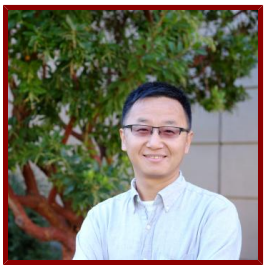
Stanford



Jian Qin

Associate Professor of Chemical Engineering

Curriculum Vitae available Online

Bio

BIO

Jian Qin is an Associate Professor in the Department of Chemical Engineering at the Stanford University. His research focuses on development of microscopic understanding of structural and physical properties of soft matters by using a combination of analytical theory, scaling argument, numerical computation, and molecular simulation. He worked as a postdoctoral scholar with Juan de Pablo in the Institute for Molecular Engineering at the University of Chicago and with Scott Milner in the Department of Chemical Engineering at the Pennsylvania State University. He received his Ph.D. in the Department of Chemical Engineering and Materials Science at the University of Minnesota under the supervision of David Morse and Frank Bates. His research covers self-assembly of multi-component polymeric systems, molecular origin of entanglement and polymer melt rheology, coacervation of polyelectrolytes, Coulomb interactions in dielectrically heterogeneous electrolytes, and surface charge polarizations in particulate aggregates in the absence or presence of flow.

ACADEMIC APPOINTMENTS

- Associate Professor, Chemical Engineering
- Member, Bio-X
- Member, Wu Tsai Neurosciences Institute

HONORS AND AWARDS

- John H. Dillon Medal, APS (2022)
- Tau Beta Pi Teaching Honor Roll, Stanford Tau Beta Pi Chapter (2020)
- ACS PMSE Young Investigator, ACS PMSE (2020)
- ACS Arthur K. Doolittle Award, ACS PMSE (2019)
- NSF CAREER, National Science Foundation (2019-2023)
- Hellman Faculty Fellow, Hellman Faculty Scholar Fund (2017-2018)
- 3M Nontenured Faculty Award, 3M Company (2017)
- Terman Faculty Fellowship, Stanford University (2016-2018)
- Kadanoff-Rice Fellowship, University of Chicago (2013)
- Doctor Dissertation Fellowship, University of Minnesota (2008)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Editorial board member, Macromolecules (2023 - present)
- Editorial board member, Journal of Polymer Science (2021 - present)

- Member, APS (2004 - present)
- Member, ACS (2016 - present)
- Member, AIChE (2012 - present)

PROGRAM AFFILIATIONS

- Stanford SystemX Alliance

PROFESSIONAL EDUCATION

- PhD, University of Minnesota (2009)

LINKS

- Google site: https://sites.google.com/site/jqin1980/
- Lab site: http://web.stanford.edu/~jianq/

Teaching

COURSES

2026-27

- Introduction to Chemical Engineering Thermodynamics: CHEMENG 110A (Aut)
- Molecular Thermodynamics: CHEMENG 340 (Aut)

2024-25

- Introduction to Nonequilibrium Statistical Mechanics: CHEMENG 468 (Aut)
- Molecular Thermodynamics: CHEMENG 340 (Aut)
- Statistical and Multi-Component Thermodynamics: CHEMENG 110B (Win)

2023-24

- Molecular Thermodynamics: CHEMENG 340 (Aut)
- Multi-Component and Multi-Phase Thermodynamics: CHEMENG 110B (Win)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Steven Dunne, Jacob Florian, Aakanksha Gubbala, Wylie Kau, Kelly Liu, Karl Persson, Kenzie Sanroman Gutierrez, Yuejun Shen, Long Than, Diego Uruchurtu Patino

Doctoral Dissertation Advisor (AC)

Elizabeth Hinks, Aditya Shah

Master's Program Advisor

Francis Appiah, Michael Chin, Hansol Chung, Kristin Cobbett, Faith Figetakis, Frank Holloway, Minji Kim, Cody Koffman, Sophia Laratta, Vasvi Mongia, Atanu Mukherjee, Sara Oliveros, Jake Owens, Constantine Ren, Matt Szymski, Slava Vladimirov

Doctoral Dissertation Co-Advisor (AC)

Briana Sobecks

Publications

PUBLICATIONS

- **Efficient Electronic Tunneling Governs Transport in Conducting Polymer-Insulator Blends.** *Journal of the American Chemical Society*
  Keene, S. T., Michaels, W., Melianas, A., Quill, T. J., Fuller, E. J., Giovannitti, A., McCulloch, I., Talin, A. A., Tassone, C. J., Qin, J., Troisi, A., Salleo, A.
  2022

- **Liquid electrolyte: The nexus of practical lithium metal batteries** *JOULE*
  Wang, H., Yu, Z., Kong, X., Kim, S., Boyle, D. T., Qin, J., Bao, Z., Cui, Y.
  2022; 6 (3): 588-616

- **Suspension electrolyte with modified Li+ solvation environment for lithium metal batteries.** *Nature materials*
  Kim, M. S., Zhang, Z., Rudnicki, P. E., Yu, Z., Wang, J., Wang, H., Oyakhire, S. T., Chen, Y., Kim, S. C., Zhang, W., Boyle, D. T., Kong, X., Xu, et al
  1800

- **Rational solvent molecule tuning for high-performance lithium metal battery electrolytes** *NATURE ENERGY*
  Yu, Z., Rudnicki, P. E., Zhang, Z., Huang, Z., Celik, H., Oyakhire, S. T., Chen, Y., Kong, X., Kim, S., Xiao, X., Wang, H., Zheng, Y., Kamat, et al
  2022

- **Distribution cutoff for clusters near the gel point** *ACS Polymers Au*
  Li, D. T., Rudnicki, P. E., Qin, J.
  2022

- **Early-career investigator special issue** *JOURNAL OF POLYMER SCIENCE*
  Lynd, N. A., Qin, J.
  2021; 59 (21): 2364

- **Steric Effect Tuned Ion Solvation Enabling Stable Cycling of High-Voltage Lithium Metal Battery.** *Journal of the American Chemical Society*
  Chen, Y., Yu, Z., Rudnicki, P., Gong, H., Huang, Z., Kim, S. C., Lai, J., Kong, X., Qin, J., Cui, Y., Bao, Z.
  2021

- **Predictably Engineering the Viscoelastic Behavior of Dynamic Hydrogels via Correlation with Molecular Parameters.** *Advanced materials (Deerfield Beach, Fla.)*
  Lou, J., Friedowitz, S., Will, K., Qin, J., Xia, Y.
  2021: e2104460

- **A molecular design approach towards elastic and multifunctional polymer electronics.** *Nature communications*
  Zheng, Y., Yu, Z., Zhang, S., Kong, X., Michaels, W., Wang, W., Chen, G., Liu, D., Lai, J., Prine, N., Zhang, W., Nikzad, S., Cooper, et al
  2021; 12 (1): 5701

- **Reversible ion binding for polyelectrolytes with adaptive conformations** *AICHE JOURNAL*
  Friedowitz, S., Qin, J.
  2021

- **Potentiometric Measurement to Probe Solvation Energy and Its Correlation to Lithium Battery Cyclability.** *Journal of the American Chemical Society*
  Kim, S. C., Kong, X., Vila, R. A., Huang, W., Chen, Y., Boyle, D. T., Yu, Z., Wang, H., Bao, Z., Qin, J., Cui, Y.
  2021

- **Atomistic Modeling of PEDOT:PSS Complexes II: Force Field Parameterization** *MACROMOLECULES*
  Michaels, W., Zhao, Y., Qin, J.
  2021; 54 (12): 5354-5365

- **Weakening of Solvation-Induced Ordering by Composition Fluctuation in Salt-Doped Block Polymers** *ACS MACRO LETTERS*
  Kong, X., Hou, K., Qin, J.
  2021; 10 (5): 545-550

- **Dual-Solvent Li-Ion Solvation Enables High-Performance Li-Metal Batteries** *ADVANCED MATERIALS*

Wang, H., Yu, Z., Kong, X., Huang, W., Zhang, Z., Mackanic, D. G., Huang, X., Qin, J., Bao, Z., Cui, Y.
2021: e2008619

- **Atomistic Modeling of PEDOT:PSS Complexes I: DFT Benchmarking** *MACROMOLECULES*
  Michaels, W., Zhao, Y., Qin, J.
  2021; 54 (8): 3634-3646
- **Physical networks from entropy-driven non-covalent interactions.** *Nature communications*
  Yu, A. C., Lian, H., Kong, X., Lopez Hernandez, H., Qin, J., Appel, E. A.
  2021; 12 (1): 746
- **Phase segregation mechanisms of small molecule-polymer blends unraveled by varying polymer chain architecture** *SmartMat*
  Chen, J., Das, S., Shao, M., Li, G., Lian, H., Qin, J., Browning, J., Keum, J., Uhrig, D., Gu, G., Xiao, K.
  2021; 2
- **Looping-in complexation and ion partitioning in nonstoichiometric polyelectrolyte mixtures** *Science Advances*
  Friedowitz, S., Lou, J., Barker, K. P., Will, K., Xia, Y., Qin, J.
  2021; 7 (31)
- **Molecular design for electrolyte solvents enabling energy-dense and long-cycling lithium metal batteries** *NATURE ENERGY*
  Yu, Z., Wang, H., Kong, X., Huang, W., Tsao, Y., Mackanic, D. G., Wang, K., Wang, X., Huang, W., Choudhury, S., Zheng, Y., Amanchukwu, C., Hung, et al
  2020
- **Comparing Experimental Phase Behavior of Ion-Doped Block Copolymers with Theoretical Predictions Based on Selective Ion Solvation** *MACROMOLECULES*
  Hou, K. J., Loo, W. S., Balsara, N. P., Qin, J.
  2020; 53 (10): 3956–66
- **A New Class of Ionically Conducting Fluorinated Ether Electrolytes with High Electrochemical Stability.** *Journal of the American Chemical Society*
  Amanchukwu, C. V., Yu, Z., Kong, X., Qin, J., Cui, Y., Bao, Z.
  2020
- **Dendrite Suppression by a Polymer Coating: A Coarse-Grained Molecular Study** *ADVANCED FUNCTIONAL MATERIALS*
  Kong, X., Rudnicki, P. E., Choudhury, S., Bao, Z., Qin, J.
  2020
- **Electrochemical generation of liquid and solid sulfur on two-dimensional layered materials with distinct areal capacities** *Nature Nanotechnology*
  Yang, A., Zhou, G., et al
  2020
- **Transient Voltammetry with Ultramicroelectrodes Reveals the Electron Transfer Kinetics of Lithium Metal Anodes** *Adv. Energy Lett.*
  Boyle, D., Kong, X., Pei, A., Rudnicki, P., Shi, F., Huang, W., Bao, Z., Qin, J., Cui, Y.
  2020; 5: 701-709
- **'Chromatic' neuronal jamming in a primitive brain** *Nature Physics*
  Khariton, M., Kong, X., Qin, J., Wang, B.
  2020
- **Reversible Gelation of Entangled Ionomers** *MACROMOLECULES*
  Cao, X., Yu, X., Qin, J., Chen, Q.
  2019; 52 (22): 8771–80
- **Impact of Liquid-Crystalline Chain Alignment on Charge Transport in Conducting Polymers** *MACROMOLECULES*
  Rudnicki, P. E., MacPherson, Q., Balhorn, L., Feng, B., Qin, J., Salleo, A., Spakowitz, A. J.
  2019; 52 (22): 8932–39
- **A Dynamic, Electrolyte-Blocking, and Single-Ion-Conductive Network for Stable Lithium-Metal Anodes** *JOULE*
  Yu, Z., Mackanic, D. G., Michaels, W., Lee, M., Pei, A., Feng, D., Zhang, Q., Tsao, Y., Amanchukwu, C., Yan, X., Wang, H., Chen, S., Liu, et al

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- **Molecular Architecture Directs Linear-Bottlebrush-Linear Triblock Copolymers to Self-Assemble to Soft Reprocessable Elastomers** *ACS MACRO LETTERS*
  Nian, S., Lian, H., Gong, Z., Zhernenkov, M., Qin, J., Cai, L.
  2019; 8 (11): 1528–34
- **Mechanically resolved imaging of bacteria using expansion microscopy.** *PLoS biology*
  Lim, Y., Shiver, A. L., Khariton, M., Lane, K. M., Ng, K. M., Bray, S. R., Qin, J., Huang, K. C., Wang, B.
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- **Nonpolar Alkanes Modify Lithium-Ion Solvation for Improved Lithium Deposition and Stripping** *ADVANCED ENERGY MATERIALS*
  Amanchukwu, C., Kong, X., Qin, J., Cui, Y., Bao, Z.
  2019
- **TCR-pMHC bond conformation controls TCR ligand discrimination.** *Cellular & molecular immunology*
  Sasmal, D. K., Feng, W., Roy, S., Leung, P., He, Y., Cai, C., Cao, G., Lian, H., Qin, J., Hui, E., Schreiber, H., Adams, E. J., Huang, et al
  2019
- **Ultrathin, flexible, solid polymer composite electrolyte enabled with aligned nanoporous host for lithium batteries.** *Nature nanotechnology*
  Wan, J., Xie, J., Kong, X., Liu, Z., Liu, K., Shi, F., Pei, A., Chen, H., Chen, W., Chen, J., Zhang, X., Zong, L., Wang, et al
  2019
- **Tunable Coacervation of Well-Defined Homologous Polyanions and Polycations by Local Polarity** *ACS CENTRAL SCIENCE*
  Lou, J., Friedowitz, S., Qin, J., Xia, Y.
  2019; 5 (3): 549–57
- **Charge polarization near dielectric interfaces and the multiple-scattering formalism** *SOFT MATTER*
  Qin, J.
  2019; 15 (10): 2125–34
- **Self-healing of electrical damage in polymers using superparamagnetic nanoparticles** *NATURE NANOTECHNOLOGY*
  Yang, Y., He, J., Li, Q., Gao, L., Hu, J., Zeng, R., Qin, J., Wang, S. X., Wang, Q.
  2019; 14 (2): 151-+
- **Polarization energy of two charged dielectric spheres in close contact** *Molecular Systems Design & Engineering*
  Lian, H., Qin, J.
  2018; 3: 197
- **Solvation and entropic regimes in ion-containing block copolymers** *Macromolecules*
  Hou, K. J., Qin, J.
  2018; 51: 7463
- **Role of electrostatic correlations in polyelectrolyte charge association** *Journal of Chemical Physics*
  Friedowitz, S., Salehi, A., Larson, R., Qin, J.
  2018; 149: 163335
- **Dielectric virial expansion of polarizable dipolar spheres** *Journal of Chemical Physics*
  Lian, H., Qin, J., Freed, K.
  2018; 149: 163332
- **Crosslinked poly(tetrahydrofuran) as a loosely-coordinating solid polymer electrolyte** *Advanced Energy Materials*
  Mackanic, D., Michaels, W., Lee, M., Feng, D., Lopez, J., Qin, J., Cui, Y., Bao, Z.
  2018
- **Tuning precursor reactivity towards nanometer-size control in palladium nanoparticles studied by in-situ small angle X-ray scattering** *Chemistry of Materials*
  Wu, L., Lian, H., Willis, J., Goodman, E., McKay, I., Qin, J., Tassone, C., Cargnello, M.
  2018; 30: 1127
- **Ion distribution in microphase-separated copolymers with periodic dielectric permittivity** *Macromolecules*

Chu, W., Qin, J., de Pablo, J.
2018; 51: 1986

- **Field-theoretic simulations of random copolymers with structural rigidity** *Soft Matter*
  Mao, S., MacPherson, Q., Qin, J., Spakowitz, A. J.
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- **Image method for electrostatic energy of polarizable dipolar spheres** *J. Chem. Phys.*
  Gustafson, K., Xu, G., Freed, K., Qin, J.
  2017; 147 (064908)
- **High-temperature crystallization of nanocrystals into three-dimensional superlattices** *Nature*
  Wu, L., Willis, J. J., McKay, I. S., Diroll, B. T., Qin, J., Cargnello, M., Tassone, C. J.
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- **Singular electrostatic energy of nanoparticle clusters** *PHYSICAL REVIEW E*
  Qin, J., Krapf, N. W., Witten, T. A.
  2016; 93 (2)
- **Criticality and connectivity in macromolecular charge complexation** *Macromolecules*
  Qin, J., de Pablo, J.
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- **Tube dynamics works for randomly entangled rings** *PHYSICAL REVIEW LETTERS*
  Qin, J., Milner, S. T.
  2016; 116: 068307
- **A theory of interactions between polarizable dielectric spheres** *JOURNAL OF COLLOID & INTERFACE SCIENCE*
  Qin, J., Li, J., Lee, V., Jaeger, H., de Pablo, J. J., Freed, K. F.
  2016; 469: 237
- **Blending education and polymer science: semiautomated creation of a thermodynamic property database** *Journal of Chemical Education*
  Tchoua, R. B., Qin, J., Audus, D. J., Chard, K., Foster, I. T., de Pablo, J. J.
  2016; 93 (1561)
- **An O(N) and parallel approach to integral problems by a kernel-independent fast multipole method: Application to polarization and magnetization of interacting particles** *Journal of Chemical Physics*
  Jiang, X., Li, J., Zhao, X., Qin, J., Karpeev, D., Hernandez-Ortiz, J., de Pablo, J. J., Hernonen, O.
  2016; 145 (064307)
- **Broadly accessible self-consistent field theory for block polymer materials discovery** *Macromolecules*
  Arora, A., Qin, J., Morse, D. C., Delaney, K. T., Fredrickson, G. H., Bates, F. S., Dorfman, K. D.
  2016
- **Ordering transition in salt-doped diblock copolymers** *Macromolecules*
  Qin, J., de Pablo, J. J.
  2016; 49: 3630-3638
- **Tube dynamics works for randomly entangled rings** *PHYSICAL REVIEW LETTERS*
  Qin, J., Milner, S. T.
  2016; 116: 068307
- **A theory of interactions between polarizable dielectric spheres** *JOURNAL OF COLLOID & INTERFACE SCIENCE*
  Qin, J., Li, J., Lee, V., Jaeger, H., de Pablo, J. J., Freed, K. F.
  2016; 469: 237
- **Sculpting bespoke mountains: Determining free energies with basis expansions** *JOURNAL OF CHEMICAL PHYSICS*
  Whitmer, J. K., Fluitt, A. M., Antony, L., Qin, J., McGovern, M., de Pablo, J. J.
  2015; 143 (4)

- **Finding Entanglement Points in Simulated Polymer Melts** *MACROMOLECULES*
  Cao, J., Qin, J., Milner, S. T.
  2015; 48 (1): 99-110
- **Chirality-selected phase behaviour in ionic polypeptide complexes** *NATURE COMMUNICATIONS*
  Perry, S. L., Leon, L., Hoffmann, K. Q., Kade, M. J., Priftis, D., Black, K. A., Wong, D., Klein, R. A., Pierce, C. F., Margossian, K. O., Whitmer, J. K., Qin, J., de Pablo, et al
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- **Tubes, Topology, and Polymer Entanglement** *MACROMOLECULES*
  Qin, J., Milner, S. T.
  2014; 47 (17): 6077-6085
- **Evolutionary Optimization of Directed Self-Assembly of Triblock Copolymers on Chemically Patterned Substrates** *ACS MACRO LETTERS*
  Khaira, G. S., Qin, J., Garner, G. P., Xiong, S., Wan, L., Ruiz, R., Jaeger, H. M., Nealey, P. F., de Pablo, J. J.
  2014; 3 (8): 747-752
- **Interfacial Tension of Polyelectrolyte Complex Coacervate Phases** *ACS MACRO LETTERS*
  Qin, J., Priftis, D., Farina, R., Perry, S. L., Leon, L., Whitmer, J., Hoffmann, K., Tirrell, M., de Pablo, J. J.
  2014; 3 (6): 565-568
- **Simulating Constraint Release by Watching a Ring Cross Itself** *MACROMOLECULES*
  Cao, J., Qin, J., Milner, S. T.
  2014; 47 (7): 2479-2486
- **Ternary, tunable polyelectrolyte complexes driven by complex coacervation** *247th National Spring Meeting of the American-Chemical-Society (ACS)*
  Priftis, D., Xia, X., Margossian, K., Perry, S. L., Leon, L., Qin, J., de Pablo, J., Tirrell, M.
  AMER CHEMICAL SOC.2014
- **Collective and Single-Chain Correlations in Disordered Melts of Symmetric Diblock Copolymers: Quantitative Comparison of Simulations and Theory** *MACROMOLECULES*
  Glaser, J., Qin, J., Medapuram, P., Morse, D. C.
  2014; 47 (2): 851-869
- **Tube Diameter of Oriented and Stretched Polymer Melts** *MACROMOLECULES*
  Qin, J., Milner, S. T.
  2013; 46 (4): 1659-1672
- **Evolutionary pattern design for copolymer directed self-assembly** *SOFT MATTER*
  Qin, J., Khaira, G. S., Su, Y., Garner, G. P., Miskin, M., Jaeger, H. M., de Pablo, J. J.
  2013; 9 (48): 11467-11472
- **Tube Diameter of Stretched and Compressed Permanently Entangled Polymers** *MACROMOLECULES*
  Qin, J., So, J., Milner, S. T.
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- **Effects of tube persistence length on dynamics of mildly entangled polymers** *JOURNAL OF RHEOLOGY*
  Qin, J., Milner, S. T., Stephanou, P. S., Mavrantzas, V. G.
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- **Fluctuations in Symmetric Diblock Copolymers: Testing Theories Old and New** *PHYSICAL REVIEW LETTERS*
  Qin, J., Morse, D. C.
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- **Test of a scaling hypothesis for the structure factor of disordered diblock copolymer melts** *SOFT MATTER*
  Glaser, J., Qin, J., Medapuram, P., Mueller, M., Morse, D. C.
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- **Finding the Tube with Isoconfigurational Averaging** *MACROMOLECULES*

Bisbee, W., Qin, J., Milner, S. T.
2011; 44 (22): 8972-8980

- **Renormalized one-loop theory of correlations in disordered diblock copolymers** *JOURNAL OF CHEMICAL PHYSICS*
Qin, J., Grzywacz, P., Morse, D. C.
2011; 135 (8)
- **Relationships among coarse-grained field theories of fluctuations in polymer liquids** *JOURNAL OF CHEMICAL PHYSICS*
Morse, D. C., Qin, J.
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- **Counting polymer knots to find the entanglement length** *SOFT MATTER*
Qin, J., Milner, S. T.
2011; 7 (22): 10676-10693
- **Phase Behavior of Nonfrustrated ABC Triblock Copolymers: Weak and Intermediate Segregation** *MACROMOLECULES*
Qin, J., Bates, F. S., Morse, D. C.
2010; 43 (11): 5128-5136
- **Polydispersity effects in poly(isoprene-b-styrene-b-ethylene oxide) triblock terpolymers** *JOURNAL OF CHEMICAL PHYSICS*
Meuler, A. J., Ellison, C. J., Qin, J., Evans, C. M., Hillmyer, M. A., Bates, F. S.
2009; 130 (23)
- **Renormalized one-loop theory of correlations in polymer blends** *JOURNAL OF CHEMICAL PHYSICS*
Qin, J., Morsea, D. C.
2009; 130 (22)
- **Bicontinuous Polymeric Microemulsions from Polydisperse Diblock Copolymers** *JOURNAL OF PHYSICAL CHEMISTRY B*
Ellison, C. J., Meuler, A. J., Qin, J., Evans, C. M., Wolf, L. M., Bates, F. S.
2009; 113 (12): 3726-3737
- **Linear response and stability of ordered phases of block copolymer melts** *MACROMOLECULES*
Ranjan, A., Qin, J., Morse, D. C.
2008; 41 (3): 942-954
- **Renormalization of the one-loop theory of fluctuations in polymer blends and diblock copolymer melts** *PHYSICAL REVIEW E*
Grzywacz, P., Qin, J., Morse, D. C.
2007; 76 (6)
- **SCFT study of nonfrustrated ABC triblock copolymer melts** *MACROMOLECULES*
Tyler, C. A., Qin, J., Bates, F. S., Morse, D. C.
2007; 40 (13): 4654-4668
- **Calculation of resistivity of the insulating layer in tunneling-magnetoresistive head by fast Green function method** *Chinese Physics Letters*
Wei, D., Piao, K., Qin, J., Dong, Z.
2005; 22: 2063-2065
- **Thermodynamic behavior of a nano-sized magnetic grain near the superparamagnetic limit** *IEICE Trans. Elec.*
Qin, J., Wei, D.
2003; E86-C: 1825-1829

PRESENTATIONS

- Polymer twists: entanglement and packing ansatz - APS march meeting, invited session on Physics of Entanglement (3/6/2015 - 3/6/2015)