Martin L. Dunn

Associate Dean for Research
College of Engineering and Applied Science
Victor Schelke Endowed Chair and Professor
Department of Mechanical Engineering
University of Colorado
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EDUCATION

Ph.D. in Mechanical Engineering, 1992, University of Washington, Seattle, WA.
Dissertation title: *Thermal, Mechanical, and Electroelastic Properties of Composite Materials*

M.S. in Mechanical Engineering, 1989, University of Washington, Seattle, WA.
Thesis Title: *Thermal Residual Stress in a Misoriented Short Fiber Composite*

B.S. in Mechanical Engineering, 1987, Montana State University, Bozeman, MT.

M.S. and Ph.D. advisor: Professor Minoru Taya, University of Washington.
Post-Doctoral advisor: Dr. E. David Reedy, Jr., Sandia National Laboratories.

EMPLOYMENT

Associate Dean for Research, College of Engineering and Applied Science, University of Colorado (2009-)
Chair, Department of Mechanical Engineering, University of Colorado (2004-2009)
Victor Schelke Chaired Professor (2006-present), **Professor** (2003-present), **Associate Professor** (1999-2003), and **Assistant Professor** (1993-99), Department of Mechanical Engineering, University of Colorado.

Postdoctoral Appointee, Sandia National Laboratories (1992-93).

Instructor (1989-2002) and **Teaching/Research Assistant** (1988-1989), Dept. of Mechanical Engineering, University of Washington.

Design Engineer, Boeing Commercial Airplanes (1987-1988).

Computer Programmer, USDA Rangeland Insect Lab, Montana State University, (1986-1987).

CONSULTING ACTIVITIES

Coventor, Inc., Colorado Springs, CO, Multiphysics analysis of micromechanical structures.
National Institute of Standards and Technology (NIST), Boulder, CO, Analysis of the effects of stress on ultrasonic wave propagation.
Sandia National Laboratories, Albuquerque, NM, stress and failure analysis of composite materials.
Ponderosa Associates, Lafayette, CO, Failure analysis.
Btechcorp, Longmont, CO, Failure characterization for adhesive-bonded structures.
Various other consulting activities for companies and lawyers involving thermomechanical behavior and failure of materials, devices, and structures.

PROFESSIONAL RECOGNITION and ACTIVITIES

- Woodward Outstanding Mechanical Engineering Faculty Award, 2009.
- Fellow of the American Society of Mechanical Engineers, 2008.
- Victor Schelke Endowed Chair, College of Engineering and Applied Science, University of Colorado, 2006-present.
- Numerous best paper awards with students.
- Numerous invited lectures at professional conferences.
- National Science Foundation, Research Initiation Award, 1994.
- University of Colorado Junior Faculty Development Award, 1994-95.
- Marsh Fellowship in Engineering, University of Washington, 1989-1990.
- Tau Beta Pi National Engineering Honor Society.

- Member, Materials Research Society (MRS), American Academy of Mechanics (AAM), American Society for Engineering Education (ASEE)
- Member of the American Society of Mechanical Engineers (ASME)
  - Adaptive Structures and Materials Committee (Aerospace Division).
  - Electronic Materials and Composites Committees (Materials Division).
  - Fracture and Deformation Committee (Applied Mechanics Division).
  - Committee on Mechanics Education (Applied Mechanics Division).
  - ASME Student Section Faculty Advisor, 1993-1997.
  - Executive Committee Member, ASME Region VIII, Western WA Section, 1988-1990.

- Technical session organizer, chair, or co-chair at numerous conferences and technical meetings annually.
- Technical session organizer, chair, or co-chair at numerous conferences and technical meetings annually.
- Organizer of the Thin Air Philosophical Society Symposium, a four-day intense symposium focused on contemporary issues in mechanics and materials: received support from NSF for the symposium and held it in Boulder in 2007 and 2009, drawing top researchers from across the country.

- Regular reviewer for archival journals:
  Acta Materialia
  Acta Mechanica
  Applied Physics Letters
  ASCE Journal of Engineering Mechanics
  ASME Journal of Applied Mechanics
  ASME Journal of Electronic Packaging
  ASME Journal of Engineering Materials and Technology
  Composites B: Engineering
  Engineering Fracture Mechanics
  Experimental Mechanics
  European Journal of Mechanics
  International Journal for Numerical Methods in Engineering
  International Journal of Engineering Science
  International Journal of Fracture
  International Journal of Solids and Structures
  Journal of Applied Physics
  Journal of Composite Materials
  Journal of Elasticity

Journal of Engineering Mathematics
Journal of Intelligent Material Systems and Structures
Journal of Materials Science
Journal of Microelectromechanical Systems
Journal of the Acoustical Society of America
Journal of the Mechanics and Physics of Solids
Mechanics of Materials
Mechanics Research Communications
Metallurgical Transactions A
Nano Letters
Nature
Nature Materials
Numerical Heat Transfer
Philosophical Magazine A
Physical Review B
Physical Review Letters
Proceedings of the Royal Society of London, A
Quarterly Journal of Mechanics and Applied Mathematics
Science
Sensors and Actuators
Thin Solid Films
Ultrasonics

• Regular grant proposal reviewer:
National Science Foundation
Department of Energy
Army Research Office

RESEARCH PUBLICATIONS

Citation Impact

Professor Dunn's research has been cited over 3500 times with an h-index of 34 according to a Citation Report from ISI Web of Science in September, 2010.

Book Chapters and Edited Volumes

9. Aifantis, K., Maute, K., Dunn, M.L., and Hackney S., "Mechanical Considerations in Li-ion Batteries," Chapter 8 in *Materials Engineering for Energy Density Power Sources*, Wiley and Sons, 2010.

8. Dunn, M. L. and Cunningham, S. J., 2010, *Thermo- and Electromechanical Behavior of Thin-Film Micro and Nanostructures*, a chapter in the *Handbook of Nanotechnology*, B. Bhushan, Ed., Springer-Verlag.

7. Qi, H. J. and Dunn, M. L., 2010, *Shape Memory Polymers: Thermomechanical Behavior and Modeling Approaches*, Chapter 3 in the *Handbook of Shape Memory Polymers and Multifunctional Composites*, J. S. Leng and S. Y. Du eds., CRC Press.

6. Dunn, M. L. and Cunningham, S. J., 2006, *Thermo- and Electromechanical Behavior of Thin-Film Micro and Nanostructures*, Chapter 56 in the *Handbook of Nanotechnology*, 2nd Ed., B. Bhushan, Ed., Springer-Verlag.

5. Dunn, M. L. and Cunningham, S. J., 2004, *Thermo- and Electromechanics of Thin-Film Microstructures*, Chapter 35 in the *Handbook of Nanotechnology*, B. Bhushan, Ed., Springer-Verlag.

4. *Multifunctional Materials*, American Society of Mechanical Engineering, American Society of Mechanical Engineering, NCA Vol. 26, 1999 International Mechanical Engineering Congress and Exposition, Nashville, TN, E. Ayorinde, M. L. Dunn, and A. Dasgupta, editors.

3. *Mechanical Behavior of Advanced Materials: Microscale Mechanics of Materials and Structures*, American Society of Mechanical Engineering, MD Vol. 84, 1998 International Mechanical Engineering Congress and Exposition, Anaheim, CA, D. C. Davis, A. M. Sastry, M. L. Dunn, and A. K. Roy, editors.

2. *Failure Mechanisms and Mechanism-Based Modeling in High Temperature Composites*, American Society of Mechanical Engineering, MD Vol. 74, 1996 International Mechanical Engineering Congress and Exposition, Atlanta, GA, G. M. Newaz, M. L. Dunn, and W. F. Jones, editors.

1. *Mechanics and Materials for Electronic Packaging: Coupled Field Behavior in Materials*, American Society of Mechanical Engineering, AMD Vol. 193, 1994 International Mechanical Engineering Congress and Exposition, Chicago, IL, M. L. Dunn, M. Taya, and M. Saka, editors.

Archival Journals

2010

132. Miller, D. C., Foster, R. R., Jen, S.-H., Bertrand, J. A., Cunningham, S. J., Morris, A. S., Lee, Y.-C., George, S. M., and Dunn, M. L., "Thermomechanical Properties of Alumina Films Created Using the Atomic Layer Deposition Technique," 2010, *Sensors and Actuators*, in press.

131. Dai, S., Park, H. S., and Dunn, M. L., 2010, "Piezoelectric Constants for ZnO Calculated Using Classical Polarizable Core-Shell Potentials," *Nanotechnology*, in press.

130. Li, X. B., Maute, K., Dunn, M. L., and Yang, R. G., 2010, "Strain Effects on the Thermal Conductivity of Nanostructures," *Physical Review B*, Vol. 81, Paper No. 245318.
129. Rupp, C. J., Dunn, M. L., and Maute, K., 2010, "Analysis of Piezoelectric Energy Harvesting Systems with Non-linear Circuits Using the Harmonic Balance Method," *Journal of Intelligent Materials and Structures*, in press.
128. Golmon, S., Maute, K., Lee, Se-Hee, and Dunn, M. L., 2010, "Stress Generation in Silicon Particles During Lithium Insertion," *Applied Physics Letters*, Vol. 97, Paper No. 033111.
127. Rupp, C. J., Maute, K., and Dunn, M. L., 2010, "Switchable Phononic Devices via Wave Filtering and Guiding in Polarization-Patterned Piezoelectric Solids," *Applied Physics Letters*, Vol. 96, Paper No. 111902.
126. Westbrook, K.K, Parakh, V., Mather, P.T., Wan, L. C., Dunn, M.L., H.J. Qi, 2010, Constitutive Modeling of Shape Memory Effects in Semicrystalline Polymers with Stretch Induced Crystallization, *Journal of Engineering Materials and Technology*, in press.
125. Long, K.N., Dunn, M.L., Scott, T.F., and Qi, H.J., 2010, Photo-Induced Creep of Network Polymers. *International Journal of Structural Changes in Solids*, Vol. 1, pp. 41-52.
124. Long, K. N., Dunn, M. L., Scott, T. F., Turpin, L. P., and Qi, H. J., 2010, "Light-Induced Stress Relief for Improved Flaw Tolerance in Polymers," *Journal of Applied Physics*, Vol. 107, Paper No. 053519.
123. Lu, Z. and Dunn, M. L., 2010, "van der Waals Adhesion of Graphene Membranes," *Journal of Applied Physics*, Vol. 96, Paper No. 111902.
122. Long, K. N., Dunn, M. L., and Qi, H. J., 2010, "Mechanics of Materials with Evolving Phases," *International Journal of Plasticity*, Vol. 26, pp. 603-616.

2009

121. Golmon, S., Dunn, M. L., and Maute, K., 2009, "Numerical Modeling of Electrochemical-Mechanical Interactions in Lithium Polymer Batteries," *Computers and Structures*, Vol. 78, pp. 156-159.
120. Miller, D. C., Foster, R. R., Jen, S.-H., Bertrand, J. A., Seghete, D., Yoon, B., Lee, Y.-C., George, S. M., and Dunn, M. L., 2009, "Thermomechanical Properties of Aluminum Alkoxide (Alucone) Films Created by Molecular Layer Deposition," *Acta Materialia*, Vol. 57, pp. 5083-5092.
119. Dunn, M. L. and Maute, K., 2009, "Photomechanics of Liquid Crystal Elastomers: Flexure of Uniformly Irradiated and Patterned Films," *Mechanics of Materials*, Vol.43, pp. 1083-1089.
118. Jones, K., and Dunn, M. L., 2009, "Predicting Corner Crack Fatigue Propagation from Coldworked Holes," *Engineering Fracture Mechanics*, Vol. 76, pp. 2074-2090.
117. Howard, M., Pajot, J., Maute, K., and Dunn, M. L., 2009, "A Computational Design Methodology for Assembly and Actuation of Thin-Film Structures via Patterning of Eigenstrains," *Journal of Microelectromechanical Systems*, Vol. 18, pp. 1137-1148.
116. Rupp, C. J., Evgrafov, A., Maute, K., and Dunn, M. L., 2009, "Design of Piezoelectric Energy Harvesting Systems: A Topology Optimization Approach Based on Multilayer Plates and Shells," *Journal of Intelligent Materials and Structures*, Vol. 20, pp. 1923-1939.
115. Zhang, Y., Zhang, Y.-Z., Miller, D. C., Bertrand, J. A., Jen, S.-H., Yang, R., Dunn, M. L., George, S. M., and Lee, Y.-C., 2009, "Fluorescent Tags to Visualize Defects in Al_2O_3 Thin Films Grown Using Atomic Layer Deposition," *Thin Solid Films*, Vol. 51, pp. 6794-6797.
114. Long, K. N., Scott, T. F., Qi, H. J., Bowman, C. N., and Dunn, M. L., 2009, "Photomechanics of Light Activated Polymers," *Journal of the Mechanics and Physics of Solids*, Vol. 57, pp. 1103-1121.
113. Miller, D. C., Foster, R. R., Zhang, Y., Jen, S.-H., Bertrand, J. A., Lu, Z., Seghete, D., O'Patchen, J. L., Yang, R., Lee, Y.-C., George, S. M., and Dunn, M. L., 2009, "The Mechanical Robustness of Atomic Layer- and Molecular Layer-Deposited Coatings on Polymer Substrates," *Journal of Applied*

Physics, Vol. 105, Paper No. 093527 (12 pages).

112. Jones, K., and Dunn, M. L., 2009, "Predicting Fatigue Crack Growth from a Preyielded Hole," *International Journal of Fatigue*, Vol. 31, pp. 223-230.

111. Zhang, Y., and Dunn, M. L., 2009, "Patterned Bilayer Plate Microstructures Subjected to Thermal Loading: Deformation and Stresses," *International Journal of Solids and Structures*, Vol. 46, pp. 125-134.

110. Sylves, K., Maute, K., and Dunn, M. L., 2009, "Adhesive Surface Design Using Topology Optimization," *Structural and Multidisciplinary Optimization*, Vol. 38, pp. 455-468.

109. Evgrafov, A., Maute, K., Yang, R., and Dunn, M. L., 2009, "Topology Optimization of Nano- and Submicron-scale Heat Transfer," *International Journal for Numerical Methods in Engineering*, Vol. 77, pp. 285-300.

2008

108. Jones, K., and Dunn, M. L., 2008, "Fatigue Crack Growth through a Residual Stress Field Introduced by Plastic Beam Bending," *Fatigue and Fracture of Engineering Materials and Structures*, Vol. 31, pp. 863-875.

107. Evgrafov, A., Rupp, C. J., Dunn, M. L., and Maute, K., 2008, "Optimal Synthesis of Tunable Elastic Waveguides," *Computer Methods in Applied Mechanics and Engineering*, Vol. 198, pp. 292-301.

106. DelRio, F., Dunn, M. L., and, de Boer, M. P., 2008, "Capillary Adhesion Model for Contacting Micromachined Surfaces," *Scripta Materialia*, Vol. 59, Viewpoint Set No. 44, pp.916-920.

105. Evgrafov, A., Rupp, C. J., Maute, K., and Dunn, M. L., 2008, "Large-Scale Parallel Topology Optimization Using a Dual-Primal Substructuring Solver," *Structural and Multidisciplinary Optimization*, Vol. 36, pp. 329-345.

2007

104. Dunn, M. L., 2007, "Photomechanics of Mono- and Polydomain Liquid Crystal Elastomer Films," *Journal of Applied Physics*, Vol. 102, 013506.

103. DelRio, F., Dunn, M. L., Phinney, L. M., Bourdon, C. J., and, de Boer, M. P., 2007, "Rough Surface Adhesion in the Presence of Capillary Condensation," *Applied Physics Letters*, Vol. 90, 163104.

102. Bhate, D. and Dunn, M. L., 2007, "Adhesion of Arbitrary-Shaped Thin-Film Microstructures," *Microelectronics Reliability*, Vol. 47, pp. 2014-2024.

101. Rupp, C. J., Evgrafov, A., Maute, K., and Dunn, M. L., 2007, "Design of Phononic Materials/Structures for Surface Wave Devices Using Topology Optimization," *Structural and Multidisciplinary Optimization*, Vol. 34, pp. 111-121.

100. Zhang, Y., Dunn, M. L., Hunter, K., Lanning, C., Lee, P.-F., Ivy, D. D., Claussen, L., and Shandas, R., 2007, "Application of A Microstructural Constitutive Model of the Pulmonary Artery to Patient-Specific Studies: Validation and Effect of Orthotropy," *Journal of Biomechanical Engineering*, Vol. 129, pp. 193-201.

2006

99. DelRio, F., Dunn, M. L., Boyce, B. L., Corwin, A. D., and de Boer, M. P., 2006, "The Effect of Nanoparticles on the Adhesion of Micromachined Surfaces," *Journal of Applied Physics*, Vol. 99, pp. 104304-1-9.

98. DelRio, F., Dunn, M. L., and de Boer, M. P., 2006, "Growth of Silicon Carbide Nanoparticles Using Tetraethylorthosilicate for Microelectromechanical Systems," *Electrochemical and Solid-State Letters*, Vol. 10, pp. H27-H30.

97. Diao, J., Gall, K., Dunn, M. L., and Zimmerman, J. A., 2006, "Atomistic Simulation of the Yield of Au Nanowires," *Acta Materialia*, Vol. 54, pp. 643-653.

96. Pajot, J., Maute, K., Zhang, Y., and Dunn, M. L., 2006, "Design of Patterned Multilayer Films with Eigenstrains by Topology Optimization," *International Journal of Solids and Structures*, Vol., 43, pp. 1832-1853.
95. Liu, Y., Gall, K., Dunn, M. L., Greenberg, A. R., and Diani, J., 2006, "Thermomechanics of Shape Memory Polymers: Uniaxial Experiments and Constitutive Modeling," *International Journal of Plasticity*, Vol. 22, pp. 279-313.

2005

94. Zhang, Y., Dunn, M. L., Drexler, E. S., McCowan, C. N., Slifka, A. J., Ivy, D. D., and Shandas, R., 2005, "A Microstructural Hyperelastic Model of Pulmonary Arteries Under Normo- and Hypertensive Conditions," *Annals of Biomedical Engineering*, Vol. 33, pp. 1042-1052.
93. DelRio, F., de Boer, M. P., Knapp, J. A., Clews, P. J., and Dunn, M. L., 2005, "The Role of van der Waals Forces in Adhesion of Micromachined Surfaces," *Nature Materials,* Vol. 4, pp. 629-634.
92. Mukdadi, O., Datta, S. K., and Dunn, M. L., 2005, "Acoustic Phonon Dispersion in Nanowires," *Journal of Applied Physics*, Vol. 97, Art. No. 074313.
91. Gall, K., Diao, J., Dunn, M. L., Haftel, M., Bernstein, N., and Mehl, M. J., 2005, "Tetragonal Phase Transformation in Gold Nanowires," *Journal of Engineering Materials and Technology*, Vol. 127, pp. 417-422.

2004

90. Gall, K., Diao, J., and Dunn, M. L., 2004, "The Strength of Gold Nanowires," *Nanoletters*, Vol. 4, pp. 2431-2436.
89. Diao, J., Gall, K., and Dunn, M. L., 2004, "Yield Strength Asymmetry in Metal Nanowires," *Nanoletters*, Vol. 4, pp. 1863 -1867.
88. Diao, J., Gall, K., and Dunn, M. L., 2004, "Surface Stress Driven Reorientation of Gold Nanowires," *Physical Review B*, Vol. 70, pp. 075413-1-075413-9.
87. Gall, K., Stefanic, G., Balzar, D., Dunn, M. L., and Liu, Y., 2004, "Internal Stress Storage in Shape Memory Polymer Nanocomposites," *Applied Physics Letters*, Vol. 85, pp. 290-292.
86. Zhang, Y., Dunn, M. L., Gall, K., Elam, J. W., and George, S. M., 2004, "Suppression of Inelastic Deformation of Nanocoated Thin Film Microstructures," *Journal of Applied Physics*, Vol. 95, pp. 8216-8225.
85. Diao, J., Gall, K., and Dunn, M. L., 2004, "Atomistic Simulation of the Structure and Elastic Properties of Gold Nanowires," *Journal of the Mechanics and Physics of Solids*, Vol. 52, pp. 1935-1962.
84. Zhang, Y. and Dunn, M. L., 2004, "Geometric and Material Nonlinearity During the Deformation of Micron-Scale Thin-Film Bilayers Subject to Thermal Loading," *Journal of the Mechanics and Physics of Solids*, Vol. 52, pp. 2101-2126.
83. Gall, K., West, N., Spark, K., Dunn, M. L., and Finch, D., 2004, "Creep of Thin Film Au on Bimaterial Au/Si Microcantilevers," *Acta Materialia*, Vol. 52, pp. 2133-2146.
82. Liu, Y., Gall, K., Dunn, M. L., and McCluskey, P., 2003, "Thermomechanics of Shape Memory Polymer Nanocomposites," *Mechanics of Materials*, Vol. 36, pp. 929-940.
81. Gall, K., Dunn, M. L., Zhang, Y., and Corff, B. A., 2004, "Thermal Cycling Response of Layered Gold/Polysilicon MEMS Structures," *Mechanics of Materials*, Vol. 36, pp. 45-55.

2003

80. Ledbetter, H. and Dunn, M. L., 2003, "Martensite Crystallography and Elastic Stiffness Coefficients," *J. Phys. IV*, Vol. 112, pp. 213-216.
79. Diao, J., Gall, K., and Dunn, M. L., 2003, "Surface Stress Induced Phase Transformation in Metal Nanowires," *Nature Materials*, nmat977, pp. 1-5.

78. Taya, M., Almajid, A. A., Dunn, M. L., and Takahashi, H., 2003, "Design of Functionally Graded Microstructure Piezocomposite Actuators," *Sensors and Actuators: A. Physical*, Vol. 107, pp. 248-260.
77. Liu, Y., Gall, K., Dunn, M. L., and McCluskey, P., 2003, "Thermomechanical Recovery Couplings of Shape Memory Polymers in Flexure," *Smart Materials and Structures*, Vol. 12, pp. 947-954.
76. Zhang, Y. and Dunn, M. L., 2003, "Deformation of Blanketed and Patterned Bilayer Thin Film Microstructures During Post-Release Thermal and Cyclic Thermal Loading," *Journal of Microelectromechanical Systems*, Vol. 12, pp. 788-796.
75. Gall, K., Hulse, M., Dunn, M. L., Finch, D., George, S. M., and Corff, B. A., 2003, "Thermo-Mechanical Response of Bare and Al_2O_3 Nanocoated Au/Si Bilayer Beams for MEMS," *Journal of Materials Research*, Vol. 18, pp 1575-1587.
74. Dunn, M. L., 2003, "Fracture Initiation at Geometric and Material Discontinuities: Criteria Based on Critical Stress Intensities of Linear Elasticity," *Chinese Journal of Mechanics – Series A*, Vol. 19, pp. 109-123.
73. Su, B., Lee, Y. C., and Dunn, M. L., 2003, "Die Cracking at Solder (In60-Pb40) Joints on Brittle (GaAs) Chips: Fracture Correlation Using Critical Interface Corner Stress Intensities," *Journal of Electronic Packaging*, Vol. 125, pp. 369-377.
72. Liew, L. A., Saravanan, R. A., Bright, V. M., Dunn, M. L., Daily, J. W., Raj, R., 2003, "Processing and Characterization of Silicon Carbon-Nitride Ceramics: Application of Electrical Properties Towards MEMS Thermal Actuators," *Sensors and Actuators: A. Physical*, Vol. 103, pp. 171-181.

2002

71. Gall, K., Dunn, M. L., Liu, Y., Finch, D., Lake, M., and Munshi, N. A., 2002, "Shape Memory Polymer Nanocomposites," *Acta Materialia*, Vol. 50, pp 5115-5126.
70. Mukdadi, O. M., Datta, S. K., and Dunn, M. L., 2002, "Elastic Guided Waves in a Layered Plate With a Rectangular Cross Section," *Journal of Pressure Vessel Technology*, Vol. 124, pp. 319-325.
69. Dunn, M. L., Zhang, Y., and Bright, V. M., 2002, "Deformation and Structural Stability of Layered Plate Microstructures Subjected to Thermal Loading," *Journal of Microelectromechanical Systems*, Vol. 11, pp. 372-384.
68. Labossiere, P. E. W., Dunn, M. L., and Cunningham, S. J., 2002, "Application of Bimaterial Interface Corner Failure Mechanics to Silicon/Glass Anodic Bonds," *Journal of the Mechanics and Physics of Solids*, Vol. 50, pp. 405-433.
67. Gall, K., Dunn, M. L., Liu, Y., Labossiere, P. E. W., Sehitoglu H. and Chumlyakov, Y. I., 2002, "Micro and Macro Deformation of Single Crystal NiTi," *Journal of Engineering Materials and Technology*, Vol. 124, pp. 238-245.
66. Liu, Y., Liew, L., Luo, R., An, L., Dunn, M. L., Bright, V. M., Daily, J. W., and Raj, R., 2002, "Application of Microforging to SiCN MEMS Fabrication," *Sensors and Actuators: A. Physical*, Vol. 95, pp. 143-151.
65. Liew, L., Liu, Y., Luo, R., Cross, T., An, L., Bright, V. M., Dunn, M. L., Daily, J. W., and Raj, R., 2002, "Fabrication of SiCN MEMS by Photopolymerization of Pre-Ceramic Polymer," *Sensors and Actuators: A. Physical*, Vol. 95, pp. 120-134.

2001

64. Ledbetter, H., Kim, S., Dunn, M. L., Xu, Z., Crudele, S., Kriven, W., 2001, "Elastic Constants of Mullite Containing Alumina Platelets," *Journal of the European Ceramic Society*, Vol. 21, pp. 2569-2576.
63. Liew, L. A., Zhang, W. G., An, L. N., Shah, S., Luo, R. L., Liu, Y. P., Cross, T., Dunn, M. L., Bright, V., Daily, J. W., Raj, R., and Anseth, K., 2001, "Ceramic MEMS - New Materials, Innovative Processing and Future Applications," *American Ceramic Society Bulletin*, Vol. 80, pp. 25-30.

62. Dunn, M. L., Zhang, Y., and Bright, V. M., 2001, "Deformation and Structural Stability of Gold/Polysilicon Layered MEMS Plate Structures Subjected to Thermal Loading," *Mechanical Properties of Structural Films*, *American Society for Testing and Materials*, Vol. *STP 1413*, pp. 306-317.
61. Liew, L., Zhang, W., Bright, V. M., An, L., Dunn, M. L., and Raj, R., 2001, "Fabrication of SiCN Ceramic MEMS Using an Injectable Polymer-Precursor Technique," *Sensors and Actuators: A. Physical*, Vol. 89, pp. 64-70.
60. Dunn, M. L., Hui, C. Y., Labossiere, P. E. W., and Lin, Y. Y., 2001, "Small Scale Geometric and Material Features at Geometric Discontinuities and Their Role in Fracture Analysis," *International Journal of Fracture*, Vol. 110, pp. 101-121.
59. Li, J. Y. and Dunn, M. L., 2001, "Viscoelectroelastic Behavior of Heterogeneous Piezoelectric Solids," *Journal of Applied Physics*, Vol. 89, pp. 2893-2903.
58. Labossiere, P. E. W. and Dunn, M. L., 2001, "Fracture Initiation at Three-Dimensional Bimaterial Interface Corners," *Journal of the Mechanics and Physics of Solids*, Vol. 49, pp. 609-634.
57. Li, J. Y. and Dunn, M. L., 2001, "Variational Bounds for the Effective Moduli of Heterogeneous Piezoelectric Solids," *Philosophical Magazine A*, Vol. 81, pp. 903-926.

2000

56. Niklasson, A. J., Datta, S. K., and Dunn, M. L., 2000, "On Ultrasonic Guided Waves in a Thin Anisotropic Layer Lying Between Two Isotropic Layers," *Journal of the Acoustical Society of America*, Vol. 108, pp. 2005-2011.
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54. Ledbetter, H. and Dunn, M. L., 2000, "Equivalence of Eshelby Inclusion Theory and Wechsler-Lieberman-Read , Bowles-Mackenzie Martensite Crystallography Theories," *Materials Science and Engineering A*, Vol. A285, pp. 180-185.
53. Ogi, H., Dunn, M. L., Takashima, K., Ledbetter, H., 2000, "Elastic Properties of a SiC_f/Ti Unidirectional Composite: Acoustic-Resonance Measurements and Micromechanics Predictions," *Journal of Applied Physics*, Vol. 87, pp. 2769-2774.
52. Dunn, M. L., Cunningham, S. J., and Labossiere, P. E. W., 2000, "Initiation Toughness of Silicon/Glass Anodic Bonds," *Acta Materialia*, Vol. 48, pp. 735-744.
51. Dunn, M. L. and Ledbetter, H., 2000, "Micromechanically-Based Acoustic Characterization of the Fiber Orientation Distribution Function of Morphologically Textured Short-Fiber Composites: Prediction of Thermomechanical and Physical Properties," *Materials Science and Engineering A*, Vol. A285, pp. 56-61.

1999

50. Ledbetter, H. and Dunn, M. L., 1999, "Habit Planes, Inclusion Theory, and Twins," *Materials Science and Engineering A*, Vol. A273-275, pp. 222-225.
49. Dunn, M. L. and Wienecke, H. A., 1999, "Half-Space Green's Functions for Transversely Isotropic Piezoelectric Solids," Journal of Applied Mechanics, Vol. 66, pp. 675-679.
48. Li, J. Y., Dunn, M. L., and Ledbetter, H., 1999, "Thermoelectroelastic Moduli of Textured Piezoelectric Polycrystals: Exact Solutions and Bounds for Film Textures," *Journal of Applied Physics*, Vol. 86, pp. 4626-4634.
47. Ogi, H., Takashima, K., Ledbetter, H., Dunn, M. L., Shimoike, G., Hirao, M., and Bowen, P., 1999, "Elastic Constants and Internal Friction of an SiC Fiber Reinforced Ti Matrix Composite: Measurement and Theory," *Acta Materialia*, Vol. 47, pp. 2787-2796.

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11. Dunn, M. L., Ledbetter, H., and Heyliger, P. R., 1995, "Free Vibration of Piezoelectric Crystals: Application to the Determination of Elastic and Piezoelectric Constants," in *Engineering Mechanics: Proceedings of the 10th Conference*, American Society of Civil Engineers, S. Sture, ed., pp. 758-761.
10. Ledbetter, H., Dunn, M., Kim, S., and Fields, R., 1995, "Void Shape in Sintered Titanium," *Review of Progress in Quantitative Nondestructive Evaluation*, Vol. 14, D. O. Thompson and D. E. Chimenti, eds., pp. 1633-1639.

1994

9. Dunn, M. L., 1994, "Electroelastic Moduli of Piezoelectric Ceramics with Elliptical Cavities and Slit Cracks," in *Mechanics and Materials for Electronic Packaging: Coupled Field Behavior in Materials*, Vol. 3, ASME AMD-Vol. 193, M. L. Dunn, M. Taya, and M. Saka, eds., pp. 19-22.3.
8. Taya, M., Dunn, M., and Ono, K., 1994, "Computational Methods in Composite Materials: Effective Medium Theory vs. Percolation Theory," in *Proceedings of the 15th Riso International Symposium on Materials Science: Numerical Predictions of Deformation Processes and the Behavior of Real Materials,* S. I. Andersen, J. B. Bilde-Sorensen, T. Lorentzen, O. B. Pedersen, and N. J. Sorensen, eds., pp. 569-583.
7. Dunn, M. L., 1994, "Theoretical Principles for the Analysis of Thermoelectroelastic Heterogeneous Media," in the *Proceedings of the Second International Conference on Intelligent Materials*, C. A. Rogers and G. G. Wallace, eds., pp. 474-485.
6. Dunn, M. L., Reedy, E. D. Jr., and Guess, T. R., 1994, "Delamination of Woven E-Glass Fabric Composites," in *Proceedings of 39th International SAMPE Symposium*, pp. 1224-1236.

1993

5. Dunn, M. L. and Taya, M., 1993, "Creep and Thermal Cycling Creep of Metal Matrix Composites" in *Thermomechanical Behavior of Advanced Structural Materials*, ASME AD-Vol. 341, AMD-Vol. 173, W. F. Jones, ed., pp. 33-46.
4. Dunn, M. L., 1993, "Exact Relations Between the Thermal and Electroelastic Moduli of Composite Materials with Emphasis on Two-Phase Laminates" in *Proceedings of the 1993 North American Conference on Smart Structures and Materials: Smart Materials*, Vol. 1916, V. K. Varadan, ed., pp. 275-285.

1992

3. Dunn, M. L. and Taya, M., 1992, "Heat Conduction in Microdamaged Composites," in *Fundamental Problems in Conduction Heat Transfer*, ASME HTD-Vol. 207, G. P. Peterson and M. M. Yovanovich, eds., pp. 69-76.

1991

2. Taya, M., Dunn. M. L., and Lilholt, H., 1991, "Long Term Properties of Metal Matrix Composites," in *Proceedings of the 12th Riso International Symposium on Materials Science: Metal Matrix Composites - Processing, Microstructure, and Properties*, N. Hansen, D. J. Jensen, T. Leffers, H. Lilholt, T. Lorentzen, A. S. Pederson, O. B. Pedersen, and B. Ralph, eds., pp. 149-171.
1. Armstrong, W. D., Taya, M., and Dunn, M. L., 1991, "Strain Accumulation in Thermal Cycled Metal Matrix Composites," in *Damage and Oxidation Protection in High Temperature Composites,* ASME AD-Vol. 25-2, G. K. Haritos and O. O. Ochoa eds., ASME Winter Annual Meeting, pp. 51-66.

Educational Papers and Presentations

Dunn, M. L., 1998, "One-Dimensional Composite Micromechanics," *International Journal of Mechanical Engineering Education*, Vol. 26, pp. 38-50.

Lee, Y. C., Bright, V. M., Dunn, M. L., Mahajan, R. L., Carlson, L. E., Henderson, W. R., Hooker, D. B., Picket-May, M., Seymour, M., and Baldwin, D. F., 1999, "Microelectromechanical Systems (MEMS) Experimental Modules to Enhance Distance Learning," Teaching with Technology Conference, Colorado School of Mines, Golden, Co, July 14-16, 1999. Presented by Y.C. Lee.

Patents, Patent Applications, and Records of Invention

1. Harsh, K. F, Kladitis, P. E., Lee, Y. C., Bright, V. M., Zhang, W., Dunn, M. L., Zhang, Y., "Controlled Surface Tension or Shrinkage Assembly of 3D MEMS," Provisional Patent Application, University of Colorado at Boulder, filed May 18, 2001.

RESEARCH GRANTS AND CONTRACTS

Center for Nanoscale Science and Technology For Integrated Micro/Nano Electromechanical Transducers (iMINT) [with Y. C. Lee, V. Bright, S. George, R. Ruoff (U. Texas), and B. Dunn (UCLA)]	DARPA	20010-2013
Microsystems Modeling for Gas Sensor Design Guidance by Nanoscale Surface Topography [with H. J. Qi and Y.Ding]	NIH (subcontract from Synkera)	2010-2011
Mechanics of Cell Alignment due to Contact Guidance by Nanoscale Surface Topography [with H. J. Qi and Y.Ding]	NSF	2009-2012
Graphene Nanomechanics: The Role of van der Waals Forces [with J. S. Bunch]	NSF	2009-2012
Reversible Shape Memory Polymers and Composites: Synthesis, Modeling and Design [with H. J. Qi and P. Mather (Syracuse U.)]	AFOSR	2009-2012
A Design Tool for Nanostructures with Tunable Thermal Properties [with R. Yang and K. Maute]	AFOSR	2007-2010
A Design-Centered Approach to Nanoscale Engineering [with K. Maute and R. Yang]	NSF	2007-2010
Multiscale Modeling Tools for Nanostructure Surface/Interface Effects [with H. Park]	DARPA	2007-2008
Adaptive Skin-Stiffener Interconnects for Shape-Changing Vehicles [with H. Qi and K. Maute]	DARPA - STTR	2006-2007
Multifunctional Energy Harvesting/Storage Materials Systems for Aerovehicles [with M. Taya (U. Washington), D. Inman (Virginia Tech), H. T. Hahn (UCLA), K. Maute And R. Yang (CU)]	AFOSR-MURI	2006-2011

Center for Nanoscale Science and Technology For Integrated Micro/Nano Electromechanical Transducers [with Y. C. Lee, V. Bright, S. George, R. Ruoff (U. Texas), and J. Hone (Columbia)]	DARPA	2006-2010
Optimal Design of Adhesive Interactions [with K. Maute]	Sandia National Laboratories MESA Fellowship for K. Sylves	2006-2008
Design of Phononic Micro/nanostructures for Harsh Environment Device Technology [with K. Maute]	AFOSR	2005-2008
High-Fidelity In-Situ Nanomechanical Characterization System [with K. Maute and H. Qi]	AFOSR	2005-2006
Surface Roughness and Interfacial Adhesion in Microsystems	Sandia National Laboratories MESA Fellowship for F. DelRio	2004-2005
Morphing at Large Stress and Strain Through Electrochemical Actuation and Tailored Structural Design [with K. Maute, R. Noble, and C. Koval]	DARPA	2004-2006
Adhesive Nanostructures [with K. Maute and C. Stoldt]	NSF	2004-2005
Acquisition of a Nanoindentor for Micro/ Nanosystems Research and Education [with K. Gall, V. Bright, M. Stowell, and S. George]	NSF-MRI	2003-2004
Shape Memory Based Polymer Nanocomposites For MEMS [with K. Gall]	NSF	2002-2005
Photo-Stereo Lithography for Polymer Derived Ceramic Microsystems [with R. Raj, V. Bright, and K. Anseth]	AFOSR-DURIP	2002-2003
Topology Optimization for the Design of 3-D Microelectromechanical Systems (MEMS) Undergoing Coupled Multiphysics Phenomena [with K. Maute and V. Bright]	AFOSR	2001-2004
Micropackages for Nanodevices [with V. Bright and Y. C. Lee]	DARPA	2002-2003

Mechanism Based Multiscale Modeling and Critical Experiments for Lifecycle Engineering of MEMS [with K. Gall]	NSF/Sandia National Laboratories	2000-2003
Linear and Nonlinear Ultrasonics for Microstructure NDE [with S. K. Datta]	DOE	1999-2002
Injectable Ceramic Microcast SiCN MEMS For Extreme Temperature Environments [with V. Bright, L. An, J. Daily, and R Raj]	DARPA	1999-2002
MEMS and Solder Self-Assembly for 3-D MEMS and MEMS Arrays [with V. Bright and Y. C. Lee]	DARPA	1998-2001
Investigation of Internal Stresses and Strains Induced by the Olivine-Spinel Transformation: Mechanical Models and Microstructural Observations [with P. Burnley]	NSF	1997-99
Electromechanical Behavior and Properties of High-T_c Superconducting Tapes [with S. K. Datta]	DOE	1996-99
Micromechanical Testing of Micromachined Silicon Structures	Ford Microelectronics, Inc.	1995-99
Advanced Ultrasonic Characterization of the Orientation Distribution Function of Short Fiber Composites	NIST	1995-98
Singular Fields at Piezoelectric Bimaterial Interfaces and Their Use as Failure Criteria	NSF	1995-98
Fundamental Physical-Mechanical Properties of Two-Phase Materials: Measurements and Modeling-Theory [with H. Ledbetter and C. Fortunko, administered to NIST]	ONR	1998
Multiple-Scale Micromechanics of Polycrystalline Piezoelectric Ceramics	NSF	1994-97
Stress Effects on Nb_3Sn Superconductors	NIST	1996-97
Failure Analysis of Laminated Composites	Sandia National	1993-95

	Laboratories	
Composite-to-Metal Joints: Experimental and Analytical Study of Structural Integrity	Colorado Advanced Materials Institute	1994-95
Superconductor Test Fixture Design and Analysis	NIST (through PREP program)	1994-95
Micromechanics Constitutive Modeling of Piezoelectric Ceramics	CU - CRCW Grant-In-Aid	1993-95
A Hybrid Experimental/Analytical Study of Stress and Strain Effects on the Critical Current of Superconductors	CU - CRCW Junior Faculty Development Award	1994-95
Elastic Constants of Short Fiber Reinforced Plastics: Experimental and Analytical Characterization	NIST	1994
The Effects of Stress and Strain on the Critical Current of A15 Superconductors	NIST	1994

EDUCATIONAL GRANTS AND CONTRACTS

Finite Element Discovery Learning to Enhance the Mechanical Engineering Curriculum [with Y. C. Lee, et al.]	CU - Engineering Excellence Fund	2000-2001
Experimental Modules for MEMS [with Y. C. Lee, et al.]	CU - Engineering Excellence Fund	1999-2000
Delivery of the ITLL to Colorado Institutions via the WWW [with S. Mahalingam, L. E. Carlson, T. L. Geers, Y. C. Lee, and G. Subbarayan]	Colorado Commission on Higher Education	1996-98
Equipment for the Durning Laboratory for Engineering Science and Practice [with S. K. Datta, T. L. Geers, and R. Raj]	CU - Undergraduate Excellence Fund	1997-98
Photoelastic Stress Analysis and Visualization	CU - Integrated Teaching Laboratory	1994-95

GRADUATE STUDENTS SUPERVISED

Current Ph.D.

Evan Anderson 2010-
Fracture Mechanics of Battery Electrodes

Narasimha Bodetti 2009-
Graphene Adhesion Mechanics

Chris Deluca 2009-
Large Deformation Mechanics for Electrochemical Energy Storage
(co-advisor with K. Maute, ASEN)

Kevin Ge 2009-
Thermomechanics of Two-Way Shape Memory Polymers
(co-advisor with H. Jerry Qi)

Stephanie Golman 2007-
Chemomechanics for Electromechanical Storage Materials
(co-advisor with K. Maute, ASEN)

Past Ph.D.		*Employer*
Kevin Long	2006-10	Sandia National Laboratories
Mechanics of Light-Activated Polymers (co-advisor with H. Jerry Qi) **received Sandia Early Career Award*		
Keith Jones	2006-09	Air Force Research Laboratory
Residual Stress Effects on Fatigue Crack Propagation		
Cory Rupp	2004-09	ATA Engineering, Inc.
Phononic Nanostructures: Analysis and Design (co-advisor with K. Maute, ASEN)		
Frank DelRio	2003-06	NIST Gaithersburg: Mat. Sci. Eng. Laboratory
Van der Waals and Capillary Adhesion of Micromachined Surfaces **received 2009 ASME Orr Early Career Award*		
Jiankuai Diao	2000-04	NASA Ames Research Center
Atomistic and Continuum Modeling of the Structure And Mechanical Properties of Metal Nanowires (co-advisor with K. Gall)		
Yiping Liu	1999-2004	Sporian Microsystems
Thermomechanics of Shape Memory Polymers (co-advisor with K. Gall)		
Yanhang Zhang	1999-2003	Boston Univ. (Clare Boothe Luce Assistant Professor)
Thermomechanical Behavior of Multilayer Thin-Film Microstructures **received 2009 NSF CAREER Award, 20007 DARPA Young Faculty Award, and 2002 SPIE National Best Student Paper Award*		
Paul Labossiere	1997-2000	Univ. of Manitoba (Assistant Professor)
Fracture Initiation at Two- and Three-Dimensional Bimaterial Interface Corners **received 1999 Society of Engineering Science National Best Student Paper Award*		
Jiangyu Li	1995-98	Univ. of Washington
Micromechanics of Heterogeneous		(Bryan T. McMinn Associate Professor)

Magnetoelectroelastic Solids
**received 2008 ASME Nemat-Nasser Early Career Award and 2008 ICCES Outstanding Young Investigator Award in Theory*

Wan Suwito 1994-97 Advanced Bionics
Fracture of Notched Silicon Microstructures

Past M.S.		*Employer*
Will Francis	2006-08	Composites Technology Development
Microbuckling Mechanics for Elastic Memory Composites (co-advisor with H. Jerry Qi)		
Kevin Sylves	2005-08	ATA Engineering, Inc.
Adhesive Nanostructures (co-advisor with K. Maute, ASEN)		
Dhruv Bhate	2001-03	Intel Corporation
Adhesion of Thin Film Microstructures: Modeling and Measurements		
Roland Sesselmann	1995-99	Seagate
Mechanics of Thin-Film Multilayers in Transverse Compression for High-T_c Superconductors (non-thesis)		
Oyvind Nilsen	1996-97	Alphasniffer LLC
An Apparatus for Measuring Creep-Recovery in Torsion		
Chris Horn	1995-96	General Motors
Delamination Modeling of Laminated Composites		
Chris May	1995-96	Lockheed-Martin
Adhesive-Bonded Composite-to-Metal Tubular Lap Joints: Experimental and Analytical Study of Structural Integrity		
Bob McDonough	1994-95	Heidelberg Web Systems
Test Fixtures for Superconductors in High Magnetic Fields		
Wallace Westlake	1994-95	APTEC
Boundary Stiffness Matrices by a Finite Element Reduction Method		

Past Postdoctoral		*Employer*
Zhixing Lu	2007-09	
Adhesion and Fracture of Nanostructures		
David Miller	2007-08	National Renewable Energy Laboratory
Mechanics and Physics of Thin Film Structures		
Anton Evgrafov	2006-08	Technical University of Denmark (DTU)
Topology Optimization for the Design of Dynamic Material Behavior (co-advisor with K. Maute)		(Assistant Professor)

Independent Study

Bram Van Der Geest	ElectricalBehavior of Deformed Nanotubes	Summer-Fall 2008
Dhruv Bhate	Adhesion of Microstructures	Spring 2002
Paul Labossiere	Advanced Solid Mechanics	Fall 1998
	Anisotropic Elasticity	Spring 1997
Thomas Murphy	Anisotropic Elasticity	Spring 1997
Roland Sesselmann	Anisotropic Elasticity	Spring 1997

Wan Suwito	Anisotropic Elasticity	Spring 1997
	Computational Fracture Mechanics	Spring 1996

UNDERGRADUATE STUDENTS SUPERVISED

Independent Study and Various Undergraduate Research Opportunity Programs

Elizabeth Jones	Environmentally Responsive Polymers	Fall 2008-Spring 2009
Lucas Turpin	Photomechanical Polymers	Fall 2008-Fall 2009
Ross Foster	Mechanical Behavior of Thin Films	Fall 2007-Spring 2009
Zach Wilson	Mechanics of Composite Materials	Spring 2008
Tom Guerin	Mechanics of Composite Materials	Spring 2007
Eric Kinne	Mechanics of Composite Materials	Spring 2007
Max Peevey	Mechanics of Composite Materials	Spring 2007
Natilie Wilson	Mechanics of Composite Materials	Spring 2007
Marcus Choi	Shape Memory Polymer Composites	Spring 2004
Judd Haefele	Composite Materials	Fall 1998
Mark Allen	Finite Element Analysis	Fall 1998
Preston Sellers	Composite Materials	Fall 1998
Bernard Roach	Fracture Mechanics	Fall 1998
Daniel Parker	Fracture Mechanics	Fall 1998
Brian Hunter	Experimental Fracture Mechanics	Spring 1996
Felix Cordova	Free Vibrations of Piezoelectric Solids	Spring 1995
Damon Tohill	Free Vibrations of Piezoelectric Solids	Spring 1995
Brad Waites	Photoelasticity	Spring 1995
Mike Deiparine	Fracture Mechanics of Piezoelectric Solids	Summer 1995
Roy Grossinger	Fracture Mechanics of Piezoelectric Solids	Summer 1995
Scott Bates	Undergraduate Research Opportunities Program	1993-95
Felix Cordova	Work Study	1994-96