

## **RICHARD J. SPONTAK**

Departments of Chemical & Biomolecular Engineering  
and Materials Science & Engineering  
North Carolina State University, Raleigh, NC 27695

Mobile: (919) 417-3554  
Office: (919) 515-4200  
E-m: [spontak@ncsu.edu](mailto:spontak@ncsu.edu)

### ***Professional Preparation***

Pennsylvania State University, Chemical Engineering, B.S. (with honors/high distinction)	1983
University of California at Berkeley, Chemical Engineering, Ph.D.	1988
University of Cambridge, Materials Science & Metallurgy, Research Scholar	1988-89
Institute for Energy Technology, Soft Condensed-Matter Physics, Research Fellow	1989

### ***Professional Experience***

2016 – present	Distinguished Professor of Chemical & Biomolecular Engineering, NC State University
2015 – present	Alumni Distinguished Graduate Professor, NC State University
2012	Lars Onsager Professor, Norwegian University of Sci. & Technol. (Norway)
2002 – 2016	Professor of Chemical & Biomolecular Engineering, NC State University
2002 – present	Professor of Materials Science & Engineering, NC State University
2001 – present	Alumni Distinguished Undergraduate Professor, NC State University
1997 – 2002	Associate Professor of Chemical Engineering, NC State University
1997 – 2002	Associate Professor of Materials Science & Engineering, NC State University
1992 – 1997	Assistant Professor of Materials Science & Engineering, NC State University
1989 – 1992	Staff Scientist, Corporate Research Division, Procter & Gamble, Cincinnati
1989	Research Fellow, Institutt for Energiteknikk, Kjeller (Norway)
1988 – 1989	Research Associate, University of Cambridge, Cambridge (United Kingdom)
1983 – 1988	Graduate Student Research Assistant, Lawrence Berkeley National Lab

### ***Awards & Honors of Distinction***

Alexander Quarles Holladay Medal for Excellence	NC State University	2022
Global Research Project Award	Institution of Chemical Engineers	2022
SPSJ International Award	The Society of Polymer Science, Japan	2022
Roy W. Tess Award in Coatings	American Chemical Society (PMSE)	2022
R.J. Reynolds Award: Teaching, Research & Extension	NC State College of Engineering	2022
Elected Fellow	American Chemical Society (PMSE)	2022
Distinguished Alumnus Award	<i>Tau Beta Pi</i> Engineering Honor Society	2021
International Award	Society of Plastics Engineers	2015
Elected Member	Norwegian Academy of Technol. Sci.	2015
Elected Fellow	Royal Society of Chemistry	2015
Fulbright Senior Specialist Award	IIE CIES <sup>1</sup>	2014
Lars Onsager Professorship and Medal	Norwegian Univ. Sci. and Technol.	2012
Alumni Fellow Award	Pennsylvania State University	2012
Alcoa Distinguished Engineering Research Award	NC State College of Engineering	2012
Colwyn Medal	Inst. of Materials, Minerals & Mining	2011
Elected Fellow	Inst. of Materials, Minerals & Mining	2011
Chemistry of Thermoplastic Elastomers Award	American Chemical Society (Rubber)	2008
Board of Governors' Award for Excellence in Teaching	University of North Carolina	2008
Elected Fellow	American Physical Society	2008
Ernst Ruska Prize	German Electron Microscopy Society	2007
Cooperative Research Award in Polymer Science	American Chemical Society (PMSE)	2006
Outstanding Research Award	NC State Alumni Association	2005

---

<sup>1</sup> Institute of International Education Council for the International Exchange of Scholars

## ***Other Awards & Honors***

### **North Carolina State University**

Idea of the Year Award	Waterloo Filtration Institute	2022
Global Oil and Gas Award Highly Commended Entry	Institution of Chemical Engineers	2022
Elected Director, Blue Ridge Group	American Chemical Society (Rubber)	2022-25
Elected Director, Piedmont Chapter	Society of Plastics Engineers	2022-23
Researcher of the Year Award	Int. Assoc. of Advanced Materials	2021
Visiting Scholar	Kraton Corporation	2021
60 <sup>th</sup> Birthday Websymposium on Advanced Materials	Int. Assoc. of Advanced Materials	2021
Advisory Board Member, Carbon Neutron Tech Center	Sichuan University, China	2021-
Global Res. Project Award Highly Commended Entry	Institution of Chemical Engineers	2021
Global Research Project Award Finalist	Institution of Chemical Engineers	2021-22
Elected Director, Research Triangle Alumni Chapter	<i>Tau Beta Pi</i> Engineering Honor Society	2021-22
Albert Nelson Marquis Lifetime Achievement Award	Marquis <i>Who's Who</i>	2020
Named Fellow	Int. Association of Advanced Materials	2020
Global Oil and Gas Award Finalist	Institution of Chemical Engineers	2020,22
Global Pharma Award Highly Commended Entry	Institution of Chemical Engineers	2019-21
Elected Member	NCSU Global Engagement Academy	2019
Elected Member	NCSU Research Leadership Academy	2019
Global Pharma Award Finalist	Institution of Chemical Engineers	2018-21
Visiting Professorship	University of Warsaw	2018
Outstanding Global Engagement Award	NC State University	2018
Alexander von Humboldt Research Fellowship	Humboldt University zu Berlin	2018
Visiting Professorship	Adam Mickiewicz University	2017-19
Outstanding Alumnus Award	Penn State Univ. Schuylkill Campus	2017
1 <sup>st</sup> place (microscopy) and 2 <sup>nd</sup> place (illustration)	NC State Research Image Contest	2017
Visiting Professorship	Humboldt University zu Berlin	2017
Erudite Professor	Mahatma Gandhi University	2017
Elected Fellow	NANOSMAT Society	2017
Alexander von Humboldt Research Fellowship	Technical University of Munich	2016
Alumni Distinguished Graduate Professor Award	NC State Alumni Association	2015
Invited Short Course Instructor	Tsinghua University	2014
Innovator of the Year Award Finalist	Institution of Chemical Engineers	2012,13
Rubber Foundation Lecture	The Polymer Society (U.K.)	2012
External Advisory Board	Penn State Schuylkill Campus	2012-
Elected Honorary Fellow	Australian Inst. of High Energ. Mater.	2010
Innovative Product of the Year Award Finalist	Institution of Chemical Engineers	2010
Outstanding Mid-Career Teaching Award	ASEE <sup>2</sup> (Southeast Region)	2009
Tech Brief Award	National Aeronautics & Space Admin.	2008
Tewkesbury Fellowship	University of Melbourne (Australia)	2007
Outstanding Scholar Alumnus Award	Penn State Univ. Schreyer College	2007
Invited Delegate, <i>Prospects for European Integration</i>	Federal Republic of Germany	2006
Guest Co-Editor	<i>Materials Research Society Bulletin</i>	2006
Recognition Award	Int. Network for Eng. Ed. and Res.	2006
Alexander von Humboldt Research Fellowship	Technical University of Berlin	2004
George H. Blesis Outstanding Advisor Award	NC State College of Engineering	2003
1 <sup>st</sup> Place, Energy Challenge National Competition	U.S. Department of Energy	2003
Science Advisory Board	SINTEF Materials Technology	2004-14

---

<sup>2</sup> American Society for Engineering Education

Alumni Distinguished Undergraduate Professor Award	NC State Alumni Association	2001-
Outstanding Teaching Award	NC State Alumni Association	2000
Outstanding Teaching Award; induction into AOT <sup>3</sup>	NC State College of Engineering	2000
Alexander von Humboldt Research Fellowship	University of Freiburg	2000,98
Visiting Professorship	University of the Philippines	1999
Alcoa Foundation Research Achievement Award	NC State College of Engineering	1996
Outstanding Research Achievement Award	<i>Sigma Xi</i> Research Society	1995
<i>Sigma Xi</i> Research Honor Society	NC State University	1995
<i>Alpha Sigma Mu</i> Materials Science Honor Society	NC State Materials Science & Eng.	1995
Young Investigator Award	Becton Dickinson Research Center	1994
Visiting Scientist Fellowship	National Ctr. for Electron Microscopy	1994
Traveling Exhibit Poster Award	Microscopy Society of America	1994
 <u>Procter &amp; Gamble Company</u>		
Team Achievement Award	Corporate Research Division	1992
Traveling Exhibit Poster Award	Microscopy Society of America	1992
 <u>Institute for Energy Technology</u>		
Research Fellowship	Royal Norwegian Council	1989
 <u>University of Cambridge</u>		
Advanced Study Institute Scholarship	North Atlantic Treaty Organization	1989
Edward Emley Award	Institute of Metals	1989
Visiting Associateship (extended life membership)	Clare Hall	1988
Research Fellowship	Hoechst-Celanese Corporation	1988-89
 <u>University of California at Berkeley</u>		
Sherwin-Williams Award Finalist	American Chemical Society (PMSE)	1987
Distinguished Scholar Award	Microbeam Analysis Society	1987
Research Achievement Award	WREMMA <sup>4</sup>	1987
Acting Instructorship (taught classes; oversaw TAs)	Department of Chemical Engineering	1987
Presidential Award	Electron Microscopy Soc. of America	1986
Outstanding Teaching Assistant Award	University of California at Berkeley	1985
 <u>Pennsylvania State University</u>		
University Scholars Medal (inaugural year)	Schreyer Honors College	1983
<i>Phi Kappa Phi</i> Honor Society	Pennsylvania State University	1982
Golden Key Honor Society	Pennsylvania State University	1982
<i>Phi Lambda Upsilon</i> Chemistry Honorary Society	Pennsylvania State University	1982
<i>Omicron Delta Kappa</i> Leadership Honor Society	Pennsylvania State University	1982
<i>Tau Beta Pi</i> Engineering Honorary Society	Pennsylvania State University	1981
ROTC <sup>5</sup> Superior Cadet Decoration	U.S. Army TRADOC <sup>6</sup>	1981
Director's Saber Award for Outstanding ROTC Cadet	Penn State Univ. Schuylkill Campus	1981
Scabbard & Blade Military Honor Society	Penn State Univ. Schuylkill Campus	1981
President's Freshman Scholar Award	Penn State Univ. Schuylkill Campus	1980

<sup>3</sup> Academy of Outstanding Teachers

<sup>4</sup> Western Regional Electron Microscopists & Microbeam Analysts

<sup>5</sup> Reserve Officers Training Corps

<sup>6</sup> Training and Doctrine Command

### **Research Highlights**

Research results featured on journal cover	<i>Macromolecular Rapid Commun.</i>	2021
Research results featured on journal cover	<i>J. Colloid Interface Science</i>	2020
Research results featured on website	<i>NPG Asia Materials</i>	2019
Research results featured on journal cover	<i>ACS Macro Letters</i>	2018
Research results featured on journal cover	<i>Journal of Chemical Physics</i>	2018
Research results featured on journal cover	<i>Solar Rapid Research Letters</i>	2018
Research results featured on journal cover	<i>Macromolecular Rapid Commun.</i>	2017
Research results featured on journal cover	<i>Soft Matter</i> (RSC)	2017
Research results featured on journal cover	<i>Proc. Royal Microscopy Society</i> (RMS)	2017
Research results featured on journal cover	<i>J. Polymer Science B: Polymer Physics</i>	2017
Research results featured on journal cover	<i>J. Polymer Science B: Polymer Physics</i>	2017
Research results featured on journal cover	<i>Macromolecular Rapid Commun.</i>	2016
Research results featured on journal cover	<i>Macromolecular Rapid Commun.</i>	2015
Research results featured on journal cover	<i>Macromolecular Rapid Commun.</i>	2012
Research results featured on journal cover	<i>Langmuir</i> (ACS)	2011
Research results featured on journal cover	<i>J. Polymer Science B: Polymer Physics</i>	2011
Research results featured on journal cover	<i>Macromolecules</i> (ACS)	2010
Research results featured on journal cover	<i>Polymer</i>	2009
Research results featured on journal cover	<i>Advanced Materials</i>	2007
Research results featured on journal cover	<i>Materials Research Society Bulletin</i>	2006
Research results featured on journal cover	<i>Macromolecular Rapid Commun.</i>	2006
Research results featured on journal cover	<i>Langmuir</i> (ACS)	2004
Research results featured on journal cover	<i>Macromolecular Chemistry &amp; Physics</i>	2004
Research results featured on journal cover	<i>Macromolecular Chemistry &amp; Physics</i>	2003
Research results featured on journal cover	<i>Advanced Materials</i>	2003
Research results featured on journal cover	<i>Macromolecular Rapid Commun.</i>	2002
Research results featured on <u>annual</u> journal cover	<i>Macromolecular Materials &amp; Eng.</i>	2000
Research results featured on journal cover	<i>Microscopy Today</i>	1999
Research results featured on journal cover	<i>Langmuir</i> (ACS)	1997
Research results featured on journal cover	<i>Journal of Materials Science</i>	1996
Research results featured on journal cover	<i>Langmuir</i> (ACS)	1996
Research results featured on journal cover	<i>Langmuir</i> (ACS)	1995
Research results featured on journal cover	<i>Microscopy Research &amp; Technique</i>	1994
Research results featured on book <i>Developments in Block Copolymer Science &amp; Technology</i>		2004
Work featured on NC State homepage/merchandise	NC State University	2019

### **Professional Memberships**

<i>Alpha Chi Sigma</i> Professional Chemistry Fraternity	1984-
Vice-Master Alchemist (1987)	
American Chemical Society	1982-
Chairman (1995-96), Chairman-elect (1994-95) — North Carolina Polymer Discussion Group	
Executive Committee Member (2018-) — North Carolina Section	
Director (2022-25) — Blue Ridge Group (reporting to National)	
<i>Tau Beta Pi</i> Engineering Honor Society	1981-
Student Chapter Advisor (2003-04, 2019-); Director, RTP Alumni Chapter (2021-22)	
American Energy Society	2015-17
American Physical Society	1991-06
Asian Council of Science Editors	2014-
Institute of Materials, Minerals and Mining	2011-
Materials Research Society	1990-14

President (1996), Secretary (1995) — North Carolina Section  
 Inaugural Student Chapter Advisor (1998-2000)  
 Microscopy Society of America 1986-96  
 National Program Committee (1992-94)  
 Royal Society of Chemistry 2014-  
 Society of Plastics Engineers 2010-  
 Student Chapter Advisor (2013-)  
 Board of Directors Piedmont Coastal Chapter 2022-  
 The Minerals, Metals and Materials Society 2013-  
 American Association for the Advancement of Science 2017-

### ***Synergistic Activities***

Co-Editor	<i>Thermoplastic Elastomers, 4<sup>th</sup> Ed.</i>	2021-
Section Editor	<i>Encyclopedia of Polymers, Polymeric Materials and Polymer Technology</i>	2021-
	<i>J. Encapsulation &amp; Adsorption Sci.</i>	2014-
Editor-in-chief	<i>Open Chemistry Journal</i>	2014-21
Associate Editor	<i>Advances in Nano Research</i>	2020-
Associate Editor	<i>ACS Sustainable Chemistry &amp; Eng.</i>	2021-
Editorial Advisory Board	<i>Int. Journal of Molecular Sciences</i>	2020-
Editorial Advisory Board	<i>Coatings</i>	2020-
Editorial Advisory Board	<i>Polymers</i>	2020-
Editorial Advisory Board	<i>Journal of Chemical &amp; Process Eng.</i>	2014-
Annual Editor-in-chief	<i>Innovations in Mater. Sci. &amp; Eng.</i>	2013-14
Editorial Advisory Board	<i>Materials Science &amp; Engineering Prog.</i>	2013-
Editor-in-chief	<i>Journal of Advanced Mechanical Eng.</i>	2011-12
Co-editor-in-chief	<i>Open J. Organic Polymer Materials</i>	2011-
Editor-in-chief	<i>Soft Nanoscience Letters</i>	2010-14
Editorial Advisory Board	<i>Langmuir (ACS)</i>	2008-10
Editor-in-chief	<i>Open Colloid Science Journal</i>	2008-12
Editorial Advisory Board	<i>International Journal of Polymer Sci.</i>	2008-
Editorial Advisory Board	<i>Macromolecules (ACS)</i>	2003-05
Inaugural Editorial Advisory Board	<i>Materials Today</i>	2002-07
Editorial Advisory Board	<i>Macromolecular Rapid Commun.</i>	2001-18
Editorial Advisory Board	<i>Macromolecular Chemistry &amp; Physics</i>	2001-18
Founding Member, Ctr. Adv. Virus Experimentation	NC State University	2020-
Elected Member, Faculty Assembly	University of North Carolina System	2020-23
Member, Faculty Hearing Committee	NC State University	2019-23
Faculty Co-advisor	<i>Tau Beta Pi Honor Soc. Student Chap.</i>	2019-
Invited Summer School Instructor	Peking University	2018
Goodnight Scholars Advisory Committee	NC State Goodnight Scholars Program	2015-
Faculty Co-advisor	SPE Student Chapter	2013-
Faculty Senate	NC State University	2012-16
Intellectual Property Committee	NC State University	2011-
Chair, Peer Evaluation of Teaching Committee	Department of Chemical Engineering	2008-
Invited Summer School Instructor	ICMR, <sup>7</sup> Univ. of CA at Santa Barbara	2007
Chair, Academic Misconduct Inquiry Board	NC State University	2006-08
Faculty Co-advisor (inaugural)	MRS Student Chapter	1998-00
Director of Graduate Admissions	Department of Chemical Engineering	1999-03

<sup>7</sup> International Center for Materials Research

## ***Overview of Teaching/Mentoring Achievements***

### ***Personal Philosophy***

- Teaching is an incredibly rewarding responsibility. The opportunities we, as teachers, have to impart knowledge and experience to our students, to help them become productive members of society, and to assist in their personal and professional development are limited only by our own creativity. Stepping into a classroom and seeing students who are eager to learn is exhilarating and spurs a receptive teacher to go above and beyond the call of duty. The important message here is to *make* students of any age or background enthusiastic about learning. To achieve this, I apply my principles of **ITEACH**: **I**ntegrity, **T**ruth, **E**xcellence, **A**ctivation, **C**hallenge and **H**ospitality. Integrity is responsible for shaping the future of society. Truth is the cornerstone of education and of our society as a whole. Excellence must be emphasized so that students realize its importance in everything the students pursue. Activation requires students to become fully engaged in their learning environment. Challenge provides an impetus to grow and promotes lifelong learning. Hospitality refers to the ability of instructors to make students always feel welcome and respected.

### ***Teaching/Mentoring Effectiveness***

- Received average student ratings of 4.62/5.00 (instructor effectiveness) and 4.48/5.00 (course quality) for 859 (under)graduates taught on-campus and by distance learning since 2011.
- Mentored over 120 undergraduates and 54 graduate students in my research laboratory.
- Included 40 undergraduates as co-authors on peer-reviewed journal publications.
- Selected to mentor 4 Park Scholars, 4 Goodnight Scholars and 1 Beckman Scholar in my research laboratory, and to serve on the Goodnight Scholars Advisory Board and Selection Committee.
- Mentored 8 award-winning senior design teams, with one interdisciplinary team winning 1<sup>st</sup> Place (\$15,000) in a DoE-sponsored Energy Challenge by building a hang-glider from cardboard and flying it at Kitty Hawk, NC, on the 100<sup>th</sup> anniversary of the Wright Brothers' historical flight.
- Mentored visiting undergraduate students from China, Turkey and Saudi Arabia, and graduate students from Canada, Norway, Germany, Japan, Thailand, and Australia.

### ***Professional Recognition***

- Received the College and NC State Alumni Association Outstanding Teaching Awards (inducted into the Academy of Outstanding Teachers), the George H. Blessis Advising Award, the NC State Alumni Association Undergraduate and Graduate Distinguished Professorships, and the Board of Governors' Award for Teaching Excellence (the highest teaching award offered) at NC State.
- Received the International Network for Engineering Education & Research Recognition Award and the American Society for Engineering Education (Southeast Region) Outstanding Mid-Career Teaching Award, and published 2 peer-reviewed publications related to engineering education.
- Received a Fulbright Senior Specialist Award and an ERASMUS Award to teach and provide curricular guidance at Istanbul Technical University and the Middle East Technical University.
- Invited to give short courses at Humboldt University, Peking University, Tsinghua University, Norwegian University of Science & Technology, University of Oslo, University of Warsaw and Adam Mickiewicz University, as well as for the American Chemical Society (Rubber Division).

### ***Instructional Methods***

- Developed a software package to help students understand multicomponent phase equilibria.
- Introduced literature critiques and mock patent litigations to deepen knowledge and improve skills.
- Promoted in-class demonstrations and videos to augment classroom learning (videos at the undergraduate level have evolved to include accounts of "thermodynamic heroes," *e.g.*, historical figures, as well as living faculty such as S. Glotzer at Michigan and P. Debenedetti at Princeton).
- Conducted off-campus tours (some of which yielded internships or employment) for students at polymer-related industrial facilities around the state, and incorporated current research in classes.
- Prepared lecture recordings to augment in-class lectures 6 years *before* the COVID-19 pandemic.
- Provided optional problem/review sessions and required 5' student talks on contemporary topics.

## ***Selection of Anonymous Student Comments***

*“Dr. Spontak has been the best professor I have had at NC State. His enthusiasm for what he does shines clearly through his teaching. In turn, this inspires a desire to learn from the students which in the end means that we learn more broadly and deeply than in a normal class. Bravo, Dr. Spontak!”*

*“Dr. Spontak is the first professor that I have had at this university who actually cares about more than a grade. He probably spent more time teaching and with review sessions than most people spend in studying. He cares about more than the class: if you go in and talk to him, he is down to earth and helps you see the big picture for the future. He is one of the top teachers I have ever had.”*

*“Dr. Spontak is an excellent instructor who possesses great knowledge and understanding of the course material, and did an excellent job of imparting that knowledge to the students. What truly amazed me was his willingness to help the students. Of all the teachers I have encountered in my three years of college, Dr. Spontak has made himself the most accessible to answer any questions that the students had, and did so with eagerness and courtesy, so the students realized he really cared. He is truly an outstanding teacher.”*

*“You are the best instructor I've had in college (and that is saying a lot considering that I've had Dr. Velez, Dr. Khan, and Dr. Bullard teach some of my classes). I really appreciate how you incorporate your knowledge from industry and research into the class material. This makes the material more engaging because I feel like I might actually draw on this knowledge in the future.”*

*“Dr. Spontak is an excellent and enthusiastic lecturer. He conveys the topic well and actively encourages thinking about the topic. I highly recommend this course to anybody interested in polymers. Truthfully, I entered the course with no particular interest (only to fulfill a major requirement) but left with a deeper appreciation of the topic and a greater interest in this technology.”*

*“Without a doubt, you have been the best professor I have had at N.C. State...in engineering courses or otherwise. You always kept the class interested and always made sure that you explained everything so that everyone could understand. On top of all that, you treat students fairly and are friendly enough to make yourself approachable without compromising professionalism.”*

*“Spontak is ALWAYS helpful; the tests are always fair; Spontak's instructions were always clear. I feel that Dr. Spontak is one of the best, if not the best, instructors I have ever had. He goes above and beyond the call of duty to assist students, always putting the student first. He is a wonderful teacher.”*

*“Dr. Spontak is the most outstanding teacher whom I have ever seen. I enjoyed his lectures very much. I wish there'll be more courses that can be taught by Dr. Spontak.”*

*“Dr. Spontak is a great professor. He really cares about students and even devotes extra time outside of class to have a problem session each week. You can tell he wants us to learn the material, which shows during class and in the amount of effort he puts into his class and to teaching. He makes the material interesting and explains why it is useful knowledge for us to have. I have learned a lot in this class!”*

*“He was an excellent professor. He cares very deeply about his students, and about the lecture material. He was very enthusiastic in lecture, something that made thermodynamics much more bearable. I wasn't a fan of his corny humor at the beginning of the semester, but by the end of the course I grew to enjoy it. His problem sessions were exactly what I needed to understand the lecture content. I loved that he emphasized knowledge of concepts over mindlessly working problems.”*

*“This instructor is THE best I've ever had. He has an inexhaustible knowledge of the material in this course, plus, unlike most other professors, he has a genuine interest and caring for how his students are progressing. He makes himself available during times other than his designated office hour[s], and gives a 'grading' sheet after each exam to see how the students felt about the exam and his teaching ability. He is a professor that I will recommend to my friends, no matter what materials class they are taking.”*

*“Thank you for being such a great chemical engineering professor. The way you ran your class made chemical engineering and thermodynamics truly come alive. You were always open to questions and discussion from students and did all you could so that we could succeed and really understand the material. The passion you have for it was truly passed down to all of us!!”*

*“Dr. Spontak is god tier when it comes to teaching.”*

## ***Overview of Research Achievements (primary themes could overlap)***

### ***Healthcare***

- Discovered inherently broad-spectrum antimicrobial polymers that could kill > 99.9% of MRSA, *C. difficile*, and SARS-CoV-2, as well as other bacteria, viruses and mold, in 5 minutes or less.
- Developed broad-spectrum antimicrobial polymer films and coatings with photosensitive dyes that could continuously kill bacteria, viruses and fungi in the presence of oxygen and visible light.
- Created a unique class of strain-reversible piezoresistive polymer nanocomposites from conventional or thermoplastic elastomers and carbon nanofiber for wearable and textile sensors.

### ***Environment***

- Designed & produced integrated gas-separation membranes by nanofabricating novel layered materials with record-shattering CO<sub>2</sub>/N<sub>2</sub> selectivity (>10<sup>3</sup>) *and* CO<sub>2</sub> permeability (>10<sup>3</sup> Barrer).
- Developed sustainable nanocellulose gas-separation membranes that exhibit exceptionally high CO<sub>2</sub> selectivity due to molecular size exclusion in the presence of an ionic liquid and humidity.
- Used charged thermoplastic elastomers alone or in the presence of an ionic liquid to generate highly basic- (NH<sub>3</sub>) or acidic- (CO<sub>2</sub>) selective gas-separation membranes.
- Introduced nonporous nanoparticles into glassy polymers to frustrate chain packing and make the membranes reverse-selective, allowing larger gas molecules to permeate faster than small ones.
- Produced a variety of new biopolymer systems (relying on nanocellulose or chemically-modified additives) that exhibit greatly enhanced mechanical properties while remaining biodegradable.

### ***Energy***

- Created precisely tunable soft materials from thermoplastic elastomers for use in a wide range of applications, including electroresponsive technologies such as soft actuators and robotics.
- Established how high-efficiency dielectric elastomers could exhibit anisotropic electroactuation by either incorporating fibrous scaffolds or subjecting crystals present to mechanical orientation.
- Fabricated both photosynthetic solar cells that mimic plants and dye-sensitized solar cells with up to 7% efficiency from charged thermoplastic elastomers impregnated with different dyes.
- Developed new materials for use as ultrahigh-strain, self-supported dielectric elastomers and relaxation-free ionic polymer-metal composites that exceed the property limits of other materials.
- Produced long-life water-in-salt electrolyte Li-ion batteries that charge faster than their analogs.

### ***Fundamental and Applied Polymer Science & Engineering***

- Pioneered a new characterization technique to identify the onset of a lyotropic phase transition on the basis of isothermal calorimetry (ITC) in a matter of minutes/hours instead of days/weeks.
- Developed a variety of new block copolymer systems (including gels) with controllable structures and properties for an improved fundamental understanding of molecular self-assembly and use.
- Combined experimental and computational efforts to optimize both the cure kinetics and property development of tough multicomponent polymer coatings applied on various consumer products.
- Introduced functionalized (in)organic nanoparticles in different polymer systems for antireflective surfaces, *in vivo* bioimaging, double-percolated conductivity, and reversible surface patterning.
- Established that highly ordered multiscale structures can be engineered from the ground-up via the crystallization- or coordination-directed self-assembly of functional polymeric molecules.
- Demonstrated the mechanism by which charged thermoplastic elastomers self-assemble and how their morphologies can be either solvent-templated or altered via solvent-vapor/water annealing.
- Introduced a variety of physical and synthetic approaches to control the phase behavior of block polymers that self-assemble into nanoscale soft structures for use in various technologies.
- Identified the principle of time-composition superpositioning in thermoplastic elastomers that permits rigorous extrapolation of mechanical properties over 10 orders of magnitude in time.
- Pioneered transmission electron microtomography (TEMT) as a highly valuable characterization tool for obtaining/quantifying 3-D images of complex nanostructures in soft materials science.



## ***Publications***

### Under review or in preparation

14. Spontak, R.J., "Morphological and Property Characteristics of Thermoplastic Elastomer Gels as Tunably Soft and Stretchy Materials," *Adv. Phys. Res.* (invited), to be submitted (tentative title).
13. Woloszczuk, S., Yan, J., Lee, B., Sadler, J.D., Floudas, G., Smith, S.D., Banaszak, M., and Spontak, R.J., "Stability of the Plumbers' Nightmare Morphology in Soft Matter: Simulation, Theory and Experiment," *Nature*, to be submitted (tentative title).
12. Luiso, S., Fedkiw, P.S., Spontak, R.J., and Lu, Y., "Quick-Recharge, Long-Life WISE Li-Ion Batteries Containing a Midblock-Sulfonated Multiblock Polymer," *Adv. Mater.*, to be submitted (tentative title).
11. Yan, J., Michel, R., Jansson, A., Braunfeld, M.B., Keszthelyi, B., Zheng, S.Q., Weikl, T., Gradzielski, M., and Spontak, R.J., "3D CryoTEM Analysis of Nanoparticle/Vesicle Interactions," *Phys. Rev. Lett.*, to be submitted (tentative title).
10. Yan, J., Jin, S.-A., Lee, B., and Spontak, R.J., "On the Transition from Rubber-Toughening to TPE Behavior in Triblock Copolymer Blends," *Macromolecules*, to be submitted (tentative title).
9. Jin, S.-A. and Spontak, R.J., "Engineering Structured Colloids from Bionanoparticles with Tannic Acid at Different pH Levels," *Langmuir*, to be submitted (tentative title).
8. Spontak, R.J., Peddinti, B.S.T., Scholle, F., and Ghiladi, R.A., "Next-Generation Self-Disinfecting Anionic Block Polymers as Fast-Acting and Broad-Spectrum Antimicrobial Surfaces for Infection Control," *Mater. Horiz.* (invited), to be submitted (tentative title).
7. Spontak, R.J., "Multiscale Advances in Electroelastomers: A Perspective," *Int. J. Mol. Sci.* (invited), to be submitted (tentative title).
6. Ingram W.F., Jur, J.S., and Spontak, R.J., "Fabrication of Nanostructures by Regioselective Atomic Deposition of Block Copolymers on Film and Fiber Surfaces," *Adv. Funct. Mater.*, to be submitted (tentative title).
5. Shamsi, M., Dickey, M.D., and Spontak, R.J., "Electrospun Thermoplastic Elastomers and Their Gels: From Fundamental Considerations to Ultrastretchable Materials Exceeding 10,000% Strain," *Adv. Funct. Mater.*, to be submitted (tentative title).
4. Yang, J., Germack, D.S., and Spontak, R.J., "Characterization of Styrenic Triblock Copolymers with Hydrogenated Randomly-Copolymerized Styrene-Butadiene Midblocks by NMR Spectroscopy," *ACS Appl. Polym. Mater.*, submitted.
3. Dai, Z., Guo, H., Deng, J., Deng, L., Yan, J., and Spontak, R.J., "Carbon Molecular-Sieve Membranes Developed from a Tröger's Base Polymer and Exhibiting Superior Gas-Separation Performance," *J. Membr. Sci.*, submitted.

2. Jin, S.-A. and Spontak, R.J., "Fundamentals of and Advances in Nanocellulose and Nanochitin Systems," *Adv. Ind. Eng. Polym. Res.*, submitted.
1. Well, K.M., Ciftci, Y., Peddinti, B.S.T., Ghiladi, R.A., Spontak, R.J., and Govind, R., "Preventing the Spread of *Clostridioides difficile* with a Continuously Self-Disinfecting Block Polymer," *ACS Infect. Dis.*, submitted.

### In press

3. Terán, J.E., Pal, L., Spontak, R.J., and Lucia, L., "Surface Mechanical Properties and Topological Characteristics of Thermoplastic Copolyesters after Precisely Controlled Abrasion," *ACS Appl. Mater. Interfaces*, in press.
2. Jin, S.-A. and Spontak, R.J., "Anisotropic Nanoscale Green Materials: Prior and Current Status of Nanocellulose and Nanochitin Systems," *Handbook of Natural Polymers* (M.S. Sreekala, L. Ravindran, K. Goda, and S. Thomas), Elsevier, Amsterdam, Vol. 1, 2022, in press.
1. Peddinti, B.S.T., Ghiladi, R.A., and Spontak, R.J., "Next-Generation Stimuli-Responsive Antimicrobial Coatings with Broad-Spectrum Efficacy," in *Handbook of Smart Polymer Coatings and Films for the 21<sup>st</sup> Century* (P. Zarras, M. Soucek and Y. Wei, eds.), Wiley, 2022, in press.

### Peer-reviewed journal articles

305. Sandru, M., Sandru, E., Stenstad, P.M., Ingram, W.F., Deng, J., Deng, L., and Spontak, R.J., "An Integrated Materials Approach to Ultrapermeable and Ultrasensitive CO<sub>2</sub> Membranes: Breaking the Upper Bound," *Science*, **376**, 90 (2022).
304. Jin, S.-A., Khan, S.A., Spontak, R.J., and Rojas, O.J., "Anion-Specific Water Interactions with Nanochitin: Donnan and Osmotic Pressure Effects as Revealed by Quartz Microgravimetry," *Langmuir*, **37**, 11242 (2021).
303. Yan, J., Lee, B., Smith, S.D., and Spontak, R.J., "Morphological Studies of Solution-Crystallized Thermoplastic Elastomers with Polyethylene Endblocks and a Random-Copolymer Midblock," *Macromol. Rapid Commun.*, **42**, 2100442 (2021).
302. Ghareeb, C.R., Peddinti, B.S.T., Kisthardt, S.C., Scholle, F., Spontak, R.J., and Ghiladi, R.A., "Towards Universal Photodynamic Coatings for Infection Control," *Front. Med.* (invited), **8**, 657837 (2021).
301. Jin, S.-A., Facchine, E.G., Khan, S.A., Rojas, O.J., and Spontak, R.J., "Mesophase Characteristics of Cellulose Nanocrystal Films Prepared from Electrolyte Suspensions," *J. Colloid Interface Sci.*, **599**, 207 (2021).
300. Jin, S.-A., Facchine, E.G., Rojas, O.J., Khan, S.A., and Spontak, R.J., "Cellulose Nanofibers and the Film-Formation Dilemma: Drying Temperature and Tunable Optical, Mechanical and Wetting Properties of Nanocomposite Films Composed of Waterborne Sulfopolyesters," *J. Colloid Interface Sci.*, **598**, 369 (2021).

299. Peddinti, B.S.T., Downs, S.N., Yan, J., Smith, S.D., Ghiladi, R.A., Mhetar, V., Tocchetto, R., Griffiths, A., Scholle, F., and Spontak, R.J., "Rapid and Repetitive Inactivation of SARS-CoV-2 and Human Coronavirus on Self-Disinfecting Anionic Block Polymers," *Adv. Sci.*, **8**, 2003503 (2021).
298. Peddinti, B.S.T., Morales-Gagnon, N., Pourdeyhimi, B., Scholle, F., Spontak, R.J., and Ghiladi, R.A., "Photodynamic Coatings on Polymer Microfibers for Pathogen Inactivation: Effects of Application Method and Composition," *ACS Appl. Mater. Interfaces*, **13**, 155 (2021).
297. Yan, J., Tuhin, M.O., Sadler, J.D., Smith, S.D., Pasquinelli, M.A., and Spontak, R.J., "Network Topology and Stability of Homologous Multiblock Copolymer Physical Gels," *J. Chem. Phys.*, **153**, 124904 (2020).
296. Srewaradachpisal, S., Dechwayukul, C., Chatpun, S., Spontak, R.J., and Thongruang, W., "Optimization of the Rubber Formulation in Footwear Applications from the Response Surface Method," *Polymers*, **12**, 2032 (2020).
295. Facchine, E.G., Jin, S.-A., Spontak, R.J., Rojas, O. J., and Khan, S.A., "Quantitative Calorimetric Studies of the Chiral Nematic Mesophase in Aqueous Cellulose Nanocrystal Suspensions," *Langmuir*, **36**, 10830 (2020).
294. Facchine, E.G., Spontak, R.J., Rojas, O. J., and Khan, S.A., "Shear-Dependent Structures of Flocculated Micro/Nanofibrillated Cellulose (MNFC) in Aqueous Suspensions," *Biomacromol.*, **21**, 3561 (2020).
293. Ito, T., Shiota, R., Taniguchi, N., Spontak, R.J., and Nagai, K., "Gas-Separation and Physical Properties of ABA Triblock Copolymers Synthesized from Polyimide and Hydrophilic Adamantane Derivatives," *Polymer*, **202**, 122642 (2020).
292. von Tiedemann, P., Yan, J., Barent, R., Spontak, R.J., Floudas, G., Frey, H., and Register, R.A., "Tapered Multiblock Star Polymers: Synthesis, Selective Hydrogenation, and Properties," *Macromolecules*, **53**, 4422 (2020).
291. Janakiram, S., Ansaloni, L., Jin, S.-A., Yu, X., Dai, Z., Spontak, R.J., and Deng, L., "Humidity-Responsive Molecular Gate-Opening Mechanism for Gas Separation in Ultrasensitive Nanocellulose/IL Hybrid Membranes," *Green Chem.*, **22**, 3546 (2020).
290. Pervaje, A.K., Tilly, J.C., Detwiler, A.T., Spontak, R.J., Khan, S.A., and Santiso, E.E., "Molecular Simulations of Thermoset Polymers Implementing Theoretical Kinetics with Top-Down Coarse-Grained Models," *Macromolecules*, **53**, 2310 (2020).
289. Armstrong, D.P., Chatterjee, K., Ghosh, T.K., and Spontak, R.J., "Form-Stable Phase-Change Elastomer Gels Derived from Thermoplastic Elastomer Copolyesters Swollen with Fatty Acids," *Thermochim. Acta*, **686**, 178566 (2020).
288. Yan, J., Yan, S., Tilly, J.C., Ko, Y., Lee, B., and Spontak, R.J., "Ionic Complexation of Endblock-Sulfonated Thermoplastic Elastomers and Their Physical Gels to Improve Thermomechanical Performance," *J. Colloid Interface Sci.*, **567**, 419 (2020).
287. Corder, R.D., Tilly, J.C., Ingram, W.F., Spontak, R.J., and Khan, S.A., "UV-Curable

- Nanocomposites Based on Polydimethylsiloxane and Zirconia Nanoparticles: Reactive vs. Passive Nanofillers," *ACS Appl. Polym. Mater.*, **2**, 394 (2020).
286. Peddinti, B.S.T., Scholle, F., Vargas, M.G., Smith, S.D., Ghiladi, R.A., and Spontak, R.J., "Inherently Self-Sterilizing Charged Multiblock Polymers that Kill Drug-Resistant Microbes in Minutes," *Mater. Horiz.*, **6**, 2056 (2019).
  285. Wozniak-Braszak, A., Knitter, M., Markiewicz, E., Ingram, W.F., and Spontak, R.J., "Effect of Composition on the Molecular Dynamics of Biodegradable Isotactic Polypropylene/Thermoplastic Starch Blends," *ACS Sustain. Chem. Eng.*, **7**, 16050 (2019).
  284. Dai, Z., Deng, J., Aboukeila, H., Yan, J., Ansaloni, L., Mineart, K.P., Giacinti Baschetti, M., Spontak, R.J., and Deng, L., "Highly CO<sub>2</sub>-Permeable Membranes Derived from a Midblock-Sulfonated Multiblock Polymer after Submersion in Water," *NPG Asia Mater.*, **11**, 53 (2019).
  283. Tilly, J.C., Pervaje, A.K., Inglefield, Jr., D.L., Detwiler, A.T., Santiso, E.E., Khan, S.A., and Spontak, R.J., "Thermomechanical and Free-Volume Properties of Polyester Polyol Films for Coatings Applications: Role of Diol Composition," *ACS Appl. Polym. Mater.*, **1**, 2398 (2019).
  282. Dai, Z., Ansaloni, L., Ryan, J.J., Spontak, R.J., and Deng, L., "Incorporation of an Ionic Liquid into a Midblock-Sulfonated Multiblock Polymer for CO<sub>2</sub> Capture," *J. Membr. Sci.*, **588**, 117193 (2019).
  281. Yan, J. and Spontak, R.J., "Toughening Poly(lactic acid) with Thermoplastic Elastomers Modified by Thiol-ene Click Chemistry," *ACS Sustain. Chem. Eng.*, **7**, 10830 (2019).
  280. Oliver, A. M., Spontak, R. J., and Manners, I., "Solution Self-Assembly of ABC Triblock Terpolymers with a Central Crystallizable Poly(ferrocenyldimethylsilane) Core-Forming Segment," *Polym. Chem.*, **10**, 2559 (2019).
  279. Mineart, K.P., Ryan, J.J., Appavou, M.-S., Lee, B., Gradzielski, M., and Spontak, R.J., "Self-Assembly of a Midblock-Sulfonated Pentablock Copolymer in Mixed Organic Solvents: A Combined SAXS and SANS Analysis," *Langmuir*, **35**, 1032 (2019).
  278. Tilly, J.C., Pervaje, A.K., Inglefield, Jr., D.L., Santiso, E.E., Spontak, R.J., and Khan, S.A., "Spectroscopic and Rheological Cross-Analysis of the Effect of 2,2,4,4-Tetramethyl 1,3-Cyclo-butanediol on Polyester Polyol Cure Behavior," *ACS Omega*, **4**, 932 (2019).
  277. Deng, J., Dai, Z., Yan, J., Sandru, M., Sandru, E., Spontak, R.J., and Deng, L., "Facile and Solvent-free Fabrication of PEG-based Membranes with Interpenetrating Networks for CO<sub>2</sub> Separation," *J. Membr. Sci.*, **570-571**, 455 (2019).
  276. Armstrong, D.P. and Spontak, R.J., "Dielectric and Resistive Heating of Polymeric Media for Remote Thermal Activation of Stimuli-Responsive Soft Materials," *Macromol. Rapid Commun.*, **39**, 1800669 (2018).
  275. Pervaje, A.K., Tilly, J., Inglefield, Jr., D.L., Spontak, R.J., Khan, S.A., and Santiso, E.E., "Modeling Polymer Glass Transition Properties from Empirical Monomer Data with the SAFT- $\gamma$  Mie Force Field," *Macromolecules*, **51**, 9526 (2018).

274. Turgut, A.; Tuhin, M.O.; Toprakci, O.; Pasquinelli, M.A.; Spontak, R.J.; Toprakci, H.A.K., "Thermoplastic Elastomer Systems Containing Carbon Nanofibers as Soft Piezoresistive Sensors," *ACS Omega*, **3**, 12648 (2018).
273. Peddinti, B.S.T., Scholle, F., Ghiladi, R.A., and Spontak, R.J., "Photoactive Polymers as Comprehensive Anti-Infective Materials: Staying Ahead of a Growing Global Threat," *ACS Appl. Mater. Interfaces*, **10**, 25955 (2018).
272. Cai, J., Mineart, K.P., Li, X., Spontak, R.J., Manners, I., and Qiu, H., "Hierarchical Self-Assembly of Toroidal Micelles into Multidimensional Nanoporous Superstructures," *ACS Macro Lett.*, **7**, 1040 (2018).
271. Tuhin, M.O., Ryan, J.J., Sadler, J.D., Han, Z., Lee, B., Smith, S.D., Pasquinelli, M.A., and Spontak, R.J., "Microphase-Separated Morphologies and Molecular Network Topologies in Multiblock Copolymer Gels," *Macromolecules*, **51**, 5173 (2018).
270. Deng, J., Yan, J., Tilly, J.C., Deng, L., Mineart, K.E., and Spontak, R.J., "Incorporation of Metallic Species into Midblock-Sulfonated Block Ionomers," *Macromol. Rapid Commun.* (invited), **39**, 1800427 (2018).
269. Armstrong, D.P. and Spontak, R.J., "Crystallization-Directed Anisotropic Electroactuation in Selectively-Solvated Olefinic Thermoplastic Elastomers: A Thermal and (Electro)Mechanical Property Study," *Adv. Funct. Mater.*, **28**, 1803467 (2018).
268. Tuhin, M.O., Woloszczuk, S., Mineart, K.P., Pasquinelli, M.A., Sadler, J.D., Smith, S.D., Banaszak, M., and Spontak, R.J., "Molecular-Level Description of Constrained Chain Topologies in Multiblock Copolymer Gel Networks," *J. Chem. Phys.*, **148**, 231101 (2018). [selected as an Editors' Pick by the *Journal of Chemical Physics* and highlighted on the journal homepage with a badge]
267. Torstensen, J.Ø., Johnsen, P.-O., Riis, H., Spontak, R.J., Deng, L., Gregersen, Ø.W., and Syverud, K., "Preparation of Cellulose Nanofibrils for Imaging Purposes: Comparison of Liquid Cryogenics for Rapid Vitrification," *Cellulose*, **25**, 4269 (2018).
266. Dai, Z., Ansaloni, L., Ryan, J.J., Spontak, R.J., and Deng, L., "Nafion/Ionic Liquid Hybrid Membranes with Enhanced Gas Permeation for CO<sub>2</sub> Separation: Effects of Ionic Liquid and Humidity," *Green Chem.*, **20**, 1391 (2018).
265. Ryan, J.J., Mineart, K.P., Lee, B., and Spontak, R.J., "Ordering and Grain Growth in Charged Block Copolymer Bulk Films: A Comparison of Solvent-Related Processes," *Adv. Mater. Interf.*, **5**, 1701667 (2018).
264. Torstensen, J.Ø., Liu, M., Jin, S.-A., Deng, L., Hawari, A.I., Syverud, K., Spontak, R.J., and Gregersen, Ø.W., "Swelling and Free-Volume Characteristics of TEMPO-Oxidized Cellulose Nanofibril Films," *Biomacromolecules*, **19**, 1016 (2018).
263. Ashraf, A., Ryan, J.J., Satkowski, M.M., Smith, S.D., and Spontak, R.J., "Effect of Systematic Hydrogenation on the Phase Behavior and Nanostructural Dimensions of Block Copolymers," *ACS Appl. Mater. Interfaces*, **10**, 3186 (2018).
262. Al-Mohsin, H.A., Mineart, K.P., Armstrong, D.P., El-Shafei, A., and Spontak, R.J., "Quasi-

- Solid-State Dye-Sensitized Solar Cells Containing a Charged Thermoplastic Elastomeric Gel Electrolyte and Hydrophilic/phobic Photosensitizers," *Sol. RRL*, **2**, 1700145 (2018).
261. Subramani, B.S., Spontak, R.J., and Ghosh, T.K., "Influence of Fiber Characteristics on Directed Electroactuation of Anisotropic Dielectric Electroactive Polymers with Tunability," *Compos. Sci. Technol.*, **154**, 187 (2018).
  260. Woloszczuk, S., Tuhin, M.O., Gade, S.R., Pasquinelli, M.A., Banaszak, M., and Spontak, R.J., "Complex Phase Behavior and Network Characteristics of Midblock-Solvated Triblock Copolymers as Physically-Crosslinked Soft Materials," *ACS Appl. Mater. Interfaces*, **9**, 39940 (2017).
  259. Caydamli, Y., Yildirim, E., Shen, J., Fang, X., Pasquinelli, M.A., Spontak, R.J., and Tonelli, A.E., "Molecular-level Considerations Responsible for Diverse Macroscopic Phase Behavior in Monosubstituted Isobutyl-POSS/Poly(ethylene oxide) Blends," *Soft Matter*, **13**, 8672 (2017).
  258. Dobies, M., Makrocka-Rydzik, M., Jenczyk, J., Jarek, M., Spontak, R.J., and Jurga, S., "Molecular Dynamics of Polystyrene-*b*-Poly(ethylene oxide) Asymmetric Diblock Copolymer Systems," *Langmuir* (invited), **33**, 8856 (2017).
  257. Ansaloni, L., Dai, Z., Ryan, J.J., Mineart, K.P., Saud, K.T., Yu, Q., Hägg, M.-B., Spontak, R.J., and Deng, L., "Base- and Acid-Gas Transport through Solvent-Templated Block Ionomers: Effect of Humidity on Ammonia and Carbon Dioxide Permeation," *Adv. Mater. Interfaces*, **4**, 1700854 (2017).
  256. Ashraf, A.R., Ryan, J.J., Satkowski, M.M., Lee, B., Smith, S.D., and Spontak, R.J., "Bicomponent Block Copolymers Derived from One or More Random Copolymers as an Alternative Route to Controllable Phase Behavior," *Macromol. Rapid Commun.*, **38**, 1700207 (2017).
  255. Armstrong, D.P. and Spontak, R.J., "Designing Dielectric Elastomers over Multiple Length Scales for 21st-Century Soft Materials Technologies," *Rubber Chem. Technol.* (invited), **90**, 207 (2017).
  254. An, R., Huang, L., Mineart, K.P., Dong, Y., Spontak, R.J., and Gubbins, K.E., "Adhesion and Friction in Polymer Films on Solid Substrates: Conformal Sites Analysis and Corresponding Surface Measurements," *Soft Matter*, **13**, 3492 (2017).
  253. Mineart, K.P., Ryan, J.J., Lee, B., Smith, S.D., and Spontak, R.J., "Molecular and Morphological Characterization of Midblock-Sulfonated Styrenic Triblock Copolymers," *J. Polym. Sci. B: Polym. Phys.*, **55**, 490 (2017).
  252. Mineart, K.E., Dickerson, J.D., Love, D.M., Lee, B., Zuo, X., and Spontak, R.J., "Hydrothermal Conditioning of Physical Hydrogels Prepared from a Midblock-Sulfonated Multiblock Copolymer," *Macromol. Rapid Commun.*, **38**, 1600666 (2017).
  251. Vatankhah-Varnosfaderani, M., Daniel, W.F.M., Zhushma, A.P., Li, Q., Morgan, B.J., Matyjaszewski, K., Armstrong, D.P., Spontak, R.J., Dobrynin, A.V., and Sheiko, S.S., "Bottlebrush Elastomers: A New Platform for Freestanding Electroactuation," *Adv. Mater.*,

- 29, 1604209 (2017).
250. Soltani, I. and Spontak, R.J., "Effect of Polyelectrolyte on the Barrier Efficacy of Layer-by-Layer Nanoclay Coatings," *J. Membr. Sci.*, **526**, 172 (2017).
  249. Al-Mohsin, H.A., Mineart, K.P., Armstrong, D.P., and Spontak, R.J., "Tuning the Performance of Aqueous Photovoltaic Elastomer Gels by Solvent Polarity and Nanostructure Development," *J. Polym. Sci. B: Polym. Phys.*, **55**, 85 (2017).
  248. Tallury, S.S., Pourdeyhimi, B., Pasquinelli, M.A., and Spontak, R.J., "Decoupling the Species Responsible for Polymer Shape Memory via Bicomponent Fiber Spinning," *Macromol. Rapid Commun.*, **37**, 1837 (2016).
  247. Mineart, K.P., Tallury, S.S., Li, T., Lee, B., and Spontak, R.J., "Phase-Change Thermoplastic Elastomer Blends for Tunable Shape Memory by Physical Design," *Ind. Eng. Chem. Res.* (invited), **55**, 12590 (2016).
  246. Armstrong, D.P., Mineart, K.P., Lee, B., and Spontak, R.J., "Olefinic Thermoplastic Elastomer Gels: Combining Polymer Crystallization and Microphase Separation in a Selective Solvent," *ACS Macro Lett.*, **5**, 1273 (2016).
  245. Lunn, D.J., Gould, O.E.C., Whittell, G.R., Armstrong, D.P., Mineart, K.P., Winnik, M.A., Spontak, R.J., Pringle, P.G., and Manners, I., "Microfibers and Macroscopic Films from the Coordination-Driven Hierarchical Self-Assembly of Cylindrical Micelles," *Nature Commun.*, **7**, 12371 (2016).
  244. Mineart, K.P., Lee, B., and Spontak, R.J., "A Solvent-Vapor Approach Towards the Control of Block Ionomer Morphologies," *Macromolecules*, **49**, 3126 (2016).
  243. Mineart, K.P., Al-Mohsin, H.A., Lee, B., and Spontak, R.J., "Water-Induced Nanochannel Networks in Self-Assembled Block Ionomers," *Appl. Phys. Lett.*, **108**, 101907 (2016).
  242. Ozcam, A.E., Efimenko, K. Spontak, R.J., Fischer, D.A., and Genzer, J., "Multipurpose Polymeric Coating for Functionalizing Inert Polymer Surfaces," *ACS Appl. Mater. Interfaces*, **8**, 5694 (2016).
  241. Hemkaew, K., Dechwayukul, C., Aiyarak, P., Spontak, R.J., and Thongruang, W., "Batch Method and Effects of Formulation and Mechanical Loading on Electrical Conductivity of Natural Rubber Composites Filled with Multiwall Carbon Nanotubes and Carbon Black," *Dig. J. Nanomater. Biostruct.*, **10**, 883 (2015).
  240. Cai, X.-J., Yuan, H.-M., Blencowe, A., Qiao, G.G., Genzer, J., and Spontak, R.J., "Film-Stabilizing Attributes of Polymeric Core-Shell Nanoparticles," *ACS Nano*, **9**, 7940 (2015).
  239. Al-Mohsin, H., Mineart, K.P., and Spontak, R.J., "Highly-Flexible Aqueous Photovoltaic Elastomer Gels Derived from Sulfonated Block Ionomers," *Adv. Energy Mater.*, **5**, 1401941 (2015).
  238. Mineart, K.P., Jiang, X., Jinnai, H., Takahara, A., and Spontak, R.J., "Morphological Investigation of Midblock-Sulfonated Block Ionomers Prepared from Solvents Differing in

- Polarity," *Macromol. Rapid Commun.*, **36**, 432 (2015).
237. Woloszczuk, S., Mineart, K.P., Spontak, R.J., and Banaszak, M., "Dual Modes of Self-Assembly in Super Strongly-Segregated Bicomponent Triblock Copolymer Melts," *Phys. Rev. E*, **91**, 010601 (2015).
  236. Thongruang, W., Nooklay, B., Bunnaul, P., Spontak, R.J., Smithpatrie, P., Chetpattananondh, K., "Characteristics of NR/CB Composites: Preparation Method and Correlations of Electrical and Mechanical Properties," *Adv. Mater. Res.*, **844**, 309 (2014).
  235. Ozcam, A.E., Spontak, R.J., and Genzer, J., "Towards the Development of a Versatile Functionalized Silicone Coating," *ACS Appl. Mater. Interfaces*, **6**, 22544 (2014).
  234. Tallury, S.S., Spontak, R.J., and Pasquinelli, M.A., "Dissipative Particle Dynamics of Triblock Copolymer Melts: A Midblock Conformational Study at Moderate Segregation," *J. Chem. Phys.*, **141**, 244911 (2014).
  233. Cai, X.-J., Genzer, J., and Spontak, R.J., "Evolution of Homopolymer Thin-Film Instability on Surface-Anchored Diblock Copolymers Varying in Composition," *Langmuir*, **30**, 11689 (2014).
  232. Tallury, S.S., Mineart, K.P., Woloszczuk, S., Williams, D.N., Thompson, R.B., Pasquinelli, M.A., Banaszak, M., and Spontak, R.J., "Molecular-Level Insights into Asymmetric Triblock Copolymers: Network and Phase Development," *J. Chem. Phys.*, **141**, 121103 (2014).
  231. Subramani, K.B., Cakmak, E., Spontak, R.J., and Ghosh, T.K., "Enhanced Electroactive Response of Unidirectional Elastomeric Composites with High-Dielectric-Constant Fibers," *Adv. Mater.*, **26**, 2949 (2014).
  230. Toprakci, H.A.K., Kalanadhabhatla, S.K., Spontak, R.J., and Ghosh, T.K., "Polymer Nanocomposites Containing Carbon Nanofibers as Soft Printable Sensors Exhibiting Strain-Reversible Piezoresistivity," *Adv. Funct. Mater.*, **23**, 5536 (2013).
  229. Piephoff, D.E., Rasmussen, K.Ø., and Spontak, R.J., "Nanoscale Distribution and Segregation of Midblock-Selective Co-Penetrants in ABA Triblock Copolymer Lamellae," *RSC Adv.*, **3**, 22863 (2013).
  228. Mineart, K.P., Yiliang, L., Desai, S.C., Krishnan, A.S., Spontak, R.J., and Dickey, M.D., "Ultrastretchable, Cyclable and Recyclable 1- and 2-Dimensional Conductors Based on Physically Cross-linked Thermoplastic Elastomer Gels," *Soft Matter*, **9**, 7695 (2013). [selected as a "hot article" by *Soft Matter* and highlighted on the journal blog at <http://blogs.rsc.org/sm/>]
  227. Vargantwar, P.H., Brannock, M.C., Tauer, K., and Spontak, R.J., "Midblock-Sulfonated Triblock Ionomers Derived from a Long-Chain Poly[styrene-*b*-butadiene-*b*-styrene] Triblock Copolymer," *J. Mater. Chem. A*, **1**, 3430 (2013).
  226. Woloszczuk, S., Banaszak, M., and Spontak, R.J., "Monte Carlo Simulations of the Order-Disorder Transition Depression in ABA Triblock Copolymers with a Short Terminal Block," *J. Polym. Sci. B: Polym. Phys.*, **51**, 343 (2013).



225. Vargantwar, P.H., Brannock, M.C., Smith, S.D., and Spontak, R.J., "Midblock Sulfonation of a Model Long-Chain Poly(*p*-*tert*-butylstyrene-*b*-styrene-*b*-*p*-*tert*-butylstyrene) Triblock Copolymer," *J. Mater. Chem.*, **22**, 25262 (2012).
224. Krishnan, A.S., Vargantwar, P.H., and Spontak, R.J., "Thermorheological Behavior of Coexisting Physical Networks: Combining SAFIN and SAMIN Organogels," *Soft Matter*, **8**, 12025 (2012).
223. Krishnan, A.S., Smith, S.D., and Spontak, R.J., "Ternary Phase Behavior of a Triblock Copolymer in the Presence of an Endblock-Selective Homopolymer and a Midblock-Selective Oil," *Macromolecules*, **45**, 6056 (2012).
222. Vargantwar, P.H., Ozcam, A.E., Ghosh, T.K., and Spontak, R.J., "Prestrain-free Dielectric Elastomers based on Acrylic Thermoplastic Elastomer Gels: A Morphological and (Electro)Mechanical Property Study," *Adv. Funct. Mater.*, **22**, 2100 (2012).
221. Roskov, K.E., Atkinson, J., Bronstein, L.M., and Spontak, R.J., "Magnetic Field-Induced Alignment of Nanoparticles in Electrospun Microfibers," *RSC Adv.*, **2**, 4603 (2012).
220. Gozen, A.O., Genzer, J., and Spontak, R.J., "Interfacial Stabilization of Bilayered Nanolaminates by Asymmetric Block Copolymers," *Appl. Phys. Lett.*, **100**, 101602 (2012).
219. Ozcam, A.E., Roskov, K.E., Spontak, R.J., and Genzer, J., "Generation of Functional PET Microfibers through Surface-Initiated Polymerization," *J. Mater. Chem.*, **22**, 5855 (2012).
218. Vargantwar, P.H., Roskov, K.E., Ghosh, T.K., and Spontak, R.J., "Enhanced Biomimetic Performance of Ionic Polymer-Metal Composite Actuators Prepared with Nanostructured Block Ionomers," *Macromol. Rapid Commun.*, **33**, 61 (2012).
217. Arvidson, S.A., Roskov, K.E., Patel, J.J., Spontak, R.J., Gorga, R.E., and Khan, S.A., "Modification of Melt-Spun Isotactic Polypropylene and Poly(lactic acid) Bicomponent Filaments with a Premade Block Copolymer," *Macromolecules*, **45**, 913 (2012).
216. Ozcam, A.E., Roskov, K.E., Genzer, J., and Spontak, R.J., "Responsive PET Nano/Microfibers via Surface-Initiated Polymerization," *ACS Appl. Mater. Interfaces*, **4**, 59 (2012).
215. Krishnan, A.S. and Spontak, R.J., "Factors Affecting Time-Composition Equivalence in Ternary Block Copolymer/Cosolvent Systems," *Soft Matter*, **8**, 1334 (2012). [selected as a "hot article" by *Soft Matter* and highlighted on the journal blog at <http://blogs.rsc.org/sm/>]
214. Vargantwar, P.H., Brelander, S.M., Krishnan, A.S., Ghosh, T.K., and Spontak, R.J., "(Electro)Mechanical Behavior of Selectively Solvated Diblock/Triblock Copolymer Blends," *Appl. Phys. Lett.*, **99**, 242901 (2011).
213. Roskov, K.E., Kozek, K.A., Wu, W.-C., Chhetri, R.K., Oldenburg, A.L., Spontak, R.J., and Tracy, J.B., "Long-Range Alignment of Gold Nanorods in Electrospun Nano/Microfibers," *Langmuir*, **27**, 13965 (2011).
212. Krishnan, A.S. and Spontak, R.J., "Deviation from Time-Composition Equivalence in Polymer Solutions with Selective Cosolvents," *AIP Adv.*, **1**, 042159 (2011).

211. Krishnan, A.S., Vargantwar, P.H., Ghosh, T.K., and Spontak, R.J., "Electroactuation of Solvated Triblock Copolymer Dielectric Elastomers: Decoupling the Roles of Mechanical Prestrain and Specimen Thickness," *J. Polym. Sci. B: Polym. Phys.*, **49**, 1569 (2011).
210. Krishnan, A.S., van Zanten, J.H., Seifert, S., Lee, B., and Spontak, R.J., "Selectively-Solvated Triblock Copolymer Networks under Biaxial Strain," *Appl. Phys. Lett.*, **99**, 101908 (2011).
209. Gozen, A.O., Zhou, J., Roskov, K.E., Shi, A.-C., Genzer, J., and Spontak, R.J., "Block Copolymer Self-Organization vs. Interfacial Modification in Bilayered Thin-Film Laminates," *Soft Matter*, **7**, 3268 (2011).
208. Vargantwar, P.H., Shankar, R., Krishnan, A.S., Ghosh, T.K., and Spontak, R.J., "Exceptional Versatility of Solvated Block Copolymer/Ionomer Networks as Electroactive Polymers," *Soft Matter*, **7**, 1651 (2011).
207. Gozen, A.O., Gaines, M.K., Hamersky, M.W., Maniadis, P., Rasmussen, K.Ø., Smith, S.D., and Spontak, R.J., "Controlling the Phase Behavior of Block Copolymers via Sequential Block Growth," *Polymer*, **51**, 5304 (2010).
206. Gaines, M.K., Smith, S.D., Samseth, J., Khan, S.A., and Spontak, R.J., "Nanoparticle Network Formation in Nanostructured and Disordered Block Copolymer Matrices," *Nanoscale Res. Lett.*, **5**, 1712 (2010).
205. Krishnan, A.S., Seifert, S., Lee, B., Khan, S.A., and Spontak, R.J., "Cosolvent-Regulated Time-Composition Rheological Equivalence in Block Copolymer Solutions," *Soft Matter*, **6**, 4331 (2010).
204. Jinnai, H., Spontak, R.J., and Nishi, T., "Transmission Electron Microtomography and Polymer Nanostructures," *Macromolecules*, **43**, 1675 (2010).
203. Ozcam, A.E., Efimenko, K., Jaye, C., Spontak, R.J., Fischer, D.A., and Genzer, J., "Modification of PET Surfaces with Self-Assembled Monolayers of Organosilane Precursors," *J. Electr. Spectrosc. Relat. Phenom.*, **172**, 95 (2009).
202. Peng, Q., Sun, X.-Y., Spagnola, J.C., Saquing, C., Khan, S.A., Spontak, R.J., and Parsons, G.N., "Bi-directional Kirkendall Effect in Coaxial Microtube Assemblies Fabricated by Atomic Layer Deposition," *ACS Nano*, **3**, 546 (2009).
201. Jinnai, H. and Spontak, R.J., "Transmission Electron Microtomography in Polymer Research," *Polymer*, **50**, 1067 (2009).
200. Shankar, R., Ghosh, T.K., and Spontak, R.J., "Mechanical and Actuation Behavior of Electroactive Nanostructured Polymers," *Sens. Actuators A*, **151**, 46 (2009).
199. Shankar, R., Klossner, R.R., Weaver, J.T., Koga, T., van Zanten, J.H., Krause, W.E., Colina, C.M., Tanaka, F., and Spontak, R.J., "Competitive Hydrogen-Bonding in Polymer Solutions with Mixed Solvents," *Soft Matter*, **5**, 304 (2009).
198. Aberg, C.M., Seyam, M.A., Lassell, S.A., Bronstein, L.M., and Spontak, R.J., "In-situ Growth of Pd Nanoparticles in Cross-linked Polymer Matrices," *Macromol. Rapid Commun.*, **29**, 1926 (2008).

197. Wei, B., Gurr, P.A., Gozen, A.O., Blencowe, A., Solomon, D.H., Qiao, G.G., Spontak, R.J., and Genzer, J., "Autophobicity-Driven Surface Segregation and Patterning of Core-Shell Microgel Particles," *Nano Lett.*, **8**, 3010 (2008).
196. Aberg, C.M., Ozcam, A.E., Majikes, J.M., Seyam, M.A., and Spontak, R.J., "Extended Chemical Cross-linking of a Thermoplastic Polyimide: Macroscopic and Microscopic Property Development," *Macromol. Rapid Commun.*, **29**, 1461 (2008).
195. Sun, X.-Y., Nobles, L.R., Börner, H.G., and Spontak, R.J., "Field-Driven Surface Segregation of Biofunctional Species on Electrospun PMMA/PEO Microfibers," *Macromol. Rapid Commun.*, **29**, 1455 (2008).
194. Shankar, R., Krishnan, A.S., Ghosh, T.K., and Spontak, R.J., "Triblock Copolymer Organogels as High-Performance Dielectric Elastomers," *Macromolecules*, **41**, 6100 (2008).
193. Gaines, M.K., Smith, S.D., Samseth, J., Bockstaller, M.R., Thompson, R.B., Rasmussen, K.Ø., and Spontak, R.J., "Nanoparticle-Regulated Phase Behavior of Ordered Block Copolymers," *Soft Matter*, **4**, 1609 (2008).
192. Walker, T.A., Frankowski, D.J., and Spontak, R.J., "Thermodynamics and Kinetic Processes of Polymer Blends and Block Copolymers in the Presence of Pressurized Carbon Dioxide," *Adv. Mater.*, **20**, 879 (2008).
191. Wang, X., Wang, H., Frankowski, D.J., Lam, P.G., Welch, P.M., Winnik, M.A., Hartmann, J., Manners, I., and Spontak, R.J., "Growth and Crystallization of Metal-Containing Block Copolymer Nanotubes in a Selective Solvent," *Adv. Mater.*, **19**, 2279 (2007).
190. Shankar, R., Ghosh, T.K., and Spontak, R.J., "Electroactive Nanostructured Polymers as Tunable Actuators," *Adv. Mater.*, **19**, 2218 (2007).
189. Guo, Q., Arends, P., Thomann, R., Spontak, R.J., and Gronski, W., "Morphological Development and Rheological Changes of Phenoxy/SAN Blends during In-Situ Polymerization," *J. Polym. Sci. B: Polym. Phys.*, **45**, 2614 (2007).
188. Shankar, R., Ghosh, T.K., and Spontak, R.J., "Dielectric Elastomers as Next-Generation Polymeric Actuators," *Soft Matter*, **3**, 1116 (2007).
187. Frankowski, D.J., Capracotta, M.D., Martin, J.D., Khan, S.A., and Spontak, R.J., "Stability of Organically-Modified Montmorillonites and Their Polystyrene Nanocomposites after Prolonged Thermal Treatment," *Chem. Mater.*, **19**, 2757 (2007).
186. Shankar, R., Ghosh, T.K., and Spontak, R.J., "Electromechanical Response of Nanostructured Polymer Systems with No Mechanical Pre-strain," *Macromol. Rapid Commun.*, **28**, 1142 (2007).
185. Maynor, B.W., LaRue, I., Hu, Z., Rolland, J.P., Pandya, A., Fu, Q., Liu, J., Spontak, R.J., Sheiko, S.S., Samulski, R.J., Samulski, E.T., and DeSimone, J.M., "Supramolecular Nanomimetics: Replication of Micelles, Viruses and Other Naturally-Occurring Nanoscale Objects," *Small*, **3**, 845 (2007).

184. Frankowski, D.J., Khan, S.A., and Spontak, R.J., "Chain Scission-Induced Intercalation as a Facile Route to Polymer Nanocomposites," *Adv. Mater.*, **19**, 1286 (2007).
183. Peng, Q., Sun, X.-Y., Spagnola, J.C., Hyde, G.K., Spontak, R.J., and Parsons, G.N., "Atomic Layer Deposition on Electrospun Polymer Fibers as a Direct Route to Al<sub>2</sub>O<sub>3</sub> Microtubes with Precise Wall Thickness Control," *Nano Lett.*, **7**, 719 (2007).
182. Gil, E.S., Frankowski, D.J., Hudson, S.M., and Spontak, R.J., "Silk Fibroin Membranes from Solvent-Crystallized Silk Fibroin/Gelatin Blends: Effects of Blend and Solvent Composition," *Mater. Sci. Eng. C*, **27**, 426 (2007).
181. Sun, X.-Y., Shankar, R., Börner, H.G., Ghosh, T.K., and Spontak, R.J., "Field-Driven Biofunctionalization of Polymer Fiber Surfaces during Electrospinning," *Adv. Mater.*, **19**, 87 (2007).
180. Wei, B., Lam, P.G., Genzer J., and Spontak, R.J., "Tunable Instability Mechanisms of Polymer Thin Films by Molecular Self-Assembly," *Langmuir*, **22**, 8642 (2006).
179. Spontak, R.J., Shankar, R., Bowman, M.K., Krishnan, A.S., Hamersky, M.W., Samseth, J., Bockstaller, M.R., and Rasmussen, K.Ø., "Selectivity- and Size-Induced Segregation of Molecular and Nanoscale Species in Microphase-Ordered Triblock Copolymers," *Nano Lett.*, **6**, 2115 (2006).
178. Nenoff, T.M., Spontak, R.J., and Aberg, C.M., "Membranes for Hydrogen Purification: An Important Step Toward a Hydrogen-Based Economy," *MRS Bull.*, **31**, 735 (2006).
177. Jinnai, H., Hasegawa, H., Nishikawa, Y., Sevink, G.J.A., Braunfeld, M.B., Agard, D.A., and Spontak, R.J., "3-D Analysis of Coexisting Bicontinuous Morphologies in a Block Copolymer/Homopolymer Blend," *Macromol. Rapid Commun.*, **27**, 1424 (2006).
176. Smith, S.D., Hamersky, M.W., Bowman, M.K., Rasmussen, K.Ø., and Spontak, R.J., "Molecularly Asymmetric Triblock Copolymers as a Single-Molecule Route to Ordered Bidisperse Polymer Brushes," *Langmuir*, **22**, 6465 (2006).
175. Gil, E.S., Frankowski, D.J., Bowman, M.K., Gozen, A.O., Hudson, S.M., and Spontak, R.J., "Mixed Protein Blends Composed of Gelatin and *Bombyx mori* Silk Fibroin: Effects of Solvent-Induced Crystallization and Composition," *Biomacromolecules*, **7**, 728 (2006).
174. Gil, E.S., Frankowski, D.J., Spontak, R.J., and Hudson, S.M., "Swelling Behavior and Morphological Evolution of Mixed Gelatin/Silk Fibroin Hydrogels," *Biomacromolecules*, **6**, 3079 (2005).
173. Harton, S.E., Stevie, F.A., Spontak, R.J., Koga, T., Rafailovich, M.H., Sokolov, J.C., and Ade, H., "Low-Temperature Reactive Coupling at Polymer-Polymer Interfaces Facilitated by Supercritical CO<sub>2</sub>," *Polymer*, **46**, 10173 (2005).
172. Hamersky, M.W., Smith, S.D., Gozen, A.O., and Spontak, R.J., "Phase Behavior of Triblock Copolymers Varying in Molecular Asymmetry," *Phys. Rev. Lett.*, **95**, 168306 (2005).

171. Gil, E.S., Spontak, R.J., and Hudson, S.M., "Effect of  $\beta$ -Sheet Crystals on the Thermal and Rheological Properties of Protein-based Hydrogels Derived from Gelatin and Silk Fibroin," *Macromol. Biosci.*, **5**, 702 (2005).
170. van Maanen, G.J., Seeley, S.L., Capracotta, M.D., White, S.A., Bukovnik, R.R., Hartmann, J., Martin, J.D., and Spontak, R.J., "Property and Morphology Development in Nanocomposite Thermoplastic Elastomer Gels," *Langmuir*, **21**, 3106 (2005).
169. Siripurapu, S., DeSimone, J.M., Khan, S.A., and Spontak, R.J., "Controlled Foaming of Polymer Films through Restricted Surface Diffusion and the Addition of Nanosilica Particles or CO<sub>2</sub>-philic Surfactants," *Macromolecules*, **38**, 2271 (2005).
168. Patel, N.P., Hunt, M.A., Lin-Gibson, S., Bencherif, S., and Spontak, R.J., "Tunable CO<sub>2</sub> Transport through Mixed Polyether Membranes," *J. Membr. Sci.*, **251**, 51 (2005).
167. Siripurapu, S., Coughlan, J.A., Spontak, R.J., and Khan, S.A., "Surface-Constrained Foaming of Polymer Thin Films with Supercritical Carbon Dioxide," *Macromolecules*, **37**, 9872 (2004).
166. Bronstein, L.M., Goerigk, G., Kostylev, M., Pink, M., Khotina, I.A., Valetsky, P.M., Matveeva, V.G., Sulman, E.M., Sulman, M.G., Bykov, A.V., Lakina, N.V., and Spontak, R.J., "Structure and Catalytic Properties of Pt-Modified Hypercrosslinked Polystyrene Exhibiting Hierarchical Porosity," *J. Phys. Chem. B*, **108**, 18234 (2004).
165. Patel, N.P., Aberg, C.M., Sanchez, A.M., Capracotta, M.D., Martin, J.D., and Spontak, R.J., "Morphological, Mechanical and Gas-Transport Characteristics of Crosslinked Poly(propylene glycol): Homopolymers, Nanocomposites and Blends," *Polymer*, **45**, 5941 (2004).
164. Patel, N.P., Zielinski, J.M., Samseth, J. and Spontak, R.J., "Effects of Pressure and Nanoparticle Functionality on CO<sub>2</sub>-Selective Nanocomposites Derived from Crosslinked Poly(ethylene glycol)," *Macromol. Chem. Phys.*, **205**, 2409 (2004).
163. Patel, N.P., Miller, A.C., and Spontak, R.J., "Highly CO<sub>2</sub>-Permeable and Selective Membranes Derived from Cross-linked Poly(ethylene glycol) and Its Nanocomposites," *Adv. Funct. Mater.*, **14**, 699 (2004).
162. Frankowski, D.J., Fournier-Bidoz, S., Manners, I., Ozin, G.A., Khan, S.A., and Spontak, R.J., "Tunable Microcellular Morphologies from Polyferrocenylsilane Ceramic Precursors Foamed in Supercritical CO<sub>2</sub>," *Macromol. Chem. Phys.*, **205**, 2398 (2004).
161. Wei, B., Gurr, P.A., Genzer, J., Qiao, G.G., Solomon, D.H., and Spontak, R.J., "Dewetting of a Star Nanogel/Homopolymer Blend Film from an Immiscible Homopolymer Substrate," *Macromolecules*, **37**, 7857 (2004).
160. Wei, B., Genzer, J., and Spontak, R.J., "Dewetting Behavior of a Block Copolymer/Homopolymer Thin Film on an Immiscible Homopolymer Substrate," *Langmuir*, **20**, 8659 (2004).
159. Frankowski, D.J., Raez, J., Manners, I., Winnik, M.A., Khan, S.A., and Spontak, R.J.,

- "Formation of Dispersed Nanostructures from Poly(ferrocenyldimethylsilane-*b*-dimethylsiloxane) Nanotubes Upon Exposure to Supercritical Carbon Dioxide" *Langmuir*, **20**, 9304 (2004).
158. Siripurapu, S., DeSimone, J.M., Khan, S.A., and Spontak, R.J., "Low-Temperature, Surface-Mediated Foaming of Polymer Films," *Adv. Mater.*, **16**, 989 (2004).
  157. Shtykova, E.V., Svergun, D.I., Chernyshov, D.M., Khotina, I.A., Valetsky, P.M., Spontak, R.J., and Bronstein, L.M., "Platinum Nanoparticles Generated in Functionality-Enhanced Reaction Media Based on Polyoctadecylsiloxane with Long-Chain Functional Modifiers," *J. Phys. Chem. B*, **108**, 6175 (2004).
  156. Patel, N.P. and Spontak, R.J., "Gas-Transport and Thermal Properties of a Microphase-Ordered Poly(styrene-*b*-ethylene oxide-*b*-styrene) Triblock Copolymer and its Blends with Poly(ethylene glycol)," *Macromolecules*, **37**, 2829 (2004).
  155. Walker, T.A., Colina, C.M., Gubbins, K.E., and Spontak, R.J., "Thermodynamics of Poly(dimethylsiloxane)/Poly(ethylmethylsiloxane) (PDMS/PEMS) Blends in the Presence of High-Pressure CO<sub>2</sub>," *Macromolecules*, **37**, 2588 (2004).
  154. Patel, N.P. and Spontak, R.J., "Mesoblends of Polyether Block Copolymers with Poly(ethylene glycol)," *Macromolecules*, **37**, 1394 (2004).
  153. Power-Billard, K.N., Spontak, R.J., and Manners, I., "Organometallic Vesicles: Aqueous Self-Assembly of Diblock Copolymers with a Corona-Forming Polyferrocenylsilane Polyelectrolyte Block," *Angew. Chem. Int. Ed.*, **43**, 1260 (2004).
  152. Walker, T.A., Melnichenko, Y., Wignall, G.D., Lin, J.S., and Spontak, R.J., "Phase Behavior of Poly(methyl methacrylate)/Poly(vinylidene fluoride) Blends in the Presence of High-Pressure Carbon Dioxide," *Macromol. Chem. Phys.*, **204**, 2064 (2003).
  151. Wilder, E.A., Hall, C.K., and Spontak, R.J., "Physical Organogels Composed of Amphiphilic Block Copolymers and 1,3:2,4-Dibenzylidene-D-sorbitol," *J. Colloid Interface Sci.*, **267**, 509 (2003).
  150. Wilder, E.A., Spontak, R.J., and Hall, C.K., "The Molecular Structure and Intermolecular Interactions of 1,3:2,4-Dibenzylidene Sorbitol," *Mol. Phys.*, **101**, 3017 (2003).
  149. Stevens, J.E., Thongruang, W., Patel, N.P., Smith, S.D., and Spontak, R.J., "Solvent-Facilitated Homopolymer Sorption in Swollen Block Copolymer Matrices," *Macromolecules*, **36**, 3206 (2003).
  148. Wilder, E.A., Braunfeld, M.B., Jinnai, H., Hall, C.K., Agard, D.A., and Spontak, R.J., "Nanofibrillar Networks in Poly(ethyl methacrylate) and Its Silica Nanocomposites," *J. Phys. Chem. B*, **107**, 11633 (2003).
  147. Patel, N.P., Miller, A.C., and Spontak, R.J., "Highly CO<sub>2</sub>-Permeable and Selective Polymer Nanocomposite Membranes," *Adv. Mater.*, **15**, 729 (2003).
  146. Walls, H.J., Riley, M.W., Gupta, R.R., Spontak, R.J., Fedkiw, P.S., and Khan, S.A.,

- "Nanocomposite Electrolytes with Fumed Silica and Hectorite Clay Networks: Passive vs. Active Fillers," *Adv. Funct. Mater.*, **13**, 710 (2003).
145. Bronstein, L.M., Linton, C.N., Karlinsey, R., Ashcraft, E., Stein, B.D., Svergun, D.I., Kozin, M., Khotina, I.A., Spontak, R.J., Werner-Zwanziger, U., and Zwanziger, J.W., "Controlled Synthesis of Novel Metallated Poly(aminohexyl)-(aminopropyl)-silsesquioxane Colloids" *Langmuir*, **19**, 7071 (2003).
  144. Oliveira, E.D., Hirsch, S.G., Spontak, R.J., and Gehrke, S.H., "Influence of Polymer Conformation on the Shear Modulus and Morphology of Polyallylamine and Poly( $\alpha$ ,L-lysine) Hydrogels," *Macromolecules*, **36**, 6189 (2003).
  143. Wilder, E.A., Hall, C.K., Khan, S.A., and Spontak, R.J., "Effects of Composition and Matrix Polarity on Network Development in Organogels of Poly(ethylene glycol) and Dibenzylidene Sorbitol," *Langmuir*, **19**, 6004 (2003).
  142. Gurr, P.A., Qiao, G.G., Solomon, D.H., Harton, S.E., and Spontak, R.J., "Synthesis, Characterization and Direct Observation of Star Microgels," *Macromolecules*, **36**, 5650 (2003).
  141. Walls, H.J., Riley, M.W., Fedkiw, P.S., Spontak, R.J., Baker, G.L., and Khan, S.A., "Composite Electrolytes from Self-Assembled Colloidal Networks," *Electrochim. Acta*, **48**, 2071 (2003).
  140. Walker, T.A., Melnichenko, Y.B., Wignall, G.D., and Spontak, R.J., "The Phase Behavior of Poly(methyl methacrylate)/Poly(vinylidene fluoride) Blends with and without High-Pressure CO<sub>2</sub>," *Macromolecules*, **36**, 4245 (2003).
  139. Merkel, T.C., Freeman, B.D., Spontak, R.J., He, Z., Pinnau, I., Meakin, P., and Hill, A.J., "Sorption, Transport and Structural Evidence for Enhanced Free Volume in Poly(4-methyl-2-pentyne)/Fumed Silica Nanocomposite Membranes," *Chem. Mater.*, **15**, 109 (2003).
  138. English, R.J., Laurer, J.H., Spontak, R.J., and Khan, S.A., "Hydrophobically-Modified Associative Polymer Solutions: Rheology and Microstructure in the Presence of Non-ionic Surfactants," *Ind. Eng. Chem. Res.*, **41**, 6425 (2002).
  137. Jinnai, H., Nishikawa, Y., Ito, M., Smith, S.D., Agard, D.A., and Spontak, R.J., "Topological Similarity of Sponge-like Bicontinuous Morphologies Differing in Length Scale," *Adv. Mater.*, **14**, 1615 (2002).
  136. Roberge, R.L., Patel, N.P., Thongruang, W., White, S.A., Smith, S.D., and Spontak, R.J., "Block Copolymer/Homopolymer Mesoblends: Preparation and Characterization," *Macromolecules*, **35**, 2268 (2002).
  135. Walker, T.A., Semler, J.J., Leonard, D.N., van Maanen G.J., Bukovnik, R., and Spontak, R.J., "ABA Triblock Copolymer Gels Modified with an A-Compatible Semicrystalline Homopolymer," *Langmuir*, **18**, 8266 (2002).
  134. Leonard, D.N., Spontak, R.J., Smith, S.D., and Russell, P.E., "Topological Coarsening of Low-Molecular-Weight Block Copolymer Ultrathin Films by Environmental AFM,"

*Polymer*, **43**, 6719 (2002).

133. Siripurapu, S., Gay, Y.J., Royer, J.R., DeSimone, J.M., Spontak, R.J., and Khan, S.A., "Generation of Microcellular Foams of PVDF and Its Blends Using Supercritical Carbon Dioxide in a Continuous Process," *Polymer*, **43**, 5511 (2002).
132. Bronstein, L.M., Linton, C., Karlinsey, R., Stein, B., Svergun, D.I., Zwanziger, J.W., and Spontak, R.J., "Synthesis of Metal-Loaded Poly(aminohexyl)(aminopropyl)- silsesquioxane Colloids and Their Self-Organization into Dendrites," *Nano Lett.*, **2**, 873 (2002).
131. Thongruang, W., Spontak, R.J., and Balik, C.M., "Bridged Double Percolation in Conductive Polymer Composites: An Electrical Conductivity, Morphology and Mechanical Property Study," *Polymer*, **43**, 3717 (2002).
130. Arnold, M.E., Nagai, K., Freeman, B.D., Spontak, R.J., Leroux, D., Betts, D.E., DeSimone, J.M., DiGiano, F.A., Stebbins, C.K., and Linton, R.W., "Microphase-Separated Block Copolymers Comprised of Low Surface Energy Fluorinated Blocks and Hydrophilic Blocks: Synthesis and Characterization," *Macromolecules*, **35**, 3697 (2002).
129. Merkel, T.C., Freeman, B.D., Spontak, R.J., He, Z., Pinnau, I., Meakin, P., and Hill, A.J., "Ultrapermable, Reverse-Selective Nanocomposite Membranes," *Science*, **296**, 519 (2002).
128. Thongruang, W., Balik, C.M., and Spontak, R.J., "Volume-Exclusion Effects in Polyethylene Blends Filled with Carbon Black, Graphite or Carbon Fiber," *J. Polym. Sci. B: Polym. Phys.*, **40**, 1013 (2002).
127. Leonard, D.N., Smith, S.D., Russell, P.E., and Spontak, R.J., "Multiscale Dewetting of Low-Molecular-Weight Block Copolymer Ultrathin Films," *Macromol. Rapid Commun.*, **23**, 205 (2002).
126. Thongruang, W., Spontak, R.J., and Balik, C.M., "Correlated Conductivity and Mechanical Property Analysis of High-Density Polyethylene filled with Graphite and Carbon Fiber," *Polymer*, **43**, 2279 (2002).
125. Hirsch, S.G. and Spontak, R.J., "Temperature-Dependent Property Development in Hydrogels Derived from Hydroxypropylcellulose," *Polymer*, **43**, 123 (2002).
124. Sidorov, S.N., Volkov, I.V., Davankov, V.A., Tsyurupa, M.P., Valetsky, P.M., Bronstein, L.M., Karlinsey, R., Zwanziger, J.W., Matveeva, V.G., Sulman, E.M., Lakina, N.V., Wilder, E.A., and Spontak, R.J., "Platinum-Containing Hypercrosslinked Polystyrene as a Modifier-Free Selective Catalyst for L-Sorbose Oxidation," *J. Am. Chem. Soc.*, **123**, 10502 (2001).
123. Arnold, M.E., Nagai, K., Freeman, B.D., Spontak, R.J., Betts, D.E., DeSimone, J.M., and Pinnau, I., "Gas Permeation Properties of Poly(1,1'-dihydroperfluorooctylacrylate) (PFOA), Poly(1,1-dihydroperfluorooctylmethacrylate) (PFOMA) and Poly(styrene-*b*-1,1'-dihydroperfluorooctylacrylate) (PS-*b*-PFOA) Block Copolymers," *Macromolecules*, **34**, 5611 (2001).
122. Jinnai, H., Kajihara, T., Watashiba, H., Nishikawa, Y., and Spontak, R.J., "Interfacial and Topological Measurements of Bicontinuous Polymer Morphologies," *Phys. Rev. E*, **64**, 10803(R) (2001). [Erratum: *Phys. Rev. E*, **64**, 69903 (2001)]



121. Smith, A.P., Spontak, R.J., and Ade, H., "On the Similarity of Macromolecular Responses to High-Energy Processes: Mechanical Milling vs. Irradiation," *Polym. Degrad. Stab.*, **72**, 519 (2001).
120. Spontak, R.J. and Smith, S.D., "Perfectly-Alternating Linear (AB)<sub>n</sub> Multiblock Copolymers: Effect of Molecular Design on Morphology and Properties," *J. Polym. Sci. B: Polym. Phys.*, **39**, 947 (2001).
119. Spontak, R.J., Wilder, E.A., and Smith, S.D., "Improved Network Development in Bidisperse Block Copolymer Gels," *Langmuir*, **17**, 2294 (2001).
118. Mercurio, D.J. and Spontak, R.J., "Morphological Characteristics of 1,3:2,4-Dibenzylidene Sorbitol/Poly(propylene glycol) Organogels," *J. Phys. Chem. B*, **105**, 2091 (2001).
117. Smith, A.P., Ade, H., Smith, S.D., Koch, C.C., and Spontak, R.J., "Anomalous Phase Inversion in Polymer Blends Prepared by Cryogenic Mechanical Alloying," *Macromolecules*, **34**, 1536 (2001).
116. Smith, A.P., Ade, H., Koch, C.C., and Spontak, R.J., "Cryogenic Mechanical Alloying as an Alternative Strategy for the Recycling of Tires," *Polymer*, **42**, 4453 (2001).
115. Kane, L., Norman, D.A., White, S.A., Matsen, M.W., Satkowski, M.M., Smith, S.D., and Spontak, R.J., "Molecular, Nanostructural and Mechanical Characteristics of Lamellar Triblock Copolymer Blends: Effects of Molecular Weight and Constraint," *Macromol. Rapid Commun.*, **22**, 281 (2001).
114. Mercurio, D.J., Khan, S.A., and Spontak, R.J., "Dynamic Rheological Behavior of DBS-Induced Poly(propylene glycol) Physical Gels," *Rheol. Acta*, **40**, 30 (2001).
113. Figueiredo, P., Geppert, S., Brandsch, R., Bar, G., Thomann, R., Spontak, R.J., Gronski, W., Samlenski, R., and Müller-Buschbaum, P., "Ordering of Cylindrical Microdomains in Thin Films of Hybrid Isotropic/Liquid Crystalline Block Copolymers," *Macromolecules*, **34**, 171 (2001).
112. Spontak, R.J., Roberge, R.L., Vratsanos, M.S., and Starner, W.E., "Model Acrylate-Terminated Urethane Blends in Toughened Epoxies: A Morphology and Stress Relaxation Study," *Polymer*, **41**, 6341 (2000).
111. Bronstein, L.M., Chernyshov, D.M., Valetsky, P.M., Wilder, E.A., and Spontak, R.J., "Metal Nanoparticles Grown in the Nanostructured Matrix of Poly(octadecylsiloxane)," *Langmuir*, **16**, 8221 (2000).
110. Shay, J.S., English, R.J., Spontak, R.J., Balik, C.M., and Khan, S.A., "Dispersion Polymerization of Polystyrene Latex Stabilized with Novel Grafted Poly(ethylene glycol) Macromers in 1-Propanol/Water," *Macromolecules*, **33**, 6664 (2000).
109. Koch, C.C., Smith, A.P., Bai, C., Spontak, R.J., and Balik, C.M., "Nonequilibrium Processing of Polymeric Materials by Mechanical Attrition," *Mater. Sci. Forum*, **343-346**, 49 (2000).
108. Bai, C., Spontak, R.J., Koch, C.C., Saw, C.K., and Balik, C.M., "Structural Changes in

- Poly(ethylene terephthalate) Induced by Mechanical Milling," *Polymer*, **41**, 7147 (2000).
107. Smith, A.P., Ade, H., Balik, C.M., Koch, C.C., Smith, S.D., and Spontak, R.J., "Cryogenic Mechanical Alloying of Poly(methyl methacrylate) with Polyisoprene and Poly(ethylene-*alt*-propylene)," *Macromolecules*, **33**, 2595 (2000).
  106. Spontak, R.J. and Vratsanos, M.S., "Stress Relaxation in Multiphase Polymer Systems Exhibiting Controlled Miscibility through Blending," *Macromolecules*, **33**, 2290 (2000).
  105. Smith, A.P., Shay, J.S., Spontak, R.J., Balik, C.M., Ade, H., Smith, S.D., and Koch, C.C., "High-energy Mechanical Milling of Poly(methyl methacrylate), Polyisoprene and Poly(ethylene-*alt*-propylene)," *Polymer*, **41**, 6271 (2000).
  104. Erlat, A.G., Wang, B.-C., Spontak, R.J., Tropsha, Y., Mar, K.D., Montgomery, D.B., and Vogler, E.A., "Morphology and Gas Barrier Properties of Thin SiO<sub>x</sub> Coatings on Polycarbonate: Correlations with Plasma-Enhanced Chemical Vapor Deposition Conditions," *J. Mater. Res.*, **15**, 704 (2000).
  103. Spontak, R.J. and Patel, N.P., "Thermoplastic Elastomers: Fundamentals and Applications," *Curr. Opin. Colloid Interface Sci.*, **5**, 334 (2000).
  102. Smith, A.P., Ade, H., Koch, C.C., Smith, S.D., and Spontak, R.J., "Addition of a Block Copolymer to Polymer Blends Produced by Cryogenic Mechanical Alloying," *Macromolecules*, **33**, 1163 (2000).
  101. Jinnai, H., Nishikawa, Y., Spontak, R.J., Smith, S.D., Agard, D.A., and Hashimoto, T., "Direct Measurement of Interfacial Curvature Distributions in a Bicontinuous Block Copolymer Morphology," *Phys. Rev. Lett.*, **84**, 518 (2000).
  100. Smith, A.P., Spontak, R.J., Koch, C.C., Smith, S.D., and Ade, H., "Temperature-induced Morphological Evolution in Polymer Blends Produced by Cryogenic Mechanical Alloying," *Macromol. Mater. Eng.*, **274**, 1 (2000).
  99. Spontak, R.J. and Alexandridis, P., "Advances in Self-Ordering Macromolecules and Nanostructure Design," *Curr. Opin. Coll. Interface Sci.*, **4**, 140 (1999).
  98. Alexandridis, P. and Spontak, R.J., "Solvent-Regulated Ordering in Block Copolymers," *Curr. Opin. Coll. Interface Sci.*, **4**, 130 (1999).
  97. Sidorov, S.N., Bronstein, L.M., Davankov, V.A., Tsyurupa, M.P., Solodovnikov, S.P., Valetsky, P.M., Wilder, E.A., and Spontak, R.J., "Cobalt Nanoparticle Formation in the Pores of Hypercrosslinked Polystyrene: Control of Nanoparticle Growth and Morphology," *Chem. Mater.*, **11**, 3210 (1999).
  96. Laurer, J.H., Khan, S.A., Spontak, R.J., Satkowski, M.M., Grothaus, J.T., Smith, S.D., and Lin, J.S., "Morphology and Rheology of SIS and SEPS Triblock Copolymers in the Presence of a Midblock-Selective Solvent," *Langmuir*, **15**, 7947 (1999).
  95. Smith, A.P., Spontak, R.J., Ade, H., Smith, S.D., and Koch, C.C., "High-Energy Cryogenic Blending and Compatibilizing of Immiscible Polymers," *Adv. Mater.*, **11**, 1277 (1999).

94. Busick, D.N., Spontak, R.J., and Balik, C.M., "Effect of Graphite Content on the Morphology and Barrier Properties of Poly(vinylidene fluoride) Composites," *Polymer*, **40**, 6023 (1999).
93. Jackson, N.R., Wilder, E.A., White, S.A., Bukovnik, R., and Spontak, R.J., "Modification of a Thermoplastic Elastomer Gel through the Addition of an Endblock-Selective Homopolymer," *J. Polym. Sci. B: Polym. Phys.*, **37**, 1863 (1999).
92. Erlat, A.G., Spontak, R.J., Clarke, R.P., Robinson, T.C., Haaland, P.D., Tropsha, Y., Harvey, N.G., and Vogler, E.A., "SiO<sub>x</sub> Gas Barrier Coatings on Polymer Substrates: Morphology and Gas Transport Considerations," *J. Phys. Chem. B*, **103**, 6047 (1999).
91. King, M.R., White, S.A., Smith, S.D., and Spontak, R.J., "Mesogel Networks via Selective Midblock Swelling of Lamellar Triblock Copolymers," *Langmuir*, **15**, 7886 (1999).
90. Walker, T.A., Raghavan, S.R., Royer, J.R., Smith, S.D., Wignall, G.D., Melnichenko, Y., Khan, S.A., and Spontak, R.J., "Enhanced Miscibility of Low-Molecular-Weight Polystyrene/Polyisoprene Blends in Supercritical CO<sub>2</sub>," *J. Phys. Chem. B*, **103**, 5472 (1999).
89. Fahmy, Y., Shen, T.D., Tucker, D.A., Spontak, R.J., and Koch, C.C., "Possible Evidence for the Stabilization of  $\beta$ -Carbon Nitride by High-Energy Ball Milling," *J. Mater. Res.*, **14**, 2488 (1999).
88. Driscoll, D.C., Gulati, H.S., Spontak, R.J., and Hall, C.K., "Grafted Polymer Tail/Loop Mixtures Differing in Chain Length," *Polymer*, **40**, 5207 (1999).
87. Wang, B.-C., Tropsha, Y., Montgomery, D.B., Vogler, E.A., and Spontak, R.J., "Enhanced Barrier Performance of SiO<sub>x</sub>-Modified Polymer Substrates: Some Morphological Considerations," *J. Mater. Sci. Lett.*, **18**, 311 (1999).
86. Smith, A.P., Bai, C., Ade, H., Spontak, R.J., Balik, C.M., and Koch, C.C., "X-ray Microscopy of Novel Thermoplastic/Liquid Crystalline Polymer Blends by Mechanical Alloying," *Macromol. Rapid Commun.*, **19**, 557 (1998).
85. Laurer, J.H., Smith, S.D., Samseth, J., Mortensen, K., and Spontak, R.J., "Interfacial Modification as a Route to Novel Bilayered Morphologies in Binary Block Copolymer/Homopolymer Blends," *Macromolecules*, **31**, 4975 (1998).
84. Kabra, B.G., Gehrke, S.H., and Spontak, R.J., "Microporous, Responsive Hydroxypropyl Cellulose Gels: I. Synthesis and Microstructure," *Macromolecules*, **31**, 2166 (1998).
83. Hong, S.-U., Laurer, J.H., Zielinski, J.M., Samseth, J., Smith, S.D., Duda, J.L., and Spontak, R.J., "Morphological and Isothermal Diffusive Probe Analyses of Low-Molecular-Weight Diblock Copolymers," *Macromolecules*, **31**, 2174 (1998).
82. Laurer, J.H., Hajduk, D.A., Dreckötter, S., Smith, S.D., and Spontak, R.J., "Bicontinuous Morphologies in Homologous Multiblock Copolymers and Their Homopolymer Blends," *Macromolecules*, **31**, 7546 (1998).
81. Yashin, V.V. and Spontak, R.J., "Miscibilization of Reactive Polymers during Early-Stage

- Spinodal Decomposition," *AIChE J.*, **44**, 416 (1998).
80. Laurer, J.H., Mulling, J.F., Khan, S.A., Spontak, R.J., Lin, J.S., and Bukovnik, R., "Thermoplastic Elastomer Gels: II. Effects of Composition and Temperature on Morphology and Gel Rheology," *J. Polym. Sci. B: Polym. Phys.*, **36**, 2513 (1998).
  79. Laurer, J.H., Mulling, J.F., Khan, S.A., Spontak, R.J., and Bukovnik, R., "Thermoplastic Elastomer Gels: I. Effects of Composition and Processing on Morphology and Gel Behavior," *J. Polym. Sci. B: Polym. Phys.*, **36**, 2379 (1998).
  78. Hong, S.-U., Stölken, S., Zielinski, J.M., Smith, S.D., Duda, J.L., and Spontak, R.J., "Anomalous Sorption in a Poly(styrene-*b*-isoprene) Diblock Copolymer near the Order-Disorder Transition," *Macromolecules*, **31**, 937 (1998).
  77. Driscoll, D.C., Gulati, H.S., Hall, C.K., and Spontak, R.J., "Mixtures of Polymer Tails and Loops Grafted to an Impenetrable Interface," *Polymer*, **39**, 6339 (1998).
  76. Norman, D.A., Kane, L., White, S.A., Smith, S.D., and Spontak, R.J., "Triblock Copolymer/Homopolymer Blends: Conformational Changes, Microstructural Transition and Macrophase Separation," *J. Mater. Sci. Lett.*, **17**, 545 (1998).
  75. Kane, L., Satkowski, M.M., Smith, S.D., and Spontak, R.J., "Compositionally Symmetric Diblock Copolymer Blends of Moderate Polydispersity," *J. Polym. Sci. B: Polym. Phys.*, **35**, 2653 (1997).
  74. Morisato, A., Toy, L.G., Freeman, B.D., Spontak, R.J., Casillas, C.G., and Pinnau, I., "Gas Permeability and Phase Morphology of Poly(1-trimethylsilyl-1-propyne)/ Poly(1-phenyl-1-propyne) Blends," *Macromolecules*, **30**, 4766 (1997).
  73. Laurer, J.H., Hajduk, D.A., Fung, J.C., Sedat, J.W., Smith, S.D., Gruner, S.M., Agard, D.A., and Spontak, R.J., "Microstructural Analysis of a Cubic Bicontinuous Morphology in a Neat SIS Triblock Copolymer," *Macromolecules*, **30**, 3938 (1997).
  72. Shepard, T.A., DelSorbo, C.R., Louth, R.M., Walborn, J.L., Norman, D.A., Harvey, N.G., and Spontak, R.J., "Self-Organization and Polyolefin Nucleation Efficacy of  $\alpha$ -Methyl Dibenzylidene Sorbitol," *J. Polym. Sci. B: Polym. Phys.*, **35**, 2617 (1997).
  71. Prevysh, V.A., Wang, B.-C., Khan, S.A., and Spontak, R.J., "Salting-in Behavior of Isotropic and Anisotropic Aqueous Hydroxypropylcellulose Solutions," *Colloid Polym. Sci.*, **275**, 284 (1997).
  70. Laurer, J.H., Ashraf, A., Smith, S.D., and Spontak, R.J., "Phase Miscibility and Morphological Behavior of Disordered 'Random' Diblock Copolymer/Homopolymer Blends," *Langmuir*, **13**, 2250 (1997).
  69. Laurer, J.H., Fung, J.C., Sedat, J.W., Agard, D.A., Smith, S.D., Samseth, J., Mortensen, K., and Spontak, R.J., "From Micelles to Randomly-Connected, Continuous Membranes in Dilute Block Copolymer Blends," *Langmuir*, **13**, 2177 (1997).
  68. Laurer, J.H., Ashraf, A., Smith, S.D., Samseth, J., and Spontak, R.J., "Macromolecular Self-Assembly in Dilute Sequence-Modified Block Copolymer/ Homopolymer Blends,"

*Supramol. Sci.*, **4**, 121 (1997).

67. Prebola, J.L. and Spontak, R.J., "The Introductory Course in Materials Thermodynamics: Strategies toward Improved Instructional Effectiveness," *J. Mater. Educ.*, **19**, 47 (1997).
66. Balik, C.M., Spontak, R.J., Brenner, D.W., Scattergood, R.O., Sitar, Z., Prebola, J.L., and Weitzel, J., "Evolution of VIMS at North Carolina State University," *J. Mater. Educ.*, **19**, 59 (1997).
65. Wang, B.-C. and Spontak, R.J., "Phase Behavior of Aqueous Hydroxypropylcellulose Mesophase Mixtures: Molecular Weight Considerations," *Liq. Cryst.*, **22**, 359 (1997).
64. Smith, A.P., Laurer, J.H., Ade, H.W., Smith, S.D., Ashraf, A., and Spontak, R.J., "X-Ray Microscopy and NEXAFS Spectroscopy of Macrophase-Separated Random Block Copolymer/Homopolymer Blends," *Macromolecules*, **30**, 663 (1997).
63. Kane, L., Satkowski, M.M., Smith, S.D., and Spontak, R.J., "Phase Behavior and Morphological Characteristics of Compositionally Symmetric Diblock Copolymer Blends," *Macromolecules*, **29**, 8862 (1996).
62. Nuñez, C.M., Whitfield, J.K., Mercurio, D.J., Ilzhofer, J.R., Spontak, R.J., and Khan, S.A., "Effect of Molecular Architecture on DBS-Induced Block Copolymer Gels: A Rheological Study," *Macromol. Symp.*, **106**, 275 (1996).
61. Gulati, H.S., Hall, C.K., Jones, R.L., and Spontak, R.J., "Equilibrium Conformations and Dynamic Relaxation of Double-Tethered Chain Molecules at an Impenetrable Interface," *J. Chem. Phys.*, **105**, 7712 (1996).
60. Jones, R.L., Kane, L., and Spontak, R.J., "Morphological Characteristics of Lamellar ABA Triblock Copolymers: A Self-Consistent Field Treatment," *Chem. Eng. Sci.*, **51**, 1365 (1996).
59. Laurer, J.H., Bukovnik, R., and Spontak, R.J., "Morphological Characteristics of SEBS Thermoplastic Elastomer Gels," *Macromolecules*, **29**, 5760 (1996).
58. Sonawala, S.P. and Spontak, R.J., "Degradation Kinetics of Glass-Reinforced Polyesters in Chemical Environments. I. Aqueous Solutions," *J. Mater. Sci.*, **31**, 4745 (1996).
57. Sonawala, S.P. and Spontak, R.J., "Degradation Kinetics of Glass-Reinforced Polyesters in Chemical Environments. II. Organic Solvents," *J. Mater. Sci.*, **31**, 4757 (1996).
56. Roberts, J.E., Spontak, R.J., Jameel, H., and Khan, S.A., "A Novel Approach to Black Liquor Viscosity Reduction Using Salt Additives," *Tappi J.*, **79**, 167 (1996).
55. Frey, M.W., Cuculo, J.A., and Spontak, R.J., "Morphological Characterization of the Lyotropic and Gel Phases in the Cellulose/NH<sub>3</sub>/NH<sub>4</sub>SCN System," *J. Polym. Sci. B: Polym. Phys.*, **34**, 2049 (1996).
54. Roberts, J.E., Khan, S.A., and Spontak, R.J., "Controlled Black Liquor Viscosity Reduction through Salting-in," *AIChE J.*, **42**, 2319 (1996).

53. Spontak, R.J., Smith, S.D., and Ashraf, A., "Replicated Surface Morphologies of Lamellar and Bicontinuous Diblock Copolymer Blends," *J. Mater. Sci. Lett.*, **15**, 1009 (1996).
52. Prevysh, V.A., Wang, B.-C., and Spontak, R.J., "Effect of Added Salts on the Stability of Hydrogen-Bonded Interpolymer Complexes," *Colloid Polym. Sci.*, **274**, 532 (1996).
51. Spontak, R.J., Fung, J.C., Braunfeld, M.B., Sedat, J.W., Agard, D.A., Kane, L., Smith, S.D., Satkowski, M.M., Ashraf, A., Hajduk, D.A., and Gruner, S.M., "Phase Behavior of Ordered Diblock Copolymer Blends: Effect of Compositional Heterogeneity," *Macromolecules*, **29**, 4494 (1996).
50. Spontak, R.J., Fung, J.C., Braunfeld, M.B., Sedat, J.W., Agard, D.A., Ashraf, A., and Smith, S.D., "Architecture-Induced Phase Immiscibility in a Diblock/Multiblock Copolymer Blend," *Macromolecules*, **29**, 2850 (1996).
49. Zielinski, J.M., Vratsanos, M.S., Laurer, J.H., and Spontak, R.J., "Phase-Separation Studies of Heat-Cured ATU-Flexibilized Epoxies," *Polymer*, **37**, 75 (1996).
48. Ade, H., Toledo-Crow, R., Vaez-Iravani, M., and Spontak, R.J., "Observation of Polymer Birefringence in Near-Field Optical Microscopy," *Langmuir*, **12**, 231 (1996).
47. Jones, R.L. and Spontak, R.J., "Effect of Chain Length and Surface Density on Looped Polymers Grafted to an Impenetrable Surface," *J. Chem. Phys.*, **103**, 5137 (1995).
46. Ilzhoefer, J.R. and Spontak, R.J., "Effect of Polymer Composition on the Morphology of Self-Assembled Dibenzylidene Sorbitol," *Langmuir*, **11**, 3288 (1995).
45. Ilzhoefer, J.R., Broom, B.C., Nepa, S.M., Vogler, E.A., Khan, S.A., and Spontak, R.J., "Evidence of Hierarchical Order in an Amphiphilic Graft Terpolymer Gel," *J. Phys. Chem.*, **99**, 12069 (1995).
44. Ilzhoefer, J.R., Knowlton, V.M., and Spontak, R.J., "Isolation of a Novel Association Network in a Polymer Gel," *Microsc. Res. Techniq.*, **31**, 467 (1995).
43. Spontak, R.J., "Self-Consistent Field Theory of Ordered Block Copolymer Blends: I.  $(AB)_\alpha/(AB)_\beta$  Blends," *Macromolecules*, **27**, 6363 (1994).
42. Smith, S.D., Spontak, R.J., Satkowski, M.M., Ashraf, A., Heape, A.K., and Lin, J.S., "Microphase-Separated Poly(styrene-*b*-isoprene)<sub>n</sub> Multiblock Copolymers with Constant Block Lengths," *Polymer*, **35**, 4527 (1994).
41. Jones, R.L. and Spontak, R.J., "Conformational Analysis of Double-Tethered Chain Molecules at an Impenetrable Interface: A Monte Carlo Study," *J. Chem. Phys.*, **101**, 5179 (1994).
40. Kane, L. and Spontak, R.J., "Microstructural Characteristics of Strongly-Segregated AXB Triblock Terpolymers Possessing the Lamellar Morphology," *Macromolecules*, **27**, 1267 (1994).
39. Spontak, R.J., Smith, S.D., and Ashraf, A., "Molecular-Weight Factors Affecting Formation

- of the OBDD Morphology in Block Copolymer Blends," *Microsc. Res. Techniq.*, **27**, 412 (1994).
38. Samseth, J., Spontak, R.J., Smith, S.D., Ashraf, A., and Mortensen, K., "Microphase-Separated Tapered Triblock Copolymers," *J. Phys. IV (Paris)*, **3**, 59 (1993).
  37. Smith, S.D., Spontak, R.J., Satkowski, M.M., Ashraf, A., and Lin, J.S., "Microdomain Contraction in Microphase-Separated Multiblock Copolymers," *Phys. Rev. B*, **47**, 14555 (1993).
  36. Mazur, A.W., Burns, J.L., Hiler, G.D. II, and Spontak, R.J., "Electron Microscopy of Reaction-Controlling Association Structures in the Enzymatic Hydrolysis of Triglycerides," *J. Phys. Chem.*, **97**, 11344 (1993).
  35. Hutton, H.D., Pocard, N.L., Alsmeyer, D.C., Schueller, O.J., Spontak, R.J., Huston, M.E., Huang, W., McCreery, R.L., Neenan, T.X., and Callstrom, M.R., "Preparation of Nanoscale Platinum(0) Clusters in Glassy Carbon and Their Catalytic Activity," *Chem. Mater.*, **5**, 1727 (1993).
  34. Spontak, R.J., Smith, S.D., and Ashraf, A., "Linear Multiblock Copolymer/ Homopolymer Blends of Constant Composition: I. Low-Molecular-Weight Homopolymers," *Macromolecules*, **26**, 5118 (1993).
  33. Spontak, R.J., Smith, S.D., and Ashraf, A., "Morphologies of Diblock Copolymer/ Homopolymer Blends near the Order-Disorder Transition," *Polymer*, **34**, 2233 (1993).
  32. Samseth, J., Spontak, R.J., and Mortensen, K., "The Response of Microstructure to Processing in a Series of Poly(siloxaneimide) Copolymers," *J. Polym. Sci. B: Polym. Phys.*, **31**, 467 (1993).
  31. Burns, J.L. and Spontak, R.J., "Grid-Specimen Interactions: Factors Affecting Copper Nanocluster Formation on Polymer Thin Films," *J. Microsc.*, **169**, 67 (1993).
  30. Spontak, R.J., Smith, S.D., and Ashraf, A., "Dependence of the OBDD Morphology on Diblock Copolymer Molecular Weight in Copolymer/Homopolymer Blends," *Macromolecules*, **26**, 956 (1993).
  29. Schueller, O.J.A., Pocard, N.L., Huston, M.E., Spontak, R.J., Neenan, T.X., and Callstrom, M.R., "Crystalline Nanoscale Platinum(0) Clusters in Glassy Carbon," *Chem. Mater.*, **5**, 11 (1993).
  28. Spontak, R.J. and Zielinski, J.M., "Dependence of the Interphase Thickness on Chain Length in Block Copolymers: Revisited," *Macromolecules*, **26**, 396 (1993).
  27. Spontak, R.J., Bartolo, R.G., El-Nokaly, M.A. and Hiler, G.D., "Enhanced Anisotropic Ordering and Phase Separation in Lyotropic Polysaccharide Blends," *Polymer*, **33**, 5343 (1992).
  26. Spontak, R.J., Zielinski, J.M., and Lipscomb, G.G., "Effect of Looping on the Microstructure of Linear Multiblock Copolymers," *Macromolecules*, **25**, 6270 (1992).

25. Zielinski, J.M. and Spontak, R.J., "Thermodynamic Considerations of Triblock Copolymers with a Random Middle Block," *Macromolecules*, **25**, 5957 (1992).
24. Spontak, R.J., Burns, J.L., and Echer, C.J., "Morphological Studies of Nanoclusters on Grid-Supported Polymer Thin Films," *J. Mater. Res.*, **7**, 2593 (1992).
23. Samseth, J., Mortensen, K., Burns, J.L., and Spontak, R.J., "Effect of Molecular Architecture on Microstructural Characteristics in some Poly(siloxaneimide) Multiblock Copolymers," *J. Appl. Polym. Sci.*, **44**, 1245 (1992).
22. Hanna, S., Lemmon, T.J., Spontak, R.J., and Windle, A.H., "Dimensions of Crystallites in a Thermotropic Random Copolyester," *Polymer*, **33**, 3 (1992).
21. Zielinski, J.M. and Spontak, R.J., "Confined Single-Chain Model of Microphase-Separated Multiblock Copolymers: I. (AB)<sub>n</sub> Copolymers," *Macromolecules*, **25**, 653 (1992).
20. Spontak, R.J. and Zielinski, J.M., "Confined Single-Chain Model of Microphase-Separated Multiblock Copolymers: II. ABC Copolymers," *Macromolecules*, **25**, 663 (1992).
19. Spontak, R.J. and Windle, A.H., "Crystallite Morphology in Thermotropic Random Copolymers: Application of Transmission Electron Microscopy," *J. Polym. Sci. B: Polym. Phys.*, **30**, 61 (1992).
18. Spontak, R.J., Samseth, J., and Zielinski, J.M., "Configurational Studies of Microphase-Separated Diblock Copolymers in the Solid State," *Polymer*, **32**, 2724 (1991).
17. Spontak, R.J., Windle, A.H., and MacDonald, W.A., "Microstructure of a Thermotropic Random Copolymer of Hydroxybenzoic Acid, Isophthalic Acid and Hydroquinone (HBA/IA/HQ)," *J. Mater. Sci.*, **26**, 4234 (1991).
16. Spontak, R.J., Samseth, J., and Bedford, S.E., "Structure in Cast Films of Poly(siloxaneimide) Multiblock Copolymers," *Eur. Polym. J.*, **27**, 109 (1991).
15. Anwer, A., Spontak, R.J., and Windle, A.H., "Domain Formation in Thin Films of a Thermotropic Copolymer," *J. Mater. Sci. Lett.*, **9**, 935 (1990).
14. Spontak, R.J. and Windle, A.H., "Electron Microscopy of NPL Crystallites in a Thermotropic Random Copoly(ester-amide)," *Polymer*, **31**, 1395 (1990).
13. Spontak, R.J., "Effect of Molecular Weight on Crystallite Structure in Thermotropic Random Copolymers," *J. Polym. Sci., Polym. Lett. Ed.*, **28**, 271 (1990).
12. Spontak, R.J. and Windle, A.H., "Electron Microscopy of Non-Periodic Layer Crystallites in Thermotropic Random Copolymers," *J. Mater. Sci.*, **25**, 2727 (1990).
11. Spontak, R.J., "Morphology of Thermotropic Copolymer Films Cast from Solution," *J. Mater. Sci. Lett.*, **9**, 589 (1990).
10. Spontak, R.J. and Williams, M.C., "Prediction of Microstructures for Polydisperse Block



- Copolymers, Using Continuous Thermodynamics" *J. Polym. Sci. B: Polym. Phys.*, **28**, 1379 (1990).
9. Spontak, R.J. and Williams, M.C., "Microstructural and Bulk Characterization of Two Poly(siloxane-imide) Multiblock Copolymers," *J. Appl. Polym. Sci.*, **38**, 1607 (1989).
  8. Spontak, R.J., "Geometrical Constraints on Microstructural Development in Block Copolymer Ultrathin Films," *Colloid Polym. Sci.*, **267**, 808 (1989).
  7. Spontak, R.J. and Williams, M.C., "Thermodynamics of Tapered Styrene-Butadiene Block Copolymers," *J. Macromol. Sci.-Phys.*, **B28**, 1 (1989).
  6. Spontak, R.J., "Effect of Temperature on Microstructural Dimensions in Microphase-Separated SB/SBS Block Copolymers," *Polymer Comm.*, **29**, 357 (1988).
  5. Spontak, R.J. and Williams, M.C., "Microstructural Response of SiIm and SBS Block Copolymers to Heat Treatment," *Polymer J.*, **20**, 649 (1988).
  4. Spontak, R.J., Williams, M.C., and Agard, D.A., "The Interphase Composition Profile in SB/SBS Block Copolymers, Measured with Electron Microscopy, and Microstructural Implications," *Macromolecules*, **21**, 1377 (1988).
  3. Spontak, R.J., Williams, M.C., and Agard, D.A., "Three-Dimensional Study of Cylindrical Morphology in an SBS Block Copolymer," *Polymer*, **29**, 387 (1988).
  2. Spontak, R.J., Williams, M.C., and Schooley, C.N., "Morphology of Bulk SBS Block Copolymers Prepared by Wet Cryo-ultramicrotomy," *J. Mater. Sci.*, **21**, 3173 (1986).
  1. Spontak, R.J., "Determination of Volumetric Properties for Systems Containing Structure I Gas Hydrates," *Ind. Eng. Chem. Proc. Des. Dev.*, **25**, 1030 (1986).

#### Peer-reviewed monographs and invited works

38. Abetz, V., Jinnai, H., Spontak, R.J., and Talmon, Y., "Determination of Bulk and Solution Morphologies by Electron Microscopy," in *Macromolecular Engineering: Precise Synthesis, Materials Properties, Applications, 2<sup>nd</sup> Ed.* (K. Matyjaszewski, Y. Gnanou, N. Hadjichristidis, and M. Muthukumar, eds.), Wiley-VCH, Weinheim, Vol. 4, 2022, pp. 1737-1778.
37. Spontak, R.J., Peddinti, B.S.T., Roskov, K.E., and Sun, X., "Advances in Functionalizing the Interior and Exterior of Polymer Nanofibers," in *Applications of Polymer Nanofibers* (A.L. Andrady and S.A. Khan, eds.), Wiley, New York, 2022, pp. 290-324.
36. Spontak, R.J. and Yan, J., "A Unique Charged Block Polymer for Propitious Use in the Energy, Environment and Healthcare Sectors," in *Applications and Industrialisation of Nanotechnology* (W. Ahmed, ed.), One Central Press, Cheshire, U.K., 2022, pp. 169-219.
35. Yan, J. and Spontak, R.J., "Advances in Stimuli-Responsive and Functional Thermoplastic Elastomers," in *Elastomer Blends and Composites: Principles, Characterization, Advances, and Applications* (S. Rangappa, J. Parameswaranpillai, S. Siengchin, and T. Ozbakkaloglu, eds.), Elsevier, Amsterdam, 2022, pp. 353-404.

34. Spontak, R.J. and Ryan, J.J., "Polymer Blend Compatibilization by the Addition of Block Copolymers," in *Compatibilization of Polymer Blends: Micro and Nano Scale Phase Morphologies, Interphase Characterization and Ultimate Properties* (S. Thomas and A. R. Ajitha, eds.), Elsevier, Amsterdam, 2020, pp. 57-102.
33. Peddinti, B.S.T., Scholle, F., Ghiladi, R.A., and Spontak, R.J., "Antimicrobial Thermoplastic Elastomers: Strategic Pathways for the Future of Broad-Spectrum Anti-Infective Materials," *TPE Magazine Int.* (invited), 4/2019, 235.
32. Peddinti, B.S.T., Scholle, F., Ghiladi, R.A., and Spontak, R.J., "Antimicrobial Thermoplastic Elastomers: Strategic Pathways for the Future of Broad-Spectrum Anti-Infective Materials," *RubberWorld* (invited), October 2019, 67.
31. Armstrong, D.P. and Spontak, R.J., "Designing Dielectric Elastomers over Multiple Length Scales for 21st-Century Soft Materials Technologies," *Rubber Fibres Plast.* (invited), **13**, 96 (2018).
30. Soltani, I. and Spontak, R.J., "Nanotechnological Strategies Yielding High-Barrier Plastic Food Packaging," in *Food Packaging: Nanotechnology in the Agri-Food Industry* (A. Grumezescu, ed.), Elsevier, Amsterdam, 2017, Vol. 7, pp. 1-43.
29. Skov, A.L., Pei, Q., Opris, D., Spontak, R.J., Gallone, G., Shea, H., and Benslimane, M.Y., "Dielectric Elastomers as EAPs: Materials," *Electromechanically Active Polymers: A Concise Reference* (F. Carpi, ed.), Springer, Cham, Switzerland, 2016, pp. 687-714.
28. Krishnan, A.S., Roskov, K.E., and Spontak, R.J., "Nanostructured Organogels via Molecular Self-Assembly," in *Advanced Nanomaterials* (K.E. Geckeler and H. Nishide, eds.), Wiley-VCH, Weinheim, 2010, pp. 791-834.
27. Bowman, M.K., Kane, L. and Spontak, R.J. " $\alpha$ -Methylstyrene," in *Polymer Data Handbook*, 2nd ed. (J.E. Mark, Ed.) Oxford University Press, New York, 2009, pp. 856-868.
26. Ozcam, A.E., Smith, A.P. and Spontak, R.J., "*p*-Methylstyrene," in *Polymer Data Handbook*, 2nd ed. (J.E. Mark, Ed.) Oxford University Press, New York, 2009, pp. 869-882.
25. Patel, A.K., Laurer, J.H. and Spontak, R.J., "*p*-Chlorostyrene," in *Polymer Data Handbook*, 2nd ed. (J.E. Mark, Ed.) Oxford University Press, New York, 2009, pp. 499-511.
24. Weaver, J.T., Shankar, R. and Spontak, R.J., "Poly(styrene-*b*-isoprene-*b*-styrene) (unsaturated and hydrogenated)" in *Polymer Data Handbook*, 2nd ed. (J.E. Mark, Ed.) Oxford University Press, New York, 2009, pp. 1042-1056.
23. Abetz, V., Spontak, R.J., and Talmon, Y., "Determination of Bulk and Solution Morphologies by Electron Microscopy," in *Macromolecular Engineering: Precise Synthesis, Materials Properties, Applications* (K. Matyjaszewski, Y. Gnanou and L. Leibler, eds.), Wiley-VCH, Weinheim, 2007, Vol. 3, Chap. 7, pp. 1649-1685.
22. Spontak, R.J. and Patel, N.P., "Phase Behavior of Block Copolymer Blends," in *Developments in Block Copolymer Science and Technology* (I.W. Hamley, ed.), Wiley, New York, 2004, pp.

159-212.

21. Thomann, R. and Spontak, R.J., "Analytical Transmission Electron Microscopy of Nanostructured Polymer Nanocomposites," in *Science, Technology and Education of Microscopy: An Overview* (Mendez-Vilas, A., Ed.) Formatex, Badajoz, Spain, 2003, pp. 249-254.
20. Wilder, E.A., White, S.A., Smith, S.D., and Spontak, R.J., "Gel Network Development in AB, ABA and AB/ABA Block Copolymer Solutions in a Selective Solvent," in *Polymer Gels: Fundamentals and Applications* (Bohidar, H.B., Dubin, P., and Osada, Y., Eds.) American Chemical Society (Symp. Ser. **833**), Washington, D.C., 2002, pp. 248-261.
19. Wilder, E.A., Hall, C.K., Khan, S.A., and Spontak, R.J., "Molecular Self-Organization and Gelation Efficacy of Dibenzylidene Sorbitol: An Overview," *Rec. Res. Develop. Mater. Sci.*, **3**, 93 (2002).
18. Smith, A.P., Ade, H., Koch, C.C., and Spontak, R.J., "Solid-State Blending of Polymers by Cryogenic Mechanical Alloying," in *Interfaces, Adhesion and Processing in Polymer Systems* (Anastasiadis, S.H., Karim, A., and Ferguson, G.S., Eds.) Mater. Res. Soc. Symp. Proc., Pittsburgh, PA, 2001, pp. FF6.9.1-FF6.9.6.
17. Siripurapu, S., Gay, Y.G., Royer, J.R., DeSimone, J.M., Khan, S.A., and Spontak, R.J., "Microcellular Polymeric Foams (MPFs) Generated Continuously in Supercritical Carbon Dioxide," in *Interfaces, Adhesion and Processing in Polymer Systems* (Anastasiadis, S.H., Karim, A., and Ferguson, G.S., Eds.) Mater. Res. Soc. Symp. Proc., Pittsburgh, PA, 2001, pp. FF9.9.1-FF9.9.6.
16. Smith, A.P., Ade, H., Smith, S.D., Koch, C.C., and Spontak, R.J., "Polymer Blends Prepared by Cryogenic Mechanical Alloying: New Insights and Opportunities," in *Advanced Materials Processing* (Zhang, D.L., Pickering, K.L., and Xiong, X.Y., Eds.) Institute of Materials Engineering Australasia Ltd., Rotorua, New Zealand, 2000, pp. 199-204.
15. Siripurapu, S., Gay, Y.J., Royer, J.R., DeSimone, J.M., Spontak, R.J., and Khan, S.A., "Microcellular Polymeric Foams Generated Continuously in Supercritical Carbon Dioxide," in *Advanced Materials Processing* (Zhang, D.L., Pickering, K.L., and Xiong, X.Y., Eds.) Institute of Materials Engineering Australasia Ltd., Rotorua, New Zealand, 2000, pp. 193-198.
14. Schneider, A., Geppert, S., Spontak, R.J., Gronski, W., and Finkelmann, H., "Effect of Composition on the Morphology and Electro-optical Properties of Physically Crosslinked Liquid Crystals," in *Liquid Crystal Materials and Devices* (Bunning, T.J., Chen, S.H., Chien, L.C., Lien, S.-C.A., Kajiyama, T., and Koide, N., Eds.) Mater. Res. Soc. Symp. Proc., Pittsburgh, PA, 1999, pp. 177-182.
13. Smith, A.P. and Spontak, R.J., "*p*-Methylstyrene," in *Polymer Data Handbook* (J.E. Mark, Ed.) Oxford University Press, New York, 1999, pp. 688-695.
12. Kane, L. and Spontak, R.J., " $\alpha$ -Methylstyrene," in *Polymer Data Handbook* (J.E. Mark, Ed.) Oxford University Press, New York, 1999, pp. 680-687.
11. Laurer, J.H. and Spontak, R.J., "*p*-Chlorostyrene," in *Polymer Data Handbook* (J.E. Mark,

Ed.) Oxford University Press, New York, 1999, pp. 499-511.

10. Balik, C.M., Bai, C., Koch, C.C., Spontak, R.J., and Saw, C.K., "Mechanical Alloying of PET and PET/Vectra Blends," in *Morphological Control in Multiphase Polymer Mixtures* (Briber, R.M, Han, C.C., and Peiffer, D.G., Eds.) Mater. Res. Soc. Symp. Proc., Pittsburgh, PA, 1997, pp. 39-44.
9. Gulati, H.S., Jones, R.L., Driscoll, D.C., Spontak, R.J., and Hall, C.K., "Conformational and Dynamic Properties of Polymer Loops and Their Mixtures at an Impenetrable Interface," in *Statistical Mechanics in Physics and Biology* (Halsey, T.C., van Zanten, J., and Wirtz, D., Eds.) Mater. Res. Soc. Symp. Proc., Pittsburgh, PA, 1997, pp. 109-114.
8. Kane, L., Norman, D.A., White, S.A., and Spontak, R.J., "Effect of Additive Constraint on the Morphological and Mechanical Properties of Triblock Copolymer Blends," in *Morphological Control in Multiphase Polymer Mixtures* (Briber, R.M, Han, C.C., and Peiffer, D.G., Eds.) Mater. Res. Soc. Symp. Proc., Pittsburgh, PA, 1997, pp. 75-80.
7. Laurer, J.H., Mulling, J.F., Bukovnik, R., and Spontak, R.J., "Phase Behavior of Triblock Copolymers upon Incorporation of Nonparent, Midblock-Associating Additives," in *Morphological Control in Multiphase Polymer Mixtures* (Briber, R.M, Han, C.C., and Peiffer, D.G., Eds.) Mater. Res. Soc. Symp. Proc., Pittsburgh, PA, 1997, pp. 69-74.
6. Fung, J.C., Kane, L., Smith, S.D., Sedat, J.W., Agard, D.A., and Spontak, R.J., "Phase Behavior of Complex Diblock Copolymer Blends: A Transmission Electron Microscopy Study," in *Defects in Insulating Materials* (Matthews, G.E. and Williams, R.T., Eds.) Trans Tech Publications, Aedermannsdorf, Switzerland, 1997, pp. 179-184.
5. Prevysh, V.A., Spontak, R.J., and Khan, S.A., "Tailored Viscosity Reduction in Aqueous Hydroxypropylcellulose Solutions," in *Polymers in Medicine and Pharmacy* (A.G. Mikos, K.W. Leong, M.L. Radomsky, J.A. Tamada, and M.J. Yaszemski, Eds.) Mater. Res. Soc. Symp. Proc., Pittsburgh, PA, 1995, pp. 137-142.
4. Spontak, R.J., Smith, S.D., Satkowski, M.M., Ashraf, A., and Zielinski, J.M., "Synthesis and Morphological Studies of  $(AB)_n$  Multiblock Copolymers," in *Polymer Solutions, Blends, and Interfaces* (I. Noda and D.N. Rubingh, Eds.), Elsevier Scientific, Amsterdam, 1992, pp. 65-88.
3. Spontak, R.J., El-Nokaly, M.A., Bartolo, R.G., and Burns, J.L., "Characterization of Lyotropic Polysaccharide Liquid Crystal Blends," in *Polymer Solutions, Blends, and Interfaces* (I. Noda and D.N. Rubingh, Eds.), Elsevier Scientific, Amsterdam, 1992, pp. 273-298.
2. Spontak, R.J. and Williams, M.C., "Novel Factors Influencing Microphase Separation in SB/SBS Block Copolymers," in *Phase Transitions in Soft-Condensed Matter* (T. Riste and D. Sherrington, Eds.), Series B, Physics **211**, Plenum Press, New York, 1989, pp. 311-314.
1. Windle, A.H., Yanming, D., Lemmon, T.J., and Spontak, R.J., "Electron Microscopy of Thermotropic Liquid Crystalline Polymers," in *Frontiers of Macromolecular Science* (T. Saegusa, T. Higashimura, and A. Abe, Eds.), Blackwell Scientific, London, 1989, pp. 343-348.

### ***Publication Metrics (16 August 2022)***

#### Google Scholar:

Citations	15,105
h-index	62

#### Web of Science:

Citations	10,910
h-index	54

### ***Patents***

#### *Pending*

6. Luiso, S., Fedkiw, P.S., Spontak, R.J., Lu, Y., and Quan, T., "Gel Polymer Electrolyte Composition and Applications Thereof," international patent filed June 2022. [exclusively licensed to Kraton Corp.]
5. Peddinti, B.S.T., Scholle, F., Spontak, R.J., and Ghiladi, R.A., "Inherently Self-Disinfecting Coating Surfaces and Method for Making Thereof," U.S. patent filed May 2021. [exclusively licensed to Kraton Corp.]
4. Ghiladi, R.A., Scholle, F., and Spontak, R.J., "Towards Universal Photodynamic Spray Coatings for Infection Control," international provisional patent filed April 2021.
3. Jin, S.A., Facchine, E.G., Khan, S.A., Rojas, O.J., Spontak, R.J., and Ghosh, K. "Aqueous Mixtures Including Cellulose Nanocrystals and Sulfonated Polyester," international patent filed November 2020.
2. Mhetar, V., Blackwell, R., Charendoff, M., Hein, M., Krutzer, B., Tocchetto, R., Wei, X., Willis, C.L., and Spontak, R.J., "Bio-Secure Protective Surface and Methods for Making," international patent filed November 2021.
1. Facchine, E.G., Khan, S.A., Rojas, O.J., Spontak, R.J., Jin, S.A., and Ghosh, K., "Suspensions Including Cellulose Nanofibril and Polyester," international patent filed May 2020.

#### *Issued*

6. Shankar, R., Ghosh, T.K., and Spontak, R.J., "Electroactive Nanostructured Polymers as Tunable Organic Actuators," U.S. Patent #7,956,520, June 7, 2011.
5. DeSimone, J.M., Siripurapu, S., Khan, S.A., Spontak, R.J., and Royer, J.R., "Nano- and Micro-cellular Foamed Thin-Walled Materials, and Processes and Apparatuses for Making the Same," U.S. Patent #7,658,989, February 9, 2010.
4. DeSimone, J.M., Khan, S.A., Royer, J.R., Spontak, R.J., Walker, T.A., Gay, Y.J., and Siripurapu, S., "Methods of Making Foamed Materials of Blended Thermo-plastic Polymers using Carbon Dioxide," U.S. Patent #6,790,870, September 14, 2004.
3. DeSimone, J.M., Royer, J.R., Walker, T.A., Spontak, R.J., and Khan, S.A., "Methods of Making Foamed Materials using Surfactants and Carbon Dioxide," U.S. Patent #6,403,663, June 11, 2002.

2. Spontak, R.J., Roberts, J.E., Prevys, V.A., and Khan, S.A., "Method of Reducing the Viscosity of a Black Liquor using Thiocyanate Salt," U.S. Patent #5,900,112, May 4, 1999.
1. Spontak, R.J., Roberts, J.E., Prevys, V.A., and Khan, S.A., "Method of Reducing the Viscosity of a Black Liquor," #5,635,027, June 3, 1997.

***Invited Research Presentations (past 6 years)***

372. "Ultrasensitive Polymer Membranes for Carbon Capture," Waterloo Filtration Institute Annual Conference, virtual conference, 2022 [distinguished lecture].
371. "Broad-Spectrum Self-Disinfecting Polymer Surfaces: Preparing for Future Health Crises," TPE World Summit, Düsseldorf, Germany, 2022.
370. "Water-Activated Materials to Mitigate Growing Global Challenges," R.J. Reynolds Tobacco Company Award in Teaching, Research and Extension Lecture, North Carolina State University, 2022 [award lecture].
369. "Broad-Spectrum Self-Disinfecting Polymer Surfaces: Preparing for Future Health Crises," 2<sup>nd</sup> Global Summit and Expo on Biotechnology and Bioscience, virtual conference, 2022 [plenary].
368. "Surface-Functionalized Polymer Membranes for Ultrasensitive Carbon Capture," International Conference on Polymer Science and Engineering, virtual conference, 2022 [keynote].
367. "Ultrasensitive Polymer Membranes for Economic Carbon Capture: Using Water to Break through the Upper Bound," Department of Chemistry, University of Tennessee, Knoxville, TN, October 2022.
366. "Broad-Spectrum Self-Disinfecting Antimicrobial Polymer Surfaces," Global Conference on Biomedical Engineering & Systems, virtual conference, September, 2022 [keynote].
365. "Advances in Thermoplastic Elastomer Gels: Lightweight High-Strain Materials," 10<sup>th</sup> International Conference and Exhibition on Mechanical & Aerospace Engineering, virtual conference, 2022 [keynote].
364. "Advancing the Mechanical Properties of Thermoplastic Elastomer Fibrous Mats," Society of Plastics Engineers 18<sup>th</sup> Thermoplastic Elastomers Topical Conference (TOPCON), Akron, OH, 2022.
363. "Functional Thermoplastic Elastomers to Meet Contemporary Needs," 2<sup>nd</sup> Global Summit on Polymer Science and Composites, Barcelona, Spain, 2022 [plenary].
362. "Functional Thermoplastic Elastomers to Meet Contemporary Needs," Department of Materials Science & Physical Chemistry, University of Barcelona, Barcelona, Spain, 2022.
361. "An Integrated Materials Approach to Ultrasensitive Polymer Membranes for Carbon Capture: Breaking through the Upper Bound," American Chemical Society National

Meeting, Chicago, IL, August 2022 [Roy W. Tess Award Lecture].

360. "Broad-Spectrum Self-Disinfecting Polymer Surfaces: Preparing for Future Health Crises," 2<sup>nd</sup> International Conference on Nature-Inspired Surface Engineering, Seoul, South Korea, 2022.
359. "Nanoporous Inorganic Nanostructures Generated on the Surfaces of Polymer Films and Fibers," Academia International Webinar on Materials Science & Engineering, virtual conference, 2022 [keynote].
358. "Broad-Spectrum Self-Disinfecting Polymer Surfaces: Preparing for Future Health Crises," Global Virtual Summit on Nanoscience & Nanotechnology, virtual conference, 2022 [keynote].
357. "A Surface-Engineering Approach to Ultrasensitive Polymer Membranes for Enhanced Carbon Capture," 6<sup>th</sup> International Conference on Bioinspiration and Biobased Materials, Nice, France, 2022 [keynote].
356. "Ultrasensitive Polymer Membranes for Carbon Capture," International Webinar on Polymer Science and Composite Materials, virtual conference, 2022 [keynote].
355. "Functionalization of Block Polymers: From Fundamental Understanding to Advanced Technologies," The Society of Polymer Science, Japan, National Meeting, virtual conference, 2022 [SPSJ International Award Lecture].
354. "Ultrasensitive Polymer Membranes for Carbon Capture," Chemical Engineering and Catalysis World Forum, London, UK, 2022 [plenary].
353. "An Integrated Materials Approach to Ultrasensitive Polymer Membranes for Carbon Capture: Breaking through the Upper Bound," Science Society, virtual seminar, 2022.
352. "Functionalization of Block Polymers: From Fundamental Understanding to Advanced Technologies," School of Polymer Science & Engineering, University of Akron, Akron, OH, 2022.
351. "Functionalization of Block Polymers: From Fundamental Understanding to Advanced Technologies," 13<sup>th</sup> Annual Conference on Polymer Science & Engineering, virtual conference, 2022 [keynote].
350. "Nonpolar and Charged Thermoplastic Elastomer Gels: Stimuli-Responsiveness & Technological Opportunities," Department of Mechanical Engineering, San Diego State University, San Diego, CA, 2022.
349. "Continuously Self-Disinfecting and Broad-Spectrum Polymers: Next Steps toward Preventing the Spread of Highly Contagious Microbes," Materials Research Society National Meeting, Boston, MA, 2021.
348. "Soft Nanotechnology to Mitigate Global Climate Change: Engineering Ultrahigh CO<sub>2</sub>-Selective Membranes from the Ground-Up," 5<sup>th</sup> Conference on Emerging Materials and Processes, virtual conference, 2021 [keynote].

347. "Advances in Analyzing and Applying the Properties of Nanocellulose," 5<sup>th</sup> Virtual Edition of Polymers, Plastics and Composites Conference, virtual conference, 2021 [keynote].
346. "Preventing the Next Pandemic with Broad-Spectrum, Self-Disinfecting Antimicrobial Polymers," 7<sup>th</sup> NANO Boston Conference, Boston, MA, 2021 [plenary].
345. "Interactions of Nanocellulose with Water: Advances in Fundamental Insights, Properties and Applications," 2<sup>nd</sup> International Symposium on Water, Ecology and Environment, virtual conference, 2021 [plenary].
344. "Charged Block Polymers: New Insights and New Opportunities," Department of Chemical & Biomolecular Engineering, Pennsylvania State University, State College, PA, 2021.
343. "Charged Block Polymers as Next-Generation Broad-Spectrum, Self-Sterilizing Antimicrobial Surfaces" and "Nanoscale Materials Strategies toward Ultrasensitive Polymer Membranes for Carbon Capture," Department of Chemical Engineering, Bucknell University, Lewisburg, PA, 2021.
342. "Nanoscale Materials Strategies toward Ultrasensitive Polymer Membranes for Carbon Capture: Breaking through the Upper Bound," Department of Chemical & Biomolecular Engineering, University of Arkansas, Fayetteville, AR, 2021.
341. "Morphological Studies of Nanostructured Block Copolymers: Marrying Fundamental Insight to Practical Application," Kraton Innovation Center, Kraton Corporation, Houston, TX, 2021.
340. "Charged Block Polymers: New Insights and New Opportunities," Department of Chemical & Biomolecular Engineering, University of Houston, Houston, TX, 2021.
339. "Chemical Modification of Polyester Polyols: Creating New Materials by Combining Simulations and Experiments," Global Virtual Summit on Catalysis and Chemical Engineering, virtual conference, 2021 [keynote].
338. "Novel Material Strategies to Ultrasensitive Membranes for CO<sub>2</sub> Capture," International Conference on Polymer Science and Composite Materials, virtual conference, 2021 [plenary].
337. "There and Back Again: A Professor's Tale," 60<sup>th</sup> Birthday Websymposium on Functional Polymeric Materials, International Association of Advanced Materials, virtual conference, 2021 [plenary].
336. "Novel Material Strategies to Ultrasensitive Membranes for CO<sub>2</sub> Capture," 5<sup>th</sup> International Conference on Fossil & Renewable Energy, virtual conference, 2021 [keynote].
335. "Strategic Use of Elastomers to Prevent the Spread of Infectious Diseases," Rubber Innovation Research Institute, Prince of Songkla University, webinar, 2021.
334. "Fast-Acting, Self-Disinfecting Macromolecular Strategies Aimed at Preventing the Spread of Highly Contagious Pathogens," International Online Conference on Macromolecules, virtual conference, 2020 [plenary].
333. "Elastomers that *Activate* in the Presence of Environmental Factors to *Inactivate* Contagious Microbes in the Environment," International Symposium on Water, Ecology and



- Environment, virtual conference, 2020 [keynote].
332. "Addressing Global Climate Change: Designing the Nanoscale Structure of CO<sub>2</sub>-Selective Polymer Membranes," Webinar on Material Science and Nanotechnology, virtual conference, 2020 [keynote].
  331. "Advances in Antimicrobial Design: Thwarting the Spread of COVID-19," 4<sup>th</sup> Global Innovators Summit, virtual conference, 2020 [keynote].
  330. "Tailoring the CO<sub>2</sub> Permeability and Selectivity of Organic Membranes from the Ground-Up," 2<sup>nd</sup> International Conference on Materials Science & Engineering, virtual conference, 2020 [keynote].
  329. "Elucidating the Contributions of Network Topologies in Multiblock Copolymers," Webinar on Materials Science, Engineering and Technology, virtual conference, 2020 [VSET Fellow Lecture].
  328. "Strategic Routes to Comprehensive Antimicrobial Polymers," 5<sup>th</sup> International Conference on Bioinspired and Biobased Chemistry and Materials, virtual conference, 2020 [keynote].
  327. "Solution Flow/Phase Behavior, Film Property Modification and Gas-Separation Attributes of Nanocellulose," 5<sup>th</sup> International Conference on Bioinspired and Biobased Chemistry and Materials, virtual conference, 2020 [keynote].
  326. "Polyester Polyol Thermosets Varying in Composition: From Molecular Simulations to Material Properties," First International Online Conference on Blends, Composites, Bio-composites and Nanocomposites, virtual conference, 2020 [plenary].
  325. "Advances in Analyzing and Applying the Properties of Nanocellulose," Green, Sustainable & Analytical Chemistry, virtual conference, 2020.
  324. "Strategic Routes to TPE Designs for Broad-Spectrum Antimicrobial Performance," SPE Thermoplastic Elastomers 2020, virtual conference, 2020 [keynote].
  323. "Multiscale Advances in Electroelastomers for Energy-Efficient and Controllable Shape Transformation," International Conference on Mechanical & Aerospace Engineering and Aerodynamics, virtual conference, 2020 [keynote].
  322. "Materials Strategies to Prevent the Spread of Highly Contagious Pathogens," Materials Summit 2020, virtual conference, 2020 [keynote].
  321. "Tailoring the CO<sub>2</sub> Permeability and Selectivity of Organic Membranes from the Ground-Up," International Association of Advanced Materials, Sweden, Advanced Materials Lecture Series, virtual conference, 2020 [IAAM Fellow Lecture].
  320. "Promising Strategies Toward Highly Effective and Broad-Spectrum Anti-Infective Polymers and Coatings," Smart Coatings 2020, Orlando, FL, 2020.
  319. "Thermoplastic Elastomer Gels: From Fundamental Network Studies to Tunable Soft Materials," 10<sup>th</sup> China International Conference on Functional Materials and Applications and

- 6<sup>th</sup> International Conference on Multi-Functional Materials and Structures, Chongqing City, China, 2019 [keynote].
318. "Controlling the Nanostructure of Charged Block Polymers for Energy-, Environment- and Health-Related Technologies," School of Mechanical and Automotive Engineering, South China University of Technology, Guangzhou, China, 2019.
  317. "Nanostructured Block Ionomers: Morphological Control & Contemporary Technologies," Institute for Polymer Chemistry, Universität Stuttgart, Stuttgart, Germany, 2019.
  316. "Thermoplastic Elastomers: From Polymer Architecture to Materials" and "Applications of Advanced Electron Microscopy in Polymer Science," Institute of Organic Chemistry, Johannes Gutenberg Universität Mainz, Mainz, Germany, 2019.
  315. "Membrane Design Strategies for Mitigating Global Climate Change by CO<sub>2</sub> Capture," NanoBioMedical Center, Adam Mickiewicz University, Poznan, Poland, 2019.
  314. "Tremendous Potential of Block Ionomers as Gas-Separation Membranes," Joint Workshop on Polymeric Membranes for CO<sub>2</sub> Capture," Trondheim, Norway, 2019.
  313. "Designing Comprehensive Self-Sterilizing Surfaces: Staying Ahead of a Growing Global Threat," NanoTech Poland International Conference & Exhibition, Poznan, Poland, 2019.
  312. "Charged Multiblock Polymers: From Cosolvent-Templated Self-Assembly to Ultraporous Gas-Separation Membranes," 32<sup>nd</sup> International Symposium on Polymer Analysis and Characterization," Sendai, Japan, 2019.
  311. "Thermodynamics of Theology: Balancing Enthalpy, Entropy and Faith," Fides et Ratio Series, Adam Mickiewicz University, Poznan, Poland, 2019.
  310. "Charged Thermoplastic Elastomers for 21<sup>st</sup> Century Soft Nanotechnologies," Department of Chemistry, American University in Cairo, Cairo, Egypt, 2019.
  309. "Designing Polymeric Materials as Comprehensive Anti-Infective Surfaces: Staying Ahead of a Growing Global Threat," Department of Chemistry, University of Victoria, Victoria, Canada, 2019.
  308. "Photodynamic Polymers as Comprehensive Anti-Infective Materials: Staying Ahead of a Growing Global Threat," Department of Chemical Engineering, Norwegian University of Science & Technology, Trondheim, Norway, 2019.
  307. "Adhesion and Stability Considerations Regarding Fiber-Reinforced Plastics," Saint-Goban High-Performance Materials Workshop, North Carolina State University, Raleigh, NC, 2018.
  306. "Nonpolar and Charged Thermoplastic Elastomer Gels: Morphological Development, Stimuli-Responsiveness & Technological Opportunities," Institute for Polymer Research, Helmholtz-Zentrum Geesthacht, Geesthacht, Germany, 2018.
  305. "Designing Selective Membranes from the Ground-Up: A Polymer Scientist's Playground," Integrative Research Institute for the Sciences, Humboldt Universität zu Berlin, Berlin, Germany, 2018.

304. "Thermoplastic Elastomer Gels as Morphologically and Mechanically Complex Soft Materials," Institute of Organic Chemistry, Johannes Gutenberg Universität Mainz, Mainz, Germany, 2018.
303. "Multiscale Design of Elastomeric Materials as Energy-Efficient Dielectric Elastomers for Electroresponsive Technologies," Department of Materials Science & Metallurgy, Warsaw University of Technology, Warsaw, Poland, 2018.
302. "Photodynamic Polymers as Comprehensive Self-Sterilizing Materials: Staying Ahead of a Growing Global Threat," Biological and Chemical Research Center, University of Warsaw, Warsaw, Poland, 2018.
301. "Block Copolymer Hierarchical Morphologies and Customized Functionality Inspired by Nature," 4<sup>th</sup> International Conference on Bioinspired and Biobased Chemistry and Materials, Nice, France, 2018 [keynote].
300. "Directed Self-Assembly of Block Copolymers as a Route to Novel Hierarchical Superstructures," Department of Chemistry, University of Warsaw, Warsaw, Poland, 2018 (repeat seminar).
299. "Nonpolar and Charged Thermoplastic Elastomer Gels: Stimuli-Responsiveness & Technological Opportunities," Department of Mechanical Engineering, University of Hong Kong, Hong Kong, China, 2018.
298. "Thermoplastic Elastomer Gels: From Simple Stretchy Materials to Morphologically Complex Responsive and Functional Systems," Department of Chemical and Biochemical Engineering, Zhejiang University, Hangzhou, China, 2018.
297. "Directed Self-Assembly of Block Copolymers as a Route to Novel Hierarchical Superstructures," Department of Polymer Science and Engineering, Zhejiang University, Hangzhou, China, 2018.
296. "Multiscale Design of Elastomeric Materials as Energy-Efficient Dielectric Elastomers for Electroresponsive Technologies" and "Thermoplastic Elastomer Gels: From Simple Stretchy Materials to Morphologically Complex Responsive and Functional Systems," School of Chemistry and Chemical Engineering, Shanghai Jiao Tong University, Shanghai, China, 2018.
295. "Directed Self-Assembly of Block Copolymers as a Route to Novel Hierarchical Superstructures" and "Thermoplastic Elastomer Gels: From Simple Stretchy Materials to Morphologically Complex Responsive and Functional Systems," Herbert Gleiter Institute of Nanoscience, Nanjing University of Science & Technology, Nanjing, China, 2018.
294. "Crystallization-/Coordination-Directed Self-Assembly of Block Copolymers," Department of Materials Science & Engineering, Peking University, Beijing, China, 2018.
293. "Solvent Templating and Solvent-Vapor Annealing of Charged Thermoplastic Elastomers," Soft Matter Lecture Series, Peking University, Beijing, China, 2018.
292. "Rethinking Soft Elastomers from Composition-Tunable Thermoplastic Elastomer Gels that

- Exhibit Rich Phase and Property Behaviour" and "Strategic Functionalization of Block Copolymers and Controlling the Phase Behaviour of Block Ionomers for Contemporary Technologies," Department of Chemical Engineering, Middle East Technical University, Ankara, Turkey, 2018.
291. "Polymer Coatings: For Food Preservation, Wearable Electronics and Everything Else," NanoBioMedical Center, Adam Mickiewicz University, Poznan, Poland, 2018.
  290. "Photodynamic Polymers as Comprehensive Anti-Infective Materials: Staying Ahead of a Growing Global Threat," Department of Physics and NanoBioMedical Center, Adam Mickiewicz University, Poznan, Poland, 2018.
  289. "Directed Self-Assembly of Block Copolymers as a Route to Novel Hierarchical Superstructures," Department of Chemistry, University of Warsaw, Warsaw, Poland, 2018.
  288. "Anisotropic Nanoparticles and Unique Hierarchical Superstructures from the Directed Self-Assembly of Block Copolymers" and "Universal and Tunable Polymeric Coating for Functionalizing Inert Polymer and Inorganic Surfaces," Institute for Nanomaterials, Advanced Technologies & Innovation, Technical University of Liberec, Liberec, Czech Republic, 2018.
  287. "Selective Midblock Modification of Thermoplastic Elastomers: Phase Behavior, Stimuli-Responsiveness and Unexpected Functionality," Soft Matter and Chemistry Laboratory, École Supérieure de Physique et de Chimie Industrielles, Paris, France, 2018.
  286. "Functionalized Thermoplastic Elastomers: A Route to Designer Soft Nanomaterials," NanoTech Poland International Conference, Poznan, Poland, 2018 [plenary].
  285. "Preparation, Characterization and Uses of Midblock-Functionalized Multiblock Copolymers," Technische Universität Berlin International Graduate Research Training Program, Potsdam, Germany, 2017.
  284. "Morphological and Spectroscopic Studies of Crystallizable Block Copolymers: From Directed Self-Assembly to Molecular Dynamic Analysis," International Conference on Molecular Spectroscopy, Mahatma Gandhi University, Kottayam, India, 2017 [plenary].
  283. "Thermoplastic Elastomer Gels as a Tunable Class of Soft Materials," "Controlling the Morphology and Properties of Charged Thermoplastic Elastomers," and "Transmission Electron Microtomography in Polymer Science: Opportunities to Visualize 3D Nanoscale Morphologies," International and Inter University Centre for Nanoscience and Nanotechnology, Mahatma Gandhi University, Kottayam, India, 2017 [Erudite Professor Lecture Series]
  282. "Morphological Development & Versatile Properties of Charged Thermoplastic Elastomers," 3<sup>rd</sup> International Conference on Polymer Science and Engineering, Chicago, IL, 2017 [keynote].
  281. "Morphological and Phase Studies of Designer Block Copolymer Systems," Small-Angle Scattering Interest Group, Argonne National Laboratory, Argonne, IL, 2017.
  280. "Directed Self-Assembly as a Route to Hierarchical Superstructures in Soft Matter,"

- Integrative Research Institute for the Sciences, Humboldt Universität zu Berlin, Berlin, Germany, 2017.
279. "Biomimicry with Block Copolymers: Hierarchical Superstructures by Directed Self-Assembly," Department of Chemistry, Jagiellonian University, Kraków, Poland, 2017.
  278. "Directed Self-Assembly of Block Copolymers and the Spontaneous Formation of Hierarchical Superstructures," NanoBioMedical Center, Adam Mickiewicz University, Poznan, Poland, 2017.
  277. "Designing Next-Gen Dielectric Elastomers as Stimuli-Responsive Soft Nanomaterials," NanoTech Poland International Conference & Exhibition, Poznan, Poland, 2017.
  276. "Biomimicry with Block Copolymers: Directed Self-Assembly via Crystallization or Chemical Coordination," Department of Physics, Adam Mickiewicz University, Poznan, Poland, 2017.
  275. "Controlled Self-Assembly of Block Copolymers and the Spontaneous Formation of Hierarchical Superstructures," Corporate Research Division, Procter & Gamble, Cincinnati, OH, 2017.
  274. "Charged Thermoplastic Elastomer Gels: Technological Opportunities and Self-Assembly Behavior," Department of Chemistry, University of South Carolina, Columbia, SC, 2017.
  273. "Charged Thermoplastic Elastomers: Technological Opportunities through Templated Self-Assembly," Kraton Polymers, Houston, TX, 2017.
  272. "Emerging Opportunities for Thermoplastic Elastomer Gels: Teaching an Old Dog New Tricks," Adidas, Portland, OR, 2017.
  271. "Bottlebrush Elastomers: A Promising Molecular Engineering Route to Tunable, Prestrain-Free Dielectric Elastomers," SPIE Smart Structures/NDE National Meeting, Portland, OR, 2017.
  270. "New Technological Insights and Opportunities for Nonpolar and Charged Thermoplastic Elastomer Gels," Nike, Portland, OR, 2017.
  269. "Advances in Thermoplastic Elastomer Gels as Highly Tunable Responsive Media," 11<sup>th</sup> International Gel Symposium, Nihon University, Chiba, Japan, 2017 [keynote].
  268. "Nonpolar and Charged Thermoplastic Elastomer Gels: Reprocessable and Recyclable Functional Soft Materials for a Sustainable Future," Institute of Multidisciplinary Research for Advanced Materials, Tohoku University, Sendai, Japan, 2017.
  267. "Nonpolar and Charged Thermoplastic Elastomer Gels: Exploring New Technological Opportunities for Soft Materials" and "Functional Polymer Nanocomposites and Polymer Nano-objects: A Panacea for Emerging Contemporary Nanotechnologies," Research & Development Division, Kuraray Co., Tsukuba, Japan, 2017.
  266. "Hierarchical Superstructures and Mesoporous Membranes from the Coordination-Driven Self-Assembly of Block Copolymers," Department of Chemical Engineering, Norwegian

University of Science & Technology, Trondheim, Norway, 2017.

265. "Self-Assembled Polymers: Letting Nature Build Beauty and Function from the Ground-Up," Science Colloquium Series, Shaw University, Raleigh, NC, 2016.
264. "A New Age of Functional and Responsive Thermoplastic Elastomers: Discovering a Buried Treasure," Australian Polymer Society Annual Meeting, Lorne, Australia, 2016 [plenary].
263. "Nano/meso/microscale Design of Elastomers as Energy-Efficient Dielectric Elastomers," Department of Chemical & Biomolecular Engineering, University of Melbourne, Melbourne, Australia, 2016.
262. "Anisotropic Nanoparticles and Hierarchical Superstructures from the Coordination-Driven Self-Assembly of Block Copolymers," Colloquium of the International Graduate Research Training Group on Self-Assembled Soft-Matter Nanostructures at Interfaces, Technische Universität Berlin, Berlin Germany, 2016.
261. "Controlling the Morphological and Property Development in Charged Thermoplastic Elastomers for Emerging Applications," Department of Materials Science & Engineering, Carnegie-Mellon University, Pittsburgh, PA, 2016.
260. "Controlling Morphological and Property Development in Network-Forming Multiblock Ionomers," International Conference on Chemical Engineering, Phoenix, AZ, 2016 [keynote].
259. "Controlling Morphological and Property Development in Network-Forming Multiblock Ionomers," School for Engineering of Matter, Transport & Energy, Arizona State University, Tempe, AZ, 2016.
258. "Nano/meso/microscale Design of Elastomers as Energy-Efficient Dielectric Elastomers," Department of Mechanical & Nuclear Engineering, Virginia Commonwealth University, Richmond, VA, 2016.
257. "Controlling the Morphological and Property Development in Network-Forming Multiblock Ionomers," Fakultät für Physik, Lehrstuhl für Funktionelle Materialien, Technische Universität München, München, Germany, 2016.
256. "Nanoengineering Macromolecular Systems to Yield Soft Materials with Novel Properties," Particulate Nanosystems Collaborative Research Centre, University of Bayreuth, Bayreuth, Germany, 2016.
255. "The Dawning of a New Age for Thermoplastic Elastomers as Functional Materials," Department of Physics, Adam Mickiewicz University, Poznan, Poland, 2016.
254. "Stabilization of Polymer/Polymer Nanolaminates: Block Copolymers vs. Nanogel Particles," NanoBioMedical Center, Adam Mickiewicz University, Poznan, Poland, 2016.
253. "Network-Forming Multiblock Ionomers: Controlling Phase Behavior for Diverse Technological Applications," NanoTech Poland International Conference & Exhibition, Poznan, Poland, 2016.

## *Litigations*

20. Served as an expert witness in the patent litigation of Becton Dickinson & Co., Sirigen, Inc. and Sirigen II Ltd. *vs.* Beckman Coulter, Inc. (Case #21:20-cv-01173-CAB-NLS) the details of ring-structured compounds for use in the fluorescence analysis of biological compounds (2022-present).
19. Served as an expert witness in the patent litigation of Huhtamaki Flexible Packaging Germany GmbH *vs.* Danapak Flexibles A/S involving the development of laminates possessing barrier properties for use in various packaging applications (2022-present).
18. Served as an expert witness in the product quality dispute of Imaflex, Inc. d/b/a CANSLIT *vs.* Cutrale Farms, Inc. (Case #8:21-cv-01341-KKM-CPT) involving the fabrication and performance of metallated polyethylene blend films for insect-induced damage prevention in the agricultural (orange) industry (2022).
17. Served as an expert witness in the product quality dispute of EFTEC North America, LLC, *vs.* Mississippi Lime Company (Case #2:20-cv-10654-RHC-MJH) involving CaO particles used in the production of automotive parts such as adhesives, sealants and coatings (2021-22).
16. Served as an expert witness in the injury litigation of Gonzalez *vs.* Watson (Miami, FL) involving the fatal fentanyl exposure of a patient to a transdermal pain patch (2021-22).
15. Served as an expert witness in a product quality dispute (Singapore International Arbitration Centre) of H.R.D. Singapore Pte Ltd. *vs.* Jinko Solar Co., Ltd. involving the long-term performance of photovoltaic modules installed in Japan (2019-2021).
14. Served as an expert witness in the patent litigation of The Regents of the University of California, Becton, Dickinson and Company, Sirigen, Inc., and Sirigen II Limited *vs.* Affymetrix, Inc. and Life Technologies Corporation (Case No. 17-cv-1394-H-NLS) involving the synthesis of polyfluorene compounds for use in the fluorescence analysis of biological compounds (2018-19). **Deposed.**
13. Served as an expert witness in the injury litigation of Jacqueline Delgado, Rene Delgado, Daniel Delgado and Chelsea Delgado *vs.* Fuel Barons, Inc. , Losorea Packaging, Inc., The TJX Companies d/b/a Marshalls, Home Goods and T.J. Maxx, and Times Square Drugs, Inc. d/b/a/ Manhattan's Pharmacy, Napa Home and Garden, Inc., Birdbrain, Inc.. and Plastic Bottle Corporation a/k/a Container Design Corpotation, Ashland Inc., Ivystone Group, LLC a/k/a Homestyle and Ivystone Group, Inc., and Christie Campbell, and Essential Ingredients, Inc. (Case No. 502011CA011245XXXXMB) involving the polymeric additives in gel fuels used in consumer products (2014-18). **Deposed.**
12. Served as an expert witness in the patent litigation of BioTras, LLC and BioTras Holdings, LLC *vs.* Clear Ballistics LLC and Joel Edwards *vs.* Johnny Wayne East, Brandon Knutson, and Edwin V. East, Jr. (Case No. 3:16-CV-566) involving the development of

thermoplastic elastomer (ballistic) gels for medical training (2017).

11. Served as an expert witness in the patent litigation of Actavis Laboratories UT, Inc. *vs.* UCB, Inc. (Case No. 2:15-cv-1001-JRG-RSP) involving adhesive performance and cold flow in transdermal drug delivery devices (2016). **Deposed.**
10. Served as an expert witness in the patent litigation of Andover Healthcare, Inc. *vs.* 3M Company (Case No. 1:13-cv-00843-LPS) involving the performance of an adhesive in a biomedical device (2014-16).
9. Served as an expert witness in an injury litigation (parties and case number not provided) involving the medical safety and material degradation of pelvic inserts (2014-16).
8. Served as an expert witness in the civil action of Daimler Trucks North America, LLC and Thomas Built Buses, Inc. *vs.* Hydro Aluminum North America, Inc. *vs.* A&E Powder Coating, LTD (Case No. 1:12-cv-00557) involving the performance of an adhesive in a commercial vehicle (2014).
7. Served as an expert witness in the civil action of New Hope Pipe Liners, LLC *vs.* Composites One, LLC, Cook Composites and Polymers, Curran Composites, Inc., Total Composites, Inc. Robert Cannon, and Eric Koettker (Case No. 09-cv-3222) involving the installation of cured-in-place-pipe (CIPP) thermosets (2011-12).
6. Served as an expert witness in the civil action of Loudermilk Services, Inc., *et al.* *vs.* Marathon Petroleum Company, LLC, *et al.* (Case No. 3-04-0966) involving the degradation of underground gasoline storage tanks (2008).
5. Served as an expert witness in the injury litigation of James L. Edwards, Jr., *et al.* *vs.* Rockwell Automation, Inc., *et al.* (Case No. 04 CVS 600) involving the fatal explosion at the West Pharmaceutical plant in North Carolina (2005-06).
4. Served as an expert witness in a patent litigation (parties and case number not provided) involving water transfer in desiccant-entrained polymers (2005).
3. Served as an expert witness in the patent litigation of LecTec Corporation *vs.* Endo Pharmaceuticals (case number not provided) involving water transfer in a commercial Lidocaine patch (2004).
2. Served as an expert witness in the patent litigation of Bausch & Lomb *vs.* CIBA Vision (case number not provided) regarding the morphology of extended-wear contact lenses in the U.S., Germany and Australia (2002-04). **Deposed** and *testified* in the U.S. and Australia.
1. Served as an expert witness in the patent litigation of Minnesota Mining and Manufacturing Company *vs.* Fellowes Manufacturing Company (Case No. 98-1667) regarding the use of block copolymer gels in wrist rests (2000). **Deposed.**