

## Bradley Edward Layton, PhD

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### EDUCATION:

- Biomedical Engineering, Ph.D.** University of Michigan, Ann Arbor, 2003  
*Concentrations:* Soft-Tissue Mechanics, Molecular Structure of Collagen  
*Dissertation:* Remodeling of Heterogeneous Extracellular Matrices of the Diabetic Nerve:  
Models and Experiments  
*Advisor:* Professor Ann Marie Sastry
- Mechanical Engineering, M.S.** University of Michigan, Ann Arbor, 1999  
*Concentrations:* Finite Element Modeling, Neuroanatomy
- Mechanical Engineering, B.S.** Massachusetts Institute of Technology, Cambridge, MA, 1992  
*Concentrations:* Fluid Mechanics, Design. *Minor:* Writing

### PROFESSIONAL EXPERIENCE:

- Assistant Professor**, September 2003 – present  
Mechanical Engineering and Mechanics, Drexel University, Philadelphia, PA
- Postdoctoral Fellow**, June 2003-August 2003  
Radiology, University of Michigan, Ann Arbor  
- Developed model for brain tumor response to radiation and chemotherapy
- Postdoctoral Fellow**, May 2003  
Neurology, University of Michigan, Ann Arbor  
- Atomic force microscopy of glucose- and dinitrobenzene-challenged mitochondria
- Postdoctoral Fellow**, January 2003-April 2003  
Biomedical Engineering, University of Michigan, Ann Arbor  
- Developed nonlinear model of molecular behavior of peripheral nerve collagen
- Graduate Student Research Assistant**, 1997-2002  
Mechanical Engineering | Biomedical Engineering, University of Michigan, Ann Arbor  
- Designed and conducted animal diabetic neuropathy studies: nerve conduction velocity measurement, *in vivo* endoneurial fluid pressure measurement, atomic force microscopy of ECM proteins, *in situ* immunohistochemistry of ECM proteins, finite-element and failure

modeling of soft-tissue composites, closed-form analysis of non-linear viscoelastic materials, statistical analysis of clinical data, image analysis of stochastic fibrous materials

**Technical Assistant, 1997**

Georgia Business Net, Augusta, GA

- Maintained and installed network hardware and software

**Construction and Design Assistant, 1997**

Stillwater Design, Cambridge, MA

- Designed and built rowing shells with carbon fiber, fiberglass and Kevlar

**Junior Engineer, 1996**

Associated Design and Manufacturing Company, Alexandria, VA

- Subcontractor to Northrop Grumman and USEPA
- Consulted in mechanical design, thermodynamics, fluid mechanics, system dynamics

**Fire Protection Engineer, 1994-1996**

Gasser Associates, Aiken, SC

- Subcontractor to Westinghouse
- Did walk-downs on US DOE Savannah River Site buildings
- Wrote recommendations based on National Fire Protection Association codes
- Clearance: DOE L

**Assistant System Administrator, 1993-1994**

Photon Research Associates, Arlington, VA

- Subcontractor to NASA and Ballistic Missile Defense Office (BMDO)
- Programmed and performed system administration on SGI-PC network
- Modeled space-based infrared sensors
- Clearance: DOD L

**Junior Scientist, 1992**

US DOE Office of Space, Washington, DC

- Collected and evaluated documents on properties of lunar soil and its effects on long-term lunar energy systems
- Discussed findings with NASA and Johnson Space Center scientists
- Clearance: DOE L

**Machinist, 1990**

Merlin Metalworks, Sommerville, MA

- Designed, machined, and welded titanium bicycles

**CONSULTING EXPERIENCE:**

Arboretum Ventures, Ann Arbor, MI

- Assessed viability of bone tissue engineering mechanical bioreactor

**ACCOMPLISHMENTS:**

- Developed numerical model and software to run thousands of finite element simulations for determining failure probability in nonlinear stochastic composite materials
- Developed atomic force microscopy protocol for measuring collagen morphology which resulted in resolving collagen's triple helix and established enlarged collagen fibril diameters in diabetic peripheral nerve
- Obtained *in vivo* endoneurial fluid pressure measurements on the order of 1 kPa and a resolution of 1Pa with an electromechanical microfluidic device
- Established a protocol for assessing relative amounts of extracellular matrix proteins in peripheral nerve with immunohistochemical confocal microscopy
- Developed soft-tissue-testing protocol which captures toe, linear, yield, failure and stress relaxation regions of peripheral nerve
- Developed numerical model to identify key molecular contributions of abnormal collagen to tissue-scale mechanical behavior of peripheral nerve
- Assessed results from two animal-model diabetic neuropathy studies with statistical methods which resulted in new findings in the role of extracellular matrix in diabetic neuropathy
- Developed GUI-based tool in Matlab for analyzing apparent diffusion coefficient and volume brain tumor data for animals and humans
- Developed closed-form and numerical-form solutions for nanoscale collagen fibril diameter aggregation limit

**CURRENT RESEARCH INTERESTS:**

- Development of a molecular atomic-force-microscope-compatible mechanical testing device
- Mechanics-based models of extracellular matrix proteins
- Molecular modeling of diseased tissue
- Load optimization for engineered tissue
- Three dimensional image characterization
- Self-assembly characteristics of structural proteins
- Axonal growth mechanics
- MEMS-based field hematology analyzer

**RESEARCH SKILLS:**

- Atomic force microscopy of extracellular matrix proteins
- Failure and finite element modeling of fibrous composites
- *In vivo* micropressure measurement
- Soft tissue testing
- Confocal microscopic immunohistochemistry
- Nanomanipulation

**COMPUTER LANGUAGES AND SOFTWARE:**

- ABAQUS, AutoCAD, Bourne shell, C, CAD, Cn3D, FORTRAN, HTML, Hypermesh, LaTeX, Maple, Mathematica, Matlab, MS Excel, MS PowerPoint, MS Word, NIH Image, SolidWorks, Perl, Photoshop, UNIX, Working Model

**COURSES TAUGHT:**

MEM 699-002 MEMS-Based Hematology Analyzer Fall 2005 CRN

- Stephanie Sullivan's project with NASA Goddard

MEM 591 Applied Engineering Mathematics I Fall 2005 CRN 13156

- matrix, tensor, vector notation, linear algebra, Markov processes, eigenvalue problems, analytical differential calculus, vector field calculus, heat transfer equations, fluid dynamics equations, elasticity equations

MEM-399-003 MechanoMolecular Properties of Growing Axons Spring 2005: CRN 33928

- Mentored Ms. Aisha Granville on the mechanical and electrostatic properties of structural proteins

MEM 380-005 MechanoEvolution CRN 33628/33629

- Explored the similarities and symbioses between natural evolution and machine evolution

MEM 593 Applied Engineering Mathematics III Spring 2005 CRN 33724

- Fourier transforms, partial differential equations, numerical methods, optimization, stochastic processes, probability theory, statistics

MEM 592 Applied Engineering Mathematics II Winter 2005 CRN 24253

- ordinary differential equations, partial differential equation, LaPlace Transforms, Navier Equations, variation of parameters, waves in elastic solids, series solutions, non-linear differential equations

MEM 591 Applied Engineering Mathematics I Fall 2004 CRN 14012

- matrix, tensor, vector notation, linear algebra, Markov processes, eigenvalue problems, analytical differential calculus, vector field calculus, heat transfer equations, fluid dynamics equations, elasticity equations

TDEC 491 Senior Design I Fall 2003

- advised students on a vibrations related problem
- evaluated several other projects and proposals as a member of the review board

TDEC 491 Senior Design II Winter 2004

- advised students on a vibrations related problem
- evaluated several other projects and proposals as a member of the review board

TDEC 491 Senior Design III Spring 2005

- advised students on a vibrations related problem
- evaluated several other projects and proposals as a member of the review board

TDEC 491 Senior Design I Fall 2004

- advised students on a pump design
- evaluated several other projects and proposals as a member of the review board

TDEC 491 Senior Design II Winter 2005

- advised students on a pump design
- evaluated several other projects and proposals as a member of the review board

TDEC 491 Senior Design III Spring 2005

- advised students on a pump design
- evaluated several other projects and proposals as a member of the review board

MEM 238 Dynamics CRN 33305 Spring 2004

- wrote and delivered lectures on Newtonian mechanics to Drexel's pre-juniors
- worked with forty-five students on design projects to prepare them for their senior design class and to improve their technical communication skills.

MEM 238 Dynamics CRN 33305 Winter 2004

- wrote and delivered lectures on Newtonian mechanics to Drexel's pre-juniors

- worked with forty-five students on design projects to prepare them for their senior design class and to improve their technical communication skills.

TDEC 211 Materials

- conducted two seminars with approximately 30 students each
- facilitated online availability of course material

TDEC 101 Freshman Design I Fall 2003

- covered basic principles of design, presentation and teamwork.

TDEC 101 Freshman Design II Winter 2004

- covered basic principles of design, presentation and teamwork.

TDEC 101 Freshman Design III Spring 2004

- covered basic principles of design, presentation and teamwork.

TDEC 101 Freshman Design I Fall 2004

- design of an educational atomic force microscope

TDEC 101 Freshman Design II Winter 2005

- design of an educational atomic force microscope continued. Students used LabView, SolidWorks and performed database research into the fundamentals of atomic force microscopy

TDEC 101 Freshman Design III Spring 2005

- design of an educational atomic force microscope continued. Students submitted the completed version which includes an instruction manual for integration with the NSF-RET program. Students received the highest grade of their class and have a two pending publications

UNIV 101 Fall 2004

- taught introductory freshman course to facilitate transition to the university environment.

UNIV 101 Winter 2005

- taught introductory freshman course to facilitate transition to the university environment.

**COURSES ASSISTED:**

- Mechanical Systems, with Calin Belta: gave lecture on Matlab programming and data display.
- Biomaterials with Caroline Schauer: gave lecture on molecular properties of collagen.

## **SYNERGISTIC ACTIVITIES:**

### **Educational Outreach**

*Junior FIRST Robotics LEGO Japan Competition Philadelphia, PA, 2005.* Worked closely with Janet Hudson of Shaw Middle School and six of her students to prepare them for an international robotics competition. Helped in securing funds from Governor Edward Rendell's office of special programs.

*Drexel University Summer Engineering Experience at Drexel for Middle School Females, Philadelphia, PA, 2005.* Presented work in my laboratory to a group of twenty-five eighth-grade girls to give them insight into university engineering research.

*Illinois Math and Science Academy, Aurora, Illinois, 2005.* Presented Drexel's engineering curriculum to over three hundred high school students, and continued to mentor Ms. Sally Tan on her work she did at Drexel during the summer of 2004 under the Summer Internship Program.

*Souderton Public High School, Souderton, PA, 2005.* Spoke to engineering class on aspects of engineering and engineering education. Topics included biomedical engineering and nanoscopic imaging and nanomanipulation.

*Havertown Public High School, Havertown, PA, 2005.* Served as a judge for senior projects ranging from engineering projects to ethics debates.

*Drexel University SuperNOVA Chairman, 2004-present.* Administering Drexel's progressive B.S./Ph.D program.

*Drexel University Research Experiences for Teachers (RET) Program, Drexel University, Philadelphia, PA, 2003-2005:* Worked closely with Ms. Janet Hudson of Shaw Middle School, Ms. Joyce Hubert-Theroit of Henderson Senior High School, and Mr. Joseph Podrazik to build an instructional atomic force microscope to be used at their schools to bring the concepts of high-power microscopes to young students.

*Souderton Public High School, Souderton, PA, 2004.* Spoke to engineering class on aspects of engineering and engineering education. Topics included biomedical engineering and nanoscopic imaging and nanomanipulation.

*Louis Stokes Alliance for Minority Participation, Drexel University, Philadelphia, PA, 2004.* Worked closely with Ms. Nykia Jackson and Ms. Sidia Rose to develop bistable microgripper technology and genetically engineered collagen protocols.

*Summer Engineering Experience at Drexel. Drexel University, Philadelphia, PA. 2004.* Worked closely with undergraduate students Mr. Gregory Buzby and Mr. Jonathan Palermo to design and build an instructional atomic force microscope to be used in high school and middle school classrooms.

*Illinois Math and Science Academy, Aurora, Illinois, 2004.* Presented Drexel's engineering curriculum to over three hundred high school students.

*Young Inventors Competition Judge, Bonner HS, Drexel Hill PA, 2004:* At the invitation of local high school teachers I served as a judge at a local high school invention competition.

*National Consortium for Specialized Secondary Schools of Mathematics, Science and Technology* Stuyvesant H.S., New York, NY, 2004: Will present current advanced research topics in nanotechnology to high school students and teachers.

*Drexel University Summer Mentor Program*, 2004: This summer program will enable me to invite top high school students to participate in the investigations of my laboratory.

*Drexel University Premed for Engineers Initiative*, 2003: Currently I am on a committee to bring a full premed degree to the College of Engineering at Drexel University.

*Hands on Science*, US Department of Energy, 1992: As a US Department of Energy employee in Washington DC, I traveled to a local K-12 school teaching science interactively to gifted minority students in southeast Washington DC.

**Service to the Scientific Community**

- NSF Review panel, Materials Division
- Internal Drexel University reviewer for State of Pennsylvania tobacco settlement, 2005
- Reviewer for numerous journals (see below)
- Regional co-chair for IEEE-EMBS chapter, 2005-

**Conference and Workshop Organization**

- Co-Chair for Microscale Flows in Biological Systems Track of the ASME 3<sup>rd</sup> Annual Conference on Microchannels and Minichannels. June 13-15, 2005. Toronto, Canada.
- Chair for Cellular and Protein Mechanics Workshop sponsored by IEEE-EMBS, ASME, GPBA (Greater Philadelphia Bioinformatics Alliance). September 14-16, 2006. Philadelphia, PA

**PUBLICATIONS:**

- Singh, R., Gadia, V., Roy, S., Venkatesh, N., Lunagaria, S., Patel, R., **Layton, B.E.** “Towards Nanotechnology for All” *to appear in News From the Bottom*
- Singh, R., Gadia, V., Roy, S., Venkatesh, N., Lunagaria, S., Patel, R., **Layton, B.E.** “Construction of an Educational Model of an Atomic Force Microscope.” The Nanotechnology Group Volume 4, Number 7.
- Layton, B.E.**, Sullivan, S.M., Palermo, J.J., Buzby, G.J., Gupta, R., Stallcup III, R.E., 2005. “Nanomanipulation and Aggregation Limits of Self-Assembling Structural Proteins,” *MicroElectronics Journal* 36 (7) 644-649.
- Layton, B.E.**, Sastry, A.M., “An Equal and Local-Load-Sharing Failure-Mechanics Model for Peripheral Nerve Extracellular Matrix in Diabetic and Non-Diabetic Rats.” *in review for Journal of Biomechanics*
- Layton, B.E.**, Sastry, A.M., 2004. “A Mechanical Model for Collagen Fibril Load Sharing in the Peripheral Nerve of Diabetic and Non-Diabetic Rats.” *ASME Journal of Biomechanical Engineering* 126, 803-814.
- Layton, B. E.**, Sastry, A. M., Lastoskie, C. M., Philbert, M. A., Miller, T. J., Sullivan, K.A., Feldman, E.L., Wang C.-W., 2004. “*In Situ* Imaging of Mitochondrial Outer Membrane Pores Using Atomic Force Microscopy.” *Biotechniques* 37, 564-573.
- Layton, B.E.**, Sastry, A.M., Sullivan, K.A., Feldman, E.L., Wang, H., Philbert, M.A., Komorowski, T.E., 2004. “Differences Between Collagen Morphologies, Properties and Distribution in Diabetic and Normal Biobreeding and Sprague-Dawley Rat Sciatic Nerves.” *Journal of Biomechanics* 37 (6) 879-888.
- Wang, H., **Layton, B.E.**, Sastry, A.M., 2003. “Nerve Collagens from Diabetic and Nondiabetic Sprague-Dawley and Biobreeding Rats: An Atomic Force Microscopy Study.” *Diabetes Metabolism Research and Reviews* 19 (4) 288-298.
- Cheng, X., Sastry, A.M., **Layton, B.E.**, 2001. “Transport in Stochastic Fibrous Networks.” *Journal of Engineering Materials and Technology* 123 (1) 12-19.

**RESEARCH SUBMITTED AND IN PREPARATION:**

- Mitchell, Tocco, Perkins, **Layton** “Knanoknot” *in preparation for Science*
- Borgmann, **Layton** “A Novel Multiscale Hypothesis for the Translation Optimization of Collagen” *in preparation for Nature*
- Legum, Patel, **Layton**, “Parameter Optimization of Piezoelectrically Driven Multiaxis Nanopositioners” *in preparation for Nano Letters*
- Layton, B.E.**, Chenevert, T.L. “A Temporal Compartmental Model for Brain-Tumor Volume and Apparent Diffusion Coefficient Changes in Response to Treatment.” *in preparation for Magnetic Resonance in Medicine*
- Layton, B.E.**, Allen K., “A Model for Axonal Transport” *in preparation for Journal of Cell Biology*

**Layton, B.E.**, Sullivan, S.M., Jamieson, B.G., A Space-Based Electrical Impedance Hematology Analyzer, *in preparation for Lab on a Chip*.

#### CONFERENCE PAPERS:

Sullivan, S.M., Jamieson, B.J., **Layton, B.E.**, “A Micro-Fabricated Electrical Impedance Based Hematology Analyzer,” ASME International Mechanical Engineering Congress and Exposition. November 5-11, Orlando, FL

Allen, K.B., Sasoglu, F.M., **Layton, B.E.**, “Mechanical Neural Growth Models,” ASME International Mechanical Engineering Congress and Exposition. November 5-11, Orlando, FL

**Layton, B.E.**, Jamieson, B.J., Sullivan, S.M. 2005. “A Micro-Fabricated Electrical-Impedance-Based In-Flight Hematology Analyzer,” 3<sup>rd</sup> Annual Conference on Microchannels and Minichannels. June 13-15, Toronto, Canada.

**Layton, B.E.**, Allen, K.B., Stokes, M.D., Myers, K.A., Baas, P.W., 2005. “Towards a Method for Peripheral Nervous System Axonal Stiffness Measurements with MEMS-based Microgrippers,” 2<sup>nd</sup> Annual IEEE-EMBS Conference on Neural Engineering, March 16-19, Arlington, VA.

**Layton, B.E.**, Fontecchio, A., Ko, F., Nabet, B., Spanier, J. 2005. “Acquisition of a Zyvex L100 nanomanipulation device for biological, electronic, and optoelectronic samples and devices.” Design, Service and Manufacturing Research and Grantees Conference, Jan 3-6. Tempe, AZ

**Layton, B.E.** 2004. “Nanomanipulation and Aggregation Limits of Self-Assembling Structural Proteins” European Micro and Nano Systems, October 20-21, Paris France

**Layton, B.E.** 2004. “Self-Assembly Limits in Structural Proteins” Proceedings of ASME Integrated Nanosystems, September 22-24, Pasadena, CA

**Layton, B.E.**, Gupta, R., Jackson, N.L., Shah, A.J., Stallcup, R.E., III, Sullivan, S.M., 2004. “Nanomanipulation and Characterization Of Structural Proteins” 26<sup>th</sup> Annual International Conference IEEE-EMBS Sep 1-5, Francisco, CA.

**Layton, B.E.** 2004 “A Mechanics-Based Model for the Collagen Fibril Aggregation Limit” October 13-16, 2004, Biomedical Engineering Society Annual Fall Meeting, Philadelphia, PA

**Layton, B.E.** Sastry, A.M., 2003. Mitochondrial Pore Imaging via AFM. BMES Annual Fall Meeting. Oct 1-4, Nashville, TN.

**Layton, B.E.** 2003. Implications of hexagonal close-packing in a finite domain on self-assembly of nanofibrous materials. NATO-Advance Study Institute (ASI) Nanoengineered Nanofibrous Materials. Sep 1-12, Antalya Turkey.

Chenevert, T.L., **Layton, B.E.**, Johnson, T.D., Schepkin, V.D., Ross, B.D. 2003. A Model of Temporal Dependence in Therapy-Induced ADC Change, ISMRM 11<sup>th</sup> Scientific Meeting and Exhibition, Toronto July 10-16.

- Layton, B.E.**, Sastry, A.M., 2002. Damage in the heterogeneous ECM of peripheral nerves due to diabetes. ASME International Mechanical Engineering Congress, November 17-22, New Orleans, LA.
- Layton, B.E.**, Sastry, A.M., Wang, H., Sullivan, K.A., 2002. A model for pressure enhancement in the diabetic nerve: simulations of diabetic rat peripheral nerve and nerve collagens. 24th Annual Conference and the Annual Fall Meeting of the Biomedical Engineering Society] EMBS/BMES Conference, 2002. Proceedings of the Second Joint, Volume: 1, 450 -451.
- Sastry, A.M.; **Layton, B.E.**; Wang, H.; Sullivan, K.A.; Philbert, M.A.; Komorowski, Mechanical and structural changes in diabetic rat peripheral nerve collagens Annual International Conference of the IEEE Engineering in Medicine and Biology - Proceedings, v 1, 2002, p 432-433
- Layton, B.E.**, Sastry, A.M., Sullivan, K.A., Feldman, E.L., 2000. Remodeling of Peripheral Nerve Tissue in Diabetic Rats. International ASME Congress, November 5-10, Orlando, FL

## CONFERENCE POSTERS

- Sullivan, S.M., **Layton, B.E.**, Jamieson, B.G. Velasquez, J. 2005. "A Micro-Fabricated Electrical-Impedance-Based In-Flight Hematology Analyzer," BMES Fall Meeting, Baltimore, MD, September 29, 2005.
- Sasoglu, F.M. **Layton, B.E.**, 2005. "Parametrization And Microfabrication Procedure Of A Microcone Array To Measure Cell Stiffness," BMES Fall Meeting, Baltimore, MD, September 29, 2005.
- Allen, K.B., **Layton, B.E.**, 2005 "Mechanical Neural Growth Models" BMES Fall Meeting, Baltimore MD September 29 2005.
- Allen, K.B., **Layton, B.E.**, 2005. "Microtubule Polymerization, and Single Cell Micromanipulation," A.J. Drexel Institute of Basic and Applied Protein Science 3<sup>rd</sup> Annual Protein Institute Retreat, June 16th 2005
- Sasoglu, F.M., **Layton, B.E.**, 2005. "A Silicone Elastomer Microbeam Array for Measuring Neurite Stiffness," Drexel University Research Day, April 26, 2005, Philadelphia, PA.
- Sullivan, S.M., **Layton, B.E.**, Jamieson, B.J., 2005 "A Micro-Fabricated, Electrical-Impedance-Based Space-Based Hematology Analyzer," Drexel University Research Day, April 26, 2005, Philadelphia, PA.
- Layton, B.E., Fontecchio, A., Ko, F.K., Nabet, B., Spanier, J.E., Luzzi, D., MacDiarmid, A., Allen, K.B., Ermold, M., Gallo, E., Laim, L., Sullivan, S.M. Titchenal, N., 2005. "Acquisition of a nanomanipulation device for biological, electronic, and optoelectronic samples and devices" National Science Foundation Design, Service, and Manufacturing Research and Grantees Conference, January 3-6, 2005, Scottsdale, AZ,
- Sullivan, S.M. **Layton, B.E.** 2004 "Genomic Sequence Analysis of Structural Proteins as a Predictor for Tissue Properties" Biomedical Engineering Society Annual Fall Meeting, Oct 13-16, 2004, Philadelphia, PA.
- Jackson, N.L., Sullivan, S.M., **Layton, B.E.** 2004. "'Knanoknot' Nanomechanical Manipulation of Collagen fibrils" Biomedical Engineering Society Annual Fall Meeting, Oct 13-16, 2004, Philadelphia, PA.
- Rose, S., Tan, S., Azad, F., **Layton, B.E.** 2004. "A self-assembly model for genetically engineered collagen" Biomedical Engineering Society Annual Fall Meeting, Oct 13-16, 2004, Philadelphia, PA
- Stokes, M., **Layton, B.E.**, 2004 "Nanotechnology - Thermally Activated microgrippers" Biomedical Engineering Society Annual Fall Meeting, Oct 13-16, 2004, Philadelphia, PA
- Palermo, J.P., Buzby, G., Allen, K., Hudson, J., Hubert-Theriot, J., **Layton, B.E.** 2004. "Bench Top Atomic Force Microscope" Biomedical Engineering Society Annual Fall Meeting, Oct 13-16, 2004, Philadelphia,
- PA Shah, A.J., **Layton, B.E.**, 2004. "Assessment and Design of MEMS Microgripper Technologies," Drexel University Research Day, May 4, 2004, Philadelphia, PA.
- Sullivan, S.M., **Layton, B.E.**, 2004. "Directed Evolution of Earth's Most Abundant Protein," Drexel University Research Day, May 4, 2004, Philadelphia, PA.

Jackson, N.L., **Layton, B.E.**, 2004. ““KnanoKnot” – Nanomechanical Manipulation of Collagen Fibrils,” Drexel University Research Day, May 4, 2004, Philadelphia, PA.

Ramacrishna, P., **Layton, B.E.**, 2004. “Towards Building a Molecular Rope Using Molecular Dynamics,” Drexel University Research Day, May 4, 2004, Philadelphia, PA.

## **APPLICATION NOTES**

Rishi Gupta, Aaron Geisberger, Gareth Hughes (Zyvex Corporation), Dr. Brad Layton (Drexel University), Zyvex Application Note 9710: “Manipulation of Collagen for Mechanical Characterization” [http://www.zyvex.com/Products/CFMC\\_001a.html](http://www.zyvex.com/Products/CFMC_001a.html)  
<http://www.zyvex.com/Documents/9710.PDF>

## **NEWS APPEARANCES**

ABC Primetime Special Report on Nanotechnology at Drexel University, Aaron Gloster, Saturday October 15, 2005. (interrupted due to football overtime)

Philadelphia Tribune, “From Philly to Japan” Janae Hoffler, Friday, August 19, 2005, Cover page and page B1.

Philadelphia Daily News, “City Kids Gearing up for a Science Trip to Japan” Elmer Smith, Friday, August 19, 2005, Page 19.

Philadelphia Daily News, “Shaw Students Come Back as Winners” Elmer Smith, Wednesday, August 31, 2005 Page 15.

The Neighborhood Leader, “Shaw Middle School Robotics Team Compete in Japan”, Carole I. Smith, August 20-September 2, 2005, Page 10.

## **LOCAL GOVERNMENTAL RECOGNITION**

Cited in the Notes of Testimony at the Philadelphia City Council meeting November 3, 2005 for assisting the Shaw Middle School FIRST Robotics Team in their Japan Competition.

**SEMINARS AND INVITED TALKS:**

- December, 2005. invited speaker at the Penn State Department of Physics: “Self-Assembly Physics of Structural Proteins, Evolutionary Optimization Implications”
- December, 2005. invited speaker at the Army Research Laboratory: “Nanometrology and Micrometrology of Cells, Organelles and Proteins Under Mechanical and Environmental Challenge”
- November, 2005. invited speaker at the National Institute of Standards and Technology, Mathematical and Computational Sciences Division "Nanometrology and Micrometrology in Biological Systems"
- July, 2005. invited speaker at the Drexel University GPBA Bio-Nanotechnology Symposium: “An update of the micromanipulation and nanomanipulation capabilities at Drexel University.”
- February, 2005. invited speaker at the Drexel University Department of Material Science and Engineering: “Micromanipulation, Nanomanipulation and Self-Assembly Limits of Structural Proteins”
- February, 2005. invited Neurology Grand Rounds speaker at the Drexel University School of Medicine: “Nanotechnology meets Neuroscience”
- November, 2004. invited speaker at the Drexel University Department of Biomedical Engineering, Science and Health Systems: “Micromanipulation, Nanomanipulation and Self-Assembly Limits of Structural Proteins”
- November, 2004. invited speaker at the Computational Systems Biology Group sponsored by Aydin Tozeren: “Nanomanipulation and Characterization of Structural Proteins”
- July, 2004. invited speaker at Drexel Queen Lane Campus laboratories of Dr. Peter Baas on neuronal manipulation: “Nanoscope Imaging and Nanomanipulation of Neurons, Organelles, and Proteins”
- June, 2004. invited seminar speaker at Drexel BioChemistry Department IBAPS Institute of Basic and Applied Protein Science, “Cell Sensing Series”
- October, 2003. invited seminar speaker at Drexel Department of Material Science Department. “Mechanical Models of Soft Tissue: Molecular to Tissue Scales”
- July, 2003. presentation of postdoctoral research on brain tumor response modeling to Radiology Department, University of Michigan
- June, 2003. presentation of postdoctoral research on mitochondrial imaging results to Neurology Department, University of Michigan

**REVIEWER FOR THE FOLLOWING JOURNALS AND PUBLICATIONS:**

- ASME Microchannels and Minichannels
- Computer-Aided Design
- Journal of Composite Materials
- Journal of Polymer Science: Polymer Physics
- Journal of Engineering Materials Technology
- Langmuir
- NATO ASI 2003 Nanotechnology Textbook

- MicroElectronics Journal

**FUNDING:**

1. "Acquisition of a Nanomanipulation Device for Biological, Electronic and Optoelectronic Samples and Devices," NSF, \$143,000
2. "Nanotechnology Meets Neuroscience: Microgrippers to Study the Molecular Motor Mechanics of Axons," Pennsylvania Department of Health, \$364,544
3. "A Micro-fabricated Hematology Analyzer," DDF05-553 NASA, \$65,000
4. "MechanoEvolution: How early molecular winners affect our lives on a daily basis," Drexel \$5,000
5. "Cell and Protein Mechanics Workshop" IEEE-EMBS/Greater Philadelphia Bioinformatics Alliance \$3,000.

**PROFESSIONAL MEMBERSHIPS:**

- American Society of Mechanical Engineers
- Biomedical Engineering Society
- IEEE-EMBS Society
- Order of the Engineer
- America's Registry of Outstanding Professionals

**HONORS AND AWARDS:**

- Advisor for Best Freshman Design Project, "Design of a Portable Educational Atomic Force Microscope" with Rahul Singh, Vinay Gadia, Sristi Roy, Nischitha Venkatesh, Sagar Lunagaria, Rohan Patel, Drexel University, 2005
- Horace H. Rackham flagbearer for Dr. Mary Sue Coleman's U of M inauguration, 2003
- Robert M. Caddell Award for research contributions in materials manufacturing, U of M, 2001
- Best Solid Mechanics and Materials Poster for Graduate Symposium, U of M, 2001

**STUDENT ADVISEES:**

- *Ms. Kathleen Allen*, M.D/Ph.D. Cand. (2008) National Science Foundation Fellow, Drexel University
- *Mr. Mert Sasoglu*, Ph.D. Candidate (2008), Drexel University
- *Ms. Stephanie Sullivan*, Ph.D. Candidate (2009), Drexel University (SuperNOVA Fellow)

**DISSERTATION COMMITTEES:**

1. Jonathan Ayutsede (Frank Ko)
2. Andrew Darling, 2005, (Wei Sun)
3. Connie Gomez (Wei Sun)
4. Saif Khalil (Wei Sun)
5. Devrim Kilinc (Ken Barbee)
6. Lin Lu (Jack Zhou)
7. Kalyani Nair (Wei Sun)
8. Anand Pillarisetti (Jaydev Desai)
9. Gwenaelle Proust, 2005, (Surya Kalidindi)

10. Bao Mosinyi (Johnathan Awerbuch)
11. Chun Xu (David Wootton)

**PATENTS GRANTED AND IN SUBMISSION:**

1. “A Pontoon Rowing Boat for Children” (in submission)
2. “An Integrated Atomic Force Microscopy Nanomanipulation Platform” (in submission)

**RECREATIONAL INTERESTS:**

- 1995 US National Rowing Team: Qualified US Quadruple Sculls for Atlanta Olympic Games
- 1997 US National Rowing Team
- 2000 – 2003 rowing instructor for Ann Arbor Rowing Club