

**DENNIS E. DISCHER, Ph.D.**

Robert D. Bent chaired Professor

Director, Penn's Physical Sciences Oncology Center/Project, PSOC@Penn – Nat'l Cancer Inst U54/U01 Center/Project  
*Head of Biophysical Engineering Labs in: Molecular & Cell Biophysics and NanoBio-Polymers*  
 School of Engineering and Applied Science, & Graduate Groups in Physics, and Pharmacological Sciences  
 University of Pennsylvania, Philadelphia, PA 19104  
[www.seas.upenn.edu/~discher/](http://www.seas.upenn.edu/~discher/)

**RESEARCH SYNOPSIS**

We work at the interface of biological physics and soft matter engineering science, extending to delivery science. We seek to understand with mathematical rigor the molecular basics of physical properties and forces in cell physiology, stem cell development, and cancer genomes, with select efforts embracing drug/gene/cell delivery and a macrophage checkpoint. Cells and tissues are of course composed largely of soft hydrated biopolymers, and our micro/nano/molecular manipulations focus on emergent properties. Synthetic materials are tools, especially polymer matrices and block copolymer assemblies. Impacts on cell biology and biophysics include Matrix Elasticity effects on Stem Cell Differentiation and Nucleus Mechanosensing in relation to Development, Aging, Cancer, and other Diseases. Pre-clinical therapies began by making novel polymer Vesicles and Filaments (we called Polymersomes & Filomicelles) with tests in Blood Circulation and Disease models (Cancer, Muscular Dystrophy). This motivated us to study and exploit how Macrophages recognize 'Self' versus 'Foreign'. *Methods developed and refined range from Fluorescence Imaged Microdeformation with micropipettes or Atomic Force Microscopy, 'Cysteine Shotgun' Mass Spec for protein conformation in cells, Titration Microarrays for high-precision genomics. Modeling efforts span Molecular Dynamics to Continua.*

**EDUCATION**

Post-doc. (1996) University of British Columbia and Simon Fraser University, British Columbia, Canada  
 - D.H. Boal and E.A. Evans, advisers; *Fellow in Statistical Biophysics*  
 Ph.D. (1993) University of California, Berkeley, and University of California, San Francisco, California  
 - N. Mohandas, adviser; *Thesis in Cell Membrane Biophysics & Biochemistry*  
 B.S. Highest Honors (1986) University of California, Davis - *studies in Engineering, Physics, & Biochemistry*

**PROFESSIONAL EXPERIENCE**

12/04 - present **Robert D. Bent chaired Professor** (2011-2021)  
*Professor*, School of Engineering and Applied Science: Chem. & Biomolecular Eng'g. (CBE),  
 Mech. Eng'g. & Applied Mech. (MEAM), and Bioengineering (BE).  
 Graduate Group Faculty Member:  
 Physics, Cell & Molecular Biology (CAMB), Pharmacological Sciences,  
 Institute & Center Affiliations:  
 Director of NCI's Physical Sciences Oncology Center, PSOC@Penn, (U54 Grant: 2015 -2020)  
 NSF-Materials Research Science & Eng. Center (MRSEC), Nano Science & Eng. Center (NSEC)  
 Institute Regen. Med. (IRM), Pennsylvania Muscle Institute (PMI), Abramson Cancer Center,  
 University of Pennsylvania, and  
*Adjunct Professor* – The Wistar Institute; Systems Biology Div. & Cancer Center (9/2000 – )  
 7/96 – 12/04 *Assistant* → *Associate* → *Full Professor* at Penn.  
 5/93 - 12/94 *Scientist*, Biochemistry/Biophysics, Life Sciences Division, Cell and Molecular Biology Group,  
 Lawrence Berkeley National Laboratory  
 2/88 - 2/90 *Consultant & Process Engineer*, Research and Development, Apprise Inc. Santa Clara, CA

**ACADEMY MEMBERSHIPS, NAMED LECTURESHIPS, & OTHER AWARDS**

*American Association for the Advancement of Science (AAAS)* – elected Fellow (Nov. 2015).

*US National Academy of Medicine (NAM)* – elected member (2015).

*US National Academy of Engineering (NAE)* – elected member (2012). For elucidation of the effects of mechanical forces on cell physiology and stem cell development.

Named Lectures among ~500 Plenaries, Keynotes, Seminars, and other Lectures since 2002 (some listed on last pages) :

**Indian Institute of Technology Mumbai – Institute Lecture** (2023).

**Shu Chien Scientific Achievement Award & Lecture** – Biomedical Engineering Society, Cell & Mol Biol Eng'g Award (2021).

**Richard Skalak Lecture** – Biomedical Engineering Dept., Columbia University, New York (Apr 2019)

**Distinguished Lectureship in BioE for 2018-2019** – Bioengineering Dept., University of California, Berkeley (Mar 2019)

**University Distinguished Lecture** – Huazhong Univ. Science & Technology (HUST) Wuhan, China (Dec 2017)

**Novartis Lecture** – Chemistry Dept., University of Texas at Austin (Mar 2017)

**Lindsay Lecture** – Chemical Eng'g., Texas A&M University (Jan 2017)  
**Nikon Lecture** – Cell and Molecular Biophysics, Randall Division, King's College London (May 2016)  
**Barry Berman Memorial Lecture** – Physics Dept., George Washington University (Apr 2016)  
**Charles Edison Lecture** – College of Engineering, University of Notre Dame (Nov 2015)  
**Ashland Inc. Distinguished Lecture** – Chem. & Mat'ls. Eng. Depts. and Pharm. Sci., Univ. Kentucky (Apr 2014)  
**Grodins Lecture** – Biomedical Eng. Dept., Univ. Southern California (Feb 2013)  
**Anbar Lecture** – Physiology & Biophysics Dept., Univ. Buffalo (Sept 2011)  
**Melville Lecture** – Chemistry Dept., Cambridge Univ. (May 2009)

**Distinguished Alumnus Award UC Davis** College of Eng'g. (2019)  
**Honorary Professor of HUST**, Huazhong Univ. Science and Technology; approved by Ministry of Ed'n of China (2017)  
**Highly Cited Researchers in Web of Science (Thomson Reuters)** top ~3000 from ~9M published scientists (Pharmacology 2014, 15, 16) ~20 at U.Penn., 1 in Eng'g.; (**Clarivate Analytics**) (Cross-Field 2018) top ~6000; ~50 at U.Penn., 4 in Eng'g.  
**Distinguished Visiting Professor, Physical Sciences Oncology Center – Johns Hopkins University** (May 2015)  
**Institut Jacques Monod, Paris, France – LabEx Fellow** (Apr. 2014)  
**AICHe Annual Meeting Plenary Award Lecture** of the Food, Pharma, & Bioeng'g. Division (Nov 2009)  
**Friedrich Wilhelm Bessel Award** (2003) from the Alexander von Humboldt Fdn. of Germany for "scientists and scholars who are already recognized as outstanding researchers in their field" - Cell Biophysics  
**George Heilmeyer Research Award** (2004) for "Polymersomes" from Penn's Sch. Eng'g. Appl. Science  
**Jorge Heller Outstanding Paper Award** – *Journal of Controlled Release* (2004)  
**Presidential Early Career Award** for Scientists & Engineers (1999) (Top ~5% of CAREER Awards)  
 Post-doctoral: NSF International Fellow and Canadian Institute of Advanced Research Fellow  
 Departmental Citation for Most Outstanding Undergraduate; B.S. with Highest Honors; Tau Beta Pi (Eng'g Honor Society); Phi Kappa Phi (Interdisciplinary Honor Society)

### MAJOR REVIEW BOARDS & LEADERSHIP POSITIONS

**Science** – Board of Reviewing Editors 2002-present (2-10 papers per month)  
**Proceedings of the National Academy of Sciences - Nexus (PNAS-Nexus)** Board of Reviewing Editors (2023 - )  
**Molecular Biology of the Cell** (journal of the American Society of Cell Biology) Ed Board/Special Forces Issue (2017-21)  
**Proceedings of the National Academy of Sciences (PNAS) ad hoc** Editor (2-3 submissions per yr since ~2015)  
**Journal of Cell Science** Editorial Board (2011- ); **Matrix Biology** Editorial Board (2011-14)  
**APL Bioengineering** – Ed. Board (2020 - ); **Annual Review of Biomedical Engineering** – Ed. Board 2007-2011, Guest 2006

**Co-Chair Physical Sciences Oncology Network** (NCI Network, 2019-2020)  
**Co-Chair NAE German-American Frontiers of Eng'g Meetings** (Cincinnati, OH Apr 2017; Hamburg, Germany Mar 2019)  
**External Advisory Committee Purdue University Center for Cancer Research** 2018 - present  
**Co-Organizer EMBO Workshop – Nuclear Mechano-genomics** (Singapore: Apr 2018)  
**NAE Russ Prize Committee** (top international award for Bioengineering Achievement) 2014 - 2017  
**Inaugural Co-Chair EMBL Symposium – Mechanical forces in biology** (Heidelberg, Germany: July 2017)  
**Chair College of Life Science & Technology of HUST External Evaluation Panel** (Wuhan, China: Dec 2017)  
**Chair Inaugural Gordon Research Conference - Physical Science of Cancer** (Galveston, TX: Feb. 2017)  
**Chair (elected for year-2) of Mechanobiology Subgroup of the Biophysical Society** (2014-2015)  
**NSF Division of Materials Research (DMR) Committee of Visitors (COV) Member – BMAT Section Leader** (2015)  
**NIH College of CSR Reviewers** (2010-2012); **NIH Study Sections Gene Drug Del.** (2013-; Chair 2016-18), **ELB** (2005-2009).  
**NIH NHLBI Intramural Research Review** (2015); **NIH Pioneer Award Phase-1 Reviewer** (2011-2014)  
**NSF Biomaterials Advisory Committee Member – Soft Materials Section Leader & Report Author** (2012-2013)

### NATIONAL ACADEMIES Service

**National Academy of Science, Engineering, Medicine:** Committee on Biological and Physical Sciences in Space (2023-)  
**National Academy of Science, Engineering, Medicine:** Planning Committee and Report Reviewer for NSF Understanding the Rules of Life Program (2022-23)  
**National Academy of Engineering German-American Frontiers of Eng'g Meetings** (Cincinnati, 2017; Hamburg, 2019)  
**National Academy of Engineering Russ Prize Committee** (top international award for Bioengineering Achievement) 2014 - 2017  
**National Research Council** Division on Engineering and Physical Sciences: Panelist (2020, 2017) and Report Reviewer (2014)  
 “An Assessment of the National Institute of Standards and Technology (NIST) Material Measurement Laboratory”  
**National Academies Keck Futures Initiative** (NAKFI) annual conference “Collective Behavior: From Cells to Societies” (2014)

**IMPACT NUMBERS:** ~300 publications, >75,000 citations, >5000 cites per year, *h*-index = 106  
 9 publications in *Science* (ISI > 30), 1 in *Nature* (ISI > 30), & 1 in *Cell* (ISI > 30) which is the  
 3<sup>rd</sup> most cited experimental research paper in all of Molecular Biology & Genetics 2004-2016 (ISI index)  
 and remains a top-5 cited article in *Cell* since year of publication.

[http://scholar.google.com/citations?hl=en&user=IPBKIS8AAAAJ&view\\_op=list\\_works&pagesize=100](http://scholar.google.com/citations?hl=en&user=IPBKIS8AAAAJ&view_op=list_works&pagesize=100)



**Dennis Discher**

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University of Pennsylvania

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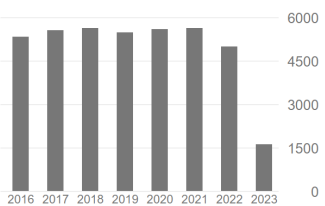
bioengineering cell and molecular biology stem cell engineering drug delivery systems mechanotransduction

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TITLE	CITED BY	YEAR
<b>Matrix elasticity directs stem cell lineage specification</b> AJ Engler, S Sen, HL Sweeney, DE Discher Cell 126 (4), 677-689	14445	2006
<b>Tissue cells feel and respond to the stiffness of their substrate</b> DE Discher, P Janmey, Y Wang Science 310 (5751), 1139-1143	6836	2005
<b>Polymer vesicles</b> DE Discher, A Eisenberg Science 297 (5583), 967-973	4031	2002
<b>Polysomes: tough vesicles made from diblock copolymers</b> BM Discher, YY Won, DS Ege, JCM Lee, FS Bates, DE Discher, ... Science 284 (5417), 1143-1146	3464 *	1999
<b>Growth factors, matrices, and forces combine and control stem cells</b> DE Discher, DJ Mooney, PW Zandstra Science 324 (5935), 1673-1677	2876	2009
<b>Shape effects of filaments versus spherical particles in flow and drug delivery</b> YAN Geng, P Dalhaimer, S Cai, R Tsai, M Tewari, T Minko, DE Discher Nature nanotechnology 2 (4), 249-255	2699	2007
<b>Myotubes differentiate optimally on substrates with tissue-like stiffness: pathological implications for soft or stiff microenvironments</b> AJ Engler, MA Griffin, S Sen, CG Bonnemann, HL Sweeney, DE Discher The Journal of cell biology 166 (6), 877-887	1941	2004
<b>Nuclear lamin-A scales with tissue stiffness and enhances matrix-directed differentiation</b> J Swift, IL Ivanovska, A Buxboim, T Harada, PCDP Dingal, J Pinter, ... Science 341 (6149), 1240104	1746	2013
<b>Substrate compliance versus ligand density in cell on gel responses</b> A Engler, L Bacakova, C Newman, A Hategan, M Griffin, D Discher Biophysical journal 86 (1), 617-628	1367	2004
<b>Bio-inspired, bioengineered and biomimetic drug delivery carriers</b> JW Yoo, DJ Irvine, DE Discher, S Mitragotri Nature reviews Drug discovery 10 (7), 521-535	1158	2011

Cited by [VIEW ALL](#)

	All	Since 2018
Citations	77275	29049
h-index	106	71
i10-index	253	198



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14 articles not available | 142 articles available

Based on funding mandates

Co-authors [VIEW ALL](#)

- Joe Swift  
University of Manchester >
- Jerome Irianto  
Assistant Professor, Florida Stat... >
- Frank S Bates  
Professor of Chemical Engineeri... >
- Adam J. Engler  
Professor and Chair, Chien-Lay ... >

*Contributions to Science (per NIH Biosketch, in five allowed topics)***1. STEM CELL MATRIX & MECHANOBIOLOGY (among ~20 papers):****Does differentiation depend on cell forces and the physics of a cell's microenvironment? Yes:**

A. Engler, S. Sen, H.L. Sweeney, and D.E. Discher. Matrix elasticity directs stem cell lineage specification. *Cell* 126: 677-689 (2006). \*\* Editor's Highlight. \*\* ~14,000 citations. This was the 3<sup>rd</sup> most cited research paper in *Cell* in the decade after its publication.

D.E. Discher\*, D.M. Mooney, P. Zandstra. Growth factors, matrices, and forces combine and control stem cells. *Science* 324: 1673-1677 (2009). (\*corresponding author).

J-W. Shin, A. Buxboim, K.R. Spinler, J. Swift, D.A. Christian, C.A. Hunter, C. Léon, C. Gachet, P.C. Dave P. Dingal, I.L. Ivanovska, F. Rehfeldt, J.A. Chasis, and D.E. Discher. Contractile forces sustain and polarize hematopoiesis from stem and progenitor cells. *Cell Stem Cell* 14: 81-93 (2014). \*\* Cover Article and Perspective Highlight. \*\*

P.C.D.P. Dingal, A.M. Bradshaw, S. Cho, M. Raab, A. Buxboim, J. Swift, D.E. Discher. Fractal heterogeneity in minimal matrix models of scars modulates stiff-niche stem-cell responses via nuclear exit of a mechanorepressor. *Nature Materials* 14: 951-960 (2015).

**2. NUCLEAR MECHANOSENSING & MIGRATION (among ~20 papers):****Is a cell's nuclear lamina mechanosensitive, and does physics of the nucleus impact cell fate & genome variation? Yes:**

J. Swift, I.L. Ivanovska, A. Buxboim, T. Harada, P.C. D.P. Dingal, J. Pinter, J.D. Pajeroski, K. Spinler, J-W. Shin, M. Tewari, F. Rehfeldt, D.W. Speicher, and D.E. Discher. Nuclear Lamin-A Scales with Tissue Stiffness and Enhances Matrix-directed Differentiation. *Science* 341: 1240104-1 to 15 (2013). \*\*Editor's Highlight.\*\*

T. Harada, J. Swift, J. Irianto, J-W. Shin, K.R. Spinler, A. Athirasala, R. Diegmiller, P.C. D.P. Dingal, I.L. Ivanovska, and D.E. Discher. Nuclear lamin stiffness is a barrier to 3D-migration, but softness can limit survival. *Journal of Cell Biology* 204:669-682 (2014).

J. Irianto, Y. Xia, C.R. Pfeifer, A. Athirasala, J. Ji, C. Alvey, M. Tewari, R.R. Bennett, S.M. Harding, A.J. Liu, R.A. Greenberg, and D.E. Discher. DNA damage follows repair factor depletion and portends genome variation in cancer cells after pore migration. *Current Biology* 27, 210-223 (2017).

Y Xia, I.L. Ivanovska, K. Zhu, L. Smith, J. Irianto, C.R. Pfeifer, C.M. Alvey, J. Ji, D. Liu, S. Cho, R.R. Bennett, A.J. Liu, R.A. Greenberg, D.E. Discher. Nuclear rupture at sites of high curvature compromises retention of DNA repair factors *Journal of Cell Biology* 217: 3796-3808 (2018).

**3. 'MARKER OF SELF' CD47 ON CELLS & PARTICLES (among ~20 papers)****How does CD47 signal 'self' from interactions at a cell surface to regulate the physics of cytoskeleton-driven phagocytosis?**

R. Tsai and D.E. Discher. Inhibition of 'Self' Engulfment through deactivation of Myosin-II at the Phagocytic Synapse between Human Cells *Journal of Cell Biology* 180: 989-1003 (2008). \*\* Cover Article and Editor's Highlight. \*\*

P.L. Rodriguez, T. Harada, D.A. Christian, D.A. Pantano, R.K. Tsai, and D.E. Discher. Minimal 'Self' peptides that inhibit phagocytic clearance and enhance delivery of nanoparticles. *Science* 339: 971-975 (2013). \*\* Editor's Highlight. \*\*

N.G. Sosale, I.L. Ivanovska, R.K. Tsai, J. Swift, J. Hsu, C.M. Alvey, P.Z. Zoltick, and D.E. Discher. 'Marker of Self' CD47 on lentiviral vectors decreases macrophage-mediated clearance and increases delivery to SIRPA-expressing lung carcinoma tumors. *Molecular Therapy — Methods & Clinical Development* (2016) 3: 16080.

C.M. Alvey, K.R. Spinler, J. Irianto, C.R. Pfeifer, B. Hayes, Y. Xia, S. Cho, P.C.P.D. Dingal, J. Hsu, L. Smith, M. Tewari, and D.E. Discher. SIRPA-inhibited, marrow-derived macrophages engorge, accumulate, and differentiate in antibody-targeted regression of solid tumors. *Current Biology* 27: 2065-2077 (2017).

**4. CELL & MOLECULAR MECHANOBIOLOGY (among ~40 papers)****Are matrix elasticity & external forces transduced into protein unfolding & myosin-II counter-forces? Yes:**

D.E. Discher\*, P. Janmey, Y-L. Wang. Tissue cells feel and respond to the stiffness of their substrate. *Science* 310: 1139-1143 (2005). (\*corresponding author).

C.P. Johnson, H-Y. Tang, C. Carag, D.W. Speicher, and D.E. Discher. Forced unfolding of proteins within cells. *Science* 317: 663-666 (2007).

M. Raab, J. Swift, P.C.D.P. Dingal, P. Shah, J-W. Shin, and D.E. Discher. Crawling from Soft to Stiff Matrix polarizes the Cytoskeleton and phospho-regulates Myosin-II heavy chain. *Journal of Cell Biology* 199: 669-683 (2012).

Cho S, Vashisth M, ... Greenberg RA, Prosser B, and Discher DE. Mechanosensing by the lamina protects against nuclear rupture, DNA damage, and cell cycle arrest. *Developmental Cell* (to appear Jun 2019)

**5. POLYMER PHYSICS OF ASSEMBLIES, CIRCULATION, & DELIVERY (among >50 papers)****Can we make fully synthetic vesicles and viral-like filaments that circulate & deliver drugs? Yes:**

D.E. Discher\* and A. Eisenberg. Polymer Vesicles. *Science* 297: 967-973 (2002). (\*corresponding). ~3,000 citations

Y. Geng, P. Dalhaimer, S. Cai, R. Tsai, M. Tewari, T. Minko, and D.E. Discher. Shape effects of filaments versus spherical particles in flow and drug delivery. *Nature Nanotechnology* 2: 249-255 (2007). \*\* Nanomedicine News & Views \*\*

D.A. Christian, A. Tian, W.G. Ellenbroek, I. Levental, P.A. Janmey, A.J. Liu, T. Baumgart, D.E. Discher. Spotted vesicles, striped micelles, and Janus assemblies induced by ligand binding. *Nature Materials* 8: 843-849 (2009). \*\* Cover Article and Highlight. \*\*

P.R. Nair, C. Alvey, X. Jin, J. Irianto, I. Ivanovska, and D.E. Discher. Filomicelles deliver a chemo-differentiation combination of Paclitaxel and Retinoic Acid that durably represses carcinomas in liver to prolong survival. *Bioconj. Chemistry* 29:914-927 (2018).

**SOCIETIES** (active & past Membership)

**Active:** American Assoc'n. Advancement Science, American Society for Cell Biology, Biomedical Engineering Society, Biophysical Society,

**Semi-active:** American Chemical Society, Materials Research Society, Controlled Release Society

**Lapsed:** American Physical Society, American Institute of Chemical Engineers, Society for Biomaterials

**SOCIETY LEADERSHIP ACTIVITIES (other than organizing & chairing sessions)**

***American Society Cell Biology – Nominating Comm. Society President & Council*** 2021-2023. ***Membership Committee*** 2023-

***Biomedical Eng'g Society – Council of Cell & Molecular Bioeng (BMES-CMBE) Special Interest Group*** 2018-2022.

***Biophysical Society – Mechanobiology Subgroup Chairman*** 2014-2015.

***Red Cell Club Annual Meeting – Lead Organizer*** 2011 (co-organizers: Mitch Weiss, CHOP, and David Speicher, Wistar)

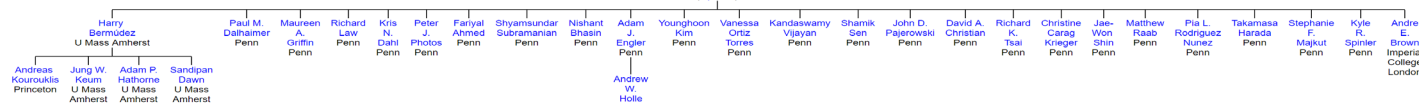
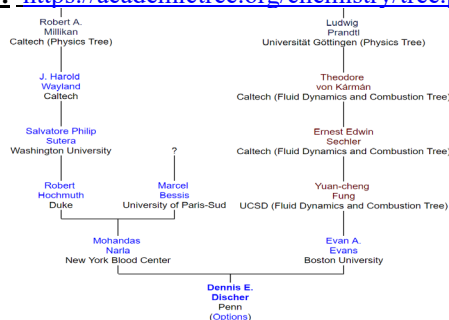
***Controlled Release Society –Board of Scientific Advisors*** 2009-2011.

**SOCIETY ORGANIZATIONAL ACTIVITIES**

***Biophysical Society – Mechanobiology Subgroup Chairman*** 2014-2015.

***Red Cell Club Annual Meeting – Lead Organizer*** 2011 (co-organizers: Mitch Weiss, CHOP, and David Speicher, Wistar)

***Controlled Release Society –Board of Scientific Advisors*** 2009-2011.

**ACADEMIC TREE:** <https://academictree.org/chemistry/tree.php?pid=35410>**ADVISEES & STAFF, CURRENT (previously: 29 PhD students, 19 Postdoctoral Fellows)**

- Ph.D. students:** Jason Andrechak (BS ChE & Neuro, U.Del.) (BE 2022) *NSF Fellow*  
 Brandon Hayes (BS ChE, UPenn) (BE 2023) *NSF Fellow*  
 Michael Tobin (BS BE, U Maryland) (BE 2023) *NSF Fellow*  
 Mai Wang (BS ChE, Rice U) (CBE 2023)  
 Steven Phan (BS ChE, Penn State) (CBE 2026)
- Post-doctoral Fellows:** Dr. Larry Dooling (PhD ChE, Cal Tech) (CBE 2017-)  
 Dr. Karan Saini (PhD Indian Inst. Tech.) (CBE 2017-)  
 Dr. Alisya Anlas (PhD Princeton Univ.) (CBE 2020 -)
- Research Staff:** Dr. Manu Tewari (PhD Biochemistry., India) (CBE, 2003-)  
 Dr. Irena Ivanovska (PhD Biophysics, Vrije Univ. Amsterdam) (Hum Front Fellow, Physics, 2009-)  
*several per year...*
- M.S. students:**
- Undergraduates:** Brandon Hayes (CBE 2018: Penn PhD program, BE); Jake Hsu (CBE 2017: Stanford PhD program); Rocky Diegmiller (CBE 2014: Cambridge Univ.),

**ADVISEES (past, with placement)**

- Ph.D. students:** Jason Andrechak (BS ChE, Neurosci) (BE 2022)  
 placement: Gillead,  
 Manasvita Vashisth (BS ChE) (CBE 2021)  
 placement: Clearview Healthcare Partners  
 Kuangzheng Zhu (BS ChE) (CBE 2021)  
 placement: National Lab, China  
 Aziz Jalil (BS Chem, Temple Univ) (Chem 2020)  
 placement: Post-Doc. Fellow, Thomas **Jefferson Univ. School of Medicine**  
 Charlotte Pfeifer (BS Carleton College) (Physics 2020)  
 placement: Post-Doc. Fellow **Rockefeller** University

Yuntao Xia (BS U Minn) (CBE 2019)  
 placement: Post-Doc. Fellow **Stanford** School of Medicine

Sangkyun Cho (BS Johns Hopkins Univ) (CBE 2018)  
 placement: Post-Doc. Fellow **Stanford** School of Medicine

Praful Nair (BS U Mumbai) (CBE 2017)  
 placement: Post-Doc. Fellow (Denis Wirtz grp –Chem. Bio. Eng’g.), **Johns Hopkins Univ.**

Cory Alvey (BA Chem & Bio, Ripon College) (Pharmacology 2017)  
 placement: Senior Scientist I, In Vivo Oncology at AbbVie, Pharmaceuticals, Wauconda, Illinois

P.C. Dave Dingal (BS ChE Nanyang Tech U, Singapore) (CBE 2014),  
 placement: Post-Doc. Fellow (Stanley Qi grp – Bioeng’g & Chem Systems Biol.), **Stanford Univ.**

Kyle Spinler (BS ChE U Minn) (CBE 2014),  
 placement: Post-Doc. Fellow (T Reya grp - Pharmacology), **UC San Diego**

Nisha Sosale (BS ChE, Rutgers) (CBE 2014) Nanotech Inst. Fellow,  
 placement: short term Post-Doc. Fellow (R.Lipowsky grp - Membranes), **Max Planck Inst. - Golm**

Stephanie Feldman Majkut (BS Claremont Colleges, CA) (Physics 2013) NIH Training Grant Fellow

Matthew Raab (BS Bioeng, Penn State) (BE, 2013) Ashton Fellow & GAANN Fellow  
 placement: Post-Doc. Fellow, **Curie Inst.**, Paris (Hum Front Sciences, Fellow)

Takamasa Harada (BS Matls Sci, Univ Tokyo) (CBE, 2013) Anderson Consulting, Tokyo

Pia Rodriguez, (BS ChE, LaPaz, Chile) (CBE, 2012) Chilean Gov’t. Fellow  
 placement: Post-Doc. Fellow (K Healey grp - Biomaterials), **UC Berkeley**

Jae-Won Shin (BS U Sydney, Australia) (Pharmacology 2011) American Heart Assocn Fellow  
 placement: Post-Doc. Fellow (D Mooney grp – Biomaterials, Wyss Inst.), Harvard Univ.  
 NIH K99 Fellow-to-Faculty Transition Award.  
 Assist Prof. Pharmacology starting Jan.2016: **Univ.Illinois – Chicago.**

Christine Carag (BS ChE, Tulane) (CBE, 2011) NIH ‘Dystrophy’, Cardiovasc. Training Grant Fellow  
 placement: Post-Doc. Fellow, **NIH**

Andre Brown (BS Physics, Memorial Univ., Canada) (Physics, 2009) Canadian-NSERC Fellow  
 placement: Post-Doc. Fellow Biology, **Cambridge Univ.**  
 Asst. Prof./Group Leader **MRC Clinical Sciences Centre in London**

Aiwei Tian (BS ChE, Tsinghua Univ., China) (CBE, 2009) co-advised with Prof. Tobias Baumgart, Chem.  
 placement: Post-Doc. Fellow (J.Groves grp – Phys-Chem Membranes) Chemistry, **UC Berkeley**

David Christian (BS ChE, U. Kentucky) (CBE, 2009) NIH-Training Grant Fellow, AIChE BioNano 2<sup>nd</sup> pl. Award  
 placement: Post-Doc. Fellow → Research Assistant Prof. Vet School Immunology, **U. Penn.**

Richard Tsai, (BS ChE UC Berkeley, MS Biotech Penn 2004) (BE, 2009)  
 placement: Biogen, LEK Consulting, Boston, MA

Shamik Sen (MS ME, India) (MEAM, 2007)  
 placement: Post-Doc. Fellow (Kumar grp – Cell Mechanics) Bioengineering, **UC Berkeley**  
 Assist. Prof. Bioeng’g., **IIT Bombay** (since 2010).

David Pajerowski (BS ChE, U. Delaware) (BE, 2008) Ashton Fellow  
 placement: Research Engineer in Proteins Group at **Merck**, Westpoint, PA

Kandaswamy Vijayan (MS Physics, Brandeis) (Physics, 2007)  
 placement: Research Scientist at BioNanomatrix, Philadelphia, PA

Adam Engler (BS BE, U Penn) (MEAM, 2006) Ashton Fellow  
 placement: Post-Doc. Fellow (Schwarzbauer grp – Matrix Bio.) Molecular Biology, **Princeton Univ.**  
 Assist. → Assoc. Prof. Bioeng’g. - **UC San Diego. Recipient of NIH New Innovator Award 2009.**  
**Recipient of 2008 Young Investigator Awards from BMES and from Int’l Society Matrix Biol.**

Younghoon Kim (MS ChE, Korea) (CBE, 2006)  
 placement: Formulations Engineer at **Particle Sciences**, Bethlehem, PA

Vanessa Ortiz (Ph.D. CBE, 2007) Nano-IGERT Fellow & NIH Pre-doc. Fellow  
 placement: Post-Doc. Fellow (J. dePablo group) Chemical Eng’g., Univ. **Wisconsin**  
 Assist. Prof. Chem Eng., **Columbia Univ** (since 2011).

Nishant Bhasin (MS ChE, India) (CBE, 2006)  
 placement: Process Engineer at **Amgen**, Thousand Oaks, CA

Shyamsundar Subramanian (MS Biotech., U.Minn.) (CBE, 2006; joint advisee) Merck Fellow  
 placement: Process Engineer in Vaccines Group at **Merck**, Westpoint, PA

Fariyal Ahmed (Ph.D. BE, 2005 / BS ChE, SUNY Buffalo) NanoTech Inst. Fellow  
 placement: Post-Doc. Fellow (Liebermann group – Drug Delivery) **Harvard Univ. Med. School**

Kris Noel Dahl (Ph.D. CBE, 2004 / BS ChE, Carnegie Mellon U.) Whitaker Fellow

	placement: Post-Doc. Fellow (K. Wilson group) Cell Biology, Johns Hopkins Univ. Assist. → Assoc. Prof. Chem. Eng. and Biomed. Eng'g. <b>Carnegie Mellon Univ.</b>
Richard Law (Ph.D. CBE, 2004 / BS ChE, U Penn)	GAANN Fellow placement: Process Engineer at <b>Intel Corp.</b> , Portland, Oregon, then <b>Amgen</b> , Thousand Oaks, CA
Peter Photos (Ph.D. CBE, 2004 / BS ChE, Princeton)	NIH-Training Grant & AHA Fellow placement: Post-Doc. Fellow (T.K. Vanderlick group) ChE, <b>Princeton</b>
Paul Dalheimer (Ph.D. CBE 2003 / BS ChE, U Penn)	GAANN Fellow placement: Post-Doc. Fellow (Pollard group – Cytoskeleton Biochem.) Cell Biology, <b>Yale Univ.</b> Assist. → Assoc. Prof. Chem. Eng., <b>Univ. Tennessee</b>
Maureen Sheehan (Ph.D. CBE, 2003 / BS ChE, U Mass-Amherst)	AHA Fellow placement: Research Scientist SelectX Pharmaceuticals (Worcester, MA)
Harry Bermudez (Ph.D. CBE 2003 / BS ChE, U Mass-Amherst) (jointly advised PhD)	placement: Post-Doc. Fellow (J. Hubbell group) ETH Zurich/Lausanne Assist. → Assoc. Prof. Polymer Science & Eng'g., <b>Univ. Mass., Amherst</b>
James C-M. Lee (Ph.D. ChE, 2000 / BS ChE, UC Berkeley)	placement: Post-Doc. Fellow Life Sciences Division, Lawrence Berkeley Natl Lab Assist. → Assoc. Prof. Biol. Eng'g., <b>Univ. Missouri, Columbia</b>

Post-doc. Fellows: Dr. Jerome Irianto (PhD Bioeng., Queen Mary, London) (CBE, 2013-2018) , **Asst.Prof. Biology, Florida State**  
 Dr. Lucas Smith, K99 Fellow (PhD Bioeng., UC San Diego) (CBE, 2016-2018), **Asst.Prof. Biology, UC Davis**  
 Dr. Joseph Swift (PhD Phys Chem, U.Penn.) (CBE, 2009-2014), **Asst.Prof. Biology, Univ. Manchester**  
 Dr. Amnon Buxboim (PhD, Weizmann Inst.) (Physics, 2008-13), **Asst.Prof. Bioeng., Hebrew Univ.**  
 Dr. Nuria Sancho Oltra (PhD Org.Chem., Groningen, NL) (Marie Curie Fellow, 2011-13) **Fellow, EPFL**  
 Dr. Sharon Loverde (PhD MSE, Northwestern Univ.) (NIH Fellow, 2007-2011), **City Univ. NY Staten Island**  
 Dr. Abdullah Mahmud (PhD Pharm., U. Alberta) (CBE, 2008-11) Scient. **NCI Nanotech. Charact'n. Lab.**  
 Dr. Diego Pantano (PhD Chemistry, Univ. Buenos Aires) (CBE, 2008-11) Scient.- Simultns. **Total SA, Paris**  
 Dr. Karthikan Rajagopal (PhD Chemistry, Univ. Delaware) (CBE, 2006-09) Scient.- Drug Deliv. **Genentech**  
 Dr. Florian Rehfeldt (PhD Biophysics, Tech.Univ.Munich) (Physics, 2006–08), Group Leader, **Univ.Goettingen**  
 Dr. Shenshen Cai (PhD Medicinal Chemistry, Univ. Utah) (CBE, 2005–07), Res.Sci. **Mylan Pharmaceuticals**  
 Dr. Xiulian Du (Ph.D. Organic Chemistry, Peking Univ.) (CBE, 2006–08), Res.Sci. Maryland Biotech.  
 Dr. Yan Geng (PhD Organic Chemistry, Rutgers Univ.) (CBE, 2003–06), Asst.Prof. **Univ. Georgia, Chem.**  
 Dr. Adam Eckhardt (PhD Physiology, Czech Republic); (CBE, 2004), **Czech Acad. Sci., Prague**  
 Dr. Colin Johnson (Ph.D. Chemistry, Univ. Illinois) (CBE, 2005–07), Asst.Prof. **Oregon State Univ., Biochem.**  
 Dr. Ranganath Parthasarathy (PhD Physical Chem., India) (CBE, 2001-04)  
 Dr. Helim Aranda-Espinoza (PhD Physics, UCSB) (IME, 2000–02), Asst.Prof. **Univ.Maryland, Chem/Bio Eng**  
 Dr. Alina Popescu (PhD Biophysics, Romania) (BE, 2000 – 03), Res. Assoc. **NIH**  
 Dr. Philippe Carl (PhD Phys. Chem., Strasbourg) (BE, 2000–02), Res. Assoc. – **Max Planck Inst. Potsdam**  
 Dr. Catherine Picart (PhD Materials Science, Grenoble) (BE, 1998–99), Prof. of Materials, **Grenoble Inst.Tech. and Membre de l'Institut Universitaire de France**  
 Dr. Lucie Bacakova (MD PhD Physiology, Prague); (BE, 2000–01), Biomats Group Leader, **Czech Acad. Sci.**  
 Dr. Bohdana Discher (PhD Bioch., OHSU-Oregon) (ChE, 98 – 2000), Res.Assist.Prof. Bioch.-Biophys, **U.Penn.**

Visiting Faculty: Dr. Eliana Lima (Faculdade de Farmácia, **Univ. Federal de Goiás, Brazil**) (CBE, Jan-Apr 2006)

M.S. students:  
 Avathamsa Athirasala (CBE 2013)  
 Edwin (Chuck) Pratt (Nanotech 2014)  
 Brian Chase (BS Biol, MIT) (BE, 2013) GAANN Fellow  
 Pierre Bhoorasingh (BE, 2010)  
 Brian Fyfe (BS ChE, Lehigh U.) (CBE, 2005)  
 Greg Brobst (BS ChE, UNC) (CBE, 2005)  
 George Liao (BioTech 2003), currently Lab Supervisor in Penn Medical School  
 Hyun Ra (Biotech., 1999), currently Ph.D. student in Cell Biology at Washington University  
 Carol Kwok (ChE, 2000), currently at Intel Corp., Portland, Oregon  
 Cindy Newman (Biotech, 2002), currently at Accenture.  
 Shilpa Choudhari (Biotech., 2000), currently at Merck

Undergraduates:  
 Kevin Hsu (CBE), Russell Speiller (ChE), Wade Bennett (MEAM), Ahmedzamri Perman (MEAM)  
 Derek Wong (BE), Rich Liu (ChE), Vanessa Chu (ChE), Nabih Bulos, Judy Lin (BE),  
 Gaurang Shah (CIS), Devang Shah (CIS), Adam Engler (BE), George Liao (BE), Samuel Kahn (BE),  
 Adam Saitowitz (CBE)

Outreach: Yavetta Woods (Biology, Millersville Univ.), Andrew T. Sensenig (Physics, Millersville Univ.), Kahlilah Clarke (Biology, Johns Hopkins), Alice Tang (Philadelphia Central H.S.), Ana Garcia (Biology, Univ. Puerto Rico), Rajeev Narayan (Biology, Drew Univ.)  
 High School: Jeremy Yatvin (Phil. Central High; 1<sup>st</sup> prize Eng'g and 4<sup>th</sup> prize overall in State Competition)

### TEACHING (summary evaluations available)

11 - 18 Sp *Instructor* CBE/BE 557 – Stem Cells, Proteomics, Drug Delivery: Soft Matter Fundamentals  
 97,99,01 Fa, 05,06...Sp,10-18Fa *Instructor* CBE/BE/MEAM 555 - Nanoscale Systems Biology / Biophysical Eng'g.  
 02-09 Fa *Instructor* CBE/MEAM 618 - Advanced Thermodynamics & Statistical Mechanics  
 98 Fa *Instructor* BE/MEAM 455 - Continuum Biomechanics  
 98, 99, 00 *Co-Instructor* MEAM 247 – Soph. Laboratory in Strength of Materials, Dynamic Systems  
 98 Fa *Invited Lecturer* BE 513 - Cell Biology; BE 700 - Topical Lectures  
 97-00 Sp, 02-04 Sp *Instructor* MEAM 211 - Dynamics  
 95 Sp, 96 Sp *Lecturer for Graduate Course* - Topic: Forces on Molecules and Cells  
 Department of Physics, University of British Columbia  
 90 Fa, 91 Sp *Graduate Student Instructor* - Computational Physiology, Dept. Physiology, UC Berkeley  
 88 Fa *Teaching Assist.* - Physical Electronics, Dept. Physics, California State University, San Jose

### Other SERVICE

*Graduate Group Chair Chemical & Biomolecular Eng'g. (2004 - 2006)*  
*Ad hoc Search Committee in Pharmacology – Penn Sch.Med.*  
*Ad hoc Review Committee of Block Grant Proposals – Penn Sch.Med.*  
*Nano Technology Institute (NTI) – Group Co-Leader for Drug Delivery*  
*Ad hoc Committee of Academic Promotions – Penn Sch.Med.*  
*Wharton School Forum on Bio-Nanotechnology (2001)*  
*NIH BRP Grantees meeting (2001): grant progress presentation to NIH*  
*Co-Director of Penn's Nanoscience & Technology Center*  
*Penn Delegate to the United States Congress' Science Day 2000*  
*Dean's Advisory & Search Committee on Nanoscience and Nanotechnology (2000)*  
*Penn's MRSEC Renewal (2000): proposal presentation to NSF Review Panel*  
*Faculty Search Committees: Bioengineering (2000), MEAM (2001-02)*

### TECHNICAL CONSULTANT, SCIENTIFIC ADVISOR

*Guidant Corporation, Research & Technology - Vascular Intervention (2005 - 2007)*  
*NextGen Corporation, Research & Technology – Therapeutic Protein Delivery (2005)*

### GRANTS REVIEW (partial list)

*NIH Gene & Drug Delivery Study Section (ad hoc; and permanent member 2013-2018; Chair 2016-18)*  
*NSF Biomechanics and Mechanobiology (BMMB) Program Review (ad hoc 2011, 2014)*  
*Science Foundation Ireland, Life Sciences Executive Panel (annual meeting 2008-2012)*  
*NIH 'Nano' Special Emphasis Panel (SEP) – Chairman of Study Section (May 2006);*  
*NIH Erythrocyte & Leukocyte Biology Study Section (ad hoc 2003-2004; member 2005-2009);*  
*NIH Biophysical Chemistry Study Section; NIH Bacterial Adhesion SEP; NIH SBIR Program;*  
*NIH Cardiovascular Sciences–Pharmacology Study Section; NIH NCRR's R21-R33 Program;*  
*National Science Foundation – MRSEC (site visit); Biomedical Eng. Division;*  
*Biochemical & Biomass Eng.Division; CAREER Programs*  
*Department of Energy - Environmental Management, Materials Science Programs*  
*European Science Foundation, Israel Science Foundation, Swiss National Sci. Fdn.*  
*ETH Research Commission (Zurich, C.H.); The Wellcome Trust (London, U.K.);*  
*Human Frontiers Science Program; Dutch National Research Council*

### ADVISEE FELLOWSHIPS/COMPETITIVE AWARDS

American Heart Assoc'n. (Maureen Sheehan-Griffin) "Adhesive mechanisms of murine muscle cells" (7/00-6/02)	\$32,000
NIH Cardiovascular Training Grant (Peter Photos) "Engin'g. a new set of cardiovasc.-capable vesicles" (7/00-6/02)	\$60,000 (est.)
American Heart Assoc'n. (Peter Photos) "CD47 as a marker of self" (7/02-6/04)	\$36,000
NIH Cardiovascular Training Grant (Helim Aranda) "Studies in experimental molecular mechanics" (9/00-8/02)	\$70,000 (est.)
Whitaker Fellow (Kris Noel Dahl) (9/00-8/04)	\$120,000 (est.)
IGERT (Richard Law) "Nanoscale studies of protein stability" (PI: Bonnell) (9/01-8/05)	\$120,000 (est.)
GAANN (Paul Dalhaimer) "Nano-computing" (PI: Bassani) (9/01-8/05)	\$90,000 (est.)



IGERT-Nano (Vanessa Ortiz) from Penn-Drexel Nanotech. NSF-IGERT (PI: Bonnell) (9/02-8/06)	\$120,000 (est.)
NIH Ruth Kerstin Predoctoral Fellow (Vanessa Ortiz) (PI: Discher) (1/06-1/08)	\$60,000 (est.)
NIH Cardiovascular Training Grant (David Christian) "Worm Micelles for Drug/Dye Delivery" (9/04-8/06)	\$70,000 (est.)
NSERC PhD Fellowship (Andre Brown) "Biophysics of Molecules & Cells" (9/04-8/06)	\$70,000 (est.)
NIH Cardiovascular Training Grant (Colin Johnson) "A proteomic method for protein unfolding" (7/05-6/07)	\$70,000 (est.)
NIH Muscle Disease Training Grant (Christine Carag) "Nano-Dystrophin structure and extensibility" (4/06-3/06)	\$35,000 (est.)
NIH Cardiovascular Training Grant (Christine Carag) "A proteomic method for protein unfolding" (7/08-6/09)	\$70,000 (est.)
NIH Training Grant (Allison Zajac) "Matrix elasticity effects on cells" (7/08-6/10)	\$70,000 (est.)
NIH Post-doctoral Fellowship (Sharon Loverde) "Simulations of block copolymers for drug delivery" (7/08-6/10)	\$70,000 (est.)
NSERC Post-doctoral Fellowship (Abdullah Mahmud) "Worm Micelles for Drug/Dye Delivery" (7/09-6/11)	\$70,000 (est.)
NIH Cardiovascular Training Grant (Stephanie Feldman) "When does tissue rigidity arise?" (7/10-6/12)	\$70,000 (est.)
NSF Nano IGERT Pre-doctoral Fellowship (Nisha Sosale) "Virus Eng'g with a Marker of Self" (7/11-6/12)	\$35,000 (est.)

**MAJOR GRANT AWARDS as PI (active)**

NIH-NCI U01 CA254886 Physical Sciences Oncology Project 04/2021 - 03/2026 (5 yrs)	~\$4M Total
<i>Live cell monitoring of mechano-genetic changes</i>	
NIH-NCI P01 CA265794 Project-2 (of 3) (Multi-PI) 05/2023 - 04/2028 (5 yrs)	~\$1M Total
<i>Mechanics of Cells &amp; Tissues impact Chromosome Instability &amp; Phagocytic Interactions</i>	

**PENDING MAJOR PROPOSALS****GRANT AWARDS as PI (past)**

NIH-NHLBI R01 HL124106 12/01/2018 – 11/31/2022 competitive renewal	~\$1.5M Total
<i>Nanoscience of 'Self' 2.0 - CD47 disruption and Solid Tumors</i>	
NIH-NCI U54 CA193417 Physical Sciences Oncology Center 06/16/2015 - 03/31/2021 (5 + 1 yrs)	~\$10M Total
<i>Liver Cancer: pre-Malignant Stiffening, Membrane Transduction, &amp; Nuclear Rheology</i>	
NIH-NHLBI R21 HL128187 (PI) 09/14/2015 - 08/31/2017	\$425k Total
<i>Nuclear Mechanics varies with Tissue Mechanics &amp; Regulates Cytoskeleton</i>	
American Heart Assoc'n Great Rivers Affiliate Winter 2014 Grant-in-Aid 07/01/2014 - 06/30/2016	\$154k Total
NSF "Nuclear Rheostat" (06/12 – 05/15)	\$400,000
NIH R01 "Avoiding clearance to maximize dose: Shape, Flexibility, & 'Marker of Self'" (renewal: 4/11-3/15)	\$900,000 (directs)
NIH R01 "Cytoskeletal Pliability within Cells" (renewal: 05/99-06/14 NCE)	\$1,550,000 (total)
NIH P01 "Matrix elasticity effects on Stem Cells" (P01-PI: M.Narla, NY Bl.Cent.) (07/08-06/13)	\$1,600,000 (total)
NIH R21 "Matrix Elasticity and Pharmacoscreens for Myogenesis of Human Stem Cells" (PI) (7/08-6/11)	\$363,000 (total)
NIH Challenge Grant RC1 "Radiation-enhanced nanobiopolymer therapeutics through the Blood-Brain Barrier"	\$100,000 (total)
NIH R01 "Carrier Shape Matters: Filomicelles, Long-circulation, and the EPR Effect" (9/06-06/10)	\$1,433,000 (total)
NSF Nano-Bio Program "Nano-Methods for how Matrix Elasticity Controls Stem Cells" (4/06-3/09)	\$250,000 (total)
FMC Corp. "Wormlike micelles for Agricultural Applications" (9/08-9/09) + NTI matching fund	\$45,000 (total)
NIH S10 (PI) "AFM(T) + Fluorescence Microscopy for Single Molecule Studies" (04/07 – 05/07)	\$382,000 (total)
NIH R21 "Stem cells sense substrate stiffness - New materials for mechanism and application" (4/05-4/07)	\$275,000 (directs total)
NIH R21 "Worm-like micelles for targeted delivery and imaging" (9/04-9/06)	\$275,000 (directs total)
NIH R21 "CD47-display on Nanomaterials" (PI) (9/03-9/05)	\$275,000 (directs total)
MDA/Muscular Dystrophy Assoc'n. "Single molecule studies for muscular dystrophies" (7/05-6/08)	\$210,000 (approx. total)
NSF PECASE/CAREER (PI) "Adhesion and Mechanics of Muscle Cells for Gene Therapy" (7/99-7/04)	\$500,000 (base)
+ Matching Funds and REU support	\$70,000 (to date)
PA Tobacco Fund Seed Grant (PI) "Polymersome-Controlled Delivery of Antimicrobials" (2005)	\$70,000 (directs total)
NIH R01 (PI) "Red Cell Spectrin and Actin - Microstructural Responses" (4/99-4/03)	\$1,033,000 (total)
Muscular Dystrophy Assoc'n. (PI) "Biophysics of Adhesion of Dystrophic Membranes" (1/00-12/02)	\$150,000 (total)
Whitaker Grant (PI) "Mechanochemical Determinants of Biomembrane Properties" (4/97 - 4/00)	\$206,000 (total)
NSF International Fellowship (6/95 - 6/96)	\$32,000 (total)

**GRANT AWARDS as Group (active) (with funded effort where relevant\*)**

HFSP Human Frontiers Sciences Program grant on Adipocyte Mechanobiology	\$100,000
NSF-MRSEC Center Grant (PI: Arjun Yodh; IRG#1) – sub-project on Soft Materials Science	\$60,000
NSF-STC Center Grant (PI: Yale Goldman) – sub-project on Nucleus-Matrix Mechanobiology	\$60,000
US – Israeli Binational Science Grant (PI: Sam Safran, Weizmann Inst) – sub-project on Heart	\$25,000

**GROUP-GRANT AWARDS (past)**

NSF Shared Instrument Grant: AFM-Fluorescence facility affiliated with NSEC (PI: Y. Goldman) (9/07-8/10)	\$800,000 (total)
NIH Training Grant at the Institute for Medicine and Engineering (4/00-3/05) (PI: P. Davies)	\$50,000 (ann. est.)
NSF-NSEC Center Grant (PI: D. Bonnell) – sub-project on Biomolecular Motions (9/04-8/15)	\$50,000 (ann. est.)
Human Frontiers Grant “Nucleus Mechanics” (Co-PI with PI: D. Lee, London) (6/09-5/11), direct to Co-PI	\$100,000 (ann. est.)
NIH BRP "Bioeng'g. Research Partnership on Cardiovascular Bioengineering" (Co-I with PI: P.F. Davies) (9/01-8/06), direct to Co-PI	\$60,000 (ann. est.)
NanoTechnology Institute (NTI) Drug Delivery Program (Program Co-leader w/ PI: D. Luzzi) (9/02-8/06)	\$70,000 (ann. est.)
NIH BRP "Muscular Dystrophy" (Co-PI with PI: H.L. Sweeney) (9/00-8/05), direct to Co-PI	\$130,000 (ann. est.)
NSF-MRSEC Seed (LRSM) "Polymersomes: Vesicles from Block Copolymers" (6/98-6/00)	\$80,000 (total)
NIH Shared Instrument Grant: AFM facility for the Inst. for Medicine and Engineering (PI: P. Davies)	\$246,000
NASA Materials Science "Polymersomes" (7/00-6/04) (Co-PI with PI: D.A. Hammer)	\$538,170
NSF Shared Instrument Grant: Confocal and Micromanipulation Center in the LRSM (PI: A. Yodh)	\$500,000
NSF Major Instrument Grant: Multi-Photon Microscope for the Cell Engineering Lab (PI: S. Margulies)	\$513,000
NSF Major Instrument Grant: Rheology Lab for Soft Materials (PI: P. Janmey)	\$500,000 (approx)

**SELECT RESEARCH COVERAGE**

*Nature* 431: 643 (2004) Research Highlight: Nuclear squeeze and stretch. [Publication #54.](#)

*Nature* 431: 643 (2004) Research Highlight: Stiffness and striation. [Publication #57.](#)

*American Society for Cell Biology Annual Meeting Press Book* (2004).

[Matrix control over Stem Cell Lineage](#) (2006 Publication #75 and 2009 Publication #110)

*Science STKE* CELL FATE: A Flexible or Inflexible Fate? [stke.sciencemag.org/cgi/content/abstract/2006/350/tw293](http://stke.sciencemag.org/cgi/content/abstract/2006/350/tw293)

*NewScientist.com* [www.newscientist.com/article/dn9849-touch-alone-makes-stem-cells-differentiate.html](http://www.newscientist.com/article/dn9849-touch-alone-makes-stem-cells-differentiate.html)

*Science Watch – Hot Papers* <http://sciencewatch.com/dr/nhp/2010/10sepnhp/10sepnhpDisc/>

*Science Daily* <http://www.sciencedaily.com/releases/2010/09/100906085156.htm>

[Polymersome-based Treatment of Cancer](#) (2006 Publication #77)

*Cancer Compass* [www.cancercompass.com/cancer-news/1,10728,00.htm](http://www.cancercompass.com/cancer-news/1,10728,00.htm)

*NanoBioTech News* [www.nanobiotechnews.com/](http://www.nanobiotechnews.com/) - April 26, 2006 issue

*American Society for Cell Biology Annual Meeting Press Book* (2010). How deeply cells feel.

[‘Self’ peptide](#) (2013 Publication #150)

*Science* <http://news.sciencemag.org/sciencenow/2013/02/a-passport-to-nanomedicine-succe.html?rss=1>

*Nature* <http://www.nature.com/news/stealth-nanoparticles-sneak-past-immune-system-s-defences-1.12478>

*C&EN News* <http://cen.acs.org/articles/91/i8/Peptide-Fools-Immune-System-Allowing.html>

*Physics Today* <http://blogs.physicstoday.org/newspicks/2013/02/addition-of-peptides-hides-nanomolecules-from-immune-system/>

*WHYY PBS Philadelphia* <http://www.newsworks.org/index.php/also-on-nwt/item/51609-penn-researchers-discovery-could-lead-to-better-cancer-treatment>

*Philadelphia Inquirer*

[http://www.philly.com/philly/health/20130222\\_Penn\\_scientists\\_use\\_protein\\_fragments\\_to\\_quot\\_fool\\_quot\\_the\\_immune\\_system\\_and\\_deliver\\_cancer\\_drugs.html](http://www.philly.com/philly/health/20130222_Penn_scientists_use_protein_fragments_to_quot_fool_quot_the_immune_system_and_deliver_cancer_drugs.html)

*MIT Tech Review* <http://www.technologyreview.com/news/511536/molecule-helps-nanoparticles-sneak-past-the-immune-system/>

[Cancer Physics NCI Center, ‘Scar in a dish’ paper](#) (2015 Publication #172)

<http://www.upenn.edu/pennnews/news/new-penn-center-will-investigate-physics-cancer-10m-nih-grant>

<http://labroots.com/trending/id/1399/penn-studies-physics-of-cancer>

<http://www.upenn.edu/pennnews/news/researchers-penn-develop-scar-culture-systems-understand-and-treat-fibrosis>

<http://www.technology.org/2015/07/16/researchers-penn-develop-scar-like-culture-systems-understand-treat-fibrosis/>

<http://medicalxpress.com/news/2015-07-scar-like-culture-fibrosis.html>

<http://www.noodls.com/view/1C7DA143A93117E6799F9BFE821E88B599BB671E?2051xxx1437163756>

[http://www.myscience.us/wire/researchers\\_at\\_penn\\_develop\\_scar\\_like\\_culture\\_systems\\_to\\_understand\\_and\\_treat\\_fibrosis-2015-penn](http://www.myscience.us/wire/researchers_at_penn_develop_scar_like_culture_systems_to_understand_and_treat_fibrosis-2015-penn)

[‘Engineered macrophage against cancer’ paper](#) (2017 Publication #190)

<https://news.upenn.edu/news/penn-researchers-engineer-macrophages-engulf-cancer-cells-solid-tumors>

<http://www.humanimmunologynews.com/issue/>

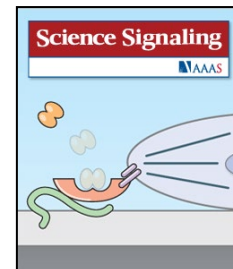
<https://www.sciencedaily.com/releases/2017/07/170719173705.htm>

**EDITORIALS, COMMENTARIES, & PERSPECTIVES**

1. [D.E. Discher](#) and R. Kamien. Towards Precision Micelles. News and Views in *Nature* 430: 519-520 (2004).

2. P. Janmey and [D.E. Discher](#). Holding it Together in the Eye. News and Views in *Nature* 431: 635-636 (2004).

3. D.E. Discher, C. Johnson, N. Bhasin. Covalent chemistry on distended proteins. Commentary in **PNAS (Proceedings of the National Academy of Sciences – USA)** 103: 7533-7534 (2006).
4. C. Picart and D.E. Discher. Embedded shells decalcified. News and Views in **Nature** 448: 879-880 (2007).
5. C. Johnson and D.E. Discher. Gluing spectrin together. Inside Blood in **Blood** 110: 795 – 796 (2007).
6. F. Rehfeldt and D.E. Discher. Cell dipoles feel their way. News and Views in **Nature Physics** 3: 592-593 (2007).
7. R.G. Wells and D.E. Discher. Matrix elasticity, cytoskeletal tension, and TGF- $\beta$ : the insoluble and soluble meet **Science Signaling - STKE** 1: pe13 (2008).
8. R. Tong, D.A. Christian, L. Tang, H. Cabral, J.R. Baker, Jr., K. Kataoka, D.E. Discher, and J. Cheng. Nanopolymeric Therapeutics. **Materials Research Society Bulletin** 34: 422-431 (2009).
9. W.E. Thomas, D.E. Discher, and V.P. Shastri. Mechanical regulation of cells by materials and tissues. **Materials Research Society Bulletin** 35: 578-583 (2010).
10. A. Buxboim and D.E. Discher. Stem cells feel the difference. News and Views in **Nature Methods** 7: 695-696 (2010).
11. M. Raab, J-W. Shin, and D.E. Discher. Matrix elasticity in vitro controls muscle stem cell fate in vivo. **Stem Cell Research & Therapy** 1:38, 2pgs. (2010).
12. T. Harada and D.E. Discher. Bubble wrap of cell-like aggregates. News and Views in **Nature** 471: 172-173 (2011).
13. J. Swift and D.E. Discher. Subcellular organization: Change of phase in partitioning the cellular milieu. Commentary in **Current Biology** 22: R188-190 (2012).
14. N. Sosale and D.E. Discher. Marker of self becomes marker of senescence. Inside Blood in 119: 5343-4 **Blood** (2012).
15. J-W. Shin and D.E. Discher. Cell culture: Soft gels select tumorigenic cells. News and Views **Nature Materials** 11: 662-3 (2012).
16. Dingal PC, Wells RG, Discher DE. Simple insoluble cues specify stem cell differentiation. Commentary in **PNAS (Proceedings of the National Academy of Sciences – USA)** 111:18104-5 (2014).
17. Discher DE and L.J. Dooling. Optimal contractile forces for a mesenchymal engine. Preview in **Developmental Cell** 42: 313-315 (2017).
18. Engler AJ, Discher DE. Rationally engineered advances in cancer research. **APL Bioengineering** 2 (3), 031601.
19. Dooling LJ, and Discher DE. Inhibiting tumor fibrosis and actomyosin through GPCR activation. **Trends in Cancer** 5:197-199 (2019).
20. Pfeifer CR, and Discher DE. Pulling the roof down on anchored nuclei. **Developmental Cell** (2019).
21. Discher DE. From DNA damage to epithelial integrity: new roles for cell forces. **Molecular Biology of the Cell** (2019).



### 200+ PAPERS and BOOK CHAPTERS:

#### PEER-REVIEWED, FULL-LENGTH JOURNAL PUBLICATIONS

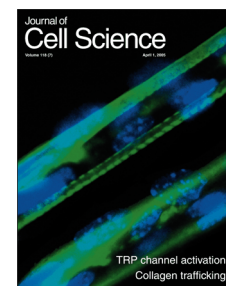
1. D. Discher, M. Parra, J.G. Conboy, N. Mohandas. Mechanochemistry of the alternatively spliced spectrin-actin binding domain in membrane skeletal protein 4.1. **Journal of Biological Chemistry** 268:7186-7195 (1993).
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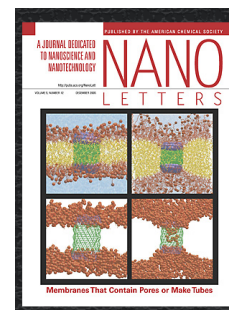
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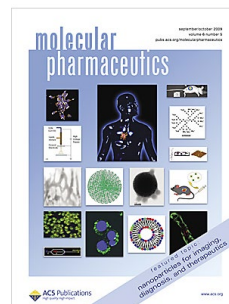
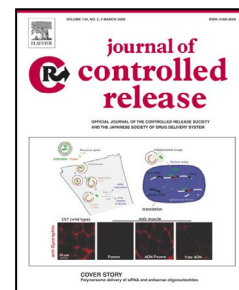
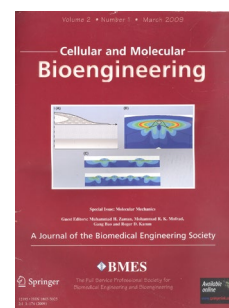
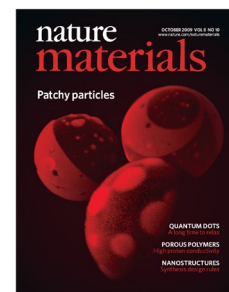


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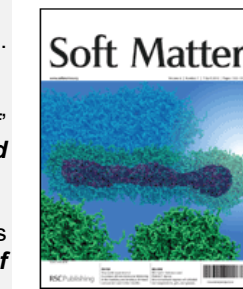




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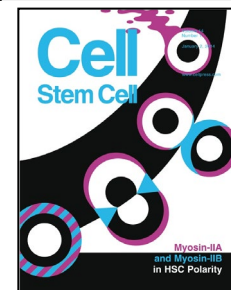


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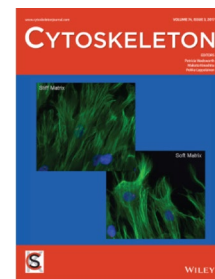


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217. Cho S, Vashisth M, Abbas A, Majkut S, Vogel K, Xia Y, Ivanovska I, Irianto J, Tewari M, Tang H, Greenberg RA, Prosser B, and Discher DE. Mechanosensing by the lamina protects against nuclear rupture, DNA damage, and cell cycle arrest. ***Developmental Cell*** 49(6):920-935 (2019)
218. Xia Y, Pfeifer C, Zhu K, Irianto J, Liu D, Pannell K, Chen E, Dooling L, Cho S, Greenberg RA, and Discher DE. Rescue of DNA damage after constricted migration reveals bimodal mechano-regulation of cell cycle. ***Journal of Cell Biology*** 218:2545-2563 (2019).
219. Deviri D, Pfeifer CR, Dooling LJ, Ivanovska IL, Discher DE, Safran SA. Scaling laws indicate distinct nucleation mechanisms of holes in the nuclear lamina. ***Nature Physics*** 15: 823-829 (2019).
220. J Steinkuhler, B Rózycki, C Alvey, R Lipowsky, TR. Weikl, R Dimova, and DE. Discher. Membrane fluctuations and acidosis regulate cooperative binding of "Marker of Self" CD47 with macrophage receptor SIRPA. ***Journal of Cell Science*** 132: jcs216770 (2019).
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222. Saini K, DE Discher. Forced unfolding of proteins directs biochemical cascades. *Biochemistry* 58: 4893-4902 (2019)
223. Andrechak JC, Dooling LJ, Discher DE. The macrophage checkpoint CD47 : SIRP $\alpha$  for recognition of 'self' cells: from clinical trials of blocking antibodies to mechanobiological fundamentals. *Philosophical Transactions of the Royal Society B* (July 2019).
224. Xia Y, Cho S, Vashisth M, Ivanovska IL, Dingal PCDP, Discher DE. Manipulating the mechanics of extracellular matrix to study effects on the nucleus and its structure. *Methods* 157:3-14 (2019).
225. Xia Y, Pfeifer C, Discher DE. Nuclear mechanics during constricted migration. *Acta Mechanica Sinica* 35: 299–308 (2019).
226. Saini K, Discher DE, Kumar N. Static and time-dependent mechanical response of organic matrix of bone. *Journal of the Mechanical Behavior of Biomedical Materials* 91: 315-325 (2019).
227. Xia Y, Zhu K, Irianto J, Andrechak JC, Dooling LJ, Pfeifer CR, Discher DE. Live cell monitoring for factors affecting genome variation. *bioRxiv*, 508150
228. Pittenger MF, Discher DE, Péault BM, Phinney DG, Hare JM, Caplan AI. Mesenchymal stem cell perspective: cell biology to clinical progress. *NPJ Regen Med*. 2019 Dec 2;4:22.
229. Jalil AR, Andrechak JC, Discher DE. Macrophage checkpoint blockade: results from initial clinical trials, binding analyses, and CD47-SIRP $\alpha$  structure-function. *Antibody Therapeutics* 3:80-94 (2020).
230. Hayes BH, Tsai RK, Dooling LJ, Kadu S, Lee JY, Pantano D, Rodriguez PL, Subramanian S, Shin JW, Discher DE. Macrophages show higher levels of engulfment after disruption of cis interactions between CD47 and the checkpoint receptor SIRP $\alpha$ . *Journal of Cell Science* 133(5):jcs237800 (2020).
231. Saini K, Cho S, Dooling L, Discher DE. Tension in fibrils suppresses their enzymatic degradation – a molecular mechanism for 'Use it or Lose it'. *Matrix Biology* -- invited review. (to appear 2020).
232. AbdelAziz R Jalil, Brandon H Hayes, Jason C Andrechak, Yuntao Xia, David M Chenoweth, Dennis E Discher. Multivalent, Soluble Nano-Self Peptides Increase Phagocytosis of Antibody-Opsonized Targets while Suppressing "Self" Signaling. *ACS Nano* 14: 15083-15093 (2020).
233. Manasvita Vashisth, Sangkyun Cho, Jerome Irianto, Yuntao Xia, Mai Wang, Brandon Hayes, Daniel Wieland, Rebecca Wells, Farshid Jafarpour, Andrea Liu, Dennis E Discher. Scaling concepts in 'omics: Nuclear lamin-B scales with tumor growth and often predicts poor prognosis, unlike fibrosis. *Proceedings of the National Academy of Sciences* 118 (48) (2021)
234. Edyta Glogowska, Malika Arhatte, Franck C Chatelain, Florian Lesage, Aimin Xu, Carsten Grashoff, Dennis E Discher, Amanda Patel, Eric Honoré. Piezo1 and Piezo2 foster mechanical gating of K2P channels. *Cell reports* 37 (9), 110070 (2021)
235. Pfeifer CR, Tobin MP, Cho S, Vashisth M, Dooling LJ, Vazquez LL, Ricci-De Lucca EG, Simon KT, Discher DE. Gaussian curvature dilutes the nuclear lamina, favoring nuclear rupture, especially at high strain rate. *Nucleus*. 2022 Dec;13(1):129-143.
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237. Jalil AR, Tobin MP, Discher DE. Suppressing or Enhancing Macrophage Engulfment through the Use of CD47 and Related Peptides. *Bioconjugate Chemistry* 2022 Mar 22. doi: 10.1021/acs.bioconjchem.2c00019.
238. Andrechak JC, Dooling LJ, Tobin MP, Zhang W, Hayes BH, Lee JY, Jin X, Irianto J, Discher DE. CD47-SIRP $\alpha$  Checkpoint Disruption in Metastases Requires Tumor-Targeting Antibody for Molecular and Engineered Macrophage Therapies. *Cancers* (Basel). 2022 Apr 11;14(8):1930.
239. Dooling L, Saini K, Anlas A, Discher DE. Tissue mechanics coevolves with fibrillar matrisomes in healthy and fibrotic tissues. *Matrix Biology*. (2022).
240. Mai Wang, I Ivanovska, M Vashisth, Discher DE. Nuclear mechanoprotection: from tissue atlases as blueprints to distinctive regulation of nuclear lamins. *APL Bioengineering* (2022).
241. Sangkyun Cho, Dennis E. Discher, Gordana Vujanak-Novakovic, and Joseph C. Wu. Challenges and Opportunities for the Next Generation of Cardiovascular Tissue Engineering. *Nature Methods* (2022).

242. JC Andrechak, LJ Dooling, MP Tobin, W Zhang, BH Hayes, JY Lee, X Jin, ... DE Discher. CD47-SIRP $\alpha$  checkpoint disruption in metastases requires tumor-targeting antibody for molecular and engineered macrophage therapies. **Cancers** 14: 1930 (2022)
243. Dooling LJ, Andrechak JA, Hayes B, Kadu, S, Zhang W, Pan R, Vashisth M, Irianto J, Alvey CM, Ma L, Discher, DE. Cooperative phagocytosis underlies macrophage immunotherapy of solid tumours and initiates a broad anti-tumour IgG response. **Nature Biomedical Engineering** (Apr.2023)
244. Ivanovska I, Tobin M, Dooling LJ, Discher DE. Small, fat-filled lipid droplets are sufficiently rigid to indent a nucleus, dilute the lamina, and cause rupture. **Journal of Cell Biology** (to appear May 2023)
245. Hayes B, Zhu PK, Wang M, Pfeifer C, Xia Y, Phan, S, ... Discher DE. Confinement plus Myosin-II suppression maximizes heritable loss of chromosomes, as revealed by live-cell ChReporters. **Journal of Cell Science** (to appear May/June 2023)
246. Wang M, Phan S, Hayes B, Discher DE. Genetic heterogeneity in p53-null leukemia increases transiently with spindle assembly checkpoint inhibition and is not rescued by p53. **Chromosoma** (minor revision).
247. BH Hayes, M Wang, H Zhu, SH Phan, JC Andrechak, AH Chang, ... DE Discher. Chromosomal instability can favor macrophage-mediated immune response and induce a broad, vaccination-like anti-tumor IgG response. **bioRxiv**, 2023.04.02.535275 (2023)
248. Saini, K.;...Dooling, L.J.;... Discher, D.E. Heterogeneous strains in tissue collagen show that high strains locally suppress degradation by collagenase. 2021 *preprinted to bioRxiv*

#### **FULL-LENGTH JOURNAL PUBLICATIONS – IN REVIEW or MAJOR REVISION**

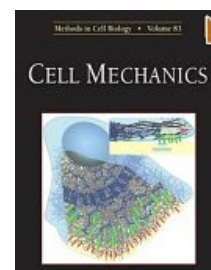
- D. Pantano, D.E. Discher, M.L. Klein. Transport mechanisms of a neurotransmitter transporter homologue revealed by molecular dynamics and normal mode analyses. (in revision).

#### **FULL-LENGTH JOURNAL PUBLICATIONS – WRITTEN, TO BE SUBMITTED**

- K. Rajagopal et al. Rapidly Reducible and Slowly Hydrolyzable Variants of PEO-PCL diblock copolymer worm micelles (in preparation).
- T. Chaudhuri, A. Engler, H.L. Sweeney, and D.E. Discher. Striation and stress fibers in stem cell differentiation - dependence on substrate elasticity and NMM II based contractility (in preparation).
- N. Bhasin, F. Nakamura, C. Johnson, A. Brown, T. Stossel, and D.E. Discher. Alternative splicing for mechanical resilience – the molecular-scale effect of filamin's hinge. (written, to be submitted).
- S. Sen, M. Tewari, H.L. Sweeney, and D.E. Discher. Orthogonal stressing and signaling of myocyte adhesions: integrin-dominated prosurvival signaling in dystrophin deficiency. (written, to be submitted).
- K.N. Dahl, D.E. Discher, P. Tran. Nuclear pore diffusion on and into the lamina-free nuclear envelope of yeast (written, to be submitted).
- V. Ortiz, C. Johnson, M.L. Klein, D.E. Discher. Symmetrically steered Molecular Dynamics and the in situ unfolding of beta-Spectrin Repeats 8-9. (in preparation).

#### **BOOKS & BOOK CHAPTERS – published (or promised\*)**

- D.E. Discher, P. Photos, F. Ahmed, R. Parthasarathy, and F.S. Bates. Polymersomes: A New Platform for Drug Targeting. **Biomedical Aspects of Drug Targeting**, editors: V.R. Muzykantov and V.P. Torchilin. Kluwer Academic Press (2002).
- G.H. Thomas and D.E. Discher. Spectrin elasticity in red blood cells. **Elastomeric Proteins**, editors: P.R. Shewry, A.S. Tatham, A. Bailey. Cambridge Univ. Press. (2003).
- D.E. Discher. Biomimetic Nanostructures (from Self-Assembly). **Nanoscale Science and Engineering**, editors: Di Ventra, S. Evoy, Heflin. Kluwer Academic Press. (2004)
- R. Law, N. Bhasin, and D.E. Discher. Application of Probe Microscopy to Protein Unfolding: Adsorption and Ensemble Analyses. **ACS Books: Applications of Scanned Probe Microscopy to Polymers**, editors: J.D. Batteas, C.A. Michaels, and G.C. Walker. ACS Books. (2005)
- D.E. Discher and F. Ahmed. Polymersomes. **Annual Review of Biomedical Engineering**, editor: M. Yarmush. 8: 323-341 (2006).





6. Y. Geng and D.E. Discher. Degradable Poly (ethylene oxide)-block-Polycaprolactone Worm Micelles. **ACS Symposium Series Books: Degradable Polymers and Materials: Principles and Practice**. editors: Kishan Khemani and Carmen Scholz. Oxford University Press (2006).
7. Y-L Wang & D.E. Discher, Editors. Vol. 83 in the series **Methods in Cell Biology - Cell Mechanics** (2007).
8. A.J. Engler, F. Rehfeldt, S. Sen, and D.E. Discher. Micro-Tissue Elasticity: Measurements by Atomic Force Microscopy and its Influence on Cell Differentiation. In (D.E. Discher & Y-L Wang, Editors.). Vol. 83 in the series **Methods in Cell Biology - Cell Mechanics** (2007).
9. F. Rehfeldt, A.J. Engler, and D.E. Discher. Stem Cells and Nanomedicine – Nanomechanics of the Microenvironment. Ch.10 in series **Nanotechnology Volume 5: Nanomedicine**. Editor: Viola Vogel. Wiley VCH (2009).
10. S. Cai, D.A. Christian, M. Tewari, T. Minko, and D.E. Discher. Anti-cancer Polymersomes. In **Polymer-Based Nanostructures: Medical Applications - Royal Society of Chemistry Nanoscience & Nanotechnology No.9**. Editor: Pavel Broz. (2010) DOI: 10.1039/9781847559968
11. T. Chaudhuri, F. Rehfeldt, H.L. Sweeney, D. E. Discher. Preparation of collagen-coated gels that maximize in vitro myogenesis of stem cells by matching the lateral elasticity of in vivo muscle. Editor: I.M. Conboy. Springer Publishing, Ch.13 in **Methods in Molecular Biology- Protocols for Adult Stem Cells** Vol.621 (2010).
12. I. Ivanovska, J. Swift, T. Harada, J.D. Pajerowski, D. E. Discher. Physical plasticity of the Nucleus and its manipulation. Editor: GV Shivashankar. Elsevier Publishing, Ch.9 in **Methods in Cell Biology - Nuclear Mechanics & Genome Regulation** (2010).
13. A. Buxboim and D.E. Discher. Mechanical Interactions between Cells and Tissues. In: Matyjaszewski K and Möller M (eds.) **Polymer Science: A Comprehensive Reference**, 9: 201–209. Elsevier Publishing. (2012)
14. N. Sancho Oltra, S.M. Loverde, T. Harada, A. Mahmud, K. Rajagopal, and D.E. Discher. Degradable poly(ethylene oxide)-block-polycaprolactone worm-like micelles: From phase transitions and molecular simulation to persistent circulation and shrinking tumors. Editors: Kishan Khemani, Carmen Scholz. Ch. 16 in **ACS Symposium Series Books: Degradable Polymers and Materials: Principles and Practice (2<sup>nd</sup> Edition)**. Vol. 1114: 255-285 (2012).
15. N. Sancho Oltra, S.M. Loverde, T. Harada, A. Mahmud, K. Rajagopal, and D.E. Discher. Polymersomes and Filomicelles. Ch.8 in **Fundamentals of Pharmaceutical Nanoscience**. Editor: Ijeoma F. Uchegbu et al. Springer Publishing. (2013).
16. I. Ivanovska, J. Swift, J. Irianto, K. Spinler, J-W. Shin, A. Buxboim, and D.E. Discher. Nuclear Imaging in Mechanobiology. **CRC Handbook of Imaging in Biological Mechanics**. Eds. Corey Neu & Guy Genin (2014).
17. Praful Nair, David Christian, and D.E. Discher. Polymersomes. Chapter 26 in **The Giant Vesicle Book**, Rumiana Dimova and Carlos Marques (eds). (2018). Taylor & Francis, LLC.
18. D.E. Discher. Biomembrane mechanical properties direct diverse cell functions. pgs. 263-285 in **Physics of Biological Membranes**, Bassereau P., and Sens P. (eds). (2018), Springer-Verlag, Berlin (2 volumes).
19. Pfeifer CR, Irianto J, and Discher DE. Nuclear mechanics and cancer cell migration, to appear in **Cell migrations: causes and function**. Eds. C.A.M. La Porta and S. Zapperi, Advances in Experimental Medicine and Biology (AEMB) Book Series, Springer-Nature. (to appear 2019).

#### PATENTS, FILINGS & DISCLOSURES (partial list)

Compositions and methods for selective phagocytosis of human cancer cells (2021)

DE Discher, KR Spinler, C Alvey  
US Patent 10,946,042

Bioreactor for isolation of rare cells and methods of use (2018)

DE Discher, JW Shin  
US Patent 9,920,295

Peptides and methods using same (2017)

DE Discher, PLR Nunez, DA Pantano  
US Patent 9,566,347

Protection of virus particles from phagocytosis by expression of CD47 (2015)

DE Discher, RKA Tsai

US Patent 9,050,269

Thermo-Responsive Block Copolymers, and Use Thereof.  
S. Qin, Y. Geng, D.E. Discher et al.

US Patent # 0220614-A1 (2009)

Polymersomes and Related Encapsulating Membranes.

US Patent # 6,835,394 (2004)

D.E. Discher (25%), B.M. Discher, Y-Y. Won, J.C-M. Lee, D.A. Hammer (25%), F.S. Bates (50%).

-- Not updated --

### FILMED DOCUMENTARIES

Videotaped Interview and Demonstration on 'Phagocytes in action'

in Schlessinger Science Library series "Immune System" for grades 5-8 (2001).

Video for Philadelphia Middle Schools "Bloods Cells: Real and Artificial" - by Penn MRSEC. Live, 20-min (2000).

### ADDITIONAL LARGE MEETING ORGANIZATION

Polymer Vesicles 2005. Co-organizer of 4-day Meeting with Wolfgang Meier, Univ. Basel. 50 invitees, held Aug.15-18 near Basel, in Rheinfelden, Germany.

Red Cell Club 2011. Lead organizer of 2-day Meeting with David Speicher (Wistar) and Mitch Weiss (CHOP). 110 attendees, held Oct.14-15 at U.Penn. and CHOP, in Philadelphia.

### LECTURES: INVITED, KEYNOTE, PLENARY (partial list, 2002-2014)

-- Not updated 2019 to 2022 --

Gordon Research Conference - Cancer Nanotechnology, Keynote Talk, Mt Snow, Vermont, Jun (2019)

Gordon Research Seminar (for students) - Cancer Nanotechnology, Keynote Talk, Mt Snow, Vermont, Jun (2019)

European Physical Society Keynote, Gdansk, Poland, May (2019)

Company of Biologists Lecturer, Santiago, Chile, Apr (2019)

-- Not updated 2014 to 2019 --

Pasteur Institute Department of Developmental and Stem Cell Biology, Seminar, Paris, Dec (2013)

Joint Weizmann - Mechanobiology Institute Conference " Dynamic Architecture of Cells and Tissues", Singapore, Oct (2013)

Nano Utah 2013 Conference - Keynote, Salt Lake City, Utah, Oct (2013)

Distinguished Lecture Series, German Cancer Research Center (DKFZ), Heidelberg, Germany, Oct (2013)

UC Berkeley-UCSF Graduate Program in Bioengineering Annual Conference – Keynote Talk, Lake Tahoe, Oct (2013)

Red Cell Club Annual Meeting – Opening Talk, New York Blood Center, Oct (2013)

Physics of Cancer 2013 Symposium - Invited Talk, Leipzig, Germany, Sept (2013)

3<sup>rd</sup> International Soft Matter Conference, invited Talk on Biological Soft Matter, Rome, Sept (2013)

European Conference on Intermediate Filaments in Health and Disease, Keynote, Amsterdam, NL, Sept (2013)

British Society of Cell Biology Meeting, 'Mechanochemical Cell Biology' – invited Talk, Cumbria, UK, Sept (2013)

International Summer Program of Tokyo Medical and Dental University on Biomaterial Science, Keynote, Aug (2013)

Gordon Research Conference on Collagens, Talk, Colby-Sawyer College, New Hampshire, July (2013)

Gordon Research Conference on Red Cells, Talk, Proctor Academy in Andover, New Hampshire, July (2013)

"Biological Surfaces and Interfaces" Symposium - Keynote, Costa Brava, Spain, Jun (2013)

European Society of Animal Cell Technologies Biannual Meeting - Keynote, Lille, France, Jun (2013)

Wyss Symposium on Medical Nanotechnologies inspired by Nature, Wyss Inst. for Biol. Inspired Eng'g, Harvard Univ., Jun (2013)

Mt. Sinai School of Medicine, Dept. of Developmental & Regenerative Biology and Stem Cell Institute Seminar, NY, May (2013)

American Thoracic Society Annual Meeting – Science Core Invited Talk, Philadelphia, May (2013)

Symposium Talk in honor of Dr. Subra Suresh "Intersection of Engineering Sciences and Medicine", Temple Univ., Apr (2013)

'Mechanical manipulations and responses at the scale of the cell' Conference, Nat'l Centre Biol. Sci., Bangalore, India, Apr (2013)

Advances in Mineral Metabolism Conference, Invited Talk, Snowmass, CO, Apr (2013)

Texas Tech University, Department of Chemical Engineering Seminar, Lubbock, Jan (2013)

Grodins Keynote Lecture University of Southern California Dept. Biomedical Engineering, Los Angeles, Feb (2013)

ASME 2013 2nd Global Congress on Nanoengineering for Medicine & Biology, Keynote, Boston, Feb (2013)

Biophysical Society Annual Meeting, Mechanobiology Subgroup Talk, Philadelphia, Feb (2013)

Stanford University Chemical Engineering Department Seminar, Jan (2013)

Yale University School of Medicine, Cell Biology Department Seminar, Jan (2013)  
 Rice University Bioengineering Department Seminar, Houston, Jan (2013)  
 Amer. Society Cell Biology, Minisymposium: Cell Mechanics and Intermediate Filaments, Dec (2012)  
 Univ. Nijmegen BioOrganic Chemistry, Nijmegen, Netherlands, Dec (2012)  
 International School on Colloids – 3 Lectures, Technical Univ. Berlin & Max Planck Inst. Golm, Germany, Nov (2012)  
 Sixth Mechanobiology Inst. Conference ‘Mechanobiology of Chromatin and Transcription’, National Univ. Singapore, Nov (2012)  
 Ninth Biannual Carolina Biophysics Symposium, "Biophysics of Signaling", Nov (2012)  
 Third Meeting on Physics of Cancer 2012 in Leipzig, Germany, Nov (2012)  
 AIChE Annual Meeting – Cell Mechanics Keynote, Pittsburgh, PA, Oct (2012)  
 CNRS "Physics from cell to Tissue" Keynote in AuTrans-Grenoble, France, Oct (2012)  
 First joint meeting of French Societies for Cell Biology (SFBC) and for Developmental Biology, Montpellier, France, Oct (2012)  
 Amer Society of Bone Mineral Research (ASBMR), State-of-the-Art Lecture " Matricellular Signaling", Minneapolis, Oct (2012)  
 Cell Press Exciting Biologies Series of interdisciplinary meetings in biomedicine 'Forces in Biology', Dublin, Ireland, Oct (2012)  
 Annual Dutch Meeting on Molecular and Cellular Biophysics - Plenary, Veldhoven, Netherlands, Oct (2012)  
 Biomembranes Symposium in honor of Wolfgang Helfrich, Potsdam, Germany, Sep (2012)  
 De Gennes Days on Physics of Cells - from soft to living matter (PhysCell2012), School Keynote, Hyères, France, Sep (2012)  
 Australia New Zealand Orthopedic Research Society (ANZORS), Plenary, Perth, Australia, Sep (2012)  
 Sydney Univ. Tissue Eng'g Network (SUTEN), Univ. Sydney, Keynote, Sydney, Aus., Aug (2012)  
 Fed'n. European Calcified Tissue Society Meeting Plenary, Katowice, Poland, Aug (2012)  
 American Physical Therapy Assocn - Regenerative Medicine and Rehabilitation Meeting Keynote, Beaver Hollow, NY, Aug (2012)  
 BIRS Workshop 'Tissue Growth and Morphogenesis: from Genetics to Mechanics and Back', Banff, Canada, July (2012)  
 GEM4 Summer School on Cellular and Molecular Mechanics with a Focus on Developmental Biology - Lecturer, July (2012)  
 Controlled Release Society Annual Meeting - Invited Speaker in ‘New Chemistries’, July (2012)  
 'Macro UK' Invited talk, The University of Warwick, Coventry, UK, July (2012).  
 Canadian Collaborative Research for Development of Extracellular Matrices, 1st Ann. Meeting Keynote, Hamilton, ON, Jul (2012)  
 IUPAC World Polymer Congress - Keynote Speaker, Blacksburg, VA, Jun (2012)  
 Colloid and Surface Science Symposium, Johns Hopkins, Jun (2012)  
 Congenital Muscular Dystrophy Conference: Myomatrix, Reno, Apr (2012)  
 American Chemical Society ‘Self-assembled Nanostructures’ Symposium, San Diego, Mar (2012)  
 French MD-PhD Program Annual Symposim, Paris, France, Mar (2012)  
 American Physical Society ‘Inherently Strained Polymers and Soft Materials’ Symposium Talk, Boston, Feb (2012)  
 Univ. Illinois Chicago Pharmacology Dept. Seminar, Feb (2012)  
 Goettingen SFB Center Symposium Talk, Germany, Feb (2012)  
 Children’s Hospital of Philadelphia Hematology Seminar, Jan (2012)  
 University of Toronto Department of Physics Colloquium, Toronto, Canada, Jan (2012)  
 National Inst. Matls. Science – Tsukuba, Japan joint symposium with U.Penn. MRSEC, Tsukuba, Japan, Dec (2011)  
 4th Int. Conference on Mechanics of Biomaterials & Tissues, Waikaloa - Kona, Hawaii, Dec (2011)  
 Stony Brook Department of Biomed. Eng'g. Seminar – State Univ. of New York, Stony Brook, NY, Nov (2011)  
 Univ. Minnesota Department of Biomed. Eng'g. Seminar, Minneapolis, MN, Nov (2011)  
 Center for Integrated Nanotechnologies Colloquium Distinguished Lecture, Sandia National Labs, Albuquerque, NM Nov (2011)  
 Univ. Connecticut Department of Mechanical Eng'g. Seminar, Storrs, CT, Oct (2011)  
 Biomedical Eng'g. Society – Symposium in honor of Shu Chien, Hartford, CT, Oct (2011)  
 Anbar Lecture and Friday Biophysics Seminar, Dept. Physiology & Biophysics, University of Buffalo, Buffalo, NY, Sept (2011)  
 American Chemical Society Polymers in Medicine, Santa Rosa, CA, Sept (2011)  
 International Summer School of the Berlin-Brandenburg School for Regenerative Therapies Lecturer, Berlin, Germany, Aug (2011)  
 Nachwuchsakademie Medizintechnik Lecturer, Charité Hospital, Berlin, Germany, Aug (2011)  
 Gordon Research Conference – Red Cells, Proctor Academy, NH, July (2011)  
 Biomatrix Symposium, Budapest, Hungary, July (2011)  
 Annual Colloquium Plenary speaker – Univ. East Anglia, Norwich, UK, Jun (2011)  
 Engineering Influences in Cancer Research – Pezcoller Foundation, Trento, Italy, Jun (2011)  
 European Interdisciplinary graduate school "Frontiers in Life Sciences”, Paris, France, Jun (2011)  
 Mid-Atlantic Soft Matter Meeting, U.Penn, Jun (2011)  
 Gordon Research Conference – Tissue Repair, Colby-Sawyer College, NH, Jun (2011)  
 Academy Sinica Physics Division, Taipei, Taiwan, May (2011)  
 Rensselaer Polytechnic Institute, Center for Biotechnology and Interdisciplinary studies, Troy, NY, May (2011)  
 Materials Research Society – Spring Meeting, Colloids Invited Talk, San Francisco, CA, Apr (2011)  
 Materials Research Society – Spring Meeting, Stem Cells, San Francisco, CA, Apr (2011)  
 University of Basel – Biozentrum, Basel, Switzerland, Apr (2011)  
 Systems Biology of Connective Tissue Meeting, Wash.DC, Feb (2011)

Cell Mechanics Meeting, co-sponsored by BMES, Miami, FL, Jan (2011)

American Society of Cell Biology Annual Meeting – Cell and Nuclear Mechanics Subgroup speaker, Philadelphia, Dec (2010)

TERMIS North America (Tissue Eng. Regenerative Medicine International Society) Keynote, Orlando, FL, Dec (2010)

Texas A&M Biomedical Eng'g Dept. Seminar, College Station, TX, Nov (2010)

Paris VII, Physics Dept. Colloquium, Paris, France, Nov (2010)

Sydney Univ. Tissue Eng'g. Network, University of Sydney, Australia, Nov (2010)

Australian Institute for Bioeng. and Nanotech., University of Queensland, Brisbane, Australia, Nov (2010)

CECAM (Centre Européen de Calcul Atomique et Moléculaire) Lausanne, Switzerland, Oct (2010)

Univ. Washington, Molecular & Cell Biology Student Symposium, Seattle, WA, Oct (2010)

Red Cell Club Annual Meeting, Children's Hospital of Cincinnati, OH, Oct (2010)

Nano Drug Delivery Systems, Omaha, Nebraska, Oct (2010)

Biochemistry School, Bristol Univ., Oct.(2010)

Physics of Living Matter Symposium, Cambridge Univ., UK, Sept (2010)

Inst. Mathematical Applications (IMA), Univ. Minnesota, Minneapolis, MN, Sept (2010)

Inst. Bioeng. Catalonia, Univ. Barcelona, Spain, Sept (2010)

Engineering Life Symposium, Inst. of Bioeng., EPFL, Lausanne, Switzerland, Sept (2010)

Gordon Research Conference – Drug Carriers in Medicine & Biology, Waterville, NH, Aug (2010)

World Congress of Biomechanics, 2 invited talks, Singapore, Aug (2010)

GEM4 (Global Enterprise for Micro Mechanics & Molecular Medicine) Summer School, Singapore, July (2010)

IUPAC (Int'l Union Pure & Applied Chemistry) – Nanomedicine Symposium, Glasgow, Scotland, July (2010)

USNCTAM (US National Congress on Theoretical and Applied Mechanics), 2 invited talks, Penn State Univ., PA, June (2010)

Nano and Micromechanics of living cell adhesion, Int'l Centre Mech Sci (CISM) Summer School, Udine, Italy, June (2010)

International Conference on Cellular Engineering, Dublin, Ireland, June (2010)

Canadian Assoc'n of Physicists Congress - "Biologically-Inspired Materials", Toronto, Canada, June (2010)

Canadian Biomaterials Society Annual Meeting - Kingston, Ontario, Canada, June (2010)

Force Measurement in Biological Manipulation and Microscopy Workshop, Univ. North Carolina, Chapel Hill, NC, May (2010)

Carolina Center of Cancer Nanotechnology Excellence Seminar, Univ. North Carolina, Chapel Hill, NC, May (2010)

Atomic Force Microscopy BioMed (AFM BioMed), Red Island, Croatia, May (2010)

Stem Cell Bioengineering, Society for Biological Engineering (SBE – Amer Inst Chem Eng), May (2010)

Neuroscience Research Institute, Ottawa, Canada, April (2010)

Cell Culture Eng'g, Banff, Canada, April (2010)

Univ. Illinois Urbana-Champaign, Cell Biology, Urbana-Champaign, IL, April (2010)

George Washington University, Biophysics Lecture, Wash.DC, Apr (2010)

George Washington University, Applied Mathematics Seminar, Wash.DC, Apr (2010)

American Chemical Society, 2 invited talks, San Francisco, CA, Mar (2010)

American Physical Society, invited Mechanics in Cell Biology Lecture, Portland, OR, Mar (2010)

City College of New York, Biochemistry Seminar, Mar (2010)

University of Buffalo, Chem Eng., Mar (2010)

Purdue Univ., Cancer Research Center, Mar (2010)

U.C. Berkeley, Structural Biology Seminar, Feb (2010)

Biophysical Society, San Francisco, CA, Feb (2010)

Institute Curie, Cell Biology and Physicochemical Biology, Paris, France, Feb (2010)

Institute Curie, Keynote - Science and Clinical Medicine Annual Meeting, Paris, France, Feb (2010)

Scripps Research Institute, Cell Biology Seminar, San Diego, Feb (2010)

U.C. San Diego, Bioengineering Seminar, San Diego, Feb (2010)

deGennes Symposium in Cell Physics - Keynote, Dead Sea, Israel, Feb (2010)

U.Penn. Institute for Regenerative Medicine Symposium Speaker, Philadelphia, Jan (2010)

Columbia Univ., Chem Eng., New York, Jan (2010)

Johns Hopkins University, Cell Biology Seminar, Baltimore, Jan (2010)

Mt. Sinai - Pharmacology and Systems Therapeutics, New York, Jan (2010)

American Society of Cell Biology (ASCB), Cell Mechanics Subgroup Talk, San Diego, Dec (2009)

Materials Research Society (MRS), Responsive Gels and Biopolymer Assemblies Session Speaker, Boston, Dec (2009)

American Inst. Chem. Eng. (AIChE), Food Pharm Division Award Keynote, Nashville, TN, Nov (2009)

Singapore Cell Mechanics Symposium, Oct (2009)

Syracuse University, Biomedical Eng'g. Seminar, Syracuse, NY, Oct (2009)

Syracuse University, Physics Colloquium, Syracuse, NY, Oct (2009)

Heraeus Foundation Cell Mechanics Symposium - Keynote, Bad Honnef, Germany, Oct (2009)

Red Cell Club Annual Meeting – Yale University, New Haven, CT, Oct (2009)

Sackler Symposium Kickoff for Physical and Engineering Biology Program, New Haven, CT, Oct (2009)

SPM in Life Sciences, Berlin, Germany, Oct (2009)  
Karolinska Institute - Department of Neuroscience Seminar, Stockholm, Sweden, Oct (2009)  
German Colloid Society Keynote, Hamburg, Germany, Sept (2009)  
French Cell Biology Society Invadopodia, Podosomes and Focal adhesions, Hyères, France, Sept (2009)  
University of Delaware, Mechanical Eng. Seminar, Newark, Delaware, Sept (2009)  
Ludwigs Max. University Munich, Biology Lecture, Sept (2009)  
Summer School on Nanobiology - Universität Karlsruhe, Bad Herrenalb, Sept (2009)  
Eng. Medicine and Biology Conference, Cellular Force Transduction Session, Minneapolis, MN, Sept (2009)  
Nanomedicine at COMS2009 Conference, Copenhagen, Denmark, Sept (2009)  
Gordon Research Conference – Soft Matter Physics, Colby-Sawyer, NH, Aug (2009)  
IUPAC (Int'l. Union of Pure & Applied Chemists) Congress, Soft Matter Symposium - Keynote, Aug (2009)  
Controlled Release Society Meeting – Nanomaterials Speaker, Copenhagen, Denmark, Jul (2009)  
Gordon Research Conference – Motile & Contractile Systems, Keynote (1hr talk), Colby-Sawyer, NH, Jul (2009)  
Woods Hole Research Inst., Physiology Summer School Lecturer, Woods Hole, MA, Jul (2009)  
Gordon Research Conference – Apoptosis, Colby-Sawyer, NH, Jun (2009)  
Gordon Research Conference – Red Cells, Univ. New England, Maine, Jun (2009)  
Institute Pasteur, Paris, France, Jun (2009)  
Paris-Ile de France Nanoscience Summer School - Lecturer, Paris, France, Jun (2009)  
ACS/ IACIS Colloids Division, Biocolloids for Imaging and Drug Delivery – Keynote, New York, NY, Jun (2009)  
ACS Polymers Division – Polymers in Medicine and Biology, Sonoma, CA, Jun (2009)  
Gordon Research Conference – Cartilage, Geneva, Switzerland, Jun (2009)  
'Molecular Cell Dynamics' Meeting, Muenster, Germany, Jun (2009)  
European Calcified Tissue Society Meeting, Vienna, Austria, May (2009)  
Melville Lecture, Cambridge Univ., Cambridge, UK, May (2009)  
Interface Biology of Implants Symposium, Rostock, Germany, May (2009)  
Univ. Manchester, Centre for Integration of Medicine & Innovative Technology, Manchester, UK, Apr (2009)  
Northwestern Univ., Institute for BioNanotechnology (IBNAM) Colloquium, Apr (2009)  
Materials Research Society – Spring Meeting, Block Copolymers, San Francisco, CA, Apr (2009)  
North Carolina State Univ., German-American Training Grant Workshop, Apr (2009)  
Penn State Univ., Chem Eng., Apr (2009)  
Boston Univ., Biomedical Eng., Apr (2009)  
Thomas Jefferson Univ., Dept of Dermatology, Mar (2009)  
American Chemical Society National Meeting – Polymers Div., Colloids Div., Salt Lake City, UT, Mar (2009)  
Vanderbilt Univ., Dept of Cell Biology, Nashville, TN, Feb (2009)  
Keystone Meeting, Mechanotransduction in Physiology and Disease, Taos, NM, Jan (2009)  
Gordon Research Conference – Polymers West, Ventura, CA, Jan (2009)  
Biomaterials Distinguished Speakers Series lecture, Hong Kong, China, Dec (2008)  
American Society of Matrix Biology Annual Meeting, San Diego, CA, Dec (2008)  
Biomaterials Symposium – Keynote, Kyoto, Japan, Dec (2008)  
Materials Research Society National Meeting – R.Langer Symposium speaker, Boston, MA, Dec (2008)  
American Inst. Chemical Eng. National Meeting –Keynote BioNano, Philadelphia, PA, Nov (2008)  
City College of New York (CCNY), Biomedical Eng., New York, NY, Nov (2008)  
Nanoscience Days Meeting, Jyvaskyla, Finland, Oct (2008)  
Southeastern US Pharmacology Meeting, Charleston, SC, Oct (2008)  
Univ. Pennsylvania, School of Medicine – Orthopedics Seminar, Oct (2008)  
Biomedical Eng. Society Meeting – 3 invited talks, St.Louis, MO, Oct (2008)  
UC Berkeley, Bioengineering, Sept (2008)  
Univ. Pennsylvania, Biochemistry & Biophysics Research Discussions Talk, Sept (2008)  
Univ. North Carolina, Biology Dept., Sept (2008)  
NanoMedicine Summit - Cleveland Clinic, Sept (2008)  
Stimuli-Responsive Polymeric Matls. (STIPOMAT) Conference, Keynote, Bordeaux, France, Sept (2008)  
Harvard Medical School - Biological Chem & Pharmacology, Sept (2008)  
American Chemical Society National Meeting – Polymers Div., Colloids Div., Biotech Div. Keynotes, Phila., PA, Aug (2008)  
Society for Biological Eng., Dublin, Ireland, July (2008)  
California Inst. of Technology – Cell & Molecular Mechanics in Medicine Summer School, Pasadena, CA, July (2008)  
Protein Society Symposium, San Diego, CA, July (2008)  
Controlled Release Society Meeting, New York, NY, July (2008)  
International Society of Biorheology Meeting, Penn State Univ., State College, PA, July (2008)  
France-US Young Eng. Scientist Symposium (YESS), French Embassy, Washington DC, July (2008)

NIH-National Cancer Inst. Workshop, Seattle, WA, July (2008)  
 International Conf. on Sickle Cell Adhesion and Malaria, Paris, France, July (2008)  
 Gordon Research Conf. – Cell Adhesion, Amherst, July (2008)  
 Federation of Eur. Biologists – IUBMB Symposium on Matrix, Athens, Greece, June (2008).  
 ASME Summer Bioeng. Conf., Keynote in Biofluid Nanotransport, Florida, June (2008)  
 Gordon Research Conf. – Basement Membranes, Maine, June (2008)  
 Woods Hole – Cape Cod, IUTAM Cell Mechanics Symposium, June (2008)  
 Membrane Skeleton Meeting Speaker, Krakow, Poland, June (2008)  
 Canadian Connective Tissue Meeting Keynote, Montreal, Canada, June (2008)  
 World Biomaterials Congress, Amsterdam, Symposium Keynote – Matrix Physics & Cells, May (2008)  
 Univ. Washington – Chemical Eng’g. Dept. Colloquium, May (2008)  
 Cell Mechanics Meeting, Georgia Tech, May (2008)  
 NAE-German Joint Symposium, Irvine, CA, Apr. (2008)  
 Eng. & Physical Biology Symposium, Harvard, Apr. (2008)  
 Woodruff Symposium, Georgia Tech, Apr. (2008)  
 BioVision Symposium Keynote, Alexandria, Egypt, Apr. (2008)  
 UNC Pharmacology, Durham, NC, Mar. (2008)  
 Computational Biology – Cold Spring Harbor/Wellcome Trust, Cambridge, UK, Mar. (2008)  
 German Physiological Society, Bonn, Mar. (2008)  
 Nano-Delivery, Boston, Feb. (2008)  
 Weizmann Institute – Biological Physics, Israel, Feb. (2008)  
 Technion – Biological Physics, Israel, Feb. (2008)  
 NIH Molecular Cardiology, Bethesda, Feb. (2008)  
 UPenn Targeted Therapeutics, Feb. (2008)  
 Stem Cell Meeting – Society of Biological Eng’g., San Diego, Jan. (2008)  
 UT Southwestern – Cell Biology, Dallas, Jan. (2008)  
 NSF – Cell Mechanics, Arlington, VA, Dec. (2007)  
 Dresden Biomaterials Symposium, Germany, Dec. (2007)  
 Amer. Society of Cell Biology (ASCB) Annual Meeting Symposium on ‘Force & Form’, Wash. DC – Dec (2007)  
 Cleveland Clinic - Cell Biology, Ohio, Dec. (2007)  
 Univ. Florida Chemical & Biomolecular Engineering Department, Gainesville, Nov. (2007)  
 Univ. Illinois Chemical & Biomolecular Engineering Department, Urbana-Champaign, Oct. (2007)  
 Wayne State Univ., Keynote at Nanotechnology Symposium, Detroit, Oct. (2007)  
 Univ. Virginia, Biomedical Eng’g. Dept. seminar, Oct. (2007)  
 Soft Matter Conference Keynote talk in Cell Biophysics, Aachen, Germany, Oct. (2007)  
 Univ. Texas - Austin, Biomedical Eng’g. Dept., Sept. (2007)  
 Univ. Houston, Chemistry Dept., Aug. (2007)  
 Univ. Illinois Cell Mechanics Summer School Lecturer, Urbana-Champaign, Jul (2007)  
 Stem Cell Conference Keynote, Univ. Vermont – Jul (2007)  
 National Univ. Singapore Cell Mechanics Summer School, Seminar – Jul (2007)  
 GEM4 Singapore Symposia: ‘Nano for Cancer’ Keynote – Jun (2007)  
 US National Committee on Biomechanics - Overview Talk, Keystone, CO – Jun (2007)  
 Amer. Chem Society Meeting – Biomedical Materials, NYC – Jun (2007)  
 Amer. Society of Gene Therapy (ASGT) Annual Meeting – Stem Cell Tissue Eng’g, Seattle – Jun (2007)  
 Canadian Society Pharm. Science “Nanopharmaceuticals” Symposium, Montreal – May (2007)  
 Gordon Research Conference on “Physical Chem & Biofunctionality”, Aussois, France – May (2007)  
 Gordon Research Conference on “Red Cells”, Aussois, France – May (2007)  
 Experimental Biology Meeting – North Amer. Vasc. Biol. Org. (NAVBO) Symposium, Wash. DC – Apr (2007)  
 Johns Hopkins Univ., Keynote at Institute for NanoBioTechnology Symposium, Baltimore – Apr (2007)  
 Keystone Symposium “Tissue Eng. & Development” Short Talk, Snowbird, UT – Apr (2007)  
 Washington Univ., Keynote at Nanotechnology and the Life Science Symposium, St. Louis – Mar (2007)  
 Univ. Alabama, Bio Matrix Eng’g & Regenerative Medicine Center Seminar, Birmingham– Mar (2007)  
 Biophysical Society Meeting Short Talk, Baltimore – Mar (2007)  
 Tufts Univ., Cell and Molecular Biology Seminar, Boston – Feb (2007)  
 Children’s Hospital of Philadelphia, Hematology/Oncology Seminar – Feb (2007)  
 U.Penn. Cell and Developmental Biology Department Symposium Speaker – Jan (2007)  
 Princeton Chemical Engineering Department, Princeton, NJ – Jan (2007)  
 UC San Diego, Cancer Institute Nanotechnology Seminar – Dec. (2006)  
 UC San Diego Bioeng’g. Seminar – Dec. (2006)

NanoBio Tokyo – Dec. (2006)  
U.Penn. Inst. Transl. Med. and Appl. Therapeutics (ITMAT) Symposium (2006)  
Rutgers Center for Biomaterials – Nov. (2006)  
RPI (Rensselaer Polytechnic Institute), Chemical & Biological Eng Dept, Albany, NY – Oct. (2006)  
Red Cell Conference, Yale University – Oct. (2006)  
MPI-Stuttgart Summer School – Oct. (2006)  
Keynote Missouri Nanotechnology Alliance, Univ. Missouri – Oct. (2006)  
Multi-Scale Materials Modeling, Freiburg, Germany – Sept.17-21 (2006)  
ACS National Meeting, Polymer Materials Symposium Invitee, San Francisco – Sept.11-14 (2006)  
Keynote World Congress Biomechanics, Munich – July 29-Aug.3 (2006)  
World Polymer Congress, Brazil, – July 16-21 (2006)  
Gordon Research Conference, Signal Transduction by Eng'd Extracellular Matrices, CT – July 2-7 (2006)  
Boulder, US Congress Biomech. – June 25-30 (2006)  
Duke University, Biomedical Eng'g. – May 23 (2006)  
Nanotechnology for Cancer, Boston – May 9 (2006)  
International Meeting on Rh protein, Paris – May 4 (2006)  
Univ. Paris VII, Cell Biomechanics Group – May 3 (2006)  
Indiana Univ. (IUPUI), Chemistry Department, Indianapolis, IN – April 19 (2006)  
MRSEC Directors Research Presentation, Univ. Chicago – April 14 (2006)  
Univ. Delaware, Chemistry and Biology Interfaces Program – April 11 (2006)  
Vrije University – Biophysics Group Seminar, Amsterdam, NL (2006)  
European Drug Delivery Conf., Netherlands – April 4-7 (2006)  
Univ. California, Los Angeles – Inst. Pure Applied Mathematics, Biomembranes Symposium – March 27-30 (2006)  
American Physical Society March Meeting – Keynote, Polymers Division, Baltimore, MD (2005)  
Univ. Maryland, Department of Chemical Eng'g., College Park, MD – Feb. 14 (2006)  
Amer. Society Cell Biology – Bone Subgroup Meeting, San Francisco (2005)  
Univ. California, Santa Barbara – Chemical Eng'g. (2005)  
Drexel University – Physics Department Colloquium, Philadelphia, PA (2005)  
Univ. Heidelberg, Physical Chemistry, Germany (2005)  
Soft Matter Days - Jülich, Bonn, Germany (2005)  
Red Cell Club Meeting, Univ. Illinois – Chicago (2005)  
University of Vermont – Chemistry Department, Burlington, VT (2005)  
Carnegie Mellon University – Chemical Eng'g., Pittsburgh, PA (2005)  
American Chemical Society National Meeting, Bionanotechnology Symposium Invitee, Wash.D.C (2005)  
International Congress of Biophysics, Montpellier, France (2005)  
Mathematical Biology of the Cell: Cytoskeleton and Motility Conference, Banff (2005)  
Lipids, Liposomes, and Biomembranes: New Technologies Conference, Vancouver (2005)  
Gordon Research Conference on Chemistry of Elastomers, New Hampshire (2005)  
Gordon Research Conference on Biocompatibility/Tissue Eng'g., New Hampshire (2005)  
Keynote Speaker at ACS Colloid and Surface Science Symposium, Clarkson Univ. Potsdam, NY (2005)  
American Chemical Society Regional Meeting, Bionanotechnology Symposium Invitee, Rutgers, NJ (2005)  
Frontiers in Soft Condensed Matter – Lubensky-Chaikin Symposium, Exxon-Mobil, Annandale, New Jersey (2005)  
Materials at the Synthetic-Biological Interface, U.Mass., Amherst (2005)  
Univ. Mass. Medical School – Cell Biology Dept., Worcester (2005)  
NIMS, Tsukuba, Japan (2005)  
Experimental Biology – Int'l. Union Physiol. Sci., Spring Molecules Symposium Invitee, San Diego, CA (2005)  
American Chemical Society Annual Meeting, Bionanotechnology Symposium Invitee, San Diego, CA (2005)  
New York Blood Center – Kimball Research Institute, Manhattan, NY (2005)  
Nanotechnology for Drug Delivery, Philadelphia (2005)  
University of Toronto, Chemistry Department, Canada (2005)  
Queen's University, Chemistry Department, Kingston, Canada (2005)  
NanoBio Expo, Tokyo, Japan (2005)  
Purdue University, Bio-Eng'g. Dept. (2005)  
California Institute of Technology Chemical Eng'g. Dept. (2005)  
University of Maryland Mechanical Eng'g. Dept. (2004)  
UC Berkeley Chemical Eng'g. Dept. (2004)  
Drexel Univ. Medical School Physiology & Pharmacology Dept. (2004)  
Single Cell Mechanics Symposium, MIT (2004)  
Polymer Chemistry Biennial (American Chemical Society) - Polymer Design for Biology, Savannah, Georgia (2004)

Washington University Biochemistry & Molecular Biophysics Department (2004)  
Air Force Biotechnology Directorate, Wright-Patterson AFB, OH (2004)  
University of Basel Physical Chemistry (2004)  
Hamburg University Physical Chemistry (2004)  
American Chemical Society Annual Meeting Philadelphia, PMSE division (2004)  
Nanomedicine Symposium, Polytechnic University, Brooklyn, NY (2004)  
Gordon Research Conference on Chemistry of Interfaces, Procter Academy, NH (2004)  
Keynote, Biomimetics Minisymposium, Prague (2004)  
IUPAC Polymers Biannual, Macro 2004, Paris (2004)  
Liposome Research Days, Taiwan (2004)  
Inaugural PULSE Interdisciplinary Lecture, hosted by Chemistry Dept., Purdue University, Lafayette, IN (2004)  
Polytechnic Univ., Chemical and Biological Sciences and Engineering Dept., Brooklyn, NY (2004)  
Plenary for Rutgers' IGERT-Biointerfaces Program, Rutgers, NJ (2004)  
Plenary at International Symposium for the Center for Practical Nano-Chemistry, Waseda University, Tokyo, Japan (2003)  
University of Florida Chemical Engineering, Gainesville, FL (2003)  
University of Delaware Biochemistry Program /Chemistry Department, Newark, DE (2003)  
University of Wisconsin Chemical and Biological Engineering, Madison, WI (2003)  
BIOSURF V Conference – Functional Polymeric Surfaces, Zurich, Switzerland (2003)  
Universität Konstanz Physics Department, Konstanz, Germany (2003)  
New Jersey Institute of Technology, Biomedical Eng'g BioMEMS Summer UG Program, Newark, NJ (2003)  
Gordon Research Conference on Supramolecular Chemistry, Procter Academy, NH (2003)  
Bioengineering Summer Conference of ASME/AIChE/BMES, Miami, FL (2003)  
Max Planck Institute for Colloids and Surface Science, Potsdam/Berlin, Germany (2003)  
Wroclaw University Institute for Biochemistry, Wroclaw, Poland (2003)  
Czech Academy of Science Institute for Macromolecular Chemistry, Prague, Czech Republic (2003)  
Czech Academy of Science Institute for Physiology, Prague, Czech Republic (2003)  
NSF-MRSEC Director's Meeting: Penn Biointerfaces Presentation, Stanford, CA (2003)  
University of Pennsylvania Institute for Environmental Medicine (2003)  
American Chemical Society Annual Meeting - Polymer and Materials Science Div. Sessions, New Orleans (2003)  
American Physical Society Annual Meeting - Nanoscience Symposium, Austin, TX (2003)  
Controlled Release Society Winter Meeting, Salt Lake City, UT (2003)  
RPI (Rensselaer Polytechnic Institute), Biomedical Engineering Department, Albany, NY (2002)  
Rice University, Bioengineering Department, Houston, TX (2002)  
ETH, Biomaterials group, Zurich, Switzerland (2002)  
Rolduc Polymer Conference, Kerkrade Netherlands (2002)  
Brown University Solid Mechanics Group, Providence, RI (2002)  
Nanoparticles Conference, Orlando, FL (2002)  
Princeton University MRSEC, Princeton, NJ (2002)  
University of Southern California, Dept. of Chemical Eng'g., Los Angeles, CA (2002)  
American Physical Society Annual Meeting, Indianapolis, IN (2002)  
Gordon Research Conference on Drug Delivery, Ventura, CA (2002)  
Biophysical Society Meeting - Red Cell Club, San Francisco, CA (2002)