# 1.PERSONAL INFORMATION

**Name:** Hugh Alan Bruck
**Department:** Mechanical Engineering
**Rank:** Professor
**Year of Appointment:** 2010

## 1.a EDUCATION

- **Ph.D. Materials Science/Applied Mechanics** 1995
  California Institute of Technology, Pasadena, CA
  (*Advisors: Ares J. Rosakis and William L. Johnson)*

- **M.S. Mechanical Engineering** 1989
  University of South Carolina, Columbia, SC
  (*Advisor: Michael A. Sutton*)

- **B.S. Mechanical Engineering, magna cum laude with honors** 1988
  University of South Carolina, Columbia, SC

## 1.b RESEARCH INTERESTS

- Polymer processing of functionally graded materials, smart materials, multifunctional materials, and nanocomposites
- Particulate material processing of functionally graded materials and nanocomposites
- Thin film processing of nanostructured functionally graded and transversely modulated materials
- Finite Element Modeling of functionally graded and multifunctional materials
- Microstructural and mechanical characterization of functionally graded materials, smart materials, multifunctional materials, nanocomposites, and biologically inspired heterogeneous structures

## 1.c FELLOWSHIPS, PRIZES, AND AWARDS

| | |
|---|---|
| Carolina Scholar at the University of South Carolina | 1984-1988 |
| Phi Beta Kappa | 1987 |
| Outstanding senior in Mechanical Engineering at the University of South Carolina | 1988 |
| Du Pont graduate fellowship in Mechanical Engineering | 1988-1989 |
| Clark fellowship in Materials Science at Caltech | 1991-1994 |
| Army Summer Faculty Research and Engineering Program Award | 1997 |
| Office of Naval Research Young Investigator Program Award | 2000 |
| Fulbright Scholar Award | 2005-2006 |
| A.J. Durelli Innovative Young Researcher Award | 2006 |
| Pi Tau Sigma Faculty Appreciation Award | 2007 |
| ASME Fellow | 2008 |
| Best paper award, ASME Mechanisms & Robotics Conference | 2010 |
| SEM Fellow | 2015 |
| NSF PROMISE Outstanding Faculty Mentor | 2015 |
| University of Maryland Distinguished Scholar-Teacher Award | 2016 |
| C.E. Taylor Award, Society for Experimental Mechanics | 2024 |

## 1.d EMPLOYMENT

- **Associate Dean for Faculty Affairs** 2018-present
  A. James Clark School of Engineering

University of Maryland, College Park, MD

- **Diversity Officer** 2018-present
  A. James Clark School of Engineering
  University of Maryland, College Park, MD

- **Associate Chair for Academic Affairs** 2012-2018
  Department of Mechanical Engineering & Reliability Engineering Program
  University of Maryland, College Park, MD

- **Director of Graduate Studies** 2010-2018
  Department of Mechanical Engineering & Reliability Engineering Program
  University of Maryland, College Park, MD

- **Professor** 2010-present
  Department of Mechanical Engineering
  Affiliate of Fischell Department of Bioengineering
  Affiliate of Applied Mathematics and Scientific Computing Program
  University of Maryland, College Park, MD

- **Associate Professor** 2004-2010
  Department of Mechanical Engineering
  University of Maryland, College Park, MD

- **Visiting Professor** 2005-2006
  Department of Solid Mechanics, Materials and Systems
  Tel Aviv University, Ramat Aviv, Israel

- **Assistant Professor** 1998-2004
  Department of Mechanical Engineering
  University of Maryland, College Park, MD

- **Research Assistant Professor** 1997-1998
  Department of Mechanical Engineering
  University of South Carolina, Columbia, SC

- **Adjunct Professor** 1995-1996
  Departments of Mechanical and Metallurgical Engineering
  University of Idaho, Moscow, ID

- **Postdoctoral Fellow** 1994-1997
  Division of Metals & Ceramics
  Idaho National Engineering Laboratories, Idaho Falls, ID

- **Graduate Fellow** 1991-1994
  Department of Materials Science
  California Institute of Technology, Pasadena, CA

- **Graduate Research Assistant** 1990-1991
  Department of Applied Mechanics
  California Institute of Technology, Pasadena, CA

- **Graduate Teaching Assistant** 1990-1993

Departments of Materials Science and Aeronautics
California Institute of Technology, Pasadena, CA

- **Graduate Research Assistant** 1988-1989
  Department of Mechanical Engineering
  University of South Carolina, Columbia, SC

- **Graduate Teaching Assistant** 1988-1989
  Department of Mechanical Engineering
  University of South Carolina, Columbia, SC

- **Mechanical Engineering Intern** 1988
  E.I. Du Pont De Nemours & Co., Inc., Chattanooga, TN

- **Undergraduate Research Assistant** 1986-1988
  Department of Mechanical Engineering
  University of South Carolina, Columbia, SC

**1.e SOCIETY MEMBERSHIPS**

Society for Experimental Mechanics
- Secretary, Composites Technical Division 2000-2002
- Vice-chair, Composites Technical Division 2002-2003
- Chair, Research Committee 2002-2009
- At large member, Executive Board 2009-present
- National Meetings Council 2009-2010
- Vice-chair, Fellows Committee 2018-present

American Society of Mechanical Engineers
- Liaison between MD/Composites and Heterogeneous Materials and AM/Materials Processing and Manufacturing Committees 2004-2009

American Association for the Advancement of Science 2013-present

**1.f EDITORSHIPS AND EDITORIAL BOARDS**

Associate Technical Editor for journal, Experimental Mechanics 2001-2010

Guest Editor, "Special Issue on Biological and Biologically Inspired Materials", for journal, Experimental Mechanics 2002

**2. RESEARCH, SCHOLARLY, AND CREATIVE ACTIVITIES**
**(In the publication listed below, an underlined name indicates a student author working under Dr. Bruck's supervision.)**

**2.a Books**

**2.a.i Books**

1. "Manufacturing in the Era of 4th Industrial Revolution, Volume I: Recent Advanced in Additive Manufacturing", Ed. **H.A. Bruck**, Y. Chen, and S. K. Gupta, World Scientific Series in Advanced Manufacturing, Hackensack, NJ, DOI: 10.1142/11898-vol1 (2021)

**2.a.ii Chapters in Books**

1. M.A. Sutton, T. L. Chae, J.L. Turner, and **H.A. Bruck**, "Development of a Computer Vision

Methodology for the Analysis of Surface Deformations in Magnified Images," MICON-90: Advances in Video Technology for Microstructural Control, Ed. George F. Vander Voot, American Society for Testing of Materials, Philadelphia, PA, 109-132 (1991)

2. **H.A. Bruck**, C.L. Moore, and H. Jin, "Modeling of Functionally Graded Shape Memory Alloy Composites and Thin Films for Smart Structures and MEMS," Advances in Elastic Vibrations and Smart Structures, Eds. A. R. Sahu, A.P. Gupta, and R.R. Bhargava, Phoenix Publishing House Pvt. Ltd., New Delhi, India, 116-126 (2001)

3. **H. A. Bruck**, A. L. Gershon, I. Golden, S. K. Gupta, L.S. Gyger, Jr., E. B. Magrab, & B. W. Spranklin, "New Educational Tools and Curriculum Enhancements for Motivating Engineering Students to Design and Realize Bio-Inspired Products", Design and Nature 2006, Wessex Institute of Technology Press, Southampton, UK, 1-10 (2006)

4. **H.A. Bruck**, "Implantable Biomedical Devices & Biologically Inspired Materials and Systems", Handbook on Experimental Mechanics, Ed. William N. Sharpe, Jr., Springer, New York, NY (2008)

5. S. Sun, N. Sergeev, J. Francis, Y. Kostov, M.Yang, **H. A. Bruck**, K. E. Herold and A. Rasooly, "Laminated Object Manufacturing (LOM) Technology Based Multi-Channel Lab-on-a-Chip for Enzymatic and Chemical Analysis", Lab-on-a-Chip Technology: Fabrication and Microfluidics, Ed. By Keith Herold and Avraham Rasooly, Horizon Scientific Press, Norwich, UK (2009).

6. A. L. Gershon, L. S. Gyger, Jr., **H. A. Bruck**, and S. K. Gupta, "In Situ Characterization of Residual Strains near Electronic Components Embedded in Thermoplastic Polymers during Processing and Operation", Advances in Mathematical Modeling and Experimental Methods for Materials and Structures. The Jacob Aboudi Volume, Eds. Leslie Banks-Sills and Rivka Gilat, Springer 145-160 (2010).

7. **H.A. Bruck,** F. M. Gallant, S. E. Prickett, and G. S. Young, "Functionally Graded Energetic Materials: Simulation-based Materials by Design", Simulation-based Innovation and Discovery. Energetics Applications, CALCE EPSC Press, College Park, MD, 1-23 (2011).

8. R. Rasooly, **H.A. Bruck**, J. Balsam, and A. Rasooly, "Portable Optical Detectors for Point-of-Care Diagnostics", Portable Biosensors and Point-of-Care Systems, Ed. S. E. Kintzios, DOI: 10.1049/PBHE003E (2017).

**2.a.iv Special Book Contributions**

1. "Design Analysis of Structural Elements", J.W. Dally (author), H. A. Bruck and W. L. Fourney (consultants), College House Enterprises, LLC, Knoxville, TN (1999)

Bruck's consultant activities: Edited entire contents of book, revised a portion of the book contents, created some new figures for illustrating concepts, worked with author on adding new chapter to book for integrating Statics and Strength of Materials concepts, and added new section at the end of each chapter for emphasizing material relevant to design.

**2.b Articles in Refereed Journals (Google Scholar Citations=9785, h-index=42, i10=128, i100=17, i1000=2)**

**2.b.i Published/Accepted**

1. **H.A. Bruck**, S.R. McNeill, M.A. Sutton, and W.H. Peters, III, "Digital Image Correlation Using Newton-Raphson Method of Partial Differential Correction," Experimental Mechanics, 29, 261-267 (1989)

2. M.A. Sutton, J.L. Turner, **H.A. Bruck**, and T.L. Chae, "Full-field Representation of Discretely Sampled Surface Deformation for Displacement and Strain Analysis," Experimental Mechanics, 31, 168-177 (1991)

3. M.A. Sutton, J.L. Turner, Y.J. Chao, **H.A. Bruck,** and T.L. Chae, "Experimental Investigations of Three-dimensional Effects Near a Crack Tip Using Computer Vision," International Journal of Fracture, 53, 201-228 (1992)

4. **H.A. Bruck** and A.J. Rosakis, "On the Sensitivity of Coherent Gradient Sensing: Part I; A Theoretical Investigation of Accuracy in Fracture Mechanics Applications," Optics and Lasers in Engineering, 17, 83-101 (1992)

5. **H.A. Bruck** and A.J. Rosakis, "On the Sensitivity of Coherent Gradient Sensing: Part II; An Experimental Investigation of Accuracy in Fracture Mechanics Applications," Optics and Lasers in Engineering, 18, 25-51 (1993)

6. **H.A. Bruck**, T. Christman, A.J. Rosakis, and W.L. Johnson, "Quasi-static Constitutive Behavior of Zr41.25Ti13.75Ni10Cu12.5Be22.5 Bulk Amorphous Alloys," Scripta Metallurgica et Materialia, 30, 429-434 (1994)

7. **H.A. Bruck**, A.J. Rosakis, and W.L. Johnson, "The Dynamic Compressive Behavior of Beryllium Bearing Bulk Metallic Glasses," Journal of Materials Research, 11, 503-511 (1996)

8. **H.A. Bruck**, "The Effects of Motion on Fringe Data Analysis for Dynamic Moire Interferometry," Optics and Lasers in Engineering, 27, 343-354 (1997)

9. B.H. Rabin, R.L. Williamson, **H.A. Bruck**, X.-L. Wang, T.R. Watkins, and D.R. Clarke, "Residual Strains in an $Al_2O_3$-Ni Joint Bonded with a Composite Interlayer: Experimental Measurements and FEM Analysis," Journal of the American Ceramic Society, 81, 1541-1549 (1998)

10. **H.A. Bruck** and B.H. Rabin, "Evaluating Microstructural and Damage Effects in Rule-of-Mixtures Predictions of the Mechanical Properties of Ni-$Al_2O_3$ Composites", Journal of Materials Science, 34, 2241-2251 (1999)

11. **H.A. Bruck** and B.H. Rabin, "An Evaluation of Rule-of-Mixtures Predictions of Thermal Expansion in Powder Processed Ni-$Al_2O_3$ Composites," Journal of the American Ceramic Society, 82, 2927-2930 (1999)

12. **H.A. Bruck**, "A One-dimensional Model for Designing Functionally Graded Materials to Attenuate Stress Waves," International Journal of Solids and Structures, 37, 6383-6395 (2000)

13. **H.A. Bruck**, D. Casem, J.S. Epstein, and R.L. Williamson, "Short Duration Stress Pulse Propagation in Unidirectional and Laminated Carbon-fiber/Epoxy Composites," Experimental Mechanics, 42, 279-287 (2002)

14. **H.A. Bruck** and A.L. Gershon, "Three-dimensional Effects Near the Interface in a Functionally Graded Ni-$Al_2O_3$ Plate Specimen," International Journal of Solids and Structures, 39, 547-557 (2002)

15. C.L. Moore and **H.A. Bruck**, "A Fundamental Investigation into Large Strain Recovery of One-way Shape Memory Alloy Wires Embedded in Flexible Polyurethanes," Smart Materials and Structures, 11, 130-139 (2002)

16. Review Article: **H.A. Bruck**, J.J. Evans, and M. Peterson, "The Role of Mechanics in Biological and Biologically Inspired Materials," Experimental Mechanics, 42, 361-371 (2002)

17. **H.A. Bruck**, C.L. Moore, and T. Valentine, "Repeatable Bending Actuation in Polyurethanes Using Opposing Embedded One-way Shape Memory Alloy Wires Exhibiting Large Strain Recovery," Smart Materials and Structures, 11, 509-518 (2002)

18. H. Surendranath, **H.A. Bruck**, and S. Gowrisankaran, "Enhancing the Optimizations of Material Distributions in Composite Structures Using Genetic Algorithms," International Journal of Solids and Structures, 40, 2999-3020 (2003)

19. **H.A. Bruck**, C.L. Moore, and T. Valentine, "Characterization and Modeling of Bending Actuation in Polyurethanes with Graded Distributions of One-way Shape Memory Alloy Wires," Experimental Mechanics, 44, 62-70 (2004)

20. **H.A. Bruck,** G. Fowler, S.K. Gupta, and T.M. Valentine, "Using Geometric Complexity to Enhance the Interfacial Strength of Heterogeneous Structures Fabricated in a Multi-stage, Multi-piece Molding Process," Experimental Mechanics, 44, 261-271 (2004)

21. F.M. Gallant, **H.A. Bruck** and A. Kota, "Fabrication of Particle-reinforced Polymers with Continuous Gradient Architectures Using Twin Screw Extrusion Processing", Journal of Composite Materials, 38, 1873-1893 (2004)

22. H.Jin and **H.A. Bruck**, "Pointwise Digital Image Correlation using Genetic Algorithms", Experimental Techniques, 29, 36-39 (2005)

23. H.Jin and **H.A. Bruck,** "Theoretical Development for Pointwise Digital Image Correlation", Optical Engineering, 44, 06700301-06700314 (2005)

24. H. Jin and **H.A. Bruck**, "A New Method for Characterizing Nonlinearity in Scanning Probe Microscopes Using Digital Image Correlation", Nanotechnology, 16, 1849-1855 (2005).

25. F.M. Gallant, **H.A. Bruck,** S.E. Prickett, and M. Cesarec, "Graded Polymer Composites using Twin Screw Extrusion: A Combinatorial Approach to Developing New Energetic Materials", Composites Part A: Applied Science and Manufacturing, 37, 957-969 (2006).

26. R.M. Gouker, S.K. Gupta, **H.A. Bruck**, and T. Holzchuh, "Manufacturing of Multi-Material Compliant Mechanisms Using Multi-Material Molding", International Journal of Advanced Manufacturing Technology, 30, 1049-1075 (2006).

27. M.L. Pines and **H.A. Bruck**, "Pressureless Sintering of Particle-reinforced Metal-Ceramic Composites for Functionally Graded Materials: Part II. Sintering Model", Acta Materialia,

54, 1457-1465 (2006).

28. M.L. Pines and **H.A. Bruck,** "Pressureless Sintering of Particle-reinforced Metal-Ceramic Composites for Functionally Graded Materials: Part I. Porosity Reduction Models", Acta Materialia, 54, 1467-1474 (2006).

29. Y.M. Shabana, M.L. Pines, and **H.A. Bruck**, "Modeling the Evolution of Stress Due to Differential Shrinkage in Powder-Processed Functionally Graded Metal-Ceramic Composites During Pressureless Sintering", International Journal of Solids and Structures, 43, 7852-7868 (2006).

30. F.M. Gallant, S.E. Prickett, and **H.A. Bruck,** "Effects of Twin Screw Extrusion Processing on the Burning Rate of Composite Propellants", Propellants, Explosives, and Pyrotechnics, 31, 456-465 (2006).

31. J.P. Luman, B. Wehrman, K.K. Kuo, R.A. Yetter, N.M. Masoud, T. G. Manning, L.E. Harris, and **H.A. Bruck**, "Development and Characterization of High Performance Solid Propellants Containing Nano-sized Energetic Ingredients", Proceedings of the Combustion Institute, 31, 2089-2096 (2007).

32. L.S. Gyger, Jr., P. Kulkarni, **H.A. Bruck**, S.K. Gupta , and O. C. Wilson, Jr., "Replamineform Inspired Bone Structures (RIBS) Using Multi-piece Molds and Advanced Ceramic Gelcasting Technology", Materials Science and Engineering C: Biomimetic and Supremolecular Systems, 27, 646-653 (2007).

33. Y.M. Shabana, M.L. Pines, **H.A. Bruck**, B. Xu, and J.P. Laskis, "Evolution of Elastic Mechanical Properties During Pressureless Sintering of Powder-Processed Metals and Ceramics", Journal of Materials Science, 42, 7708-7715 (2007).

34. **H. A. Bruck**, A. L. Gershon, I. Golden, S. K. Gupta, L. S. Gyger, Jr., E. B. Magrab, and B. W. Spranklin, "Training Mechanical Engineering Students to Utilize Biological Inspiration during Product Development", Bioinspiration and Biomimetics, 2, S198-S209 (2007).

35. A, Kota, B, H. Cipriano, M. Duesterberg, D, Powell, D. I. Bigio, S, R. Raghavan, and **H. A. Bruck**, "Electrical and Rheological Percolation in Polystyrene/MWCNT composites", Macromolecules, 40, 7400-7406 (2007).

36. **H. A. Bruck,** R. Gilat, J. Aboudi, and A. L. Gershon, "A New Approach for Optimizing the Mechanical Behavior of Porous Microstructures for Porous Materials by Design", Modelling and Simulation in Materials Science & Engineering, 15, 653- 674 (2007).

37. F. M. Gallant, S. E. Prickett, M. Cesarec, and **H.A. Bruck**, "Ingredient and Processing Effects on the Burning Rates of Composite Rocket Propellants Utilizing a Reduced-Run Mixture-Process Experiment Design", Chemometric and Intelligent Laboratory Systems , 90, 49-63 (2007).

38. A, Kota, B, H. Cipriano, M. Duesterberg, D, Powell, S, R. Raghavan, and **H. A. Bruck,** "Quantitative Characterization of the Formation of an Interpenetrating Phase Composite in Polystyrene from the Percolation of Multiwalled Carbon Nanotubes", Nanotechnology, 18, 505705 (2007).

39. R. Kavetsky, D. Anand, J. Goldwasser, **H. Bruck**, R. M. Doherty, and R.W. Armstrong, "Energetic Systems and Technology - A Look Ahead", International Journal of Energetic Materials and Chemistry, 6, 39-48 (2007).

40. D. P. Cole **H.A. Bruck**, and A.L. Roytburd, "Nanoindentation Studies of Graded Shape Memory Alloy Thin Films Processed Using Diffusion Modification", Journal of Applied Physics, 103, 064315 (2008).

41. A. K. Kota, R. Kerzner, D. I. Bigio, **H. A. Bruck**, and D. Powell, "Characterization of Processing Effects in HIPS-CNF composites using Thermogravimetric Analysis", Polymer Engineering and Science, 48, 1120-1125 (2008).

42. A.L. Gershon, L.S. .Gyger, Jr., **H. A. Bruck** and S.K. Gupta, "Thermoplastic Polymer Shrinkage in Emerging Molding Processes", Experimental Mechanics, 48, 789-798 (2008).

43. A.Kota, L.Murphy, T. Strohmer, D.I. Bigio, **H.A. Bruck**, and D. Powell, "Combinatorial Development of Polymer Nanocomposites using Transient Processing Conditions in Twin Screw Extrusion", AICHE Journal, 54, 1895-1900 (2008).

44. J. Kruft, Y. Shabana, and **H.A. Bruck**, "Effect of TiO2 Nanopowder on the Sintering Behavior of Nickel-Alumina Composites for Functionally Graded Materials", Journal of the American Ceramic Society, 91, 2870-2877 (2008).

45. B. H. Cipriano A. K. Kota A. L. Gershon, C. J. Laskowski T. Kashiwagi **H. A. Bruck** S. R. Raghavan,"Conductivity Enhancement of Carbon Nanotube and Nanofiber-based Polymer Nanocomposites by Melt Annealing", Polymer, 22, 4846- 4851 (2008).

46. M. Yang, Y. Kostov, **H.A. Bruck**, and A. Rasooly, "Carbon Nanotubes with Enhanced Chemiluminescence (CNT-ECL) Immunoassay for CCD-based Detection of Staphylococcal Enterotoxin B (SEB) in Food", Analytical Chemistry, 80, 8532- 8537 (2008)

47. Y.Q. Wang, M.A. Sutton, **H.A. Bruck,** and H.W. Schreier, "Quantitative Error Assessment in Pattern Matching: Effects of Intensity Pattern Noise, Interpolation, Subset Size and Image Contrast on Motion Measurements", Strain, 45, 160-178 (2009).

48. A. Ananthanarayanan, S.K. Gupta, and **H.A. Bruck**, "Characterization and Control of Plastic Deformation in Mesoscale Premolded Components to Realize In-mold Assembled Mesoscale Revolute Joints", Polymer Engineering and Science, 49, 293- 304 (2009).

49. D.P. Cole, H. Jin, W.-Y. Lu, **H.A. Bruck,** and A.L. Roytburd, "Reversible Nanoscale Deformation in Compositionally Graded Shape Memory Alloy Films", Applied Physics Letters, 94, 193114 (2009).

50. D.P. Cole, **H.A. Bruck**, and A.L. Roytburd, "Nanomechanical Characterization of Graded NiTi films Fabricated though Diffusion Modification", Strain, 45, 2332-237 (2009).

51. M. Yang, D. Kostov, **H.A. Bruck**, and A. Rasooly, "Gold Nanoparticle-based Enhanced Chemiluminescence Immunosensor for Detection of Staphylococcal Enterotoxin B (SEB) in Food", International Journal of Food Microbiology , 133, 265-271 (2009).

52. A.L. Gershon, A.K. Kota, and **H.A. Bruck**, "Characterization of Quasi-static Mechanical

Properties of Polymer Nanocomposites using a New Combinatorial Approach", Journal of Composite Materials, 43, 2587-2598 (2009).

53. W. Bejgerowski, S. K. Gupta, and **H.A. Bruck**, "A Systematic Approach to Designing Multi-functional Thermally Conducting Polymer Structures with Embedded Actuators", Journal of Mechanical Design, 131, DOI: 10.1115/1.4000239 (2009)

54. L. Banks-Sills, J. Shklovsky, S. Krylov, **H.A. Bruck**, V. Fourman, R. Eliasi, and D. Ashkenazi, "A Methodology for Accurately Measuring Mechanical Properties at the Micro-scale", Strain, DOI 10.1111/j.1475-1305.2009.00692.x. (2010).

55. A. L. Gershon, **H.A. Bruck**, A.R. Hopkins, and K.N. Segal, "Curing Effects of Single-Wall Carbon NanoTube Reinforcement on Mechanical Properties of Filled Epoxy Adhesives", Composites Part A: Applied Science and Manufacturing, 41, 729-743 (2010).

56. A.L. Gershon, **H.A. Bruck,** M.A. Sutton, S. Xu, and V. Tiwari, "Multiscale Mechanical and Structural Characterization of Palmetto Wood for Bio-inspired Hierarchically Structured Polymer Composites", Materials Science and Engineering C: Materials for Biological Systems, 30, 235-244 (2010).

57. M. Yang, **H.A. Bruck**, D. Kostov, and A. Rasooly, "Biological Semiconductor Based on Electrical Percolation", Analytical Chemistry 82, 3567-3572 (2010).

58. M.Yang, S. Sun, **H.A. Bruck**, A. Rasooly, and Y. Kostov, "Electrical percolation-based biosensor for real-time direct detection of Staphylococcal enterotoxin B (SEB)", Biosensors and Bioelectronics 25, 2573-2578 (2010).

59. D. Mueller, **H.A. Bruck** and S.K. Gupta, "Measurement of Thrust and Lift Forces Associated with Drag of Compliant Flapping Wing for Micro Air Vehicles Using a New Test Stand Design", Experimental Mechanics, 50, 725-735 (2010).

60. A. Ananthanarayanan, S.K. Gupta, and **H.A. Bruck**, "Characterization of a Reverse Molding Sequence at the Mesoscale for In-mold Assembly of Revolute Joints", Polymer Engineering and Science, 50, 1843-1852 (2010).

61. M. Yang, S.Sun, **H.A. Bruck**, D. Kostov, and A. Rasooly, "Lab-on-a-chip for Label Free Biological Semiconductor Assay of Staphylococcal Enterotoxin B", Lab on a Chip, 10, 2534-2540 (2010).

62. A. Ananthanarayanan, S.K. Gupta, and **H.A. Bruck**, "Modeling and Characterization to Minimize Effects of Melt Flow Fronts on Premolded Component Deformation during In-Mold Assembly of Mesoscale Revolute Joints", Journal of Manufacturing Science and Engineering-Transactions of the ASME, 132, 041006 (2010).

63. A.L.Gershon, D.P.Cole, A.K.Kota, and **H.A. Bruck**, "Nanomechanical Characterization of Dispersion and its Effects in Nano-Enhanced Polymers and Polymer Composites", Journal of Materials Science, 45, 6353-6364 (2010).

64. J.Balsam, M. Ossandon, **H.A. Bruck,** and A. Rasooly, "Lensless CCD-based Fluorometer using a Micromachined Optical Söller Collimator", Lab on a Chip, 11, 941-949 (2011).

65. S. Haldar, **H. A. Bruck**, N. Gheewala, K. J. Grande-Allen, and M.A. Sutton, "Multi-scale Mechanical Characterization of Palmetto Wood using Digital Image Correlation to Develop a Template for Biologically-inspired Polymer Composites", Experimental Mechanics, 51, 575-589 (2011).

66. H. Jin, S.Haldar, W. Lu, and **H.A. Bruck**, "Grid Method for Microscale Discontinuous Deformation Measurement", Experimental Mechanics, 51, 565-574 (2011).

67. L. Banks-Sills, Y. Hikri, S. Krylov, V. Fourman, Y. Gerson, and **H.A. Bruck**, "Measurement of Poisson's Ratio by Means of a Direct Tension Test on Micron-sized Specimens", Sensors and Actuators A: Physical , 169, 98-114 (2011).

68. H. Jin, W.-Y. Lu, S. Haldar, and **H.A. Bruck**, "Microscale Characterization of Granular Deformation near a Crack Tip", Journal of Materials Science, 46, 6596-6602 (2011).

69. W. Bejgerowski, J.W. Gerdes, S.K. Gupta, and H.A. Bruck, "Design and Fabrication of Miniature Compliant Hinges for Multi-material Compliant Mechanisms", International Journal of Advanced Manufacturing Technology, 57, 437-452 (2011)

70. A.L. Roytburd, J. Ouyang, B. Boyerinas, and **H.A. Bruck,** "Stability of Heterophase Nanostructure and Field Induced Response of Epitaxial Ferroelectric Films", Applied Physics Letters, 99, 172902 (2011).

71. J. Balsam, Y. Kostov, **H.A. Bruck**, and A. Rasooly, Image stacking approach to increase sensitivity of fluorescein detection using a low cost complementary metal-oxide-semiconductor (CMOS) webcam", Sensors and Actuators B: Chemical , 10.1016/j.snb.2012.02.003, 141-147 (2012)

72. J. Balsam, M. Ossandon, **H.A. Bruck,** and A. Rasooly, "Modeling and Design of Micromachined Optical Söller Collimators for Lensless CCD-based Fluorometry", Analyst, 137, 5011-5017 (2012).

73. S. Haldar and **H.A. Bruck**, "Characterization of Dynamic Damage Mechanisms in Palmetto Wood as Biological Inspiration for Impact Resistant Polymer Composites", Mechanics of Materials, 57, 97-108 (2013).

74. J. Balsam, M. Ossandon, **H.A. Bruck,** I. Lubensky, and A. Rasooly, "Low cost technologies for medical diagnostics in low-resource settings", Expert Opinions on Medical Diagnostics , 10.1517/17530059.2013.767796, 1-13 (2013).

75. D. Shahmirzadi, **H.A. Bruck**, and A. Hsieh, "Measurement of Mechanical Properties of Soft Tissues In Vitro under Controlled Tissue Hydration", Experimental Mechanics, 53, 405-414 (2013).

76. D. Shahmirzadi, A. Hsieh, and **H.A. Bruck**, "Quantifying the Interfibrillar Spacing and Fibrillar Orientation of Aortic Extracellular Matrix using Histology Image Processing: Towards Multiscale Modeling", IEEE Transactions on Biomedical Engineering, 60, 1171-1180 (2013).

77. J. Gerdes, K.C. Cellon, **H.A. Bruck** and S.K. Gupta, "Characterization of the Mechanics of Compliant Wing Designs for Flapping Wing Miniature Air Vehicles", Experimental Mechanics , DOI:10.1007/s11340-013-9779-5, 1-11 (2013).

78. B.M. Boyerinas, J. Balsam, **H.A. Bruck**, and A.L. Roytburd. ""Effect of Oxygen Environment on Formation of Modulated Ag Nanostructures along the Interface of a Ag-Si Heterostructure", Journal of Applied Physics, 113, 184302 (2013).

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127. S.F. Karimian, **H.A. Bruck**, and M. Modarres, "A new method for detecting fatigue crack initiation in aluminum alloy using acoustic emission waveform information entropy", Engineering Fracture Mechanics, 223, 106771(2019)

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132. L.D. Johnson, D. Paley, and **H.A. Bruck**, "Modeling the Flight Dynamics and Battery Utilization of a Hybrid Flapping-Gliding UAV", Journal of Guidance, Control, and Dynamics, 44, 2276-2283 (2021)

133. D. Edelen and **H.A. Bruck**, "Predicting Failure Modes of 3D-Printed Multi-Material Polymer Sandwich Structures from Process Parameters", accepted for publication in International Journal of Sandwich Structures, DOI: 10.1177/10996362211020445, 1-27 (2021).

134. P. Lara and **H.A. Bruck**, "Experimental Investigation of High Frequency Pulse Loading on Fatigue Crack Growth in 5052-H32 Series Aluminum", International Journal of Fatigue, 153, 106476 (2021).

135. J. Armen and **H.A. Bruck**, "Development of Magnetohydrodynamic Avionics Cooling Using Complex Structures Realized Through Additive Manufacturing", accepted for publication in Journal of Thermophysics and Heat Transfer, DOI: 10.2514/1.T6211, 35, 800-813 (2021).

136. L.S.Santos and **H.A. Bruck**, "New Method for Fatigue Characterization vis Cyclical Instrumented Indentation Testing", Experimental Techniques, 1-10 (2022)

137. **H.A. Bruck** and S.K. Gupta, "A Retrospective of Project Robo Raven: Developing New Capabilities for Enhancing the Performance of Flapping Wing Aerial Vehicles", to appear in *Biomimetics* (2023).

**2.b.ii To appear**

**2.b.iv Editorials**

1. **H.A. Bruck,** "Guest Editorial: Biological and Biologically Inspired Materials", Experimental Mechanics, 42, 359-360 (2002).

## 2.e. Talks, Abstracts, and Other Professional Papers Presented

### 2.e.1.a Invited Talks

#### 2.e.1.a.1 Conferences and Workshop Presentations

1. "Residual Stresses in Functionally Graded Materials," *DOE Discussion Meeting on Neutron Residual Stress Analysis*, Sante Fe, NM, 10/96

2. "Magnetic Flyer Plate Shock Wave Experiments in AS4/3501-6 Composites," *1997 SEM Spring Conference & Exhibit*, Bellevue, WA, 6/97

3. "Modeling of Functionally Graded Shape Memory Alloy Composites and Thin Films for Smart Structures and MEMS," *Indo-US Workshop on Problems in Elastic Vibrations, Smart Structures, and Their Solutions Technology*, Roorkee, India, 1/01

4. "Multiscale Deformation Measurements for Functionally Graded Materials," *Virtual Community Workshop on Displacement Measurement Methods*, Wright Patterson Air Force Base, Dayton, OH, 1/01

5. "Point of Care Detection of Staphylococcal Enterotoxins", *nanoKAP 2008: Utilizing Nanotechnology for Detection of Toxins and Pathogens*, Phoenix, AZ, 11/08

6. "Multiscale Characterizqtion of the Mechanics of Heterogeneous Structures Using DIC", *2009 SEM Fall Symposium and Workshop*, Columbia, SC, 10/09

7. Keynote: "Integrating Nanoscale Fillers into Polymers and Composites: Nano-enhanced Materials", *14th Israeli Materials Engineering Conference*, Tel Aviv, Israel, 12/09

8. "Functionally Graded Energetic Materials: Materials by Desing", *Energetics Workshop – Past and Present*, Hong Kong, 12/10

9. "Combinatorial Processing and Curing of Thermoplastic and Thermoset Polymers Nano-enhanced with CNTS", *Polymer Nanocomposites 2011*, Lehigh University, Bethlehem,PA, 3/11

10. "Power and Energy Issues for Morphing Wings", *ICCM20*, Copenhagen, Denmark, 7/15

11. "Multiscale DIC Characterization of the Mechanics of Composite Sandwich Structures with Fiber-reinforced Foam Cores", *International Digital Image Correlation Society 2015 Meeting*, Columbia, SC, 11/15

12. "Multiscale Mechanics of Natural Materials: A Source of Inspiration for Composites", *Mechanics of Materials across Nano to Geological Time and Length Scales*, Brown University, 9/16

13. "Materials Characterization and Modeling for Powder-based Additive Manufacturing Processes", *2nd ICME Government Working Group Meeting,* NAVAIR, Pax River, MD, 11/16

14. Distinguished Lecture: "Bioinspired Engineering: From Icarus to Robo Raven", University of Maryland, 12/16

15. Plenary: "Flexible Energy Harvesting/Storage Structures for Flapping Wing Air Vehicles", *Society for Experimrental Mechanics 2017 Annual Meeting,* Indianapolis, IN, 6/17

**2.e.1.a.2 University and Government Lab Seminars**

1. "Dynamic Constitutive Behavior of Beryllium Bearing Bulk Metallic Glasses," Idaho National Engineering Labs, Idaho Falls, ID, 4/94

2. "Mechanical and Thermal Characterization of MMCs and CMCs for FGMs," Department of Mechanical Engineering, University of South Carolina, Columbia, SC, 1/96

3. "Optical Techniques for Measuring Mechanical Phenomena: Coherent Gradient Sensing and Dynamic Moire Interferometry," Department of Mechanical Engineering, Clemson University, Clemson, SC, 4/96

4. "Techniques for Analyzing Dynamic Mechanical Behavior in Bulk Metallic Glasses and CFE Composites," Weapons Technology Directorate-Target Interaction Branch, Armor Concepts Section, Army Research Laboratory, Aberdeen Proving Grounds, MD, 4/96

5. "Modeling Residual Stresses and Wave Propagation Phenomena in Layered Media," Department of Mechanical Engineering, University of Utah, 5/96

6. "Modeling Thermal Residual Stresses and Fracture in Functionally Graded Materials (FGMs)," Department of Mechanical Engineering, Oregon State University, Corvallis, OR, 12/96

7. "Functionally Graded Materials for Armor Applications," given at Weapons and Materials Research Directorate, Materials Division, Army Research Laboratory, Aberdeen Proving Grounds, MD, 12/97

8. "Functionally Graded Materials: Designing Interfaces for the Future," University of Maryland, College Park, MD, 5/98

9. "Design and Fabrication of Functionally Graded Materials," Naval Surface Warfare Center at Indian Head, Indian Head, MD, 6/99

10. "Design and Fabrication of Functionally Graded Materials," Department of Materials Science and Engineering, Johns Hopkins University, Baltimore, MD, 9/00

11. "Design and Fabrication of Functionally Graded Materials," University of Maryland-Baltimore County, Baltimore, MD, 10/01

12. "Design and Fabrication of Functionally Graded Composite Energetic Materials," Propulsion Directorate, Edwards AFB, Edwards, CA, 3/02

13. "Design and Fabrication of Functionally Graded Materials," Munitions Directorate, Eglin Air Force Base, Eglin, FL, 3/02

14. "Design and Fabrication of Functionally Graded Materials and Nanocomposites for Aerospace Applications", Advanced Materials and Processing Branch, NASA-Langley, Hampton, VA, 7/03

15. "Nanocomposite and Functionally Graded Materials: Materials by Design", Department of Solid Mechanics, Structures, and Materials, Tel Aviv University, Ramat Aviv, Israel, 12/05

17. "Nanocomposite and Functionally Graded Materials: Materials by Design", Department of Mechanical Engineering, Technion-Israel Institute of Technology, Haifa, Israel, 2/06

18. "Nanocomposite and Functionally Graded Materials: Materials by Design", Department of Materials Engineering, Technion-Israel Institute of Technology, Haifa, Israel, 5/06

19. "Combinatorial Development of Polymer Nanocomposites using Transient Processing in Twin Screw Extrusion", Du Pont, Wilmington, DE, 2/08

20. "Processing-Stucture-Property Relationships in Polymer Nanocomposites for Multifunctional Structures", NASA-Goddard, Greenbelt, MD, 3/08

21. "Subscale modeling for ballistic response of geometrically complex structures:experimentally-derived scaling laws", ARL, Adelphi, MD, 11/08

22. "Integrating Nano-scale Fillers into Polymers and Composites: Nano-enhanced Materials", NASA-Goddard, Beltsville, MD, 3/11

23. "Integrating Nano-scale Fillers into Polymers and Composites: Nano-enhanced Materials", APL, Laurel, MD, 5/11

24. "Multiscale Characterization of the Mechanics of Heterogeneous Structures using DIC", Army-Navy TIM meeting, Irvine, CA, 7/12

25. "Low Cost Point of Care Technologies for Global Health", Cancer Detection, Diagnostics, and Treatment Technologies for Global Health, Bethesda, MD, 1/14

26. "Digital Image Correlation: Application and Principles", NAWCAD, Patuxent River, MD, 11/15

**2.e.1.b Conference Presentations**

1. **H.A. Bruck**, M.A. Sutton, and S.R. McNeill, "Digital Image Correlation using Bicubic Splines and the Newton-Raphson Method," *1987 Southeastern Graduate Student Conference*, Gainesville, FL, 3/87

2. **H.A. Bruck**, M.A. Sutton, S.R. McNeill, and T. Chae, "Evaluation of the J-integral Near a Crack Tip Using Digital Image Correlation," *1988 Southeastern Graduate Student Conference*, Atlanta, GA, 3/88

3. **H.A. Bruck**, S.R McNeill, S.S. Russell, and M.A. Sutton, "Use of Digital Image Correlation for Determination of Displacements and Strains," *Nondestructive Testing of Aerospace Requirements*, Huntsville, AL, 5/88

4. **H.A. Bruck**, A.J. Rosakis, and W.L. Johnson, "Dynamic Constitutive Behavior of Beryllium Bearing Bulk Metallic Glasses," *Society of Engineering Science 31st Annual Technical Meeting*, College Station, TX, 10/94

5. **H.A. Bruck**, J.S. Epstein, K.E. Perry, Jr., and M.G. Abdallah, "Dynamic Characterization of Short Duration Stress Pulses Generated by a Magnetic Flyer Plate in Carbon-fiber/Epoxy Laminates," *1995 SEM Spring Conference and Exhibit*, Grand Rapids, MI, 6/95

6. **H.A. Bruck**, B.H. Rabin, and R.L. Williamson, "Mechanical and Thermal Behavior of Metal Matrix and Ceramic Matrix Composites for FGMs," given at the *Second International Conference on Composites Engineering, ICCE/2*, New Orleans, LA, 8/95

7. B. H. Rabin, **H.A. Bruck**, and R. L. Williamson, "Characterization of Al2O3-Ni Composites for Use as FGM Interlayers," given at *1996 Conference & Exposition on Composites, Advanced Ceramics, Materials and Structures*, Cocoa Beach, FL, 1/96

8. **H.A. Bruck** and J.S. Epstein, "Short Pulse Impact in Graphite Epoxy Composites," *VII International Congress on Experimental Mechanics*, Nashville, TN, 6/96

9. **H.A. Bruck**, B.J. Buescher, Jr., J.S. Epstein, V.A. Deason, and K.L. Ricks, "Dynamic Moire Interferometry," *22nd International Congress on High-Speed Photography and Photonics*, Sante Fe, NM, 10/96

10. **H.A. Bruck**, B.H. Rabin, and I. Reimanis, "Basic Fracture Studies in Functionally Graded Materials," *ASME Winter Annual Meeting*, Atlanta, GA, 11/96

11. **H.A. Bruck**, B.H. Rabin, R.L. Williamson, and X.-L. Wang, "Thermally Induced Residual Stresses in Functionally Graded Nickel-Alumina Joints," *1997 SEM Spring Conference & Exhibit*, Bellevue, WA, 6/97

12. **H.A. Bruck**, H.W. Schreier, M.A. Sutton, Y.J. Chao, X. Deng, and M. Davoud, "Distortion in GMAW of Thin Plates: Temperature and 3-D Deformation Measurements Using High-Speed Thermal Imaging and Stereoscopic Video Imaging," *Trends in Welding '98*, Pine Mountain, GA, 6/98

13. **H.A. Bruck**, "One-Dimensional Model for Designing Functionally Graded Interfaces to Manage Stress Waves," *1998 International Mechanical Engineering Congress & Exposition*, Anaheim, CA, 11/98

14. **H.A. Bruck** and C.L. Moore, "Mechanical Characterization of SMAs and SMA Composites for Designing Actuation Devices," *1999 Summer ASME Mechanics and Materials Conference*, Blacksburg, VA, 6/99

15. **H.A. Bruck** and C.L. Moore, "Mechanical Characterization of SMA Composite for Designing Smart Structures," *Fourth ARO Workshop on Smart Structures*, State College, PA, 8/99

16. **H.A. Bruck** and C.L. Moore, "Mechanical Characterization of Shape Memory Alloy Composites for Designing Smart Structures," *ASME International Mechanical Engineering Congress and Exposition*, Nashville, TN, 11/99

17. C.R. Owens, W.E. Owens, and **H.A. Bruck**, "Reflexive Material Technology: Biologically Optimized Porous Materials," *SAMPE 2000*, Orlando, FL, 5/00

18. **H.A. Bruck** and C.L. Moore, "Mechanical Characterization of Shape Memory Alloy Composites for Designing Smart Structures," *SEM IX International Congress*, Orlando, FL, 6/00

19. **H.A. Bruck** and C.R. Owens, "Reflexive Material Technology: Biologically Optimized Porous Materials," *SEM IX International Congress*, Orlando, FL, 6/00

20. **H.A. Bruck**, C.L. Moore, and T.L. Valentine, "Mechanical Characterization and Modeling of Functionally Graded Adaptive Structures for Shape Control," *The 37th Annual Technical Meeting of the Society of Engineering Science*, Columbia, SC, 10/00

21. M. Kumar, S.K. Gupta, **H.A. Bruck**, C.L. Moore, and J. Mantich, "Multimaterial Compliant Mechanisms with Improved Fracture Characteristics," *The 37th Annual Technical Meeting of the Society of Engineering Science*, Columbia, SC, 10/00

22. **H.A. Bruck** and H. Surendranath, "Optimization of Functionally Graded Nickel-Alumina Composites," *The 37th Annual Technical Meeting of the Society of Engineering Science*, Columbia, SC, 10/00

23. **H.A. Bruck** and C.L. Moore, "Mechanical Characterization and Design of Shape Memory Alloy Composites for Functionally Graded Adaptive Structures", *ASME International Mechanical Engineering Congress and Exposition*, Orlando, FL, 11/00

24. **H.A. Bruck** and H. Jin, "Characterization and Modeling of Shape Memory NiTi Thin Films for Functionally Graded MEMS," *ASME International Mechanical Engineering Congress and Exposition*, Orlando, FL, 11/00

25. **H.A. Bruck** and H. Jin, "Thermomechanical Modeling of Functionally Graded SMA Thin Films," *2001 SEM Annual Conference & Exposition on Experimental and Applied Mechanics*, Portland, OR, 6/01

26. **H.A. Bruck** and H. Surendranath, "Biologically Inspired Optimization of Functionally Graded Nickel-Alumina Composites," *2001 SEM Annual Conference & Exposition on Experimental and Applied Mechanics*, Portland, OR, 6/01

27. **H.A. Bruck**, C.L. Moore, and T. Valentine, "Thermomechanical Modeling and Characterization of Functionally Graded Smart Structures," *2001 SEM Annual Conference & Exposition on Experimental and Applied Mechanics*, Portland, OR, 6/01

28. **H. A. Bruck**, "Damage and Fracture in Metal-Ceramic Composites for Functionally Graded Materials," *2002 SEM Annual Conference & Exposition*, Milwaukee, WI, 6/02

29. G. Fowler, S.K. Gupta, and **H.A. Bruck**, "Manufacturing of Bio-Inspired Heterogeneous Structures with Improved Interfacial Strength using a Multi-stage Multi-material Molding Technique," *2002 SEM Annual Conference & Exposition*, Milwaukee, WI, 6/02.

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**2.h Original Designs, Plans, Inventions, Patents, and Invention Disclosures**

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## 2.i Contracts and Grants

### 2.i.i External Funding

**Total Share of Hugh Bruck's External Grants**

- $7,520,150 from proposals written at the University of Maryland
- $52,500 from proposals written at the University of South Carolina
- $45,000 from proposals written at the Idaho National Engineering Laboratory

**Grants and Contracts Resulting from Proposals Written at University of Maryland**

1. PI, "Fabrication and Design of Functionally Graded Energetic Materials," Office of Naval Research Young Investigator Program, Washington, DC, $349,989 (Bruck's share: $349,989), 5/00-9/03

2. PI, "Development of Twin-Screw Extrusion Process for Fabricating Functionally Graded Energetic Materials," NAVSEA-IH, Indian Head, MD, $50,000 (Bruck's share: $50,000), 1/01-9/01

3. PI, "Quantitative Microstructural Characterization of Functionally Graded Inert Formulations for Energetic Materials Fabricated in a Twin Screw Extrusion Process," NAVSEA-IH, Indian Head, MD $25,000 (Bruck's share $25,000), 1/02- 9/02

4. PI, "Fracture Analysis of Cast Iron Piping," National Transportation Safety Board, Washington, DC, $2,000, (Bruck's share: $2,000) 3/02-5/02

5. Co-PI, "Characterization and Model Assessment for Impact Damage Evolution in Functionally Graded Composites using a Novel Nanosecond 3D Deformation Measurement System," (PI: Prof. Michael A. Sutton, University of South Carolina) Army Research Office, Research Triangle Park, NC, $280,000 (Bruck's share: $75,000), 7/02-7/05

6. Co-PI, "University Laboratory Consortia to Perform Research on Energetic Materials," (PI: Prof. Dave K. Anand, University of Maryland) Office of Naval Research, Arlington, VA, $156,000 (Bruck's share: $31,200) 8/02-6/03

7. PI, "Fabrication and Design of Multifunctional Energetic Structures Using Gradient Architectures", AFRL, Eglin, FL, $60,000 (Bruck's share: $60,000), 4/03-4/04

8. Co-PI, "Effect of Energetic Nano-sized Particles on the Performance of Gun Propellants," (PI: Prof. Ken Kuo, Pennsylvania State University) U.S. Army/Warheads and Energetics Consortium, Picatinny, NJ, $363,000 (Bruck's share: $55,000), 9/02-12/04

9. PI, "Dispersion of Aluminum Nanoparticles in Polymer Composites Using Twin Screw Extrusion Processing", NAVSEA, Indian Head, MD, $25,000 (Bruck's share: $25,000), 1/03-

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10. PI, "Oriented Carbon Nanotube Composite Extrusion", NASA/GSFC, Greenbelt, MD, $214,500 (Bruck's share: $214,500), 4/03-9/06

11. Co-PI, "Mechanical Engineering Curriculum Enhancement to Introduce Product Realization with Bio-inspired Concepts", (PI: Prof. Satyandra K. Gupta, University of Maryland) National Science Foundation, Arlington, VA, $381,000 (Bruck's share: $95,250), 9/03-9/06

12. Co-PI, "Integrated Array Detection System for Food Microbial Pathogens", (PI: Prof. Keith Herold, University of Maryland) US Department of Agriculture, Washington, DC, $250,000 (Bruck's share: $83,333), 9/03-9/05

13. PI, "Technical Meeting on Biological and Biologically Inspired Materials and Systems", National Science Foundation, Arlington, VA, $10,000 (Bruck's share: $10,000)

14. PI, "Twin Screw Extrusion Processing of Hierarchical Energetic Materials Using Functionalized Nanoparticles", NAVSEA, Indian Head, MD, $100,000 (Bruck's share: $100,000), 9/03-9/04

15. PI, "Multifunctional Materials for Aerospace Applications using Functionally Graded Materials and Nanocomposites", National Institute for Aeronautics, Langley, VA, $50,000 (Bruck's share: $50,000), 5/04-5/05

16. Co-PI, "Principles of Engineering Graded Materials with Self-Assembling Microstructures", (PI: Alexander Roytburd, University of Maryland) National Science Foundation, Arlington, VA, $320,525 (Bruck's share: $160,262), 9/04-9/07

17. Co-PI, "Development of Educational Materials and Acquisition of Equipment for a Nanoscale to Microscale Engineering Laboratory", National Science Foundation, Arlington, VA, (PI: Luz Martinez-Miranda), $150,000 (Bruck's share: $30,000), 9/04-9/05

18. PI, "Processing of Nanostructured Materials for Insensitive Munitions", NAVSEA, Indian Head, MD, $50,000 (Bruck's share: $50,000), 3/05-9/05

19. PI, "Advanced Structures & Materials for Concrete Molds", Maryland Industrial Partnerships, MTECH, College Park, MD, $156,502 (Bruck's share: $156,502), 2/05-8/08

20. PI, "Development of Advanced Composite Materials Using Graded, Bioinspired, and Nanostructured Principles: Maryland-Israel Cooperation for Competitiveness", Fulbright Scholars Program, CIES, Washington, DC, $55,000 (Bruck's share: $55,000) , 8/05-7/06

21. Co-PI, "Manufacturing of Mesoscopic 3D Articulated Devices Using Robomold Tooling", National Science Foundation, Arlington, VA (PI: Satyandra K. Gupta), $229,356 (Bruck's share: $114,678), 9/05-8/08

22. PI, "Processing of Multifunctional Organic Matrix Composites", NASA/GSFC, Greenbelt, MD, $115,000 (Bruck's share: $115,000), 9/06-8/08

23. PI, "Defining Transition Length Scales and Compositions in Hierarchically Structured Polymer Composites for the Development of Multifunctional Marine Structures", ONR Solid Mechanics Program, Arlington, VA, $150,000 (Bruck's share: $150,000), 1/07-1/09

24. PI, "Nanostructured Adhesives in Composite Structures for Space Systems",

NASA/GSFC, Greenbelt, MD, $25,000 (Bruck's share: $25,000), 9/08-1/09

25. PI, "Rheological Behavior and Health Monitoring of Propellants", NAVSEA, Indian Head, MD, $25,000 (Bruck's share: $25,000), 3/08-9/08

26. PI, "Small scale modeling for ballistic response of geometrically-complex structures: experimentally-derived scaling laws", ARL, Adelphi, MD, $50,000 (Bruck's share: $50,000), 7/08-1/09

27. PI, "Prognosis for Airframe Readiness and Safety: Composite Structures", NAWCAD, Pax River, MD, $717,000 (Bruck's share: $442,000), 12/08-12/11

28. PI, "Dynamic Damage Mechanisms in Hierarchically-structured Polymer Composites for Marine Structures", ONR Solid Mechanics Program, Arlington, VA, $150,000 (Bruck's share: $150,000), 3/09-12/11

29. PI, "Characterizing Sensor-Propellant interaction for Health Management", NAVSEA, Indian Head, MD, $100,000 (Bruck's share: $100,000), 7/09-7/10

30. PI, "Principles for Formation of Transversely Modulated Heterophase Nanostructures" , National Science Foundation, Arlington, VA, $360,000 (Bruck's share: $180,000), 6/09-5/12

31. PI, "Characterization of Laser-target Interactions Using in situ DIC Measurements and a posteriori Nanohardness Measurements", ARL, Aberdeen, MD, $50,000 (Bruck's Share: $50,000), 10/10-10/11

32. PI, "Modeling and Characterization of K-Cor and X-Cor Composites", Navy STTR Phase I, Arlington, VA, $40,000 (Bruck's share: $20,000), 12/10-06/11.

33. PI, "Principles for Designing Compliant Multifunctional Wing Structures with Integrated Solar Cells for MAVs", AFOSR Multifunctional Structures Program, Arlington, VA, $459,053 (Bruck's share: $229,527), 4/12-3/15

34. PI, "Damage and Durability Modeling of Laminated Composite Structures", NAWCAD, Pax River, MD, $195,000 (Bruck's share: $115,000), 12/11-12/13

35. PI, "Validated Design Model of Lightweight Contoured Sandwich Structures for Aircraft Components", Navy STTR Phase II, Arlington, VA, $300,000 (Bruck's share: $150,000), 7/12-10/14.

36. PI, "Multi-scale Characterization of Contact using Digital Image Correlation", Toshiba Corporation, $40,000 (Bruck's share: $40,000), 10/12-10/13.

37. PI, "Fabrication and Multi-Physical Characterization of Carbon-to-Metal Connections for a Cell/Battery", U.S. Government, Langley, VA $100,000 (Bruck's share: $100,000), 5/13-5/14.

38. PI, "Self-sensing Thermal Management System using Multifunctional Nano-enhanced Structures", NASA, Washington, DC, $99,032 (Bruck's share: $99,032), 8/13-8/14

39. PI, "NRI-Small: Compliant Multifunctional Robotic Structures for Safety and Communication by Touch", NSF, Arlington, VA, $600,000 (Bruck's share: $300,000), 9/13-9/16

40. PI, "Development of Compliant Multifunctional Skin Materials for Harvesting and Utilizing Solar Energy in Aerospace Applications", AFOSR, Arlington, VA, $499,916 (Bruck's share: $249,958), 5/15-4/18

41. Co-PI, "Novel Polymer Composite Heat Exchanger for Dry Cooling of Power Plants", DOE, Gaithersburg, MD, $1,993,425 (Bruck's share: $400,000), 8/15-7/18

42. PI, "Feature Design for Final Machining of Near Net Shape Parts", NAWCAD, Pax River, MD, $160,000 (Bruck's share: $160,000), 12/15-11/17

43. Co-PI, "Unified Damage Mechanisms-Based Model to Predict Remaining Useful Life for Rotorcraft Structures", Navy Phase II STTR, Arlington,VA, $307,572 (Bruck's share: $153,786), 12/15-11/18

44. PI, "REU SITE: Research Opportunities in Bio-inspired Robotics", NSF, Arlington, VA, $382,184 (Bruck's share: $191,092), 1/17-12/19

45. PI, "Design and Manufacturing of BondTrue: A New Class of Low-Cost Surgical Assist Devices", Maryland Industrial Partnerships, MTECH, College Park, MD, $200,000 (Bruck's share: $200,000), 1/17-1/19

46. PI, "Predicting Failure Mechanisms of Adhesively Bonded Thick Metallic and Composite Adherends", ONR, Arlington, VA, $157,103 (Bruck's share: $157,103), 3/2016-2/2019

47. PI, "Embedded High Frequency Signal Effects on Failure Mechanisms and Models", ONR, Arlington, VA, $190,000, 10/2017-9/2020

48. Co-PI, "Generative Design for Digital/Additive Manufacturing", Lockheed Martin, Bethesda, MD, $100,000 (Bruck's share: $50,000), 10/2018-10/2019.

49. PI, "Modeling and Characterization for Optimization of Additively Manufactured Parts", NAWCAD, Patuxent River, MD, $160,000, 4/2018-4/2020.

50. PI, "Design and Manufacturing of BondTrue 2.0 Pressure Applying Dressing", Maryland Industrial Partnerships, MTECH, College Park, MD, $100,000 (Bruck's share: $100,000), 2/20-2/21

51. PI, "Additively Manufactured Multi-Pass Manifold-Microchannel Heat Exchanger for Low-Cost High-Temperature and High-Pressure Solar Thermal Applications", DOE ARPA-E, Washington, DC, $675,000 (Bruck's share: $675,000), 4/20-9/22

52. PI, "UMD-ARL Alliance for Additive Manufacturing Science", ARL, Aberdeen, MD, $281,937 (Bruck's share: $31,937)

53. PI, "A Novel Heat Sink For Advanced Electric Propulsion System", DOE ARPA-E, Washington, DC, $376,000 (Bruck's share: $272,000), 10/21-1/25

54. PI, "Functional Polymer-Based Integrated Multimodal Structural Health Monitoring and Electromagnetic Shielding", ARL, Aberdeen, MD, $800,000 (Bruck's share: $200,000)

55. PI, "Synthetic Oyster Shells", MIPS, College Park, MD, $100,000 (Bruck's share: $100,000)

**Grants and Contracts Resulting from Proposals Written at University of South Carolina**

1. Co-PI, "Measurements and Modeling of Temperature Fields Generated During Friction Stir Welding of 2195 Aluminum Alloys", (PI: Prof. Anthony Reynolds, University of South Carolina) Lockheed Martin/Michoud Space Systems, New Orleans, LA, $75,000 (Bruck's share: $37,500), 3/98-12/98

2. Co-PI, "Modeling and Experimental Studies of Friction Stir Welding Processes for Aluminum Alloys", (PI: Prof. Anthony Reynolds, University of South Carolina) NASA/Space Grant Consortium, Charleston, SC, $30,000 (Bruck's share: $15,000), 5/98-5/99

**Grants and Contracts Resulting from Proposals Written at the Idaho National Engineering Laboratory**

1. Co-PI, "Fracture Analysis of MMCs Produced by the APIC™ Process Using Laser Moire Interferometry", (PI: Dr. James Cornie, Metal Matrix Cast Composites, Waltham, MA) NASA SBIR, Washington, DC, $75,000 (Bruck's Share: $25,000), 1/96-6/96

2. Co-PI, "Development of Functionally Graded Armor Materials", (PI: Dr. James Cornie, Metal Matrix Cast Composites, Waltham, MA) ARL SBIR, Aberdeen, MD, $750,000 (Bruck's share: $20,000), 3/97-3/99

**2.i.ii Internal Funding**

**Total Share of Hugh Bruck's Internal Grants**

- $75,000 from proposals written at the University of Maryland
- $1,500 from proposals written at the University of South Carolina
- $280,000 from proposals written at the Idaho National Engineering Laboratory

**Grants and Contracts Resulting from Proposals Written at the University of Maryland**

1. PI, "Designing Functionally Graded Materials for Smart Aerospace Structures", funded, Minta-Martin Foundation, University of Maryland, $35,000 (Bruck's share - $35,000), 5/99-5/00

2. Co-PI, "Manufacturing of Heterogeneous Structures for Bio-inspired Devices", (PI: Prof. Satyandra K. Gupta, University of Maryland) Minta-Martin Foundation, University of Maryland, $30,000 (Bruck's share - $15,000), 5/02-5/03

3. PI, "Self-sensing Compliant Multifunctional Structures for Robotics", Maryland Robotics Center, College Park, MD, $75,000 (Bruck's share: $25,000), 1/11-1/12

**Grants and Contracts Resulting from Proposals Written at the University of South Carolina**

1. PI, "Workshop on Outcome Based Assessment and Professional Skills Development Programs for Undergraduate Mechanical Engineering Education", USC Teaching Grant, University of South Carolina, $1,500 (Bruck's share - $1,500), 2/98-4/98

**Grants and Contracts Resulting from Proposals Written at the Idaho National Engineering Laboratory**

1. PI, "Development of a Cooperative Research Effort for the Development of Ballistic Materials at the INEL", INEL LDRD, Idaho National Engineering Laboratory, $280,000 (Bruck's share - $280,000), 10/95-10/97

## 3. TEACHING AND ADVISING

### 3.a Courses taught from 1998 to 2009

#### 3.a.i General

| *Semester* | *Course Title* | *Level* | *Number of Students* | *Evaluation Score* |
|---|---|---|---|---|
| Spring 1999 | Statics (ENES 102) | Undergraduate | 15 | 2.63 |
| Fall 1999 | Dynamic Behavior of Materials and Structures (ENME 808G) | Graduate | 10 | 3.82 |
| Spring 2000 | Statics (ENES 102) | Undergraduate | 35 | 2.17 |
| Spring 2000 | Applied Elasticity (ENME 677) | Graduate | 15 | 2.82 |
| Fall 2000 | Statics (ENES 102) | Undergraduate | 35 | 3.15 |
| Spring 2001 | Continuum Mechanics (ENME 670) | Graduate | 12 | 3.23 |
| Fall 2001 | Elasticity of Advanced Materials and Structures (ENME 677) | Graduate | 10 | 3.50 |
| Spring 2002 | Composite Materials (ENME 672) | Graduate | 10 | 3.49 |
| Fall 2002 | Dynamic Behavior of Materials and Structures (ENME 661) | Graduate | 8 | 3.51 |
| Spring 2003 | Engineering Materials and Manufacturing Processes (ENME 382) | Undergraduate | 92 | 3.67 |
| Fall 2003 | Elasticity of Advanced Materials and Structures (ENME 677) | Graduate | 15 | 3.43 |
| Spring 2004 | Continuum Mechanics (ENME 670) | Graduate | 22 | 3.47 |
| Fall 2004 | Engineering Materials and Manufacturing Processes (ENME 382) | Undergraduate | 78 | 3.52 |
| Spring 2005 | Materials by Design (ENME 808B) | Graduate | 17 | 3.52 |
| Spring 2005 | Engineering Materials and Manufacturing Processes (ENME 382) | Undergraduate | 100 | 3.79 |
| Fall 2006 | Engineering Materials and Manufacturing Processes (ENME 382) | Undergraduate | 72 | 3.88 |

| | | | | |
|---|---|---|---|---|
| Spring 2007 | Engineering Materials and Manufacturing Processes (ENME 382) | Undergraduate | 72 | 3.62 |
| Fall 2007 | Engineering Materials and Manufacturing Processes (ENME 382) | Undergraduate | 80 | 3.59 |
| Spring 2008 | Elasticity of Advanced Materials and Structures (ENME 677) | Graduate | 11 | 3.82 |
| Fall 2008 | Engineering Materials and Manufacturing Processes (ENME 382) | Undergraduate | 77 | 3.42 |
| Spring 2009 | Deformable Bodies and their Material Behavior (ENME 489Y) | Undergraduate | 32 | 3.59 |
| Fall 2009 | Engineering Materials and Manufacturing Processes (ENME 382) | Undergraduate | 113 | 3.40 |
| Spring 2010 | Composite Materials (ENME 672) | Graduate | 28 | 3.45 |
| Fall 2010 | Deformable Bodies and their Material Behavior (ENME 489Y) | Undergraduate | 22 | 3.68 |
| Fall 2010 | Deformable Bodies and their Material Behavior (ENME 808Y) | Graduate | 10 | 3.54 |
| Spring 2011 | Advanced Strength of Materials (ENME 489Z) | Graduate | 28 | 3.23 |
| Fall 2011 | Deformable Bodies and their Material Behavior (ENME 489Y) | Undergraduate | 4 | 3.40 |
| Fall 2011 | Deformable Bodies and their Material Behavior (ENME 808Y) | Graduate | 14 | 3.63 |
| Spring 2012 | Composite Materials (ENME 672) | Graduate | 28 | 3.06 |
| Fall 2012 | Deformable Bodies and their Material Behavior (ENME 489Y) | Undergraduate | 17 | 3.23 |
| Fall 2012 | Deformable Bodies and their Material Behavior (ENME 808Y) | Graduate | 16 | 3.35 |
| Spring 2013 | Advanced Strength of Materials (ENME 489Z) | Undergraduate | 26 | 3.13 |
| Spring 2013 | Advanced Strength of Materials (ENME 676) | Graduate | 10 | 3.15 |
| Fall 2013 | Introduction to Materials Engineering (ENMA 300) | Undergraduate | 14 | 3.22 |

| | | | | |
|---|---|---|---|---|
| Fall 2013 | Engineering Materials and Manufacturing Processes (ENME 382) | Undergraduate | 101 | 3.07 |
| Spring 2014 | Composite Materials (ENME 672) | Graduate | 29 | 3.37 |
| Fall 2014 | Deformable Bodies and their Material Behavior (ENME 489Y) | Undergraduate | 19 | 3.51 |
| Spring 2015 | Advanced Strength of Materials (ENME 489Z) | Undergraduate | 43 | 2.64 |
| Fall 2015 | Finite Element Analysis (ENME 470) | Undergraduate | 35 | 3.02 |
| Spring 2016 | Composite Materials (ENME 672) | Graduate | 27 | 3.53 |
| Fall 2016 | Finite Element Analysis (ENME 470) | Undergraduate | 29 | 2.97 |
| Spring 2017 | Bioinspired Robotics (489L) | Undergraduate | 29 | 3.02 |
| Fall 2017 | Finite Element Analysis (ENME 470) | Undergraduate | 29 | 2.88 |
| Spring 2018 | Composite Materials (ENME 672) | Graduate | 29 | 3.54 |
| Spring 2019 | Integrated Product and Process Development (ENME 472) | Undergraduate | 30 | 3.13 |
| Spring 2020 | Bioinspired Robotics (489L) | Undergraduate | 32 | N/A |
| Fall 2020 | Integrated Product and Process Development (ENME 472) | Undergraduate | 32 | 2.90 |
| Spring 2021 | Bioinspired Robotics (ENME 489L) | Undergraduate | 34 | 3.40 |
| Fall 2021 | Assistive Robotics (ENME 444) | Undergraduate | 30 | 3.20 |

**3.iv Independent study, tutorial, internship supervision (other than research direction)**

Mr. Christian Rosenzweig, 3/02-8/02

Mr. Pedro Oliveira, 3/03-8/03
Mr. Bjoern Ritter, 3/04-8/04
Ms. Katrin Haaf, 3/05-8/05
Mr. Timo Strohmer, 3/06-8/06
Mr. Chrisian Mueller, 9/07-2/08
Mr. Mohammad Mansoursafaian, 10/08-2/09
Ms. Marie-Katrin Digel, 3/09-8/09
Mr. Florian Kreis, 3/10-8/10
Mr. Manuel Muehlbueher, 9/10-2/11
Mr. Jens Jungmann, 3/11-8/11
Mr. Robert Kupferschmitt, 9/11-2/12
Mr. Johannes Kempny, 9/12-2/13
Mr. Adrian Griesinger, 9/13-2/14
Mr. Gokhan Ocel, 9/14-2/15
Ms. Ella Steins, 9/15-2/16
Mr. David Schillinger, 3/16-8/16
Mr. Andreas Cattelaens, 3/16-8/16
Mr. Raphael Kraeling, 9/16-2/17
Mr. Andreas Scholtz, 3/17-9/17
Mr. Felix Filafer, 3/17-9/17
Ms. Jasmin Rohwerder, 9/17-3/18
Mr. Christoph Sailer, 9/17-3/18
Ms. Abriana Stewart-Height, 1/17-5/17
Mr. Josh Geating, 1/17-5/17
Mr. Nick Preston, 1/17-5/17
Mr. Jose Ignacios Rios, 1/17-5/17
Mr. Felix Seitz, 3/18-9/18
Ms. Michelle Offermanns, 3/18-9/18
Mr. Felix Filafer, 9/18-3/19
Mr. Maurice Impraim, 3/19-9/19
Ms. Edda Mueller, 9/19-3/20
Mr. Nayan Goyal, 9/18-present
Mr. Pranav Meshram, 6/19-present

**3.b Course or Curriculum Development 3.b.1 NewCourses Introduced**

1. Created ENME 661 (ENME 808G): "Dynamic Behavior of Materials and Structures"

   - Created course objectives and content
   - Developed web-based content for curriculum
   - Developed archival Powerpoint lecture material for delivering the course content.

2. Created ENME 808B: "Materials by Design"

   - Created course content and objectives
   - Developed archival Powerpoint lecture material for delivering the course content
   - Delivered course via archival instructional learning technology

**3.b.2 Enhancement of Existing Courses**

1. Integrated ENES 102: "Statics" and ENES 220: "Strength of Materials" curriculum

- Consulted on new textbook for curriculum, "Design Analysis of Structural Elements"
- Organized new infrastructure for delivering the curriculum
- Developed metrics for evaluating success of curriculum integration
- Offered pilot courses in new curriculum
- Disseminated curriculum externally through a conference publication

2. Revised ENME 670: "Continuum Mechanics" curriculum

- Created notes on microcontinuum mechanics for curriculum
- Covered micropolar, micromorphic, and microstretch theories
- Discussed applications of microcontinuum theory

3. Revised ENME 672: "Composite Materials" curriculum

- Added functionally graded composites and biologically inspired composites to curriculum
- Developed web-based content for curriculum
- Developed archival Powerpoint lecture material for delivering the course content.

4. Revised ENME 677: "Elasticity of Advanced Materials and Structures" (*formerly known as Applied Elasticity*) curriculum

- Changed title of course
- Revised course objectives to include emphasis on more advanced materials and structures
- Added smart structures and functionally graded materials to curriculum.

5. Enhanced ENME 382, "Engineering Materials and Manufacturing Processes"

- Added additional content to archival Powerpoint presentation material on course website
- Added links to course website for accessing additional learning material on the Internet
- Revised labs to better emphasize understanding of processing-structure-property relationships in materials

6. Enhanced ENME 489Y, "Deformable Bodies and their Material Behavior"

- Created archival Powerpoint presentation material on course website to standardize instructional delivery
- Added links to course website for accessing additional learning material on the Internet

**3.b.3 Laboratory Development**

1. Established Functionally Graded Materials Development Lab

Established a state-of-the art facility for characterizing and modeling functionally graded materials. Facilities include the following:

- DME non-contact AFM for characterizing nanostructures,

- Versamet inverted microscope for characterizing microstructure
- Digital Image Correlation techniques for acquiring full-field deformations on the surface of objects from the macroscale to the nanoscale
- Wilson Tukon microindenter for microhardness characterization
- 4'x 6' vibration isolation table for performing noise-free material and mechanical characterization
- Lab cabinetry for storing supplies and to provide surfaces for preparing specimens
- Standard Buehler metallographic cutting and polishing equipment for preparing specimens
- Windows 2000 workstations for performing modeling analysis using Fortran, C++, Abaqus, and Matlab codes

2. Added a new Nanoindenter to Modern Materials Instructional Lab

- Setup and supervised the operation of a new Hysitron Triboindenter that was integrated into a Hardness Testing Laboratory module in ENME 382

3. Added new Twin Screw Extruder to Polymer Processing Lab

- Setup a new 28 mm Twin Screw Extruder
- Added 2 new feeders and feeder controls for changing ingredients to process functionally graded materials

4. Added new tube furnace to Smart Materials and Structures Research Center

- Setup a new 1500 ºC tube furnace to sinter new ceramics, composites, and functionally graded materials and structures.

5. Established Advanced Ceramics and Polymers Fabrication Laboratory

Established a state-of-the art facility for processing and characterization of advanced ceramic and polymeric materials. Facilities include the following:

- Sub-divided space to establish new laboratory
- Setup material preparation facilities
- Injection molding technology
- Vacuum degasser
- Aqueous gelcasting technology
- 25 kip and 250 kip Carver press
- Lindberg 1300 ºC box furnaces

6. Established Multiscale Measurements Lab

Established a state-of-the art facility for characterizing the properties and structure of materials at multiple length scales. Facilities include the following:

- Built customized biaxial microtensile tester with integrated imaging technology for performing *in situ* DIC full-field deformation analysis of specimens to characterize the mechanical behavior of materials at the micro/nanoscale
- Imada MX-500 test stand with integrated DIC optimal imaging system for characterizing the mechanical behavior of materials at the macro/meso/microscale

- AccuPyc II 1340 Micromeritics Gas Pycnometer for characterizing the density of materials
- Cahn TherMax 400 TGA for thermogravimetric and differential thermal analysis of the phase change and thermal decomposition characteristics of materials

### 3.c Manuals, Notes, Software, Webpages, and Other Contributions to Teaching

**1.** www.ajcoline.umd.edu, ENME 808G: Dynamic Behavior of Materials and Structures

**2.** www.ajconline.umd.edu, ENME 672: Composite Materials

**3.** www.ajconline.umd.edu, ENME 382: Engineering Materials and Manufacturing Processes

### 3.e Advising: Other Than Research Direction

#### 3.e.i Undergraduate Students

1. Mr. John Atchinson, Senior, Idaho State University, "Investigation of Optical Conditions to Optimize the Accuracy of DIC at the INEL", 1/96-5/96

2. Mr. Brent J. Buescher, Jr., BS, University of Idaho, "A New High Speed Electrooptic Q-switching System for Ruby Lasers used in Dynamic Moire Interferometers", 3/96-6/96

3. Mr. John L. Jackson, BS, Eastern Washington University, "Fracture Analysis of Metal Matrix Composites for Aerospace Applications using Moire Interferometry", 4/96-8/96

4. Mr. Alan L. Gershon, Senior, Columbia University, "3-D Finite Element Modeling of Thermal Residual Stesses in Functionally Graded Nickel-Alumina Joints", 6/96-8/96

5. Ms. Brandy Gibson, Senior, University of South Carolina, "A Novel Technique for Simultaneous Surface Measurements of Temperature and 2-D Deformation Fields", 8/97-8/98

6. Mr. Jason Mantich, Junior, University of Maryland, "Fabrication and Characterization of Multimaterial Compliant Mechanisms", 5/00-12/00

7. Ms. Theresa L. Valentine, Junior, University of Maryland, "Fabrication of Smart Structures using Shape Memory Alloy Wires", 5/00-8/02 (*recipient of the University of Maryland ASPIRE research scholarship (2000), the University of Maryland Senior Summer Scholars award (2001), the ASM Outstanding Scholars award (2002), and the TMS J. Keith Brimacombe Presidential Scholarship (2002)*)

8. Mr. Kunal Thaker, Senior, University of Maryland, "Fabrication of Functionally Graded Metal-Ceramic Armor Packages"& "Processing of Functionally Graded Thin Films", 9/02-12/02 & 5/03-1/04

9. Mr. Kyal Wright, Senior, Eleanor Roosevelt High School, Greenbelt, MD, ESTEEM Mentoring Program, "Characterization of Biological Structures", 9/02-6/03

10. Mr. Brent Spranklin, Senior, University of Maryland, "Gelcasting of Geometrically Complex Structures", 6/03-5/04 (co-advisor with Prof. S.K. Gupta)

11. Ms. Prachi Kulkarni, Senior, University of Maryland, "Gelcasting of Biologically Inspired Materials and Structures", 1/04-7/05

12. Ms. Gemma Easterling, Senior, Eleanor Roosevelt High School, Greenbelt, MD, ESTEEM Mentoring Program, "Gelcasting of Biologically Inspired Materials and Structures", 9/04-5/05

13. Mr. Daniel Calderon, Senior, Eleanor Roosevelt High School, Greenbelt, MD, Science and Technology Internship Program, "Twin Screw Extrusion Processing of Nanocomposites", 9/04-5/05

14. Mr. Adam Larusso, Senior, Eleanor Roosevelt High School, Greenbelt, MD , Science and Technology Internship Program, "Processing and Characterization of Advanced Composite Materials", 9/04-5/05

15. Mr. Lawrence S. Gyger, Jr., Senior, University of Maryland, "Mechanical Analysis of Bioinspired Materials and Structures", 5/04-12/04

16. Mr. Jon Kruft, Senior, University of Maryland, "Fabrication of Graded Metal-Ceramic Composites", 11/04-5/05

17. Mr. Benjamin Bernstein, University of Maryland, "Fabrication and Characterization of Graded Self-assembling Microstructures", 5/05-5/06

18. Mr. Eric Esch, Montgomery-Blair High School, Silver Spring, MD, "Development of Polymer Nanocomposites for Bio-inspired Robots", 6/05-8/05.

19. Mr. Michael Lerman, University of Pennsylvania, "Mechanical Modeling of Geometrically Complex Mold Structures for Concrete Products", 6/05-8/05

20. Ms. Sarah Kavli, North Dakota State University, NASA Summer Internship Program, "Rheological Characterization of Polymer Nanocomposites", 6/04-8/04

21. Mr. Michael Conti, University of Rhode Island, NASA Summer Internship Program, "Twin Screw Extrusion Processing of Graded Nanocomposites for Combinatorial Materials Science", 6/04-8/04 & 6/05-8/05

22. Mr. Matt Duesterberg, University of Virgnia, NASA Summer Internship Program, "Rheological Characterization of Polymer Nanocomposites", 6/05-8/05

23. Ms. Grace Ryan, Eleanor Roosevelt High School, Greenbelt, MD, Science and Technology Internship Program, "Processing and Characterization of Molded Polymer Structures with Embedded Electronic Components", 9/05-5/06

24. Mr. Daniel Adkins, Eleanor Roosevelt High School, Greenbelt, MD, Science and Technology Internship Program, "Processing of Graded Polymer Nanocomposites Using Twin Screw Extrusion", 9/05-5/06

25. Ms. Francis Samalot, University of Alabama at Birmingham, NASA Summer Internship Program, "Processing of Polymer Nanocomposites using Twin Screw Extrusion", 6/06-8/06

26. Mr. Michael Kravchenko, University of Michigan, "Rheological Characterization of Polymer Nanocomposites", 6/06-8/06

27. Mr. Michael Karsky, Winona State University, Winona, MN, NASA Summer Internship Program, "Mechanical Characterization of Polymer Nanocomposites", 6/06-8/06

28. Ms. Rachel Kerzner, University of Maryland, "Compositional Characterization of Multifunctional Polymer Nanocomposites", 9/06-5.08

29. Mr. Jonathan Dykes, University of Maryland, "Mechanical Characterization of Multifunctional Polymer Nanocomposites", 9/06-12/06

30. Mr. Shea Brown, Eleanor Roosevelt High School, Greenbelt, MD, Science and Technology Internship Program, "Thermomechanical Characterization of Embedded Electrical Components in Polymers", 9/06-4/07

31. Ms. Mercelyn Matthews, Charles H. Flowers High School, Springdale, MD, ESTEEM Mentoring Program, "Electrical Characterization of Polymer Nanocomposites", 9/06-4/07

32. Ms. Melanie Patrick, Charles H. Flowers High School, Springdale, MD, ESTEEM Mentoring Program, "Sintering of Graded Metal-Ceramic Composites using Carbon as a Sintering Aid for Reducing the Mismatch of Shrinkage Strain", 9/06-4/07

33. Mr. Bernard Murphy, University of Maryland, LSAMP, "Electrical Characterization of Polymer Nanocomposites", 9/06-5/08

34. Mr. Conrad Laskowski, University of Maryland, "Fabrication of Polymer Nanocomposites", 1/07-5/08

35. Mr. Micah Sussman, Lehigh University, NASA Summer Internship Program, "Rheological Characterization of PS-CNF Composites", 6/07-8/07

36. Mr. Greg Newbloom, Oregon State University, NASA Summer Internship Program, "Mechanical Property Characterization of PS-CNF Composites", 6/07-8/07

37. Ms. Chanelle Brown, Eleanor Roosevelt High School, ESTEEM Mentoring Program, "Graded Nanostructured Titanium Dioxide for Solar Cells", 8/07-5/08

38. Ms. Elaine Lin, Montgomery Blair High School, "CNT-based bionsensors", 5/08-8/08

39. Ms. Sarah Oben, Eleanor Roosevelt High School, "Electrical Percolation Biological Semiconductors", 9/08-5/09

40. Ms. Adedayo Adeniran, University of Maryland, "Characterization of Polymer Shrinkage around Hard and Soft Sensors", 5/08-7/09

41. Ms. Lara Schloss, University of Maryland, "Dynamic Response of Geometrically-complex Structures", 5/08-5/09

42. Mr. Curtis Sharkey, University of Maryland, "Characterization of Damage Evolution in Advanced Composite Structures", 11/08-5/09

43. Mr. Josh Balsam, University of Maryland, "Transversely Modulated Nanostructured Films", 8/08-12/09

44. Mr. Jachimike Imo, University of Maryland, "Mechanical Characterization of Hierarchically-structured Laminated Polymer Composites", 6/09-12/10

45. Mr. Bowofoluwa Akinlabi-Oladimeji, University of Maryland, LSAMP, "Mechanical Characterization of Z-Cor Composites", 9/09-5/11

46. Ms. Kathy Dharmaraj, University of Maryland, "Health Monitoring of Filled Polymers", 9/09-5/11

47. Mr. Luke Seppi, Eleanor Roosevelt High School, "Integrating SMA Actuators into Filled Polymers for Health Monitoring", 9/09-5/10

48. Ms. Shoshana Bernstein, Hebrew Academy, "Measuring Performance of Compliant Wing Structures", 3/10-7/10

49. Mr. Jordan Williams, "Characterization of Multifunctional Compliant Wing Structures", 9/10-5/11

50. Mr. Obinna Obineche, Eleanor Roosevelt High School, ESTEEM Mentoring Program, "Advanced Composite Sandwich Structures", 9/10-5/11

51. Mr. Jonathan Chung, University of Maryland, "Dynamic Testing of Advanced Composite Structures", 1/10-5/10

52. Mr. Richard Lin, Montgomery Blair High School, "Measuring Effects of Wing Compliance on Flapping Wing MAV Performance", 6/11-8/11, 6/12-present

53. Mr. Nick Hesser, University of Maryland, "Compression Testing of X-Cor and K-Cor Composite Sandwich Specimens", 6/11-8/11

54. Ms. Liz Sauerbrunn, University of Maryland, "Fabrication and Advanced Mechanical Characterization of Bio-inspired Composite Sandwich Structures", 9/11-present

55. Ms. Lena Johnson, University of Maryland, "3-D DIC Characterization of Flapping Wing MAVs with Embedded Strain Sensors", 6/11-8/11.

56. Mr. Justin Ahalt, Eleanor Roosevelt High School, Greenbelt, MD, "Characterization of Bio-inspired Sandwich Composites", 9/11-5/12

57. Mr. Chinua Abubakar, Oxon Hill High School, ESTEEM mentoring program, "Dynamic Characterization of Flapping Wing MAVs using 3D Digital Image Correlation", 9/11-5/12

58. Mr. Eli Barnett, University of Maryland, "Mechanics of Multifunctional Robotic Structures", 9/12-5/16

59. Ms. Alyssa Philipps, University of Seattle, "Design and Characterization of Compliant MAV Wings with Solar Cells", 6/12-8/12

60. Ms. Fanny Planes, Ecole Nationale Superieure D'Ingenieurs de Bourges, "Mixed Mode Fracture Characterization of Laminated Composites using DIC", 6/12-8/12

61. Ms. Sarah Cornen, Ecole Nationale Superieure D'Ingenieurs de Bourges, "Modeling of Multifunctional Structures with Bio-inspired Cores", 6/12-8/12

62. Mr. Ricardo Morales, Eleanor Roosevelt HS, Greenbelt, MD "Characterization of Flapping Wing MAVs", 9/12-5/13

63. Mr. Ignacio Chumacero, John F. Kennedy High School, Silver Spring, MD, "Mixed Mode Fracture Characterization of Composite Materials", 9/12-5/13

64. Mr. Alex Lingfu, Poolesville High School, Poolesville, MD, "Design of Compliant Wings for MAVs", 6/12-9/12

65. Mr. Brian Koskey, Carnegie Mellon University, "Development of a 6 DOF Test Stand for Flapping Wing MAVs", 6/12-9/12

66. Mr. Trevor Evans, Oxon Hill High School, ESTEEM Mentoring Program, "Characterization of Flapping Wing MAVs", 9/12-5/13

67. Mr. Joseph Cho, Poolesville High School, "Design of Wings with Lift and Thrust Separation", 6/13-8/13

68. Mr. Michael Yeh, Poolesville High School, "Design of Flapping Wing MAVs using 2D Laser Cutting", 6/13-8/13.

69. Mr. Evan Feinberg, Blair High School, "Modeling of Aerodynamic Forces Generated by Bio-inspired Compliant Wings", 6/13-8/13

70. Mr. Vincent Cheng, Blair High School, "Multi-physic Processing and Characterization of Carbon-Metal Connections for Batteries", 6/13-8/13

71. Mr. Nathaniel Fikru, University of Maryland, Louis Stokes Alliances for Minority Partnership Program, "Development of Multifunctional Wing Structures for Flapping Wing MAVs", 6/13-8/13

72. Mr. Howard Yeh, Case Western University, "Wind Tunnel Characterization of Flapping Wing MAVs using DIC", 6/13-8/13

73. Mr. Deepak Lingam, Johns Hopkins University, "Development of Novel Wing Structures for Flapping Wing MAVs", 6/13-8/13

74. Ms. Savannah Nolen, Tennessee Technological University, "Integrating Solar Cells into Flapping Wings of the Robo Raven, a MAV", 6/13-8/13

75. Ms. Mandy Tran, John F. Kennedy High School, "DIC-enhanced CFD Modeling of Compliant Multifunctional Wings for MAVs", 9/13-5/14

76. Ms. Hannah Cetuk, Eleanor Roosevelt High School, "Engineering of Carbon-metal Interfaces", 9/13-8/14

77. Mr. Darius Quach, "Electroplating of Carbon Fibers for Carbon-Metal Connections",

6/14-11/14

78. Mr. Brendenn Davis, Charles H. Flowers High School, "Mechanics of Robo Raven", 9/14-5/15

79. Ms. Rachel Gehlhar, University of St. Thomas, "Enhancement of Solar Cell Wings for Robotic Birds", 6/14-8/14

80. Mr. Micah Segal, University of Maryland, "Mechanics of Advanced Composite Structures", 9/14-5/16

81. Mr. Julian Lofton, University of Maryland, "Compliant Sensors for Robotics", 8/14-5/16

82. Mr. Joshua Spokes, University of Maryland, "Multiscale Carbon-based Compliant Sensors", 8/15-8/16

83. Mr. John Amigos, John F. Kennedy High School, "Multifunctional Wing Structures for Harvesting and Storing Solar Energy", 9/15-5/16

84. Mr. David Edelen, University of Maryland, "Multimaterial Fused Deposition Modeling for Aerospace Structures", 9/15-2/16

85. Ms. Abriana Stewart-Height, University of Maryland, "Flexible Multifunctional Structures for Bio-inspired Robots", 9/16-5/17

86. Mr. Jeffrey Ge, University of Maryland, "Additive Manufacturing of Biosensors and Heat Exchangers", 6/17-5/18

87. Mr. Mikhail Khrenov, Montgomery Blair High School, "Robotic 3D Digital Image Correlation", 6/17-8/17

88. Mr. Keene Chin, UT-Dallas, "Morphing Wing Structures for Robo Raven", 6/17-8/17

89. Ms. Alisha Piazza, University of Seattle, "Multifunctional Compliant Wing Structures for Energy Storage and Harvesting", 6/17-8/17

90. Ms. Ashley Newman, University of Seattle, "Inertial Control of Flapping Wing Air Vehicles", 6/18-8/18

91. Ms. Hannah Solheim, University of Seattle, "Enhanced Energy Harvesting Structures for Flapping Wing Air Vehicles", 6/18-8/18

92. Ms. Karla Negrete, University of Seattle, "Advanced Actuation Concepts for Flapping Wing Air Vehicles", 6/18-8/18

93. Ms. Hannah Benson, Ohio University, "3D Printed Actuator with Variable Stiffness using Layer Jamming Technology", 6/19-8/19

94. Mr. Zachary Weiss, Swarthmore University, "Huginn: Eye in the Sky", 6/19-8/19

95. Mr. Rafael Pederson, University of Maryland, "Design of Additively Manufactured

Biomedical Devices", 6/19-5/20

**3.e.ii Graduate Students**

1. Mr. Hubert Schreier, Ph.D., University of South Carolina, "In-Situ Surface Measurements of Temperature and 3-D Deformation Fields During Structural Joining Processes", 8/97-8/98 (Co-advised with Prof. Michael A. Sutton)

2. Mr. Tilman Seidel, Ph.D., University of South Carolina, "Measurement and Modeling of Temperature Fields during Friction Stir Welding", 6/98-8/98 (Co-advised with Prof. Anthony Reynolds)

**3.e.iii Other advising activities (advising student groups, special assignments, recruiting, etc.).**

1. Advisor, UMD SEM Student Chapter (20 students), 2003-2005

**3.f. Advising: Research Direction**

**3.f.ii Master's Thesis Students**

1. Mr. Harishbabu Surendranath, MS, 2001, University of Maryland, "Design Optimization Using Functionally Graded Material Concepts", 8/99-8/01, Committee: Prof. Amr Baz, ME; Prof. S.K. Gupta, ME (Currently employed by HKS, Inc., Providence, Rhode Island)

2. Mr. Charles Moore, MS, 2001, University of Maryland, "Shape Control of Structures with SMA Wire Reinforcement", 1/99-3/01, Committee: Prof. Amr Baz, ME; Prof. Inder Chopra, AE (Currently employed by Ford Motor Company, Detroit, MI) (*Recipient of the University of Maryland's George R. Irwin Centennial Research Award, 2000*)

3. Mr. Michael L. Pines, MS, 2004, University of Maryland, "Pressureless Sintering of Powder Processed Functionally Graded Metal-Ceramic Plates", 2/03-11/04, Committee: Prof. Abhijit Dasgupta, Assoc. Prof. Pat McCluskey (Currently employed by Army Research Laboratory, Aberdeen, MD)

4. Mr. Lawrence S. Gyger, Jr., MS, 2006, University of Maryland, "Thermal and Thermomechanical Behavior of Multi-Material Molded Modules with Embedded Electronic Components for Biologically-Inspired and Multi-Functional Structures", 1/05-8/06, Committee: Prof. Satyandra K. Gupta, Prof. Abhijit Dasgupta (Currently employed by Whiting-Turner, Baltimore, MD)

5. Mr. Jonathan Kruft, MS, 2007, University of Maryland, "Pressureless Sintering of Powder Processed Graded Metal-Ceramic Composites Using a Nanoparticle Sintering Aid and Bulk Molding Technology", 6/05-1/07, Committee: Prof. Satyandra K. Gupta, Prof. Patrick McCluskey (Currently employed by NSWC-Carderock, Carderock, MD).

6. Mr. Alexander Hauck, MS, 2010, Hochschule Mannheim, "Dynamic Mechanical Characterization of Homogeneous and Heterogeneous Materials using Impact Testing and Digital Image Correlation", 9/09-4/10 (Currently with Altek, Munich, Germany)

7. Mr. Curtis Sharkey, MS, University of Maryland, "Mechanical Response of K-and X-Cor Composite Sandwich Structures", 6/09-5/11 (Withdrew from program to assume

position at NAWCAD, Pax River, MD)

8. Ms. Kelsey Cellon, MS, 2010, University of Maryland, "Characterization of Flexible Flapping Wings and the Effects of Solar Cells for Miniature Air Vehicles", 1/10-12/10, Committee: Prof. Satyandra K. Gupta, Prof. Sarah Bergbreiter (Currently commissioned as an Ensign in the U.S. Navy)

9. Mr. Frank Robinson, MS, 2011, University of Maryland (co-advised with Prof. Avi Bar-Cohen), "Thermomechanical Behavior of Polymer Composite Heat Exchangers", 5/10-8/11, Committee: Prof. Avi Bar-cohen, Prof. Satyandra K. Gupta, Prof. Abhijit Dasgupta (Currently employed by NASA-Goddard, Greenbelt, MD)

10. Ms. Bianca Brandveen, MS, 2013, University of Maryland, "Mechanics of Pin-reinforced Composite Structures", 8/11-5/13 (Currently employed by Northrop Grumman Corporation, Baltimore, MD)

11. Mr. Joe Puishys, III, MS, 2013, University of Maryland, "Characterization of Mixed Mode Energy Release Rates in Laminated Composites using Digital Image Correlation", 1/12-12/12, Committee: Prof. Sung Lee, Prof. Abhijit Dasgupta (Currently commissioned as an Ensign in the U.S. Navy) (*Recipient of Best Master's Thesis in Department of Mechanical Engineering, 2013*)

12. Ms. Elizabeth Sauerbrunn, MS, 2014, University of Maryland, "Characterization of Exfoliated Graphite and Latex Composite as Temperature Sensors to Produce Thermal Images", 8/13-8/14, Committee: Prof. Elisabeth Smela, Prof. Miao Yu (Currently working for Boeing Company, Philadelphia, PA) (*Recipient of NASA NSTRF Graduate Fellowship, 2013)*

13. Mr. Prakhar Singh, MS, 2014, University of Maryland, "Characterization of Fatigue Crack Growth in Unidirectional Carbon Fiber Epoxy Composites using Digital Image Correlation", 1/13-5/14, Committee: Prof. Sung Lee, Prof. Patrick McCluskey (Currently working for Volvo Group, Hagerstown, MD)

14. Mr. Christopher Bilger, MS, 2014, University of Maryland, "Mechanical and Electrical Properties of Carbon-Metal Connections for Battery Applications", 8/13-12/14, Committee: Prof. Abhijit Dasgupta, Prof. Patrick McCluskey (Currently working for U.S. Government, Langley, VA)

15. Mr. Oleg Popkov, MS, 2015, Hochschule Mannheim "A New Self-sensing Rectilinear Robotic Arm", 8/13-1/15 (Currently working for Bertrandt Ingenieruburo GmbH, Munich, Germany)

16. Mr. Nathan Marshall, "A Hybrid Selective Laser Sintering and Laser Cutting Machine", 12/16-5/17 (withdrew from program due to reassignment by Navy)

**3.f.iii Doctoral Thesis Students**

1. Dr. Frederick M. Gallant, Ph.D., 2003, University of Maryland, "Twin-Screw Extrusion Processing of Functionally Graded Composite Energetic Materials", 8/00-11/03, Committee: Prof. Amr Baz, ME; Prof. Davinder K. Anand, ME; Prof. David I. Bigio, ME; Prof. Robert M. Briber, MatE (passed qualifying exam in Spring 2002, defended dissertation in November 2003, currently employed by Indian Head-Naval Surface Warfare Center and as an adjunct faculty at the Southern Maryland Higher

Education Center)

2. Dr. Huiqing Jin, Ph.D., 2004, University of Maryland, "New Metrological Technique for Mechanical Characterization at the Microscale and Nanoscale", 8/99-12/04, Committee: Prof. Amr Baz, Prof. Abhijit Dasgupta, Prof. Amde Amde, Assoc. Prof. Bongtae Han, Research Assoc. Prof. Jamie Cardenas (passed qualifying exam in Spring 2001, coursework completed in Spring 2002, defended dissertation in December 2004, received degree in May 2005, currently employed by Sandia National Laboratories, Livermore, CA) (*Recipient of Best Poster Award, Greater Washington Nanotechnology Alliance Fall 2003 Symposium, Laurel, MD, Nov. 25th, 2003;Recipient of Irwin Centennial Travel Award, 2004*)

3. Mr. Swaminathan Gowrisankaran, PhD, University of Maryland, "Burn Rate and Performance Modeling of Functionally Graded Energetic Materials", 8/01-8/03 (Passed qualifying exam in Spring 2003, passed away 8/03)

4. Dr. Arun K. Kota, PhD, 2008, University of Maryland, "Processing-Structure-Microstrutcure-Property Relationships in Polymer Nanocomposites", 8/03-1/08, Committee: Prof. Abhijit Dasgupta, Assoc. Prof. Srini Raghavan, Assoc. Prof. David Bigio, Asst. Prof. Santiago Solares (Passed qualifying exam in Spring 2005, coursework completed in Fall 2006, defended dissertation in December 2007, post-doctoral research associate at University of Pennsylvania Department of Materials Science and Engineering, post-doctoral research associate at University of Michigan, currently Assistant Professor in Department of Mechanical Engineering, North Carolina State University, formerly Assistant Professor in Department of Mechanical Engineering at Colorado State University) (*Recipient of Irwin Centennial Travel Award, 2005&2007, Block Grant Fellowship Award, 2003-2005, Award of Excellence in the Mechanics, Modeling, and Predictions category at the Graduate Research Interaction Day, 2007, Society of Plastics Engineers Travel Grant,, 2007, Society of Plastics Engineers Certificate of Merit for Best Research Poster at Polymer Nanocomposites Conference, 2008, North American Thermal Analysis Society Travel Grant for Outstanding Original Contribution to the field of Thermal Analysis, 2008, Jacob K. Goldhaber Travel Award, 2008*)

5. Dr. Daniel P. Cole, PhD, University of Maryland, "Fabrication and Characterization of Compositionally-graded Shape Memory Alloy Films", 8/04-2/09 (Passed qualifying exam in Spring 2006, defended dissertation February 2009, currently employed by Motile Robotics, Aberdeen, MD) (*Recipient of Irwin Centennial Travel Award, 2007, Robert M. and Mary Haythornthwaite Foundation Travel Grant, 2008, NRC Post-doctoral Fellowship, 2009*)

6. Dr. Alan L. Gershon, PhD, University of Maryland, "Multiscale Mechanical Characterization and Modeling of Hiearchically-structured Materials: Synthetic Nano-enhanced Polymers and Natural Palmetto Wood", 8/04-5/09 (Passed qualifying exam in Spring 2005, coursework completed in Fall 2006, defended dissertation in April 2009, currently employed by Nanomotion, Yokneam, Israel) (*Recipient of Irwin Centennial Travel Award, 2007*)

7. Dr. Brad Boyerinas, PhD, University of Maryland, "Transversely Modulated Heterophase Nanostructures", 8/09-5/13 (Passed qualifying exam in Spring 2010, proposal defense in August 2012, defended dissertation in May 2013, currently a post-doctoral research associate at NIST, Gaithersburg, MD)

8. Dr. Sandip Haldar, PhD, University of Maryland, "Multifunctional Hierarchically-Structured Polymer Composites", 8/09-5/13 (Passed qualifying exam in Spring 2010, Proposal defense in August 2011, defended dissertation in April 2013, Currently an Assistant Professor at Indian Institute of Technology-Goa) (*Recipient of Irwin Centennial Travel Award, 2011 and 2012, Robert M. and Mary Haythornthwaite Foundation Travel Grant, 2012, NSF Summer Institute Course on Novel Super-resolution Methods for Bioimaging Fellowship, 2013, ASME AMD Travel Award for IMECE 2013, NSF-PACAM Travel Scholarship, 2013)*

9. Dr. Josh Balsam, PhD, University of Maryland, "Principles for New Optical Techniques in Medical Diagnostics for mHealth Applications", 1/10-5/14 (passed qualifying exam in Spring 2013, Proposal defense in August 2013, defended dissertation in April 2014, currently at the Food and Drug Administration, White Oak, MD) (*Recipient of ORISE Fellowship, 2012-2013*)

10. Dr. Ariel Perez-Rosado, PhD, University of Maryland, "Design, Fabrication, and Performance Characterization of Multifunctional Structures to Harvest Solar Energy for Flapping Wing Aerial Vehicles", 8/11-2/16 (passed qualifying exam in Spring 2013, Proposal defense in August 2014, defended dissertation in 2014, currently Mechanical Systems Engineer at Adcole Maryland Aerospace, LLC, Rockville, MD) (*Recipient of Sloan Fellowship, 2013-2016*)

11. Dr. Jeffrey L. Gair, PhD, University of Maryland, "Effects of CNT Reinforcement on Thermally Activated Healing of Carbon-fiber Reinforced Thermoplastic Matrices", 1/11-5/17 (Passed qualifying exam in April 2013, proposal defense in August 2016, defended dissertation in May 2017, currently at ARL-Aberdeen)

12. Dr. Scott Rauscher, PhD, University of Maryland, "Force Sensing by Electrical Contact Resistance in SOI-DRIE MEMS", 8/12-11/17 (passed qualifying exam in Spring 2014, defended proposal in August 2016, defended dissertation in November 2017, currently at Harris Corporation) (Co-advised with Don Devoe)

13. Dr. Alex E. Holness, PhD, University of Maryland, "Strategies for Enhancing Performance of Flapping Wing Aerial Vehicles using Multifunctional Structures and Mixed Flight Modes", 8/13-8/17 (passed qualifying exam in Spring 2015, defended proposal in December 2016, defended dissertation in August 2018, currently at Advanced Technology & Research, Highland, MD) (*Recipient of LSAMP Bridge-to-the-Doctorate Fellowship, 2013-2015*)

14. Dr. Daniel C. Hart, PhD, University of Maryland, "Predicting Failure Mechanisms of Adhesively Bonded Thick Metallic and Composite Adherends", 8/13-12/19 (defended dissertation in December 2019)

15. Dr. Cory R. Knick, PhD, University of Maryland, "Fabrication and Characterization of Nanoscale Shape Memory Alloy MEMS Actuators", 1/16-7/20 (defended dissertation July 2020)

16. Dr. Jerald Armen, PhD, University of Maryland, "In-situ Additive Manufacturing of Metals for Embedding Parts Compatible with Liquid Metals to Enhance Thermal Performance of Avionics for Spacecraft", 8/13-11/20 (Advanced to candidacy in Spring 2019, defended dissertation in November 2020)

17. Mr. Luis Santos, PhD, University of Maryland, "Design and Characterization of Additively Manufactured Lightweight Metal Structures with Equivalent Compliance and Fatigue Resistance", 8/16-7/21 (advanced to candidacy in Summer 2019, defended dissertation in July 2021)

18. Mr. Ruben Acevedo, PhD, University of Maryland, "Programmable Multifunctional Actuator Arrays", 1/17-4/21 (Completed dissertation with Prof. Ryan Sochol)

19. Mr. Paul A. Lara, PhD, University of Maryland, "Strength and Fatigue Performance of Aluminum Structural Configurations Subjected to Seaway Loadings", 8/13-2/22 (defended dissertation in February 2022)

20. Ms. Lena Johnson, PhD, University of Maryland, "Multifunctional Morphing Wings", 8/16-present (passed qualifying exam in Spring 2017, advanced to candidacy in Fall 2019)

21. Mr. Jeremy Hill, PhD, University of Maryland, "Environmental Effects on the Mechanical Behavior of Sealants", 8/16-1/20 (withdrew from program due to change in position at NAVAIR)

### 3.f.iv Post-doctoral Research Associates

1. Dr. Rajath Mudalamane, "Lattice-Boltzmann Modeling of Microchannel Flow", 6/03-11/03

2. Dr. Y.M. Shabana, "Modeling Pressureless Sintering of Functionally Graded Metal-Ceramic Composites", 2/04-11/04

3. Dr. Minghui Yang, "Development of Biosensors for Food Safety Using Au Nanoparticles and CNTs", 2/08-9/09

4. Dr. Mark Kujawski, "Development and Characterization of Self-sensing Multifunctional Robotic Structures", 4/11-6/11

5. Dr. Sandip Haldar, "Deformation Characterization of Failure Mechanisms in Advanced Composite Structures using Digital Image Correlation", 7/13-9/14

6. Dr. Ye Qin, "Advanced Manufacturing of Multifunctional Skin Structures", 12/15-12/16

## 4. SERVICE

### 4.a Professional Organizations

#### 4.a.i Offices and committee memberships held in professional organizations

| | |
|---|---|
| Secretary, Composites Technical Division, Society for Experimental Mechanics | 2000-2002 |
| Vice-chair, Composites Technical Division, Society for Experimental Mechanics | 2002-2003 |
| Chair, Research Committee, Society for Experimental Mechanics | 2003-2009 |
| University Representative, Greater Washington Nanotechnology Alliance Organizing Committee | 2003-2005 |
| Liaison, Applied Mechanics Division Materials Processing and Manufacturing Committee & Materials Division Composites and | 2004-2008 |

| | |
|---|---|
| Heterogeneous Materials Committee, American Society for Mechanical Engineers | |
| At-large member, Executive Board, Society for Experimental Mechanics | 2009-2011 |
| National Meetings Council, Society for Experimental Mechanics | 2009-2011 |
| Member, International Advisory Board, *Experimental Mechanics* | 2011-present |
| Member, Fellows Committee, Society for Experimental Mechanics | 2018 |
| Vice-chair, Fellows Committee, Society for Experimental Mechanics` | 2019 |
| Chair, Fellows Committee, Society for Experimental Mechanics | 2020 |
| Member, DIC Challenge Board, iDICs and Society for Experimental Mechanics | 2017-present |

**4.a.ii Reviewing activities for agencies**

| | |
|---|---|
| National Defense Science and Engineering Graduate Fellowship Review Committee | 1998 |
| Proposal Reviewer, Unsolicited Program, National Science Foundation, Division of Civil & Mechanical Systems | 1999 |
| Proposal Reviewer, "XYZ on a Chip" Program. National Science Foundation, Division of Civil & Mechanical Systems | 2000 |
| Proposal Reviewer, United States Civilian Research and Development Foundation | 2001,2006 |
| Proposal Reviewer, University of California Energy Institute | 2002,2004 |
| Proposal Reviewer, South Carolina Space Grant Consortium | 2002 |
| Proposal Reviewer, Swiss Federal Institute of Technology Zurich | 2004 |
| Proposal Reviewer, South Carolina DoD EPSCOR program | 2004 |
| Proposal Reviewer, "Innovations in Cancer Sample Preparation" RFP, National Cancer Institute, National Institute of Health | 2005 |
| Technical Review Committee, Food and Drug Administration | 2007 |
| Proposal Reviewer, Unsolicited Program, National Science Foundation, Division of Civil, Mechanical, and Manufacturing Innovation | 2008 |
| Proposal Reviewer, CORE Program, Fonds National de la Reserche Luxembourg | 2008 |
| Proposal Reviewer, South Carolina NASA EPSCOR Program | 2009 |
| Proposal Reviewer, Florida Institute of Commercialization | 2010 |
| Proposal Reviewer, MTECH MIPS Program | 2010-2012 |
| Proposal Reviewer, Atlantic Innovation Fund, Atlantic Canada Opportunities Agency | 2012 |
| Proposal Reviewer, Unsolicited Program, National Science Foundation, Division of Materials Research, Metal and Metallic Nanostructures | 2011,2012 |
| Proposal Reviewer, Sheik Zayed Institute for Pediatric Surgical Innovation, Children's National Medical Center, Washington, DC | 2012 |
| Proposal Reviewer, Atlantic Innovation Fund, Atlantic Canada Opportunities Agency, Moncton, Canada | 2013 |
| Ad-Hoc Proposal Reviewer, Materials Processing and Manufacturing Program, CMMI, National Science Foundation, Arlington, VA | 2013 |
| Proposal Reviewer, Research North Dakota, North Dakota Department of Commerce, Bismarck, North Dakota | 2014-2017 |
| Proposal Reviewer, Mechanics of Multifunctional Materials Program, Air Force Office of Scientific Research, Arlington, VA | 2014,2018 |
| Proposal Reviewer, Swiss National Science Program, Zurich, Switzerland | 2014 |
| Proposal Reviewer, "DEMS" Program, National Science Foundation. Division of Civil, Mechanical, and Manufacturing Innovation | 2015 |
| Proposal Reviewer, SBIR Program, National Institutes of Health, Bethesda, MD | 2015 |

Proposal Reviewer, Deutscher Akademischer Austauschdienst, Bonn, Germany 2016
Proposal Reviewer, DMREF Program, CMII, National Science Foundation, Arlington, VA 2017
Proposal Reviewer, Swiss Federal Laboratories for Materials Science and Technology, Dubendorf, Switzerland 2017
Proposal Review, US-Israel Binational Science Foundation, Tel Aviv, Israel 2018

**4.a.iii Other unpaid services to local, state, and federal agencies**

None

**4.a.iv Other non-University committees, commissions, panels, etc.**

Instructor for ASME Nano Training Bootcamp 2005

**4.a.v International activities not listed above**

Session Co-Chair, "Novel Experimental Techniques III", VII International Congress on Experimental Mechanics, Nashville, TN 1996
Session Co-Chair, "TC-3 Fracture and Fatigue", *SES 2000*, Columbia, SC 2000
Symposium Co-Chair, "Symposium on Biologically Inspired Materials", *SEM IX International Congress*, Orlando, FL 2000
Session Chair, "Shape Memory Materials", *SEM IX International Congress*, Orlando, FL 2000
Session Chair, "Biologically Inspired Materials", *SEM IX International Congress*, Orlando, FL 2000
Session Chair, "Testing Methodologies for MEMS Characterization", SEM IX International Congress 2000
Symposium Chair, “Symposium on Biologically Inspired Materials & & Design”, *SEM Annual Conference & Exposition on Experimental and Applied Mechanics,* Portland, OR 2001
Invited Participant, *Indo-Us Workshop on Problems In Elastic Vibrations, Smart Structures and Their Solution Technologies*, Roorkee, India 2001
Invited Participant, *Virtual Community Workshop on Displacement Measurement Methods*, Wright Patterson Air Force Base, Dayton, OH 2001
Track Co-Chair, “Biologically Inspired and Multifunctional Materials & Systems”, *SEM Annual Conference & Exposition,* Milwaukee, WI 2002
Symposium Co-Chair, “Symposium on Research and Education in Experimental Mechanics (honoring Prof. James W. Dally)” *U.S. National Congress on Theoretical and Applied Mechanics*, Blacksburg, VI 2002
Conference Chair, “SEM Technical Conference on Mechanics of Biological And Biologically Inspired Materials”, Springfield, MA 2003
Track Co-Chair, “Expreriments in Bioengineering”, *SEM X International Congress & Exposition*, Costa Mesa, CA 2004
Symposium Chair, “Heterogeneous Materials and Systems”, *2004 IMECE*, Anaheim, CA 2004
Track Co-Chair, “Advanced Composites and Material Systems”, *2005 SEM Annual Conference and Exposition* 2005
Symposium Chair, “Processing of Advanced Composite Materials”, *2005 IMECE*, Orlando, FL 2005
Symposium Chair, “Processing of Advanced Composite Materials”, *2006 IMECE*, Chicago, IL 2006
Symposium Chair, “Processing of Advanced Composite Materials”, 2007

*2007 IMECE*, Seattle, WA
Symposium Co-Chair, "Symposum Honoring Prof. John W. Hutchinson", 2008
*2008 IMECE*, Boston, MA
Symposium Co-Chair, "Ballistic Shock Mitigation Materials and Technology 2009
for Protective System", *USNCCM X*, Columbus, OH
Conference Co-Chair, "SEM 2009 Fall Symposium and Workshop", Columbia, SC 2009
Conference Organizer, "SEM 2012 Northeast Graduate Student Symposium", 2012
College Park, MD
Organizing Committee, "ICEM 16", Cambridge, England 2014
Organizer, Student Paper Competition, "SES 2016", College Park, MD 2016
Scientific Committee, "14th International Conference on Fracture", 2017
Rhodes, Greece
Symposium Organizer, "The impact of Digital Image Correlation on Experimental 2018
Mechanics in the 21st Century" in Honor of Professor Michael A. Sutton,
Society for Experimental Mechanics Annual Conference & Exposition, Greenville, SC

**4.a.vi Reviewing Activities for Journals and Other Learned Publications**

Technical Reviewer for journal, Experimental Mechanics 1992-2018
Technical Reviewer for journal, Optics and Lasers in Engineering 1994-1996
Technical Reviewer for journal, Journal of Materials Processing and 1998
Manufacturing Science
Technical Reviewer for journal, Optical Engineering 1999,2002,2006-2007,2015
Technical Reviewer for journal, Journal of Strain Analysis for Engineering Design 1999
Technical Reviewer for journal, Journal of Intelligent Materials 1999, 2005
Systems and Structures
Technical Reviewer for journal, Journal of Applied Mechanics 1999
Technical Reviewer for journal, AIAA Journal 2000-2001,2014
Technical Reviewer for journal, International Journal of 2000-2001, 2003-2004,2014-2015
Solids and Structures
Technical Reviewer for journal, Metallurgical and Materials 2000,2008
Transactions
Technical Reviewer for journal, Nanotechnology 2002,2007
Technical Reviewer for journal, Microelectronics Reliability 2002
Technical Reviewer for journal, ASME Journal of Dynamic Systems, 2002
Measurement, and Control
Technical Reviewer for journal, Thin Solid Films 2002
Technical Reviewer for journal, Journal of Physics D:Applied Physics 2002,2006-2007
Technical Reviewer for journal, Journal of Composite Materials 2003-2007,2009,2104-2016
Technical Reviewer for journal, Materials Research Bulletin 2003,2006,2013
Technical Reviewer for journal, Acta Materialia 2003, 2016,2019
Technical Reviewer for journal, Composites Science and Technology 2004, 2017
Technical Reviewer for journal, Scripta Materialia 2005
Technical Reviewer for journal, Composites Part A 2005-2008,2013-2018
Technical Reviewer for journal, ASME Journal of Engineering Materials 2004-2005
and Technology
Technical Reviewer for journal, Materials Science and Engineering A 2006
Technical Reviewer for journal, Journal of Hazardous Materials 2006
Technical Reviewer for journal, Mechanics of Materials 2007
Technical Reviewer for journal, Pattern Recognition Letters 2007
Technical Reviewer for journal, Aerospace Science & Technology 2007
Technical Reviewer for journal, Surface & Coatings Technology 2007
Technical Reviewer for journal, Journal of Materials Science 2007-2008,2010-2017
Technical Reviewer for journal, Polymer 2008

Technical Reviewer for journal, Polymer Engineering & Science 2008-2009
Technical Reviewer for journal, Strain 2007-2009,2012
Technical Reviewer for journal, Materials Letters 2008,2015
Technical Reviewer for journal, Composites Part B 2008,2019
Technical Reviewer for journal, Journal of Strain Analysis for Engineering Design 2008, 2014
Technical Reviewer for journal, Journal of Biomechanics 2009
Technical Reviewer for journal, Mechanics of Materials 2009,2012-2013,2015
Technical Reviewer for journal, Macromolecules 2009
Technical Reviewer for journal, Materials Chemistry and Physics 2009
Technical Reviewer for journal, International Journal of Food Microbiology 2012,2015
Technical Reviewer for journal, Acta Biomaterialia 2012,2014-2016
Technical Reviewer for journal, Sensors and Actuators B 2013
Technical Reviewer for journal, Journal of Mechanical Engineering 2013-2014
Technical Reviewer for journal, BioResources 2013
Technical Reviewer for journal, Journal of Dynamic Behavior of Materials 2014-2015
Technical Reviewer for journal, Experimental Techniques 2014, 2017-2018
Technical Reviewer for journal, Materials Chemistry and Physics 2014
Technical Reviewer for journal, Scientific Reports 2014
Technical Reviewer for journal, Ultramicroscopy 2014,2016
Technical Reviewer for journal, Acta Rheologica 2014
Technical Reviewer for journal, Industrial Crops and Products 2014
Technical Reviewer for journal, Materials 2014
Technical Reviewer for journal, Applied Surface Science 2014
Technical Reviewer for journal, Structural and Multidisciplinary Optimization 2015
Technical Reviewer for journal, Materials & Design 2015
Technical Reviewer for journal, International Journal of Applied Ceramic Technology 2015
Technical Reviewer for journal, International Journal of Energetic Materials and Chemical Propulsion 2015
Technical Reviewer for journal, Materials 2015
Technical Reviewer for journal, AIMS Materials Science 2016
Technical Reviewer for journal, Measurement Science & Technology 2016
Technical Reviewer for journal, Journal of Materials Processing Technology 2016
Technical Reviewer for journal, Engineering Fracture Mechanics 2016-2017
Technical Reviewer for journal, Bioinspired and Biomimetics 2017
Technical Reviewer for journal, Materials and Design 2017
Technical Reviewer for journal, International Journal of Applied Glass Science 2017
Technical Reviewer for journal, Journal of Wind Engineering & Industrial Aerodynamics 2017
Technical Reviewer for journal, International Journal of Adhesion & Adhesives 2017
Technical Reviewer for journal, Journal of Aerospace Engineering 2018
Technical Reviewer for journal, Applied Sciences 2018
Technical Reviewer for journal, Journal of Alloys and Compounds 2018
Technical Reviewer for journal, Aerospace Science and Technology 2018
Technical Reviewer for journal, Journal of Renewable Materials 2019
Technical Reviewer for journal, Energy 2019
Technical Reviewer for journal, IEEE Access 2019
Technical Reviewer for journal, International Journal of Micro Air Vehicles 2019
Technical Reviewer for journal, Proceedings of the Royal Society A 2019
Technical Reviewer for journal, International Journal of Mechanical Sciences 2019

**4.b Campus**

**4.b.i Department**

**Department committees**

| | |
|---|---|
| Co-Chair, George Dieter Distinguished Lecture Series in Mechanics and Materials, Department of Mechanical Engineering, UMD | 2021-present |
| Graduate Committee, Department of Mechanical Engineering, UMD (Chair, 2010-2018) | 2001-2005,2010-2018 |
| ME Faculty Search Committee, Department of Mechanical Engineering, UMD | 2002 |
| Undergraduate Committee, Department of Mechanical Engineering, UMD | 2003-2010 |
| APT Committee for Prof. Elias Balaras, Department of Mechanical Engineering, UMD | 2006 |
| APT Committee, Department of Mechanical Engineering, UMD | 2008-2013 |
| Faculty Senate Representative, Department of Mechanical Engineering, UMD | 2008-2010 |
| APT Committee for Prof. Elisabeth Smela, Department of Mechanical Engineering | 2010 |
| APT Committee for Assoc. Prof. Teng Li, Department of Mechanical Engineering | 2011 |
| APT Committee for Assoc. Prof. Peter Chung, Department of Mechanical Engineering (Chair) | 2014 |
| APT Committee for Prof. Miao Yu, Department of Mechanical Engineering, UMD (Chair) | 2016 |
| APT Committee for Prof. Teng Li, Department of Mechanical Engineering, UMD (Chair) | 2017 |
| ME Self-study Committee, Department of Mechanical Engineering, UMD | 2011-2012 |
| ME Strategic Planning Committee, Department of Mechanical Engineering, UMD | 2011-2012 |
| ME Faculty Affairs Committee, Department of Mechanical Engineering, UMD | 2010-2018 |
| ME Academic Affairs Committee, Department of Mechanical Engineering, UMD (Chair, 2012-present) | 2012-2018 |
| ME/MSE Faculty Search Committee, Departments of Mechanical Engineering and Materials Science and Engineering, UMD | 2013 |
| ME Faculty Search Committee, Department of Mechanical Engineering, UMD | 2015 |

**Thesis and dissertation defense committees**

1. Cheng-Chieh Tu, MS, ME, 1999, "Effects of Exposure and Wettability of Solder on Various Board Finishes", Advisor: Marjorie Natishan

2. Daniel T. Casem, PhD, ME, 2000, “High Strain-rate Testing of Low-Impendance materials”, Advisor: William L. Fourney

3. Ramakrishna Arni, MS, ME, 2000, “Web-based Manufacturability Analysis for Solid Freeform Fabrication”, Advisor: Satyandra K. Gupta

4. Parthasarathy Srinivasan, MS, ME, 2000, “Reliability of Solder Die Attaches for a High Power Application”, Advisor: F. Patrick McCluskey

5. Malay Kumar, MS, ME, 2001, "Automated design of multi-stage molds for manufacturing multi-material objects", Advisor: Satyandra K. Gupta

6. Jeff Freemire, MS, ME, 2001, "Measurement of Deformations in Soft Tissues", Advisor: Stephen Belkoff (University of Maryland at Baltimore County)

7. Kunal Goray, MS, ME, 2001, "Durability of Surface Mount Assemblies Under Flexural Loads", Advisor: Abhijit Dasgupta

8. Thomas Kurian, MS, ME, 2001, "Dynamic Behavior and Stress Wave Propagation Through Porous Medium of Varying Saturation Levels", Advisor: William L. Fourney

9. Ramana Kumar Kaza, MS, ME, 2001, "Solid Free Form Design for Static Loading by Simple Isotropic Material with Penalization (SIMP) Approach", Advisor: Yu Michael Wang

10. Saravanakumar Velayudham, MS, ME, 2001, "Experimental Investigation of Underwater Explosive Channeling", Advisor: William L. Fourney

11. Miao Yu, PhD, ME, 2002, "Fiber Optic Sensor Systems for Acoustic Measurements", Advisor: Balakumar Balachandran

12. Alok Priyadarshi, MS, ME, 2002, "Geometric Algorithms for Automated Design of Multi-Piece Permanent Molds", Advisor: Satyandra K. Gupta

13. Kevin Cochran, MS, ME, 2003, "Development of a Micro Optical Switch Fabricated by Deep Reactive Ion Etching (DRIE) for High-Power Transfer Applications", Advisor: Donald L. Devoe

14. Rajath Mudalamane, PhD, ME, 2003, "Process Variations and the Transient Behavior of Extruders", Advisor: David I. Bigio

15. Xuejun Li, PhD, ME, 2003, "Geometric Algorithms for Automated Design of Multistage Molds for Manufacturing Multi-material Objects", Advisor: Satyandra K. Gupta

16. Zhaoyang Wang, PhD, ME, 2003, "Development and Application of Computer-aided Fringe Analysis", Advisor: Bongtae Han

17. Chris Baldwin, PhD, ME, 2003, "Distributed Sensing for Flexible Structures Using a Fiber Optic Sensor System", Advisor: Steve Buckley

18. Paul Elkouss, Ph.D., ME, 2004, "Physics Based Control and Modeling of Reactive Extrusion Processes", Advisor: David I. Bigio

19. Greg Fowler, MS, ME, 2004, "Cost and Performance Evaluation Models for Comparing Multi-shot and Traditional Injection Molding", Advisor: Satyandra K. Gupta

20. Sisir Nath, PhD, Math, 2004, "Some Problems of Recent Developments in Elastodynamics", Advisor: P.R. Sengupta (University of Kalyani, Kalyani, India)

21. Changwoon Han, PhD, ME, 2005, "Shadow Moire Using Non-zero Talbot Distance and Application of Diffraction Theory to Moire Interferometry", Advisor: Bongtae Han

22. Yunqi Zheng, PhD, ME, 2005, "Effect of Surface Finishes and Intermetallics on the Reliability

of Snagcu Interconnects", Advisor: Patrick Mccluskey

23. Nicolas Cornille, PhD, ME, 2005, "Accurate 3D Shape and Displacement Measurement using a Scanning Electron Microscope", Advisor: Jean-Jose Orteau (de L'institut National des Sciences Appliques de Toulouse", Elbi, France)

24. Kevin Uleck, PhD, Aero, 2005, "A Hybrid Model for Fatigue Life Estimation of Polymer Matrix Composites", Advisor: Anthony Vizzini

25. Raj Bahadur, PhD, ME, 2005, "Characterization, Modeling, and Optimization of Polymer Composite Pin Fins", Advisor: Avram Bar-Cohen

26. Ira Golden, MS, ME, 2005, "Development of a Bio-inspired Design Repository", Advisor: Satyandra K. Gupta

27. Alok Priyadarshi, PhD, ME, 2006, "Algorithms for generating multi-stage molding plans for articulated assemblies", Advisor: Satyandra K. Gupta

28. Leila Ladani, PhD, ME, 2006, "Damage Initiation and Evolution in Voided and Unvoided Lead Free Solder Joints Under Cyclic Thermo-Mechanical Loading", Advisor: Prof. Abhijit Dasgupta

29. Joseph Varghese, PhD, ME, 2006, "Effect Of Dynamic Flexural Loading On The Durability And Failure Site Of Solder Inteconnects Of Printed Wiring Assemblies", Advisor: Prof. Abhijit Dasgupta

30. Tao Peng, PhD, ME, 2006, "Algorithms and Models for 3-D Shape Measurement Using Digital Fringe Projections", Advisor: Prof. Satyandra K. Gupta

31. Brent Spranklin, MS, ME, 2006, "Design, Analysis, and Fabrication of a Snake-inspired Robot with a Rectilinear Gait", Advisor: Prof. Satyandra K. Gupta

32. Xuezheng Wang, PhD, ME, 2007, "Understanding Actuation Mechanisms of Conjugated Polymer Actuators: Ion Transport", Advisor: Elisabeth Smela

33. Mario Urdenata, PhD, ME, 2007, "Design of a Dielectrophoretic Cell Loading Device", Advisor: Elisabeth Smela

34. Zhuopeng Tan, PhD, MSE, 2008, "Formation and Piezoelectricity of Self-assembled Lead titanate-Cobalt iron oxide Nanostructural Films", Advisor: Alexander Roytburd

35. Paul Jawlik, MS, ME, 2008, "Effects of Ceria Addition on Nickel-YSZ Anodes in Solid Oxide Fuel Cells Operating on Hydrogen And Syngas Fuel Feeds", Advisor: Greg Jackson

36. Joshua Crone, MS, ME, 2008, "Quantitative Prediction of Tip-Sample Repulsive Forces and Sample Deformation in Tapping-Mode Frequency and Force Modulation Atomic Force Microscopy", Advisor: Santiago Solares

37. Nick Garcia, MS, ME, 2008, "Heavily Loaded Vehicle Tires: Analysis and Characterization", Advisor: Balakumar Balachandran

38. Pedro Quintero, PhD, ME, 2008, "Development Of A Shifting Melting Point Ag-In Paste Via Transient Liquid Phase Sintering For High Temperature Environments", Advisor: Patrick McCluskey

39. Arvind Ananthanarayanan, PhD, ME, 2009,"Development of In-mold Assembly Methods for Producing Mesoscale Revolute Joints", Advisor: Satyandra K. Gupta

40. Steven Decaluwe, PhD, ME, 2009, "Quantifying the Role of Cerium Oxide as a Catalyst in Solid Oxide Fuel Cells", Advisor: Gregory S. Jackson

41. Yasir Majeed, MS, ME, 2009, "Reliability Analysis of Fiber Optic Sensors for Structural Health Monitoring Applications", Advisor: Abhijit Dasgupta

42. Yong Wang, PhD, ME, 2009, "Integrated Measurement Technique to Measure Curing Process-dependent Mechanical and Thermal Properties of Polymeric Materials using Fiber Bragg Grating Sensors", Advisor: Bongtae Han

43. Ashis G. Banerjee, PhD, ME, 2009, "Automated Micro and Nanoscale Assembly Using Optical Tweezers", Advisor: Satyandra K. Gupta

44. Gayatri Cuddalorepatta, PhD, ME, 2010, "Evolution of the Microstructure and Viscoplastic Behavior of Microscale SAC305 Joints as a Function of Mechanical Fatigue Damage", Advisor: Abhijit Dasgupta

45. Danial Shahmirzadi, PhD, ME, 2010, "Experimental Characterization of Vascular Tissue Viscoelasticity with Emphasis on Elastin's Role", Advisor: Adam Hsieh

46. John Gerdes, MS, ME, 2010, "Design, Analysis, and Testing of a Flapping Wing Miniature Air Vehicle", Advisor: Satyandra K. Gupta

47. Stuart Douglas, MS, ME, 2010, "High Shock Accelerations Produced through Secondary Impact and its Effect on Board Level Reliability:, Advisor: Abhijit Dasgupta

48. Wojciech Bejgerkowski, PhD, ME, 2010, "In-Mold Assembly of Multifunctional Structures", Advisor: Satyandra K. Gupta

49. Tim Hall, MS, ME, 2011, "Manufacturability Analysis of Thermally-enhanced Polymer Composite Heat Exchangers", Advisor: Satyandra K. Gupta

50. Thomas Brewer, MS, ME, 2011, "Development of a Quadraped Robot and Parameterized Stair-Climbing Behavior, Advisor: Satyandra K. Gupta

51. Mohammad Nuhi Faridani, MS, RE, 2011, "Classification and Probabilistic Model Development for Creep Failures of Structures: Study of X-70 Carbon Steel and 7075-T6 Aluminum Alloys", Advisor: Mohammad Modarres

52. Ananth Virakthi, MS, AE, 2011, "Stiffness and Strength of Z-pin Reinforced K-Cor Sandwich Structure under Compression and Shear Loading Conditions", Advisor: Sung W. Lee

53. Atul Thakur, PhD, ME, 2011, "Physics-Aware Model Simplification for Interactive Virtual Environments", Advisor: Satyandra K. Gupta

54. William Pappas, MS, ME, 2011, "Characterization and Comparison of Stress History in Various Sized Twin-Screw Extruders using Residence Stress Distributions", Advisor: David I. Bigio

55. Dennis Mayo, PhD, Chemistry, 2011, "Synthesis of Aluminum Supramolecular Structures", Advisor: Bryan Eichhorn

56. Dwight Hunter, PhD, MSE, 2011, "Fabrication and Characterization of Giant Magnetorestrictive Films using the Combinatorial Method", Advisor: Ichiro Takeuchi

57. Kaushik Chatterjee, PhD, RE, 2011, "A Probabilistic Mechanistic Approach for Assessing the Rupture Frequency of Small Modular Reactor Steam Generator Tubes using Uncertain Inputs from In-service Inspections", Advisor: Mohammad Modarres

58. Michael Gaither, PhD, MSE, 2011, "Ultra-small Scale Mechanical Properties Measurement", Advisors: Isabel Lloyd and Robert Cook

59. Masou Rabiei, PhD, RE, 2011," A Bayesian Framework for Structural Health Management using Acoustic Emission Monitoring and Periodic Inspections", Advisor: Mohammad Modarres

60. Zhao Zhang, PhD, ME, 2011, "Morphological Instability of Graphene and Its Potential Applications", Advisor: Teng Li

61. Gilad Sharon, PhD, ME, 2011,"Modeling the Physics of Failure for Electronic Packaging Components Subjected to Thermal and Mechanical Loading", Advisor: Don Barker

62. Uli Leiste, PhD, ME, 2012, "Experimental Studies to Investigate Pressure Loading on Target Plates", Advisor: William L. Fourney

63. Robert Boettcher, MS, ME, 2012, "Arcing Failure of RoHS Compliant Electromagnetic Relays", Advisor: Patrick McCluskey

64. Ehsan Mirgabi, MS, ME, 2012, "Investigation of Wear Characteristics of Conical Delrin Thrust Bearings", Advisor: Abhijit Dasgupta

65. Anne Lederer, MS, ME, 2012, "Characterization of Physical Properties of Multi-Scale Polymer Composites Under Various Processing Conditions", Advisor: David I. Bigio

66. Andrew Vogel, MS, ME, 2013, "Design of Compliance Assisted Gaits for a Quadrupedal Amphibious Robot", Advisor: Satyandra K. Gupta

67. Azadeh Keshtgar, PhD, RE, 2013, "Acoustic Emission-Based Structural Health Management and Prognostics Subject to Small Fatigue Cracks", Advisor: Mohammad Modarres

68. Juan Cevallos, PhD, ME, 2013, "Thermal and Manufacturing Design of Polymer Composite Heat Exchangers", Advisor: Avram Bar-Cohen

69. Victor Ontiveros, PhD, RE, 2013, "Strain Energy and Thermodynamic Entropy as Prognostic Measures of Crack Initiation in Aluminum", Advisor: Mohammad Modarres

70. Jarrod Bonsmann, PhD, ME, 2013, "Small Scale Testing to Study Mitigation of Acceleration on Simulated Vehicles", Advisor: William L. Fourney

71. Jarrett Leeds, PhD, Chemistry, 2013, "Application of Small Molecule-Carbon Nanotube Interactions", Advisors: John T. Fourkas and YuHuang Wang

72. James Hopkins, PhD, ME, 2013, "Design and Analysis of Exaggerated Rectilinear Gait-Based Snake Inspired Robots", Advisor: Satyandra K. Gupta

73. Sagar Chowdhury, PhD, ME, 2013, "Planning for Automated Optical Micromanipulation Of Biological Cells", Advisor: Satyandra K. Gupta

74. Andy Fox, PhD, ME, 2014, "Fracture Behavior and Thermal Conductivity of Polycrystalline Graphene", Advisor: Teng Li

75. Benjamin William Warner, MS, ME 2014, "Finite-Discrete Element Method Simulations of Colliding Red Blood Cells", Advisor: Santiago Solares

76. Abdallah Al Tamimi, PhD, RE, 2014, "Improved Probabilistic Remaining Useful Life Estimation in Engineering Structures: Modeling Multi-Site Fatigue Cracking", Advisor: Mohammad Modarres

77. Graeme Fukuda, MS, ME, 2014, "A New Scale-Up Approach Through the Evaluation of Stress History Within a Twin-Screw Extruder", Advisor: David Bigio

78. Stephen Mark Oursler, MS, ME, 2014, "A Proposed Mechanical-Metabolic Model of the Human Red Blood Cell", Advisor: Santiago Solares

79. Subhasis Mukherjee, PhD, ME, 2014, "Multiscale Modeling of Anisotropic Creep Response of SnAgCu Single Crystal Solder Joints", Advisor: Abhijit Dasgupta

80. Yong-sik Kim, PhD, ME, 2014, "Design of Three Degrees-of-freedom Motion Stage of Micro Manipulation", Advisor: Satyandra K. Gupta

81. Zheng Jia, PhD, ME, 2014, "Failure Mechanics of Functional Nanostructures in Advanced Technologies", Advisor: Teng Li

82. Ed Habtour, PhD, ME, 2015, "Damage Precursor Detection in Structures Under Uniaxial and Multiaxial Vibration: Nonlinear Approach", Advisor: Abhijit Dasgupta

83. Isaac Leventon, PhD, ME, 2015, "Prediction of Upward Flame Spread over Polymers", Advisor: Stanislav Stoliarov

84. Anahita Imanian, PhD, RE, 2015, "An Entropic Theory of Damage with Applications to Corrosion-Fatigue Structural Integrity Assessment", Advisor: Mohammad Modarres

85. Ellis Feldman, PhD, RE, 2016, "A Meta-Data Informed Expert Judgment Aggregation and Calibration Technique", Advisor: Ali Mosleh

86. Yong Sun, PhD, ME, 2016, "Characterization of Non-Linear Polymer Properties To Predict Process Induced Warpage and Residual Stress pf Electronic Packages", Advisor: Bongtae Han

87. Elaheh Rabiei, PhD, RE, 2016, "Damage Precursor Based Structural Health Monitoring and Prognostic Framework Using Dynamic Bayesian Network", Advisors: Enrique Droguett and Mohammad Modarres

88. Alexi Charalambides, PhD, ME, 2016, "Microfabricated elastomer tactile sensors for

robotic fingertip system", Advisor: Sarah Bergbreiter

89. Ben Dryer, MS, ME, 2016, "Experimental Modeling of Twin-Screw Extrusion Processes to Predict Properties of Extruded Composites", Advisor: David Bigio

90. Brual Shah, PhD, ME, 2016, "Planning for Autonomous Operation of the Unmanned Surface Vehicles", Advisor: Satyandra K. Gupta

91. Christine Sauerbrunn, MS, RE, 2016, "Evaluating Information Entropy from Acoustic Emission Waveforms as a Fatigue Damage Metric For AL7075-T6", Advisor: Mohammad Modarres

92. Dana Vogtmann, PhD, ME, 2016, "Design, Modeling, and Fabrication of Microrobot Legs", Advisor: Sarah Bergbreiter

93. Jason Nixon, PhD, ME, 2016, "Characterization of Property -Structure Dependencies for Multi-Scale Polymer Composites Using Extrusion ProcesseS", Advisor: David Bigio

94. Martinus Arie, PhD, ME, 2016, "Air Side Heat Transfer Enhancement In Heat Exchangers Utilizing Innovative Designs and the Additive Manufacturing Technique", Advisor: Michael Ohadi

95. Lena Johnson, MS, ME, 2016, "SUR Hand: A Soft Underactuated Robotic Hand", Advisor: Satyandra K. Gupta

96. Adam Barrett, MS, RE, 2017, "An Investigation on the Effect of External Conditions on the Reliability of Aircraft Inspections", Advisor: Mohammad Modarres

97. Nitish Balakrishnan, MS, ME, 2017, "Validation of Residence Stress Distribution Methodology Using 1-D Computer Simulations", Advisor: David I. Bigio

98. Dave Horst, MS, ME, 2018, "An Alternative to Hydraulic Fracturing: An Explosively Driven Mechanical Device", Advisor: William L. Fourney

99. Seyed Ali Moeini, PhD, ME, 2017, "Mesoscale Microstructure Evolution Reliability and Failure Analysis of High Temperature Transient Liquid Phase Sintering Joints", Advisor: Patrick McCluskey

100. Ananth Vikrathi, PhD, AE, 2018, "Z-pinning Techniques and Modeling in Composite Laminates and X-Cor Sandwich Structures", Advisor: Sung Lee

101. Galen Mullins, PhD, ME, 2018, "Adaptive Test Generation Methods for Autonomous Vehicles", Advisor: Satyandra K. Gupta

102. John Gerdes, PhD, ME, 2018, "Improved Prediction of Flapping Wing Aerial Performance through Component Interaction Modeling", Advisor: Satyandra K. Gupta

103. Michael Kuhlman, PhD, ME, 2018, "Trajectory Planning for Autonomous Vehicles Performing Information Gathering Tasks", Advisor: Satyandra K. Gupta

104. Rushit Shah, MS, ME, 2018, "Fault Detection Framework for Imbalanced and

Sparsely-labeled Data Sets using Self-organizing Maps", Advisor: Michael Pecht

105. Matthew Draper, PhD, MS, 2018, "Structural Evolution During Thermal Treatments and ehe Resultant Mechanical Behavior of High Yield Low Alloy Steels", Advisor: Sreeramamurthy Ankem

106. Neil Dalal, MS, ME, 2018, "Influence of Gas Flow Rates on Trace Quality And Reliability in a Selected Conductor Ink Printed with an Aerosol Jet Printer", Advisors: Abhijit Dasgupta and Siddhartha Das

107. Subramani Manoharan, PhD, ME, 2018, "Reliability of Thermosonically Bonded Copper Wire on Aluminum Pad in Microelectronic Devices", Advisor: Patrick McCluskey

108. Hao Huang, PhD, ME, 2019, "Mechanical Characterization of Pressure-Sensitive Adhesive Bonded Assembly", Advisor: Abhijit Dasgupta

109. Johnny Russo, PhD, ME, 2019, "Tritiated Nitroxide for Betavoltaic Cell Nuclear Battery: 3d Beta Flux Modeling, Synthesis, Stability Analysis, and Coating Techniques", Advisor: David I. Bigio

110. Connor Armstrong, MS, ME, 2019, "Dynamic Control of Fiber Orientation for Additive Manufacturing using A Soft-Actuating Extrusion Nozzle", Advisors: David I. Bigio and Ryan D. Sochol

111. Jason Morin, MS, ME, 2019, "Comparison of High Strain Rate Properties of Additively Manufactured and Wrought Inconel 625 Via Kolsky Bar Testing", Advisor: William L. Fourney

112. Jennifa Li, PhD, ME, 2019, "Effect of Ferroelectric Properties on Mechanical Behavior of Class II Multilayer Ceramic Capacitors", Advisor: Patrick McCluskey

113. Jian Cheng, PhD, ME, 2019, "Deformation Mechanics of Soft Matter under External Stimuli", Advisor: Teng Li

114. Nick Jankowski, PhD, ME, 2020, "Phase Change Materials For Vehicle And Electronic Transient Thermal Systems", Advisor: Patrick McCluskey

115. Fabio Battaglia, PhD, ME, 2020, "Design and Experimental Characterization of Metal Additive Manufactured Heat Exchangers for Aerospace Application", Advisor: Michael Ohadi

**Ph.D. qualifying committees**

Eric Luft, Mechanics and Materials Program, 1998
Miao Yu, Mechanics and Materials Program, 1999
Saeed Asiri, Mechanics and Materials Program, 2000 (Chaired)
Mary Leibolt, Mechanics and Materials Program, 2000 (Chaired)
Hongqiang Zhang, Mechanics and Materials Program, 2000
He Li, Mechanics and Materials Program, 2001 (Chaired)
Huiqing Jin, Mechanics and Materials Program, 2001
Xiaoquan Wang, Mechanics and Materials Program, 2001 (Chaired)
Frederick M. Gallant, Mechanics and Materials Program, 2002

Zhihua Yue, Mechanics and Materials Program, 2002 (Chaired)
Adel El Sabbagh, Mechanics and Materials Program, 2002 (Chaired)
Swami Gowrisankaran, Mechanics and Materials Program, 2003
Arun Kota, Mechanics and Materials Program, 2004
Alan Gershon, Mechanics and Materials Program, 2005
Ulrich Leiste, Mechanics and Materials Program, 2008 (Chaired)
Gaurav Chawla, Mechanics and Materials Program, 2008 (Chaired)
Jaspreet Gandhi, Electronic Packaging Systems Program, 2009
Alan Wright, Mechanics and Materials Program, 2009
Hyungdae Bae, Mechanics and Materials Program, 2009
Baoguang Yan, Reliability Program, 2009
Brad Boyerinas, Mechanics and Materials Program, 2010
Sandip Haldar, Mechanics and Materials Program, 2010
Ed Habtour, Mechanics and Materials Program, 2010 (Chaired)
Fei Chai, Electronic Packaging Systems Program, 2011
Jeff Gair, Mechanics and Materials Program, 2011
Zheng Jia, Mechanics and Materials Program, 2011 (Chaired)
Ryan Knight, Mechanics and Materials Program, 2011
Subhasis Mukherjee, Mechanics and Materials Program, 2011
Andy Fox, Mechanics and Materials Program, 2012
Yinjun Huang, Mechanics and Materials Program, 2012
Sungmin Park, Mechanics and Materials Program, 2012
Ariel Perez-Rosado, Mechanics and Materials Program, 2013
Josh Balsam, Mechanics and Materials Program, 2013
John Gerdes, Design and Reliability of Systems Program, 2013 (Chaired)
Nadir Shah, Design and Reliability of Systems Program, 2013 (Chaired)
Daniel Hart, Mechanics and Materials Program, 2014
Paul Lara, Mechanics and Materials Program, 2014
Mona Mirzaei, Mechanics and Materials Program, 2014 (Chaired)
Luke Roberts, Mechanics and Materials Program, 2014 (Chaired)
Alex Holness, Design and Reliability of Systems Program, 2015
Brual Shah, Design and Reliability of Systems Program, 2015 (Chaired)
Jerald Armen, Design and Reliability of Systems Program, 2015
Upamanyu Ray, Mechanics and Materials Program, 2015
Shing Shin, Design and Reliability of Systems Program, 2015 (Chaired)
Cory Knick, Mechanics and Materials Program, 2016
Jeremy Hill, Mechanics and Materials Program, 2016
Shaurya Shriyam, Design and Reliability of Systems Program, 2016 (Chaired)
Lena Johnson, Mechanics and Materials Program, 2017
Amirhossein Yazdkhasti, Mechanics and Materials Program, 2018 (Chaired)
Keshav Rajasekaran, Mechanics and Materials Program, 2018 (Chaired)
Ruben Acevedo, Mechanics and Materials Program, 2018
Han Zhou, Mechanics and Materials Program, 2019 (Chaired)
Natasha Bradley, Mechanics and Materials Program, 2020
Allen Garcia, Mechanics and Materials Program, 2021
Ziteng Wen, Mechanics and Materials Program, 2021 (Chaired)

**4.b.ii College and University**

**College committees**

Engineering Council representative, A. James Clark School of Engineering, UMD — 1999-2001

| | |
|---|---|
| Review Committee for Kim Building Materials Instructional Lab, A. James Clark School of Engineering, UMD | 2003-2007 |
| Alternate to Advancement, Promotion, and Tenure Committee, A. James Clark School of Engineering, UMD | 2004-2005 |
| Graduate Activities Council, School of Engineering, UMD | 2010-2018 |
| Assistant Dean of Communications Search Committee, A. James Clark School of Engineering, UMD | 2012 |
| Assistant Dean of Communications Search Committee, School of Engineering, UMD | 2012 |
| Joint Faculty Search Committee for Computational Materials and Mechanics, A. James Clark School of Engineering, UMD | 2013 |
| Student Competition Advisor of the Year Award Selection Committee, Chair, A. James Clark School of Engineering, UMD | 2015 |
| Senior Faculty Research Award Selection Committee, A. James Clark School of Engineering, UMD | 2016 |
| Chair, Senior Faculty Research Award Selection Committee, A. James Clark School of Engineering, UMD | 2017 |
| Member, Administrative Council, A. James Clark School of Engineering, UMD | 2018-present |
| Co-Chair, Investing in the Clark School Community Committee, Strategic Planning Committee, A. James Clark School of Engineering, UMD | 2023-present |

**University Committees**

| | |
|---|---|
| McNair Graduate Fellowship Selection Committee, Graduate School, Member | 2012 |
| Working Group on PhD and Professional Doctorate, Graduate School, UMD | 2013-2014 |
| Graduate Council, Graduate School, UMD | 2013-2017 |
| Distinguished Dissertation Review Committee, Graduate School, Member | 2014 |
| Chair, Working Group on Graduate Fellowship Allocation, Graduate School, UMD | 2015-2016 |
| Graduate School Operations Review Committee, Member | 2016 |
| Programs, Curricula & Courses Committee, Graduate School, Member | 2016-2017 |
| Chair, Working Group on Statement of Mutual Expectations for Teaching Assistants, Graduate School, UMD | 2017 |
| Leave Without Pay Policy Working Group, UMD | 2019 |
| Equity Council, Office of Diversity and Inclusion, UMD | 2019-present |
| Diversity Recruitment Working Group, Graduate School, UMD | 2019-present |
| PACT Committee, UMD | 2019-present |
| Council of Associate Deans for Faculty Affairs, UMD | 2018-present |
| Chair, ARLIS AEP Policy Development Committee, UMD | 2022 |
| Member, PTK Instructional Workload Policy Group, Office of Faculty Affairs, UMD | 2023-present |

**4.b.iii Other**

| | |
|---|---|
| Tau Beta Pi materials science review sessions for EIT exam | 1999, 2000, 2005, 2008 |
| Judge, PROMISE AGEP Research Symposium | 2018-2020 |
| Reviewer, Packard Foundation Fellowship Program, UMD | 2020 |
| Judge, Poster Competition, Graduate Research Appreciation Day, Graduate School, UMD | 2018 |
| Judge, 3 Minute Thesis Competition, Graduate School, UMD | 2021 |
| Reviewer, Packard Fellowship, UMD | 2020 |

**4.c Communal, State, National**

Youth Soccer Coach, Wheaton Boys and Girls Club
By-laws Committee, Kemp Mill Civic Association
Education Committee, Kemp Mill Civic Association