33** (5), 385–390 (2011).
12. K.V. Deshpande⁺ and **N.C. Shapley**,* “Particle migration in oscillatory torsional flows of concentrated suspensions,” *Journal of Rheology* **54**, 663-686 (2010).
13. M.U. Larsen,⁺ M. Seward, A. Tripathi, and **N.C. Shapley**,* “Biocompatible nanoparticles trigger rapid bacteria clustering,” *Biotechnology Progress* **25**, 1094-1102 (2009).
14. C. Xi⁺ and **N.C. Shapley**,* “Flows of concentrated suspensions through an asymmetric bifurcation,” *Journal of Rheology* **52**, 625-647 (2008).
15. T. Moraczewski⁺ and **N.C. Shapley**,* “Pressure drop enhancement in a concentrated suspension flowing through an abrupt axisymmetric contraction-expansion,” *Physics of Fluids* **19**, 103304 (2007).
16. H.J. Hester-Reilly⁺ and **N.C. Shapley**,* “Imaging contrast effects in alginate microbeads containing trapped emulsion droplets,” *Journal of Magnetic Resonance* **188**, 168-175 (2007).
17. M.U. Larsen⁺ and **N.C. Shapley**,* “Stream spreading in multilayer microfluidic flows of suspensions,” *Analytical Chemistry* **79**, 1947-1953 (2007).
18. T. Moraczewski⁺ and **N.C. Shapley**,* “The effect of inlet conditions on concentrated suspension flows in abrupt expansions,” *Physics of Fluids* **18**, 123303 (2006).
19. **N.C. Shapley*** and M.A. d'Avila, “Two-phase flow of emulsions,” Book chapter in *Nuclear Magnetic Resonance Imaging in Chemical Engineering*, S. Stapf and S.-I. Han, (eds.), (Wiley-VCH, Weinheim, Germany, 2006).
20. M.A. d'Avila, **N.C. Shapley**, J.H. Walton, R.J. Phillips, R.L. Powell and S.R. Dungan, “A novel gravity-induced flow transition in two-phase fluids,” *Physics of Fluids* **18**, 103305 (2006).

Refereed Publications, continued

21. T. Moraczewski,⁺ H. Tang and **N.C. Shapley**,* “Flow of a concentrated suspension through an abrupt axisymmetric expansion measured by nuclear magnetic resonance imaging,” *Journal of Rheology* **49**, 1409-1428 (2005).
22. M.A. d'Avila, R.L. Powell, R.J. Phillips, **N.C. Shapley**, J.H. Walton and S.R. Dungan, “Magnetic resonance imaging (MRI): A technique to study flow and microstructure of concentrated emulsions,” *Brazilian Journal of Chemical Engineering* **22**, 49-60 (2005).
23. E.F. Leonard, A.C. West, **N.C. Shapley** and M.U. Larsen,⁺ “Dialysis without membranes: How and why?” *Blood Purification* **22**, 92-100 (2004).
24. M.A. d'Avila, **N.C. Shapley**, J.H. Walton, R.J. Phillips, S.R. Dungan, and R.L. Powell, “Mixing of concentrated oil-in-water emulsions measured by nuclear magnetic resonance imaging,” *Physics of Fluids* **15**, 2499-2511 (2003).
25. **N.C. Shapley**, M.A. d'Avila, J.H. Walton, R.L. Powell, S.R. Dungan, and R.J. Phillips, “Complex flow transitions in a homogeneous, concentrated emulsion,” *Physics of Fluids* **15**, 881-891 (2003).
26. **N.C. Shapley**,* R.A. Brown and R.C. Armstrong, “Evaluation of particle migration models based on laser Doppler velocimetry measurements in concentrated suspensions,” *Journal of Rheology* **48**, 255-279 (2004).
27. **N.C. Shapley**,* R.C. Armstrong and R.A. Brown, “Laser Doppler velocimetry measurements of particle velocity fluctuations in a concentrated suspension,” *Journal of Rheology* **46**, 241-272 (2002).
28. M.T. Arigo, D. Rajagopalan, **N. Shapley** and G.H. McKinley, “The sedimentation of a sphere through an elastic fluid: Part I - steady motion,” *Journal of Non-Newtonian Fluid Mechanics* **60**, 225-257 (1995).

Conference Proceedings

1. **N.C. Shapley*** and C. Xi,⁺ “Flow of concentrated suspensions in asymmetric bifurcations,” Proceedings of the 9th International Bologna Conference on Magnetic Resonance in Porous Media (MRPM 9), Cambridge, MA, July 2008, published in *Diffusion Fundamentals* **10**, Contributed Talks p.11, 2009. (<http://www.uni-leipzig.de/diffusion/journal/>)
2. **N.C. Shapley*** and T. Moraczewski,⁺ “Concentration distribution, recirculation length, and pressure drop for a concentrated suspension flowing through an abrupt contraction-expansion,” *Proceedings of the IUTAM Invited Symposium on Recent Advances in Multiphase Flows: Numerical and Experimental*, Istanbul, Turkey, June 2007, p.2.

3. S.R. Dungan, **N. Shapley**, M. d'Avila, J. Walton, R.L. Powell and R.J. Phillips, “Flow and mixing of oil-in-water emulsions,” *Abstracts of Papers of the ACS* **222**, U315 (2001).

Patents

US Patent # 20080009780: E.F. Leonard, A.C. West, **N.C. Shapley** and Z. Tang, “Systems and methods of blood-based therapies having a microfluidic membraneless exchange device,” Columbia University, 2008.

Conference Presentations

1. C. Leung, **N. C. Shapley**, T. A. G. Langrish and B. J. Glasser, “Impact of Process Conditions on Fluidized Bed Drying: Experiments and Model Predictions,” *Fluidization XV Conference*, Edinburgh, UK, May, 2023.
2. P. Mirbod and **N. Shapley**, “Particle migration of suspensions over and through a porous structure using MRI,” *Society of Rheology Annual Meeting*, Chicago, IL, October, 2022.
3. E. Haffner, C. Kang, **N. Shapley** and P. Mirbod, “Experimental and numerical studies of particle-laden fluid flows over a porous media model,” *American Physical Society (APS) Division of Fluid Dynamics Annual Meeting*, November, 2019.
4. A. Potanin and **N. Shapley**, “Using rheometry and MRI to predict transfer of pastes and gels,” *Society of Rheology Annual Meeting*, Raleigh, NC, October, 2019.
5. Z. Abd Al-Jaleel, T. Char, W. Borghard and **N.C Shapley**, “Cake filtration of catalyst materials,” *American Institute of Chemical Engineers (AIChE) 2018 Annual Meeting*, Pittsburgh, PA, November, 2018.
6. A. Chaturbedi, B. Schendt and **N.C. Shapley**, “Rheology of a concentrated bimodal suspension,” *Society of Rheology Annual Meeting*, Baltimore, MD, October, 2015.
7. K. Yu and **N.C. Shapley**, “Copper ion adsorption by chitosan and alginate gel nanoparticles and microparticles for water purification applications,” *American Institute of Chemical Engineers (AIChE) 2014 Annual Meeting*, Atlanta, GA, November, 2014.
8. **N.C. Shapley**, O. Isijola and A. Chaturbedi, “Rheology of a bimodal suspension containing rigid and soft particles,” *Society of Rheology Annual Meeting*, Philadelphia, PA, October, 2014.
9. K. Yu and **N.C. Shapley**, “Rheology of a concentrated bimodal suspension,” *Society of Rheology Annual Meeting*, Montreal, Canada, October, 2013.
10. G. Azadi, S. Sun, A. Cham, G. Tsui, **N. Shapley**, K. Matthews and A. Tripathi, “Synergistic action of chitosan nanoparticles and low voltage electric field in bacterial inhibition,” *AIChE 2012 Annual Meeting*, Pittsburgh, PA, November, 2012.

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11. K.V. Deshpande and **N. Shapley**, “Optimizing the coating of microparticles with nanoparticles at higher microparticle concentrations,” *AICHE 2010 Annual Meeting*, Salt Lake City, UT, November, 2010.
12. K. Gilida, C. Stanton, K. Morabito, A. Tripathi and **N. Shapley**, “Uniform composite nanoparticles for the protection of ultraviolet sensitive molecules,” *AICHE 2010 Annual Meeting*, Salt Lake City, UT, November, 2010.
13. N.F. Zeng, B. Prasad and **N.C. Shapley**, “Bimodal vs. monomodal suspension flows through an abrupt contraction-expansion,” *American Institute of Chemical Engineers (AIChE) 2009 Annual Meeting*, Nashville, TN, November 2009.
14. K. Gilida, K. Morabito, M. Huang, C. Stanton, A. Tripathi and **N.C. Shapley**, “Tunable core-shell nanoarchitectures containing encapsulated beta-carotene,” *AICHE 2009 Annual Meeting*, Nashville, TN, November 2009.
15. K.V. Deshpande and **N.C. Shapley**, “Using shear flow to assist the coating of microparticles with nanoparticles,” *AICHE 2009 Annual Meeting*, Nashville, TN, November 2009.
16. K.V. Deshpande and **N.C. Shapley**, “Particle migration and torque evolution in oscillatory torsional flows of concentrated suspensions,” poster, *AICHE 2009 Annual Meeting*, Nashville, TN, November 2009.
17. K.V. Deshpande and **N.C. Shapley**, “Particle migration in oscillatory torsional flows of concentrated suspensions,” *Society of Rheology 81st Annual Meeting*, Madison, WI, October, 2009.
18. N.F. Zeng, H.J. Hester-Reilly and **N.C. Shapley**, “Bimodal suspension flow through an abrupt contraction-expansion,” *American Institute of Chemical Engineers (AIChE) 2008 Annual Meeting*, Philadelphia, PA, November 2008.
19. K. Deshpande and **N.C. Shapley**, “Oscillatory torsional flow of concentrated suspensions,” *AICHE 2008 Annual Meeting*, Philadelphia, PA, November 2008.
20. M.U. Larsen, M. Seward, A. Tripathi and **N.C. Shapley**, “Biocompatible nanoparticles trigger rapid bacteria clustering,” *AICHE 2008 Annual Meeting*, Philadelphia, PA, November 2008.
21. C. Xi and **N.C. Shapley**, “Flow of concentrated suspensions in asymmetric bifurcations,” *15th International Congress on Rheology 2008*, Monterey, CA, August 2008.
22. **N.C. Shapley** and C. Xi, “Flow of concentrated suspensions in asymmetric bifurcations,” *9th International Bologna Conference: Magnetic Resonance in Porous Media*, Cambridge, MA, July 2008.
23. T. Moraczewski and **N.C. Shapley**, “Relating the pressure drop to the concentration and flow fields for a concentrated suspension flowing through an abrupt contraction-expansion,” *AICHE 2007 Annual Meeting*, Salt Lake City, UT, November 2007.

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24. C. Xi and **N.C. Shapley**, “Flow of concentrated suspensions in bifurcations measured by MRI,” *AICHE 2007 Annual Meeting*, Salt Lake City, UT, November 2007.
25. M.U. Larsen and **N.C. Shapley**, “Tailoring the size, surface charge, and release properties of biocompatible chitosan nanoparticles,” *AICHE 2007 Annual Meeting*, Salt Lake City, UT, November 2007.
26. M.U. Larsen and **N.C. Shapley**, “Biocompatible nanoparticles trigger rapid bacteria clustering,” *AICHE 2007 Annual Meeting*, Salt Lake City, UT, November 2007.
27. M.U. Larsen and **N.C. Shapley**, “Multilayer microfluidic flows of suspensions and flow focusing,” *Society of Rheology 79th Annual Meeting*, Salt Lake City, UT, October 2007.
28. T. Moraczewski and **N.C. Shapley**, “Concentration, velocity and pressure distributions for a concentrated suspension flowing through an abrupt, annular contraction-expansion,” *Society of Rheology 79th Annual Meeting*, Salt Lake City, UT, October 2007.
29. M.U. Larsen, M. Seward, A. Tripathi and **N.C. Shapley**, “Biocompatible nanoparticles trigger rapid bacteria clustering,” *ACS 2007 National Meeting*, Boston, MA, August 2007.
30. **N.C. Shapley** and T. Moraczewski, “Concentration distribution, recirculation length, and pressure drop for a concentrated suspension flowing through an abrupt contraction-expansion,” *IUTAM Invited Symposium on Recent Advances in Multiphase Flows: Numerical and Experimental*, Istanbul, Turkey, June 2007.
31. H. Hester-Reilly and **N.C. Shapley**, “Imaging contrast effects in alginate microbeads,” American Physical Society, *APS 2007 Spring Meeting*, “Frontiers of Imaging” session, Denver, CO, March 2007.
32. M.U. Larsen and **N.C. Shapley**, “Multilayer microfluidic flows of suspensions,” *AICHE 2006 Annual Meeting*, San Francisco, CA, November 2006.
33. T. Moraczewski and **N.C. Shapley**, “Pressure drop and flow evolution of a concentrated suspension in an abrupt expansion,” *AICHE 2006 Annual Meeting*, San Francisco, CA, November 2006.
34. C. Xi and **N.C. Shapley**, “Flows of concentrated suspensions in symmetric and asymmetric bifurcations measured by NMRI,” poster, *AICHE 2006 Annual Meeting*, San Francisco, CA, November 2006.
35. T. Moraczewski and **N.C. Shapley**, “Comparison of experimental results and model predictions for complex geometry flows of a concentrated suspension,” poster, *AICHE 2006 Annual Meeting*, San Francisco, CA, November 2006.
36. C. Xi and **N.C. Shapley**, “Flows of concentrated suspensions in symmetric and asymmetric bifurcations,” *Society of Rheology 78th Annual Meeting*, Portland, ME, October 2006.
37. C. Xi, T. Moraczewski and **N.C. Shapley**, “Branching channel flows of concentrated suspensions measured by NMRI,” *15th U.S. National Congress on Theoretical and Applied Mechanics*, Boulder, CO, June 2006.

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38. T. Moraczewski and **N.C. Shapley**, “Evolution of the flow of a concentrated suspension through an annular expansion measured by NMRI,” *AICHE 2005 Annual Meeting*, Cincinnati, OH, November 2005.
39. T. Moraczewski and **N.C. Shapley**, “Concentrated suspension flow through an abrupt expansion measured by NMRI,” *AICHE 2005 Annual Meeting*, Cincinnati, OH, November 2005.
40. M.U. Larsen and **N.C. Shapley**, “Particle motion in microfluidic contraction and expansion flows,” poster, *AICHE 2005 Annual Meeting*, Cincinnati, OH, November 2005.
41. C. Xi and **N.C. Shapley**, “Particle migration patterns observed in oscillatory flow by NMRI,” poster, *AICHE 2005 Annual Meeting*, Cincinnati, OH, November 2005.
42. T. Moraczewski and **N.C. Shapley**, “Annular expansion flow of a concentrated suspension measured by NMRI,” *Society of Rheology 77th Annual Meeting*, Vancouver, CA, October 2005.
43. C. Xi and **N.C. Shapley**, “Particle migration patterns observed in oscillatory flow by NMRI,” *Society of Rheology 76th Annual Meeting*, Lubbock, TX, February 2005.
44. T. Moraczewski and **N.C. Shapley**, “Properties of a concentrated suspension flowing through an abrupt expansion measured by NMRI,” *Society of Rheology 76th Annual Meeting*, Lubbock, TX, February 2005.
45. C. Xi, T. Moraczewski and **N.C. Shapley**, “Particle migration patterns in oscillatory flows measured by NMR imaging,” poster, *AICHE 2004 Annual Meeting*, Austin, TX, November 2004.
46. T. Moraczewski, C. Xi and **N.C. Shapley**, “Nonuniform distributions of particles in abrupt expansion flows: Characterization by NMR imaging,” poster, *AICHE 2004 Annual Meeting*, Austin, TX, November 2004.
47. **N. Shapley**, M. d'Avila, J. Walton, S. Dungan, R. Phillips and R. Powell, “Kinetics and mechanism of mixing in concentrated, oil-in-water emulsions,” *7th International Conference on Magnetic Resonance Microscopy*, Snowbird, UT, September 2003.
48. **N. Shapley**, M. d'Avila, J. Walton, S. Dungan, R. Phillips and R. Powell, “Complex flows of concentrated emulsions,” *Society of Rheology 73rd Annual Meeting*, Bethesda, MD, October 2001.
49. **N. Shapley**, M. d'Avila, J. Walton, S. Dungan, R. Phillips and R. Powell, “Complex flows of concentrated emulsions,” poster, *Gordon Research Conference on Gravitational Effects in Physico-Chemical Systems*, New London, NH, July 2001.
50. **N. Shapley**, M. d'Avila, J. Walton, S. Dungan, R. Phillips and R. Powell, “Development of a magnetic resonance imaging technique for measuring emulsion coalescence,” *Fifth Microgravity Fluid Physics and Transport Phenomena Conference (NASA)*, Cleveland, OH, August 2000.

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51. **N. Shapley**, R.C. Armstrong and R.A. Brown, “LDV measurements of particle velocity fluctuations in a concentrated suspension,” *AICHE 1999 Annual Meeting*, Dallas, TX, November 1999.
52. **N. Shapley**, R.C. Armstrong and R.A. Brown, “LDV measurements of particle velocity fluctuations in a concentrated suspension,” *AICHE 1998 Annual Meeting*, Miami Beach, FL, November 1998.
53. **N. Shapley**, R.C. Armstrong and R.A. Brown, “LDV measurements of particle velocity fluctuations in a concentrated suspension,” *Society of Rheology 69th Annual Meeting*, Columbus, OH, October 1997.

Invited Lectures

1. *MRI Visualization of Product Flows*, Tech Exchange Talk (virtual), Colgate-Palmolive Company, May 2021.
2. *Developing Sustainable Biopolymer Adsorbents for Water Purification*, Department of Environmental Sciences, Rutgers University, Piscataway, NJ, May 2018.
3. *Complex Geometry Flows and Rheology of Bimodal Suspensions*, Rheology Research Center Seminar, University of Wisconsin, Madison, WI, March 2010.
4. *NMR Imaging of Bimodal Suspension Flows*, School of Engineering, Montana State University, Bozeman, MT, April 2009.
5. *Flow of Concentrated Suspensions in Asymmetric Bifurcations*, Department of Mathematical Science Fluid Dynamics Seminar, NJIT, Newark, NJ, November 2008.
6. *Complex Geometry Flows of Concentrated Suspensions and Novel Biopolymer Gel Tracer Particles*, Process Research & Development, Bristol-Myers Squibb, New Brunswick, NJ, April 2008.
7. *Contraction-Expansion Flows of Concentrated Suspensions and Novel Biopolymer Gel Tracer Particles*, Polymers Division, NIST, Bethesda, MD, April 2008.
8. *Using NMR Imaging to Map Complex Geometry Flows of Concentrated Suspensions*, IFPRI Leadership Meeting at City College of New York, New York, NY, April 2008.
9. *Imaging Contrast Effects and Tracer Particle Applications of Alginate Microbeads*, NMR Center, Washington University, St. Louis, MO, March 2008.
10. *Contraction-Expansion Flows of Concentrated Suspensions and Novel Biopolymer Gel Tracer Particles*, Department of Chemical Engineering, University of Pennsylvania, Philadelphia, PA, March 2008.
11. *Complex Geometry Flows of Concentrated Suspensions and Novel Biopolymer Gel Tracer Particles*, Department of Chemical and Biochemical Engineering, Rutgers University, Piscataway, NJ, January 2008.

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12. *Complex Geometry Flows of Concentrated Suspensions and Novel Tracer Particle Design*, Granular and Multiphase Flows Series Seminar, NJIT, Newark, NJ, November 2007.
13. *Biopolymer Micro and Nanoparticles as Novel MRI Tracers and Tools for Separations*, Department of Chemical Engineering, Syracuse University, Syracuse, NY, September 2007.
14. *Concentration Distribution, Recirculation Length, and Pressure Drop for a Suspension Flowing through an Abrupt Contraction-Expansion*, IUTAM Invited Symposium on Recent Advances in Multiphase Flows: Numerical and Experimental, Istanbul, Turkey, June 2007.
15. *Complex Geometry Flows of Concentrated Suspensions*, Department of Chemical Engineering, NJIT, Newark, NJ, April 2007.
16. *Contraction-Expansion Flows of Concentrated Suspensions*, Department of Chemical Engineering, Polytechnic University, Brooklyn, NY, March 2007.
17. *Expansion Flows of Concentrated Suspensions Measured by NMRI*, Department of Chemical Engineering, Tulane University, New Orleans, LA, March 2006.
18. *Expansion Flows of Concentrated Suspensions Measured by NMRI*, Science Seminar, Sarah Lawrence College, Bronxville, NY, February 2006.
19. *Complex Flows of Concentrated Suspensions Measured by NMRI*, Rheology Research Center Seminar, University of Wisconsin, Madison, WI, November 2005.
20. *Complex Flows of Concentrated Suspensions Measured by NMRI*, Department of Chemical Engineering, Lehigh University, Bethlehem, PA, October 2005.
21. *Complex Flows of Concentrated Suspensions Measured by NMRI*, Department of Chemical Engineering, Stevens Institute of Technology, Hoboken, NJ, September 2005.
22. *Complex Flows of Concentrated Suspensions Measured by NMRI*, Division of Engineering Fluid Mechanics Seminar, Brown University, Providence, RI, March 2005.
23. *Nonuniform Distributions of Particulates in Complex Flows: Characterization by NMR Imaging*, Theoretical and Computational Biology Seminar, Mt. Sinai Hospital, New York, NY, May 2004.
24. *Nonuniform Distributions of Particulates in Complex Flows: Characterization by NMR Imaging*, Program in Polymer Science and Technology, MIT, Cambridge, MA, May 2004.
25. *NMR Imaging of Dispersions in Complex Flows*, Applied Math Lab Fluid Mechanics Seminar, Courant Institute, NYU, New York, NY, October 2003.
26. *Complex Flow and Mixing of Concentrated Emulsions*, Levich Institute, City College of the City University of New York, New York, NY, September 2002.

Students Graduated and Advised

Postdoctoral Researchers:

Rutgers University

Kristin Gilida Steeley (2016-2017)

Project: “Development of high performance natural dyes.”

Employment: Senior Researcher, L’Oreal

Graduate Researchers:

Rutgers University

Kristin Gilida Steeley (Ph.D. received January 2014)

Thesis: “The protection of ultraviolet sensitive molecules through polymeric encapsulation and proximity.”

Employment: Postdoctoral Researcher, Rutgers University

Kun Yu (Ph.D. received January 2014)

Thesis: “Copper ion adsorption by chitosan gel nanoparticles and calcium alginate gel beads for water purification applications.”

Employment: Senior Researcher, L’Oreal

Kapil Deshpande (Ph.D. received January 2014)

Thesis: “Particulate flows and heteroaggregation studied by optical imaging and fluorescence spectroscopy.”

Employment: Senior Researcher, Croda

Anik Chaturbedi (Co-advised with Rohit Ramachandran, Ph.D. received January 2019)

Thesis: “A combined computational and experimental study of the heteroaggregation of dissimilar adsorbent particles.”

Employment: Postdoctoral Researcher, University of Wisconsin, Madison

Zainab Abd Al-Jaleel (Ph.D. received October 2021)

Thesis: “The effect of cake filtration behavior and washing on the cake microstructure.”

Employment: Postdoctoral Researcher, Rutgers University.

Chinmay Pathak (M.S. received May 2015)

Thesis: “A fluorescence spectroscopy and fluorescence anisotropy investigation of the heteroaggregation of alginate microparticles and chitosan nanoparticles.”

Employment: Intern, Aurex Laboratories

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Shiwen Sun (M.S. received May 2014)

Thesis: “Design of polymeric nanoparticles for edible antimicrobials and chemical oxygen sensors.”

Employment: Ph.D. candidate, T.U. Graz, Austria

Shashank Kosuri (M.S. received October 2016)

Thesis: “Study of polylysine and chitosan nanoparticles synthesized using various cross-linkers and their applications for heavy metal ion recovery.”

Employment: Ph.D. candidate, Rutgers Biomedical Engineering

Christopher Dobrzanski (M.S. received October 2016)

Thesis: “Non-toxic method for creating UV-protective nanoparticles.”

Employment: Ph.D. candidate, NJIT

Tulsi Char (M.S. received May 2019)

Thesis: “Porous particle filtration.”

Employment: Process Engineer, Eurofins

11 non-thesis M.S., graduated: Bidya Prasad, Samyukta Budumuru, Olanike Isijola, Jenna Lo, Yanru Yu, Sanyukta Patil, Narsimha Sandeep Podicheti, Shivani Desai, Adithya Gundlapalli, Navya Donipati, Naomi Arias-Fernandez.

Columbia University

Tracey Moraczewski (Ph.D. received June 2007)

Thesis: “Concentrated Suspension Flows Through an Abrupt Axisymmetric Expansion.”

Employment: Postdoctoral Researcher, University of Cambridge.

Mona Utne Larsen (Ph.D. received February 2008)

Thesis: “Understanding Particulate Flow in Microfluidics and Novel Designs of Biopolymer Nanoparticles.”

Employment: Senior Researcher, Merck & Co.

Chunguang Xi (Ph.D. received February 2008)

Thesis: “Flows of Concentrated Suspensions through Bifurcations.”

Employment: Quantitative Analyst, Chatham Financial.

Jennifer Elyazi (Coursework M.S. received February 2008)

Employment: Chemical Process Engineer, CH2M HILL.

Holly Hester-Reilly (Coursework M.S. received June 2008)

Employment: Project Manager, New York City Mayor's Office of Environmental Remediation.

Undergraduate Researchers:

Rutgers University (43 total): Jackie Ho, Chelsea Stanton, Michael Mankbadi, Rikita Patel, Danielle Gal, David Park, Jennifer Liguori, Linda Gao, Brett Kuestermeyer, Jonathan Liu, Samie Leigh, Louis Ruggeri, Adam Cham, David Park, Danielle Mazza (RISE), Eric Somers, Modupe Kuti (RISE), Sharif Farghaly, Vetri Velan, Daniel Chatten, Brian Schendt (Aresty), Erin Dippold (Aresty), Kayla Williams, Safia Begum (Aresty), Andrew Johnsen (Aresty), Jakub Chmiel (Aresty), Emily Diep (Aresty), Max Narozanick (Slade), Christina Tai, Saurabh Choudhuri, Monica Wall (RISE), Sean Patrick Monteverde, Alex Lubarsky, Alexis Torres Caraballo (RISE), Ruidong Jia, Jonathan Bar-Or, Hannah Weitz (Aresty), Arielle Banal (Aresty), Yebin Kim, Katherine Phillips, Philip Mai, Jayden Nelson, Hoonbae Park.

Columbia University (12 total): Nancy Zeng, Ju Young Lee, Lindsay Turner, Joel Yu, Alain Lefevre, Pamela Sundelacruz, Jennifer Smith, Kapil Deshpande, Holly Hester-Reilly, Emmi Yonekura, Promiti Dutta, Judy Choi.

High School Researchers:

Rutgers University: Palak Patel

Teaching Experience

Courses taught at Rutgers University, Department of Chemical & Biochemical Engineering:

Process Engineering Laboratory I (undergraduate core course): Fall, 2023.
Transport Phenomena II (undergraduate core course): Spring, 2010-2011; 2017-2022.
Pharmaceutical Materials Engineering (graduate core course for Pharmaceutical ME): Spring, 2015-2016; Fall, 2017-2019; 2022. Online: Spring, 2014, 2016; Fall, 2018, 2020.
Analytical Methods (graduate core course): Fall, 2021.
Advanced Transport Phenomena I (graduate core course): Fall, 2008-2009; 2011-16.

Courses taught at Columbia University, Department of Chemical Engineering:

Material and Energy Balances (undergraduate core course): Fall, 2004-2006.
Transport Phenomena III (graduate core course): Fall, 2002-2007.
Complex Fluids Laboratory (graduate elective): Spring, 2004, 2006.
Soft Materials Laboratory (graduate elective): Fall, 2004, 2006.
Chemical Engineering Colloquium (graduate course): 2005-2008.

Departmental, School and University Service

Rutgers University

- Undergraduate program director (Jun. 2022 – present).
- ABET Committee (2009-2011; 2022-present).
- Graduate program director (Feb. 2011 – Dec. 2012).
- FCP PEC Committee (2017, 2020, 2024).

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- Academic Integrity Facilitator (2020-2022), first in CBE department in the role.
- Faculty search committee, Spring 2022.
- Graduate admissions and recruiting committee (2008-2012; 2014; 2018-2022).
- PhD Qualifier organizer (2012, 2014-2016, 2019-2021).
- Newsletter (2014 – 2016).
- Seminar coordinator (2013 – 2014).
- OXE advisor (2011 – 2013).
- Chair of graduate admissions and recruiting committee (2009-2010).
- Undergraduate junior class advisor (2009-2010).
- Recruiting lectures to attract first-year undergraduate majors (2008-2011).
- Director of recruiting for the GAANN Graduate Fellowships program in Pharmaceutical Engineering (PI: Y. Chiew), (2009-2012).
- School of Engineering Diversity, Equity and Inclusion Committee (2021-present).
- School of Engineering Courses of Study Committee (2014-2019).
- Rutgers New Brunswick Faculty Council, representing SOE (2016-2022).
- University Senator, representing SOE (2013-2016).
- Graduate School, Physical and Mathematical Sciences and Engineering Area Committee (2013-2015).
- Faculty search committee (environmental engineering hiring cluster), Department of Civil and Environmental Engineering (Spring 2023).
- Faculty search committee (atmospheric chemistry), Department of Environmental Sciences (Spring 2018).

Columbia University

- Graduate admissions, recruitment, qualification and advising committee (2002-2008).
- Chemical Engineering Colloquium coordinator (2005-2008).
- Faculty mediator (ombud) (2005-2008).
- AIChE student chapter advisor (2004).

Professional Activities

Professional Society Activities:

- Advisory Board, *Physics of Fluids* (2021 - present).
- Editorial Board, *Colloid and Interface Science Communications* (2014 - present).
- Society of Rheology Metzner Junior Faculty Award Committee (2013-2015).
- Session Chair/Co-Chair for Society of Rheology Suspensions and Colloids Session (2013, 2015).
- Elected to Fluid Mechanics (Area 1j) Program Committee, American Institute of Chemical Engineers (AIChE), Nov. 2007, 2007 – 2011 term.
- Chaired both Particulate and Multiphase Flows Sessions at AIChE 2009 Annual Meeting.
- Co-Chaired Poster Session for International Congress on Rheology 2008 (over 290 abstracts).
- Chaired Suspensions and Colloids Session at Society of Rheology 2007 Annual Meeting.

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- Co-Chaired Fluid Mechanics Poster Session at AIChE 2007 Annual Meeting.
- Chaired Particulate and Multiphase Flows and Co-Chaired Colloidal Hydrodynamics Sessions at AIChE 2005 Annual Meeting.
- Co-Chaired Suspensions and Colloids Session at Society of Rheology 2005 Annual Meeting.
- Chaired Fluid Mechanics Poster Session at AIChE 2004 Annual Meeting.

Consultant:

- Sun Chemical (NMR imaging of emulsion inks: (2007 – 2008).
- Frommer Lawrence & Haug LLP (intellectual property: 2007 – 2008).

Peer Reviewer:

Journal of Fluid Mechanics	Journal of Magnetic Resonance
Physics of Fluids	Journal of Magnetic Resonance Imaging
Journal of Rheology	Langmuir
Journal of Non-Newtonian Fluid Mechanics	Journal of Colloid and Interface Science
Rheologica Acta	Experiments in Fluids
Chemical Engineering Science	National Science Foundation
AIChE Journal	ACS Petroleum Research Fund
Int. Journal of Chem. Reactor Engineering	A*STAR Biomedical Research Council
Colloids and Surfaces A	USDA/NIFA Nanotechnology Program
Journal of Environmental Chem. Engineering	
Physical Review Fluids	

Member: American Institute of Chemical Engineers Society of Rheology

Outreach Activities:

- Research advisor and mentor for women students (total: 17 graduate, 27 undergraduate, includes 3 RISE summer undergraduate students).
- Ran “Squishy and Mushy Materials” laboratory workshop through Rutgers 4-H program for local high school students, July, 2016.
- Developed and ran “Squishy and Mushy Materials” laboratory workshops through the TARGET (The Academy at Rutgers for Girls in Engineering and Technology) program for local high school girls, July, 2009.
- Supervised 4 high school teachers through RET (RU-RET-E) (2012-2015).
- Participated in SOE recruiting events for admitted women undergraduate students (2017-present).
- Research mentor for a rising high school senior through Engineering the Future and the Liberty Science Center Partners in Science program, summer 2009.
- Developed and ran “Squishy and Mushy Materials” laboratory workshops for local high school students through the Columbia Double Discovery Center program, July, 2006; July, 2007; July, 2008.
- Participated in “Girls Science Day” event organized by Women in Science at Columbia, November, 2007.

Grants Received

Drying of Catalysts; Calcination of Catalysts

Rutgers Catalyst Manufacturing Consortium

Role: Co-PI (Consortium Director: B. Glasser, Rutgers University) 09/01/22 – 03/01/24

Core Facility Utilization Grant: MRI imaging of nonuniform particle distributions in highly filled, non-Newtonian liquids

Rutgers University Role: PI 04/15/22 – 07/01/23

Core Facility Utilization Grant: Using pre-formed base layers to enhance filter cake permeability of catalyst materials

Rutgers University Role: PI 04/15/21 – 12/31/21

MRI Imaging of Paste Flows

Anonymous Company Role: PI 11/04/15 – 12/31/21

Filtration of Catalyst Materials

Rutgers Catalyst Manufacturing Consortium

Role: PI (Consortium Director: B. Glasser, Rutgers University) 09/28/15 – 09/30/19

STTR Phase I: Next Generation Dyes for a Sustainable Future

National Science Foundation

Role: Co-PI (PI: Jane Palmer, Noon Design Studio/Nature Coatings) 01/01/16 – 6/30/17

Developing “Green Nanotechnology” For Eliminating Foodborne Pathogens

U.S. Department of Agriculture 01/01/11 – 12/31/14

Role: PI (Co-PIs: A. Tripathi, Brown University; Karl Matthews, Rutgers University)

Biopolymer Particles for Sustainable Multi-ion Water Purification

Rutgers Research Council Role: PI 07/01/14 – 05/01/15

GAANN: Graduate Fellowships in Pharmaceutical Engineering

Department of Education Role: Co-PI (PI: Y. Chiew, Rutgers University) 9/1/09 - 8/31/13

Developing “Green” Nanoparticles for Eliminating Foodborne Pathogens

Center for Advanced Food Technology, Rutgers University 9/1/09 - 8/31/10

Role: PI (Co-PI: K. Matthews, Rutgers University)

NSF Engineering Research Center for Structured Organic Particulate Systems (C-SOPS)

National Science Foundation

Role: Co-Investigator (PI: F. Muzzio) 06/06 - 05/16

ERC New Faculty Seed Funding: Multiscale Structures for Improved Nanoparticle Handling

Role: Sole PI 09/08 – 08/09

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Formation of Multiscale Biopolymer Particle Structures for Novel Biosorbent Design
National Science Foundation Role: Sole PI 02/01/08 – 01/31/13

Collaborative Research: Understanding UV Protective Mechanisms Using Hybrid
Nanoarchitectures **National Science Foundation** 06/01/08 – 05/31/12
Role: PI (Other collaborative PI's: A. Tripathi, Brown University; P. Calvert, U. Mass. Dartmouth)

IGERT: Nanopharmaceutical Engineering and Science **National Science Foundation**
Role: Co-Investigator (PI: F. Muzzio) 11/04 – 10/09

IGERT: Multiscale Phenomena in Soft Materials **National Science Foundation**
Role: Co-Investigator (PI: M. Denn, City College of New York; Co-PI: J. Koberstein, Columbia
University) 12/01/02 – 11/30/08

Diversity Research Fellowship
Columbia University (Internal Grant) Role: Sole PI 02/01/08 – 09/01/08

Synergistic Action of Electroporation and Controlled Release of Nanoparticle Additives to
Promote Pathogen Lysis **U.S. Department of Agriculture**
Role: PI (Co-PI: A. Tripathi, Brown University) 01/01/07 – 12/31/07

Equipment Grant for Circular Dichroism Spectrometer
Air Force Office of Scientific Research
Role: Co-PI (PI: S. Banta, Columbia University) 09/01/07

James D. Watson Investigator Award - Nonuniform Distributions of Particulates and Stresses in
Complex Flows: Characterization by NMR Imaging
NYSTAR: New York State Office of Science, Technology, and Academic Research
Role: Sole PI 10/01/04 - 09/30/06

Particle Migration in Oscillatory Flows of Suspensions Investigated by NMRI and Rheological
Techniques **American Chemical Society Petroleum Research Fund** (Type G)
Role: Sole PI 09/01/04 - 08/31/06

SGER: Accumulation of Particulates in Complex Flows: Characterization by NMR Imaging
National Science Foundation Role: Sole PI 05/01/04 - 04/30/05