

Curriculum Vitae
Christopher J. Roberts, Ph.D

Professor, Chemical and Biomolecular Engineering
University of Delaware, Newark, DE 19716
Email: cjr@udel.edu

Positions / Appointments

2016 - Visiting Professor, School of Chemical Engineering and Analytical Sciences, University of Manchester

2015 - Director, Center for Biomanufacturing Science and Technology, University of Delaware

2015 - Professor, Department of Chemical and Biomolecular Engineering, University of Delaware

2014 - Director, Biomolecular Interaction Technologies Center

2010 - Guest Researcher, National Institute of Standards and Technology, Center for Neutron Research

2009 - Faculty Member, Center for Molecular and Engineering Thermodynamics, University of Delaware

2003 - Faculty Member, UD Chemistry-Biology Interface Program, University of Delaware

2010 Visiting Investigator, GlaxoSmithKline

2010 - 2014 Associate Professor (affiliated), Biomedical Engineering, University of Delaware

2009 - 2015 Associate Professor, Department of Chemical and Biomolecular Engineering, University of Delaware

2008 - 2014 Graduate Program Co-Director, Department of Chemical and Biomolecular Engineering, University of Delaware

2006 - 2008 Faculty Member, UD IGERT Biotechnology Program

2002 - 2009 Assistant Professor, Department of Chemical Engineering, University of Delaware

2000 - 2002 Senior Research Scientist, Department of Pharmaceutical R&D, Pfizer Global Research and Development

1999 - 2000 Research Scientist, Department of Pharmaceutical R&D, Pfizer Central Research

1994 - 1999 Graduate Research Associate, Department of Chemical Engineering, Princeton University

1995 Visiting Research Associate, Pafra Biopreservation, Ltd.

Education

Princeton University	Chemical Engineering, Ph.D.	1999
University of Delaware	Chemical Engineering, BChE <i>summa cum laude</i>	1994

Selected Honors

Research & Scholarship

- Inaugural John Finlayson Lecture, US Food & Drug Administration (2016)
- AAPS Chapter Pharmaceuticals Lecturer, University of Kansas (2006)
- AAPS New Investigator Award (Pharmaceutics and Pharmaceutical Technology) (2005)
- Merck Faculty Fellow, University of Delaware (2004-2007)
- Ebert Prize, American Pharmaceutical Association & American Pharmaceutical Research Society (2004)
- Wallace Memorial Fellowship, Princeton University (1998)
- National Science Foundation Graduate Fellowship (1994-1998)
- Barry M. Goldwater Scholarship (1992-1994)

Teaching and Service

- Editorial Advisory Board, *J. Pharm. Sci.* (2017-present)
- Scientific Advisory Board, PIPPI consortium (2016-present)
- College of Engineering, Excellence-in-Teaching Award, University of Delaware (2008)
- Nominated, University Excellence-in-Teaching Award, University of Delaware (2004, 2006, 2009)
- *Journal of Pharmaceutical Sciences* Service Award (2007, 2008, 2012, 2015), *Biophysical Chemistry* Service Award (2014)

Peer-Reviewed Publications (*h-index* = 29, for multi-author publications, asterisk denotes corresponding author(s))

1. Roberts CJ, Franks F* Crystalline and amorphous phases in the binary system water – β , β trehalose. *J. Chem. Soc. Faraday Trans.* 92:1337-1343 (1996).
2. Roberts CJ, Debenedetti PG* Polyamorphism and density anomalies in network-forming fluids: Zeroth- and first-order approximations. *J. Chem. Phys.* 105:658-672(1996).
3. Roberts CJ, Panagiotopoulos AZ, Debenedetti PG* Liquid-liquid immiscibility in pure fluids: Polyamorphism in simulations of a network-forming fluid. *Phys. Rev. Lett.* 77:4386-4389 (1996).
4. Roberts CJ, Karayiannakis GA, Debenedetti PG* Pure-fluid liquid-liquid equilibrium in a model of network-forming fluids, and implications for polyamorphism in water. *Ind. & Eng. Chem. Res.* 37:3012-3020 (1998).
5. Roberts CJ, Debenedetti PG* Structure and dynamics in concentrated amorphous carbohydrate-water systems by molecular dynamics simulation. *J. Phys. Chem. B* 103:7308-7318 (1999).
6. Debenedetti PG*, Stillinger FH, Truskett TM, Roberts CJ. The equation of state of an energy landscape. *J. Phys. Chem. B* 103:7390-7397 (1999).
7. Roberts CJ, Stillinger FH, Debenedetti PG* Equation of state of the energy landscape of SPC/E water. *J. Phys. Chem. B* 103:10258-10265 (1999).
8. Roberts CJ*, Ji Q, Zhang L, Darrington RT. Dissolution behavior of porcine somatotropin with simultaneous gel-formation and lysine Schiff-base hydrolysis. *J. Controlled Release*, 77:107-116 (2001).
9. Waterman KC*, Adami RC, Alsante KM, Hong J, Landis MS, Lombardo F, Roberts CJ. Stabilization of pharmaceuticals to oxidative degradation. *Pharm. Dev. Tech.* 7:1-32 (2002).
10. Roberts CJ, Debenedetti PG* Engineering pharmaceutical stability with amorphous solids. *AIChE J.* 48:1140-1144 (2002).
11. Roberts CJ. Kinetics of irreversible protein aggregation: analysis of extended Lumry-Eyring models and implications for shelf life prediction *J. Phys. Chem. B* 107:1194-1207 (2003).
12. Roberts CJ*, Darrington RT, Whitley MB. Irreversible aggregation of recombinant bovine granulocyte-colony stimulating factor (bG-CSF) and implications for predicting protein shelf life. *J. Pharm. Sci.*, 92:1095-1111 (2003).
13. Roberts CJ. Improved quasi-chemical equation of state based on energy and density fluctuations in the small system grand canonical ensemble, *J. Phys. Chem. B* 108:19843-19851 (2004).
14. Shah PP, Roberts CJ* Molecular solvation in water-methanol and water-sorbitol mixtures: the roles of preferential hydration, hydrophobicity, and the equation of state, *J. Phys. Chem. B* 111:4467-4476 (2007).
15. Andrews JM, Roberts CJ* Non-native aggregation of α -chymotrypsinogen occurs through nucleation and growth with competing nucleus sizes and negative activation energies, *Biochemistry* 46:7558-7571 (2007).
16. Andrews JM, Roberts CJ* A Lumry-Eyring nucleated-polymerization model of protein aggregation kinetics: 1. Aggregation with pre-equilibrated unfolding, *J. Phys. Chem. B* 111:7897-7913 (2007).
17. Roberts CJ [134] Nonnative protein aggregation kinetics. *Biotechnol. Bioeng.* 98:927-938 (2007).
18. Young TM, Roberts CJ* A quasichemical approach for protein-cluster free energies in dilute solution, *J. Chem. Phys.* 127:165101/1-10 (2007).
19. Weiss WF IV, Hodgdon TK, Kaler EW, Lenhoff AM, Roberts CJ* Nonnative protein polymers: structure, morphology, and relation to nucleation and growth, *Biophys. J.* 93:4392-4403 (2007).
20. Shah PP, Roberts CJ* Solvation in mixed-aqueous solvents from a thermodynamic cycle approach, *J. Phys. Chem. B* 112:1049-1052 (2008).
21. Andrews JM, Weiss WF IV, Roberts CJ* Nucleation, growth, and activation energies for seeded and unseeded aggregation of α -chymotrypsinogen A. *Biochemistry* 47:2397-2403 (2008).
22. Top A, Kiick KL*, Roberts CJ* Modulation of self-association and subsequent fibril formation in an alanine-rich helical polypeptide. *Biomacromolecules* 9:1595-1603 (2008).
23. Weiss WF IV, Young TM, Roberts CJ* Principles, approaches, and challenges for prediction of protein aggregation kinetics and shelf life *J. Pharm. Sci.*, 98:1246-1277 (2009).

24. Li Y, Weiss WF IV, Roberts CJ* Characterization of high molecular-weight nonnative aggregates and aggregation kinetics by size exclusion chromatography with inline multi-angle laser light scattering. *J. Pharm. Sci.* 98:3997-4016 (2009).
25. Spataro ML, Roberts CJ, Robinson AS* Kinetic folding studies of the P22 tailspike beta-helix domain reveal multiple unfolded states. *Biophys. Chem.* 141:214-221 (2009).
26. Li Y, Roberts CJ* A Lumry-Eyring nucleated-nolpolymerization (LENP) model of protein aggregation kinetics 2. Competing growth via condensation- and chain-polymerization. *J. Phys. Chem. B* 113:7020-7032 (2009).
27. Young TM, Roberts CJ* Structure and thermodynamics of colloidal protein cluster formation: comparison of square-well and simple dipolar models. *J. Chem. Phys.* 131:125104/1-9 (2009).
28. Li Y, Ogunnaik BA, Roberts CJ* Multi-variate approach to global protein aggregation behavior and kinetics: effects of pH, NaCl, and temperature for α -chymotrypsinogen A. *J. Pharm. Sci.* 99:645-662 (2010).
29. Sahin E, Grillo AO, Perkins MD, Roberts CJ* Comparative effects of pH and ionic strength on protein-protein interactions, unfolding, and aggregation for IgG1 antibodies, *J. Pharm. Sci.* 99:4830-4848 (2010).
30. Zhang A, Jordan JL, Ivanova MA, Weiss WF, Roberts CJ, Fernandez EJ* Molecular-level insights into thermally-induced α -chymotrypsinogen A amyloid aggregation mechanism and semi-flexible protofibril morphology. *Biochemistry* 49:10553-10564 (2010).
31. Sahin E, Jordan JL, Zhang A, Naranjo A, Costanzo JA, Weiss WF IV, Spataro ML, Robinson AS, Fernandez EJ*, Roberts CJ* Computational design and biophysical characterization of point mutations for gamma-D-crystallin illustrate a balance of conformational stability and intrinsic aggregation propensity. *Biochemistry* 50:628-639 (2011).
32. Brummitt RK, Nesta DP, Chang L, Chase SF, Laue TM, Roberts CJ* Non-native aggregation of an IgG1 antibody in acidic conditions: 1. Unfolding, colloidal interactions, and formation of amyloid-like high molecular weight aggregates. *J Pharm Sci* 100:2087-2103 (2011).
33. Brummitt RK, Nesta DP, Chang L, Kroetsch AM, Roberts CJ* Non-native aggregation of an IgG1 antibody in acidic conditions: 2. Nucleation-and-growth kinetics with competing growth mechanisms. *J Pharm Sci* 100:2104-2119 (2011).
34. Top A, Roberts CJ*, Kiick KL* Conformational and aggregation properties of a PEGylated alanine-rich polypeptide *Biomacromolecules* 12:2184–2192 (2011).
35. Blanco MA, Sahin E, Li Y, Roberts CJ* Reexamining Protein-Protein and Protein-Solvent Interactions from Kirkwood-Buff Analysis of Light Scattering in Multi-Component Solutions. *J Chem Phys* 134:225103/1-12 (2011).
36. Brummitt, RK, Nesta DP, Roberts, CJ* Predicting accelerated and low-temperature aggregation rates for monoclonal antibody formulations. *J Pharm Sci* 100:4234-4243 (2011).
37. Roberts CJ*, Das TK, Sahin E. Predicting Aggregation Rates for Therapeutic Proteins: Approaches and Challenges. *Int J Pharm* 418:318-333 (2011).
38. Top A, Zhong S, Yan C, Roberts CJ*, Pochan DJ*, Kiick KL* Controlling assembly of helical polypeptides via PEGylation strategies. *Soft Matter* 7:9758-9766 (2011).
39. Sahin E, Weiss WF IV, Kroetsch AM, King KR, Kessler RK, Das TK, Roberts CJ* Non-native aggregation and pH-temperature phase behavior of aggregates for an IgG2 antibody *J Pharm Sci* 101:1678–1687 (2012).
40. Siderius DW*, Krekelberg WP, Roberts CJ, Shen VK. Osmotic virial coefficients for model protein and colloidal solutions: Importance of ensemble constraints. *J Chem Phys*, 136(17) 175102/1-9 (2012).
41. Brummitt RK, Andrews JM, Jordan JL, Fernandez EJ, Roberts CJ* Thermodynamics of amyloid dissociation provide insights into aggregate stability regimes *Biophys Chem*, 168-169: 10-18 (2012).
42. Kroetsch AM, Sahin E, Wang H-Y, Krizman S, Roberts CJ* Relating particle formation to salt- and pH-dependent phase separation of non-native aggregates of alpha-chymotrypsinogen A. *J Pharm Sci*, 101:3651-3660 (2012).
43. Sahin E, Roberts CJ* Size-Exclusion Chromatography with Multi-Angle Light Scattering (SEC-MALS) for Elucidating Protein Aggregation Mechanisms. *Methods Mol Biol* 899:403-423 (2012).
44. Grünberger A, Lai P-K, Blanco MA, Roberts CJ* Coarse-grained modeling of protein second osmotic virial coefficients: sterics and non-specific attractions. *J Phys Chem B*, 117:763-770 (2013).
45. Kim N, Remmele RL, Liu D, Razinkhov V, Fernandez EJ, Roberts CJ* Aggregation of Anti-Streptavidin Immunoglobulin Gamma-1 Mediated by Fab Unfolding and Competing Growth Pathways. *Biophys Chem*, 172:26-36 (2013).
46. Wang W*, Roberts CJ* Non-Arrhenius Protein Aggregation. *AAPS J*, (online only) doi: 10.1208/s12248-013-9485-3 (2013).
47. Roberts CJ*, Nesta DP, Kim N. Effects of temperature and osmolytes on parallel degradation routes for an IgG1 antibody. *J Pharm Sci* 102:3556-3566 (2013).

48. Murphy RM*, Roberts CJ. Protein misfolding and aggregation research: some thoughts on improving quality and utility. *Biotechnol Prog* 29:1109-1115 (2013).
49. Maurer RW, Hunter AK, Wang X, Wang WK, Robinson AS*, Roberts CJ* Folding and aggregation of a multi-domain engineered immunotoxin. *Biochem Eng J.* 81:8-14 (2013).
50. Blanco MA, Sahin E, Robinson AS, Roberts CJ* Coarse-grained model of protein-protein interactions, B₂₂, and protein cluster formation. *J Phys Chem B* 117: 16013-16028 (2013).
51. Weiss WF IV, Zhang A, Jordan JL, Ivanova MA, Sahin E, Fernandez EJ, Roberts CJ* Reduction of the C191-C220 disulfide of α -chymotrypsinogen A accelerates amyloid formation via reduced nucleation barriers. *Biophys Chem* 185:79-87 (2014).
52. Maurer RW, Hunter AK, Robinson AS*, Roberts CJ* Aggregates of α -chymotrypsinogen anneal to access more stable aggregate states. *Biotechnol Bioeng* 111: 782-791 (2014).
53. Wu H, Kroe-Barrett R, Singh S, Robinson AS, Roberts CJ* Competing aggregation pathways for monoclonal antibodies. *FEBS Letters* 588: 936-941(2014).
54. Costanzo JA, O'Brien CJ, Tiller K, Tamargo E, Robinson AS, Roberts CJ*, Fernandez EJ* Computational Design to Control Protein Aggregation Rates Through Conformational Stability. *Protein Engineering Design & Selection* 27: 157-167 (2014).
55. Blanco MA, Martorana E, Manno M, Perevozchikova T, Roberts CJ* Protein-protein interactions in dilute to concentrated solutions: alpha-chymotrypsinogen at acidic pH. *J Phys Chem B* 118: 5817-5831 (2014).
56. Roberts CJ. Therapeutic protein aggregation: mechanisms, design, and control. *Trends Biotech.* 32: 372-380 (2014).
57. Roberts CJ. Protein Aggregation and Its Impact on Product Quality. *Curr Opin Biotech* 30:211-217 (2014).
58. Roberts CJ,* Blanco MA. Role of anisotropic interactions for proteins and patchy nanoparticles. *J Phys Chem B* 118:12599-12611 (2014).
59. Amin S,* Barnett GV, Pathak J,* Roberts CJ, Sarangapani PS. Protein aggregation, particle formation, characterization, and rheology. *Curr Opin Coll Int Sci* 19:439-449 (2014).
60. Paik B, Blanco MA, Roberts CJ,* Jia X, Kiick KL* Aggregation of poly(acrylic acid)-containing elastin copolymers. *Soft Matter* 11:1839-1850 (2015).
61. Barnett GV, Razinkov V, Kerwin BA, Laue TM, Woodka A, Butler PD, Perevozchikova T, Roberts CJ* Specific ion effects on the aggregation mechanisms and protein-protein interactions for anti-streptavidin immunoglobulin gamma 1. *J Phys Chem B* 119:5793-5804 (2015).
62. Perevozchikova T, Nanda H, Nesta DP, Roberts CJ* Protein adsorption, desorption, and aggregation mediated by solid-liquid interfaces. *J Pharm Sci* 104:1946-1959 (2015).
63. Barnett GV, Qi W, Amin S, Lewis EN, Roberts CJ* Aggregate structure, morphology and the effect of aggregation mechanisms on viscosity at elevated protein concentrations. *Biophys Chem* 207:21-29 (2015).
64. Wu H, Truncali K, Ritchie J, Kroe-Barrett R, Singh S, Robinson AS, Roberts CJ* Weak protein interactions and pH- and temperature-dependent aggregation of human Fc1. *mAbs* 7:1-12 (2015).
65. Barnett GV, Qi W, Amin S, Lewis EN, Razinkov V, Kerwin BA, Liu Y, Roberts CJ* Structural Changes and Aggregation Mechanisms for Anti-streptavidin IgG1 at Elevated Concentration. *J Phys Chem B* 119:15150-15163 (2015).
66. Barnett GV, Razinkov V, Kerwin BA, Hillsley A, Roberts CJ* Acetate and Citrate Specific-Ion-Effects on Temperature-Dependent Aggregation Rates of Anti-Streptavidin IgG1. *J Pharm Sci* 105:1066-1073 (2016).
67. Ghosh R, Calero-Rubio C, Saluja A, Roberts CJ* Relating protein-protein interactions and aggregation rates from low to high concentrations. *J Pharm Sci* 105:1086-1096 (2016).
68. Barnett GV, Razinkov V, Kerwin BA, Blake S, Qi W, Curtis RA, Roberts CJ* Osmolyte Effects on Monoclonal Antibody Stability and Concentration-Dependent Protein Interactions with Water and Common Osmolytes *J Phys Chem B* 120:3318-3330 (2016).
69. O'Brien CJ, Blanco MA, Robinson AS,* Roberts CJ* Modulating Non-Native Aggregation and Electrostatic Protein-Protein Interactions with Computationally Designed Single Point Mutations, *Protein Engineering Design & Selection* 29:231-243 (2016).
70. Calero-Rubio C, Saluja A, Roberts CJ* Coarse-grained antibody models for "weak" protein-protein interactions from low to high concentrations *J Phys Chem B* 120:6592-6605 (2016).
71. Calero-Rubio C, Paik BA, Jia X, Kiick KL*, Roberts CJ* Predicting unfolding thermodynamics and stable intermediates for alanine-rich helical peptides with the aid of coarse-grained molecular simulation. *Biophys Chem* 217:8-19 (2016).
72. Barnett GV, Drenski MC, Razinkov V, Reed WF*, Roberts CJ* Identifying protein aggregation mechanisms and kinetics from combined monomer depletion rates and continuous scattering *Analytical Biochem* 511:80-91 (2016).

73. Barnett GV, Razinkov V, Kerwin BA, Blake S, Qi W, Curtis RA, Roberts CJ* Reply to Comment on Osmolyte Effects on Monoclonal Antibody Stability and Concentration-Dependent Protein Interactions with Water and Common Osmolytes. *J Phys Chem B* 120:11333-11334 (2016).
74. Bain DL, Brenowitz M, Roberts CJ. Commentary on higher education and next-generation researchers: Biophysical characterization, higher-order structure, and industrial/academic opportunities. *J Pharm Sci.* 105:3483-3486 (2016).
75. Meric UG, Robinson AS*, Roberts CJ* Driving forces for non-native protein aggregation and approaches for predicting aggregation-prone regions. *Ann Rev Chem Biomol Eng* 8 (2017), DOI: 10.1146/annurev-chembioeng-060816-101404

Book Chapters

1. Roberts CJ. Non-native protein aggregation: pathways, kinetics, and shelf-life prediction, in *Misbehaving Proteins: Protein (Mis)Folding, Aggregation, and Stability*, Murphy, R. M. & Tsai, A. M. Eds., Springer-Verlag: New York, NY 2006.
2. Roberts CJ. Irreversible protein aggregation: principles and rationale for common stabilization strategies, in *Encyclopedia of Agricultural, Food, and Biological Engineering*, Heldman, D., Ed., Taylor and Francis, 2006. (<http://www.dekker.com/sdek/issues~db=enc~content=t713172957>)
3. Li Y, Roberts CJ* Protein Aggregation Pathways, Kinetics, and Thermodynamics, in *Aggregation of Therapeutic Proteins*. Wang, W & Roberts, CJ, Eds., John Wiley & Sons: New York, NY 2010.
4. Roberts, CJ Nucleation, Aggregation, and Conformational Distortion, Ch. 5 in *Biophysical Methods for Biotherapeutics: Discovery and Development Applications*, Das, TK (Ed.), John Wiley & Sons, Hoboken, NJ, 2014.
5. S. Ewing, A. Hussain, G. Collins, C. Roberts, E. Shalaev. Low-Temperature Mobility of Water in Sugar Glasses: Insights from Thermally Stimulated Current Studies, in *Water Stress in Biological, Chemical, Pharmaceutical, and Food Systems*, G. F. Gutierrez-Lopez, L. Alamilla-Beltran, M. del Pilar Buera, J. Welti-Chanes, E. Parada-Arias, G. V. Barbosa-Canovas (Eds.), Springer, New York (2015).

Books

Aggregation of Therapeutic Proteins, Eds. W. Wang and C. J. Roberts, John Wiley & Sons: New York, NY (2010).

Protein Solutions: From a Molecular to a Thermodynamic Perspective. R. A. Curtis, L. Lue, C. J. Roberts (in preparation).

Research Presentations and Lectures

Plenary / Keynote / Named Lectures

1. Inaugural John Finlayson Lecture, US Food and Drug Administration, Silver Spring, MD (2016).
2. Symposium for the Relevance of Protein Aggregation in Biologics and Vaccines Development, Merck & Co., Kenilworth, NJ (2016).
3. Advanced Biomanufacturing Centre, University of Sheffield, Sheffield, United Kingdom (2015).
4. Protein Engineering Summit, Boston, MA (2015).
5. International Symposium on Polymer Analysis and Characterization, New Orleans, LA (2013).
6. International Light Scattering Conference, Santa Barbara, CA (2012).
7. 2012 Biomolecular Interaction Technologies Conference, Durham, NH (2012).
8. XV International Congress on Rheology, Lisbon, Portugal (2012).
9. CHI Bioprocessing Summit, Boston, MA (2012).
10. Symposium on Biopharmaceutical and Pharmaceutical Applications, CALCON, Oahu, HI (2011).
11. AAPS Chapter Annual Pharmaceuticals Lecture, Department of Pharmaceutical Chemistry, University of Kansas, Lawrence, KS (2006).

Invited

12. Janssen Pharmaceuticals, Spring House Station, PA (2017)
13. Workshop on Recent Breakthroughs and New Perspectives on Protein Aggregation, University of Manchester, UK (2017)

14. Mid-Atlantic Soft Matter Conference, Newark, DE (2017)
15. Advances in Biophysical Methods for Protein Characterisation, Palermo, Italy (2016)
16. Merck Research Laboratories, West Point, PA (2016)
17. Dept. of Biochemistry and Molecular Biology, University of Kansas Medical Center, Kansas City, KS (2016)
18. Protein Engineering Summit, Boston, MA (2016)
19. Eli Lilly, Indianapolis, IN (2016)
20. Amgen, Thousand Oaks, CA (2016)
21. Department of Pharmaceutical Sciences, University of Connecticut, Storrs, CT (2015).
22. IABS, Progress and Challenges for Particle Formation and Immunogenicity of Biotherapeutics 2015, Rockville, MD (2015).
23. Bristol-Myers Squibb Biologics Development Organization, Pennington, NJ (2015)
24. AAPS Annual Meeting, Orlando, FL (2015).
25. Department of Pharmaceutical Sciences, University of Kentucky, Lexington, KY (2015).
26. Higher Order Structure Conference, Boston, MA (2015).
27. PepTalk, Cambridge Healthtech Institute, San Diego, CA (2015).
28. AbbVie, Worcester, MA (2014).
29. Merck Research Laboratories, Kenilworth, NJ (2014).
30. Neutron Characterisation in Fundamental and Applied Biotechnology, Abingdon, UK (2014).
31. Bioprocessing Summit, Boston, MA (2014).
32. Biological and Pharmaceutical Complex Fluids II, Durham, NC (2014).
33. Teva Pharmaceuticals, Rockville, MD (2014).
34. Department of Chemical Engineering, University of California, Santa Barbara, CA (2014).
35. Institute for Bioscience and Biotechnology Research, University of Maryland, Rockville, MD (2014).
36. Colorado Protein Stability Meeting, Breckenridge, CO (2013)
37. Malvern Instruments, Columbia, MD (2013).
38. Departmental Seminar, Preclinical Development, Regeneron Pharmaceuticals, Tarrytown, NY (2013).
39. Department of Chemical and Biological Engineering, Princeton University, Princeton, NJ (2013).
40. Department of Chemical Engineering, University of Texas, Austin, TX (2012).
41. Department of Chemical Engineering, University of Virginia, Charlottesville, VA (2012).
42. American Association of Pharmaceutical Sciences Annual Meeting, Chicago, IL (2012).
43. Peck Symposium, College of Pharmacy, Purdue University, West Lafayette, IN (2012).
44. Department of Pharmaceutical Sciences, University of Kentucky, Lexington, KY (2012).
45. ECI, Biological and Pharmaceutical Complex Fluids: New Trends in Characterizing Microstructure, Interactions & Properties, Tomar, Portugal (2012).
46. American Conference on Neutron Scattering, Washington, D.C. (2012).
47. Process Development Department, Genentech, South San Francisco, CA (2012).
48. University of Manchester Interdisciplinary Biosciences, Manchester, United Kingdom (2012).
49. Bioprocess International Annual Conference, Prague, Czech Republic (2012).
50. Formulation Sciences, Allergan, Inc., Irvine, CA (2012).
51. Department of Chemical Engineering, Lehigh University, Bethlehem, PA (2012).
52. Department of Chemical and Biomolecular Engineering, Univ. of Maryland, College Park, MD (2011).
53. Departmental seminar, Drug Product Development, Amgen, Seattle, WA (2011).
54. Department of Biotherapeutics R&D, Boehringer-Ingelheim Pharmaceuticals, Ridgefield, CT (2011).
55. World Pre-Filled Syringes Summit, Tyson's Corner, VA (2011).
56. Laboratory of Biochemistry and Genetics, National Institute of Diabetes, Digestive, and Kidney Disorders, Bethesda, MD (2011).
57. 1st International Symposium on Higher-Order Structure of Protein Therapeutics, Rockville, MD (2011).
58. Drug Product Science & Technology R&D Seminar, Bristol Myers Squibb, New Brunswick, NJ (2011).
59. Colorado Protein Stability Conference, Breckenridge, CO (2011).
60. Symposium on Databases, Global Analysis, Modeling, and Simulations, CALCON, Oahu, HI (2011).
61. CHI Protein Engineering Summit, Boston, MA (2011).
62. Institute of Biophysics, National Research Council of Italy (Consiglio Nazionale della Ricerche), Palermo, Italy (2011).
63. Novo Nordisk Biophysics Symposium, Copenhagen, Denmark (2011).
64. Department of Chemical and Biomolecular Engineering, Tulane University, New Orleans (2011).
65. XV School of Pure and Applied Biophysics, Venice, Italy (2011).
66. Protein Sciences, Inc., Meridan, CT (2010).
67. New Cell, New Vaccines Conference, Wilmington, DE (2010).

68. Department of Biochemical Engineering, University College London, London UK (2010).
69. Chemical Science & Technology Laboratories, Departmental Seminar, National Institute of Standards and Technology, Gaithersburg, MD (2010).
70. Bioproduct R&D Departmental Seminar, Eli Lilly & Co., Indianapolis, IN (2010).
71. Food and Drug Administration, Bethesda, MD (2010).
72. SANS Seminar Series, National Institute of Standards and Technology, Gaithersburg, MD (2010).
73. Cambridge Health Institute, Protein Aggregation Conference, San Diego, CA (2010).
74. Wyeth Vaccine Research, Pearl River, NY (2009).
75. BD Sensitive Drug Initiative 2009 Science and Technology Forum, San Francisco, CA (2009).
76. IIR BioProduction Conference, Barcelona, Spain (2009).
77. Colorado Protein Stability Conference, Breckenridge, CO (2009).
78. National Institute of Standards and Technology, Gaithersburg, MD (2009).
79. CALCON, Santa Fe, NM (2009).
80. AAPS National Biotechnology Conference, Seattle, WA (2009).
81. Fraunhofer, Inc., Newark, DE (2009)
82. ARO Enzyme Stability Workshop, Key West, FL (2008).
83. Dept. of Chemical and Biological Engineering, Rensselaer Polytechnic Institute, Troy, NY (2008).
84. EMD Chemicals Inc., Gibbstown, NJ (2008).
85. Biomolecular Interaction Technologies Conference, Durham, NH (2008)
86. Recovery of Biological Products XIII, Québec City, Québec (2008).
87. AAPS National Biotechnology Conference, Toronto, Ontario (2008).
88. RISE seminar series, College of Natural Sciences, University of Puerto Rico – Rio Piedras (2008).
89. Symposium on Biophysics and Multiscale Modeling, ACS Spring Meeting, New Orleans, LA (2008)
90. IIR 5th Annual Formulation & Forced Degradation Strategies for Biomolecules, San Diego, CA (2008)
91. Computational Biology Seminar Series, Washington University at St. Louis, St. Louis, MO (2007).
92. Department of Chemical Engineering, Purdue University, West Lafayette, IN (2007).
93. Parenteral Center of Emphasis, Pfizer Global R&D, Groton, CT (2007).
94. Department of Chemical and Biological Engineering, University of Colorado – Boulder (2007).
95. Merck Bioprocess R&D, Rahway, NJ (2007)
96. Bristol-Myers Squibb, New Brunswick, NJ (2007)
97. Biochemical Engineering XV, Québec City, Québec (2007)
98. AAPS National Biotechnology Conference, San Diego, CA (2007).
99. Dept. of Chemical and Biochemical Engineering, University of Maryland – Baltimore County (2007).
100. Department of Pharmaceutical Sciences, University of Kentucky (2007).
101. Department of Pharmaceutical Sciences, University of Connecticut (2007).
102. Society of Biological Engineering Meeting, Coronado, CA (2007).
103. Department of Chemical and Biological Engineering, University of Wisconsin (2007).
104. Pfizer Global R&D, St. Louis, MO (2006).
105. Glaxo-Smith Kline, King of Prussia, PA (2006).
106. Amgen, Inc., Thousand Oaks, CA (2005).
107. Centocor, Inc., Malvern, PA (2005).
108. American Association of Pharmaceutical Scientists Annual Meeting, Nashville, TN (2005).
109. 5th Annual IBC Formulation Strategies for Protein Therapeutics, Boston, MA (2005).
110. Colorado Protein Stability Conference, Breckenridge, CO (2005).
111. Midwest Thermodynamics and Statistical Mechanics Conference, Purdue University (2005).
112. Bristol-Meyers Squibb, Pennington, NJ (2005).
113. DuPont Experimental Station, Wilmington, DE (2004).
114. 4th Annual IBC Formulation Strategies for Protein Therapeutics, Boston, MA (2004).
115. Barnett Protein Aggregation Conference, Phila., PA (2004).
116. Protein Society Annual Meeting, San Diego, CA (2004).
117. Freeze-Drying of Pharmaceuticals and Biologicals Conference, Breckenridge, CO (2004).
118. Chemistry-Biology Interface Seminar, University of Delaware (2003).
119. 3rd Annual IBC Conference on Protein Formulation and Stability, Philadelphia, PA (2003).
120. International Workshop on Non-Equilibrium Thermodynamics and Complex Fluids, Princeton, NJ (2003).
121. Merck Bioprocess Symposium, West Point, PA (2003).
122. AAPS Short Course, *Understanding Amorphous Pharmaceutical Systems*, AAPS Annual Meeting, Toronto, Ontario (2002).

Accepted from open submissions (underline indicates presenter)

123. C. Calero-Rubio, A. Saluja, C. J. Roberts, ACS Spring National Meeting, San Diego, CA (2016).
124. M. A. Woldeyes, V. Razinkov, E. M. Furst, C. J. Roberts, ACS Spring National Meeting, San Diego, CA (2016)
125. M. A. Woldeyes, C. J. Roberts, E. M. Furst, Society of Rheology Meeting (2015).
126. G. V. Barnett, V. Razinkov, B. A. Kerwin, C. J. Roberts, ACS Spring National Meeting, Denver, CO (2015).
127. R. Ghosh, C. Calero-Rubio, A. Saluja, C. J. Roberts, ACS Spring National Meeting, Denver, CO (2015).
128. C. J. Roberts, G. V. Barnett, B. A. Kerwin, V. Razinkov, Amorph 2014, Cambridge, UK (2014).
129. C. J. Roberts, V. K. Shen, ACS Spring National Meeting, Dallas, TX (2014).
130. C. J. Roberts, M. A. Blanco, AIChE Annual Meeting, San Francisco, CA (2013).
131. M. A. Blanco, T. Perevozchikova, E. Martorana, M. Manno, C. J. Roberts, ACS Spring National Meeting, New Orleans, LA (2013).
132. C. J. O'Brien, M. A. Blanco, J. A. Costanzo, E. J. Fernandez, A. S. Robinson, C. J. Roberts, ACS Spring National Meeting, New Orleans, LA (2013).
133. T. Perevozchikova, H. Nanda, R. L. Jones, C. J. Roberts, ACS Spring National Meeting, New Orleans, LA (2013).
134. R. Jones, T. Perevozchikova, K. Weigandt, C. J. Roberts, Society of Rheology Meeting, Pasadena, CA (2013).
135. J. Wiesbauer, R. Meier, C.J. Roberts, B. Nidetzky, 4th ÖGMBT Annual Meeting, Graz, Austria (2012).
136. J. Wiesbauer, R. Meier, C. J. Roberts, B. Nidetzky, NAWI Graz Doctoral School of Molecular Biosciences and Biotechnology. Graz, Austria (2012).
137. J. A. Costanzo, C. J. O'Brien, E. Sahin, E. Tamargo, K. Tiller, A. S. Robinson, C. J. Roberts, E. J. Fernandez, ACS Spring Annual Meeting, San Diego, CA (2012).
138. M. A. Blanco, J. Costanzo, C. J. O'Brien, E. J. Fernandez, A. S. Robinson, C. J. Roberts, ACS Spring Annual Meeting, San Diego, CA (2012).
139. C. J. Roberts, E. Sahin, M. Blanco, T. K. Das, AIChE Fall Meeting, Minneapolis, MN (2011)
140. J. A. Costanzo, E. Sahin, C. O'Brien, E. Tamargo, K. Tiller, A. S. Robinson, C. J. Roberts, E. J. Fernandez, ACS Spring National Meeting, Anaheim, CA (2011).
141. C. J. Roberts, D. P. Nesta, R. K. Brummitt, ACS Spring National Meeting, Anaheim, CA (2011).
142. M. A. Blanco, E. Sahin, A. Gruenberger, C. J. Roberts, AIChE Annual Meeting, Salt Lake City, UT (2010).
143. E. Sahin, A. O. Grillo, M. D. Perkins, C. J. Roberts, ACS Spring National Meeting, San Francisco, CA (2010).
144. W. F. Weiss IV, A. Zhang, E. Sahin, E. J. Fernandez, C. J. Roberts, AIChE Fall Meeting, Nashville, TN (2009).
145. R. K. Brummitt, L. Chang, D. P. Nesta, C. J. Roberts, ACS Annual Meeting, Washington D.C. (2009)
146. J. L. Jordan, E. Sahin, A. S. Robinson, C. J. Roberts, E. J. Fernandez, ACS Annual Meeting, Washington D.C. (2009)
147. A. Zhang, E. Sahin, W. F. Weiss IV, K. L. Kiick, C. J. Roberts, E. J. Fernandez, ACS Annual Meeting, Washington D.C. (2009)
148. (poster) E. Sahin, J. L. Jordan, A. S. Robinson, E. J. Fernandez, C. J. Roberts, Colorado Protein Stability Conference, Breckenridge, CO (2009)
149. (poster) E. Sahin, A. O. Grillo, M. D. Perkins, C. J. Roberts, Colorado Protein Stability Conference, Breckenridge, CO (2009)
150. T. M. Young, C. J. Roberts, AIChE Annual Meeting, Philadelphia, PA (2008)
151. Y. Li, B. A. Ogunnaike, C. J. Roberts, AIChE Annual Meeting, Philadelphia, PA (2008)
152. Y. Li, B. A. Ogunnaike, C. J. Roberts, ACS Annual Fall Meeting, Philadelphia, PA (2008)
153. A. Top, K. L. Kiick, C. J. Roberts, ACS Annual Fall Meeting, Philadelphia, PA (2008)
154. T. M. Young and C.J. Roberts, AIChE Annual Meeting, Salt Lake City, UT (2007)
155. P. P. Shah and C. J. Roberts, AIChE Annual Meeting, Salt Lake City, UT (2007)
156. W. F. Weiss IV, A. M. Lenhoff, C. J. Roberts, ACS National Fall Meeting, Boston, MA (2007)
157. M. L. Spataro, C. J. Roberts, A. S. Robinson, ACS National Fall Meeting, Boston, MA (2007)
158. J. M. Andrews, C. J. Roberts, AIChE Annual Meeting, San Francisco, CA (2006).
159. J. M. Andrews, C. J. Roberts, AIChE Annual Meeting, Cincinnati, OH (2005).
160. E. M. O'Dea, R. S. Farmer, K. L. Kiick, C. J. Roberts, ACS Spring Meeting, San Diego, CA (2005).
161. J. M. Andrews, E. M. O'Dea, C. J. Roberts, AIChE Annual Meeting, Austin, TX (2004).
162. P. P. Shah, C. J. Roberts, AIChE Annual Meeting, Austin, TX (2004).
163. C. J. Roberts, D. J. Caravoulias, J. H. Nonnemacher, AIChE Annual Mtg., Indianapolis, IN (2003).
164. C.J. Roberts, J. M. Roberts, J. F. Blake, ACS Annual Meeting, Boston, MA (2002).

165. C.J. Roberts, J. M. Roberts, J. F. Blake, AIChE Annual Meeting, Indianapolis, IN (2002).
166. C. J. Roberts, R. T. Darrington, M. B. Whitley, AIChE Annual Meeting, Indianapolis, IN (2002).

Memberships & Affiliations

Member, American Association of Pharmaceutical Scientists
Member, American Chemical Society
Member, American Society for Engineering Education
Member, Sigma Xi
Member, Neutron Scattering Society of America
Member, Tau Beta Pi