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EDUCATION:

Sc.D., June 1974, Department of Electrical Engineering and Computer Science,
Massachusetts Institute of Technology

S.M., S.B., January 1971, Department of Electrical Engineering,
Massachusetts Institute of Technology

PROFESSIONAL EXPERIENCE:

- 1974-1977 **Assistant Professor**, Department of Electrical Engineering & Computer Science,
Massachusetts Institute of Technology
- 1975-1977 Esther and Harold E. Edgerton Assistant Professor of Electrical and Bioengineering,
Massachusetts Institute of Technology (Endowed)
- 1976-1977 Visiting Lecturer and Research Associate, Department of Orthopaedic Surgery, Harvard
Medical School and Children's Hospital, Boston, MA
- 1977-1984 **Associate Professor** of Electrical and Bioengineering, Department of Electrical
Engineering & Computer Science, MIT
- 1977 Visiting Associate Professor, Biomechanics Laboratory, Department of Mechanical
Engineering, Rensselaer Polytechnic Institute (summer)
- 1979-1984 Joint Appointment with Harvard-MIT Division of Health Science and Technology as
Associate Professor of Electrical and Bioengineering
- 1980-1987 Science Advisory Panel of New York State Department of Health: 5-year Research
Program on Health Effects of High Voltage Transmission Lines
- 1981-1986 Scientific Program Committee of the Bioelectrical Repair & Growth Society; Chairman of
Program Committee in 1984; Scientific Council 1984-6
- 1982-1992 Editorial Board: Associate Editor, Journal of Orthopaedic Research
- 1984-present **Professor** of Electrical and Bioengineering, Department of Electrical Engineering and
Computer Science, Massachusetts Institute of Technology; and Harvard-MIT Division of
Health Sciences and Technology (Joint)
- 1985,'96,'97 Study Sections, NIH, NIAMS (also on Special Study Sections)

1986-1987 **President** of the Bioelectrical Repair and Growth Society (now: Society for Physical Regulation in Biology and Medicine)

1987-1992 Biomedical Engineer, Department of Biomedical Engineering, Massachusetts General Hospital

1988 Visiting Professor of Biochemistry and Orthopaedics, Rush Presbyterian St. Luke's Medical Center, Rush University, Chicago

1988-2003 Science Advisory Board for NIH SCOR Grant on Osteoarthritis: Biochemistry Dep't., Rush University Medical School, Chicago

1990 **Chairman, Gordon Research Conference** on Bioengineering. & Orthopaedic Science

1992 **Joint Appointment: Professor of Mechanical Engineering**, Department of Mechanical Engineering, MIT

1992-1995 Member of **Biochemistry Study Section**, Arthritis Foundation

1995-1998 Associate Director, Center for Biomedical Engineering, MIT

1992-2001 Editorial Board: Journal of Polymer Gels and Networks

1995-2002 Editorial Board: Archives Biochemistry Biophysics

1995-2000 External Advisory Board: UCSD Dep't. Bioengineering

1995-2002 External Advisory Board: Cleveland Clinic Foundation Lerner Research Institute

1996-2010 Chairman, External Advisory Board: Cleveland Clinic Lerner Research Institute Dep't. of Biomedical Engineering

1996 Invited Visiting Professor, Mayo Clinic, Feb 1996

1996-1997 Gastprofessor of Biomechanik, Univ. Bern, Switzerland, Oct'96-Jan'97

1998-2008 **Dual Appointment: MIT EECS Dept & Biological Engineering Dept;** Primary in BE 2008-present with joint appointments in EECS and ME

1998-present **Director, MIT Center for Biomedical Engineering**

1998-2000 **President:** International Cartilage Repair Society

2001-2006 Science Advisory Board, ISTO Technologies (Cartilage Tissue Engineering)

2002-2006 Science Advisory Board, Smith and Nephew (Endoscopy), UK

2003-2010 **Graduate Officer and Chair, Graduate Program** of Biological Engineering Dept, MIT

2003-2007 Science Advisory Board for NIH SCOR Grant on Osteoarthritis: Orthopaedics Department, University of Iowa Medical School, Chicago

2004-2005 **Program Chair**, Orthopaedic Research Society; **President Elect:** 2006-7

2005-2008 External Advisory Board, Cleveland Clinic Musculoskeletal Core Center Grant

2005-2009 External Advisory Board, Cleveland Clinic – Case Western University: Clinical Tissue Engineering Center

2005-2008 Editorial Board, Arthritis and Rheumatism

2007-2008 **President** Orthopaedic Research Society

2008-present Editorial Board, Osteoarthritis and Cartilage

2009-2011	Science Advisory Board on Osteoarthritis, Biogen Idec
2010-Spring	Visiting Professor Lund University Depts Orthopaedics, Rheumatology, Clinical Immunol.
2010-present	Chair, Advisory Board to Arthritis Research UK Biomechanics and Bioengineering Centre
2011-2012	Institute for Advanced Studies Professorship-at-Large Fellowship, University of Western Australia, Perth, Australia

RESEARCH INTERESTS:

Mechanobiology: mechanical regulation of gene expression and cellular synthesis, assembly, and degradation of extracellular matrix; Osteoarthritis and Joint Injury: in vitro models of cartilage injury and degradation, diagnostics, therapeutics, and drug discovery; Cartilage tissue engineering: functionalized self-assembling peptide hydrogel scaffolds encapsulating bone marrow stem cells; Molecular NanoMechanics: AFM-based molecular mechanical properties of matrix proteins and proteoglycans; Cell and tissue biomechanics; Influence of chemical and electrical stresses on connective tissue metabolism, growth, and pathology; Electromechanical and physicochemical properties of biological tissues and polyelectrolyte-based scaffold biomaterials; Electrically controlled hydrogel membrane permeability for drug delivery and separation processes; Fundamental study and modeling of electrical, mechanical and chemical energy conversion in natural and synthetic membranes, and in biological tissues.

HONORS and AWARDS:

1973	Goodwin Medal, MIT, for “Conspicuously Effective Teaching While a Graduate Student and Member of the Academic Staff”
1975-1977	Esther and Harold E. Edgerton Endowed Assistant Professorship (two-year), Department of Electrical Engineering and Computer Science, MIT
1977	C. Holmes MacDonald Distinguished Young Electrical Engineering Teacher Award, Honorable Mention, 1979 (awarded by the Eta Kappa Nu Association, Nation-wide Electrical Engineering Honor Society)
1979	Best Paper Award, 7th Northeast Bioengineering Conference: “Proton Diffusion-Reaction in a Protein Polyelectrolyte,” (with J. Nussbaum)
1979	Orthopaedic Science and Bioengineering Group: American Delegation to the People's Republic of China (summer)
1980	Best Paper Award, 8th Northeast Bioengineering Conference: “Electrically Modulated Membrane Permeability,” (co-authored with S. Eisenberg)
1985	Kappa Delta Award of Bioelectrical Repair & Growth Society for research on “Cartilage Electromechanics and Implications For Stimulation of Cellular Response”
1987	Best Student Paper Award, Bioelectromagnetics Society (to L MacGintie; AJ Grodzinsky, Preceptor)
1987	Giovani Borelli Award of the American Society of Biomechanics for “Outstanding Contributions on Cartilage and Soft Tissue Electromechanics”

- 1990 Chairman, Gordon Research Conference on Bioengineering and Orthopaedic Science
- 1993 Ann Doner Vaughan Kappa Delta Award of the American Academy of Orthopaedic Surgeons for Research on “Physical Regulation of Cartilage Matrix Metabolism”
- 1993 Distinguished Lecturer in Chemical Engineering, University of Toronto
- 1993 Founding Fellow of the American Institute of Medical and Biological Engineering, “For contributions to the understanding of the physical regulation, synthesis, assembly, and degradation of cartilage extracellular matrix”
- 1994 NIH MERIT Award, National Institute of Arthritis, Musculoskeletal and Skin Diseases for research on “Cartilage Metabolic Response to Loading”
- 1996 Best Paper Award of ASME Bioeng Div, J Biomech Eng. (w M. Buschmann)
- 1997 Melville Medal of the ASME for best original paper in all areas of Mechanical Engineering (w M. Buschmann)
- 1999 MIT Class of 1960 Innovation in Education Award (with L. Griffith and R. Kamm)
- 1998-2000 President: International Cartilage Repair Society
- 2001 Amer Chem Soc Best Poster Award to J. Seog (AJG Co-Supervisor)
- 2002 New Investigator Research Award, Orthopaedic Res. Soc. to M. Jin (AJG Supervisor)
- 2005 New Investigator Research Award, Orthop. Res. Soc. to J. Fitzgerald (AJG Supervisor)
- 2005 IEEE/ACM (MIT Chapter) Award for Best Undergrad Academic Advisor in EECS, MIT
- 2007 Honorary Fellow & Life Membership Award, International Cartilage Repair Society, ICRS
- 2007-2008 President Orthopaedic Research Society (ORS)
- 2008 Honorary Doctorate (Docteur honoris causa), University of Montreal, May, 2008
- 2011-2012 Institute for Advanced Studies Professorship-at-Large Fellowship, University of Western Australia, Perth.

PROFESSIONAL SOCIETIES:

- American Institute of Medical and Biological Engineering (**AIMBE Founding Fellow**)
- American Society for Biochemistry and Molecular Biology (ASBMB)
- American Society for Matrix biology (ASMB)
- American Society of Biomechanics (ASB)
- Biophysical Society
- Bioelectromagnetics Society (Board of Directors, 1989-91)
- Biomedical Engineering Society (Chairman, Constitution & Bylaws Committee 1984-1986)
- International Cartilage Repair Society (**President**, 1998-2000; Honorary Life Member)
- International Society for Matrix Biology (ISMB)
- Orthopaedic Research Society (**President** 2007-2008)
- Osteoarthritis Research Society International (OARSI)
- Soc Physical Regulation in Biology & Medicine (formerly BRAGS, **President** 1986-7)

SUBJECTS TAUGHT During Career at MIT:

MIT Department of ELECTRICAL ENGINEERING & COMPUTER SCIENCE

- 6.013 Electromagnetic Fields and Energy (Lecturer-in-charge, Spring '84, '86, '87, '91, '93, '97)
- 6.012 Electronic Devices and Circuits (Co-Lecturer-in-Charge 1974-1978)
- 6.014 Electrodynamics (Recitations)
- 6.601 Electromechanics (Lecturer-in-Charge)
- 6.003 Systems and Signals (Recitations)
- 6.071 Introduction to Electronics (Recitations)
- 6.021J Quantitative Physiology: Cells and Tissues (Undergraduate, Recitations)
- 6.024 Molecular, Cellular, and Tissue Biomechanics (Undergraduate, also 20.310, 2.797)
- 6.561 Fields, Forces and Flows in Biological Systems (Lecturer-in-charge in early format during: 1975-1997; in 1998, evolved into 20.430 (required in Biol Eng), co-listed as 2.795, 10.539, HST544)
- 6.524 Molecular, Cellular, and Tissue Biomechanics (Graduate, 20.410, 310J, 2.797, 10.537)

MIT BIOLOGICAL ENGINEERING DEPARTMENT

- 20.410 Molecular, Cellular, and Tissue Biomechanics (Graduate, Co-Lecturer-in-Charge, 1999-2009; also 2.798, 10.537, 6.524)
- 20.310 Molecular, Cellular, and Tissue Biomechanics (Undergraduate, 1997-1999; 2011)
- 20.430 Fields, Forces and Flows in Biological Systems (Graduate, Co-Lecturer-in-Charge, 1999-Present; also 6.561, 10.539, 2.795, HST 544)
- 20.330 Fields, Forces and Flows in Biological Systems (Undergraduate; chair, development committee)

MIT Department of MECHANICAL ENGINEERING (in addition to 2.795, 2.798 above)

- 2.907 Mechanics of Biological Polymers (PPST 1071) (Guest Lectures)
- 2.785J Mechanical Forces in Organ Development (HST523J) (Guest Lectures)

MIT Department of CHEMICAL ENGINEERING Lectures in:

- 10.565 Separation Processes for Biochemical Products (1988-92)

Harvard-MIT Div. of HEALTH SCIENCES & TECHNOLOGY Lectures in:

- HST-020 Bone and Connective Tissue; 2008-2010 HST-202 = Musculoskeletal Pathophysiology
- HST-050 Physical Principles Applied to Physiology
- HST-585 Biomedical Measurements
- HST-572 Creation of Medical Technology

MIT COMMITTEE & EDUCATIONAL ASSIGNMENTS (Current):

- (1) Biological Engineering Department: Member, Undergraduate Program Committee;
Faculty Search Committee
- (2) Member, School of Engineering Council (as Director of Center for Biomedical Engineering)
- (3) MIT-MGH Post Doc Steering Committee
- (4) MIT Biomechanics Training Grant Steering Committee
- (5) Teaching: Co-Lecturer-in-Charge for 20.430; 20.310
- (6) Textbook on Fields, Forces and Flows in Biological Systems: Garland Science, Publisher

REVIEWER FOR:

- IEEE Transactions on Biomedical Engineering
- Annals of Biomedical Engineering
- Biomechanics and Modeling in Mechanobiology
- Biomaterials
- Journal of Biomechanical Engineering
- Journal of Biomechanics
- Journal of Biomaterials Science
- Journal of Bioelectricity
- Journal of Electrostatics
- Journal of Royal Society Interface
- Medical Instrumentation
- AIChE Journal
- Archives Biochemistry Biophysics (*Editorial Board 1995-1998*)
- BioMacromolecules
- Biomed Central (Open Access)
- Biophysical Journal
- Biophysical Chemistry
- Biorheology
- Biotechnology and Bioengineering
- Journal of Controlled Release
- Journal of Electrochemical Society
- Journal of Membrane Science
- Journal of Polymer Gels and Networks (*Editorial Board 1992-2000*)
- Journal of Physical Chemistry
- Macromolecules
- Matrix Biology
- Philosophical Transactions of the Royal Society
- Proceedings National Academy of Science
- Cells Tissues and Organs
- Journal of Cell Science
- Annals of Rheumatic Diseases
- Arthritis and Rheumatism (*Editorial Board, 2005-2008*)
- Arthritis Research and Therapy
- BMC Musculoskeletal Disorders
- Calcified Tissue International
- Clinical Orthopaedics and Related Research (*Review Board 1993-1997*)
- Clinical Oral Implants Research

- Connective Tissue Research
 - Inflammation Research
 - Journal of Biological Chemistry (JBC)
 - Journal of Bone and Joint Surgery
 - Journal of Bone and Mineral Research
 - Journal of Cellular Physiology
 - Journal of Clinical Investigation
 - Journal of Investigative Dermatology
 - Journal of Orthopaedic Research (*Editorial Board 1982-1992*)
 - Journal of Periodontal Research
 - Osteoarthritis and Cartilage (*Editorial Board 2008-present*)
-
- National Institutes of Health: *Orthopaedic Study Section (NIH)* Special study secs.
 - National Sciences and Engineering Research Council of Canada
 - NIH (NIAMS) Skeletal Biology Research Study Section (Feb 2006)
 - NIH NIDCR Intrameural Program Review Panel
 - National Science Foundation
 - American Society of Mechanical Engineers (ASME)
 - Arthritis Foundation *Biochemistry Study Section*
 - Arthritis Research Campaign (ARC), United Kingdom
 - Orthopaedic Research Society
 - Whitaker Foundation
 - Canadian Arthritis Network
 - Wellcome Trust

CONSULTED FOR:

- Biomechanics Lab., RPI
- The Gillette Co.
- Teepak (Continental Can Co.)
- Valley Lab (Electrosurgery Division)
- Codman & Shurtleff, Inc.
- American Cyanamid, Inc.
- New York State Department of Health
- Burns and Levinson, Attorneys
- United States Department of Justice
- Analytix, Inc.
- Ethicon (Johnson and Johnson)
- American Medical Electronics
- Bard, Med Systems Division
- Olin Corp.
- Norwich Eaton Pharmaceuticals
- Monsanto
- Burke, Weiners, Moran, Hurley and Merrick, Attorneys
- Krent-Parffett, Associates
- Southeast Center for Electrical Engineering Education
- Dow Corning, Inc.
- U.S. Food and Drug Administration

- U.S. Department of Justice
- Merck
- BioSurface Technology, Inc. (became Genzyme Tissue Repair)
- Pfizer (St. Louis)
- Bayer
- Cleveland Clinic Foundation
- Cleveland Clinic Lerner Research Institute
- University of California, San Diego
- GlaxoSmithKline
- Tissue Engineering, Inc.
- ISTO Technologies
- Reconstructive Technologies, Inc.
- Pharmacia
- Smith and Nephew
- Hale and Dorr, LLP
- Centocor, J&J
- 3D-Matrix (Scientific Co-Founder and former Science Advisory Board Member)
- Biogen Idec
- Biomet
- Pfizer, Cambridge (North)
- Merrimack Pharmaceuticals
- Wellcome Trust and Engineering and Physical Sciences Research Council, U.K.

PUBLICATIONS: BOOKS

1. **Grodzinsky, AJ, *Fields, Forces and Flows in Biological Systems*, Garland Science (Taylor and Francis), March 8, 2011, ISBN-13: 9780815342120.**
308-page-Textbook used for MIT courses including: *Fields, Forces and Flows in Biological Systems* (graduate: 20.430/6.561/2.795/10.539/HST544), and *Molecular, Cellular and Tissue Biomechanics* (graduate: 20.410, 2.798, 3.971/6.524/10.537; and undergraduate: 20.310, 2.797, 6.024).
2. **Sandell, LJ and Grodzinsky, AJ, eds., *Tissue Engineering in Musculoskeletal Practice*, Amer Acad Orthop Surg, Pub., Rosemont, IL., 2004.**

PUBLICATIONS: Refereed Journal Articles and Review Articles

1. Lee, BB, Han, L, Frank, EH, Grodzinsky, AJ, Ortiz, C, Time-Dependent Evolution of the Tissue-Engineered Matrix of Individual Bone Marrow Stromal Cells, 2012 (submitted).
2. Ahn, AC, Gow, B, Martinsen, OG, Zhao, M, Grodzinsky, AJ, Baikie, I, Applying the Kelvin probe to biological tissues: theoretical and computational analyses, 2012 (submitted).
3. Lee, CM, Kisiday, JD, McIlwraith, Grodzinsky, AJ, Frisbie, DD, Development of an in vitro model of injury induced osteoarthritis in adult equine cartilage using single impact compressive overload, 2012 (submitted).

4. Kopesky, PW, Byun, S, Vanderploeg, EJ, Kisiday, JD, Frisbie, DD, Grodzinsky, AJ, Sustained delivery of bioactive TGF- β 1 from self-assembling peptide hydrogels induces chondrogenesis of encapsulated bone marrow stromal cells, 2012 (submitted).
5. Zhang, L, Smith, DW, Gardiner, BS, Grodzinsky, AJ, Mathematical Modeling of Insulin-Like Growth Factor System in Articular Cartilage, 2012 (submitted).
6. Florine, EM, Miller, RE, Porter, RM, Evans, CH, Kurz, B, Grodzinsky, AJ, Effects of dexamethasone on mesenchymal stromal cell chondrogenesis and ADAMTS activity: comparison of agarose and self-assembling peptide scaffolds, 2012 (submitted).
7. Florine, EM, Grodzinsky, AJ, The role of chondrogenic factors in differentiation of bone marrow stromal cells to the cartilage lineage, in *Stem Cells And Cancer Stem Cells: Therapeutic Applications in Disease and Injury*, Volume 7, M.A. Hayat, ed., Springer Verlag, 2012 (in press).
8. Gardiner, BS, Zhang, L, Smith, DW, Pivonka, P, Grodzinsky AJ, A mathematical model for targeting chemicals to tissues by exploiting complex degradation, *Biology Direct*, 6:46, 1-16, 2011.
9. Nia, HK, Han, L, Ortiz, C, Grodzinsky, AJ, Poroelasticity of cartilage at the nanoscale, *Biophys J*, 101:2304-2313, 2011.
10. Lu, YCS, Evans, C, Grodzinsky, AJ, Effects of short-term glucocorticoid treatment on changes in cartilage matrix degradation and chondrocyte gene expression induced by mechanical injury and inflammatory cytokines, *Arthritis Research Therapy*, 13:1-15, R142, 2011.
11. Han, L, Grodzinsky AJ, Ortiz, C, Nanomechanics of cartilage extracellular matrix, *Ann Review Materials Res*, 41:133-168, 2011.
12. Rolauffs, B, Rothdiener, M, Bahrs, C, Badke, A, Weise, K, Kuettner, KE, Baddeley, A, Kurz, B, Aurich, M, Grodzinsky, AJ, Aicher, WK, Onset of pre-clinical osteoarthritis: the angular spatial organization permits early diagnosis, *Arthritis Rheumatism*, 63:1637-1647, 2011.
13. Miller, RE, Kopesky, PW, Grodzinsky, AJ, Growth factor delivery via self-assembling peptide scaffolds, *Clinical Orthop Rel Res*, 469:2716-2724, 2011.
14. Han, L, Frank, EH, Greene, JJ, Lee, H-Y, Hung, HK, Grodzinsky, AJ, Ortiz, C, Time-Dependent Nanomechanics of Cartilage, *Biophysical J*, 100:1846-1854, 2011.
15. Kopesky, PW, Vanderploeg, EJ, Kisiday, JD, Frisbie, DD, Sandy, JS, Grodzinsky, AJ, Controlled delivery of TGF- β 1 by self-assembling peptide hydrogels induces chondrogenesis of bone marrow stromal cells via Smad2/3 signaling, *Tissue Engineering A*, 17:83-92, 2011.
16. Rolauffs, B, Badke, A, Weise, K, Grodzinsky, AJ, Aicher, WK, Stem cells and cartilage repair, in *Stem Cell Based Tissue Repair*, Goradetsky R and Schäfer R, Eds, Royal Soc Chemistry Publishing, London, DOI:10.1039/9781849732246-00248, pp. 248-272, 2010.
17. Miller, RE, Grodzinsky AJ, Vanderploeg, EJ, Lee C, Ferris, DJ, Barrett, MF, Kisiday, JD, Frisbie, DD, Repair of full-thickness articular cartilage defect using self-assembling peptide, chondrogenic factors, and bone marrow derived stromal cells, *Osteoarthritis Cartilage*, 18:1608-1619, 2010.
18. Miller, RE, Grodzinsky, AJ, Cummings, K, Plaas, AHK, Cole, AA, Lee, RT, Patwari, P, Intra-articular injection of heparin-binding insulin-like growth factor-1 sustains delivery of insulin-like growth factor 1 to cartilage through binding to chondroitin sulfate, *Arthritis Rheumatism*, 62:3686-3694, 2010.

19. Lee, H-Y, Kopesky, PK, Plaas, AHK, Sandy, JD, Kisiday, JD, Frisbie, DD, Grodzinsky, AJ, Ortiz, C, Adult bone marrow stromal cell-based tissue-engineered aggrecan exhibits ultrastructure and nanomechanical properties superior to native cartilage, *Osteoarthritis Cartilage*, 18:1477-1486, 2010.
20. Rolauffs, R, Muehleman, C, Li, J, Kurz, B, Kuettner, KE, Frank, EH, Grodzinsky, AJ, Vulnerability of the superficial zone of immature articular cartilage to compressive injury, *Arthritis Rheumatism*, 62: 3016-3027, 2010.
21. Zhang, L, Smith, DW, Gardiner, GS, Pivonka, P, Grodzinsky, AJ, The transport of insulin-like growth factor through cartilage, in *Porous Media: Applications in Biological Systems and Biotechnology*, ed., K Vafai, CRC Press, 2010, pp. 399-453.
22. Hosseini, A, Van de Velde, SK, Kozanek, M, Gill, TJ, Grodzinsky, AJ, Rubash, HE, Li, G, In-vivo time-dependent articular cartilage contact behavior of the tibiofemoral joint, *Osteoarthritis Cartilage*, 18:909-916, 2010.
23. Byun, S, Tortorella, MD, Malfait, AM, Fok, K, Frank, EH, Grodzinsky, AJ, Transport and equilibrium uptake of a peptide inhibitor of pace4 into articular cartilage is dominated by electrostatic interactions, *Archiv Biochem Biophys*, 499:32-39, 2010.
24. Lemke, AK, Sandy, JD, Voigt, H, Dreier, R, Lee, JH, Grodzinsky, AJ, Mentlein, R, Fay, J, Schünke, M, Kurz, B, Interleukin-1 α treatment of meniscal explants stimulates the production and release of aggrecanase-generated GAG-substituted aggrecan products and also the release of pre-formed aggrecanase generated G1 and m-calpain generated G1-G2, *Cell Tissue Res*, 340:179-188, 2010.
25. Bao, G, Kamm, RD, Thomas, W, Hwang, W, Fletcher, DA, Grodzinsky, AJ, Zhu, C, Mofrad, MRK, Molecular biomechanics: the molecular basis of how forces regulate cellular function, *Cellular and Molecular Bioengineering*, 3:91-105, 2010.
26. Kopesky, PW; Lee, H.-Y.; Vanderploeg, EJ; Kisiday, JD; Frisbie, DD; Ortiz, C; Grodzinsky, AJ, Adult equine bone-marrow stromal cells produce a cartilage-like ECM superior to animal-matched adult chondrocytes, *Matrix Biology*, 29:427-438, 2010.
27. Kisiday, JD, Vanderploeg, EJ, McIlwraith, CW, Grodzinsky, AJ, Frisbie, DD, Mechanical Injury of Explants from the Articulating Surface of the Inner Meniscus, *Arch Biochem Biophys*, 494:138-144, 2010.
28. Zhang, L, Gardiner, BS, Smith, DW, Pivonka, P, Grodzinsky, AJ, On the role of diffusible binding partners in modulating the transport and concentration of proteins in tissues, *J Theoretical Biol*, 263:20-29, 2010.
29. Kopesky PW, Vanderploeg, EJ, Sandy JD, Kurz, B, Grodzinsky, AJ, Self-assembling peptide Self-assembling peptide hydrogels modulate *in vitro* chondrogenesis of bovine bone marrow stromal cells, *Tissue Engineering A*, 16:465-477, 2010.
30. Chai, DH, Arner, EC, Griggs, DW, Grodzinsky, AJ, α v and β 1 integrins regulate dynamic compression-induced proteoglycan synthesis in 3D gel culture by distinct complementary pathways, *Osteoarthritis Cartilage*, 18, 249-256, 2010.
31. Rolauffs, B, Williams, JM, Grodzinsky AJ, Aurich, M, Kuettner, KE, Cole, AA, Proliferative remodeling of the spatial organization of human superficial chondrocytes distant to focal early osteoarthritis (OA), *Arthritis Rheumatism*, 62:489-498, 2010.
32. Lee BB, Han, L, Frank, EH, Chubinskaya, S, Ortiz, C, Grodzinsky, AJ, Dynamic mechanical properties of the tissue-engineered matrix associated with individual chondrocytes, *J Biomech*, 43:469-476, 2010.

33. Lee, JH, Fitzgerald, JB, DiMicco, MA, Flannery, CR, Cheng, DM, Sandy, JD, Plaas, AH, Grodzinsky, AJ, Co-culture of mechanically injured cartilage with joint capsule tissue alters chondrocyte expression patterns and increases ADAMTS5 production, *Archiv Biochem Biophys*, 489:118-126, 2009.
34. Sui, Y, Lee, JH, DiMicco, MA, Vanderploeg, EJ, Blake, SM, Hung, H-H, Plaas, AHK, James, IE, Song, X-Y, Lark, MW, Grodzinsky, AJ, Mechanical injury potentiates proteoglycan catabolism induced by IL-6/sIL-6r and TNF- α in immature bovine and adult human articular cartilage, *Arthritis Rheumatism*, 60:2985-2996, 2009.
35. Vanderploeg, EJ and Grodzinsky, AJ, Can the meniscus affect the nature of a chondrocyte, *Osteoarthritis and Cartilage*, 17:969-970, 2009.
36. Kisiday, JD, Lee, JH, Siparsky, PN, Frisbie, DD, Flannery, CR, Sandy, JD, Grodzinsky, AJ, Catabolic responses of chondrocyte-seeded peptide hydrogel to dynamic compression, *Annals Biomed Eng*, 37:1368-75, 2009.
37. Ahn, AC, Grodzinsky, AJ, Relevance of collagen piezoelectricity to “Wolff’s Law”: a critical review, *Medical Engineering and Physics*, 31:733-741, 2009.
38. Kisiday, JD, Frisbie, DD, McIlwraith, CW, Grodzinsky, AJ, Dynamic compression stimulates proteoglycan synthesis by mesenchymal stem cells in the absence of chondrogenic cytokines, *Tissue Engineering Part A*, 15:2817-2824, 2009.
39. Wheeler, CA, Jafarzadeh, SR, Rocke, DM, Grodzinsky, AJ, IGF-1 does not moderate the time-dependent transcriptional patterns of key homeostatic genes induced by sustained compression of bovine cartilage, *Osteoarthritis Cartilage*, 17:930-938, 2009.
40. Stevens, AL, Wishnok, JS, White, FM, Grodzinsky, AJ, Tannenbaum, SR, Mechanical injury and cytokines cause loss of cartilage integrity and upregulate proteins associated with catabolism, immunity, inflammation, and repair, *Molecular Cell Proteomics*, 8:1475–1489, 2009.
41. Patwari, P, Lin, SN, Kurz, B, Cole AA, Kumar, S, Grodzinsky, AJ, Potent inhibition of cartilage biosynthesis by coincubation with joint capsule through an IL-1-independent pathway, *Scand J Med Sci in Sports*, 19:528-535, 2009.
42. Jones, ARC, Chen, S, Chai, D, Stevens, AL, Gleghorn, JP, Bonassar, LB, Grodzinsky, AJ, Flannery, CR, Modulation of lubricin biosynthesis and tissue surface properties following cartilage mechanical injury, *Arthritis Rheum*, 60:133-42, 2009.
43. Zhang, L, Gardiner, B, Smith, D, Pivonka, P, Grodzinsky, AJ, An Integrated model of IGF-I mediated biosynthesis in deforming articular cartilage, *Journal of Engineering Mechanics*, 135:439-449, 2009.
44. Han, L, Dean, D, Daher, LA, Grodzinsky, AJ, Ortiz, Cartilage aggrecan can undergo self-adhesion, *Biophysical J*, 95:4862-70, 2008.
45. Lin, Z, Fitzgerald, JB, Xu, J, Willers, C, Wood, D, Grodzinsky, AJ, Zheng MH, Gene expression profiles of chondrocytes during passaged monolayer cultivation, *J Orthop Res*, 26:1230-1237, 2008.
46. Pfeiffer, E, Vickers, SM, Frank, EH, Grodzinsky, AJ, Spector, M, The effects of glycosaminoglycan content on the compressive modulus of cartilage engineered in type ii collagen scaffolds, *Osteoarthritis Cartilage*, 16:1237-44, 2008.
47. Zhang, L, Gardiner, B, Smith, D, Pivonka, P, Grodzinsky, AJ, A fully coupled poroelastic reactive-transport model of cartilage, *Molecular Cellular Biomech*, 5:133-153, 2008.
48. Rolauffs, B, Williams, JM, Grodzinsky, AJ, Kuettner, KE, Cole, AA, Distinct horizontal patterns in the spatial organization of superficial zone chondrocytes of human joints, *J Struc Biol*, 162:335-44, 2008.

49. Tokunou, T, Miller, R, Patwari, P, Davis, ME, Segers, VFM, Grodzinsky, AJ, Lee, RT, Engineering insulin-like growth factor-1 for local delivery, *FASEB J*, 22:1886-1893, 2008.
50. Wagner T, Eden, U, Fregni, F, Valero-Cabre, A, Ramos-Estebanez, C, Pronio-Stelluto, V, Grodzinsky, AJ, Zahn, M, Pascual-Leone, A, Transcranial magnetic stimulation and brain atrophy: a computer-based human brain model study, *Exp Brain Res*, 186(4):539-50, 2008.
51. Zhang, L, Gardiner, B, Smith, D, Pivonka, P, Grodzinsky, AJ, Growth factor uptake with competitive binding in articular cartilage, *J Biological Systems*, 16:175-195, 2008.
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POST-DOCTORAL ASSOCIATES (Supervised by A.J. Grodzinsky)

1. Valleton, Jean-Marc, ``Mechanochemical coupling in an enzyme system," Jan. 1984 - Dec 1985; current position: Staff Scientist, CNRS, France.

2. Nussbaum, Jeremy, ``Electromagnetic interactions with cells and tissues," Sept. 1986 - June 1987; current position: Prime Computer.
3. Weiss, Aryeh, ``Fluorescence detection of protein transport," Sept. 1986 - June 1987; current position: Asst. Prof., Department of Electrical Engineering, Jerusalem College of Technology, Israel.
4. Grimshaw, Paul, ``Electrical control of membrane permeability," Sept. 1989 - July 1991; current position: Research Engineer, Cambridge Heart, Inc., Billerica, Mass.
5. Adi Shefer, ``Synthesis of hydrogel membranes," Sept. 1990 - August 1993; current position: Asst. Professor, Department of Chemistry, Rutgers.
6. Robert Sah, ``Growth factor regulation of biosynthesis and physical properties of cartilage," July 1991 - Sept. 1992; current position: Asst. Professor, Department of Biomedical Engineering, UCSD.
7. Marc E. Levenston, ``Long Term Static and Dynamic Compression of Chondrocytes," 1995-1998, NIH NRSA Post-Doctoral Fellow, MIT.
8. Lawrence J. Bonassar, ``Matrix Metalloproteinase Degradation of Articular Cartilage," 1995-1998.
9. Bodo Kurz, Injurious Compression of Cartilage: Relation to Gene Expression and Matrix Turnover," Oct 1998-Sept 1999.
10. Alex Kerin, ``Effects of Mechanical Compression on Chondrocytes in Adult Human Articular Cartilage," May 1999-May 2001.
11. Jean-Noel Guze, ``Aggrecan Processing in Chondrocytes and Cartilage", February-August, 2000; March 2001-February 2004.
12. Moonsoo Jin, "ERK Signaling and Gene Expression in Cartilage," 2002.
13. Bernd Rauloffs, "Cartilage Injury," January 2003-December, 2005.
14. Michael A. DiMicco, Cartilage Injury, September 2001-May, 2005.
15. John Kisiday, "Cartilage tissue Engineering using an Equine Model, April 2003 – March 2005.
16. Delphine Dean, AFM Measurement and Molecular Modeling of Aggrecan interactions, Jan – June, 2005.
17. Eric Vanderploeg, Cartilage Tissue Engineering with Self Assembling Peptide Scaffolds, August 2006 – July 2009.
18. Detlef Schumann, Human Cartilage Injury, October 2006 – October 2008.
19. Paul Kopesky, Self-Assembling Peptides for Cartilage Tissue Engineering, 2009.
20. Lin Han, Nanomechanics of Cartilage (Co-Supervised by Prof. C. Ortiz), 2009-2011.

DOCTORAL THESES (Supervised by A.J. Grodzinsky)

1. Lee, Raphael C., Cartilage Electromechanics: The Relationship Between Physiochemical and Mechanical Properties, September 1979.
2. Eisenberg, Solomon R., Non Equilibrium Electromechanical Interactions in Cartilage, January 1983.
3. Siegel, Ronald A., Sustained Release of Drugs from Polymers, February 1984. (Co-Supervised with R. Langer)
4. Weiss, Aryeh M., Real Time Control of the Permeability of Crosslinked Polyelectrolyte Membranes to Fluorescent Solutes," May 1986.
5. Nussbaum, Jeremy H., Electric Field Control of Polyelectrolyte Swelling and Permeability," August 1986.
6. Gray, Martha L., Physical Regulation of Epiphyseal Cartilage Biosynthesis: Responses to Electrical, Mechanical, and Chemical Signals, July 1986. (Co-Supervised: R. Lee)
7. Frank, Eliot H., Electromechanics of Normal and Degenerated Cartilage: Poroelastic Behavior and Electrokinetic Mechanisms, May 1987.
8. Sachs, Jeffrey, A Mathematical Model of an Electromechanically Coupled Poroelastic Medium, June 1987.
9. MacGinitie, Laura A., Electrical and Thermal Modulation of Protein Synthesis in Cartilage: A Model for Field Effects on Biological Tissues, December 1987.
10. Grimshaw, Paul E., Electrical Control of Solute Transport Across Polyelectrolyte Membranes, February 1989.
11. Sah, Robert L., Biophysical Regulation of Matrix Synthesis, Assembly, and Degradation in Dynamically Compressed Calf Cartilage, January 1990.
12. Buschmann, Michael D., Extracellular Matrix in Chondrocyte/Agarose Gel Culture: Physical Characterization and Metabolic Stimulation, February, 1992.
13. Kim, Young-Jo, Mechanical and Chemical Stimulation of Cartilage Matrix Metabolism: Cellular Kinetics, January, 1993.
14. Chang, David Y-S, Augmentation of Mass Transfer Through Electrical Means and Nutrient Enrichment for Suspension and Entrapment Cell Cultures, May, 1994 (co-supervised with Prof. D.I.C. Wang).
15. Bonassar, Larry, Matrix Metalloproteinase Activity and Inhibition in Articular Cartilage: Effects on Composition and Biophysical Properties and Relevance to Osteoarthritis, February, 1995.
16. Berkenblit, Scott, Spatial Localization of Cartilage Degradation using Electromechanical Surface Spectroscopy with Variable Wavelength and Frequency, June, 1996
17. Quinn, Thomas M., Articular Cartilage: Matrix Assembly, Mediation of Chondrocyte Metabolism, and Response to Compression, June, 1996.
18. Garcia, A. Minerva, Mechanisms of Macromolecular Transport Through Articular Cartilage: Relevance to Loading, June, 1996.

19. Treppo, Steven, Physical Diagnostics of Cartilage Degradation, January, 1999.
20. Ragan Paula M, Effects of Mechanical Compression on Chondrocyte Gene Expression, June, 1999.
21. Jin, Moonsoo, Shear Deformation of Cartilage Modulates Matrix Biosynthesis, June 2002
22. Lee, Cynthia R, Behavior of Passaged Chondrocytes in Collagen-Glycosaminoglycan Scaffolds: Effects of Cross Linking, Mechanical Loading, and Genetic Modification of the Scaffold (Co-Supervised by M. Spector), February, 2002.
23. Patwari, Parth K, Mannosamine Inhibits the Degradation of Cartilage Biomechanical Properties induced by IL-1, June, 2003.
24. Szasz, Nora, Transport and Binding of Proteins within Cartilage Explants, June 2003.
25. Soeg, Joonil, Measurement of Chondroitin Sulfate Intermolecular Electrostatic Repulsion Using High Resolution Force Spectroscopy, June 2003 (Co-Supervised by C. Ortiz).
26. Kisiday, John, Self Assembling Peptide Gel Matrix for Cartilage Tissue Engineering, June, 2003.
27. Bathe, Mark, Atomic Model for Persistence length and GAG Electrostatic interactions, (Co-Supervised by B. Tidor and Greg Rutledge), June, 2004.
28. Dean, Delphine, Modeling and Measurement of Intermolecular Interaction Forces between Cartilage ECM Macromolecules, (Co-Supervised by C. Ortiz), February, 2005.
29. Lee, Jennifer H., Chondrocyte Response to *In Vitro* Mechanical Injury and Co-Culture with Joint Capsule Tissue, June, 2005.
30. Szafranski, Jon, Cartilage Mechanobiology: The Effects of Loading on the Fine Structure and Function of Chondroitin Sulfate Glycosaminoglycans, June, 2005.
31. FitzGerald, Jonathan, Chondrocyte Gene Expression and Intracellular Signaling Pathways in Cartilage Mechanotransduction, September, 2005.
32. Ng, Laurel, Structure and Nanomechanics of Aggrecan and the Aggrecan-Rich Pericellular Matrix of Chondrocytes in Cartilage (Co-Supervised by C. Ortiz), September 2005.
33. Stevens, Anna, L. Mechanical injury and inflammatory cytokines affect cartilage matrix integrity and tissue homeostasis: A mass spectrometric analysis of proteins with relevance to arthritis, September, 2006.
34. Han, Lin, DMSE, Nanomechanics of Cartilage Extracellular Matrix Macromolecules (in progress, Co-Supervised by C. Ortiz), August, 2007.
35. Chai, Diana, H., BE, Progression of Chondrocyte Signaling Responses to Mechanical Stimulation in 3-D Gel Culture, February, 2008.
36. Cameron A. Wheeler, BE, Cartilage Response to In Vitro Models of Injury in Combination With Growth Factor and Antioxidant Treatments, February, 2008.

37. Paul Kopesky, BE, Self-Assembling Peptide Hydrogels Promote *in vitro* Chondrogenesis of Bone Marrow-Derived Stromal Cells: Effects of Peptide Sequence, Cell Donor Age, and Method of Growth Factor Delivery, June, 2009.
38. Shuodan Chen, EECS, Regulation of Lubricin Gene Expression and Synthesis in Cartilage by Mechanical Injury, September, 2009.
39. Bobae Lee, DMSE, (Co-Supervised by C. Ortiz), Time-dependent mechanical behavior of newly developing matrix of bovine primary chondrocytes and bone marrow stromal cells using Atomic Force Microscopy, September, 2009.
40. Yihong Sui, BE, In Vitro Models of Cartilage Degradation Following Joint Injury: Mechanical Overload, Inflammatory Cytokines, and Therapeutic Approaches, February, 2010.
41. Rachel Miller, BE, In Vitro and In Vivo Growth Factor Delivery to Chondrocytes and Bone-Marrow-Derived Stromal Cells in Cartilage and in Self-Assembling Peptide Scaffolds June, 2010.
42. Sangwon Byun, EECS, Transport of Proteins, Biopharmaceuticals, and Small Pharmaceutical Compounds into Normal and Injured Cartilage, June, 2010.
43. Hsu-Yi Lee, EECS (Co-Supervised by C. Ortiz), Molecular Structure and Nanomechanical Properties of Aggrecan from Aged, Diseased, and Engineered Tissues, June, 2010.
44. Emily Florine, BE (in progress)
45. Yang Li, BE (in progress)
46. Hadi Tavakoli Nia, MechE (in progress)
47. Yang Wang, BE (in progress)
48. Ambika Goel, MechE (in progress)
49. Paul Liebesny, BE (in progress)

M.D. - HST THESES (Supervised by A.J. Grodzinsky)

1. Sukhatme, Vikas, "Varying Cell shape in Tissue Culture by Changing Substratum Surface Charge," February 1979.
2. Salant, Evan, "Surface Probe for Electrokinetic Detection of Cartilage Degeneration," October 1991.

MASTER'S THESES (Supervised by A.J. Grodzinsky)

1. Shoenfeld, Norman, A Class of Macromolecular Interactions Induced by an Imposed Electric Field, August 1977.

2. Nussbaum, Jeremy, H⁺ Binding and Diffusion-Reaction Rates in Collagen Electromechanics, May 1979.
3. Eisenberg, Solomon, Electric Field-Induced Changes in Membrane Permeability, August 1979.
4. Olson, Craig, Structure-Property Relations in Proteoglycan-Extracted Cartilage, June 1981.
5. Gray, Martha, A New Flow Cytometric Technique for Determining Cell Volume, June 1981.
6. Hoch, David, The Mechanical and Electromechanical Properties of Articular Cartilage Associated with a Meniscectomy Model for Osteoarthritis, August 1981.
7. Grimshaw, Paul, The Response of Cartilage in Compression as it Undergoes Diffusion Limited Chemical Changes, September 1982.
8. Frank, Eliot, Dynamics of Articular Cartilage in Compression as it Undergoes Degenerative Changes, September 1983.
9. Phillips, Susan, Charge Density and Stiffness in Cartilage, September 1984.
10. Morgenthaler, Ann, Theoretical and Experimental Studies of the Action of Proteoglycan-Degrading Enzymes Hyaluronidase, Chondroitinase, and Trypsin on Articular Cartilage, October 1987.
11. Adler, Karen, Correlation of Permeability, Hydration, and Crosslink Density in Polyelectrolyte Hydrogel Membranes, May 1988.
12. Kim, Young-Jo, Radially Unconfined Compression of Poroelastic Media with Axisymmetric Boundary Conditions, June 1989.
13. Bonassar, Lawrence, Electrokinetic Transduction in Bovine Articular Cartilage Under Radially Unconfined Compression, May 1991.
14. Quinn, Thomas, Poroelastic Properties and Electrostatic Interactions in Polyelectrolyte Hydrogels, May 1991.
15. Wu, Hsi-Jung, The Effect of Cytoskeletal Disruption on Cartilage Metabolic Response to Compression, January, 1992.
16. Kung, Sophia T-W., Effects of Mechanical Loading on Cartilage Degradation, September, 1993.
17. Paguio, Claribel G., Effects of Endogenous and Exogenous Metalloproteases on Articular Cartilage Explants: Relevance to Osteoarthritis, September, 1993.
18. Stinn, Jennifer L., Inhibition of Metalloproteinases in Articular Cartilage, May, 1995.
19. Bombard, David L., A Surface Probe for In Situ Detection of Cartilage Degradation via Electromechanical Spectroscopy, May, 1995.
20. Lin, John W., Electrokinetic Evaluation of Human Articular Cartilage, May, 1995.
21. Jen, Michelle C., Transport Studies of Component Proteoglycan Molecules Through Cartilage," May, 1995.

22. Lin, Bryant., Characterization of the Properties of Cartilage in the Hartley Guinea Pig spontaneous Osteoarthritis Model, June, 1997.
23. Zhu, Julianne J., Transport Studies of Chondroitin Sulfate Disaccharide Through Articular Cartilage, June, 1997.
24. Emerson Quan, Differential Progression of Arthritic Degradation in Human Knee and Ankle Cartilage: Physical Diagnostics, June, 1998.
25. Loening, Andy, Effects of Dynamic Compression on Cartilage Metabolism, Dec, 1998.
26. Jin, Moonsoo, Effects of Static and Dynamic Shear Deformation on Cartilage Metabolism, February, 1999.
27. Tsay, Jeff, Early Detection of Osteoarthritis by Electromechanical Spectroscopy, February, 1999.
28. Szasz, Nora, IGF-I Transport Through the Extracellular Matrix, June, 1999.
29. Kong, Jiang-Ti, Intermolecular Interaction between Chondroitin Sulfate GAG Chains: Atomic Force Microscopy and Molecular Mechanics, August, 1999.
30. Patwari, Parth, Mannosamine Inhibites Aggrecanase-Mediated Degradation of the Mechanically Functional Portion of Proteoglycans and of the Physical Properties of Articular Cartilage, Feb, 2001.
31. Evans, Robin, Diagnostic Probe for Cartilage Impedance, June, 2001.
32. Dean, Delphine, Measurement and Modeling of GAG Electrostatic Repulsion Forces by Atomic Force Microscopy, June, 2001.
33. Wagner, Tim, Field Distributions Within the Human Cortex Induced by Transcranial Magnetic Stimulation, EECS, June 2001.
34. Suggs, Jeremy, ACL Injuries, MechE, 2002
35. Timp, Winston, Study of Disposable Microdevices for DNA Electrophoresis, Feb, 2003.
36. Cheung, Regina, Characterization of Scaffold-free Chondrocyte-based Tissue Engineering Constructs for Cartilage Repair, June 2003.
37. Cosman, Christina, Effects of shear deformation on matrix biosynthesis by chondrocytes in self-assembling peptide gel culture, June 2003.
38. Saatchi, Sanaz, A novel osteochondral composite consisting of a self-assembling peptide hydrogel and 3D-printed polycaprolactone scaffold: potential for articular cartilage repair, June, 2004.
39. Lee, Gary, IGF-1 and Extended Mechanical Stimulation of Cartilage for Growth and Repair, EECS, June, 2004.
40. Norris-Lee, Stephanie, Co-Culture of Injured Cartilage with Joint Capsule Tissue causes enhanced enzymatic degradation of cartilage, August, 2004.
41. Chen, Schuodan, Effects of Dynamic Shear Deformation on Chondrocyte Biosynthesis in Agarose Gel Culture, June, 2005.

42. Motion, J.P. Michael, Mechanically Reduced Intercellular Remodeling of Cardiomyocytes by Magnetic Micromanipulation, February, 2006.
43. Wheeler, Cameron, Cartilage Mechanobiology and Transcriptional Effects of Combined Mechanical Compression and IGF-1 Stimulation on Bovine Cartilage Explants, June, 2006.
44. Cheng, HE, High-Throughput Singler Cell Force Spectroscopy Array, DMSE/SMA, 2010 (in progress).
45. Krishna Swaminathan, BE, A Quantitative Proteomics Study of the Additive Effect of Inflammatory Cytokines and Injurious Compression on Cartilage Damage, May, 2011.
46. Fei Liang, ChemE, Molecular Studies of Aggrecan: Experiments and Simulations, May, 2011.
47. Nicole Casasnovas, BE, Molecular Imaging for Cartilage Tissue Engineering and Osteoarthritis, June, 2012.

BACHELOR'S THESES (Supervised by A.J. Grodzinsky)

1. Picheny, Michael, ``Diffusion Potentials Measured Across Charged Collagen Membranes," June 1975.
2. Kazen, Jerry, ``Modeling of Currents Induced by High Voltage Transmission Lines in Living Organisms," June 1976.
3. Palmer, Miles, ``Measurements of Charge on Artificial Skin Composite Materials," June 1976.
4. Cremer, Jay, ``A Membrane Diffusion Potential Monitoring System with Forced Convection," June 1976.
5. Shoenfeld, Norman, ``Electric-Field-Controlled Transduction in Polyelectrolyte Membranes: An Artificial Muscle," June 1976.
6. Bediako, Emmanuel, ``Control of the Electric Response of the Collagen Membrane," June 1976 (co-supervised with Professor T. L. Johnson).
7. Eisenberg, Solomon, ``Time and Space Periodic Collagen Membrane Electromechanics," May 1977. (Awarded the Department's Guillemin Prize for Best Undergraduate Thesis).
8. Scott, William, ``The Effect of Internal Fixed Charge Groups and External Chemical Environments on the Electrical Conductance of Connective Tissue Proteins," May 1978.
9. Longley, Lester, ``Experimental Evidence for Diffusion-Limited Reaction Kinetics in Intact Collagen Structures," May 1978.
10. Nussbaum, Jeremy, ``Some Techniques of Data Collection, Reduction and Analysis," May 1979.
11. Grossman, Walter, ``Electromechanical Measurements of Calcium Binding in Cartilage," May 1979.
12. Wozniak, John, ``Changes in Membrane Permeability Due to Mechanical Stimuli," May 1979.
13. Frank, Eliot, ``Electromechanical Dynamics of a Charged, Hydrated Polymer," January 1980. (Awarded the Department's Guillemin Prize for Best undergraduate Thesis).

14. Kwok, Edward, ``Chemical Modification of Molecular Fixed Charge Groups in Articular Cartilage," May 1980.
15. Chen, Terence L., ``Physical Characterization of Electrosurgical Coagulation," May 1980.
16. Chung, Jay, ``Stress Relaxation Kinetics in Charged and Neutral Polyacrylamide Gels," May 1980.
17. Grimshaw, Paul, ``Real-time Analysis of Cartilage Compression/Stress Relaxation Response Using a Microcomputer," May 1980.
18. Hoch, David, ``A Method for the Preparation and Detection of Oriented Collagen Fibril Gels Using Orientation Polarization and Optical Birefringence," September 1980.
19. Fechner, Patricia, ``The Influence of Applied Electric Fields on Neutral Isotope Transport Across Membranes," June 1981.
20. Kazdan, David, ``Examination of an Analytic Model for the Teorell Membrane Oscillator," June 1981.
21. Bart, Stephen, ``The Mechanism of Electrosurgical Coagulation: Steam Evolution Versus Dielectric Breakdown," May, 1982.
22. Pratt, Randy, ``The Effect of Solvent Composition on the Absorption and Fluorescence of Organic Dyes in Solution," May 1983.
23. Brenner, Jacqueline, ``Transport of Insulin Across PMAA Membranes," June 1984.
24. Kavesh, Neal, ``Electromechanical Transduction Properties of Bovine Articular Cartilage," June 1984.
25. Gerber, Monica, ``The Effect of Matrix Depletion by Chondroitinase ABC on Proteoglycan Synthesis in Live Articular Cartilage," May 1984.
26. Hey, Lloyd, ``The Effect of Mechanical and Electrical Forces on Cartilage Biosynthesis," December 1984.
27. Brown, Paula, ``Electrically and Chemically Stimulated Changes in Polyelectrolyte Membrane Swelling," June 1985.
28. Lee, R. Todd, ``Optical Measurement of Charge Densities in Crosslinked PMAA Membranes," May 1986.
29. Jablonski, Mark, ``Characterization of the Net Charge of Fluorescent Dyes," February 1986.
30. Siu, Hoi Man, ``Chemically Controlled Transport of Protein-Fluorescent Dye Conjugates Through Poly(MAA/DEAEMA/HEMA) Copolymer Membranes," June 1987.
31. Lee, Janet, ``Chymopapain - Induced Depolymerization of Proteoglycans in Human Intervertebral Disc," August 1987.
32. Liu, Thomas, ``Swelling and Permeability of Polymethacrylic Acid Polymer Membranes," May 1988.
33. Hollerbach, Karin, ``The Electromechanical and Biochemical Behavior of Chondrosarcoma Cell Cultures," May 1988.
34. Tiao, Paul, ``Electroextraction of Proteoglycans from Calf Articular Cartilage In Vitro," June 1989.

35. Chen, Suephy, ``Nondestructive Measurements of Fixed Charge Density in Biomaterials," May 1989.
36. Chwang, Sophia, ``Electromechanical Properties of a Piezo Film in Probe for Cartilage Degeneration," June 1990.
37. Su, Catherine, ``Characterization of Swelling and Electroosmotic Transport in Polyelectrolyte Hydrogel Membranes," June 1990.
38. Holcroft, Christina, ``Effects of Dynamic Loading on Cartilage Metabolism," June 1990.
39. Kim, Frank, ``Experimental Measurement of Solute Transport Through Gel Membranes," June 1991.
40. Davis, Charles, ``A Feasibility Study on Auto-Focusing Glasses and Contact Lenses," May 1991.
41. Janslewitz, Steven, ``A Device for Characterization of Mechanical and Electrical Properties of Cartilage, May 1992.
42. Paguio, Claribel, ``Effects of Enzymatic Degradation on Articular Cartilage: Relevance to Osteoarthritis," May, 1992.
43. Lee, Ming-Shing, ``Effect of Retinoic Acid and pH on the Biosynthetic Activity of Articular Cartilage," June, 1992.
44. Hung, Claudia, ``Permeability and Transport Characteristics of Poly(Acrylic Acid) Gel Membranes," May 1993.
45. Chu, Lillian, ``Electromechanical Properties of Alginate Gel Prepared for Chondrocyte Culture," May 1993.
46. Jeffries, Kimberly A., ``Effects of Stromelysin and Its Inhibitors on Rabbit Articular Cartilage In Vivo," February, 1994.
47. Duffin, Nolan J., ``Development of an Electromechanical Indentation Device Used in the Detection of Streaming Potentials in Articular Cartilage," May, 1994.
48. Koot, Gretchen E., ``Long Term Effects of Static Compression on Bovine Articular Cartilage," May, 1994.
49. Jen, Michelle, ``Transport Studies in Cartilage Using Protease Inhibitor - Supplemented Buffers," May, 1994.
50. Hsieh, Susan J., ``IL-1 and Retinoic Acid Induced Degradation of Cartilage Matrix and the Inhibitory Effects of Proteinase Inhibitors: Relevance to Osteoarthritis," May, 1995.
51. Maung, Adrian, ``Role of Mechanical Compression in Cartilage Extracellular Matrix Metabolism," May, 1996.
52. Kong, Jiang-Ti, ``The Effect of Mechanical Compression and TGF β on Matrix Biosynthesis in Bovine Articular Cartilage," June, 1997.
53. Davila, Salomon G., ``Biosynthetic Response of Cartilage Explants to Dynamic Compression and Changes in pH in the Presence of IGF-1," June, 1997.

54. Sebern, Elizabeth L., ``Characterization of Electromechanical Properties of Cartilage in the Hartley Guinea Pig Spontaneous Osteoarthritis Model," June, 1997.
55. Nirav Bhakta, ``Electroosmotic Fluid flow in Articular Cartilage," EECS (AUP), June, 1998.
56. Nikhil N. Batra, ``Parameter Estimation of Material Properties: Experimental Approaches," Civil Eng., June, 1998.
57. Hung, Gilbert, ``Effects of Artificial Aging (Non-enzymatic Glycation) on the Mechanical Properties of Articular Cartilage," June, 2000.
58. Cosman, Christina, ``Effects of IGF-1 on Repair of Injurious Compressed Tissue," June, 2001.
59. Norris, Stephanie, ``Co-Culture Model for Joint Injuries," June, 2001.
60. Rojas, Fredrick, Molecular interactions between collagen and aggrecan from cartilage extracellular matrix, (DMSE), June, 2011.

DOCTORAL THESIS COMMITTEE: READER

1. Tung, Lesley, A Bi-Domain Model for Describing Ischemic Myocardial Potentials, EECS, May 1978.
2. Baden-Kristensen, Keld, ``An Investigation of the Mechanisms of Generation of Intracellular Electric Potentials of Cochlear Hair and Supporting Cells of the Alligator Lizard," EECS, September 1979.
3. Kawate, Keith, ``Electrical Surface Studies on Hexagonal Ice and Their Interpretation," EECS, September 1979.
4. Odette, Louis, ``Dynamics of Photoreception in Invertebrates," EECS, February 1981.
5. Smith, Frank III, ``Electrostatic Effects on Restricted Diffusion of Macromolecules," September 1981 (Dept. of Chemical Engineering).
6. Parker, Kevin, ``The Generation and Analysis of Hypothermia by Ultrasound," HST, September 1981.
7. Lang, Elizabeth, ``Charge Effects on the Solution Behavior of Hyaluronic Acid," September 1982 (Dept Nutrition and Food Science).
8. Sheppard, Norman, ``Structure/Dielectric Property Relationships of Model Polymer Networks," EECS, September 1984.
9. McLeod, Kenneth, ``The Interaction of Very Low Frequency Electric Fields with Cells in a Tissue Equivalent Matrix," EECS, May 1985
10. Freeman, Dennis, ``Theoretical Studies of Passive Models of Ciliary Tuft Motion," EECS, June 1986.
11. Johnson, Mark, ``Transport Properties of the Juxtacanalicular Meshwork," Mechanical Engineering, February 1986.
12. Saltzman, Mark, ``A Microstructural Approach For Modeling Diffusion of Bioactive Macromolecules in Porous Polymers," HST, April 1987.

13. Zaretsky, Mark, ``Theory and Applications of Measuring Complex Permittivities of Insulating Media Using Microdielectrometry," EECS, May 1987.
14. Sung, Cynthia, ``A Study of Polyethylene Oxide-Polysiloxane Networks as Biomaterials for Drug Release," HST, December 1988.
15. Williams, R. P. W., ``Cartilage Proteoglycans and Osmotic Flow," May 1989, (Monash University, Australia).
16. Olson, William, ``Electrophoretic Elution and Adsorption Techniques for Immunoabsorption," (Dept. of Chemical Engineering) January 1989.
17. Phillips, Ronald, ``The Hindered Transport of Compact Macromolecules In Fibrous Media," Chemical Engineering, 1990.
18. Shapiro, Andrew, ``Electroosmotic Removal of Chemical Species from Porous Media," Mechanical Engineering, January 1990.
19. Lin, Nelson, ``Hindered Diffusion of Linear Polyelectrolytes," Chemical Engineering, January, 1991.
20. Shockley, Ty, ``Uptake and Spatial Distribution of Anti-Tumor Monoclonal Antibodies in Melanoma Tumors," Chemical Engineering, January 1991.
21. Gajar, Stephanie A., ``An Ionic Liquid-Channel Field Effect Transistor," EECS, June, 1992.
22. Loree, Howard M. II., ``The Mechanics of Atherosclerotic Plaque Rupture," Mechanical Engineering, June, 1992.
23. Shen, Jian, ``Signal Transduction by Fluid Shear Stress in Vascular Endothelial Cells," Mechanical Engineering, September, 1992.
24. Oliver, James D. III, ``Analysis of Glomerular Permeability in the Rat Using Theoretical Methods of Hindered Transport, HST, October, 1992.
25. Melcher, Jennifer R., ``The Cellular Generators of the Brainstem Auditory Evoked Potential," EECS, February, 1993.
26. Ito, Keita, ``Movement-Induced Orientation of Collagen Fibrils in Cartilaginous Tissues," Mechanical Engineering, May, 1994.
27. Malek, Adel M., Molecular Characterization of the Vascular Endothelial Response to Fluid Shear Stress, HST, May 1994.
28. Wong, Joyce YW, Electrically Conducting Polymers for Non-Invasive Control of Mammalian Cell Behavior, Chemical Engineering, May, 1994.
29. Boxerman, Jerrold L., Non-Invasive Measurement of Physiology Using Dynamic Susceptibility-Contrast NMR Imaging, HST, January, 1995.
30. Washabaugh, Andrew P., Flow Electrification in Electric Power Transformers, EECS, January, 1995.
31. Shieh, Lisa, Erosion and Drug Release from Bioerodable Polyanhydrides, HST, January, 1995.

32. Szajda, Kenneth S., A High Resolution Integrated Circuit Biomedical Temperature Testing System, EECS, January, 1995.
33. Johnson, Erin M., Partitioning and Diffusion of Macromolecules in Charged Gels, Chemical Engineering, September, 1995.
34. Lee, Elaine, Effects of Cytokines and Monocytes on Matrix Metalloproteinases in Human Vascular Smooth Muscle Cell Cultures, HST, September, 1995.
35. Lee, Woojin, Polymer Gel-Based Actuator: Dynamic Model of Gel for Real Time Control, EECS, June, 1996.
36. Cheng, George, Regulation of Vascular Smooth Muscle Cell Function by Mechanical Strain, HST, June, 1996.
37. Lesho, Matthew J., The Design of Conductimetric Biosensors Based on Responsive Hydrogels, Dep't Biomedical Engineering, Johns Hopkins University, June, 1996.
38. Abnet, C. Cameron, Measuring Mechanical Properties of the Tectorial Membrane, Mechanical Engineering, December, 1997.
39. Swartz, Melody A., Interstitial-Lymphatic Transport Phenomena, Chemical Engineering, May, 1998.
40. Bolton, Glen R., Permeation of Ficoll and Ficoll Sulfate through Glomerular Basement Membrane: Effects of Molecular Size and Charge, Chemical Engineering, May, 1998.
41. Breinan, Howard A., Development of a Collagen-Glycosaminoglycan Analog of Extracellular Matrix to Facilitate Articular Cartilage Regeneration, HST, May, 1998.
42. Chen, T., Skin Electroporation, Chemical Engineering, June, 1999.
43. Johnston, Scott T., Convective Transport of Macromolecules in Gels, Chemical Engineering, July, 1999.
44. Younis, Hesham F., Modeling of Disease-Free and Atherosclerotic Human Carotid Bifurcation based on In Vivo Magnetic Resonance Imaging Data: Correlations to Atherogenesis," Mechanical Engineering, September, 2001.
45. Chi-Pong Kwan, Glycosaminoglycan-protein interactions: the fibroblast growth factor paradigm, Biological Engineering Division, 2002.
46. Dawn Hastreiter, A Collagen-GAG Matrix for Growth of Intervertebral Disc Tissue," (MEMP), June, 2002.
47. Brian Stoll, Factors Affecting the Development and Remodeling of Microvascular Architecture in Solid Tumors, ChemE, June, 2003.
48. Rahul Raman, Glycomics: An Emerging Paradigm in Protein Carbohydrate Interactions (BE), June, 2003.
49. Timothy P. Padera, Lymphatic Pathophysiology of Tumors, Chemical Engineering-MEMP, June, 2003.
50. Kevin Pojasek, Development of Enzymatic and Analytical Tools for the Analysis of Chondroitin Sulfate and Dermatan sulfate Oligosaccharides, Biological Engineering, June, 2003.

51. Emily Cooper, Silicon field-effect sensors for biomolecular assays, EECS, June, 2003.
52. Kimberly Brian, Diffusion and Convection in Composite Hydrogels, ChemE, June, 2004.
53. Mariah Hahn, EECS, Characterization of the Vocal Fold Lamina Propria Towards Voice Restoration, June, 2004
54. Lily Laiho, Tissue Spectroscopic characterization based on fluorescence, Second Harmonic Generation, and Reflected Light, MechE, August, 2004.
55. Chris Hartemink, "The Cross-Linking Mechanism of Filamin A in the Actin Cytoskeleton," ME-MEMP, September, 2004.
56. Louis Defrate, The biomechanics of the knee following injury and reconstruction of the posterior cruciate ligament, MechE, June, 2005.
57. Thomas Gervais, Mass Transfer and Structural Analysis of Microfluidic Devices, BE, September, 2005.
58. Paul George, Novel Polypyrrole Derivatives to Enhance Conductive Polymer-Tissue Interactions, (ChemE-MEMP) September, 2005.
59. Kinu Masaki (HST, EECS), May, 2006.
60. Michael Garcia-Webb, An Apparatus for High Throughput Muscle Cell Experimentation, BE, August, 2006.
61. Alex Rabodzey, Flow-induced Mechanotransduction in Cell-cell Junctions of Endothelial Cells, BE, August, 2006.
62. Rouzbeh Taghizadeh, Development of methods for the ex vivo expansion of human hematopoietic stem cells (BE), May, 2006.
63. Jianping Fu (MechE), Nanofluidic Devices for Rapid Analysis of DNA and Proteins, June, 2007.
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