

MARY C. BOYCE

PROFESSOR OF MECHANICAL ENGINEERING
PROVOST EMERITA
DEAN EMERITA, THE FU FOUNDATION SCHOOL OF
ENGINEERING AND APPLIED SCIENCE
COLUMBIA UNIVERSITY

boyce@columbia.edu

Education:

Ph.D.	Massachusetts Institute of Technology	1987
S.M.	Massachusetts Institute of Technology	1983
B.S.	Virginia Polytechnic Institute and State University	1981

Academic Appointments:

Joined Columbia University in 2013:

Provost	2021-2023
Dean of Engineering and Applied Science; Schapiro Professor	2013-2021
Professor of Mechanical Engineering	2013-Present

Joined the MIT Faculty in 1987:

Ford Professor of Engineering	2011-2013
Gail E. Kendall (1978) Professor of Mechanical Engineering	2000-2011
Head, Mechanics Division, Mechanical Engineering	2008-2013
Head, Mechanics Division, Mechanical Engineering	2001-2005
Assistant to Associate to Tenured to Full Professor to Kendall Professor	1987-2000

Selected Honors and Awards:

NSF Presidential Young Investigator Award	1991
DuPont Young Faculty Award	1992-1995
ALCOA Foundation Awards	1988,1991
Joel and Ruth Spira Teaching Award	1997
GenCorp Signature University Award	1998
Joseph Henry Keenan Innovation in Undergraduate Education Award	1998
ASME Special Achievement Award for Young Investigator in Applied Mechanics	1998
Fellow, American Academy of Mechanics	1999
MacVicar Faculty Fellow (highest teaching honor at MIT)	2000
Fellow, American Society of Mechanical Engineers	2004
Midwest Mechanics Seminar Speaker	2004
American Academy of Arts and Sciences	2004
National Academy of Engineering	2012
Honorary Professor, Zhejiang University	2015
Engineering Science Medal, Society of Engineering Science	2015
ASME Timoshenko Medal (contributions to Applied Mechanics)	2020

Selected External Professional Service

ASME Applied Mechanics Division Executive Committee	1999-2004
U.S. National Congress on Theoretical and Applied Mechanics	2000,2001
External Board, Mechanical Engineering: Purdue University	2004
NAE/NRC Committee on Integrated Computational Materials Engineering	2006-2008
External Board, Mechanical Engineering, University of Southern California	2008
External Board, Mechanical Engineering, University of Michigan	2008
External Board, School of Engineering, Ecole Polytechnic Federal Lausanne	2009
External Board, Mechanical Engineering, Stanford University	2010, 2016
National Academies Board on Army Science and Technology	2012
External Board, Mechanical and Aerospace Engineering, Princeton	2012
External Board, Mechanical Engineering, Georgia Tech	2012
External Board, School of Engineering, Princeton University	2015
External Board, Mechanical Engineering, University of Pennsylvania	2017
National Academy of Engineering, Mechanical Engineering Peer Committee	2014-2017
National Academy of Engineering, Mechanical Engineering Peer Committee Chair	2017
Queen Elizabeth Prize Committee	2017-2021
National Academy of Engineering, Draper Prize Committee	2015-2022
National Academy of Engineering, Draper Prize Committee Chair	2020-2022
New York City Crane Safety Working Group, (Pro-Bono Technical Expert)	2016
New York State L-train Tunnel Repair/Reconstruction Design and Process (Expert Consultant/Advisor on L-train Tunnel Reconstruction)	2018-2019

Prior to graduate school, Professor Boyce worked in aerospace engineering at Martin Marietta Denver Aerospace.

Over her career, Professor Boyce has also served as an expert technical consultant for several companies in the areas of mechanics, materials modeling, and materials design.

Since 2018, Professor Boyce has served as an Independent Director of Altair Engineering. Altair is a multinational technology company based in the United States which provides software and cloud solutions in modeling and simulation, high performance computing, data analytics and artificial intelligence.

Professor Boyce also serves on the Advisory Board for The Boston Dynamics Artificial Intelligence Institute (2023-Present), a private research institute focused on the frontiers of robotics and artificial intelligence.

Journal Publications of Mary C. Boyce

Professor Boyce, together with her research group and collaborators, has published over 170 peer-reviewed archival journal publications; over 60 conference proceedings papers, and is a co-inventor on four issued U.S. Patents. Professor Boyce has mentored 40 S.M. and 28 Ph.D. theses as well as several postdoctoral associates. Her doctoral student and postdocs have gone on to serve in faculty positions across the country and the world, as well as in industry, consulting and entrepreneurial endeavors. A list of research student and postdoc alumni is appended after the archival publication list.

A list of Archival Refereed Journal Articles is provided below:

1. Boyce, M.E., Argon, A.S., Parks, D.M., "Mechanical Properties of Compliant Particles Effective in Toughening Glassy Polymers", *Polymer*, 28, 1680-1694, September 1987.
2. Boyce, M.C., Parks, D.M., Argon, A.S., "Large Inelastic Deformation of Glassy Polymers, Part I: Rate-Dependent Constitutive Model", *Mechanics of Materials*, 7 15-33, 1988.
3. Boyce, M.C., Parks, D.M., Argon, A.S., "Large Inelastic Deformation of Glassy Polymers, Part II: Numerical Simulation of Hydrostatic Extrusion", *Mechanics of Materials*, 7 35-47, 1988.
4. Boyce, M.C., Weber, G.G., Parks, D.M., "On the Kinematics of Finite Strain Plasticity", *Journal of the Mechanics and Physics of Solids*, 37, 647-665, 1989.
5. Boyce, M.C., Parks, D.M., Argon, A.S., "Plastic Flow in Oriented Glassy Polymers", *International Journal of Plasticity*, 5, 593-615, 1989.
6. Boyce, M.C., Arruda, E.M., "An Experimental and Analytical Investigation of the Large Strain Compressive and Tensile Response of Glassy Polymers", *Journal of Polymer Engineering and Science*, 30, 1288-1298, 1990.
7. Boyce, M.C., Palmer, M.L., Seo, M.H., Schwartz, P., Backer, S., "A Model of the Tensile Failure Process in Woven Fabrics", *Journal of Applied Polymer Science*, Applied Polymer Symposium 47 - Fiber Society 50th Anniversary Technical Conference, 383-402, 1991.
8. Realff, M.L., Seo, M.H., Boyce, M.C., Backer, S., "On the Mechanical Properties of Fabric Woven from Yarns Produced on Different Spinning Technologies - Yarn Failure as a Function of Gauge Length", *Textile Research Journal*, 61, 517-530, 1991.
9. Karafillis, A.P., Boyce, M.C., "Tooling Design Accommodating Springback Error", *J. Mat. Process. Tech.*, 32, 144, 1991.
10. Sim, A.B., Boyce, M.C., "Finite Element Analyses of Real-Time Stability Control in Sheet Forming Processes", *Trans. ASME Journal of Engineering Materials and Technology*, 114, 180-188, 1992.
11. Boyce, M.C., Montagut, E., Argon, A.S., "The Effects of Thermomechanical Coupling on the Cold Drawing Process of Glassy Polymers", *Journal of Polymer Engineering and Science*, 32, 1073-1085, 1992.
12. Karafillis, A.P., Boyce, M.C., "Tooling Design in Sheet Metal Forming Using Springback Calculations", *International Journal of Mechanical Sciences*, 34, 113-131, 1992.
13. Arruda, E.M., Boyce, M.C., "A Three-Dimensional Constitutive Model for the Large Stretch Behavior of Rubber Elastic Materials", *Journal of the Mechanics and Physics of Solids*, 41, 389-412, 1993.
14. Hasan, O.A., Boyce, M.C., Li, X.S., Berko, S., "An Investigation of the Yield and Post-Yield Behavior and Corresponding Structure of PMMA", *Journal of Polymer Science, Part B: Polymer Physics Edition*, 31, 185-197, 1993.
15. Li, X.S., Boyce, M.C., "On the Measurement of Structural Relaxation in Glassy Polymers Using Positron Annihilation Lifetime Spectroscopy", *Journal of Polymer Science, Polymer Physics Edition*, 31, 869-873, 1993.
16. Arruda, E.M., Boyce, M.C., "Evolution of Plastic Anisotropy in Amorphous Polymers during Finite Straining", *International Journal of Plasticity*, 9, 697-720, 1993.

17. Seo, M.H., Realff, M.L., Pan, N., Boyce, M.C., Schwartz, P., Backer, S., "Mechanical Properties of Fabric Woven from Yarns Produced by Different Spinning Technologies: Yarn Failure in Woven Fabric", *Textile Research Journal*, 63, 123-134, 1993.
18. Arruda, E.M., Boyce, M.C., Quintus-Bosz, H., "Effects of Initial Anisotropy on the Finite Strain Deformation Behavior of Glassy Polymers", *International Journal of Plasticity*, 9, 783-811, 1993.
19. Hasan, O.A., Boyce, M.C., "Energy Storage during Inelastic Deformation of Glassy Polymers", *Polymer*, 34, 5085-5092, 1993.
20. Jayachandran, R., Boyce, M.C., Argon, A.S., "Mechanics of the Indentation Test and Its Use to Assess Adhesion of Polymeric Coatings", *Journal of Adhesion Science and Technology*, 7, 813-836, 1993.
21. Karafillis, A., Boyce, M.C., "A General Anisotropic Yield Criteria Using Bounds and a Transformation Weighting Tensor", *Journal of Mechanics and Physics of Solids*, 41, 1859-1886, 1993.
22. Boyce, M.C., Arruda, E.M., Jayachandran, R., "The Large Strain Compression, Tension, and Simple Shear of Polycarbonate", *Polymer Engineering and Science*, 34, 716-725, 1994.
23. Scelzo, W.A., Backer, S., Boyce, M.C., "Mechanistic Role of Yarn and Fabric Structure in Determining Tear Resistance of Woven Cloth - Part I: Understanding Tongue Tear", 64, 291-304, *Textile Research Journal*, 1994.
24. Scelzo, W.A., Backer, S., Boyce, M.C., "Mechanistic Role of Yarn and Fabric Structure in Determining Tear Resistance of Woven Cloth - Part II: Modelling Tongue Tear", 64, 321-329, *Textile Research Journal*, 1994.
25. Arruda, E.M., Boyce, M.C., Jayachandran, R., "Effects of Strain Rate, Temperature, and Thermo-Mechanical Coupling on the Large Strain Deformation of Glassy Polymers", *Mechanics of Materials*, 19, 193-212, 1995.
26. Jayachandran, R., Boyce, M.C., Argon, A.S., "Thermomechanical Analysis of Indentation Behavior of Thin PMMA Coatings", *Journal of Computer Aided Materials Design*, September, 1994.
27. Hasan, O.A., Boyce, M.C., "A Constitutive Model for the Nonlinear Viscoelastic Viscoplastic Behavior of Glassy Polymers", *Polymer Engineering and Science*, 35, 331-344, 1995.
28. Jayachandran, R., Boyce, M.C., Argon, A.S., "Design of Multi-Layer Polymeric Coatings for Indentation Resistance", *Journal of Computer Aided Materials Design*, 2, 151-166, 1995.
29. Taylor, L., Cao, J., Karafillis, A.P., Boyce, M.C., "Numerical Simulation of Sheet Metal Forming", *J. Mater. Process. Tech.*, 29, 1995.
30. Karafillis, A.P., Boyce, M.C., "Tooling and Binder Design for Sheet Metal Forming Processes Compensating Springback Error", *Journal of Machine Tools and Manufacture*, 36, 503-526, 1995.
31. Sunseri, M., Cao, J., Karafillis, A.P., Boyce, M.C., "Accommodation of Springback in Channel Forming Using Active Binder Control", *Tran. ASME Journal of Engineering Materials and Technology*, 118, 426-435, 1996.
32. Cao, J., Boyce, M.C., "Wrinkling Behavior of Rectangular Plates under Lateral Constraint", *International Journal of Solids and Structures*, 34, 153-176, 1997.
33. Zaroulis, J., Boyce, M.C., "Temperature, Strain Rate, and Strain State Dependence of Evolution in Mechanical Behavior and Structure of PET with Finite Strain", *Polymer*, 38, 1303-1315, 1997.
34. Boyce, M.C., "Direct Comparison of the Gent and the Arruda-Boyce Constitutive Models of Rubber Elasticity", *Rubber Chemistry and Technology*, 69, 781-785, 1997.
35. Cao, J., Boyce M.C., "A Predictive Tool for Delaying Wrinkling and Tearing Failure in Sheet Metal Forming", *Trans. ASME Journal of Engineering Materials and Technology*, 119, 354-365, 1997.
36. Realff, M.L., Boyce, M.C., Backer, S., "A Micromechanical Model of the Tensile Behavior of Woven Fabric", *Textile Research Journal*, 67, 445-459, 1997.

37. Bergstrom, J.S., Boyce, M.C., "Constitutive Modelling of the Large Strain Time-Dependent Behavior of Elastomers", *Journal of the Mechanics and Physics of Solids*, 46, 931-954, 1998.
38. Chui, C., Boyce, M.C., "A Control Volume Technique for Computing Continuum Deformation Measures in Discrete Polymeric Systems", *Journal of Non-Crystalline Solids*, 235, 612-618, 1998.
39. Ayala, H.M., Hart, D.P., Yeh, O.C., Boyce, M.C., "Wear of Elastomeric Seals in Abrasive Slurries", *Wear*, 220, 9-21, 1998
40. Llana, P.G., Boyce, M.C., "Finite Strain Behavior of Poly(ethylene terephthalate) above the Glass Transition Temperature", *Polymer*, 40, 6729-6751, 1999.
41. Chui, C., Boyce, M.C., "Monte Carlo Modelling of Amorphous Polymer Deformation: Evolution of Stress with Strain", *Macromolecules*, 32 (11), 3795-3808, 1999.
42. Bergstrom, J.S., Boyce, M.C., "Mechanical Behavior of Particle Filled Elastomers", *Rubber Chemistry and Technology*, 72, 633-656, 1999.
43. Realf, M.L., Pan, N., Seo, M., Boyce, M.C., Backer, S., "Stochastic Simulation of the Failure Process and Ultimate Strength of Blended Continuous Yarns", *Textile Research Journal*, 70 (5), 415-430, 2000.
44. Socrate, S., Boyce, M.C., "Micromechanics of Toughened Polycarbonate", *Journal of the Mechanics and Physics of Solids*, 48, 233-273, 2000.
45. Boyce, M.C., Socrate, S., Llana, P.G., "Constitutive Model for the Finite Deformation Stress-Strain Behavior of PET above the Glass Transition", *Polymer*, 41, 2183-2201, 2000.
46. Tzika, P., Boyce, M.C., Parks, D.M., "Micromechanics of Deformation in Particle-Toughened Polyamides", *Journal of the Mechanics and Physics of Solids*, 48, 1893-1929, 2000.
47. Boyce, M.C., Arruda, E.M., "Constitutive Models of Rubber Elasticity: A Review", *Rubber Chemistry and Technology*, 73, 504-523, 2000.
48. Cao, J., Yao, H., Karafillis, A., Boyce, M.C., "Prediction of Localized Thinning in Sheet Metal Using a General Anisotropic Yield Criterion", *International Journal of Plasticity*, 16, 1105-1129, 2000.
49. Bergstrom, J.S., Boyce, M.C., "Large Strain Time-Dependent Behavior of Filled Elastomers", *Mechanics of Materials*, 32, 627-644, 2000.
50. Boyce, M.C., Kear, K., Socrate, S., Shaw, K., "Deformation of Thermoplastic Vulcanizates", *Journal of the Mechanics and Physics of Solids*, 49, 1073-1098, 2001
51. Boyce, M.C., Socrate, S., Yeh, O.C., Kear, K., Shaw, K., "Micromechanisms of Deformation and Recovery in Thermoplastic Vulcanizates", *Journal of the Mechanics and Physics of Solids*, 49, 1323-1342, 2001.
52. Boyce, M.C., Yeh, O.C., Socrate, S., Kear, K., Shaw, K., "Micromechanisms of Cyclic Softening in Thermoplastic Vulcanizates", *Journal of the Mechanics and Physics of Solids*, 49, 1343-1360, 2001.
53. Bergstrom, J.S., Boyce, M.C., "Deformation of Elastomeric Networks: Relation between Molecular Level Deformation and Classical Statistical Mechanical Models of Rubber Elasticity", *Macromolecules*, 34(3), 614-626, 2001.
54. Socrate, S., Boyce, M.C., Lazzeri, A., "A Micromechanical Model for Multiple Crazing in High Impact Polystyrene", *Mechanics of Materials*, 33, 155-175, 2001.
55. Socrate, S., Boyce, M.C., "A Finite Element Based Die Design Algorithm for Sheet Metal forming on Reconfigurable Tools", *Trans.ASME Journal of Materials Engineering and Technology*, 123 (4), 489-495, 2001.
56. Boyce, M.C., Arruda, E.M., "Swelling and Mechanical Stretching of Elastomeric Materials", *Mathematics and Mechanics of Solids*, 6, 641-659, 2001.
57. Bergstrom, J.S., Boyce, M.C., "Constitutive Modeling of the Time-Dependent and Cyclic Loading of Elastomers and Application to Soft Tissues", *Mechanics of Materials*, 33, 523-530, 2001.
58. Xia, Q.S., Boyce, M.C., Parks, D.M., "A Constitutive Model for the Anisotropic Elastic-Plastic Deformation of Paper and Paperboard", *International Journal of Solids and Structures*, 39, 4053-4071, 2002.

59. Danielsson, M., Parks, D.M., Boyce, M.C., "Three-Dimensional Micromechanical Modeling of Particle-Toughened Polymeric Materials", *Journal of the Mechanics and Physics of Solids*, 50, 351-379, 2002.
60. van Dommelen, J.A.W., Parks, D.M., Boyce, M.C., Brekelmans, W.A.M., Baaijens, F.P.T., "Micromechanical Modeling of the Thermo-Elasto-Viscoplastic Behavior of Semi-Crystalline Polymers", *Journal of the Mechanics and Physics of Solids*, 51, 519-541, 2003.
61. Qi, H., Joyce, K., Boyce, M.C., "Durometer Hardness and the Stress-Strain Behavior of Elastomeric Materials", *Rubber Chemistry and Technology*, 76, 419-435, 2003.
62. Capaldi, F.M., Boyce, M.C., Rutledge, G.C., "Enhanced Mobility Accompanies the Active Deformation of a Glassy Amorphous Polymer", *Physical Review Letters*, 89 (17), 175505-(1-4), 2002.
63. Danielsson, M., Parks, D.M., Boyce, M.C., "Constitutive Modelling of Porous Hyperelastic Materials", 36(4), 347-358, *Mechanics of Materials*, 2004.
64. van Dommelen, J.A.W., Parks, D.M., Boyce, M.C., Brekelmans, W.A.M., Baaijens, F.P.T., "Micromechanical Modeling of Intraspherulitic Deformation of Semicrystalline Polymers", *Polymer*, 44, 6089-6101, 2003.
65. Qi, H.J., Teo, K.B.K., Lau, K.K.S., Boyce, M.C., Milne, W.I., Roberston, J., Gleason, K.K., "Determination of Mechanical Properties of Carbon Nanotubes and Vertically Aligned Carbon Nanotube Forests using Nanoindentation", *Journal of the Mechanics and Physics of Solids*, 51(11-12), 2213-2237, 2003.
66. Capaldi, F.M., Boyce, M.C., Boyce, M.C., Rutledge, G.C., "Molecular Response of a Glassy Polymer to Active Deformation", *Polymer*, 45(4), 1391-1399, 2003.
67. Sheng, N., Boyce, M.C., Parks, D.M., Rutledge, G.C., Abes, J.J., Cohen, R.E., "Multiscale Micromechanical Modeling of Polymer/Clay Nanocomposites and the Effective Clay Particle", *Polymer*, 45(2), 487-506, 2004.
68. Pantano, A., Boyce, M.C., Parks, D.M., "Nonlinear Structural Mechanics Based Modeling of Carbon Nanotube Deformation", *Physical Review Letters*, 91(14), Art. No. 145504, 2003.
69. Pantano, A., Boyce, M.C., Parks, D.M., "Mechanics of Deformation of Single- and Multi-Wall Carbon Nanotubes", *Journal of the Mechanics and Physics of Solids*, 52, 789-821, 2004.
70. Parsons, E., Boyce, M.C., Parks, D.M., "An Experimental Investigation of the Large Strain Tensile Behavior of Neat and Rubber-Modified Polycarbonate", *Polymer*, 45, 2665-2684, 2004.
71. Pantano, A., Parks, D.M., Boyce, M.C., "Mechanics of Axial Compression of Single and Multi-wall Carbon Nanotubes", *Trans. ASME Jnl. Engineering Materials and Technology*, 126 (3), 279-284, 2004.
72. Qi, H.J., Boyce, M.C., "Constitutive Model for Stretch-Induced Softening of the Stress-Stretch Behavior of Elastomeric Materials", *Journal of the Mechanics and Physics of Solids*, 52, 2187-2205, 2004.
73. Pantano, A., Nardelli, M., Parks, D.M., Boyce, M.C., "Mixed Finite Element-Tight Binding Electromechanical Analysis of Carbon Nanotubes", *Journal Applied Physics*, 96 (11), 6756-6760, 2004.
74. Qi, H.J., Boyce, M.C., "Stress-Strain Behavior of Thermoplastic Polyurethane", *Mechanics of Materials*, 31, 817-839, 2005.
75. Parsons, E., Boyce, M.C., Parks, D.M., Weinberg, M., "3D Large Strain Tensile Behavior of Neat and Calcium Carbonate Filled HDPE", *Polymer*, 46, 2257-2265, 2005.
76. Dupaix, R.B., Boyce, M.C., "Finite Strain Behavior of PET and PETG", *Polymer*, 46, 4827-4838, 2005.
77. Mulliken, A., Boyce, M.C., "Mechanics of the Rate-Dependent Elastic-Plastic Deformation of Glassy Polymers from Low to High Strain Rates", *International Journal of Solids and Structures*, 43, 1331-1356, 2006.
78. Qi, H.J., Bruet, B.F.J., Palmer, J.S., Ortiz, C., Boyce, M.C., "Micromechanics of the Tensile Behavior of Nacre", Chapter in *Mechanics of Biological Tissue*, Ed. Holzapfel and Ogden, Proceedings of IUTAM, Springer Verlag, 2006.

79. Ha, Y.-H., Kwon, Y., Beiner, T., Chan, E.P., Tzianetopolou, T., Cohen, R.E., Boyce, M.C., Thomas, E.L., "An Orientationally Ordered Hierarchical Exfoliated Clay Block Copolymer Nanocomposites", *Macromolecules*, 38, 5170-5179, 2005.
80. Capaldi, F.M., Rutledge, G.C., Boyce, M.C., "Structure and Dynamics of Blends of Polyhedral Oligomeric Silsesquioxanes and Polyethylene by Atomistic Simulation", *Macromolecules*, 38, 6700-6709, 2005.
81. Arslan, M., Boyce, M.C., "Constitutive Modeling of the Finite Deformation Behavior of Membranes Possessing a Triangulated Network Microstructure", *Journal of Applied Mechanics*, 73, 536-543, 2006.
82. Bruet, B.F.J., Panas, R., Tai, K., Frick, L., Ortiz, C., Qi, H.J., Boyce, M.C., "Nanoscale Morphology and Indentation of Individual Nacre Tablets from the Gastropod Mollusk *Trochus Niloticus*", *Journal of Materials Research*, 20, 2400-2419, 2005.
83. Yi, J., Boyce, M.C., Balizer, E., Lee, G., "Large Deformation Rate-Dependent Stress-Strain Behavior of Polyurea and Polyurethane", *Polymer*, 47, 319-329, 2006.
84. Bamberg, E., Grippo, C.P., Wanakamol, P., Slocum, A.H., Boyce, M.C., Thomas, E.L., "A Tensile Test Device for In-Situ Atomic Force Microscope Mechanical Testing", *Precision Engineering*, 30 (1), 71-84, 2006.
85. Danielsson, M., Parks, D.M., Boyce, M.C., "Micromechanics, Macromechanics and Constitutive Modeling of the Elasto-Viscoplastic Deformation of Rubber-Toughened Glassy Polymers", *Journal of the Mechanics and Physics of Solids*, 55, 533-561, 2007.
86. Dupaix, R.B., Boyce, M.C., "Constitutive Modeling of the Finite Strain Behavior of Amorphous Polymers in and above the Glass Transition", *Mechanics of Materials*, 39, 1, 39-52, 2006.
87. Mulliken, A.D., Boyce, M.C., "Polycarbonate and a Polycarbonate-POSS Nanocomposite at High Rates of Deformation", *Trans. ASME, Jnl. Engineering Materials and Technology*, 128, 543, 2006.
88. Capaldi, F.M., Boyce, M.C., Rutledge, G.C., "The Mechanical Properties of Crystalline Cyclopentyl Polyhedron Oligomeric Silsesquioxane", *Jnl. Chemical Physics*, 124, 214709, 2006.
89. Qi, H.J., Ortiz, C., Boyce, M.C., "Mechanics of Biomacromolecular Networks Containing Folded Domains", *Trans. ASME, Jnl. Engineering Materials and Technology*, 128, 509-518, 2006.
90. Sarva, S., Mulliken, A.D., Boyce, M.C., "Mechanics of Taylor Impact Tests on Polycarbonate", *International Journal of Solids and Structures*, 44, 2381-2400, 2007.
91. Kearney, C., Zhao, Z., Bruet, B.J.F., Radovitzky, R., Boyce, M.C., Ortiz, C., "Nanoscale Anisotropic Plastic Deformation in Single Crystal Aragonite", *Physical Review Letters*, 96, 255505, 2006.
92. Soong, S.Y., Mulliken, A.D., Cohen, R.E., Boyce, M.C., "Rate Dependent Deformation Behavior of POSS-Filled and Plasticized PVC", *Macromolecules*, 39, 2900-2908, 2006.
93. Sarva, S., Mulliken, A.D., Boyce, M.C., "The Mechanics of Large Strain Inhomogeneous Deformation of Polymeric Materials under Dynamic Loading Conditions", *Journal de Physique IV France*, 134, 95-101, 2006.
94. Mulliken, A.D., Soong, S.Y., Boyce, M.C., Cohen, R.E., "High-rate Thermomechanical Behavior of Poly(vinyl chloride) and Plasticized Poly(vinyl chloride)", *Journal de Physique IV France*, 134, 217-223, 2006.
95. Cantournet, S., Boyce, M.C., Tsou, A.H., "Micromechanics and Macromechanics of Carbon Nanotube Enhanced Elastomers", *Journal of the Mechanics and Physics of Solids*, 55, 1321-1339, 2007.
96. Garg, M., Pantano, A., Boyce, M.C., "An Equivalent Orthotropic Representation of the Non-linear Elastic Behavior of Multiwalled Carbon Nanotubes", *Trans. ASME Jnl. Engineering Materials and Technology*, 129, 431-439, 2007.
97. Garg, M., Mulliken, A.D., Boyce, M.C., "Temperature Rise in Polymeric Materials during High Rate Deformation", *Journal of Applied Mechanics*, 75(1), 011009, 2008.
98. Soong, S.Y., Cohen, R.E., Boyce, M.C., "Polyhedral Oligomeric Silsesquioxane as Novel Plasticizer for Poly(vinyl chloride)", *Polymer*, 48, 1410-1417, 2007.

99. Sarva, S., Boyce, M.C., “Mechanics of Polycarbonate During High Rate Tension”, *Journal of Mechanics of Materials and Structures*, 2, 10, 1853, 2007.
100. Bertoldi, K., Boyce, M.C., “Mechanics of the hysteretic large strain behavior of mussel byssus threads”, *Journal of Materials Science*, 42, 8943-8956, 2007.
101. Sarva, S., Deschanel, S., Boyce, M.C., Chen, W., “Stress-Strain Behavior of a Polyurea and a Polyurethane from Low to High Strain Rates”, *Polymer as a Communication*, **48**, 2208-2213, 2007.
102. Arslan, M., Boyce, M.C., Qi, H.J., Ortiz, C., “Constitutive Modeling of the Stress-Stretch Behavior of Two-Dimensional Triangulated Macromolecular Networks containing Folded Domains”, *Journal of Applied Mechanics*, 75(1), 011020, 2008.
103. Mullin, T., Deschanel, S., Bertoldi, K., Boyce, M.C., “Pattern Transformation Triggered by Deformation”, *Physical Review Letters*, 99, 084301, 2007.
104. Ortiz, C., Boyce, M.C., “Bioinspired Structural Materials”, *Science*, 1053-1054, 2008.
105. Palmer, J.S., Boyce, M.C., “Constitutive Modeling of the Stress-Strain Behavior of F-Actin Filament Networks”, *Acta Biomaterialia*, 4, 597-612, 2008.
106. Bertoldi, K., Boyce, M.C., “Mechanically-Triggered Transformations of Phononic Band Gaps in Periodic Elastomeric Structures”, *Physical Review B*, 77, 052102-1 – 052105-4, 2008.
107. Bertoldi, K., Boyce, M.C., Deschanel, S., Prange, S.M., Mullin, T., “Mechanics of Deformation – Triggered Pattern Transformations in Periodic Structures”, *Journal of the Mechanics and Physics of Solids*, 8, 2642-2668, 2008.
108. Soong, S.Y., Cohen, R.E., Boyce, M.C., “The Effects of Thermomechanical History and Strain Rate on Antiplasticization of PVC”, *Polymer* 49, 1440-1443, 2008.
109. Bruet, B.J.F., Song, J.H., Boyce, M.C., Ortiz, C. “Materials Design Principles of Ancient Fish Armor”, *Nature Materials*, 7(9), 748-756, 2008.
110. Tsui, N.T., Yang, Y., Mulliken, A.D., Swager, T., Boyce, M.C., Thomas, E.L., “Enhancement to the Rate-Dependent Mechanical Behavior of Polycarbonate by Incorporation of Triptycenes”, *Polymer*, 49(21), 4703-4712, 2008.
111. Bertoldi, K., Boyce, M.C., “Wave Propagation and Instabilities in Monolithic and Periodically Structured Elastomeric Materials undergoing Large Deformations”, *Physical Review B*, 78(18), 184107, 2008.
112. Sharma, R., Boyce, M.C., Socrate, S., “Micromechanics of Toughening in Ductile/Brittle Polymeric Microlaminates: Effect of Volume Fraction”, *International Journal of Solids and Structures*, 7, 2173-2202, 2008.
113. Deschanel, S., Grevskes, B.P., Bertoldi, K., Sarva, S.S., Chen, W., Samuels, S.L., Cohen, R.E., Boyce, M.C., “Rate Dependent Finite Deformation Stress-Strain Behavior in Ethylene Methacrylic Acid Copolymer and an Ethylene Methacrylic Acid Butyl Acrylate Copolymer”, *Polymer*, 50, 227-235, 2009.
114. Pai, C.L., Boyce, M.C., Rutledge, G.C., “On the Morphology of Porous and Wrinkled Fibres of Polystyrene Electrospun from Dimethylformamide”, *Macromolecules*, 42, 2102-2114, 2009.
115. Wang, L.F., Wen, C-Y, Thomas, E.L., Boyce, M.C., “Plastic Dissipation Mechanisms in Periodic Microframe Structured Polymers”, *Advanced Functional Materials*, 19, 1343-1350, 2009.
116. Singamaneni, S., Bertoldi, K., Chang, S., Jang, J.-H., Young, S.L., Thomas, E.L., Boyce, M.C., Tsukruk, V.V., “Bifurcated Mechanical Behavior of Deformed Periodic Porous Structures”, *Advanced Functional Materials*, 19, 1426-1436, 2009.
117. Singamaneni, S., Bertoldi, K., Chang, S., Jang, J.-H., Thomas, E.L., Boyce M.C., Tsukruk, V.V., “Instabilities and Pattern Transformation in Periodic, Porous Elastoplastic Solid Coatings”, *ACS Applied Materials and Interfaces*, 1, 42-47, 2009.
118. Wang, L.F., Pai, C.L., Boyce, M.C., Rutledge, G.C., “Wrinkled Surface Topographies of Electrospun Polymer Fibers”, *Applied Physics Letters*, 15, 151916, 2009.
119. Jang, J.H., Koh, C.Y., Bertoldi, K., Boyce, M.C., Thomas, E.L., “Combining Pattern Instability and Shape-Memory Hysteresis for Phononic Switching”, *Nano Letters*, 9, 2113-2119, 2009.

120. Wang, L.F., Song, J.H., Ortiz, C., Boyce, M.C., “Anisotropic Design of a Multilayered Biological Exoskeleton”, *Journal of Materials Research*, 24, 3477-3497, 2009.
121. Silberstein, M.N., Boyce, M.C., “Constitutive Modeling of the Rate, Temperature and Hydration Dependent Deformation Response of Nafion to Monotonic and Cyclic Loading”, *Journal of Power Sources*, 195 (17), 5692-5706, 2010.
122. Greviskes, B.P., Bertoldi, K., Deschanel, S., Samuels, S., Spahr, D., Cohen, R.E., Boyce, M.C., “Effects of Sodium and Zinc Neutralization on Large Deformation hysteresis of an Ethylene Methacrylic Acid Butyl Acrylate Copolymer”, *Polymer*, 51 (15), 3532-3539, 2010.
123. Song, J.H., Reichert, S., Kallai, I., Boyce, M.C., Ortiz, C., “Quantitative Microstructural Studies of the Armor of the Marine Threespine Stickleback (*Gasterosteus Aculeatus*)”, *Journal of Structural Biology*, 171 (3), 318-331, 2010.
124. Wang, L.F., Ortiz, C., Boyce, M.C., “Mechanics of Indentation into Micro and Nanoscale Forests of Tubes, Rods and Pillars”, *Journal of Engineering Materials and Technology*, 133, 011014 (1-9), 2010.
125. Lee, J.H., Wang, L.F., Kooi, S., Boyce, M.C., Thomas, E.L., “Enhanced Energy Dissipation in Periodic Epoxy Nanoframes”, *Nano Letters*, 10(7), 2592-2597, 2010.
126. Wang, L.F., Boyce, M.C., “Bioinspired Structural Material Exhibiting Post-Yield Lateral Expansion and Volumetric Energy Dissipation During Tension”, *Advanced Functional Materials*, 20 3025-3030, 2010.
127. Johnson, T.P.M., Boyce, M.C., Socrates, S., “A Viscoelastic Viscoplastic Model of Cortical Bone Valid at Low and High Strain Rates.”, *Acta Biomaterialia*, 6 4073-4080, 2010.
128. Dong, J.J. Castro, C.E., Boyce, M.C., Lang, M.J., Lindquist, S., “Optical Trapping with high forces reveals unexpected behaviors of prion fibrils”, *Nature Structural and Molecular Biology*, 17, 1422-1430, 2010.**
129. Silberstein, M.N., Pillai, P.V., Boyce, M.C., “Biaxial Elastic-Viscoplastic Behavior of Nafion Membranes”, *Polymer*, 52 2, 529-539, 2011.
130. Silberstein, M.N., Boyce, M.C., “Hygro-Thermal Mechanical Behavior of Nafion During Constrained Swelling” , *Journal of Power Sources*, 196 7, 3452-3460, 2011.
131. Castro, C.E., Dong, J., Boyce, M.C., Lindquist, S., Lang, M.J., “Physical Properties of Polymorphic Yeast Prion Amyloid Fibers”, *Biophysical Journal*, 101 2, 439-448, 2011.
132. Song, J.H., Ortiz, C., Boyce, M.C., “Threat-Protection Mechanics of an Armored Fish”, *Journal of the Mechanical Behavior of Biomedical Materials*, 4 699-712, 2011.
133. Matin, A., Khan, Z., Zaidi, S., Boyce, M.C., “Biofouling in Reverse Osmosis Membranes for Seawater Desalination”, *Desalination*, 281, 1-16, 2011.
134. Pai, C.L., Boyce, M.C., Rutledge, G.C., “ Mechanical Properties of Individual Electrospun PA 6(3)T Fibers and Their Variation with Fiber Diameter”, *Polymer*, 52 10, 2295-2301, 2011.
135. Wang, L.F., Castro, C.E., Boyce, M.C., “Growth strain-induced Wrinkled Membrane Morphology of White Blood Cells”, *Soft Matter*, 7 24, 11319-11324, 2011.
136. Wang, L.F., Lau, J., Thomas, E.L., Boyce, M.C., “ Co-Continuous Composite Materials for Stiffness, Strength and Energy Dissipation”, *Advanced Materials*, 23 13, 1524-1529, 2011.
137. Silberstein, M.N. Pai, C.L., Rutledge, G.C., Boyce, M.C., “Elastic-Plastic Behavior of NonWoven Mats”, *Journal of the Mechanics and Physics of Solids*, 60, 295-318, 2012.
138. Pai, C.L., Boyce, M.C., Rutledge, G.C., “On the Importance of Fiber Curvature to the Elastic Moduli of Electrospun Nonwoven Mats” , *Polymer*, 52 26, 6126-6133, 2011.
139. Rinaldi, R.G., Boyce, M.C., Weigand, S.J., Londono, D.J., Guise, M., “Microstructure Evolution during Tensile Loading Histories of a Polyurea”, *Journal of Polymer Science Part B-Polymer Physics*, 49 24, 1660-1671, 2011.
140. Connors, M.J., Ehrlich, H., Hog, M., Godeffroy, C., Aray, S., Kallai, I., Gazit, D., Boyce, M., Ortiz, C., “Three-dimensional structure of the shell plate assembly of the chiton *Tonicella Marmorea* and its biomechanical consequences”, *Journal of Structural Biology*, in press, 2012.

141. Rinaldi, R., Hsieh, A.J., Boyce, M.C., “Tunable Microstructures and Mechanical Deformation in Transparent Poly (urethane ureas)”, *Jnl. Polymer Science Part B: Polymer Physics*, 49, 123-135, 2011.
142. Han, L., Wang, L.F., Chia, K.-K., Cohen, R.E., Rubner, M.F., Boyce, M.C., Ortiz, C., “ Geometrically Controlled Mechanically Responsive Polyelectrolyte Tube Arrays”, *Advanced Materials*, 23 40, 4667, 2011.
143. Li, Y., Ortiz, C., Boyce, M.C.,”Stiffness and Strength of Natural Suture Joints”, *Physical Review E*, 84 6, 062904, 2011.
144. Yin, J., Retsch, M., Lee,J.-H., Thomas, E.L., Boyce, M.C., “ Mechanics of Nanoindentation on a Monolayer of Colloidal Hollow Nanoparticles”, *Langmuir*, 27 17, 10492-10500, 2011.
145. Han, L., Wang, L.F., Song, J., Boyce, M.C., Ortiz, C., “Direct Quantification of the Mechanical Anisotropy and Fracture of an Individual Exoskeleton Layer via Uniaxial Compression of Micropillars”, *Nano Letters*, 11 9, 3868-3874, 2011.
146. Li, Y., Ortiz, C., Boyce, M.C., “ A Bio-inspired Mechanical, Deterministic Fractal Model for Hierarchical Suture Joints”, *Physical Review E*, 85, 3, 031901, 2012.
147. Arslan, M., Boyce, M.C., “A Micromechanically Based Anisotropic Constitutive Model for the Microtubule Wall “, *Journal of Applied Mechanics*, 79, 2, 021002, 2012.
148. Han, L, Yin, J., Wang, L, Chia, K.K., Rubner, M., Cohen, R.E., Ortiz, C. Boyce, M.C., “ Tunable stimulus-responsive friction mechanisms of polyelectrolyte films and tube forests”, *Soft Matter*, 8, 33, 8642-8650, 2012.
149. Yin, J., Retsch, M., Thomas, E.L., Boyce, M.C., “Collective Mechanical Behavior of Multilayer Colloidal Arrays of Hollow Nanoparticles” , *Langmuir*, 28, 13, 5580-5588, 2012.
150. Lee, J-H, Wang, L, Boyce, M.C., Thomas, E.L, “ Periodic Bicontinuous Composites for High Specific Energy Absorption”, *Nano Letters*, 12, 8, 4392-4396, 2012.
151. Yin, J. , Yague, J., Eggenpieler, D., Gleason, K.K., Boyce, M.C., “Deterministic Order in Surface Micro-Topologies through Sequential Wrinkling”, *Advanced Materials*, 24, 40, 5441-5446, 2012.
152. Browning, A., Ortiz, C., Boyce, M.C., “Mechanics of composite elasmoid fish scale assemblies and their bioinspired analogues”, *Journal of the Mechanical Behavior of Biomedical Materials*, 19, 75-86, 2013.
153. Liu, D.S., Ashcraft, J.N., Mannarino, M.M., Silberstein, M.N., Boyce, M.C., Rutledge, G.C., Hammond, P., “Spray Layer-by-Layer Electrospun Composite Proton Exchange Membranes”, *Advanced Functional Materials*, 23(24), 3087-3095, 2013.
154. Cho, H., Rinaldi, R.G., Boyce, M.C. , “Constitutive Modeling of the Rate-Dependent Resilient and Dissipative Large Deformation Behavior of a Segmented Copolymer Polyurea”, *Soft Matter*, 9(27), 6319-6330, 2013.
155. Taylor, R.E., Boyce, C.M., Boyce, M.C., Pruitt, B., “Planar Patterned Stretchable Electrode Arrays based on Flexible Printed Circuits”, *Journal of Micromechanics and Microengineering*, 23 (10) 105004, 2013.
156. Li, Y., Ortiz, C., Boyce, M.C., “ A Generalized Mechanical Model for Suture Interfaces of Arbitrary Geometry”, *Journal of the Mechanics and Physics of Solids*, 61(4) 1144-1167, 2013.
157. Cho, H., Bartyczak, S., Mock, W., Boyce, M.C., “Dissipation and Resilience of Elastomeric Segmented Copolymers under Extreme Strain Rates”, *Polymer*, 54(21), 5952-5964, 2013.
158. Li, Y., Kaynia, N., Rudykh, S., Boyce, M.C., “Wrinkling of Interfacial Layers in Stratified Composites”, *Advanced Engineering Materials*, 15(10), 92`-926, 2013.
159. Rudykh,S., Boyce, M.C., “Transforming Wave Propagation in Layered Media via Instability-Induced Interfacial Wrinkling”, *Physical Review Letters*, 112(3), 034301, 2014.
160. Yin, J., Yague, J. L, Boyce, M.C., Gleason, K.K., “Biaxially Mechanical Tuning of 2D Reversible and Irreversible Surface Topologies through Simultaneous and Sequential Wrinkling”, *ACS Applied Materials and Interfaces*, 6(4), 2850-2857, 2014.

161. Lin, E., Li, Y., Weaver, J.C., Ortiz, C., Boyce, M.C., “Tunability and Enhancement of Mechanical Behavior with Additively Manufactured Bio-Inspired Hierarchical Suture Interfaces”, *Journal of Materials Research*, 29(17), 1867-1875, 2014.
162. Rudykh, S., Boyce, M.C., “Analysis of Elasmoid Fish Imbricated Layered Scale-Tissue Systems and Their Bio-Inspired Analogues at Finite Strains and Bending”, *IMA Journal of Applied Mathematics*, 79 (5), 830-847, 2014.
163. Rudykh, S., Boyce, M.C., “Transforming Small Localized Loading into Large Rotational Motion in Soft Anisotropically Structured Materials”, *Advanced Engineering Materials*, 16(11), 1311-1317, 2014.
164. Lin, E., Li, Y., Ortiz, C., Boyce, M.C., “ 3D Printed, Bio-Inspired Prototypes and Analytical Models for Structured Suture Interfaces with Geometrically-Tuned Deformation and Failure Behavior”, *Journal of the Mechanics and Physics of Solids*, 73, 166-182, 2014.
165. Rudykh, S., Ortiz, C., Boyce, M.C., “Flexibility and Protection by Design: Imbricated Hybrid Microstructures of Bio-Inspired Armor”, *Soft Matter*, 11(13), 2547-2554, 2015.
166. Yin, J., Boyce, M.C., “Unique Wrinkles as Identity Tags”, *Nature*, 520 (7546), 164-165, 2015.
167. Guttag, M., Boyce, M.C., “Locally and Dynamically Controllable Surface Topography through the Use of Particle-Enhanced Soft Composites”, *Advanced Functional Materials*, 201501035, 2015.
168. Duro-Royo, J., Zolotovskiy, K., Mogas-Soldevila, L., Varshney, S., Oxman, N., Boyce, M.C., Ortiz, C., “Meta-Mesh: A hierarchical computational model for design and fabrication of biomimetic armored surfaces” , *Computer-Aided Design*, 60, 14-27, 2015.
169. Varshney, W., Song, J., Li, Y., Boyce, M.C., Ortiz, C., Morphometric structural diversity of a natural armor assembly investigated by 2D continuum strain analysis”, *Journal of Structural Biology*, 192(3), 487-499, 2015.
170. Galich, P. I., Fang, N.X., Boyce, M.C., Rudykh, S., “Elastic wave propagation in finitely deformed layered materials”, *Journal of the Mechanics and Physics of Solids*, 98,390-410, 2017.
171. Raayai-Ardakani, S., Luis Yague, J., Gleason, K.K., Boyce, M.C., “Mechanics of Graded Wrinkling”, *Journal of Applied Mechanics*, 83(12), 121011, 2016.
172. Cho, H., Weaver, J.C., Poeselt, E., In't Veld, P.J., Boyce, M.C., Rutledge, G.C., Mechanics of Heterogeneous Soft Crystals”, *Advanced Functional Materials*, 26 (38), 6938-6949, 2016.
173. Liu, L., Jiang, Y., Boyce, M.C., Ortiz, C., Baur, J., Song, J., Li, Y., “The effects of morphological irregularity on the mechanical behavior of interdigitated biological sutures”, *Journal of Biomechanics*, 2017.
174. Cho, H., Mayer, S., Poselt, E., Susoff, M., In't Veld, P.J., Rugledge, G.C., Boyce, M.C., “Deformation Mechanisms of Thermoplastic Elastomers: Stress-Strain Behavior and Constitutive Modeling”, *Polymer* 128, 87-99, 2017.
175. Gao, C., Slesarenko, V., Boyce, M.C., Rudykh, S., Li, Y., “ Instability-Induced Pattern Transformation in Soft Metamaterial with Hexagonal Networks for Tunable Wave Propagation”, *Scientific Reports*, 8:11834, 1-9, 2018.
176. Zolotovskiy, K., Varshney, S., Reichert, S., Arndt, E.M., Dao, M., Boyce, M.C., Ortiz, C., “Fish-inspired flexible protective material systems with anisotropic bending stiffness”, 2:35, 2-10, *Communications Materials*, 2021.
177. Boyce, M.C., “2020 Timoshenko Medal Acceptance Lecture: Mechanics: Evergreen and Forever New”, *Journal of Applied Mechanics*, 88 (9) , 1-3, 2021.