

Curriculum Vitae of Lisa A. Pruitt

EDUCATION

Ph.D. Engineering *Brown University*, Providence, RI, May 1993

Doctoral Thesis: *Cyclic Damage Ahead of Fatigue Cracks in Amorphous Solids: Theory, Experiments and Implications*

M.S. Engineering *Brown University*, Providence, RI, May 1990

Masters Thesis: *Fatigue Behavior of Carbon Fiber-Reinforced Epoxy Composites Under Far-Field Cyclic Compression*

B.S. Materials Engineering, *University of Rhode Island*, Kingston, RI, May 1988

B.S. Chemical and Ocean Engineering, *University of Rhode Island*, Kingston, RI, May 1988

WORK EXPERIENCE

Department of Mechanical Engineering, University of California at Berkeley, College of Engineering, Berkeley, CA

Vice Chair of Graduate Studies. 2013-2016

Equity, Diversity, and Inclusion Officer. 2009-2012

Chancellor's Professor of Mechanical Engineering. 2004 – 2009

Professor of Mechanical Engineering. 1993-present

Director of the Medical Polymer and Biomaterials Group. 1993-present

Department of Bioengineering, University of California at Berkeley, College of Engineering, Berkeley, CA

Vice Chair of Undergraduate Studies, 2002-2003

Professor of Bioengineering, 1998-present

College of Engineering, University of California at Berkeley, College of Engineering, Berkeley, CA

Lawrence Talbot Chaired Professorship in Engineering. 2007-present

Associate Dean for Lifelong Learning and Outreach Education. 2005-2007

Director of the Engineering Systems Research Center (ESRC). 2003- 2004

Department of Orthopedic Surgery, University of California at San Francisco, School of Medicine, San Francisco, CA

Adjunct Professor of Orthopedic Surgery, 2001 - present

Research is focused on structure–property relationships in orthopedic biomaterials and medical polymers. Projects include the assessment of fatigue fracture mechanisms of orthopedic biomaterials and associated devices. Retrievals of orthopedic implants are characterized to model *in vivo* degradation and to optimize device design. Techniques for structural characterization include SEM, FEA, wear testing, fatigue-fracture analysis, and nanoindentation.

Pedagogical experience includes curriculum development in mechanical engineering and bioengineering. Undergraduate teaching includes *Introduction to Engineering Design and Analysis*, *Mechanical Behavior of Engineering Materials*, *Structural Aspects of Biomaterials (Medical Device Design)* and *Principles of Bioengineering*. Graduate courses include *Advanced Structural Aspects of Biomaterials*, *Fracture Mechanics*, *Mechanical Behavior of Materials*, *Polymer Engineering*, and *Teaching Methodologies for Graduate Students*.

Brown University, Division of Engineering, Providence, RI, 1988 - 1993

Graduate Researcher and Research Associate. Investigated fatigue and fracture resistance of polymeric composites, polymers and biomaterials. Characterized and quantified the evolution of cyclic stress fields ahead of fatigue cracks by recourse to photoelasticity and laser interferometry. Confirmed that residual tension is responsible for crack nucleation under cyclic compression in polymeric solids. Studied micromechanisms of deformation using electron and optical microscopy techniques. Developed models for cyclic damage in structural polymers.

Army Research Labs, Corrosion Science Division, Watertown, MA, 1987- 1988

Research Engineer. Characterized the effect of surface treatments on the hydrogen embrittlement resistance in 4340 steels. Analytic techniques included barnacle electrode methods and fracture toughness testing. Fractography and microstructural characterization were performed with scanning and transmission electron microscopy.

Lawrence Talbot Chaired Professor of Engineering
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HONORS AND AWARDS

UC Berkeley Distinguished Teaching Award. Awarded for sustained teaching excellence, 2016.

American Institute for Medical and Biological Engineering Fellow. Awarded for outstanding research, teaching, and mentoring contributions in the field of medical polymers, with particular application to orthopaedic joint replacements, 2013

Minners Faculty Fellow. Awarded for implementation of ethics in the engineering curriculum, University of California, Berkeley, 2012

Denise Denton Best Education Paper Award. For paper entitled "Leadership and Service Learning Improves Engineering Skills in Women," American Society for Engineering Education, 2012

A. Richard Newton Educator Award. Given by the Anita Borg Institute for broadening engineering participation of women through the use of undergraduate engineering education and K-12 engineering outreach, 2011

Presidential Chairs Teaching Fellow. Given for teaching excellence, University of California, Berkeley 2010-2011

American Society of Engineering Education Best Paper Award (Multidisciplinary Teams). For paper entitled, "Use of Learning Styles for Teamwork and Professional Development in a Multidisciplinary Course", 2010

Biomaterials Best Image Award published in the *Year in Images*, from paper entitled, "Clinical Rim Fracture of Cross-linked Acetabular Liners," 2010

Faculty Award for Outstanding Mentorship of Graduate Student Instructors. Awarded by UC Berkeley, 2009

National Effective Teaching Institute. Elected participant, 2009

Lawrence Talbot Chaired Professorship in Engineering, University of California, Berkeley, 2007-present

Faculty of the National Student Leadership Conference. 2006-2011

University of California Chancellor's Professorship, 2004

U.S. Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring, 2004

Faculty Mentor to the **Society for Biomaterials Undergraduate Research Award** for research entitled, "Biochemical Characterization of Atherosclerotic Plaques Using FTIR Spectroscopy and Histology," 2002

Elected Fellow to American Association for the Advancement of Science, 2002

American Association for the Advancement of Science Mentor Award, 2001

Miller Research Professorship, 2000

Congressional Citation for Engineering Excellence, 1999

Engineering Excellence and Distinguished Engineering Alumni Award, University of Rhode Island, 1999

Chancellor's Research Initiative Award, 1999-2000

ONR Young Investigator Award, 1998-2001

The Alonzo J Neufeld Award, Western Orthopedic Association, 1998

Prytanean Alumnae Award, 1997-1998 Given annually to a Professor who serves as an exceptional role model to women.

Hellman Family Faculty Fund Award, 1997-1998

National Science Foundation CAREER Award, 1996-2001

Cal Berkeley Career Development Award, 1996-1997

Faculty Sponsor for the **DuPont Plunkett Student Award for Innovation with Teflon and Tefzel, 1996**

Chancellor's Award for Academic Excellence of Research, 1995

U. C. Regents' Junior Faculty Fellowship, 1995

Brown University Materials Engineering Teaching Award, 1993

Elected to Sigma Xi, 1990

Brown University Presidential Fellowship and Research Assistantship, 1988-1993

Elected to Tau Beta Pi, 1988

University of Rhode Island Undergraduate Research Award, 1988

PROFESSIONAL SERVICE

Reviewer: *Biomaterials, Journal of Biomedical Materials Research, Journal of Orthopedic Research, Polymer, International Journal of Fatigue, Journal of Biomechanical Engineering, Journal of Bone and Joint Surgery, Journal of Mechanical Behavior of Biomaterials and Tissues*

Member: AAAS, ASEE, ASME, EGEA, TMS, ORS, SFB, Prytanean Honor Society

PATENTS: "Plasma-Assisted Surface Modification of Polymers for Medical Device Applications"

1. U.S. Patent No. 6,379,741. Issued April 30, 2002

2. U.S. Patent No. 6,685,743. Issued February 3, 2004.

BOOKS

1. **Mechanics of Biomaterials: Fundamental Principles for Implant Design**, with A. Chakravartula, Cambridge University Press, Cambridge, UK, 2011.
2. **Horse of Fire: The Story of an Extraordinary and Knowing Horse as told by JJ Luck**, Authorhouse Press, Indianapolis, IN, 2008.
3. **Savanna and the Magic Boots**, Authorhouse Press, Indianapolis, IN, 2011.

BOOK CHAPTERS

1. "Fatigue Crack Propagation in Polymer Blends," R. Pearson and L. Pruitt, in Polymer Blends: Formulation and Performance, D.R. Paul and C.B. Bucknall, Eds., John Wiley and Sons, Inc., New York, **27**, 269-299, 1999.
2. "Fatigue Testing and Behavior of Plastics," L. Pruitt, in ASM Handbook, Volume 8, Mechanical Testing and Evaluation, H. Kuhn and D. Medlin, Eds., ASM International, Ohio, **8** 758-767, 2000.
3. "Fluorocarbon Polymers in Biomedical Engineering," L. Pruitt, in Advances in Polymer Science: Encyclopedia of Materials: Science and Technology, D.F. Williams, Ed., Elsevier Science Limited, Oxford, 2001.
4. "Radiation Effects on Medical Polymers and on their Mechanical Properties," in Advances in Polymer Science: Radiation Effects, H.H. Kausch, Ed., Springer-Verlag, Heidelberg, 2003.
5. "Fatigue of Polymers," L. Pruitt, in Comprehensive Structural Integrity, R.O. Ritchie and Y. Murakami, Eds., Elsevier Science Limited, Oxford, 2002.
6. "Conventional and Cross-linked Polyethylene Properties," L. Pruitt, in Total Knee Arthroplasty: A Guide for Better Performance, J. Bellmans, M. Ries, and J. Victor, Eds., Springer-Verlag, Heidelberg, 2004.
7. "Advances in UHMWPE: Structure-Property-Processing Inter-relationships," A. Bellare and L. Pruitt, in Joint Replacements and Bone Resorption Eds. A. Shanbhag, H. Rubash and J. Jacobs, Marcel Dekker, NY, 2004.
8. "Alternative Bearings for Knee Articulation: Hopes and Realities," M. Ries and L. Pruitt, in Surgery of the Knee, 4th ed. Ed W.N. Scott, J. Insall, NY, 2005.
9. "Morphological Analysis of Retrieved Cross-linked UHMWPE and Improved Microstructures for Enhanced Fatigue and Wear Performance," L. Pruitt, in UHMWPE for Arthroplasty: From synthesis to implant, 121-132, Eds; L. Costa, E.M. Brach del Prever, P. Bracco, Torino, IT, 2005.
10. "Structural Biomedical Polymers (Non-degradable)," L. Pruitt, in Comprehensive Biomaterials, Eds: L. Hutchins, P. Ducheyne, K. Healy. Elsevier, 2011.
11. "Biomedical Polymers", L. Pruitt, in Comprehensive Biomaterials, 2nd edition; Eds: L. Hutchins, P. Ducheyne, K. Healy. Elsevier, 2017.

ARCHIVAL JOURNAL PUBLICATIONS

1. L. Malito, J. Sov, B. Gludavitz, R.O. Ritchie, and L. Pruitt, "Fracture Toughness of Ultra-High Molecular Weight Polyethylene: A basis for defining the crack-initiation toughness in polymers," submitted to *J. Mech. Phys. Solids* (2018).
2. L. Malito, S. Arevalo, A. Kozac, S. Spiegelberg, A. Bellare and L. Pruitt, "Material Properties of Ultra Molecular Weight Polyethylene: Comparison of Tension, Compression, Nanomechanics and Microstructure across Clinical Formulations," **83** 9-19 *Journal of Mechanical Behavior of Biomedical Materials* (2018).
3. A. Ford, S. Li, J. Sov, H. Grammlin, A. Srinivasan and L. Pruitt, "Micromechanisms of Fatigue Crack Growth in Polycarbonate Urethanes: Time dependent and conditioning effects," *Journal of Mechanical Behavior of Biomedical Materials*, **79** 324-331 (2018).
4. J. Furmanski and L. Pruitt, "Static Mode Fatigue Crack Propagation and Generalized Stress Intensity Correlation for Fatigue-Brittle Polymers," *International Journal of Fracture*, Accepted, in press (2018).
5. N. Bonnheim, H. Gramling, M. Ries, D. VanCitters, and L. Pruitt, "Fatigue Fracture of a Cemented Omnifit Femoral Stem: Case Report and Failure Analysis," *Arthroplasty Today*, **3** 234-238 (2017).
6. F. Ansari, B. Gludovatz, R.O. Ritchie, and L. Pruitt, "Notch Fatigue in UHMWPE used in Total Joint Replacements: A Linear Elastic Fracture Mechanics Approach," *Journal of Mechanical Behavior of Biomedical Materials* **60**, 267-279, July (2016).
7. F. Ansari, T. Lee, L. Malito, A. Martin, T. Norris, S. Gunther, M. Ries, D. VanCitters and L. Pruitt, "Analysis of Severely Fractured Glenoid Components: Clinical Consequences of Biomechanics, Design and Materials Selection on Implant Performance," *Journal of Shoulder and Elbow Surgery*, **25**, 1041-1050 (2016).

8. M.D. Ries, F. Ansari, and L.Pruitt, "Effect of Processing, Sterilization and Crosslinking on UHMWPE Fatigue Fracture and Fatigue Wear Mechanisms in Total Joint Arthroplasty," Invited Review Paper, *Journal of Mechanical Behavior of Biomedical Materials*, **53** 329-340 (2016); online August 29 (2015).
9. E. Patten, D. VanCitters, M. Ries, and L. Pruitt, "Quantifying Cross-shear under Sliding, Rolling, and Rotation and its Effect on UHMWPE Wear," *WEAR*, **313** 125-134 (2014).
10. F. Ansari, T. Norris, S.B. Gunther, M.Ries and L.Pruitt, "Failure of Modular Reversed Shoulder Stems," *Journal of Shoulder and Elbow Surgery* **23** e40-45 (2014).
11. F. Ansari, J. Chang, J. Huddleston, D. Van Citters, M. Ries, and L. Pruitt, "Fractography and Oxidative Analysis of Posterior-Stabilized Tibial Insert Post Fractures: Report of Two Cases," *The Knee* **Dec 2016**:609-13 (2013).
12. N. Gundiah, A. Babu and L. Pruitt, "Effects of Elastase and Collagenase on the Nonlinearity and Anisotropy of Porcine Aorta," *Physiological Measurement* **34** 1-17 (2013).
13. E. Patten, D. VanCitters, M. Ries, and L. Pruitt, "Wear of UHMWPE from Sliding, Rolling, and Rotation in a Multidirectional Tribosystem," *WEAR*, **304**, 60-66 (2013).
14. J. Iyenger, R. Usoff, M. Feldstein, P. Jreij, L. Pruitt, M. Ries, and S. Morsh, "Atypical Subtrochanteric Stress Fracture Through a Cephalomedullary Implant: A Case Study," *Journal of Bone and Joint Surgery Case Connector* **3**(2) 1-6, June (2013).
15. L. Pruitt, M. Kury, F. Ansari, A. Mehdizah, J. Huddleston, D. Mickelson, H. Kim, E. Patten, J. Chang, and M. Ries, "Clinical Trade-offs in Crosslinked Ultra High Molecular Weight Polyethylene used in Total Joint Arthroplasty," *Journal of Biomedical Materials Research B*, Invited contribution, **101B** (10,) 476-484, April (2013).
16. R. Shelby, F. Ansari, E. Patten, L. Pruitt, G. Walker and J. Wang, "Teaching as Leadership: Use of K-12 outreach education in a freshman engineering course," *International Journal of Engineering Education* **29**(1), 85-98, (2013).
17. M. Laidre, E. Patten and L. Pruitt, "Costs of a More Spacious Home after Remodelling by Hermit Crabs," *Journal of Royal Society Interface*, RSIF2012.0512, August 15 (2012).
18. R.S. Fajardo, L. Pruitt, F.C. Finzen, G.W. Marshall, S. Singh, and D. Curtis "The Effect of E-Glass Fibers and Acrylic Resin Thickness on Fracture Load in a Simulated Implant-Supported Over-denture Prosthesis," *The Journal of Prosthetic Dentistry*, **106**(6), 373-377 (2011).
19. C. Li, T. Alliston and L. Pruitt, "The use of Polyacrylide Gels for Mechanical Calibration of Cartilage- A Combined Nanoindentation and Unconfined Compression Study," *Journal of Mechanical Behavior of Biomaterials and Tissues*, **4**(7), 1540-1547 (2011).
20. S. Atwood, E. Patten, D.W Van Citters, J. Furmanski, M. Ries, and L. Pruitt, "Tradeoffs Amongst Fatigue, Wear and Oxidation Resistance of Crosslinked Ultra High Molecular Weight Polyethylene," *Journal of Mechanical Behavior of Biomaterials and Tissues* **4**(7), 1033-1045 (2011).
21. E. Patten, S. Atwood, D.W Van Citters, B.A Jewett, L. Pruitt, and M.D. Ries, "Delamination of a Highly Crosslinked UHMWPE Acetabular Liner Associated with Titanium Deposits on the Co-Cr Head Following Dislocation: A Case Report," *Journal of Bone and Joint Surgery (British)* **92-B** 1306-1311 (2010).
22. S. Atwood, E. Patten, K.J. Bozic, L. Pruitt, and Mike Ries, "Corrosion-Induced Fracture of a Double-Modular Hip Prosthesis: A Case Study," *Journal of Bone and Joint Surgery* **92**: 1522 - 1525 (2010).
23. S. Kane, P.D. Ashby, and L.A. Pruitt, "Microscale Wear Behavior and Crosslinking of PEG-Like Coatings for Total Joint Replacements," *Journal of Materials Science: Materials in Medicine Research*, **21** 1037-1045 (2010).
24. S. Kane, P.D. Ashby, and L. Pruitt, "Characterization and Tribology of PEG-Like Coatings on UHMWPE for Total Hip Replacements," *Journal of Biomedical Materials Research*, **92A**: 1500-1509 (2010).
25. S. Kane, P. Ashby, and L. Pruitt, "ATR- FTIR as a Thickness Measurement Technique for Hydrated Polymer-on-Polymer Coatings," *Journal of Biomedical Materials Research, Part B: Appl Biomater* **91B**: 613-620, (2009).
26. J. Furmanski and L. Pruitt, "Polymeric biomaterials for use in load-bearing medical devices: The need for understanding structure-property-design relationships," Invited contribution, *JOM*, September, 14-20 (2009).
27. J. Furmanski, M. Anderson, S. Bal, S. Greenwald, D. Halley, B. Penenberg, M. Ries and L. Pruitt, "Clinical Rim Fracture of Cross-linked Acetabular Liners," *Biomaterials* **30** 5572-5582 (2009).
28. S. Gupta, J. Lin, P.D. Ashby and L. Pruitt, "A Fiber Reinforced Poroelastic Model of Nanoindentation of Porcine Costal Cartilage: A Combined Experimental and Finite Element Approach," *Journal of Mechanical Behavior of Biomedical Materials*, **2**(4) 326-338 (2009).
29. P. Hansma, H. Yu , D. Schultz, A. Rodriguez, E. Yurtsev , J. Orr , S. Tang, J. Miller, J. Wallace, F. Zok, C. Li, R. Souza, A. Proctor, Davis Brimer, X. Nogues-Solan, L. Mellbovsky, M. Peña, O. Diez-Ferrer, P. Matthews, C. Randall, A. Kuo ,

- Carol Chen , M. Peters, D. Kohn , J. Buckley, X. Li, L. Pruitt, A. Diez-Perez, T. Alliston , V. Weaver, and J. Lotz, "A Handheld Instrument for Quantifying Mechanical Properties of Tissues," *Review of Scientific Instruments*, 80 054303 (2009).
30. N. Gundiah, M. Ratcliffe, and L. Pruitt, "The biomechanics of arterial elastin," *Journal of Mechanical Behavior of Biomedical Materials*, 2(3) 288-296 (2009).
31. D.M. Ebenstein, D. Coughlin, J. Chapman, C. Li, and L. Pruitt, "Structure-property relations of atherosclerotic plaque tissue," *Journal of Biomedical Materials Research A* Dec 23 e-Pub (2008).
32. C.M. Rimnac and L. Pruitt, "How do Material Properties Influence Wear and Fracture Mechanisms?" *Journal of the American Academy of Orthopedic Surgeons*, 16(1) S94-S100 (2008).
33. J. Furmanski, S. Gupta, A. Chawan, A. Kohm, J. Lannutti, B. Jewett, L. Pruitt, and M. Ries, "Aspherical Femoral Head with Highly Cross-Linked Ultra-High Molecular Weight Polyethylene Surface Cracking. A Case Report," *Journal of Bone and Joint Surgery*, 89(10): 2266 - 2270 (2007).
34. S. Gupta, F. Carrillo, C. Li, L. Pruitt, and C. Puttlitz, "Adhesive Forces Significantly Affect Elastic Modulus Determination of Soft Polymeric Materials in Nanoindentation," *Journal of Materials Science Letters* 61(2):448-451(2007).
35. J. Furmanski and L. Pruitt, "Peak stress intensity dictates fatigue crack propagation in UHMWPE," *Polymer*, **48** 3512-3519 (2007).
36. N. Gundiah, M. Ratcliffe, and L. Pruitt, "Determination of Strain Energy Function for Arterial Elastin: Experiments using Histology and Mechanical Tests," *Journal of Biomechanics* 40(3) 586-594 (2007).
37. C. Li, L.Pruitt, and K. King, " Nanoindentation Differentiates Tissue-Scale Properties of Native Articular Cartilage," *Journal of Biomedical Materials Research* Sep 15;78(4):729-38 (2006).
38. D.M. Ebenstein and L. Pruitt, "Nanoindentation of Biological Materials," *Nano Today* 1(3) 27-33 (2006).
39. K. Cheng, L. Pruitt, C. Zaloudek, and M. D. Ries, "Osteolysis is caused by Tibial Component Debonding in Total Knee Arthroplasty," *Clinical Orthopaedics and Related Research* 443 333-336 (2006).
40. M.D. Ries, T. Petrie, L. Al-Marashi, E. Young, P. Goldstein, A. Hetherington and L. Pruitt, "In-vivo Behavior of Acrylic Bone Cement in Total Hip Arthroplasty," *Biomaterials*, 27(2) 256-261 (2006).
41. K. Simis, A. Bistolfi, A. Bellare and L. Pruitt, "The Combined Effects of Crosslinking and Elevated Crystallinity on the Microstructural and Mechanical Properties of Ultra High Molecular Weight Polyethylene," *Biomaterials* 27(9) 1688-1694 (2006).
42. A.P.D. Elfick, K. Healy, A. Unsworth, L. Pruitt, "The Importance of Protein Physisorption in BioMEMS/NEMs Applications: A Nanotribological Study" in "Life Cycle Tribology" (Eds Dowson D, Priest M, Dalmaz G, Lubrecht AA), p835-844, Tribology and Interface Engineering Series, No 48, Elsevier, Amsterdam, (2005).
43. S. Gupta, F. Carrillo, M. Balooch, L. Pruitt, C.M. Puttlitz, "Simulated Soft Tissue Nanoindentation – A Finite Element Study," *Journal of Materials Research* 20(8) 1979-1994 (2005).
44. M. Ries and L. Pruitt, "Effect of Crosslinking on the Microstructure and Mechanical Properties of UHMWPE," *Clinical Orthopaedics and Related Research*, 440:149-156 (2005).
45. F. Carrillo, S. Gupta, M. Balooch, S.J. Marshall, G.W. Marshall, L. Pruitt, C.M. Puttlitz, "Nanoindentation of Polydimethylsiloxane Elastomers: Effect of crosslinking, work of adhesion, and fluid environment on elastic modulus" *Journal of Materials Research*, 20(10) 2820-2830 (2005).
46. L. Pruitt, "Deformation, Yielding, Fracture and Fatigue Behavior of Conventional and Highly Cross-linked Ultra High Molecular Weight Polyethylene," *Biomaterials* **26** (8) 905-915 (2005).
47. L. Bradford, D. Baker, M.D. Ries, and L. Pruitt, "Fatigue Crack Propagation Resistance of Highly Crosslinked Polyethylene," *Clinical Orthopaedics and Related Research*, (**429**): 68-72 (2004).
48. D. M. Ebenstein, A. Kuo, J.J. Rodrigo, A. H.Reddi, M.D. Ries, and L. Pruitt, "A Nanoindentation Technique for Functional Evaluation of Cartilage Repair Tissue," *Journal of Materials Research*, **19**(1), 273-281 (2004).
49. J. Zhou, A. Chakravartula, L. Pruitt, and K. Komvopoulos, "Tribological and Nanomechanical Properties of Unmodified and Crosslinked Ultra-High Molecular Weight Polyethylene for Total Joint Replacements," *Journal of Tribology ASME Trans.*, **126**(2), 386-394 (2004).
50. L. Bradford-Collons, D.A. Baker, J. Graham, A. Chawan, M.D. Ries, L. Pruitt, "Wear and Surface Cracking in Early Retrieved Highly Crosslinked Durasul Acetabular Liners," *Journal of Bone and Joint Surgery* 86:1271-1282 (2004).
51. D. Ebenstein and L. Pruitt, "Nanoindentation of Hydrated Materials for Application to Vascular Tissues," *Journal of Biomedical Materials Research*, 69A(2) 222-232 (2004).
52. L. Bradford, R. Kurland, M. Sankaran, H. Kim, L. Pruitt, M. Ries, "Early Failure due to Osteolysis in Highly Cross-linked Ultra-High Molecular Weight Polyethylene: A Case Report," *Journal of Bone and Joint Surgery* 86:1051-1056 (2004).

53. J. Graham, M. Ries, and L. Pruitt, "Effect of Bone Porosity on Mechanical Integrity of the Bone-Cement Interface," *Journal of Bone and Joint Surgery*, **85(A)** 10, 1901-1908 (2003).
54. C. Li, D. Ebenstein, C. Xu, Chapman, J., Saloner, D., Rapp, J., and L. Pruitt, "Biochemical Characterization of Atherosclerotic Plaques Using FTIR Spectroscopy and Histology," *Journal of Biomedical Materials Applied Biomaterials*, **64A**(2) 197-206 (2003).
55. K. Hughes, M.D. Ries, and L. Pruitt, "Structural Degradation of Acrylic Bone Cement due to In Vivo and Simulated Aging," *Journal of Biomedical Materials Research*, **65A**:126-135(2003).
56. D.A. Baker, A. Bellare, L. Pruitt, "The Effects of Degree of Crosslinking on the Fatigue Crack Initiation and Propagation Resistance of Orthopedic Grade Polyethylene," *Journal of Biomedical Materials Research* **66A**:146-154 (2003).
57. E.A. Nauman, D.M. Ebenstein, K.F. Hughes, L. Pruitt, B.P. Halloran, D.D. Bickle, and T.M. Keaveny, "Mechanical and Chemical Characteristics of Mineral Produced by bFGF-Treated Bone Marrow Stromal Cells In Vitro", *Tissue Engineering*, **8**(6) 931-939 (2002).
58. S.B. Gunther, J. Graham, T.R. Norris, M.D. Ries, and L. Pruitt, "Retrieved Glenoid Components: A Classification System for Surface Damage Analysis," *Journal of Arthroplasty*, **17**(1) 95-100 (2002).
59. C.M. Klapperich, L. Pruitt, and K. Komvopoulos, "Nanomechanical Properties of Energetically Treated Polyethylene Surfaces", *Journal of Materials Research*, **17**(2) 423-430 (2002).
60. D. Baker, A. Bellare, and L. Pruitt, "Ultra-Small X-ray Scattering to Detect Fatigue Damage in Polymers," *Journal of Materials Science Letters* **20**(12) 1163-1164 (2001).
61. C. Klapperich, L. Pruitt, and K. Komvopoulos, "Chemical and biological characteristics of low-temperature plasma treated ultra-high molecular weight polyethylene for biomedical applications," *Journal of Materials Science: Materials in Medicine*, **12** 549-556 (2001).
62. S. Niedzwiecki, J. Short, S. Jani, W. Sauer, C. Klapperich, M. Ries, and L. Pruitt, "Comparison of Three Viable Wear Debris Isolation Techniques: Acid Digestion, Enzyme Cleavage and the Campbell Method," *Journal of Biomedical Materials Research*, **56** 245-249 (2001).
63. R. Meyer and L. Pruitt, "The Effect of Cyclic True Strain on the Morphology, Structure, and Relaxation Behavior of Ultra High Molecular Weight Polyethylene," *Polymer*, **42** 5293-5306 (2001).
64. C. Klapperich, K. Komvopoulos, and L. Pruitt, "Nanoindentation of Various Polymers for the Determination of Surface Mechanical Properties," *ASME Journal of Tribology* **123** (3) 624-631 (2001).
65. J. Graham, M. Ries, L. Pruitt, and N. Gundiah "Fracture and Fatigue Properties of Acrylic Bone Cement: The Combined Effects of Sterilization and Mixing Method," *Journal of Arthroplasty*, **15**(8) 1028-1035 (2000).
66. S. M. Kurtz, C. M. Rimnac, L. Pruitt, C. W. Jewett, V. Goldberg, and A. A. Edidin, "The Relationship Between the Clinical Performance and Large Deformation Mechanical Behavior of Retrieved UHMWPE Tibial Inserts," *Biomaterials* **21** 283-291 (2000).
67. C. Klapperich, S. Niedzwiecki, M. Ries, and L. Pruitt, "Fluid Sorption of Orthopedic Grade UHMWPE in a Serum Environment is Affected by Surface Area and Sterilization Method," *Applied Biomaterial* **53** 73-75 (2000).
68. D.A. Baker, R.S. Hastings and L. Pruitt, "Compression and Tension Fatigue Resistance of Medical Grade UHMWPE: The Effect Morphology, Sterilization, Aging and Temperature," *Polymer*, **41** 795-808 (2000).
69. C. Klapperich, J. Graham, L. Pruitt, and M. Ries, "Failure of a Metal - Metal Total Hip Arthroplasty from Progressive Osteolysis," *Journal of Arthroplasty*, **14** (7) 877-881 (1999).
70. D. Baker, R.S. Hastings and L. Pruitt, "A Study of the Fatigue Resistance of Chemical and Radiation Crosslinked Medical Grade UHMWPE", *Journal of Biomedical Materials Research*, **46**(4), 573-581, (1999).
71. S.M. Kurtz, D.J. Crane, L. Pruitt, and A. Edidin, "Evolution of Morphology in UHMWPE Following Accelerated Aging: The Effect of Heating Rates," *Journal of Biomedical Materials Research* **46** (1) 112-120 (1999).
72. S.M. Kurtz, L. Pruitt, C.W. Jewett, J.R. Foulds, and A. A. Edidin, "Radiation and Chemical Crosslinking Promote Strain Hardening Behavior and Molecular Alignment in UHMWPE During Multi-axial Conditions," *Biomaterials*, **20** (16) 1449-1462 (1999).
73. A. Edidin, L. Pruitt, C.W. Jewett, R.P. Crawford, D. J. Crane, D. Roberts and S.M. Kurtz, "Plasticity-Induced Damage Layer is Precursor to Wear in Radiation-Crosslinked UHMWPE," *Journal of Arthroplasty*, **14** (5) 616-627 (1999).
74. Klapperich, K. Komvopoulos, and L. Pruitt, "Tribological Properties and Microstructure Evolution of Ultra-High Molecular Weight Polyethylene," *Journal of Tribology*, **121**(2) 394-402 (1999).
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4. N. Bonnheim, M.D. Ries, B. Glaser, A. Gleason, D.W. Van Citters, "Surface Damage of Retrieved Oxidized Zirconium Implants," Annual Meeting of the Orthopedic Research Society, New Orleans, LA, March (2018).

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69. L. Pruitt "Introduction to Engineering Design for Freshman: Implementation of Leadership and Service Learning for Broadening Engineering Ingenuity," Annual Meeting of the American Society for Engineering Education, Vancouver, CANADA, June 2011.
70. A.J. Almuegar, S. Chen, M. Ford and L. Pruitt, "Building Engineers and Mentors: A Model Program for university partnerships with local k-12 schools," Annual Meeting of the American Society for Engineering Education, Vancouver, CANADA, June 2011.
71. A.J. Almuegar, S. Chen, M. Ford and L. Pruitt, "Berkeley Engineers and Mentors," Annual Meeting of the Pacific-Southwest Chapter of the American Society for Engineering Education, Fresno, CA, April 2011.
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209. L. Pruitt, "Cyclic Near Tip Stress Fields in Amorphous Polymers", in *Proceedings of the 31st Annual Society of Engineering Science Conference*, edited by D. Allen and D. Lagoudos, 366 (1994).
210. L. Pruitt, "Cyclic Deformation Mechanisms in Polymer Composites", in *The International Conference on Composites Engineering*, edited by D. Hui, New Orleans, 409-410 (1994).
211. L. Pruitt and S. Suresh, "Cyclic Near-Tip Stresses for Fatigue Cracks in Polymers: In situ Measurements, Crack-tip Microscopy and Applications", in *The 9th International Conference on Deformation, Yield and Fracture of Polymers*, edited by R. J. Young, et al., 38-1-1-38/4, (1994). The Institute of Materials, London.
212. L. Pruitt, C. Bull and S. Suresh, "Fatigue Crack Tip Damage and Stress Fields in Polymers and Polymeric Composites", in *Fatigue'93*, edited by Jean-Paul Bailon, **3**, 1349-1354, Montreal, Canada (1993).
213. L. Pruitt, J. Koo, C. Rimnac, S. Suresh and T. Wright, "Compression Fatigue of Ultra High Molecular Weight Polyethylene and its Implications for Total Joint Replacements" in the *Proceedings of the 39th Annual Meeting of the Orthopaedic Research Society*, (1993). ORS, San Francisco.
214. S. Suresh and L. Pruitt, "Fatigue Crack Growth in Polymers and Organic Composites under Cyclic Compressive Loads", in *The 8th International Conference on Deformation, Yield and Fracture of Polymers*, edited by R. J. Young, et al., 32-1-32-4, (1991). The Plastics and Rubber Institute, London.
215. O. J. Gregory, E.E. Crisman, L. Pruitt, D. Hymes and J. J. Rosenberg, "Electrical Characterization of Some Native Insulators on Germanium", *Materials Research Society Proceedings*, 76, 307-311, (1987).

INVITED TALKS

- “Fatigue and Fracture in Medical Polymers,” Mechanics and Materials Seminar, UCSD, La Jolla, CA, March 2017.
- “Methodology for capturing Mechanical Properties of Ultra-High-Molecular-Weight-Polyethylene for Orthopaedic Implant Design,” International Conference on Mechanical Behavior of Biomaterials and Tissues, Waikoloa, HI, December 2017.
- “Building Better Knees: Load Bearing Devices that Carry their Weight,” Homecoming lecture, UC Berkeley, September 2016.
- “Bearing Surface Damage of Anatomical and Reverse Total Shoulder Replacements: Retrieval Analysis Across Fixation Designs and UHMWPE Composition,” International Meeting of Ultra High Molecular Weight Polyethylene, Philadelphia, October 2015.
- “Engineering is Elementary,” The Hilldale School, Daly City, CA. May 2015.
- “Fundamentals of Technical Writing,” The Hilldale School, Daly City, CA. May 2015.
- “Bearing Surface Damage Analysis of Total Shoulder Replacement Retrievals Across Fixation Designs and UHMWPE Composition,” Annual Meeting of the Orthopaedic Research Society, Las Vegas, NV, March 2015.
- “Current Challenges in Total Joint Replacements: Trade-offs in Fatigue and Wear Performance of UHMWPE”, DSM Biomedical, Berkeley CA, November, 2014.
- “Damage Mechanisms in Total Shoulder Arthroplasty,” World Congress of Biomechanics, Boston, MA, July 2014.
- “Failure Analysis of Crosslinked UHMWPE Implants with Stress Concentrations,” 6th International Conference on Ultra High Molecular Weight Polyethylene, Turin, Italy, October 2013.
- “Alternative Bearing Materials for Total Joint Arthroplasty,” DSM Biomedical, Berkeley, CA, October 2012.
- “Through the eyes of our children: methods for broadening engineering participation and k-12 outreach in the engineering curriculum,” Grace Hopper Celebration for Women in Computing and Technology, sponsored by the Anita Borg Institute for Women and Technology, Portland, OR, November 2011.
- “Clinical Assessment of Bearing Surfaces in Orthopedics“, Society for Biomaterials Annual Meeting, Orlando, FL, April 2011.
- “Biotribology,” International Conference on Tribology and Society for Lubricating Engineers, San Francisco, October 2010.
- “Interactive Learning and K-8 Outreach Teaching in the Undergraduate Curriculum,” Materials Research Society Meeting, Boston, December 2009.
- “Fatigue and Fracture Behavior Of Crosslinked UHMWPE: Implications for implant design”, International conference on Ultra High Molecular weight Polyethylene, Turin, Italy, September 2009.
- “Structural Requirements for Biomaterials in Load-Bearing Applications,” Deformation, Yield and Fracture of Polymers,” Eindhoven, Netherlands, April 2009.
- “Structural Aspects of Fracture in Ultra High Molecular Weight Polyethylene and the Implications for Total Joint Replacements,” TMS Annual Meeting, San Francisco, CA February 2009.
- “Crosslinked Polyethylene: Where the Faults May Lie,” with M. Ries at the Orthopaedic Research Society Annual Meeting, San Francisco, CA March 2008.
- “Fracture of Highly Crosslinked UHMWPE Acetabular Liners,” presented as an exhibit at the American Academy of Orthopaedic Surgeons, San Francisco, CA March 2008.
- “How do material properties influence wear mechanisms?” with C. Rimnac, presented at the American Academy of Orthopaedic Surgeon’s symposium on Osteolysis and Implant Wear: Biological, Biomedical Engineering and Surgical Principals, Austin, TX November 2007.
- “Mechanical Behavior of Ultra High Molecular Weight Polyethylene,” 3rd International Meeting on Polyethylene in Total Joint Replacement Systems: Concerns and Solutions, Madrid, Spain, Sept 2007.
- “Probing structural tissue properties at hierarchical length scales,” Gordon Research Conference on Tribology, Colby College, Waterville, ME 2006.
- “The Origins of Wear in Orthopedic UHMWPE,” Deformation, Yield and Fracture of Polymers, Netherlands, April 2006.
- “Role of Elastin and Collagen in Arterial Mechanics,” International Conference on Mechanics of Biomaterials & Tissues, HI, May 2005.
- “Multiscale Mechanical Characterization of Cartilage and other Structural Tissues,” Fall Annual Meeting of the Materials Research Society, Boston, December 2005.
- “Use of Interactive Exhibits in Undergraduate Curriculum to Provide Public Science Education to K-12,” Forum on Materials Science Education, Annual Meeting of the Materials Research Society, Boston, December 2005.
- “Surface Engineering of Orthopedic Bearing Materials,” ASM Materials and Processes for Medical Devices Conference, Boston, December 2005.

- “Advances in Orthopedics Biomaterials Research,” Departamento de Ciencia de Materiales, Universidad Politecnica de Madrid, Madrid, Spain, September 2005.
- “Orthopedic Biomaterials and Tissue Research,” Lawrence Livermore National Lab, Livermore CA, April 2005.
- “Utilization of Biomaterials and Tissue Mechanics Research to Improve the Bearing Surface in Articular Joints,” Center of Excellence Symposia, Contra Costa College, San Pablo, CA, 2005.
- “Alternate Bearing Surfaces in Total Joint Replacements,” Inman-Abbot Lecture, UCSF Medical School, San Francisco, CA, 2005.
- “Current Trends in Orthopedic Biomaterials Research”, Bioengineering Seminar Series, Stanford University, Stanford, CA 2005.
- “Morphological Analyses of Retrieved Crosslinked UHMWPE and Improved Microstructures for Enhanced Fatigue and Wear Performance,” Symposium on UHMWPE for Arthroplasty: Degradation, Stabilisation and Crosslinking, Turino, Italy, 2005.
- “The Role of Microstructure on the Plastic Deformation and Fatigue Behavior of Ultra High Molecular Weight Polyethylene” International Meeting on Plasticity, Kauai, HI (2005)
- “The Role of Microstructure on the Fatigue and Fracture Properties of Medical Grade Ultra High Molecular Weight Polyethylene” Int. Congress on Fracture, ICF 11 Turin, Italy, 2005.
- "Advances in Orthopedic Biomaterials for Articular Joint Repair", Bioengineering Seminar Series, Georgia Tech, Atlanta, GA, 2004.
- “Innovations in Medical Devices and Biomaterials Science”, Business Innovation Symposium, University of Notre Dame, Notre Dame, IN, 2004.
- “Nanoindentation as A Characterization Tool for Orthopedic Tissues,” Bay Area Biomechanics Seminar Series, UC Davis, Davis CA, 2003.
- “Current Research Trends in Polymers for Total Joint Replacements,” Polymer Science and Engineering Seminar Series, University of Massachusetts, Amherst, MA, 2003.
- “Cyclic Damage in Medical Grade Polymers used in Orthopedics, 10th International Conference on Fracture, Honolulu, HI, 2002.
- “Current Research in Orthopedics, Biomaterials, and Vascular Tissues”, Biomechanics Seminar Series, University of Notre Dame, 2002.
- “ Biomechanical Design Issues in Orthopedic Biomaterials,” Bio-Design Seminar Series, Stanford University, 2002
- “Characterization of Sub-micron Mechanical Behavior and Fracture Processes of Polymers and Biomaterials,” 13th European Conference on Fracture, San Sebastian, Spain, 2000.
- “Advancing Medicine with Engineered Materials and Tissues,” UCB Chancellor's Forum, 1999.
- “Polymers in Medicine” Golden Gate Polymer Forum on Polymers in Medical and Biomedical Applications, San Francisco, 1998.
- “Fatigue Fracture Mechanisms of Advanced Polymers”, 7th International Conference on Fracture, Sydney, Australia, 1997.
- “Characterization of Polymer Resistance to Cyclic Damage”, 33rd Annual Meeting of the Society of Engineering Science, Tempe, Arizona, 1996.

OUTREACH AND K-12 ACTIVITIES

Berkeley Engineers and Mentors (BEAM). Work with undergraduate students in engineering on developing teaching plans for elementary, middle and high school levels. Technical concepts on the topic of biomaterials and medical devices are developed and presented by undergraduate mentors in an interactive format for students at k-12 sites in the Berkeley and Oakland school districts (2010- present).

Engineering for Kids Day (E4K). Work with the Engineering for Kids (E4K) student group at UC Berkeley to bring in about 300 elementary schoolchildren annually. The all day workshop provides lectures, engineering activities, and lab tours (2010- present).

Girls in Engineering (GIE). Summer program at UC Berkeley targeted at providing engineering experiences to underprivileged middle school girls (2014-present).

Lawrence Hall of Science Interactive Children’s Exhibits entitled, *The Way Things Break, The Human Body Shop, The Body Builders, Fantastic Plastic, The Bionic Bear, Body by Design,* and *Engineering Ingenuity.* Developed interactive

LISA A. PRUITT
CURRICULUM VITAE

teaching demonstrations with undergraduate and graduate classes in the areas of design, engineering materials, polymers, and medical devices. Student teams develop projects aimed at teaching science and engineering concepts to k-12 (1997- present).

Summer Undergraduate Program in Engineering Research at Berkeley. Provided summer research opportunities to under-represented or non-traditional students from around the nation. Students were teamed up with a mentoring graduate student in the research laboratory for 8 weeks in the summer (1993-2010).

Summer Undergraduate Research Program in Bioengineering. Developed an industry-funded summer research program aimed at providing bioengineering research experiences to Berkeley undergraduates. Mentor undergraduate researchers in biomaterials (2000-2010).

National Student Leadership Conference (NSLC) at UC Berkeley. Facilitated three 10-day sessions for approximately 350 high school honors students from around the country. Conference involves implementation of hands-on design projects, faculty lectures providing an overview of engineering, and research laboratory tours (2006-2010).

Berkeley Early Academic Outreach Program. Facilitated interactive laboratory activities in biomaterials and medical devices for a Reverse Engineering Class targeted to high school students (2005-2008).

LEADERSHIP AND MENTORING PRACTICE

Equine Guided Education Facilitator and Leadership Mentor. Graduate of the Strozzi Leadership Institute (Petaluma, CA). This practice utilizes the intuitive nature of the horse to provide an environment that enables people to develop communication and leadership skills. This practice facilitates leadership workshops and mentoring with UC Berkeley graduate students and staff, professionals and the public (2006-present).

ENGINEERING CONSULTANT

Lisa A. Pruitt Consulting. Expert consultant for engineering failures and materials selection for medical device development. Expert work in medical devices and patent litigation cases.