

# Rafael Verduzco

Associate Professor

Chemical and Biomolecular Engineering and Materials Science and NanoEngineering  
Rice University

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## Professional Preparation

Institution	Major/Area	Degree	Date
Rice University	Chemical Engineering	BS	5/2001
California Institute of Technology	Chemical Engineering	MS	5/2003
California Institute of Technology	Chemical Engineering	PhD	5/2007
Oak Ridge National Laboratory	Nanoscience	Postdoc	3/2007-6/2009

## Appointments

07/2016-present	Associate Professor, Chemical and Biomolecular Engineering and Materials Science and NanoEngineering, Rice University
07/2009-06/2016	Louis Owen Assistant Professor, Chemical and Biomolecular Engineering and Materials Science and NanoEngineering, Rice University
03/07-06/09	Postdoctoral Associate, Center for Nanophase Materials Sciences, Oak Ridge National Laboratory
05/04-08/04	NSF EAPSI Fellow, Pohang Institute of Technology, Pohang, South Korea
09/01-03/07	Graduate Student, Chemical Engineering, California Institute of Technology

## Awards and Honors

October 2015	<i>Europhys Lett.</i> Young Investigator Prize, ILCEC
September 2015	HENAAC Great Minds in STEM award
December 2013	NSF CAREER Award
November 2012	Best Fundamental Paper – STS-AIChE
June 2012	John S. Dunn Foundation Collaborative Research Award (w. JG Jacot)
July 2012	ACS Petroleum Research Fund Doctoral New Investigator Award
July 2009	Louis Owen Assistant Professor Chair in Chemical Engineering
June 2004	National Science Foundation EAPSI Fellow
August 2001	James Irvine Foundation Fellowship
August 2001	National Defense Science and Engineering Graduate Fellowship
May 2001	Graduated <i>summa cum laude</i>
May 2001	Thomas W. Moore award in Chemical Engineering
May 2000	Thomas W. Moore award in Chemical Engineering

## Teaching

CHBE 411: Thermodynamics I (Spring 2011, Fall 2012 – 2016)  
CHBE 594: Properties of Polymers (Fall 2009 – 2011, Spring 2015, 2017)  
CHBE 602: Physico-Chemical Hydrodynamics (Spring 2012, 2014, 2016)  
CHBE 495: Chemical Engineering Car Design (Fall 2016)  
CHBE 500 and 495: Undergraduate Research (Spring 2010 – present)  
Guest lecturer in CHBE 100 (Spring 2010, 2011, 2012) and CHEM 533 (Spring 2013, 2015)  
Faculty mentor for ENGI 100 (Spring 2011, 2014, 2015, 2016)

## Peer-Reviewed Journal Publications

(\*denotes corresponding author, ‡denotes undergraduate co-author)

59. L Qi, H ShamsiJazeyi, G Ruan, J Mann, YH Lin, C Song<sup>‡</sup>, Y Ma<sup>‡</sup>, L Wang, JM Tour, GJ Hirasaki\*, and R Verduzco\*. "Segregation of Amphiphilic Polymer-Coated Nanoparticles to Bicontinuous Oil/Water Microemulsion Phases," *under review*.
58. B Zhu, M Barnes, H Kim<sup>‡</sup>, M Yu, H Ardebilli, and R Verduzco\*. "Molecular Engineering of Step-Growth Liquid Crystal Elastomers," *Sensor. Actuat. B: Chem.*, **2017**, in press.
57. A Agrawal, H Chen, B Zhu, H Kim<sup>‡</sup>, O Adeitba, A Miranda, AC Chipara, PM Ajayan, JG Jacot\*, and R Verduzco\*, "Electromechanically Responsive Liquid Crystal Elastomer Nanocomposites for Active Cell Culture," *ACS Macro Lett.*, **2016**, 1386 – 1390.
56. JK Ponniah, H Chen, O Adetiba, R Verduzco, and JG Jacot\*. "Mechanoactive materials in cardiac science," *J. Mater. Chem. B.*, **2016**, *4*, 7350 – 7362.
55. H An, X Li, C Chalker, M Stracke, R Verduzco\*, and JL Lutkenhaus\*. "Conducting Block Copolymer Binders for Carbon-Free Hybrid Vanadium Pentoxide Cathodes with Enhanced Performance," *ACS Appl. Mater. Interfaces*, **2016**, *8*, 28585 – 28591.
54. SL Pesek, Q Xiang, B Hammouda, and R Verduzco. "Small-angle neutron scattering analysis of bottlebrush backbone and side chain flexibility," *J. Polym. Sci., Part B: Polym. Phys.* **2017**, *55*, 104 – 111.
53. JW Mok, D Kipp, LR Hasbun, J Strzalka, V Ganesan, and R Verduzco. "Parallel Bulk Heterojunction Photovoltaics Based on All-Conjugated Block Copolymer Additives," *J. Mater. Chem. A*, **2016**, *4*, 14804 – 14813.
52. D Kipp, R Verduzco, V Ganesan. "Block copolymer compatibilizers for ternary blend polymer bulk heterojunction solar cells -- An opportunity for computation aided molecular design." *Mol. Syst. Design. & Eng.*, **2016**, *1*, 353 – 369.
51. YH Lin, W Nie, H Tsai, X Li, A Mohite, G Gupta, and R Verduzco. "Supramolecular Block Copolymer Photovoltaics through Ureido-Pyrimidinone Hydrogen Bonding Interactions," *RSC Advances*, **2016**, *6*, 51562 – 51568.
50. H Tsai, W Nie, JC Blancon, CC Stoumpos, R Asadpour, B Harutyunyan, R Verduzco, J Crochet, S Tretiak, L Pedesseau, J Evan, MA Alam, G Gupta, J Lou, PM Ajayan, MJ Bedzyk, MG Kanatzidis, AD Mohite. "Layered 2D perovskite solar cells with 11.2 % efficiency, superior crystallinity and environmental stability," *Nature*, **2016**, *536*, 312 – 316.
49. D Kipp, R Verduzco, and V Ganesan. "Design of bicontinuous donor/acceptor morphologies for use as organic solar cell active layers," *J. Polym. Sci. B., Polym. Phys.*, **2016**, *54*, 884-895.
48. SL Pesek, YH Lin, W Kasper, B Chen, BJ Rhode, ML Robertson, GE Stein\*, and R Verduzco\*. "Synthesis of bottlebrush copolymers based on poly(dimethylsiloxane) for surface active additives," *Polymer*, **2016**, *98*, 495 – 504.
47. H Kim, B Zhu, A Oluwatomiyin, H Chen, P Ajayan, JG Jacot, R Verduzco\*. Preparation of Monodomain Liquid Crystal Elastomers and Liquid Crystal Elastomer Nanocomposites. *J. Vis. Exp.* **2016**, *108*, e53688, DOI:10.3791/53688.

46. KA Smith, YH Lin, K Yager, J Strzalka, W Nie, A Mohite, R Verduzco\*. Molecular origin of photovoltaic performance in donor-*block*-acceptor all-conjugated block copolymers, *Macromolecules*, **2015**, *46*, 2636.
45. H An, J Mike, KA Smith, L Swank, YH Lin, SL Pesek, R Verduzco\*, and JL Lutkenhaus\*. "Flexible Self-Assembled V2O5 Cathodes Enabled by Conducting Diblock Copolymers," *Scientific Reports*, **2015**, *5*, 14166.
44. D Kipp, J Mok, J Strzalka, SB Darling, V Ganesan, and R Verduzco\*. Rational Design of Thermally Stable, Cocontinuous Donor/Acceptor Morphologies Based on the Conjugated Polymer/All-Conjugated Block Copolymer/PCBM Blend. *ACS Macro Lett.* **2015**, *4*, 867 – 871.
43. JW Mok, YH Lin, KG Yager, AD Mohite, W Nie, SB Darling, Y Lee, ED Gomez, D Gosztola, RD Schaller, R Verduzco\*. Linking group influences charge separation and recombination in all-conjugated block copolymer photovoltaics, *Adv. Funct. Mater.* **2015**, *25*, 5578 – 5585.
42. R Verduzco\*. Shape-Shifting Liquid Crystals. Invited Perspective, *Science* **2015**, *347*, 949 – 950.
41. R Verduzco\*, X Li, SL Pesek, and GE Stein. Structure, function, self-assembly, and applications of bottlebrush copolymers. *Chem. Soc. Rev.* **2015**, *44*, 2405 – 2420.
40. A Agrawal, T Adetiba, X Li, AC Chipara, PM Ajayan, JA Jacot, and R Verduzco\*. Stimuli-Responsive Liquid Crystal Elastomers for Dynamic Cell Culture, *J. Mater. Res.*, **2015**, *30*, 453 – 462.
39. I Mitra, X Li, SL Pesek, BS Lokitz, D Uhrig, JS Ankner, R Verduzco\*, GE Stein\*. Thin film phase behavior of bottlebrush/linear polymer blends, submitted, *Macromolecules*, **2014**, *47*, 5269 – 5276.
38. KA Smith, B Stewart<sup>‡</sup>, KG Yager, J Strzalka, R Verduzco\*. Control of all-conjugated block copolymer crystallization via thermal and solvent annealing, *J. Polym. Sci. B: Polym. Phys.* **2014**, *52*, 900 – 906.
37. GK Mor, D Jones, TP Le, Z Shang, PJ Weathers, M Woltermann, K Vakhshouri, SA Tohran, T Saito, R Verduzco, A Salleo, MA Hickner, ED Gomez. Contact Doping with Sub-Monolayers of Strong Polyelectrolytes for Organic Photovoltaics, *Adv. Energy Mater.*, **2014**, *4*, 1400439.
36. Y-H Lin, KA Smith, K Yager, B Stewart<sup>‡</sup>, and R Verduzco\*. Lamellar and Liquid Crystal Ordering in Solvent-Annealed All-Conjugated Block Copolymer Thin Films, *Soft Matter* **2014**, *10*, 3817 – 3825.
35. X Li, H ShasiJazeyi, SL Pesek, A Agrawal, B Hammouda, R Verduzco\*. Thermoresponsive PNIPAAm bottlebrush polymers with tailored side-chain length and side-chain end-group structure, *Soft Matter* **2014**, *10*, 2008 – 2015.
34. H ShamsiJazeyi, R Verduzco, GJ Hirasaki\*. Reducing adsorption of anionic surfactant for enhanced oil recovery: Part II. Applied aspects. *Colloids Surf A Physicochem Eng* **2014**, *453*, 168 – 175.

33. H ShamsiJazeyi, R Verduzco, GJ Hirasaki\*. Reducing adsorption of anionic surfactant for enhanced oil recovery: Part I. Competitive adsorption mechanism. *Colloids Surf A Physicochem Eng* **2014**, 453, 168 – 175.
32. A Agrawal, T Yun<sup>‡</sup>, SL Pesek, WG Chapman, R Verduzco\*. Shape-responsive liquid crystal elastomer bilayers, *Soft Matter* **2014**, 10, 1411 – 1415.
31. H ShamsiJazeyi, CA Miller, GJ Hirasaki, R Verduzco\*. Polymer-Coated Nanoparticles for Enhanced Oil Recovery, *J. Appl. Polym. Sci.* **2014**, 131, 40576.
30. KA Smith, DL Pickel, K Yager, K Kisslinger, and R Verduzco\*. Conjugated Block Copolymers via Functionalized Initiators and Click Chemistry, *J. Poly. Sci. A. Polym. Chem.*, **2013**, 52, 154 – 163.
29. SL Pesek, X Li, B Hammouda, and R Verduzco\*. Small-angle neutron scattering analysis of bottlebrush polymers made by grafting-through polymerization, *Macromolecules*, **2013**, 46, 6998 – 7005.
28. C Guo, Y-H Lin, MD Witman, KA Smith, C Wang, A Hexemer, J Strzalka, ED Gomez, and R Verduzco\*. Conjugated block copolymer photovoltaics with near 3% efficiency through microphase separation, *Nano Lett.* **2013**, 13, 2957 – 2963.
27. A Agrawal, AC Chipara, Y Shamoo, PK Patra, BJ Carey, PM Ajayan, WG Chapman, and R Verduzco\*. Dynamic self-stiffening in liquid crystal elastomers, *Nat. Commun* **2013**, 4, 1739.
26. KA Smith, Y-H Lin, DB Dement<sup>‡</sup>, J Strzalka, SB Darling, DL Pickel, and R Verduzco\*. Synthesis and crystallinity of conjugated block copolymers prepared by click chemistry, *Macromolecules* **2013**, 46, 2636 – 2645.
25. CN Kempf<sup>‡</sup>, S Prukop, X Li, KA Smith, and R Verduzco\*. Amphiphilic poly(alkylthiophene) block copolymers prepared *via* externally initiated GRIM and click coupling, *Polym. Chem.* **2013**, 4, 2158 – 2163.
24. Y-H Lin, KA Smith, \*CN Kempf, and R Verduzco\*. Synthesis and crystallinity of all-conjugated poly(3-hexyl thiophene) block copolymers, *Polym. Chem.* **2013**, 4, 229 – 232.
23. X Li, SL Prukop, SL Biswal, R Verduzco\*. Surface Properties of Bottlebrush Polymer Thin Films, *Macromolecules* **2012**, 45, 7118 – 7127.
22. Y-H Lin, SB Darling, MP Nikiforov, J Strzalka, R Verduzco\*. Supramolecular Conjugated Block Copolymers. *Macromolecules* **2012**, 45, 6571 – 6579.
21. Y Zhu, X Li, Q Cai, Z Sun, G Casillas, M Jose-Yacaman, R Verduzco, JM Tour\*. Quantitative Analysis of Structure and Bandgap Changes in Graphene Oxide Nanoribbons during Thermal Annealing, *J. Am. Chem. Soc.* **2012**, 134, 11774 – 11780.
20. A Agrawal, P Luchette, P Palffy-Muhoray, SL Biswal, WG Chapman, and R Verduzco\*. Surface wrinkling in liquid crystal elastomers, *Soft Matter* **2012**, 8, 7138 – 7142.
19. P Dong, CL Pint, M Hainey, F Mirri, Y Zhan, J Zhang, M Pasquali, RH Hauge, R Verduzco, M Jiang, H Lin, J Lou.\* Vertically Aligned Single-Walled Carbon Nanotubes as Low-cost and

High Electrocatalytic Counter Electrode for Dye-Sensitized Solar Cells, *ACS Appl. Mater. Interfaces* **2011**, *3*, 3157 – 3161.

18. SH Hong, R Verduzco, JT Gleeson, S Sprunt, A Jákli\*. Nanostructures of liquid crystal phases in mixtures of bent-core and rod-shaped molecules, *Phys. Rev. E* **2011**, *83*, 061702.
17. I Botiz, RD Schaller, R Verduzco, SB Darling.\* Optoelectronic Properties and Charge Transfer in Donor–Acceptor All-Conjugated Diblock Copolymers, *J. Phys. Chem. C* **2011**, *115*, 9260 – 9266.
16. R Verduzco\*, I Botiz, DL Pickel, SM Kilbey, K Hong, E Dimasi, and SB Darling. Polythiophene-block-polyfluorene and Polythiophene-block-poly(fluorene-co-benzothiadiazole): Insights into the self-assembly of all-conjugated block copolymers, *Macromolecules* **2011**, *44*, 530 – 539.
15. R Verduzco\*, P Luchette, SH Hong, J Harden, E DiMasi, P Palffy-Muhoray, SM Kilbey II, S Sprunt, JT Gleeson, A Jakli. Bent-core liquid crystal elastomers, *J. Mater. Chem.* **2010**, *20*, 8488.
14. SH Hong, R Verduzco, JC Williams, RJ Twieg, E DiMasi, R Pindak, A Jakli, JT Gleeson, S Sprunt\*. Short-range smectic order in bent-core nematic liquid crystals, *Soft Matter* **2010**, *6*, 4819 – 4827.
13. J Harden, M Chambers, R Verduzco, P Luchette, JT Gleeson, S Sprunt, AJakli\*. Giant flexoelectricity in bent-core nematic liquid crystal elastomers, *Appl. Phys. Lett.* **2010**, *96*, 102907.
12. C Bailey, K Fodor-Csorba, R Verduzco, JT Gleeson, S Sprunt, A Jákli.\* Large Flow Birefringence of Nematogenic Bent-Core Liquid Crystals, *Phys. Rev. Lett.* **2009**, *103*, 237803.
11. BS Lokitz, JM Messman, JP Hinestrosa, J Alonzo, R Verduzco, RH Brown, M Osa, JF Ankner, SM Kilbey.\* Dilute Solution Properties and Surface Attachment of RAFT Polymerized 2-Vinyl-4,4-dimethyl Azlactone (VDMA), *Macromolecules* **2009**, *42*, 9018 – 9026.
10. M Chambers, R Verduzco, JT Gleeson, S Sprunt, A Jákli.\* Flexoelectricity of a calamitic liquid crystal elastomer swollen with a bent-core liquid crystal, *J. Mater. Chem.* **2009**, *19*, 7909 – 7913.
9. M Chambers, R Verduzco, JT Gleeson, S Sprunt, A Jákli.\* Calamitic liquid crystal elastomers swollen in bent-core liquid crystal solvents, *Adv. Mater.* **2009**, *21*, 1 – 5.
8. NR Scruggs, R Verduzco, D Uhrig, W Khan, S-Y Park, J Lal, JA Kornfield.\* Self-Assembly of Coil/Liquid-Crystalline Diblock Copolymers in a Liquid Crystal Solvent, *Macromolecules* **2009**, *42*, 299 – 307.
7. L Porcar, Y Liu, R Verduzco, K Hong, PD Butler, LJ Magid, GS Smith, W-R Chen.\* Structural Investigation of PAMAM Dendrimers in Aqueous Solutions Using Small-Angle Neutron Scattering: Effect of Generation, *J. Phys. Chem. B* **2008**, *112*, 14772 – 14778.

6. T Li, K Hong, L Porcar, R Verduzco, PD Butler, GS Smith, Y Liu, W-R Chen.\* Assess the Intramolecular Cavity of a PAMAM Dendrimer in Aqueous Solution by Small-Angle Neutron Scattering, *Macromolecules* **2008**, *41*, 8916 – 8920.
5. Y Xia, R Verduzco, RH Grubbs, JA Kornfield.\* Well-Defined Liquid Crystal Gels from Telechelic Polymers, *J. Am. Chem. Soc.* **2008**, *130*, 1735 – 1740.
4. R Verduzco, NR Scruggs, S Sprunt, P Palfy-Muhoray, JA Kornfield.\* Director dynamics in liquid-crystal physical gels, *Soft Matter* **2007**, *3*, 993 – 1002.
3. R Verduzco, G Meng, JA Kornfield.\*; Meyer, R. B. Buckling Instability in Liquid Crystalline Physical Gels, *Phys. Rev. Lett.* **2006**, *96*, 147802.
2. MD Kempe, R Verduzco, NR Scruggs, JA Kornfield.\* Rheological study of structural transitions in triblock copolymers in a liquid crystal solvent, *Soft Matter* **2005**, *2*, 422 – 431.
1. MD Kempe, NR Scruggs, R Verduzco, J Lal, JA Kornfield.\* Self-assembled liquid-crystalline gels designed from the bottom up, *Nat. Mater.* **2004**, *3*, 177 – 182.

### Book Chapters

1. Y-H Lin, R Verduzco\*. Synthesis and Process-Dependent Film Structure of All-Conjugated Copolymers for Organic Photovoltaics, in *Polymer Composites for Energy Harvesting, Conversion, and Storage*. ACS Symposium Series 2014, vol. 1161, ch. 3, 49 – 70.

### Invited Presentations

48. “Bottlebrush Additives for Functional Thin Film Coatings,” University of Texas Dallas, Chemistry Department Seminar, Dallas, TX, March 24, 2017.
47. “Conjugated Polymer Binders for Electrochemical Energy Storage,” American Physical Society Spring Meeting, New Orleans, LA, March 13, 2017
46. “Programming Shape-Responsiveness in Liquid Crystal Elastomers,” Liquid Crystal Institute, Kent OH, Department Seminar. March 1, 2017
45. “Conjugated Polymer and Block Copolymer Additives in Bulk Heterojunction OPVs,” American Institute of Chemical Engineering Annual Meeting, San Francisco, CA, November 16, 2016.
44. “Conjugated polymer and block copolymer additives in bulk heterojunction OPVs,” American Chemical Society Southwest Regional Meeting, Galveston, TX, November 11, 2016.
43. “Entropy-mediated segregation of bottlebrush polymer additives,” American Chemical Society Southwest Regional Meeting, Galveston, TX, November 10, 2016.
42. “Entropy-mediated segregation of bottlebrush polymer additives,” Texas Soft Matter Meeting, Dallas, TX, August 12, 2016.
41. “Structure and Conformation of Bottlebrush Polymers and Assemblies Determined by Small-Angle Neutron Scattering,” American Conference on Neutron Scattering, Long Beach, CA, July 12 2016.

40. "Synthesis, Alignment and Spontaneous Shape-Change in Epoxy-Based Liquid Crystal Elastomers," Phoenix, CA, MRS Spring Meeting, March 29, 2016.
39. "All-conjugated block copolymer additives and compatibilizers for organic photovoltaics," San Diego, CA, ACS Spring Meeting, March 15, 2016.
38. "Tailoring Interfaces in Soft Materials through Block Copolymer and Bottlebrush Additives," PRISM/PCCM Fall 2015 Seminar Series, December 9, 2015, Princeton, NJ.
37. "Energy Storage and Photovoltaics through Block Copolymer Self-Assembly," MRS Fall meeting, December 2015, Boston, MA.
36. "Dynamic Cell Culture through Liquid Crystal Elastomer Composites," MRS Fall Meeting, December 2015, Boston, MA
35. "Electromechanically Responsive Liquid Crystal Elastomer Nanocomposites for Active Cell Culture" International Liquid Crystal Elastomers Conference, October 4, Erice, Italy.
34. "Conjugated Block Copolymer Photovoltaics," *IX International Congress on Chemical Sciences, Technology and Innovation*, Quimicuba, October 2015, Havana, Cuba
33. "Block Copolymer Compatibilizers for Organic Photovoltaic Blends," 250<sup>th</sup> ACS FALL Meeting, August 18, 2015, Boston, MA.
32. "Conjugated Block Copolymers for Energy Storage and Self-Assembled Photovoltaics," Workshop on Frontiers of Block Copolymer Self Assembly, NSLS-II/CFN Joint Users Meeting, May 18 2015.
31. "Block Copolymer Self-Assembly for Photovoltaics, Energy Storage, and Responsive Coatings," 4<sup>th</sup> International Grubb's Symposium, April 10 2015, Ningbo, China
30. "Morphology of All-Conjugated Block Copolymer Thin Films: Self-Assembly, Crystallization, and Phase Separation," APS Spring Meeting, March 2, 2015, San Antonio, TX.
29. "Functional Polymeric Materials: Block Copolymer Photovoltaics and Shape Responsive Liquid Crystal Elastomers," University of Houston, February 20, 2015, Department of Electrical Engineering, Houston, TX.
28. "Charge Separation and Photovoltaic Performance of All-Conjugated Block Copolymers" Gulf Coast Consortia Workshop: Light-Driven Processes in Bio-Inspired Materials. December 15, 2014, Rice University, Houston, TX
27. "Morphology and Charge Separation in All-Conjugated Block Copolymer Photovoltaics," ACS Macromex Meeting, December 4, 2014, Puerto Vallarta, Mexico.
26. "All-Conjugated Block Copolymer Photovoltaics," AIChE Annual Meeting, Emerging Areas in Polymer Science and Engineering Plenary Session, November 17, 2014, Atlanta, GA
25. "All-Conjugated Block Copolymer Photovoltaics," 2014 NorTex Nano Summit, Rice University, October 14, 2014, Houston, TX.
24. "Bottlebrush Polymers as Additives for Tailoring Thin Film Properties," Department of Chemical & Biomedical Engineering, University of Southern Florida, October 3, 2014.

23. "Structure and Photovoltaic Performance of All-Conjugated Block Copolymers" National Graduate Research Polymers Conference, Baton Rouge, LA, June 2, 2014.
22. "Charge and Energy Transfer in All-Conjugated Block Copolymers," 30<sup>th</sup> International Conference of the Polymer Processing Society, June 10, 2014
21. "Block Copolymer Cathodes for Electrochemical Energy Storage," Los Alamos National Laboratory, May 28, 2014.
20. "Morphology and Charge Separation in All-Conjugated Block Copolymers," CNM/APS/EMC user conference, May 12, 2014.
19. "Synthesis, morphology, and optoelectronic properties of donor-acceptor all-conjugated block copolymers," 247<sup>th</sup> ACS Spring Meeting, March 18, 2014.
18. "Polymer Nanocomposites using Bottlebrush Polymers," Materials Science and Engineering Department, SUNY Stonybrook, July 2, 2013
17. "Structure and Photovoltaic Performance of All-Conjugated Block Copolymers," Center for Integrated Nanoscale Technologies, Los Alamos National Lab, July 10, 2013.
16. "Solution Conformation of Multicomponent Bottlebrush Polymers," National Institute for Standards and Technology, April 18, 2013.
15. "Synthesis and Film Properties of Multicomponent Bottlebrush Polymers," ExxonMobil Baytown Research Center, February 8, 2013.
14. "Sustainable Energy from Light-Harvesting Plastics," Rice Undergraduate Research Symposium, January 26, 2013
13. "Sustainable Energy from Light-Harvesting Plastics," Rice Engineering Alumni Annual Banquet, December 4, 2012
12. "Design of High Performance Block Copolymer Photovoltaics," Texas A&M University, Materials Engineering Seminar, November 30, 2012
11. "Characterization of All-Conjugated Block Copolymers and Bottlebrush Polymers," University of Houston, Advanced Polymer Characterization Workshop, November 9, 2012
10. "Synthesis and Crystallinity of All-Conjugated Block Copolymers," Annual Meeting of the American Institute of Chemical Engineers, Pittsburgh, PA, October 30, 2012
9. "Dynamic Stiffening in Liquid Crystal Elastomers," Chemical Engineering Department, Lamar University, April 11, 2012
8. "All-Conjugated Block Copolymers for Self-Assembled Photovoltaics," Center for Nanoscale Materials, Argonne National Laboratory, December 14, 2011
7. "All-Conjugated Block Copolymers for Self-Assembled Photovoltaics," Center for Nanoscale Materials Sciences, Oak Ridge National Laboratory, September 2011



6. "Synthesis and Self-Assembly of Rod-Rod Polythiophene-*block*-Polyfluorene Conjugated Copolymers," ACS National Meeting, Denver, Colorado, August 2011
5. "Block Copolymers for Nanostuctured Photovoltaics," Chemical Engineering Department, Tianjin University, January 20, 2011
4. "Neutron and X-Ray Scattering Studies of Structured Fluids: Bent-Core Liquid Crystals and PAMAM Dendrimers," Case Western Reserve University, April 2009
3. "Investigation of PAMAM in solution by Neutron Scattering" Tennessee Technological University, Department of Chemical Engineering, 2008
2. "Self-Assembled Liquid Crystal Gels," Kent State University, Liquid Crystal Institute, 2007
1. "Self-Assembled Liquid Crystal Gels," invited talk, University of Leeds, Polymers and Complex Fluids, 2007

### Department Service

1. **Graduate Recruiting and Admissions (2010 – present):** RV has served as a member of the graduate committee since joining the department and is currently serving as the head of the CHBE Graduate Recruiting Committee. Responsibilities include reviewing and admitting applicants to the PhD, MS, and MCHE programs, planning the graduate student visitation weekend, and advertising the department through events such as the AIChE national meeting.
2. **Undergraduate Studies (2009 – 2014):** RV served as a member of the undergraduate studies committee for five years. Responsibilities include reviewing and updating the department curriculum, advising students on department courses and requirements, and recognizing the achievements of undergraduate students through endowed awards and fellowship. RV is no longer a formal member of the committee but continues to advise CHBE students in his roles as faculty associate and as an undergraduate student mentor.
3. **Department Seminar Coordinator (2010 – 2015):** Along with Prof. Deepak Nagrath, RV has coordinated department seminars for the past 5 years. This includes scheduling 10 – 12 seminars each semester, coordinating with faculty, and inviting annual lecturers for the Leland, Wilbur, and Chevron lectures.
4. **Applied Physics Graduate Recruiting Committee (Spring 2013 – present):** RV has served on the recruiting committee of applied physics since Spring of 2013. Responsibilities include reviewing applicants to the program and participating in the annual visitation weekend.
5. **Faculty Search Committee (Fall 2016 – Spring 2017)**

### University Service

1. **Committee on Research (Fall 2016 – present)**
2. **Shared Equipment Authority Faculty Board Member (2010 – present):** RV has served on the board of the SEA for the past 5 years. The board meets monthly and serves the university by acquiring and maintaining shared equipment facilities on campus. This includes

setting instrument rates, coordinating instrument upgrades and repairs, acquiring new instrumentation, and managing finances related to shared instrument use.

3. **Rice Center for Engineering Leadership Faculty Advisory Committee (2010 – present):** RV has served on the RCEL board since its inception in 2010. Responsibilities include recruiting an RCEL director, advising RCEL staff, and defining a long-term mission for RCEL.
4. **Sid Richardson Faculty Associate (Fall 2009 – present):** RV has served as a faculty associate of Sid Richardson College since the fall of 2009. RV also served as a first-year mentor for a group of freshmen at Sid Richardson College that matriculated in 2013.
5. **Rice Vision Dinner.** Undergraduate recruiting event, February 16 2016.
6. **Security Marshal.** Rice University Commencement 2016.

## Professional Service

### Proposal Review:

1. **National Science Foundation:** CBET (Interfacial Processes and Thermodynamics, Energy for Sustainability), CMMI (Materials Processing and Manufacturing), and DMR (Polymers and DMREF).
2. **Department of Energy:** Basic Energy Sciences, Center for Nanoscale Materials Sciences at Oak Ridge National Laboratory, Center for Nanoscale Materials at Argonne National Laboratory, Center for Functional Nanomaterials at Brookhaven National Laboratory.
3. **American Chemical Society:** Petroleum Research Fund
4. **European Research Council:** ERC Consolidator Grant 2014
5. **National Laboratory Facilities:** Facility Proposal Review for the Center for Nanoscale Materials at Argonne National Laboratory, the Center for Functional Materials at Brookhaven National Laboratory, the Center for Nanophase Materials Sciences, the National Center for Neutron Research at the National Institute of Standards and Technology (NIST), and the Stanford Synchrotron Radiation Light Source (SSRL).
6. **Research Council KULeuven,** InterDisciplinaire Onderzoeksprogramma's - Interdisciplinary research project
7. **Royal Society e-GAP.** Leverhulme-Royal Society Africa Award.
8. **Advanced Research Projects Agency - Energy (ARPA-E).** SHIELD FOA.

**Journal Review:** *ACS Macro Letters, ACS Nano, ACS Applied Materials and Interfaces, Advanced Materials, Advanced Energy Materials, Advanced Functional Materials, Angewandte Chemie International Edition, Applied Physics Letters, Chemical Communications, Chemistry of Materials, Colloid and Polymer Science, Colloid and Surfaces A, Colloids and Surfaces B: Biointerfaces, Energy and Environmental Science, Energy and Fuels, Fuel, IEEE Transactions on Nanotechnology, Industrial and Engineering Chemistry Research, International Journal of Molecular Sciences, Journal of Applied Polymer Science, Journal of the American Chemical Society, Journal of Chemical Physics, Journal of Physical Chemistry C, Journal of Materials Chemistry A, Journal of Materials Chemistry C, Journal of Physical Chemistry, Journal of Polymer Science Part A: Polymer Chemistry, Journal of Polymer Physics Part B: Polymer Physics, Polymers, Langmuir, Macromolecular Symposia, Macromolecules (top 150 reviewer), Materials Today, Nano Letters, Nanoscale, Nature, Nature Chemistry, Nature Communications, Nature Materials, Nature Nanotechnology, New Journal of Chemistry, Physical Chemistry Chemical Physics, Physical Review Applied, Physical Review E, Physical Review Letters,*

*Polymer, Polymer Chemistry, RSC Advances, Science, Science Advances, Sensors and Actuators B: Chemical, Small, Soft Matter.*

#### **Facility Boards and External Review:**

1. NIST Center for Neutron Research Users Group (NUG) Executive Committee, 2015 – present. (elected in 2015).
2. User Executive Board Member for the Center for Nanophase Materials Sciences (CNMS), 2012 – present (elected in 2012, renewed in fall 2014).
3. External Review Board Member for Puerto Rico-Wisconsin NSF-PREM
4. Invited speaker for Center for High Resolution Neutron Scattering (CHRNS) site visit and panelist for CHRNS workshop: "Neutron Measurements for Materials Design & Characterization"

#### **Conference Organization:**

1. Lead Organizer for the 2017 International Liquid Crystal Elastomers Conference.
2. Organizer for fall 2017 American Chemical Society Fall Meeting Session on Shape-Shifting Polymers.
3. Organizer of the Chemical Engineering session for the Gulf Coast Undergraduate Research Symposium (GCURS) (2015 and 2016). <http://gcurs.rice.edu/>
4. Organizer for the Texas Soft Matter Meeting, August 21, 2015, Rice University. <http://txsoftmatter.chee.uh.edu/>
5. Organizing committee member for the 28<sup>th</sup> International Symposium on Polymer Analysis and Characterization (ISPAC, <http://www.ispac-conferences.org/ispac-2015.aspx>).
6. Organizing committee member for the 2015 Center for Nanophase Materials Sciences (CNMS) user meeting at Oak Ridge National Laboratory (ORNL).
7. Session Organizer for "Structure and Properties of Polymers I," "Polymer Processing and Rheology II," "Polymeric Materials for Energy Conversion," "Nanoscale Structure in Polymers" at the annual meeting of the American Institute of Chemical Engineers (2009, 2010, 2011, 2013, 2014, 2015, 2016, respectively). Poster judge for both graduate and undergraduate student poster presentations.
8. Judge for graduate student poster competition at the AIChE annual meeting (2013 and 2014), APS March Meeting (San Antonio, 2015), NorTex Nano Meeting (Rice University, 2014).
9. Organizer for the Chemical Engineering session of the Rice Undergraduate Research Symposium (RURS), held annually in October.

#### **Synergistic Activities**

1. **Descubra Event at the Houston Children's Museum (December 10, 2016):** In an event co-sponsored by the Children's Museum of Houston and the Smithsonian Latino Center –

Descrubra – visitors participated in hands-on STEM based activities and informal conversations between with Latino STEM professionals. This event also co-incided with a Star Wars Day at the Children’s museum, and activities involved a Star Wars theme. The Verduzco laboratory organized a table demonstrating various properties of polymers: viscoelasticity (Oobleck swamp made from corn starch and water) and a glass-transition (shrinking of polystyrene sheet cut into shapes, ‘shrinky-dinks’).

2. **Rice Institute of Biosciences and Bioengineering (IBB) STEM Engagement Program:** The IBB STEM Engagement program brings high school students from the Science Academy of South Texas to Rice to participate in field trips, demonstrations, and conduct laboratory research. Two graduate students in the Verduzco laboratory taught the high school visitors about energy storage and shape-responsive polymeric materials.
3. **National Science Foundation Research Experiences for Undergraduates:** RV is the co-PI on an NSF-sponsored REU program focused on community college applicants. Activities include recruiting 8 – 10 community college students for summer research each year, advertising the program on community college campuses, and mentoring two community college students per year. The program begins in the summer of 2015.
4. **NSF Reserch Experiences for Teachers (RET) Mentor:** RV served as a faculty mentor during the summer of 2014 for an NSF RET researcher. RV designed the project and coordinated training and laboratory activities. The summer researcher Ralph Cox was mentored by Verduzco group member Stacy Pesek.
5. **West Houston Center for Science and Engineering Alliance for Minority Participation at Houston Community College:** Since 2010, RV has served as a mentor and research advisor to students from Houston Community College. RV has mentored seven houston community college undergraduate students in summer research projects. Two have been listed as authors or co-authors on publications, and all seven have transferred to four-year universities to complete degrees in science and engineering.
6. **NEWT Nano-Environmental Workshop:** The Verduzco laboratory participated in the NEWT Nano-Environmental workshop in March 2016, one of the first outreach activities as part of the new NSF Engineering Research Center established at Rice University. This activity focused on K-12 teachers and discussing challenges and technologies related to water purification.
7. **Rice’s Community and Mentoring Program for Undergraduate Success:** RV has served as a mentor for underrepresented students at Rice through the Community and Mentoring Program led by Dr. Richard Tapia. RV has participated in outreach activities on campus, including as a one-on-one mentor for students, a plenary speaker during a student-organized science and engineering conference, and a speaker during regular meetings.
8. **Kashmere High School Research/Mentorship Program:** RV served as a faculty mentor for the pilot research experience and mentorship partnership between Rice Institute of Biosciences and Bioengineering and Kashmere High School (KHS). The program provided four rising seniors at KHS the opportunity to experience science, technology, engineering, and mathematics (STEM) research, learn valuable life skills, and develop a mentormentee relationship with scientists and engineers in the academic/professional workplace. Jorge Mok, a student in the Verduzco group, is participating in the program as a mentor
9. **Children’s Museum NanoDays:** The Verduzco group has volunteered at the Houston Children’s Museum NanoDays event the past two years, in March 2014 and 2015. NanoDays brings scientists together with museums to create unique learning experiences and engages people of all ages by combining simple hands-on activities for young people with events exploring current research for adults.

10. **John Foster Dulles Science and Math Academy:** As a native of the Houston area and former John Foster Dulles High School student, RV has returned to his *alma mater* for presentations and science demonstrations. In August 2014, RV participated in orientation activities for new students entering the Science and Math Academy.
11. **Sally Ride Festival:** RV has participated in the Sally Ride Festival the past two years, in leading science demonstrations for small groups and in conjunction with the South Texas Section of the American Institute of Chemical Engineers (STS-AIChE). The Sally Ride Festival provides interactive science demos and experiments for kids.
12. **Rice University Continuing Studies Teacher Training:** RV has twice served as a guest lecturer for Continuing Studies' teacher training programs. RV participated in a teacher training program focused in science teachers from Humble ISD, and the goal of the lectures was to provide teachers with insights into university-level expectations for students in science, mathematics, and engineering.

## Students Mentored

### PhD students:

<u>Name</u>	<u>Degree Program</u>	<u>Start Date and Status</u>
Xianyu Li	Chemical & Biomolecular Engineering	Fall 2009-May 2014
Aditya Agrawal	Chemical & Biomolecular Engineering	Fall 2009-July 2014
Kendall Smith	Chemical & Biomolecular Engineering	Fall 2009-November 2014
Hadi ShamsiJazeyi <sup>‡</sup>	Chemical & Biomolecular Engineering	Fall 2010-December 2014
Yen-Hao Lin	Chemical & Biomolecular Engineering	Fall 2009-April 2015
Stacy Prukop	Chemical & Biomolecular Engineering	Fall 2010-August 2015
Aarthi Muthuswami <sup>‡</sup>	Chemical & Biomolecular Engineering	Fall 2010-October 2015
Jorge Mok	Chemical & Biomolecular Engineering	Fall 2012-present
Luqing Qi	Chemical & Biomolecular Engineering	Fall 2012-present
Zhiqi Hu	Chemical & Biomolecular Engineering	Fall 2014-present
Xiaoyi (Tracy) Li	Chemical & Biomolecular Engineering	Fall 2014-present
Amit Jain	Chemical & Biomolecular Engineering	Fall 2015-present
Hao Mei	Chemical & Biomolecular Engineering	Spring 2015-present
Morgan Barnes	Materials Science and NanoEngineering	Summer 2016 – present
Andrea Miranda	Chemistry	Summer 2016 – present
Saurabh Sharma	Chemical & Biomolecular Engineering	Spring 2017 – present

<sup>‡</sup>Co-advised with Professor George Hirasaki

### MS and MCHE students:

<u>Name</u>	<u>Degree Program</u>	<u>Start Date and Status</u>
Luis Hasbun	Chemical & Biomolecular Engineering	Fall 2015-Spring 2016
Bohan Zhu	Chemical & Biomolecular Engineering	Fall 2013-Spring 2016

### M.S and Ph.D.Thesis Committees:

<u>Year</u>	<u>Name</u>	<u>Degree Program</u>	<u>Chairperson</u>
2016	Mohammed Adnan	PhD, Chemical Engineering	Matteo Pasquali
2016	Abdulrahman Alharbi	MS, Chemical Engineering	Lisa Biswal
2016	Yuchong Zhang	PhD, Chemical Engineering	Walter Chapman
2016	Chad Byers	PhD, Chemistry	Christy Landes
2016	Víctor García López	PhD, Chemistry	James Tour
2016	Pingfei Lu	PhD, Chemistry	James Tour
2015	Brittany Olivy	PhD, Chemistry	Andrew Barron
2015	Chad Byers	PhD, Applied Physics	Christy Landes
2015	Ariana Melendez	M.S., Chemical & Biomolecular Eng.	Francisco Vargas
2015	Stacy Pesek	PhD, Chemical & Biomolecular Eng.	Rafael Verduzco
2015	Aarthi Muthuswamy	PhD, Chemical & Biomolecular Eng.	George Hirasaki
2015	Jinjian Wu	PhD, Civil and Environmental Eng.	Qilin Li
2015	Dmitri Tsenttalovich	PhD, Chemical & Biomolecular Eng.	Matteo Pasquali
2015	Yen-Tien Lu	PhD, Chemical & Biomolecular Eng.	Andrew Barron
2015	Yen-Hao Lin	PhD, Chemical & Biomolecular Eng.	Rafael Verduzco
2014	Hadi ShamsiJazeyi	PhD, Chemical & Biomolecular Eng.	George Hirasaki
2014	Ramya Sambasivan	PhD, Chemistry	Zachary Ball
2014	Kendall Smith	PhD, Chemical & Biomolecular Eng.	Rafael Verduzco
2014	Kung-Po Chao	PhD, Chemical & Biomolecular Eng.	Lisa Biswal
2014	Aditya Agrawal	PhD, Chemical & Biomolecular Eng.	Rafael Verduzco
2014	Bennet Marshall	PhD, Chemical & Biomolecular Eng.	Walter Chapman
2014	Xianyu Li	PhD, Chemical & Biomolecular Eng.	Rafael Verduzco
2013	Pinn-Tsong Chiang	PhD, Chemistry	James Tour
2011	Nikolaos Soultanidis	PhD, Chemical & Biomolecular Eng.	Michael Wong

2011	Yu-Lun Fang	PhD, Chemical & Biomolecular Eng.	Michael Wong
2011	Jinjian Wu	MS, Civil and Environmental Eng.	Qilin Li
2011	Jonathan Lo	MS, Chemical & Biomolecular Eng.	Marc Robert
2010	Allison Contreras	PhD, Civil and Environmental Eng.	Qilin Li

#### Post-Doctoral Research Associates:

<u>Name</u>	<u>Degree Institution</u>	<u>Start Date</u>	<u>End Date</u>
Pine Yang	Syracuse University	March 2015	June 2015
Qinjia Cai	National University of Singapore	November 2010	November 2011

#### Undergraduate Researchers from Rice:

<u>Name</u>	<u>Degree Program</u>	<u>Dates</u>
Ruby Lu	Chemical & Biomolecular Engineering	Fall 2016
Isaiah Barth	Chemical & Biomolecular Engineering	Fall 2016
Tensae Assefa	Bioengineering	Summer 2016
Grant Chan	Chemical & Biomolecular Engineering	Spring 2016 – Fall 2016
Abdi Sarbessa	Chemical & Biomolecular Engineering	Spring 2016 – Fall 2016
Justin Tenor	Chemical & Biomolecular Engineering	Spring 2016 – Fall 2016
Yichen Zhang	Chemical & Biomolecular Engineering	Spring 2016
Ray Wang	Chemical & Biomolecular Engineering	Summer 2015
Qianhong Zhu	Chemical & Biomolecular Engineering	Fall 2014 – Spring 2016
Ryan Roberts	Chemical & Biomolecular Engineering	Spring 2015
Hojin Jeon	Chemical & Biomolecular Engineering	Fall 2014
Chen Song	Chemical & Biomolecular Engineering	Summer 2014
Javier Perez	Chemical & Biomolecular Engineering	Summer 2014
Yichuan Ma	Chemical & Biomolecular Engineering	Summer 2014
Snehav Gupta	Chemical & Biomolecular Engineering	Summer 2014
Will Kasper	Chemical & Biomolecular Engineering	Spring 2014
Hojin Kim	Chemical & Biomolecular Engineering	Fall 2013
Leslie Nguyen	Chemical & Biomolecular Engineering	Fall 2013
Connie Shen	Chemical & Biomolecular Engineering	Fall 2013
Cathy Zhang	Chemical & Biomolecular Engineering	Spring 2013
E-Fei Lu	Chemical & Biomolecular Engineering	Spring 2013
Lisa Swank	Chemical & Biomolecular Engineering	Spring 2013
Qiqi Xiang	Chemical & Biomolecular Engineering	Fall 2012 – Fall 2014
Teju Keishore	Chemical & Biomolecular Engineering	Fall 2012 – Fall 2013
Jim Howe	Chemical & Biomolecular Engineering	Fall 2011– Spring 2013
Chloe Kempf	Chemical & Biomolecular Engineering	Fall 2011– Fall 2012
Dana Dement	Chemical & Biomolecular Engineering	Spring 2012
Sarah Southmayd	Chemical & Biomolecular Engineering	Fall 2012 – Fall 2013
David Tae-Hyun Yun	Chemical & Biomolecular Engineering	Fall 2012
Li Xiong	Materials Science	Summer 2011
Yichen Li	Chemical & Biomolecular Engineering	Summer 2009

#### Undergraduate Researchers from Other Schools:

<u>Name</u>	<u>Degree Program</u>	<u>Start Date and Status</u>
JinZhao Zhang	Peking University, Physics	Fall 2016 – Spring 2017
Niloufar Jafari	HCC Engineering	Summer 2016
Shams Albayati	HCC Engineering	Summer 2016
Abigail Gonzales	HCC Engineering	Summer 2016
Daniel Gonzales	HCC Engineering Honors Student	Summer 2013
Bridget Stewart	HCC Engineering Honors student	Summer 2012 and 2013
Charlie Chirino	HCC Engineering Honors student	Summer 2011

Ümmügülsüm Özel	Fatih University, Turkey	Summer 2011
Amanda Schlafer	HCC Engineering Honors student	Summer 2010

#### High School Teacher Researchers:

<u>Name</u>	<u>School</u>	<u>Start Date and Status</u>
Ralph Cox	Furr High School	Summer 2014
Shawn Richard	Cinco Ranch High School	Summer 2015

#### High School Student Researchers:

<u>Name</u>	<u>Degree Program</u>	<u>Start Date and Status</u>
Howard Yong	Clements University	Fall 2016
Melinda Ding	Clements University	Summer 2016
Edward Cen	Bellaire Senior High School	Summer 2016
Annum Sadana	Carnegie Vanguard HS	Summer 2015
Brenda Gonzales	Furr High School	Summer 2015
Michelle Chao	Debakey High School	Summer 2013
Dominic Litong	TAMS	Summer 2013
Brenda Gonzales	Furr High School	Summer 2015
Annum Sadana	Carnegie Vanguard	Summer 2015

#### Student Awards

1. Excellence in Graduate Student Research, Polymers division, AIChE 2016 Annual Meeting, Jorge Mok
2. Excellent in Graduate Student Research, Electronics and Optics Division, AIChE 2015 Annual Meeting, Jorge Mok
3. 7<sup>th</sup> International Liquid Crystal Elastomers Conference (ILCEC) Best Poster Award, Shanghai, China, 2013, Aditya Agrawal.
4. 1<sup>st</sup> place, Outstanding Graduate Research Presentation Award, ACS POLY Symposium on the Bottom-up design of the next generation of biomaterials, May 2013, Stacy Pesek.
5. Kobayashi Fellowship 2012 – 2013, Xianyu Li.
6. Institute for Biosciences and Bioengineering travel grants awarded to Jorge Mok (2015, APS March Meeting), Stacy Pesek (2014 Spring ACS conference), and Aditya Agrawal (2013 Spring ACS conference)
2. Excellence in Graduate Polymer Research at the ACS National Meeting, Spring 2014 (Xianyu Li) and Spring 2013 (Yen-Hao Lin)
3. Excellent Poster Presentation for Chinese American Chemical Society Poster Competition, Xianyu Li, March 2013
4. NSF Graduate Student Research Fellowship Program, Stacy Pesek, 2012 – 2015.
5. ACS Summer School on Green Chemistry and Sustainable Energy, Yen-Hao Lin, 2012.
6. AIChE South Texas Section best fundamental paper award, 2012.

#### Patents



“Liquid Crystal Elastomer Substrates for Cell Sheet Alignment,” Verduzco, Jacot, Agrawal, and Adetiba, non-provisional patent filed July 2014

“Compression Induced Stiffening and Alignment of Liquid Crystal Elastomers,” Verduzco and Agrawal, non-provisional patent filed August 2013

**Contributed Oral Presentations** (presenting author underlined)

1. D Kipp, JW Mok, V Ganesan, and R Verduzco. “Rational Design of Thermally Stable, Cocontinuous Donor/Acceptor Morphologies for Use As Organic Solar Cell Active Layers,” AIChE Annual Meeting, Nov. 10, 2015, Salt Lake City, UT.
2. B Zhu, H Kim, R Verduzco. “Liquid Crystal Elastomers with Reversible Crosslinking and Low  $T_g$ ,” AIChE Annual Meeting, Nov. 10, 2015, Salt Lake City, UT.
3. JW Mok, R Verduzco. “Role of Molecular Linker in Charge Separation in All-Conjugated Block Copolymers,” AIChE Annual Meeting, Nov. 9, 2015, Salt Lake City, UT.
4. H Kim, O Adetiba, H Chen, A Agrawal, B Zhu, JG Jacot, and R Verduzco. “*Liquid Crystal Elastomers as Active Substrates for Dynamic Cell Culture*,” Biomaterials Day, June 1, 2015. Rice University, Houston, TX.
5. SL Pesek, I Mitra, X Li, GE Stein, and R Verduzco. “Synthesis and spontaneous segregation of functional bottlebrush polymer additives,” 249<sup>th</sup> ACS National Meeting, March 23, 2015. Denver, CO.
6. JW Mok, YH Lin, Y Lee, ED Gomez, SB Darling, RD Schaller, D Gosztola, and R Verduzco. “Role of linking chemistry on charge separation and photovoltaic performance of all-conjugated block copolymers,” 249<sup>th</sup> ACS National Meeting, March 25, 2015. Denver, CO.
7. A Agrawal, H Kim, O Adetiba, H Chen, JA Jacot, and R Verduzco. “Liquid crystal elastomers with a reversible and multistimulus response,” 249<sup>th</sup> ACS National Meeting, March 22, 2015. Denver, CO.
8. JW Mok, YH Lin, K Yager, Y Lee, ED Gomez, SB Darling, RD Schaller, D Gosztola, and R Verduzco. “Role of linking chemistry on charge separation and photovoltaic performance of all-conjugated block copolymers,” APS March Meeting, March 2, 2015. San Antonio, TX.
9. A Agrawal, O Adetiba, JA Jacot, and R Verduzco. “Electromechanically Responsive Liquid Crystal Elastomers for Dynamic Cell Culture,” MRS Spring Meeting, April 23, 2014, San Francisco, CA
10. L Qi, H ShamsiJazeyi, X Li, S Pesek, M Puerto, GJ Hirasaki, R Verduzco “Bottlebrush Polymer & Surfactant Blends for Low IFT”, 18th Consortium For Processes in Porous Media, Rice University, April 21,2014. Houston, TX
11. KA Smith, R Verduzco. “Control of all-conjugated block copolymer crystallization via thermal and solvent annealing,” 247<sup>th</sup> ACS National Meeting, March 19, 2014, Dallas, TX.
12. A Agrawal, O Adetiba, JA Jacot, and R Verduzco. “Responsive Liquid Crystal Elastomer for Cell Sheet Growth and Alignment,” 247<sup>th</sup> ACS National Meeting, March 19, 2014, Dallas, TX.

13. KA Smith, R Verduzco, YH Lin, and JW Mok. "Synthesis, Morphology, and Optoelectronic Properties of All-Conjugated Block Copolymers," APS March Meeting, March 5, 2014, Denver, CO.
14. A Agrawal, O Adetiba, J Jacot, and R Verduzco. "Fast Electromechanical Response in Liquid Crystal Elastomer Nanocomposites," APS March Meeting, March 4, 2014, Denver, CO.
15. A Agrawal, O Adetiba, J Jacot, and R Verduzco. "Liquid Crystal Elastomer Substrates for Enhanced Cell Sheet Alignment," MRS Fall Meeting, December 3, 2013, Boston, MA.
16. A Agrawal, P Patra, P Ajayan, WG Chapman, Y Shamoo, and R Verduzco. "Dynamic Stiffening in Liquid Crystal Elastomers," AIChE Annual Meeting, November 7, 2013, San Francisco, CA.
17. X Li, H ShamsiJazeyi, SL Pesek, A Agrawal, B Hammouda, and R Verduzco. "Thermo-responsive Bottlebrush Polymers," AIChE Annual Meeting, November 7, 2013, San Francisco, CA.
18. R Verduzco, A Agrawal, B Carey, A Chipara, P Ajayan, P Patra, Y Shamoo, and WG Chapman, "Alignment and Stiffening of Polydomain LCEs under Dynamic Deformations," The 7<sup>th</sup> International Liquid Crystal Elastomer Conference, September 11<sup>th</sup> 2013. Shanghai, China
19. SL Pesek, R Verduzco. "Poly(lactic acid)-block-Poly(ethylene glycol) Bottlebrush Polymers," Texas Soft Matter Meeting, August 12 2013, Texas A&M University, College Station, TX.
20. Xianyu Li, Stacy L Pesek, Boualem Hammouda, Rafael Verduzco. "The role of side-chain conformation on the solution phase behavior of PNIPAAm bottlebrush polymers", Texas Soft Matter Meeting, August 12<sup>th</sup>, 2013, Texas A&M University, College Station, TX.
21. A Agrawal and R Verduzco. "Liquid Crystal Elastomers for functional materials," Texas Soft Matter Meeting, August 12<sup>th</sup> 2013, Texas A&M University, College Station, TX
22. KA Smith, DL Pickel, K Yager, and R Verduzco. "All-conjugated block copolymers via functionalized catalysts and click chemistry," 245<sup>th</sup> ACS National Meeting, April 10, 2013, New Orleans, LA.
23. SL Prukop, X Li, B Hammouda, and R Verduzco. "Synthesis and conformational analysis of bottlebrush polymers by SANS," 245<sup>th</sup> ACS National Meeting, April 10, 2013, New Orleans, LA.
24. A Agrawal, A Chipara, Y Shamoo, PK Patra, B Carey, P Ajayan, WG Chapman, and R Verduzco. "Dynamic Self-Stiffening behavior in Liquid Crystal Elastomer," 245<sup>th</sup> ACS National Meeting, April 8, 2013, New Orleans, LA.
25. H ShamsiJazeyi, GJ Hirasaki, and R Verduzco. "Sacrificial Agent for Reducing Adsorption of Anionic Surfactants," International Oilfield Chemistry Symposium, April 9, 2013, Woodlands, TX
26. H ShamsiJazeyi, GJ Hirasaki, and R Verduzco. "Sacrificial Agent for Reducing Adsorption of Anionic Surfactants," SPE Gulf Coast Student Paper Contest, April 6, 2013, University of Texas, Austin, Austin, Texas.

27. C Guo, YH Lin, MD Witman, KA Smith, C Wang, A Hexemer, ED Gomez and R Verduzco. "Conjugated Block Copolymer Photovoltaics with near 3% Efficiency," MRS Spring Meeting, April 2, 2013, San Francisco, CA.
28. YH Lin and R Verduzco. "Synthesis, Crystallinity and Process-dependent Nanostructure of All-Conjugated Poly(3-hexylthiophene) Block Copolymers," MRS Spring Meeting, April 2, 2013, San Francisco, CA.
29. A Agrawal, A Chipara, Y Shamoo, PK Patra, B Carey, P Ajayan, WG Chapman, and R Verduzco. "Alignment and Stiffening of Liquid Crystal Elastomers under Dynamic Compression," 245<sup>th</sup> APS National Meeting, March 19, 2013, Baltimore, MD.
30. SL Pesek, R Verduzco. "Conformational analysis of bottlebrush polymers by SANS," Texas Soft Matter Meeting, January 11, 2013, University of Houston, Houston, TX.
31. H ShamsiJazeyi, GJ Hirasaki, and R Verduzco. "Sacrificial Agent for Reducing Adsorption of Anionic Surfactants," Texas Soft Matter Meeting, January 11, 2013, University of Houston, Houston, TX.
32. A Agrawal, A Chipara, Y Shamoo, PK Patra, B Carey, P Ajayan, WG Chapman, and R Verduzco. "Self stiffening behavior in Liquid Crystals elastomers under Dynamic load," Texas Soft Matter Meeting, January 11, 2013, University of Houston.
33. X Li, SL Pesek, SL Biswal, and R Verduzco. "Surface Properties of Bottlebrush Polymer Thin Films," Texas Soft Matter Meeting, January 11, 2013, University of Houston.
34. H ShamsiJazeyi, GJ Hirasaki, and R Verduzco. "Sacrificial Agent for Reducing Adsorption of Anionic Surfactants," 17<sup>h</sup> Consortium for Processes in Porous Media, April 2013, Rice University, Houston, TX.
35. YH Lin and R Verduzco. "Process-Dependent Nanostructure and Crystallinity Competition in All-Conjugated Poly(3-hexylthiophene) Block Copolymers," APS National Meeting, March 21, 2013, Baltimore, MD.
36. R Verduzco, YH Lin, KA Smith. "Synthesis and Crystallinity of All-Conjugated Block Copolymers," AIChE Annual Meeting, October 31, 2012, Pittsburgh, PA.
37. YH Lin, R Verduzco. "Synthesis and Characterization of All-Conjugated Block Copolymers/ Supramolecular Block Copolymers in Thin Films," AIChE Annual Meeting, October 30, 2012, Pittsburgh, PA.
38. H ShamsiJazeyi, GJ Hirasaki, and R Verduzco. "Sacrificial Agent for Reducing Adsorption of Anionic Surfactants," 16<sup>h</sup> Consortium for Processes in Porous Media, April 2012, Rice University, Houston, TX.
39. A Agrawal, P Luchette, P Palffy-Muhoray, SL Biswal, WG Chapman, and R Verduzco. "Liquid crystal elastomer based wrinkling instability," APS National Meeting, March 2, 2012, Boston, MA.
40. YH Lin and R Verduzco. "Controlled Phase Separation in Conjugated Polymer Blends Using Quadruple Hydrogen Bonding Interaction," APS National Meeting, February 28, 2012, Boston, MA.

41. KA Smith, YH Lin, and R Verduzco. "Understanding Self-Assembly of All-Conjugated Block Copolymers," AIChE Annual Meeting, October 20, 2011
42. SL Prukop, R Verduzco, L Putcha. "Multipurpose bottlebrush Polymers for Health Care" NASA Human Research Program Investigators' Workshop, September 2011, Houston, TX.
43. H ShamsiJazeyi, GJ Hirasaki, and R Verduzco. "Sacrificial Agent for Reducing Adsorption of Anionic Surfactants," 15<sup>th</sup> Consortium for Processes in Porous Media, April 2011, Rice University, Houston, TX.
44. R Verduzco, SB Darling, I Botiz, D Pickel, K Hong, and SM Kilbey. "Synthesis and Thin Film Morphology of Rod-Rod Polythiophene-*b*-Polyfluorene Conjugated Copolymers," AIChE Annual Meeting, November 10, 2010.
45. R. Verduzco, B.S. Lokitz, P. Luchette, J. Harden, P. Sálamon, P. Palffy-Muhoray, E. DiMasi, J. T. Gleeson, S. Sprunt, A. Jákli. "Bent-Core Liquid Crystal Polymers and Elastomers." APS March Meeting, March 15 2010.
46. J. Harden, M. Chambers, R. Verduzco, P. Luchette, P. Palfy-Muhoray, J.T. Gleeson, S. Sprunt, A Jákli. "First Bent-Core Nematic Liquid Crystal Elastomer: Characterization and Giant Flexoelectric Response." September 26, 2009. International Liquid Crystal Elastomer Conference.
47. R. Verduzco, B.S. Lokitz, P. Luchette, J. Harden, P. Sálamon, P. Palffy-Muhoray, E. DiMasi, J. T. Gleeson, S. Sprunt, A. Jákli. "Bent-Core LC Elastomers and Side-Group LC Polymers Using Reactive Bent-Core Mesogens." September 24, 2009. International Liquid Crystal Elastomer Conference.

**Contributed Poster Presentations** (presenting author underlined)

1. SL Pesek, I Mitra, X Li, GE Stein, and R Verduzco. "Synthesis of bottlebrush copolymers based on poly(dimethylsiloxane) for surface active additives," International Society for Polymer Analysis and Characterization (ISPAC), June 8, 2015, ZaZa Hotel, Houston, TX.
2. JW Mok, KA Smith, YH Lin, and R Verduzco. "Molecular Linker Effect on Charge Separation in Organic Photovoltaics," International Society for Polymer Analysis and Characterization (ISPAC), June 8, 2015, ZaZa Hotel, Houston, TX.
3. L Qi, H ShamsiJazeyi, G Ruan, JA Mann, MS Wong, JT Tour, and R Verduzco. "Interfacial behaviour of polymer coated nanoparticles," International Society for Polymer Analysis and Characterization (ISPAC), June 8, 2015, ZaZa Hotel, Houston, TX
4. SL Pesek, I Mitra, X Li, GE Stein, and R Verduzco. "Bottlebrush polymers: shape, size, and assemblies of amphiphilic nanoparticles," Biomaterials Day, June 1, 2015, Rice University, Houston, TX.
5. YH Lin, W Nie, A Mohite, S Gupta, and R Verduzco. "Hydrogen Bonding-mediated Conjugated Polymers for Bulk-Heterojunction Organic Photovoltaics," APS National Meeting, March 4, 2015. San Antonio, TX.

6. L Qi, J Mann, H ShamsiJazeyi, M Puerto, JM Tour, R Verduzco, and GJ Hirasaki "Nanoparticle Interactions with Surfactant Micro-emulsions", APS San Antonio National Meeting, March 4, 2015. San Antonio, TX
7. L Qi, J Mann, H ShamsiJazeyi, M Puerto, JM Tour, R Verduzco, and GJ Hirasaki. "Nanoparticle Interactions with Surfactant Micro-emulsions," APS National Meeting, March 4, 2015. San Antonio, TX
8. JW Mok, YH Lin, K Yager, SB Darling, Y Lee, ED Gomez, Gosztola, Schaller, and R Verduzco. "Charge Separation in All-Conjugated Block Copolymer Photovoltaics," Macromolecular Materials Gordon Research Conference, January 12, 2015. Ventura, CA.
9. JW Mok, YH Lin, K Yager, Y Lee, ED Gomez, SB Darling, RD Schaller, D Gosztola, and Verduzco. "Role of linking chemistry on charge separation and photovoltaic performance of all-conjugated block copolymers," Gulf Coast Consortia Workshop: Light-Driven Processes in Bio-Inspired Materials. December 15, 2014, Rice University, Houston, TX
10. L Qi, C Shen, X Li, M Puerto, R Verduzco and GJ Hirasaki "Synergic effects of bottlebrush polymer & surfactant mixture on interfacial tension of oil & water phases", 2014 T.W. Leland Lecture, Rice University, September 25, 2014, Houston, TX
11. L Qi, H ShamsiJazeyi, X Li, S Pesek, GJ Hirasaki, R Verduzco "Synergic effects of bottlebrush polymer & surfactant mixture on interfacial tension of oil & water phases" Texas Soft Matter Meeting, University of Texas, Austin, August 22, 2014, Austin, TX
12. KA Smith, L Swank, YH Lin, H An, JF Mike, J O'Neal, JL Lutkenhaus, and R Verduzco. "Hybrid P3HT-*b*-PEO Block Copolymer/V<sub>2</sub>O<sub>5</sub> Electrodes for Electrochemical Energy Storage," MRS Spring Meeting, April 24, 2014, San Francisco, CA
13. X Li, H ShamsiJazeyi, SL Pesek, A Agrawal, B Hammouda, and R Verduzco. "Thermo-responsive Bottlebrush Polymers," 247<sup>th</sup> ACS National Meeting, March 18, 2014, Dallas, TX.
14. SL Pesek, Q Xiang, and R Verduzco. "Bottlebrush polymers: custom shape, size and composition of nanoparticles," 247<sup>th</sup> ACS National Meeting, March 18 2014, Dallas, TX.
15. JW Mok, R Verduzco. "Synthesis, characterization, and device performance of naphthalene diimide based block copolymers," 247<sup>th</sup> ACS National Meeting, March 18, 2014, Dallas, TX
16. L Qi, H ShamsiJazeyi, X Li, S Pesek, GJ Hirasaki, R Verduzco "Synergic effects of bottlebrush polymer & surfactant mixture on interfacial tension of oil & water phases", 247<sup>th</sup> ACS Dallas National Meeting, March 17, 2014, Dallas, TX
17. SL Pesek, X Li, Q Xiang, B Hammouda, L Putcha, and R Verduzco. "Custom Shape, Size, and Composition of Polymer Nanoparticles for Drug Delivery," NASA Human Research Program Investigators' Workshop, February 2014, Galveston, TX.
18. KA Smith, YH Lin, BS Stewart, and R Verduzco. "All-Conjugated Block Copolymers for Self-Assembled Organic Photovoltaics," MRS Fall Meeting, December 3, 2013, Boston, MA.
19. KA Smith, YH Lin, J Strzalka, and R Verduzco. "Understanding the role of side-chain structure on the morphology and performance of all-conjugated block copolymer photovoltaics," AIChE Annual Meeting, November 7, 2013, San Francisco, CA

20. A Agrawal, O Adetiba, E Lu, C Zhang, JA Jacot, WG Chapman and R Verduzco, "Responsive Liquid Crystal Elastomers for Cell Sheet Alignment," The 7<sup>th</sup> International Liquid Crystal Elastomer Conference, September 10-12<sup>th</sup> 2013. Shanghai, China.
21. X Li, SL Pesek, SL Biswal and R Verduzco. "Surface Properties of Bottlebrush Polymer Thin Films," 245<sup>th</sup> ACS National Meeting, April 8, 2013, New Orleans, LA.
22. YH Lin and R Verduzco. "Synthesis and Crystallinity of All-Conjugated Poly(3-hexylthiophene) Block Copolymers," 245<sup>th</sup> ACS National Meeting, April 8, 2013, New Orleans, LA.
23. R Verduzco, YH Lin, KA Smith, DB Darling, J Strzalka, DL Pickel, CN Kempf, D Dement. "All-Conjugated Block Copolymers for Self-Assembled Photovoltaics," Polymer Physics Gordon Research Conference, July 24, 2012, Mount Holyoke MA.
24. X. Li, SL Prukop, and R. Verduzco. "Surface Properties of Bottlebrush Thin Films," International Congress on Marine Corrosion and Fouling, June 24 2012.
25. YH Lin and R Verduzco. "All-Conjugated Block Copolymers/Supramolecular Block Copolymers for Organic Photovoltaics," ACS Summer School on Green and Environmental Chemistry, June 2012, Denver, CO.
26. X Li, SL Pesek, SL Biswal and R Verduzco "Surface properties of bottlebrush polymer thin films", Chinese-American Chemical Society, March 2012, Houston, TX
27. KA Smith and R Verduzco. "Synthesis and Characterization of a Systematic Series of All-Conjugated Diblock Copolymers," APS March Meeting, February 27, 2012, Boston, MA.
28. X Li, SL Pesek, SL Biswal, and R Verduzco. "Surface Properties of Bottlebrush Thin Films," APS March Meeting, February 27, 2012, Boston, MA.