

JUSTIN HANES, PH.D.

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I. Education

- 1996 Ph.D., Chemical Engineering, Massachusetts Institute of Technology
1991 B.S., Chemical Engineering, University of California Los Angeles

II. Professional Experience

Academic Positions

- 2004 – Present Associate Professor, Department of Chemical & Biomolecular Engineering (primary), The Johns Hopkins University (JHU)
Courtesy Joint Appointments in Biomedical Engineering, Environmental Health Sciences (since 2007), and Oncology
- 1998 – 2004 Assistant Professor of Chemical & Biomolecular Engineering (primary) and Biomedical Engineering (joint), JHU
- 1996 – 1998 Postdoctoral Fellow (Advisors: Professors Henry Brem and Drew Pardoll) Departments of Oncology and Neurosurgery, JHU
- 1991 – 1996 Research Assistant (Advisor: Professor Robert Langer) Department of Chemical Engineering The Massachusetts Institute of Technology

Other Professional Positions

- 2006 – Present Director of Therapeutics (and Member of the Executive Committee) The Institute for NanoBioTechnology at Johns Hopkins (INBT)
- 2006 – Present Executive Board, American Academy of Nanomedicine
- 2006 – Present Faculty Member and Director of the Nanotechnology Core, Cystic Fibrosis Research & Development Center at JHU
- 2006 – Present Associate Editor, *Nanomedicine: Nanotechnology, Biology, and Medicine*
- 2005 – Present Associate Editor, USA, *International Journal of Nanomedicine*

III. Honors and Awards

- 2008 Plenary Lecture, 11th International Inhalation Symposium. Theme: "Benefits and Risks of Inhaled Engineered Nanoparticles", June 11-14, Hannover, Germany
- 2007 Plenary Lecture, AIChE National Meeting, Bionanotechnology Topical Conference (T8), November 4-9, Salt Lake City, Utah
- 2006 Young Investigator Award, The American Academy of Nanomedicine
- 2006 Featured Speaker at the US National Academy of Sciences and Chinese Academy of Sciences 2006 Kavli Chinese-American Frontiers of Science, Irvine, CA, October 26-28, 2006. (US representative for "Nanomedicine" topic).
- 2006 Fellow, The American Academy of Nanomedicine
- 2006 The 2006 Sigma Xi Distinguished Lecture at Auburn University
- 2004-2009 CAREER Award, National Science Foundation
- 2004 William H. Huggins Excellence in Teaching Award, Johns Hopkins
- 2003 Named among "World's Top 100 Young Innovators and Leaders in Technology and Business," *MIT Technology Review*
- 2003 Best Paper Award (co-author), Aerosole in der Inhalationstherapie VIII (English Translation: "Aerosols in Inhalation Therapy"), Marburg, Germany
- 2003 Among "Runners-Up", Best Nanotech Discovery of 2003, Nanotechnology Now
- 1998-2001 Merck & Co. Junior Faculty Award
- 2001 Plenary Lecture, "Biomaterials in Medicine," National Educators Workshop, National Institute of Standards and Technology
- 2000-2001 3M Corporation Young Faculty Award
- 2000 Robert B. Pond Sr. Award for Excellence in Undergraduate Teaching
- 2000 Inducted as Honorary Member of the Golden Key National Honor Society for Excellence in Undergraduate Teaching
- 1999 *Ebert Prize* (Awarded by the American Pharmaceutical Association and American Chemical Society for the "best report of original investigation of a medicinal substance")
- 1997-1998 Bonnie Blair/American Brain Tumor Association Postdoctoral Fellowship
- 1997 Controlled Release Society-3M Pharmaceuticals Outstanding Graduate Student Research Award in Drug Delivery

IV. Publications

Total Number of Times Cited > 1,000

[Impact Factor of Journal]; {Number of times cited}

Peer-Reviewed Papers

Graduate Work

1. Hanes J., Chiba M., Langer R. (1996) Synthesis and characterization of degradable anhydride-co-imide terpolymers containing trimellitylimido-L-tyrosine: Novel polymers for drug delivery, **Macromolecules** 29:5279-5287. [Impact 4.28]; {Times Cited 18}
2. Edwards, D. A., Hanes J., Caponetti, G., Hrkach, J., Ben-Jebria, A., Eskew, M. L., Mintzes, J., Deaver, D., Lotan, N., and Langer, R. (1997) Large porous particles for pulmonary drug delivery, **Science**. 276: 1868-71. [Impact 30.03]; {Times Cited 269}
3. Batycky R.P., Hanes J., Langer R., Edwards D.A. (1997) Theoretical model of erosion and macromolecular drug release from biodegrading microspheres, **J. Pharm. Sci.**, 86:1464-1477. [Impact 2.23]; {Times Cited 100}
4. Hanes J., Cleland J.L., Langer R. (1997) New advances in microsphere-based single-dose vaccines, **Adv. Drug Del. Rev.** 28:97-119. [Impact 7.98]; {Times Cited 68}
5. Chiba, M., Hanes, J., and Langer, R. (1997) Controlled protein delivery from biodegradable tyrosine-containing poly(anhydride-co-imide) microspheres, **Biomaterials**. 18: 893-901. [Impact 5.20]; {Times Cited 32}
6. Hanes, J., Chiba, M., Langer, R. (1998) Degradation of porous poly(anhydride-co-imide) microspheres and implications for controlled macromolecule delivery, **Biomaterials**, 19:163-172. [Impact 5.20]; {Times Cited 41}
7. Evora C., Soriano I., Rogers R., Shakesheff K.M., Hanes J., Langer R. (1998) Relating the phagocytosis of microparticles by alveolar macrophages to surface chemistry: The effect of 1,2-dipalmitoylphosphatidylcholine, **J. Controlled Rel.**, 51:143-152. [Impact 4.01]; {Times Cited 53}

Postdoctoral Work

8. Sampath P, Hanes J, DiMeco F, Tyler BM, Brat D, Pardoll DM, Brem H (1999) Paracrine immunotherapy with interleukin-2 and local chemotherapy is synergistic in the treatment of experimental brain tumors. **Cancer Res**. 59:2107-2114. [Impact 7.66]; {Times Cited 30}
9. DiMeco, F., Rhines, L. D., Hanes, J., Tyler, B. M., Brat, D., Torchiana, E., Guarnieri, M., Colombo, M. P., Pardoll, D. M., Finocchiaro, G., Brem, H., Olivi, A. (2000) Paracrine delivery of IL-12 against intracranial 9L gliosarcoma in rats, **Journal of Neurosurgery**. 92: 419-427. [Impact 2.24]; {Times Cited 35}
10. Ewend, M. G., Thompson, R. C., Anderson, R., Sills, A. K., Staveley-O'Carroll, K., Tyler, B. M., Hanes, J., Brat, D., Thomas, M., Jaffee, E. M., Pardoll, D. M., and Brem, H. (2000) Intracranial paracrine interleukin-2 therapy stimulates prolonged antitumor immunity that extends outside the central nervous system, **Journal of Immunotherapy**. 23: 438-448. [Impact 4.51]; {Times Cited 16}
11. Hanes J, Sills AK, Zhao Z, Suh KW, Tyler BM, DiMeco F, Brat DJ, Choti MC, Leong KW, Pardoll DM, Brem H (2001) Controlled local delivery of interleukin-2 by biodegradable polymers protects animals from experimental brain tumors and liver tumors. **Pharm. Res**. 18:899-906. [Impact 2.85]; {Times Cited 27}

Peer-Reviewed Papers (continued)

Papers Generated as PI at Johns Hopkins

12. Fu J, Fiegel J, Krauland E, Hanes J (2002) New polymeric carriers for controlled drug delivery following inhalation or injection, **Biomaterials**, 23: 4425-4433. [Impact 5.20]; {Times Cited 37}
13. Ehrhardt C, Fiegel J, Fuchs S, Abu-Dahab R, Schäfer UF, Hanes J, Lehr C-M (2002) Drug absorption by the respiratory mucosa: Cell culture models and particulate drug carriers, **J. Aerosol Med.**, 15:131-140. [Impact 1.95]; {Times Cited 17}
14. Ehrhardt C, Kneuer C., Fiegel J, Hanes J, Schäfer UF, Kim K.J., Lehr C-M (2002) Influence of apical fluid volume on the development of functional cellular junctions in the human epithelial cell line 16HBE14o-: Implications for its use as an in vitro model for bronchial drug absorption studies, **Cell & Tissue Res.**, 308: 391-400. [Impact 2.58]; {Times Cited 26}
15. Li H, Yuan Z, Ng TY, Lee HP, Lam KY, Wang QX, Wu S, Fu J, Hanes J (2003) Constitutive model development and micro-structural topology optimization for Nafion hydrogel membranes with ionic clustering, **J Biomater Sci-Polymer E**, 14:1181-1196. [Impact 1.61]; {Times Cited 6}
16. Rhines, L.D., P. Sampath, F. Dimeco, H.C. Lawson, B.M. Tyler, Y. Har-el, J. Hanes, A. Olivi, D.M. Pardoll, H. Brem. (2003) Local immunotherapy with interleukin-2 delivered from biodegradable polymer microspheres combined with interstitial chemotherapy: A novel treatment for experimental malignant glioma. **Neurosurg**, 52:872-880. [Impact 2.69]; {Times Cited 27}
17. Fiegel J, Ehrhardt C, Schäfer U, Lehr C-M, Hanes J (2003) Large Porous Particle Impingement on Lung Epithelial Cell Monolayers: Toward Improved Particle Characterization in the Lung, **Pharm. Res.**, 20(5):788-796. [Impact 2.85]; {Times Cited 16}
18. Dawson M., Wirtz D., and Hanes J. (2003) Enhanced viscoelasticity of human cystic fibrotic sputum correlates with increasing microheterogeneity in particle transport, **J. Biol. Chem.**, 278:50393-50401. [Impact 5.81]; {Times Cited 19}
19. Sakhalkar HS, Dalal MK, Salem AK, Ansari R, Fu J, Kiani MF, Kurjiaka DT, Hanes J, Shakesheff KM, Goetz DJ (2003) Leukocyte inspired biodegradable particles that selectively and avidly adhere to inflamed endothelium in vitro and in vivo, **P Natl Acad Sci USA**, 100:15895-15900. [Impact 9.64]; {Times Cited 25}
20. Suh J, Wirtz D., Hanes J (2003) Efficient Active Transport of Gene Nanocarriers to the Cell Nucleus, **P Natl Acad Sci USA**, 100: 3878-3882. [Impact 9.64]; {Times Cited 82}
21. Fiegel J, Fu J, Hanes J. (2004) Poly(ether-anhydride) dry powder aerosols for controlled drug delivery in the lungs, **J. Controlled Release**, 96:411-423. [Impact 4.01]; {Times Cited 14}
22. Suh J, Wirtz D, and Hanes J, (2004) Real-time intracellular transport of gene nanocarriers studied by multiple particle tracking, **Biotechnol Progr**, 20:598-602. [Impact 2.10]; {Times Cited 13}
23. Li H, Yuan Z, Lam KY, Lee HP, Chen J, Hanes J, Fu J, (2004) Model development and numerical simulation of electric-stimulus-responsive hydrogels subject to an externally applied electric field. **Biosensors & Bioelectronics**, 19:1097-1107. [Impact 4.13]; {Times Cited 9}

Peer-Reviewed Papers (continued)

24. Dawson M, Krauland E, Wirtz D, Hanes J, (2004) Transport of polymeric nanoparticle gene carriers in gastric mucus, ***Biotechnol Progr***, 20:851-857. [Impact 2.10]; {Times Cited 15}
25. Fu J, Fiegel J, Hanes J, (2004) Synthesis and characterization of PEG-based ether-anhydride terpolymers: New polymers for controlled drug delivery, ***Macromolecules***, 37:7174-7180 [Impact 4.28]; {Times Cited 5}
26. Suh J, Dawson M, Hanes J, (2005) Real-time particle tracking: Applications to drug and gene delivery, ***Adv Drug Del Rev***, 57:63-78 [Impact 7.98]; {Times Cited 16}
27. Sakhalkar HS, Hanes J, Fu J, Uruguaysito B, Borruso CL, Kohn LD, Kurjiaka DT and Goetz DJ, (2005) Enhanced adhesion of ligand-conjugated biodegradable particles to colitic venules, ***FASEB J***, 19:792-794. [Impact 6.72]; {Times Cited 4}
28. Fiegel J, Jin F, Hanes J, Stebe K, (2005) Wetting of a particle in a thin film, ***J. Colloid Interf Sci.***, 291:507-514. [Impact 2.23]; {Times Cited 2}.
29. Suk JS, Suh J, Choy K, Lai S, Fu J, and Hanes J (2006) Gene delivery to neurotypic cells with RGD and HIV-1 Tat peptide functionalized polymeric gene vectors, ***Biomaterials***, 27:5143-5150. [Impact 5.20]; {Times Cited 7}.
Listed in 2006 by Science Direct as a "Top 25 Hottest Article" in the area of Biomaterials (based on times downloaded).
30. Lai SK, O'Hanlon ED, Harrold S, Man ST, Wang YY, Cone R, Hanes J. (2007) Rapid transport of large polymeric nanoparticles in fresh undiluted human mucus. ***Proc Natl Acad Sci USA***, 104 (5): 1482-1487. [Impact 9.64]; {Times Cited 3}
This article was listed as an "Editor's Choice", Drug Discovery Today, <http://drugdiscoverytoday.com/echoice/apr2007/>
31. Lai SK, Hida K, Man ST, Chen C, Machamer C, Schroer TA, Hanes J. (2007) Privileged delivery of polymer nanoparticles to the perinuclear region of live cells via a non-clathrin, non-degradative pathway. ***Biomaterials***, 28: 2876-2884. [Impact 5.20]; {Times Cited 7}
This article was listed as an "Editor's Choice", Drug Discovery Today, <http://drugdiscoverytoday.com/echoice/apr2007/>
32. Hida K, Hanes J, Ostermeier M (2007) Directed Evolution for Drug and Nucleic Acid Delivery, ***Adv Drug Del Rev***, 59: 1562-1578. [Impact 7.98]
33. Suk JS, Suh J, Lai SK, Hanes J, (2007) Quantifying the intracellular transport of viral and nonviral gene vectors in primary neurons, ***Experimental Biology and Medicine***, 232:461-469. [Impact 2.85]; {Times Cited 1}
34. Suh J, Choy K-L, Lai SK, Suk JS, Tang B, Prabhu S, Hanes J, (2007) PEGylation of nanoparticles improves their cytoplasmic transport, ***Int. J. Nanomed.***, 2(4):1-7. {Times Cited 3}
35. Lai SK, Wirtz D, Hanes J (2008) Micro- and macro-rheology for biophysical characterization of mucus, ***Adv Drug Del Rev***, *accepted*. [Impact 7.98]
36. Lai SK, Hanes J (2008) Nanoparticles for drug and gene delivery to mucosal tissues, ***Adv Drug Del Rev***, *accepted*. [Impact 7.98]
37. S.K. Lai, K. Hida, C. Chen, J. Hanes (2008) Characterization of the intracellular dynamics of a Non-Clathrin and Non-Caveolae Pathway Using High Resolution Confocal Particle Tracking, ***J. Controlled Release***, 125: 107-111. [Impact 4.01]

Peer-Reviewed Papers (continued)

Papers Submitted to Peer-Review Journals

38. Suh J, An Y, Tang, B, and Hanes J, Real-time confocal polyplex trafficking in the endo-lysosomal pathway of live stem cells, submitted.
39. Har-el Y, Suh J, van Zanten JH, Hanes J, DNA loading density of polyethylenimine/DNA nanocomplexes correlates with transfection efficiency, submitted.
40. Deosarkar SP, Malgor R, Fu J, Kohn LD, Hanes J, Goetz DJ, Polymeric Particles Conjugated with a Ligand to VCAM-1 Exhibit Selective, Avid and Focal Adhesion to Sites of Atherosclerosis, submitted.
41. Dawson M, Wirtz D, Zeitlin PL, Boyle MP, Hanes J, N-acetyl-L-cysteine decreases while rhDNase unexpectedly increases the Cystic Fibrosis sputum barrier to nanoparticle movement, submitted.

Book Chapters and Journal Articles (Not Peer-Reviewed)

42. Hanes J, Chiba M., Langer R. (1995) Polymer microspheres for vaccine delivery, in: **Vaccine Design: The Subunit and Adjuvant Approach**, (M.F. Powell and M.J. Newman eds.), Plenum Press, New York, pp. 389-412 {Times Cited 22}
43. Hanes J, Langer R. (1996) Polymeric controlled release vaccine delivery systems, in: **Reproductive Immunology**, (R. Bronson, N. Alexander, D. Anderson, D.W. Branch and W.H. Kutteh eds.), Blackwell Scientific Publications, Inc., Boston, pp. 647-664.
44. Kline D.F., Hanes J, Langer R. (1996) Adjuvant-active polymeric microparticulate vaccine-delivery systems, in: **Microparticulate Systems for the Delivery of Proteins and Vaccines**, (S. Cohen and H. Bernstein eds.), Marcel Dekker, Inc., New York, pp. 349-380.
45. Hanes J and Burke, M. (1997) Polymer-controlled drug delivery: An overview for the clinician, **Hospital Pharmacist Report** (December Issue Supplement): 1-11.
46. Hanes J, Dawson M, Har-el Y, Suh J, Fiegel J (2003) Gene delivery to the lung. In **Pharmaceutical Inhalation Aerosol Technology**, AJ Hickey (Ed.), 2nd Ed., pp. 489-539. Marcel Dekker Inc., New York. {Times Cited 5}
47. Ehrhardt C, Fiegel J, Bakowsky U, Schaefer UF, Hanes J, Lehr CM. (2004) Toward improved particle characterisation in the lung: Impingement of large porous particles on lung epithelial cell monolayers, in G Scheuch (ed.) **Aerosole in der Inhalationstherapie VIII**, dustriTBmed, München, pp 87-93.
48. Wei C, Lyubchenko Y.L., Ghandehari H., Hanes J, Stebe KJ, Mao H.-Q., Haynie D.T., Tomalia D.A., Foldvari M., Monteiro-Riviere N., Simeonova P., Nie S., Mori H., Gilbert S.P., Needham D. (2006) New technology and clinical applications of nanomedicine: Highlights of the second annual meeting of the American Academy of Nanomedicine, **Nanomedicine: Nanotechnology, Biology, and Medicine**, 2(4): 253-263.
49. Lai SK, Hanes J. (2007) Studying transport of gene carriers in complex biological environments by multiple particle tracking. In: **Gene Therapy Protocols**, J Ledoux (Ed.), 3rd Ed. Humana Press, Totowa, in press.

V. Patents

1. Hanes J, Fiegel J, and Fu J, Biodegradable polymer compositions: Compositions and uses related thereto, U.S. Patent No. 7,163,697 B2. Granted January 16, 2007.
2. Porous Particles comprising excipients for deep lung delivery, U.S. Patent No. 6,740,310. Granted May 25, 2004.
3. Edwards, D.A., Caponetti, G., Hrkach, J.S., Lotan, N., Hanes, J., Ben-Jebria, A.A., and Langer, R., Aerodynamically light particles for pulmonary drug delivery, U.S. Patent No. 6,635,283. Granted October 21, 2003.
4. Edwards, D.A., Caponetti, G., Hrkach, J.S., Lotan, N., Hanes, J., Ben-Jebria, A.A., and Langer, R., Aerodynamically light particles for pulmonary drug delivery, U.S. Patent No. 6,503,480. January 7, 2003. (Continuation of U.S. Patent Application 09/562,988, filed May 1, 2000, which is a continuation of U.S. Patent No. 6,136,295).
5. Edwards, D.A., Caponetti, G., Hrkach, J.S., Lotan, N., Hanes, J., Langer, R., Ben-Jebria, A. Amorphous porous particles for deep lung delivery, U.S. Patent No. 6,447,752. September 10, 2002. (Continuation of U.S. Patent No. 6,254,854)
6. Edwards, D.A., Caponetti, G., Hrkach, J.S., Lotan, N., Hanes, J., Langer, R., Ben-Jebria, A. Porous particles for deep lung delivery, U.S. Patent No. 6,447,753. September 10, 2002. (Continuation of U.S. Patent No. 6,254,854)
7. Edwards, D.A., Caponetti, G., Hrkach, J.S., Lotan, N., Hanes, J., Langer, R., Ben-Jebria, A. Porous particles for deep lung delivery, U.S. Patent No. 6,254,854. July 3, 2001.
8. Hanes, J., Edwards, D.A., Evora, C., and Langer, R., Particles incorporating surfactants for pulmonary drug delivery, U.S. Patent RE37,053. Granted February 13, 2001. Continuation of U.S. Patent No. 5,855,913.
9. Edwards, D.A., Caponetti, G., Hrkach, J.S., Lotan, N., Hanes, J., Ben-Jebria, A.A., and Langer, R., Aerodynamically light particles for pulmonary drug delivery, U.S. Patent No. 6,136,295. Granted October 24, 2000. (Divisional of U.S. Patent No. 5,874,064)
10. Edwards, D.A., Caponetti, G., Hrkach, J.S., Lotan, N., Hanes, J., Ben-Jebria, A.A., and Langer, R., Aerodynamically light particles for pulmonary drug delivery, U.S. Patent No. 5,874,064. Granted February 23, 1999.
11. Hanes, J., Edwards, D.A., Evora, C., and Langer, R., Particles incorporating surfactants for pulmonary drug delivery, U.S. Patent No. 5,855,913. Granted January 5, 1999.
12. Hanes J, Fu J, (2006) Functionalized Poly(ether-anhydride) Block Copolymers (PCT Publication Number: WO/2006/063249 A2).
13. Hanes J, Dawson M, Wirtz D, Fu J, Krauland E, (2005) Drug and gene carrier particles that rapidly move through mucus barriers (PCT Publication Number: WO/2005/072710)
14. Edwards, D.A., Hanes, J., Evora, C., Langer, R., Vanbever, R., Mintzes, J., Wang, J., Chen, D., Preparation of Particles for Inhalation. (PCT Pending)
15. Lai SK, Hanes J, Large nanoparticles that cross mucosal barriers (PCT Pending).
16. Lai SK, Hida K, Hanes J, Drug and Gene Carriers that enter and traffic within cells via a privileged non-degradative pathway (Patent Pending).
17. Lai SK, Wang Y-Y, Cone R, Hanes J, Methods to reduce mesh spacing of the protective mucus barrier (Patent Pending).
18. Cone R, Hida K, Lai SK, Hanes J, Methods to associate and immobilize viruses to mucus (Patent Pending).

VI. Research Support

(Dollar amounts are total value of grants unless otherwise noted)

Active Grants as Principal Investigator (PI):

1R01 EB003558-01 (Hanes) 08/13/07 – 08/12/11
NIH \$1,433,610
Gene Vectors for CF: Extra- and Intracellular Barriers

The major goals are to understand the bottlenecks to efficient gene delivery in the lungs and to develop improved sub-25 nm gene carriers to treat Cystic Fibrosis. Barriers studied include mucus from CF patients and intracellular trafficking in lung epithelial cells.

R21HL089816-01 (Hanes) 04/01/08 – 03/31/10
NIH \$439,844
Polymer Nanoparticles that Cross Mucus

The goal is to design biodegradable, drug-loaded, polymer nanoparticles that are capable of rapidly penetrating undiluted human mucus for potential use in sustained drug delivery for a variety of diseases.

Score = 112 (0.4 percentile), funding to begin April 1, 2008.

BES-0346716 (Hanes) 7/01/2004 – 6/30/2009
NSF \$400,000

CAREER: Real-Time Transport Phenomena of Non-Viral DNA Nanocarriers in Live Cells: A Research and Education Program

The major goal of this project is to develop a new method capable of quantifying the intracellular movements of gene-carrying nanoparticles in order to determine the bottlenecks to successful gene delivery in non-dividing primary cells.

EEC-0741363 (Hanes) 01/01/08 – 12/31/09
NSF \$199,993

New Undergraduate Engineering Minor in Nanotechnology Risk Assessment and Public Policy

This grant seeks funding to develop a new undergraduate engineering minor at Johns Hopkins, housed in the Institute for NanoBioTechnology (INBT), and involving: the Whiting School of Engineering, the Bloomberg School of Public Health, the Risk Sciences & Public Policy Institute, the Berman Institute for Bioethics, The Center for Law and the Public's Health, and the Center for Educational Outreach.

HANES08G0 (Hanes) 02/01/08 – 01/31/10
Cystic Fibrosis Foundation \$194,400
Sputum-Penetrating Drug Nanocarriers for Cystic Fibrosis

The major goals of this project are to: (i) develop corticosteroid-loaded nanoparticles capable of overcoming the mucus barrier, and (ii) test their efficacy in a mouse model of lung inflammation.

HANES07XX0 (Hanes) 01/01/08 – 12/31/09
Cystic Fibrosis Foundation \$151,200
Particle Delivery to Optimize Small Airway Mucociliary Transport

Goal is production of phagocytosis-resistant particles for improved imaging in the airways.

Active Grants as PI (continued):

(Hanes) 06/01/07 – 05/31/08
JHU Lung Cancer SPORE (NIH # P50 CA058184-12) \$72,291
Pilot Project: Formulating 5-azacytidine (5-AC) into a Nanoparticle Delivery Strategy
SPORE PI: S Baylin

The goal of this project is to develop slow-release polymer nanoparticles for the anticancer drug, 5-azacytidine.

(Hanes) 02/01/08 – 01/31/09
JHU Cervical Cancer SPORE (NIH # 5-P50-CA098252) \$41,853
Pilot Project: Polymeric Nanoparticle Drug Delivery Systems for Cervical Cancer
SPORE PI: T-C Wu

The goal of this project is to test the efficacy of polymer nanoparticles in the treatment of cervical cancer.

Active Grants as co-PI or co-Investigator:

1P50ES015903-01 (Breyse, PD) 09/29/07 – 06/30/12
NIH/NIEHS \$12,112,399
Center for Childhood Asthma in the Urban Environment

Hanes is co-investigator on Project III (direct costs in Yr 1 are \$243,621 and IDC is \$155,916). Goal of Project III is to test the hypothesis that enhancing Nrf2 activity in the lungs can attenuate asthma. **Hanes** role is enhancement of Nrf2 activity via polymeric aerosol delivery of small molecules that activate Nrf2.

R025-CR02 (W. Guggino) 07/01/07-06/30/11
Cystic Fibrosis Foundation \$1,840,000 (Direct Costs)
Research Development Program Center / Molecular Defect in CF
Hanes is an investigator at the Center and is PI of the “Nanotechnology Core”.

RO1 U060181 (Price) 06/01/06 – 05/31/11
NIH \$1,749,808
Arteriogenesis by Ultrasonic Microbubble Destruction
The major goal of Hanes Lab portion of this project is to develop gene carriers to enhance arteriogenesis following extravasation into muscle from the blood aided by ultrasonic microbubble destruction. **Hanes** is PI of a subaward from the University of Virginia.

1RO1 DC04395-06A2 (Ryugo) 7/01/06 – 6/30/11
NIH/NIDCD \$1,714,580
Studies of the Cochlear Nucleus Granule Cell Domain
The long-term goal is to study cell populations that project into the granule cell domain of the cochlear nucleus and the resulting synaptic organization. **Hanes** Lab role will be to use nanotechnology and novel dyes for pathway tracing studies to investigate the axon projections, synaptic connections, and signal processing in granule cell circuits.

Active Grants as co-PI or co-Investigator (continued):

BC051245 (Kominsky) 05/01/06 – 05/31/09
DOD \$491,500
Therapeutic Potential of Clostridium Perfringens Enterotoxin in the Specific Targeting of Breast Cancer Metastasis to the Brain.
The overall goal of this proposal is to test the ability of the cytolytic enterotoxin CPE to specifically eliminate breast cancer cells in the brain. **Hanes** (co-PI) role is the development of polymeric delivery systems for CPE, which are tested for efficacy by Kominsky Lab.

(Kominsky) 07/01/07 – 6/30/09
Orthopaedic Research and Education Foundation \$100,000
Bone-Targeted Biodegradable Nano-spheres for Localized Treatment of Skeletal Disease
The overall goal of this proposal is to generate a drug-delivery system capable of delivering therapeutics specifically to sites of skeletal disease. **Hanes** lab role is the development of targeted polymeric nanoparticles, which are tested in animals by Kominsky lab.

56005677 (Wirtz) 01/01/06 – 12/31/09
HHMI/NIBIB \$1,000,000
Interdisciplinary graduate training program in nanotechnology for biology and medicine
The major goal of this program is to train predoctoral students in physics and engineering to address complex problems in biology and medicine. **Hanes** is one of several Co-PIs.

Active Grants as Faculty Participant:

(Searson) 10/01/06 – 09/30/08
NASA \$1,839,383
The Johns Hopkins University Institute for NanoBioTechnology
This funding helped to establish a new multidisciplinary institute at Johns Hopkins that spans the schools of engineering, arts and sciences, medicine, and public health.

DGE-0549350 (Stebe) 05/01/06 – 04/30/11
NSF/IGERT \$2,740,419
Physical & biomolecular foundations for designing nanoprobe for biology
The major goal of this program is to train PhD students in physics, biology, material science and engineering, and chemical and biomolecular engineering to develop novel nanoparticles for biology.

1S10RR023454-01 (McCaffery) 04/01/07 – 03/31/08
NIH \$476,000
FEI Tecnai 12 BioTwin transmission electron microscope
This grant supplies funds for acquisition of a FEI Tecnai 12 BioTwin transmission electron microscope.

Pending Grants as PI:

Hanes is PI on five submitted grants worth more than \$6,000,000.

Expired Grants:

Hanes has served as PI on 13 expired grants, co-PI or co-investigator on 5 expired grants, and faculty participant on 3 expired grants.

VII. Invited Presentations

§*International Meetings*; †*University Seminars*

2008

1. §Transmucosal Therapeutics: Nanoparticles that “Slip” Through Mucus Barriers, Annual Meeting of the Controlled Release Society, New York, NY, July 12-16, 2008.
2. §Novel Approaches for Pulmonary Drug Delivery based on Nanotechnology, Academie des Alpillles, St. Remy, Provence, France, June 27-29, 2008.
3. §**Plenary Lecture**: Pulmonary Nanoparticles: Use in Therapy and Diagnostics, 11th Annual International Inhalation Symposium (INIS), Theme: Benefits and Risks of Inhaled Engineered Nanoparticles, Hannover, Germany, June 11-14, 2008.
4. §Controlled Drug Delivery Systems that Overcome the Mucus Barrier, 12th Annual Drug Delivery Partnerships conference, Sponsored by the International Institute for Research (IIR), San Diego, CA, January 21-23, 2008.

2007

5. §Transmucosal Therapeutics, The Forbes/Wolfe Nanotech Forum, Albuquerque, NM, December 10-11, 2007.
6. †Nanoparticulate Drug Carriers that Penetrate Human Mucus Barriers, The Cystic Fibrosis Research Center, The University of North Carolina, Raleigh-Durham, NC, November 30, 2007.
7. §**Plenary Lecture**: Shedding Light on “The Dark Side”: Particle Tracking as a Catalyst for Drug Delivery Nanotechnology Innovation, AIChE National Meeting, Bionanotechnology Topical Conference (T8), Salt Lake City, Utah, November 4-9, 2007.
8. §Pulmonary Nanotherapeutics, Polymers in Medicine and Biology, Sonoma Valley (Hilton Hotel, Santa Rosa, CA), June 17-20, 2007.
9. Polymer-based drug delivery to mucosal tissues, Enzon, Inc., Piscataway, NJ, August 15, 2007
10. †Large Nanoparticle Drug Delivery Systems that “Slip Through” the Human Mucus Barrier, Division of Allergy and Clinical Immunology, the Johns Hopkins Asthma and Allergy Center, May 23, 2007.
11. †Targeted Drug and Gene Delivery with Biodegradable Nanosystems, Department of Cell Biology, The Johns Hopkins University School of Medicine, April 5, 2007.
12. §Drug Delivery in the Lungs: Overcoming Barriers with Novel Polymer Nanoparticles, 13th International Symposium on Recent Advances in Drug Delivery Systems, Salt Lake City, UT, February 26-28th, 2007.

2006

13. †Real-time Particle Tracking for Improved Design of Polymeric Nanotherapeutics, Second Annual Symposium on Translational Research in Molecular Pathology, University of Maryland at Baltimore School of Medicine, Baltimore, MD, November 14, 2006.
14. §Polymeric Nanomedicine for Inhalation The American Academy for Nanomedicine 2nd Annual Meeting, Washington, DC, September 9-11, 2006.
15. §Nanomedicine, The National Academies of Science 2006 Chinese-American Frontiers of Science, Irvine, CA, October 26-28, 2006.
16. §Quantitative confocal nanoparticle tracking in live cells: Application to Gene Delivery, 4th International Nanomedicine and Drug Delivery Symposium, Omaha, NE, Oct. 8-10, 2006.

Invited Presentations (continued)

17. [§]Tracking therapeutic nanoparticles in biological fluids and live cells, A focused meeting on “Cellular Delivery of Therapeutic Macromolecules,” Sponsored by The Biochemical Society, The Royal Society of Chemistry, and The Royal Pharmaceutical Society of Great Britain, Cardiff, Wales, UK, August 29-31, 2006.
18. [§]Micro- and Nanoparticles for Pulmonary Delivery, Celebrating 30 Years of Robert Langer’s Science, Cambridge, MA, July 14-16, 2006.
19. [†]New Polymeric Nanomedicines for Targeted and Sustained Drug and Gene Delivery, University of Texas at Dallas, April 13, 2006.
20. [†]Toward Synthetic Gene Carriers that Overcome the CF Mucus Barrier, Department of Physiology, Cystic Fibrosis Meeting, Johns Hopkins University School of Medicine, March 24, 2006.
21. [†]Polymeric Drug and Gene Delivery in the Lungs, Department of Chemical Engineering, Auburn University, March 9, 2006.
22. [†]Polymeric Nanopharmaceuticals: Good Things in Small (Plastic) Packages, The 2006 Sigma Xi Distinguished Lecture at Auburn University, March 8, 2006.
23. [†]Polymer Systems for Targeted Drug and Gene Delivery, Polymer Science and Engineering Department, University of Massachusetts, Amherst, March 3, 2006.

2005

24. [§]New Polymer Delivery Systems, Interventional Oncology Symposium, 91st Scientific Assembly and Annual Meeting of the Radiological Society of North America, Chicago, IL, December 1, 2005.
25. [§]Targeted Nanoparticles, Interventional Oncology Symposium, 91st Scientific Assembly and Annual Meeting of the Radiological Society of North America, Chicago, IL, December 1, 2005.
26. [§]Enhancing Intracellular Penetration of Therapeutics, Interventional Oncology Symposium, 91st Scientific Assembly and Annual Meeting of the Radiological Society of North America, Chicago, IL, December 1, 2005.
27. [§]Polymeric Materials in Targeted and Sustained Drug Delivery for Cancer, American Association for Cancer Research (AACR)/National Cancer Institute (NCI)/European Organisation for Research and Treatment of Cancer (EORTC) International Conference on Molecular Targets and Cancer Therapeutics: Discovery, Biology, and Clinical Applications, Philadelphia, PA, November 14, 2005.
28. Gene delivery to the lungs, Galenea, Cambridge, MA, May 5, 2005.
29. [†]Overcoming Extra- and Intracellular Barriers to Effective Drug and Gene Delivery, Department of Biomedical Engineering seminar series, Johns Hopkins University School of Medicine, April 22, 2005.
30. [§]Poly(ether-anhydrides): A New Drug Delivery Platform Technology, IIR Conference on Formulation Strategies for Biopharmaceuticals, Washington D.C., April 1, 2005.
31. [†]Targeted and Sustained Drug and Gene Delivery, Colorado State University, Cell and Molecular Biology Program, March 31, 2005.
32. Polymer Systems that Improve Half-life and Intracellular Penetration of Large Molecules, Corgentech, San Francisco, CA, February 2005.
33. [†]Overcoming Extra- and Intracellular Barriers to Effective Drug and Gene Delivery, University of Pennsylvania, Department of Bioengineering, February 10, 2005.

2004

34. [†]Extra- and Intracellular Barriers to Effective Drug Delivery, University of Virginia, Department of Biomedical Engineering, December 3, 2004.

Invited Presentations (continued)

35. New Polymers for Targeted Drug and Gene Delivery, Chondros, Inc., December 2004.
36. §Extra- and Intracellular Barriers to Drug Delivery, American Institute of Chemical Engineers, Advances in Biomaterials, Bionanotechnology, Biomimetic Systems and Tissue Engineering: Tutorial Session, Austin, TX, November 2004.
37. §Polymer Drug Delivery Systems, TIDES 2004 Oligonucleotide and Peptide Technology Conference, Sponsored by IBC, Las Vegas, NV, April 2004.
38. §Polymer Aerosols for Targeted and Sustained Drug Delivery in the Lungs, National Cancer Institute, Washington, D.C., March 2004.
39. §Fast Particle Tracking Inside Cells, 5th International Conference and Workshop on Cell Culture and in-vitro Models for Drug Absorption and Delivery, Saarbrücken, Germany, March 2004.
40. †Polymer systems for drug and gene delivery in the lungs, Johns Hopkins School of Public Health, Department of Environmental Health Sciences, March 2004.

2003

41. †Extra- & Intracellular Transport Barriers to Effective Drug and Gene Delivery, Yale University, Department of Biomedical Engineering, December 2003.
42. §Active Nucleic Acid Delivery to Cell Nuclei, 3rd Annual International Conference on: Gene Delivery—Non-viral Systems & In vivo Applications, Sponsored by The Knowledge Foundation, San Diego, CA, November 2003.
43. †Advanced Drug and Gene Delivery Systems, Johns Hopkins Medical Institutes Interventional Radiology Lecture Series, November 2003.
44. †Advanced Drug and Gene Delivery Systems for Cancer, Johns Hopkins Oncology Center Translational Research Conference, October 2003.
45. New Injectable and Inhalable Drug Delivery Systems, Enzon, Inc., Piscataway, NJ, August 5, 2003.

2002

46. †Gene Delivery to the Lung, University of Texas at Austin, Department of Chemical Engineering, October 2002.
47. §Real-time Quantitation of Intracellular Polycation/DNA Nanocomplex Transport: Evidence for Directed Motion, Biomedical Engineering Society Annual Meeting, Houston, TX. October, 2002.
48. Drug Delivery to the Lung, Pharmaceutical Discovery Corporation. Elmsford, NY. October 4, 2002.
49. §New Pulmonary and Parenteral Drug Delivery Systems, Oligonucleotide and Peptide Technology Conference, Sponsored by IBC, Las Vegas, NV, May 2002.
50. †Polymeric Devices for Efficient and Sustained Pulmonary Drug Delivery. The Ohio University, Department of Biomedical Engineering, April 25, 2002.
51. New Particulate Aerosol Technologies, Pharmaceutical Discovery Corporation. Elmsford, NY. February 15, 2002.
52. §Particulate Carriers for Pulmonary Delivery, 4th Intensive Course and Workshop on Cell Culture and in-vitro Models for Drug Absorption and Delivery, Saarbrücken, Germany, February 2002.
53. †Engineering Polymeric Aerosols for Pulmonary Drug and Gene Delivery, Georgia Institute of Technology, Department of Chemical Engineering. February 2002.

Invited Presentations (continued)

2001

54. [§]New Polymers Engineered for Controlled Pulmonary Drug Delivery, Biomedical Engineering Society 2001 Annual Fall Meeting, Durham, NC, October, 2001.
55. [§]**Plenary Lecture:** Biomaterials in Medicine, National Educators Workshop. National Institute of Standards and Technology, Washington, D.C. October 2001.
56. [†]Engineering a Better Immune Response, University of Maryland, Baltimore, Department of Pharmaceutical Sciences, September 2001.
57. [§]Polymeric Cytokine Delivery Systems for Cancer Immunotherapy, IBC USA Conference on Protein & Peptide Drug Delivery: Overcoming the Challenges of Non-Traditional Approaches, San Francisco, CA, September 2001.

2000

58. Therapeutic Polymer Aerosols, 3M Corporation, St. Paul, MN, June 2000.
59. [†]Novel Polymeric Systems in Vaccine Design, University of Delaware, Polymer Research Group Seminar Series, May 2000.
60. [†]Vaccine Design with Novel Polymeric Systems and Genetically-Engineered Cells, University of Maryland, College Park, Department of Chemical Engineering, April 2000.
61. Novel Biomaterials for the Encapsulation and Controlled Delivery of Proteins, Genes and Cells, The Institute for Genomic Research (TIGR), Gaithersburg, MD, March 2000.

1999

62. Controlled drug delivery from polymeric vehicles, Armed Forces Radiobiology Research Institute, Bethesda, MD, 1999.

1998

63. [†]Engineering "Smart" Drug Delivery Systems to Enhance the Immune System, Johns Hopkins University School of Medicine, Department of Biomedical Engineering, November 1998.
64. Polymeric systems engineered for pulmonary drug delivery, Aradigm Corporation, Hayward, CA, May 1998.
65. Synthetic controlled drug delivery systems for cancer therapy, Megabios Corporation, Burlingame, CA, May 1998.

1993-1997

- 66.-80. 15 Invited talks prior to beginning faculty position at Johns Hopkins.

VIII. Conference Abstracts and Proceedings

2007

1. Sudhir P. Deosarkar, Ramiro Malgor, Jie Fu, Leonard D. Kohn, Justin Hanes, and DJ Goetz, α -VCAM-1 Polymeric Particles Exhibit Selective, Avid and Focal Adhesion to Sites of Atherosclerosis, Biomedical Engineering Society Annual Meeting, 2007.
2. Sudhir P. Deosarkar, Ramiro Malgor, Jie Fu, Leonard D. Kohn, Justin Hanes, and DJ Goetz, Targeting polymeric particles to sites of atherosclerosis, Proceedings of the American Institute of Chemical Engineers, Salt Lake City, UT, 2007.

2006

3. Campbell CT, Zaidi H, Fu J, Weier CA, Sampathkumar SG, Li KW, Tyler BM, Jones MB, Hanes J, Yarema KJ, and Brem H, Treatment of CNS Tumors with N-Acetyl-D-Mannosamine Tetrabutryrate, American Association of Neurological Surgeons, San Francisco, CA, April 22-27, 2006.
4. Deosarkar SP, Christman M, Malgor R, Kohn LD, Hanes J, and Goetz D, Targeting polymeric particles to sites of atherosclerosis, Biomedical Engineering Society Annual Meeting, October 13, 2006.
5. Sampathkumar S.-G., Campbell C. T., Meledeo M. A., Choi S. S., Sheh T., David M. B., Khanduja K., Fu J., Gilmartin T., Head S. R., Hanes J., Yarema K. J., Carbohydrate-short chain fatty acid (SCFA) hybrids as anti-cancer prodrugs: The sugar matters, *Annual Conference of the Society for Glycobiology*, Universal City, CA, Nov. 15 – 18, 2006.
6. Alia Hdeib, Betty Tyler, Khan Li, Francesco DiMeco, Justin Hanes, and Henry Brem, MD. Efficacy of Controlled Local Delivery of IL-12 from Polymer Microspheres in a Metastatic Melanoma Intracranial Mouse Model. Poster presentation, 5th Annual International Neuro-Oncology Update, Memphis, TN, August 24-25, 2006.
7. Hdeib A, Reidler J, Tyler B, DiMeco F, Vick J, Caplan J, Hanes J and Brem H (2006) Efficacy of controlled local delivery of IL-12 from polymer microspheres in a metastatic melanoma intracranial mouse model. American Association of Neurological Surgeons, San Francisco, CA, April 22-27, 2006.
8. Hdeib A, Tyler B, Legnani F, Caplan J, Reidler J, DiMeco F, Hanes J and Brem H (2006) Efficacy of locally delivered IL-12 polymer microspheres in an experimental intracranial 9L gliosarcoma rat model. American Association of Neurological Surgeons, San Francisco, CA, April 22-27, 2006.

2005

9. Har-el Y, van Zanten JH, and Hanes, J. (2005) Stability of High Density PEI/VEGF DNA Nanocomplexes in Physiological Fluids. Proceedings of the American Institute of Chemical Engineers, 2005: Cincinnati, OH.
10. Sakhalkar HS, Fu J, Deosarkar S, Zou X, Christman M, Hanes J, Kurjiaka D and Goetz D. Enhanced Adhesion of anti-E-selectin Biodegradable Nanoparticles to TNF- α Activated Endothelium In Vitro and In Vivo. American Institute of Chemical Engineers Annual Meeting, 2005: Cincinnati, OH.
11. S.K. Lai, E. O'Hanlon, S.T. Man, R. Cone, J. Hanes. (2005) Real-Time Quantitation of Polymeric Nanoparticle Transport in Human Cervical Vaginal Mucus. Biomedical Engineering Society Annual Meeting: Baltimore, M.D, October 2005.
12. S.K. Lai, J. Hanes. (2005) Size of Nanoparticles Affect Intracellular Trafficking in Live Cells. American Institute of Chemical Engineers Annual Meeting, 2005: Cincinnati, OH.

Conference Proceedings (continued)

13. S.K. Lai, E. O'Hanlon, S.T. Man, R. Cone, J. Hanes. Real-Time Transport of Polymer Nanoparticles in Cervical Vaginal Mucus. American Institute of Chemical Engineers Annual Meeting, 2005: Cincinnati, OH.
14. S.K. Lai, S.T. Man, J. Fu, J. Hanes. Real-Time Tracking of the Intracellular Path of PLA-PEG Polymeric Micelles in Live Cells. American Institute of Chemical Engineers Annual Meeting, 2005: Cincinnati, OH.
15. Sakhalkar HS, Fu J, Deosarkar S, Zou X, Malgor R, Christman M, Hanes J, Kurjiaka D and Goetz D. (2005) Targeting anti-E-selectin biodegradable nanoparticles to inflamed endothelium in vitro and in vivo. Biomedical Engineering Society Annual Meeting, Baltimore, MD, October 2005.
16. Lai SK, An Y, Suk JS, Hanes J. Rapid Perinuclear Accumulation of Novel Drug Delivery Nanoparticles. Proceedings of the 32nd Controlled Release Society Meeting: Miami, FL. 2005.
17. Lai SK, O'Hanlon ED, Man ST, Dawson M, Cone R., Hanes J. Real-Time Transport of Polymer Nanoparticles in Cervical Vaginal Mucus. Proceedings of the 32nd Controlled Release Society Meeting: Miami, FL. 2005.
18. Dawson M, Fu J, Hanes J. PEG-Containing Poly(ether-anhydride) Nanoparticles Rapidly Traverse Mucus Barriers. Proceedings of the 32nd Controlled Release Society Meeting: Miami, FL. 2005.
19. Dawson M, Harel Y, van Zanten JH, Hanes J. PEGylated PEI/DNA Nanocomplexes Demonstrate Increased Transport and Stability in Mucus. Proceedings of the 32nd Controlled Release Society Meeting: Miami, FL. 2005.
20. Jabart E, An Y, Lai SK, Hanes J. Real-time Intracellular transport and trafficking of Adenoviruse/PEI/DNA Nanocomplex in Live HeLa Cells. Proceedings of the 32nd Controlled Release Society Meeting: Miami, FL. 2005.

2004

21. Suh J, An Y, Tang B, Suk JS, Hanes J. Real-time correlation of intracellular gene vector transport rates with biological location in live mesenchymal stem cells. Proceedings of the American Institute of Chemical Engineers, 2004: Austin, TX.
22. Suh J, Hanes J. Immobilization of gene vectors in perinuclear region as potential intracellular barrier to efficient gene delivery. Proceedings of the American Institute of Chemical Engineers, 2004: Austin, TX.
23. Choy K, Suh J, Hanes J. PEG improves intracellular transport of drug/gene carriers as revealed by real-time particle tracking. Proceedings of the American Institute of Chemical Engineers, 2004: Austin, TX.
24. Suk JS, Suh J, Hanes J. Cellular uptake and intracellular transport of viral and non-viral gene vectors in differentiated neurons affected in Parkinson's Disease. Proceedings of the American Institute of Chemical Engineers, 2004: Austin, TX.
25. Dawson M, Wirtz D, Hanes J. Microscopic Viscoelasticity of CF Sputum Determined by High-Resolution Nanoparticle Tracking, Proceedings of the American Institute of Chemical Engineers, Austin, TX. Podium presentation. 2004.
26. Dawson M, Wirtz D, Hanes J. Gene Carriers Modified with PEG Demonstrate Increased Transport and Stability in Mucus as Explored with High-Resolution Nanoparticle Tracking, Proceedings of the American Institute of Chemical Engineers, Austin, TX. Podium presentation. 2004.
27. An Y, Suh J, Hanes J. Tracking the intracellular path of fluorescently labeled DNA delivered by PEI nanocomplexes in live cells. Proceedings of the American Institute of Chemical Engineers, 2004: Austin, TX.

Conference Proceedings (continued)

28. Sakhalkar HS, Fu J, Benavides U, Hanes J, Kohn LD, Kurjiaka DT, Goetz DJ, Selective adhesion of anti-VCAM-1 biodegradable particles to DSS induced colitic vasculature. Proceedings of the American Institute of Chemical Engineers, Austin, TX, 2004.
29. Suh J, Suk JS, Har-el Y, Hanes J, Targeting high DNA density HIV vaccines to dendritic cell nuclei. 16th B. Frank Polk HIV Research Symposium, Johns Hopkins Bloomberg School of Public Health, 2004.
30. Sakhalkar HS, Fu J, Benavides U, Hanes J, Kohn LD, Kurjiaka DT, Goetz DJ, Enhanced Adhesion of Anti-VCAM-1 Biodegradable Particles to Murine Colitic Vasculature. Biomedical Engineering Society Annual Meeting, Philadelphia, PA, October, 2004.
31. Seguritan J, Dawson M, Chauhan V, Hanes J, Quantitative Study of Nanoparticle Adhesion with CF Mucus. Biomedical Engineering Society Annual Meeting, Philadelphia, PA, October, 2004.
32. Dawson M, Wirtz D, Hanes J, Real-time tracking of nanoparticle gene carriers in gastrointestinal mucus, Biophysical Society Annual Meeting, Baltimore, MD, Feb 2004.
33. Dawson M, Krauland E, Wirtz D, and Hanes J. Transport of Cationic Particle Gene Carriers in Gastric Mucus, Proceedings of the 31st International Symposium on Controlled Release of Bioactive Materials. Controlled Release Society, Honolulu, HI. 2004.
34. Dawson M, Wirtz D, and Hanes J. The Effects of Mucolytic Agents on Transport Rates of Nanoparticles in Human CF Sputum, Proceedings of the 31st International Symposium on Controlled Release of Bioactive Materials. Controlled Release Society, Honolulu, HI. 2004.
35. Suh J, Hanes J. Simultaneous confocal tracking of PEI/DNA nanocomplexes and acidic vesicles. Proceedings of the 31st Controlled Release Society Meeting, Honolulu, HI. 2004.
36. Suh J, An Y, Hanes J. Real-time intracellular transport of PEI/DNA nanocomplexes in Mesenchymal stem cells. Proceedings of the 31st Controlled Release Society Meeting, Honolulu, HI. 2004.
37. Suk JS, Suh J, Hanes J. Cellular uptake and tracking of gene carriers in undifferentiated and differentiated neurons. Proceedings of the 31st Controlled Release Society Meeting, Honolulu, HI. 2004.

2003

38. Shichkin, V., Levitsky, H., Tyler, B., Brem, H., Hanes, J. Do T cells "See" Brain Tumors? Proceedings of the American Institute of Chemical Engineers, San Francisco, CA, 2003.
39. Hanes J, Fu J, Sakhalkar HS, Morita T, Goetz DJ. Targeted Drug Delivery to Sites of Inflammation using New Leukocyte-Mimetic Polymeric Particles, Proceedings of the American Institute of Chemical Engineers, San Francisco, CA, 2003.
40. Suh J, Hanes J. Real-time Confocal Nanoparticle Tracking of Intracellular Gene Carriers in Stem Cells, Proceedings of the American Institute of Chemical Engineers, San Francisco, CA, 2003.
41. Suh J, Wirtz D, Hanes J. Real-time Intracellular Transport of Non-Viral Gene Carrier-Containing Vesicles as Investigated by Live-cell Multiple Particle Tracking, Proceedings of the American Institute of Chemical Engineers, San Francisco, CA, 2003.
42. Fiegel J, Stebe K, Hanes J. Modeling Insoluble Aerosol Particle Submersion in Lung Fluids, Proceedings of the American Institute of Chemical Engineers, San Francisco, CA, 2003.
43. Fiegel J, Fu J, Hanes J. Poly(ether-anhydride) Aerosol Particles: Control of Surface Characteristics to Improve Aerodynamics, Proceedings of the American Institute of Chemical Engineers, San Francisco, CA, 2003.
44. Dawson, M, Wirtz D, Hanes J. Effects of rhDNase Therapy on the Microrheological Properties and Transport Rates of Nanoparticles in Cystic Fibrotic Mucus as Probed by

Conference Proceedings (continued)

- Multiple Particle Tracking and Confocal Microscopy, Proceedings of the American Institute of Chemical Engineers, San Francisco, CA, 2003.
45. Fu, J., Har-el, Y., Suh, J., and Hanes, J., Polymeric Gene Vectors with Reduced Cytotoxicity that Efficiently Unpack DNA. Proceedings of the Biomedical Engineering Society Annual Fall Meeting, Nashville, TN, 2003
 46. Sakhalkar HS, Salem A, Shakesheff KM, Morita T, Hanes J, Ansari R, Kiani MF, Goetz DJ. Leukocyte Inspired Therapeutic Particles that Selectively and Avidly Adhere to Inflamed Endothelium In Vitro and In Vivo. Biomedical Engineering Society Annual Meeting, Nashville, TN, 2003.
 47. Suh, J, Wirtz, D, Hanes J. Quantifying the Intracytoplasmic Transport of NonViral Gene Carriers with Confocal Particle Tracking. Biomedical Engineering Society Annual Meeting, Nashville, TN, 2003.
 48. Har-el, Y., van Zanten, J.H. and Hanes, J. Different Density PEI/DNA Nanocomplexes have Similar Uptake but Dissimilar Transfection Efficiency. Biomedical Engineering Society Annual Meeting, Nashville, TN, 2003.
 49. Dawson, M, Wirtz, D, Hanes J. Individual Gene Carrier Transport Phenomena in Human Cystic Fibrosis Sputum Treated with rhDNase. Biomedical Engineering Society Annual Meeting, Nashville, TN, 2003.
 50. Dawson M, Wirtz D, Hanes J. Nanoparticle Transport in Cystic Fibrosis (CF) Mucus by Multiple Particle Tracking (MPT), International Society for Aerosols in Medicine Annual Meeting, Baltimore, MD, 2003.
 51. Fiegel, J., Fu, J., and Hanes, J. Controlled release poly(ether-anhydride) large porous particles for pulmonary delivery, International Society for Aerosols in Medicine Annual Meeting, Baltimore, MD, 2003.
 52. Dawson M, Wirtz D, Hanes J. Transport Phenomena and Microrheology in Human Cystic Fibrotic Mucus by Real-Time Nanoparticle Tracking, American Society of Gene Therapy Annual Meeting, Washington, D.C., 2003.
 53. Suh J, Wirtz D, Hanes J. Intracellular Transport of Gene Carrier-Containing Vesicles as Probed by Real-time Live-cell Multiple Particle Tracking, American Society of Gene Therapy Annual Meeting, Washington, D.C., 2003.
 54. Har-el, Y., van Zanten, J.H. and Hanes, J. Density of PEI/DNA Complexes Correlates to Transfection Efficiency, American Society of Gene Therapy Annual Meeting, Washington, D.C., 2003.
 55. Dawson, M., Wirtz, D., and Hanes, J. Dynamics of gene carrier transport in synthetic and cystic fibrosis mucus as explored by multiple particle tracking and rheology, Annual Meeting of the Biophysical Society, San Antonio, TX, 2003.
 56. Suh J, Wirtz D, Hanes J., Ligand attachment affects dynamics and spatial distribution of intracellular gene carrier transport, Annual Meeting of the Biophysical Society, San Antonio, TX, 2003.
 57. Dawson, M., Wirtz, D., and Hanes, J. Transport Phenomena and Microrheology in Human Cystic Fibrotic Mucus by Real-Time Nanoparticle Tracking, Proceedings of the International Symposium on Controlled Release of Bioactive Materials. Controlled Release Society, Glasgow, Scotland. 30:101-102, 2003.
 58. J. Fiegel, J. Hanes. Effect of Surface Properties on Aerosolization of PEGylated Poly(ether-anhydride) Microspheres, Proceedings of the International Symposium on Controlled Release of Bioactive Materials. Controlled Release Society, Glasgow, Scotland. 30:719-720, 2003.

Conference Proceedings (continued)

59. Suh, J., Wirtz, D., and Hanes, J. Real-time Biophysical Study of the Intracellular Trafficking of Non-viral Gene Carriers, Proceedings of the International Symposium on Controlled Release of Bioactive Materials. Controlled Rel. Soc., Glasgow, Scotland. 30: 30-31, 2003.
60. Har-el, Y., van Zanten, J.H. and Hanes, J. Characterization of PEI/VEGF DNA Polyplexes for Gene Therapy, Proceedings of the International Symposium on Controlled Release of Bioactive Materials. Controlled Release Society, Glasgow, Scotland. 30: 591-592, 2003.
61. Fu, J., Har-el, Y., Suh, J., and Hanes, J. Biodegradable Poly(aspartic anhydride-co-ethylene glycol) for Gene Delivery, Proceedings of the International Symposium on Controlled Release of Bioactive Materials. Controlled Release Society, Glasgow, Scotland. 30: 586-587, 2003.
62. Fu, J., and Hanes J., A New Family of Poly(ether-anhydrides) for Pulmonary Drug Delivery, Proceedings of the International Symposium on Controlled Release of Bioactive Materials. Controlled Release Society, Glasgow, Scotland. 30:728-729, 2003.
63. Shichkin, V., Levitsky, H., Tyler, B., Brem, H., Hanes, J. Quantification of T cell Anergy to Brain Tumors Following DNA Vaccination, Proceedings of the International Symposium on Controlled Release of Bioactive Materials. Controlled Release Society, Glasgow, Scotland. 30: 2-3, 2003.
64. Sakhalkar HS, Salem A, Shakesheff KM, Morita T, Hanes J, Ansari R, Kiani MF, Goetz DJ. Leukocyte Inspired Therapeutic Particles that Selectively and Avidly Adhere to Inflamed Endothelium In Vitro and In Vivo. Proceedings of the International Symposium on Controlled Release of Bioactive Materials. Controlled Release Society, Glasgow, Scotland. 30: 507-508, 2003.
65. Morita T, Hanes J. Simple Protein Microparticle Preparation Method for Dry Powder Inhalation, Proceedings of the International Symposium on Controlled Release of Bioactive Materials. Controlled Release Society, Glasgow, Scotland. 30:724-725, 2003.
66. Sakhalkar HS, Salem A, Shakesheff KM, Morita T, Hanes J, Ansari R, Kiani MF, Goetz DJ. Targeting Biodegradable Particles to Select Segments of the Endothelium in Vitro and in Vivo, Proceedings of the Controlled Release Society Winter Symposia; Salt Lake City, UT, 2003.

2002

67. Fiegel, J., Fu, J., and Hanes, J. New poly(ether-anhydride) aerosols: Control of particulate physical and chemical properties for improved aerosolization and deposition behavior, Proceedings of the American Institute of Chemical Engineers, 2002.
68. Fu, J., Fiegel, J., and Hanes, J. Synthesis and drug release from PEG-containing poly(ether-anhydride) aerosols: New materials for pulmonary drug delivery, Proceedings of the American Institute of Chemical Engineers, 2002.
69. Fu, J., Krauland, E., Har-el, Y., and Hanes, J. New degradable cationic polymers for nonviral gene delivery, Proceedings of the American Institute of Chemical Engineers, 2002.
70. Dawson M, Wirtz D, Hanes J. Mucosal Barriers to Drug and Gene Delivery in the Lung Explored with Nanoparticle Tracking, Proceedings of the American Institute of Chemical Engineers, 2002.
71. Har-el, Y., van Zanten, J. H., and Hanes, J. Preparation of high density PEI/VEGF DNA nanocomplexes for in vivo gene therapy, Proceedings of the American Institute of Chemical Engineers, 2002.
72. Suh, J., Wirtz, D., and Hanes, J. Real-time Intracellular Tracking of PEI/DNA Nanocomplexes, Proceedings of the American Institute of Chemical Engineers, 2002.

Conference Proceedings (continued)

73. Dagia NM, Sakhalkar HS, Hanes J, Kiani MF, Goetz DJ. Investigating the Effects of Endothelial Cell Adhesion Molecule Transcription Inhibitors for use in Targeted Drug Delivery, Proceedings of the American Institute of Chemical Engineers, November 2002.
74. Hanes, J. Polymeric Devices for Efficient and Sustained Pulmonary Drug Delivery, The Whitaker Foundation Annual Meeting, La Jolla, CA, August 2002.
75. Ehrhardt, C., Fiegel, J., Schaefer, U. F., Hanes, J., and Lehr, C. M. Calu-3 bronchial epithelial cell monolayers to study drug release and absorption from aerosol particles in vitro, Proceedings of the 4th World Meeting ADRITELF/APGI/APV (Italian, French and German Societies for Pharmaceutical Technology), 1009-1010, 2002.
76. Fu, J., Krauland, E., Har-el, Y., and Hanes, J. New degradable cationic polyesters for nonviral gene delivery, Proceedings of the Second Joint EMBS/BMES Conference, p551-2, 2002.
77. Suh, J., Wirtz, D., and Hanes, J. Real-time Quantitation of Intracellular Polycation/DNA Nanocomplex Transport: Evidence for Directed Motion, Proceedings of the Second Joint EMBS/BMES Conference, p548-9, 2002.
78. van Zanten, J. H., Har-el, Y., and Hanes, J. Optimization of PEI/VEGF DNA polyplexes for potential delivery from tissue engineering scaffolds, Proceedings of the Second Joint EMBS/BMES Conference, p563-4, 2002.

2001

79. Fiegel, J., Ehrhardt, C., Lehr, C. M., and Hanes, J. An in vitro method to characterize therapeutic aerosol particulates using lung epithelial cell monolayers, Proceedings of the American Institute of Chemical Engineers, 2001.
80. Fiegel, J., Ehrhardt, C., Lehr, C. M., and Hanes, J. Air-interfaced lung epithelial cell monolayers for characterization of large light polymer aerosols, Biomedical Engineering Society Annual Meeting, 2001.
81. Fu, J., Fiegel, J., and Hanes, J. Large, light polyether-anhydride microspheres: A new carrier for pulmonary drug delivery, Proceedings of the International Symposium on Controlled Release of Bioactive Materials. Controlled Release Society, San Diego, CA, 28: 393-394, 2001.
82. Hanes, J., Fiegel, J., and Fu, J. New polymers for controlled pulmonary drug delivery, Biomedical Engineering Society Annual Meeting, 2001.
83. Har-el, Y., Janardhana, D., and Hanes, J. Enhanced transfection efficiency through long term delivery of PEI/DNA nanocomplexes from porous PLGA microspheres, Proceedings of the International Symposium of Controlled Release and Bioactive Materials. Controlled Release Society, San Diego, CA, 28: 1213-1214, 2001.
84. Har-el, Y., van Zanten, J. H., and Hanes, J. Polycation/DNA nanocomplex delivery from porous PLGA microspheres, Biomedical Engineering Society Annual Meeting, 2001.
85. Tam, J., Fiegel, J., and Hanes, J. Protein crystals for pulmonary controlled drug delivery, Proceedings of the International Symposium on Controlled Release of Bioactive Materials. Controlled Release Society, San Diego, CA, 28: 1027-1028, 2001.

1993-2000

- 86.-101. 15 Abstracts based on work prior to joining the Hopkins faculty.

IX. Service to the Profession

Editorial Boards

1. Associate Editor (USA), *International Journal of Nanomedicine*, 2005 – Present
2. Associate Editor, Drug Delivery, *Nanomedicine: Nanotechnology, Biology, and Medicine*, 2006 – Present
3. *Journal of Biomedical Nanotechnology* (www.aspbs.com/jbn), 2004 – Present.
4. *Experimental Biology and Medicine* (www.ebmonline.org), 2006 – Present

Guest Editor

1. Guest Editor for a Special Issue on “The Mucus Barrier to Drug and Gene Delivery” for ***Advanced Drug Delivery Reviews*** [Impact Factor 7.98], to be published in 2008.

Advisory Boards/Committees

1. Organizing Committee, 11th Annual Chinese-American Kavli Frontiers of Science Symposium, sponsored by the Chinese Academy of Sciences and the U.S. National Academy of Sciences. Irvine, CA, October 2-4, 2008.
2. Organizing Committee, 2008 German-American Frontiers of Engineering Symposium, sponsored by the U.S. National Academy of Engineering and the Alexander von Humboldt Foundation. Irvine, CA, April 25-28, 2008.
3. Organizing Committee, 10th Annual Kavli Chinese-American Frontiers of Science Symposium, sponsored by the Chinese Academy of Sciences and the U.S. National Academy of Sciences. Beijing, China, October 27-29, 2007.
4. Member of the National Heart Lung and Blood Institute (NHLBI) Division of Blood Diseases and Resources (DBDR) Working Group for "Nanobiotechnology Impact on Hematology & Cellular Therapeutics". The purpose of this working group is to identify the current status of nanobiotechnology and how it may impact future scientific advancements in blood/hematology. Bethesda, MD. September 26, 2006.
5. Organizing Committee, 11th Annual Kavli Chinese-American Frontiers of Science Symposium, sponsored by the Chinese Academy of Sciences and the U.S. National Academy of Sciences. Meeting in Irvine, CA, October 2008. (Also listed under “Honors”)
6. Organizing Committee, German-American Frontiers of Engineering Symposium, sponsored by the U.S. National Academy of Engineering and the Alexander von Humboldt Foundation. Meeting in Irvine, CA, April 25-28, 2008. (Also listed under “Honors”)
7. Organizing Committee, 10th Annual Kavli Chinese-American Frontiers of Science Symposium, sponsored by the Chinese Academy of Sciences and the U.S. National Academy of Sciences. Meeting in Beijing, China, October 2007. (Also listed under “Honors”)
8. Organizing and Program Committee, American Association of Nanomedicine 3rd Annual Meeting, La Jolla, CA, September 7-8, 2007.
9. Organizing and Program Committee, American Association of Nanomedicine 2nd Annual Meeting, Washington DC, September 2006.
10. Program Committee, Celebrating 30 Years of Robert Langer’s Science, Cambridge, MA, July 14-16, 2006.
11. Organizing Committee, Delivery Strategies for Proteins and Peptides, IBC’s 4th International Conference, Boston, MA, 2004.
12. Organizing Committee, Protein & Peptide Drug Delivery, IBC’s 3rd International Conference, Philadelphia, PA, September, 2003.

Advisory Boards/Committees (continued)

13. Organizing Committee, Protein & Peptide Formulation Strategies for Drug Development and Delivery, Conference Sponsored by the Institute for International Research, Boston, MA, March, 2003.
14. Organizing Committee, Protein & Peptide Drug Delivery: Scientific Advances Enabling Novel Approaches & Improved Products, IBC's 2nd International Conference, Boston, MA, September, 2002.
15. Organizing Committee, The Future of Biopharmaceutical Drug Delivery, IBC USA, Boston, MA, September, 2002.
16. Organizing Committee, Protein & Peptide Drug Delivery: Overcoming the Challenges of Non-Traditional Approaches, IBC USA Conference, San Francisco, CA, September, 2001.
17. Organizing Committee, Perspectives on Animal-Human PK/PD Correlations in Biotech Drug Delivery, IBC USA Symposium, San Francisco, CA, September, 2001.

Sessions Organized and/or Chaired

1. "Nanotechnology for Medical Therapies," German-American Frontiers of Engineering Symposium, sponsored by the U.S. National Academy of Engineering and the Alexander von Humboldt Foundation. Irvine, CA, April 25-28, 2008.
2. "Single Molecule Analysis," 10th Annual Kavli Chinese-American Frontiers of Science Symposium, sponsored by the Chinese Academy of Sciences and the U.S. National Academy of Sciences. Beijing, China, October 27-29, 2007.
3. "Drug Delivery Nanomedicine," American Association of Nanomedicine 2nd Annual Meeting, Washington DC, September 2006.
4. "Drug Delivery," Celebrating 30 Years of Robert Langer's Science, Cambridge, MA, July 14-16, 2006 (Co-chair with Mark Saltzman).
5. "Nanosystems in Cells and Biological Fluids," American Institute of Chemical Engineers, Cincinnati, OH, November 2005 (with Dr. Junghae Suh).
6. "Subcellular Fate and Function of Nanoconstructs," Third International Nanomedicine and Drug Delivery Symposium, Baltimore, MD, September 26, 2005.
7. "Intracellular Trafficking of Biomaterials/Bionanotech Devices," American Institute of Chemical Engineers, Austin, TX, November 2004.
8. "Transport of Biomaterials/Bionanotech Devices Through Biological Barriers," American Institute of Chemical Engineers, Austin, TX, November 2004 (with Prof. Nicholas Peppas).
9. "Biomaterials and Bionanotechnology in Cancer," American Institute of Chemical Engineers, Austin, TX, November 2004 (with Prof. Sean Palecek).
10. "Novel Delivery Systems," 3rd Annual International Conference on Gene Delivery—Non-viral Systems & In vivo Applications, Sponsored by The Knowledge Foundation, San Diego, CA, November 2003.
11. "Optimizing Gene Delivery," 3rd Annual International Conference on Gene Delivery—Non-viral Systems & In vivo Applications, Sponsored by The Knowledge Foundation, San Diego, CA, November 2003.
12. "Drug Delivery—Interfacial Effects I," American Institute of Chemical Engineers, San Francisco, CA, November, 2003 (with Prof. John van Zanten).
13. "Drug Delivery—Interfacial Effects II," American Institute of Chemical Engineers, San Francisco, CA, November, 2003 (with Prof. John van Zanten).
14. "Biomimetics II," American Institute of Chemical Engineers, Indianapolis, IN, November, 2002 (with Prof. Lonnie Shea)

Sessions Organized and/or Chaired (continued)

15. "Drug Delivery I," American Institute of Chemical Engineers, Indianapolis, IN, November, 2002 (with Prof. Marylee Southard).
16. "Drug Delivery II," American Institute of Chemical Engineers, Indianapolis, IN, November, 2002 (with Prof. Marylee Southard).
17. "Targeted Delivery," Biomedical Engineering Society Annual Meeting, Houston, TX, October, 2002 (with Dr. Phil Messersmith)
18. "The Future of Biopharmaceutical Drug Delivery," 2nd Conference on Protein & Peptide Drug Delivery, Sponsored by IBC, Boston, MA, September, 2002.
19. "Improving Protein/Peptide Performance through Modifications," 2nd Conference on Protein & Peptide Drug Delivery, Sponsored by IBC, Boston, MA, September, 2002.
20. "Modified Injectables for Sustained Release," 2nd Conference on Protein & Peptide Drug Delivery, Sponsored by IBC, Boston, MA, September, 2002.
21. "Novel Approaches to Drug Targeting," 2nd Conference on Protein & Peptide Drug Delivery, Sponsored by IBC, Boston, MA, September, 2002.
22. "Cutting-Edge Technology Highlights," 2nd Conference on Protein & Peptide Drug Delivery, Sponsored by IBC, Boston, MA, September, 2002.
23. "Recent Advances in Noninvasive Delivery Efforts," 2nd Conference on Protein & Peptide Drug Delivery, Sponsored by IBC, Boston, MA, September, 2002.
24. "Drug Delivery I," American Institute of Chemical Engineers, Reno, NV, November, 2001 (with Prof. John van Zanten).
25. "Drug Delivery III," American Institute of Chemical Engineers, Reno, NV, November, 2001 (with Prof. John van Zanten).
26. "Carrier Systems," Conference on Protein & Peptide Drug Delivery, Sponsored by IBC, San Francisco, CA, September, 2001.
27. "Cutting-Edge Technology Highlights," Conference on Protein & Peptide Drug Delivery, Sponsored by IBC, San Francisco, CA, September, 2001.
28. "Case Studies," Conference on Protein & Peptide Drug Delivery, Sponsored by IBC, San Francisco, CA, September, 2001.
29. "Regulatory & Quality Considerations," Conference on Protein & Peptide Drug Delivery, Sponsored by IBC, San Francisco, CA, September, 2001.
30. "Drug Delivery II," American Institute of Chemical Engineers, Los Angeles, CA, November, 2000.
31. "Novel Gene Carriers," Biomedical Engineering Society, Seattle, WA, October, 2000.
32. "Vaccine Delivery," Conference on Formulations and Drug Delivery II, Cosponsored by the American Chemical Society and the Controlled Release Society, La Jolla, CA, October, 1997.
33. "Non-replicating Vaccine Delivery Systems," Fourth Annual Conference on New Advances in Vaccine Technologies and Applications, Sponsored by IBC, Rockville, MD, January, 1997.

Professional Society Memberships

American Association of Pharmaceutical Scientists
American Institute of Chemical Engineers
Controlled Release Society

X. Research Supervision

Postdoctoral Fellows

1. Jie Fu, Ph.D. (9/00 – 9/02)
Currently: Associate Research Scientist (9/02 – present), Department of Chemical and Biomolecular Engineering, Johns Hopkins University
2. Valentin Shichkin, Ph.D., D.Sc. (3/02 – 4/03)
Currently: Professor of Immunology, National University "Kiev-Mohila academy"
Kiev, Ukraine +38 (044) 230-8512; +38 (097) 507-2932
3. Samuel K. Lai, Ph.D. (10/07 – Present)

Ph.D. Students

1. Jennifer Fiegel (1998 – 2003); Ph.D. in Chemical Engineering
Thesis: "Poly(ether-anhydride) Dry Particle Aerosols"
Postdoctoral Work: Harvard University, School of Engineering and Applied Science
Mentor: David Edwards; <http://people.deas.harvard.edu/~dedwards/>
Currently: Assistant Professor of Chemical & Biomolecular Engineering and
Pharmaceutics, Iowa University
2. Junghae Suh (2001 – 2004); Ph.D. in Biomedical Engineering
Thesis: "Live-cell Multiple Particle Tracking and its Application to Investigate the
Cytoplasmic Transport of Nonviral Gene Vectors."
Postdoctoral Work: Salk Institute, Laboratory of Genetics
Mentor: Matthew Weitzman; <http://www-biology.ucsd.edu/faculty/weitzman.html>
Currently: Assistant Professor of Bioengineering, Rice University (Ranked 10th, US News)
3. Yah-el Har-el (1998 – 2004); Ph.D. in Chemical & Biomolecular Engineering
Thesis: "High DNA Density Non-viral Gene Vectors"
Currently: NRSA Postdoctoral Fellow, Johns Hopkins School of Medicine, Russel H.
Morgan Department of Radiology and Radiological Sciences
Mentor: George Sgouros; http://www.hopkinsmedicine.org/RTD_lab/about/
4. Michelle Dawson (2000 – 2005); Ph.D. in Chemical & Biomolecular Engineering
Thesis: "Mucosal Barriers to Non-viral Gene Delivery in the Cystic Fibrotic Lung"
Currently: Ford Foundation Postdoctoral Fellow, Harvard Medical School
Mentor: Rakesh Jain; <http://steele.mgh.harvard.edu/HomePage.html>
Update: Michelle is applying for faculty positions currently.
5. Samuel K. Lai (2003 – 2007); Ph.D. in Chemical & Biomolecular Engineering
Thesis: "Mucus-Penetrating Therapeutic Nanosystems"
Currently: Postdoctoral Fellow, Johns Hopkins University, Mentor: Justin Hanes
6. Benjamin Tang (2003 – present); Ph.D. Candidate, Chemical & Biomolecular Engineering
"Polymer Nanoparticle Aerosols for Lung Cancer"
7. Ming Yang (2006 – present); Ph.D. Candidate, Biomedical Engineering
"Molecularly Targeted Therapeutic Polymer Nanoparticles for Ovarian Cancer"

Ph.D. Students (continued)

8. Kaoru Hida (2006 – present); Ph.D. Candidate, Biomedical Engineering
co-advisor with Prof. Marc Ostermeier, Dept. of Chem. & Biomolec. Eng., JHU
“Directed Evolution of Viruses for Therapeutic Gene Delivery to Mucosal Tissues”
9. Nicholas Boylan (2006 – present); Ph.D. Candidate, Chemical & Biomolecular Engineering
“Highly compacted gene vector design for Nrf2 gene therapy in the lungs”
10. Jung Soo Suk (2007 – present); Ph.D. Candidate, Biomedical Engineering
“New polymeric gene carriers for aerosol therapy of Cystic Fibrosis”
11. Ashish Jachak (2007 – present); Ph.D. Candidate, Environmental Health Sciences
“Risks associated with inhalation of nanoscale metal particles”
12. Laura Ensign (2007 – present); Ph.D. Candidate in Chemical & Biomolecular Eng.
13. Elizabeth Nance (2007 – present); Ph.D. Candidate, Chemical & Biomolecular Eng.
14. Craig Schneider (2007 – present); Ph.D. Candidate in Chemical & Biomolecular Eng.

Masters Students

1. Divya Janardhana (1998 – 2000); M.S. in Chemical Engineering
“Controlled Delivery of DNA/PEI Nanocomplexes for Gene Therapy.”
Currently:
Supervisor, Method Development, Wyeth Vaccines
2. Eric Krauland (2001 – 2002); M.S. in Biomedical Engineering
“Cationic Delivery Systems for Pulmonary Gene Delivery.”
Currently: Recently received his Ph.D., Biological Engineering, MIT
3. Jung Soo Suk (2003 – 2004); M.S. in Biomedical Engineering
“Gene Delivery into Differentiated Neurons Using Nonviral Vectors.”
Currently: Ph.D. program at Johns Hopkins in Biomedical Engineering.
4. Yoojin An (2004 – 2005); M.S. in Chemical & Biomolecular Engineering
“Real-Time Intracellular Trafficking of DNA-Loaded Polymer Nanoparticles.”
Currently: Ph.D. program at University of Pennsylvania in Bioengineering
5. Kok Leong Choy (2004 – 2005); M.S. in Biomedical Engineering
“Surface-modified Nanoparticles for Enhanced Non-viral Gene Delivery.”
Currently: Research Engineer, DSO National Laboratories, Singapore
6. Eric Jabart (May 2004 – 2005); M.S. in Chemical & Biomolecular Engineering
“Real-Time Intracellular Transport of Adenovirus-Modified Polymeric DNA Nanocomplexes
in Live Cells”
Currently: Ph.D. program at UC Berkeley / UCSF in Bioengineering

Masters Students (continued)

7. Vikash Chauhan (2004 – 2006); M.S. in Chemical & Biomolecular Engineering
“Nanoparticle Transport in Purulent CF Sputum Treated with a Mucolytic Agent: Toward Effective Gene Therapy for Cystic Fibrosis”
Currently: Ph.D. program at Harvard University in Bioengineering
8. Matthew Durst (2004 – 2006); M.S. in Biomedical Engineering
“Copolymer implants for high-dose and long-duration controlled drug delivery”
Currently: Attending Medical School
9. Ying-Ying Wang (2007 – present); M.S. Candidate in Biomedical Engineering
10. Christina “Beana” Happe (2007 – present); M.S. Candidate in Chemical & Biomolecular Engineering
11. Amanda Pace (2007 – present); M.S. Candidate in Chemical & Biomolecular Engineering
12. Chun-Ting “Tina” Lin (2007 – present); M.S. Candidate in Chemical & Biomolecular Eng.

Visiting Scientists

Sabbaticals

1. Raz Jelinek, Ph.D., Associate Professor and Past Chair, Dept of Chemistry, Ben Gurion University, Beer-Sheva, Israel 84105
Tentative Visit Dates: 7/08 – 7/10
2. Yong Ba, Ph.D. , Associate Professor of Chemistry and Biochemistry, California State University Los Angeles
Visit Dates: 9/07 – 8/08
3. Hua Li, Ph.D., Assistant Professor, Division of Engineering Mechanics, Nanyang Technological University
Dates visited: 10/05 – 11/05

Other Visitors

4. Olcay Mert, Ph.D. Candidate from Middle East Technical University, Turkey.
5. Takahiro Morita, Ph.D., Tanabe Seiyaku, Japan, Dates visited: 4/02 – 4/03
6. Katrin Johannsen, Ph.D. Candidate from Freie Universität Berlin, Germany
Dates visited: 6/02 – 9/02
7. Carsten Ehrhardt, Ph.D., Lecturer, School of Pharmacy, The University of Dublin, Trinity College, Dates visited: 7/02 – 9/02
8. Stan Man, Research Coordinator, Intergrated Chinese Medicine Holdings Limited

Undergraduate Research Assistants

1. Sang Won, ChemBE, 10/07 – present.
2. Jean Chen, ChemBE, 1/08 – present.
3. Michael Zhang, Chem. Eng., JHU, 2/07 – present
4. Nisarg Shah, ChemBE, JHU, 1/07 – present
5. Richie Tay, ChemBE, JHU, 9/06 – present
6. Britni Lonesome, ChemBE, JHU, 9/06 – present
7. Nicholas Chidiac, Chem. Eng., JHU, 2/06 – present
8. Joey Wood, Biomed. Eng., JHU, 1/06 – present
9. Christina “Beana” Happe, ChemBE, JHU, 6/06 – 5/07
10. Sudhir Khetan, Biomed. Eng., JHU, 9/05 – 5/07
11. Clive Chen, ChemBE, JHU, 6/05 – 5/07
12. Ying-Ying Wang, Biomed. Eng., JHU, 1/05 – 5/07
13. Charlotte Chung, Biomed. Eng., JHU, 9/04 – 5/07
14. Montaski McCoy, Chem. Eng., Auburn Univ, 6/06 - 8/06
15. Alexander Aleem, Biomed. Eng., JHU, 9/05 –
16. Afrah Salahuddin, Biomed. Eng., JHU, 8/04 – 10/05
17. Stephanie Piecewicz, ChemE, JHU, 10/03 – 9/04
18. Patrick Marti, ChemE, JHU, 10/03 – 5/05
19. Claire Jeong, Biomed. Eng., 6/03 – 5/04
20. Kok-Leong Choy, Biomed. Eng., JHU, 1/03 – 5/04
21. Stephanie Hee-Kyong Kim, ChemE, JHU, 6/02 – 9/04
22. Sudhir Prabhu, ChemE, 5/02 – 5/05
23. Michael Lee, Biomed. Eng., 2/02 – 5/05
24. David McGovern, Biomed. Eng., 10/01 – 9/04
25. Yoojin An, Biomed. Eng., JHU, 5/03 – 12/03
26. Anthony Sheh, Biomed. Eng., 1/03 – 9/03
27. Shikha Mishra, Biomed. Eng., 10/02 – 6/03
28. Ashish Patel, Biomed. Eng., 9/02 – 5/03
29. Mary McDonald, Biomed. Eng., 5/02 – 12/02
30. Rashea McCall, ChemE, 5/02 – 9/02
31. Toni Forest, Biomed. Eng., 2/02 – 9/02
32. Daniel Callahan, Biomed. Eng., JHU, 9/01 – 12/03
33. Aimee Wu, Biomed. Eng., 7/01 – 05/02
34. Michael Luc, Biomed. Eng., 6/01 – 6/03
35. Nithin Gottam, Biomed. Eng., 1/01 – 9/01
36. Timothy Muldoon, Biomed. Eng., 9/00 – 5/01
37. Colin Bunni, Biomed. Eng., 6/00 – 1/01
38. Abbas Yaseen, Biomed. Eng., 5/00 – 5/02
39. Morgan Robertson, Morgan State University, 5/00 – 9/00
40. Eric Krauland, Biomed. Eng., 1/00 – 6/01
41. Sarah Parola, ChemE, 12/99 – 5/01
42. Tadej Recelj, Exchange student from the University of Ljubljana, Slovenia, 9/99 – 10/99
43. Sahil Sood, Biomed. Eng., 6/99 – 6/01
44. Joshua Tam, Biomed. Eng., 5/99 – 6/01
45. Shelly Gulati, ChemE, 1/99 – 5/00
46. Anjali Jain, Biomed. Eng., 7/98 – 9/98

High School Students

1. Kneisha McClinton, Baltimore Polytechnic Institute (Public High School in Baltimore City), 09/06 – 05/07 (Currently: Enrolled at Johns Hopkins with full scholarship)
2. Lu Wang, Towson High School, 06/06 – 05/07 (Currently: Enrolled at Brown University with full scholarship)
3. Britni Lonesome, Baltimore Polytechnic Institute, 09/05 – 05/06 (Currently: Enrolled at Johns Hopkins with full scholarship)
4. Amanda Steber, Baltimore Polytechnic Institute, 08/03 – 05/04
5. Will Hahn, McDonough High School, 6/03 – 9/03
6. Craig Turner, The Baltimore Polytechnic Institute, 08/00 – 05/01

Awards to Graduate Students

Most Significant

- 2007 – 2010 National Science Foundation Graduate Student Fellowship (L. Ensign)
2007 – 2010 National Science Foundation Graduate Student Fellowship (Y.-Y. Wang)
2007 – 2010 Howard Hughes Medical Institutes Fellow (L. Ensign)
2007 – 2010 Howard Hughes Medical Institutes Fellow (C. Schneider)
2005 – 2008 Postgraduate Scholarship, Natural Sciences & Engineering Research Council of Canada (SK Lai)
2002 – 2005 National Science Foundation Graduate Student Fellowship (M. Dawson)
2004 Society for Experimental Biology & Medicine Graduate Student Research Forum, 3rd place (J. Suh)
2004 CRS-Capsugel/Pfizer Innovative Aspects of Oral Drug Delivery and Absorption Graduate Student/Post-Doc Award (M. Dawson)
2003 International Society for Aerosol Medicine Student Research Award (M. Dawson)
Note: This award is given to one student once every two years.
2001 – 2004 Ford Foundation Graduate Student Fellowship (M. Dawson; declined 2003-2004)
1999 – 2002 National Science Foundation Graduate Student Fellowship (J. Fiegel)

Other Awards and Fellowships

- 2005 – 2007 BIGSTEP Fellowship (B. Tang)
2004 – 2005 Achievements Reward for College Students Fellowship (J. Suh)
2004 Grant to Attend the Ideal Faculty Position Workshop for Female Engineers at University of Texas, Austin (J. Suh and J. Fiegel)
2004 Grant to Attend the Science and Engineering Education Scholars Program (SEESP) at the Pennsylvania State University (M. Dawson)
2003 Biomedical Engineering Society Travel Award (Y. Har-el)
2003 Biomedical Engineering Society Travel Award (J. Suh)
2003 Biophysical Society FASEB MARC Travel Award (M. Dawson)
2003 American Society for Gene Therapy Travel Award (J. Suh)
2002 Biomedical Engineering Society Travel Award (J. Suh)
2000 – 2001 Achievements Reward for College Students Fellowship (M. Dawson)
1998 – 1999 Abel Wolman Fellowship (Y. Har-el)

Awards to Undergraduate Students

2007

- Elenora Streb Muly Award for Undergraduate Research (Pei Kun Tay)
Elenora Streb Muly Award for Undergraduate Research (Michael Zhang)
Undergraduate Research Award in Chemical & Biomolecular Eng. (Clive Chen)
Richard J Johns Award in Biomedical Engineering (Ying-Ying Wang)
Provost's Undergraduate Research Award—Fall (Joseph Wood)

2006

- Tau Beta Pi Scholarship (Charlotte Chung)
Provost's Undergraduate Research Award—Fall (Ying-Ying Wang)
Provost's Undergraduate Research Award—Fall (Clive Chen)
Barry M. Goldwater Scholarship (Ying-Ying Wang)
Howard Hughes Summer Research Fellowship (Clive Chen)
Howard Hughes Summer Research Fellowship (Ying-Ying Wang)
Provost's Undergraduate Research Award—Summer (Sudhir Khetan)

2005

- Provost's Undergraduate Research Award (Charlotte Chung)

Awards to Undergraduate Students (Continued)

Provost's Undergraduate Research Award (Ying-Ying Wang)
Howard Hughes Summer Research Fellowship (Charlotte Chung)

2004

Augustine Scholarship (Afrah Salahuddin; Excellence in Biomedical Engineering Research)
Provost's Undergraduate Research Award (Sudhir Prabhu)
Elenora Streb Muly Award for Undergraduate Research (Stephanie Kim)
Elenora Streb Muly Award for Undergraduate Research (Sudhir Prabhu)

2003

Howard Hughes Summer Research Fellowship (Daniel Callahan)
Provost's Undergraduate Research Award (Michael Lee)
Howard Hughes Summer Research Fellowship (Anthony Sheh)

2002

Bankard Research Award (David McGovern)
Provost's Undergraduate Research Award (David McGovern)
Howard Hughes Summer Research Fellowship (Toni Forest)
Bankard Research Award (Michael Luc)
Howard Hughes Summer Research Fellowship (Daniel Callahan)
Bankard Research Award (Daniel Callahan)
G.E. Faculty for the Future Award (Rashea McCall)

2001

Howard Hughes Summer Research Fellowship (Michael Luc)
Howard Hughes Summer Research Fellowship (Timothy Muldoon)
G.E. Faculty for the Future Award (Abbas Yaseen)
Biomedical Engineering Research Award (Joshua Tam)

2000

G.E. Faculty for the Future Award (Sarah Parola)
Howard Hughes Summer Research Fellowship (Sahil Sood)
Howard Hughes Summer Research Fellowship (Morgan Robertson)
Biomedical Engineering Research Award (Sahil Sood)
Barry M. Goldwater Scholarship (Sahil Sood)
Dept of Chemical Engineering Undergraduate Research Award (Shelly Gulati)
Provost's Undergraduate Research Award (Eric Krauland)
G.E. Faculty for the Future Award (Joshua Tam)
Barry M. Goldwater Scholarship (Joshua Tam)

Awards to High School Students

1. 1st Place Award, The Maryland Society of Clinical and Lab Scientists, 51st Annual Baltimore Science Fair, 2006 (Britni Lonesome)
2. Gold Medal Award in Chemistry, NAACP ACT-SO State Competition, 2006 (Britni Lonesome^S).
3. Honorable Mention, Biological Sciences, 49th Annual Baltimore Science Fair, 2004 (Amanda Steber)
4. Grand Prize, Physical Sciences, 46th Annual Baltimore Science Fair, 2001 (Craig Turner)
5. Finalist, Intel International Science and Engineering Fair, 2001 (Craig Turner)

XI. Service within the School of Engineering and Department

Present

- Executive Committee Member and Director of Therapeutics, The Institute for NanoBioTechnology at Johns Hopkins, 2006 – present
- Director, ChemBE Career Network, Department of Chemical & Biomolecular Engineering, <http://www.jhu.edu/~cheme/ccn/index.asp>, 2005 – present
- Undergraduate Academic Advisor
~1/3 of the Class of 2009, Chemical & Biomolecular Engineering, 2005—present
- Co-Director (with Jonathan Links), Undergraduate Nanotechnology Risk Assessment Educational Program (Goal is the Enhancement of Nanotechnology Risk Assessment and Public Policy Education at Johns Hopkins), 2007 – present
- Faculty Advisor, JHU Student Chapter of the Controlled Release Society, 2001 – present

Past

- Undergraduate Academic Advisor
 - Class of 2002, ~15 Biomedical Engineers with a Concentration in ChemE, 1998 – 2002
 - Class of 2005, ~20 Chemical Engineers, 2001 – 2005
- JHU Animal Use Committee, WSE and KSAS, 2005 – 2007
- Graduate Admissions Committee, Chemical & Biomolecular Engineering, 2005 & 2007
- Program Chair, Part Time Engineering Program in Chemical & Biomolecular Engineering, October 2002 – September 2005
- Chair, Chemical & Biomolecular Engineering Ph.D. Qualifying Examination, 1999 – 2005
- Dean Search Committee Member, Whiting School of Engineering (2002 – 2004)
- Howard Hughes Undergraduate Research Fellowship Selection Committee (2002)
- Chemical Engineering Library Liaison at JHU (1999 – 2002)
- Applied Mathematics Committee, Whiting School of Engineering (2000 – 2001)
- Research Presentations for the Whiting School of Engineering
 - JHU Class of 1951 Homecoming Speaker at Homewood Campus (2001)
 - Whiting School of Engineering Alumni Club, Hagerstown, MD (2001)
- Lectures on Diffusion in “Physiological Foundations” for Dept. of Biomed. Eng. (2001)
- Participant: Engineering School Open House (1999, 2000)
- Organizer, Department of Chemical Engineering Seminar Series (Fall 1998 and Spring 1999)

XII. Courses Developed

• 540.433/633 Engineering Aspects of Controlled Drug Delivery

(offered Spring 1999, 2000, 2001, 2002, Fall 2002, Spring 2004, 2005, 2006)

This course addresses the fundamental science and engineering behind the development and understanding of modern controlled/targeted drug delivery systems. Such systems are currently of great importance to the Pharmaceutical and Biotechnology industries. Emphasis is placed on correlations between physicochemical properties of advanced particulate systems and their behavior in complex biological environments. Mathematical models of relevant processes are covered and extended in class and as part of assignments. Routes of drug administration covered include oral, transdermal, pulmonary, injection and surgical implantation. Topics include physicochemical characteristics of biological barriers to drug delivery, particle transport in biological environments, molecularly targeted delivery, particle-cell interactions under static and flow conditions, particle uptake and trafficking within cells, and progress toward the development of safe and effective "synthetic viruses" for gene therapy. Theoretical aspects are complemented with descriptive information to give students a sound physical understanding of the phenomena being considered.

The JHU Academic Course Evaluation Guide (ACE Guide) summarized student comments on this course as follows: "The professor was 'reasonable and flexible'. The lectures were described as 'amazing.'"

• 540.101 Chemical Engineering Today

(Fall 1999, 2000, 2001)

This course introduces first year undergraduate students to the field of Chemical Engineering via a series of lectures by Chemical Engineering faculty and industry leaders. Students participate in group activities designed to involve them with their new department and with each other, as well as to pique their interest in Chemical Engineering. Such activities include short (two page) descriptions of important work or research being conducted by modern chemical engineers and the design of a freshmen Chemical Engineering class web page. The course also serves as a "preface" to the undergraduate Chemical Engineering program that enhances student awareness of the usefulness of core classes and how they are all interconnected within the overall degree program. Emphasis is placed on the discussion of real world applications of chemical engineering principles. This course continues to be taught every fall (Fall 2002 by Professor Gray and Fall 2003-present by Professor Kermis).

The JHU ACE Guide summarized student comments as follows: "Students enjoyed this 'exciting' and 'thought provoking' introduction to various areas of chemical engineering. The format of guest speakers was thought to be particularly effective as many appreciated hearing about groundbreaking research from pioneers in the field. Professor Hanes was commended for being knowledgeable and accessible, and many noted that the final project was a good way to develop teamwork skills."

• 540.301 Chemical Kinetics & Reactor Design

(offered Fall 1999, 2000, 2001, 2002; Spring 2004, 2005, 2006, 2007, 2008)

This class provides an introduction to kinetic phenomena and reactor design in chemical processes. Homogeneous kinetics and interpretation of reaction rate data. Elementary, power-law, and nonelementary rate processes. Batch, plug flow, and stirred tank reactor analyses, including continuous reactors in parallel and in series. Selectivity and optimization considerations in multiple reaction systems. Nonisothermal reactors, including stable and

Courses Developed (continued)

unstable steady state analyses of stirred tank reactors. Elements of heterogeneous kinetics, including adsorption isotherms and heterogeneous catalysis. Coupled transport and chemical reaction rates. Introduction to non-ideal reactors.

Starting in the Spring of 2004, this course was modified to increase emphasis kinetic modeling of biological systems and bioreactors. The refocusing does not sacrifice the teaching of the fundamentals of chemical kinetics and reactor design, but rather reinforces it through the inclusion of modern biological examples designed to pique student interest in the subject and to demonstrate the usefulness of the material in a variety of chemical and biological processes. The modernization of this course reflects the growing realization that chemical engineering principles are powerful when applied to biological problems.

The JHU ACE Guide summarized student comments as follows: "Professor Hanes offered clear, well-organized lectures and seemed genuinely interested in the class learning the material covered. Students found learning about large-scale chemical engineering design extremely interesting and appreciated the professor's accessibility."

• 540.442/642 *Advanced Topics in Bio/Chemical Kinetic Processes*

(co-taught with M. Betenbaugh and M. Ostermeier; offered Spring 2007)

This course presents a survey of kinetic/reactor phenomena of high relevance to industry and cutting-edge biomolecular engineering research. Topics to be covered include: reactions with phase change for the microelectronics industry, computational modeling of complex multiple reaction systems, polymerization kinetics, enzyme kinetics (including inhibition, allostery and cooperativity), pharmacokinetics, reaction with diffusion in biological tissues, cell bioreactors, and intracellular kinetics relevant to metabolic engineering.

No JHU ACE Guide comments yet available (see scores in next section).

• 540.404/604 *Therapeutic Colloids in Biological Fluids*

(co-taught with D. Wirtz in Spring 2007; To be taught solo in Spring 2008)

The inefficient or inappropriate transport of particles in complex biological fluids in the body currently limits the effectiveness of nanoparticle-based strategies aimed at providing a variety of breakthroughs in medicine, from highly targeted drug and gene delivery systems to improved particles for advanced imaging and diagnostics. Many bodily fluids that serve as barriers to particle transport to desired locations are microporous and highly viscous and/or elastic in nature. Therefore, this course seeks to provide a fundamental understanding of the phenomena that governs nano- and microparticle transport in important biological fluids, including the blood, airways, mucus, and living cells. A comparison of macroscopic and microscopic particle transport behavior, including comparisons of ensemble-average transport behavior to that of *individual* particle behavior, is a common thread that runs throughout the course. The importance of particle physicochemical properties in achieving rapid and targeted particle transport through biological barriers to desired sites of action will also be addressed.

No JHU ACE Guide comments yet available (see scores in next section).

XIII. Teaching (* student course evaluation rating out of a possible 5.00)

Spring 1999	540.433/633 Engineering Aspects of Controlled Drug Delivery; Enrollment: 30 (Presentation: 4.79; Professor Deserves Award: 4.65)*
Fall 1999	540.301 Chemical Kinetics & Reactor Design; Enrollment: 22 (Presentation: 4.53; Professor: 4.67)*
Fall 1999	540.101 Chemical Engineering Today; Enrollment: 33 (Presentation: 3.94; Professor: 4.27)*
Spring 2000	540.433/633 Engineering Aspects of Controlled Drug Delivery; Enrollment: 31 (Presentation: 4.84; Professor: 4.80; Interest: 4.96)*
Fall 2000	540.301 Chemical Kinetics & Reactor Design; Enrollment: 38 (Presentation: 4.77; Professor: 4.92)*
Fall 2000	540.101 Chemical Engineering Today; Enrollment: 33 (Presentation: 4.58; Professor: 4.50)*
Spring 2001	540.433/633 Engineering Aspects of Controlled Drug Delivery; Enrollment: 26 (not published)
Fall 2001	540.301 Chemical Kinetics & Reactor Design; Enrollment: 44 (Presentation: 4.06; Professor: 4.40)*
Fall 2001	540.101 Chemical Engineering Today; Enrollment: 30 (Presentation: 4.37; Professor: 4.50)*
Spring 2002	540.433/633 Engineering Aspects of Controlled Drug Delivery; Enrollment: 19 (Presentation: 4.08; Professor: 4.18)*
Fall 2002	540.301 Chemical Kinetics & Reactor Design; Enrollment: 29 (Presentation: 4.00; Professor: 4.40)*
Fall 2002	540.433/633 Engineering Aspects of Controlled Drug Delivery; Enrollment: 27 (Presentation: 4.57; Interest: 4.71)*
Spring 2004	540.433/633 Engineering Aspects of Controlled Drug Delivery; Enrollment: 48 (Presentation: 4.43; Professor: 4.21)*
Spring 2004	540.302 Kinetic Processes; Enrollment: 30 (Presentation: 4.50; Professor: 4.44)*
Spring 2005	540.433/633 Engineering Aspects of Controlled Drug Delivery; Enrollment: 48 (Ratings not provided)
Spring 2005	540.302 Kinetic Processes; Enrollment: 30 (Presentation: 4.52; Professor: 4.30)*
Spring 2006	540.433/633 Engineering Aspects of Controlled Drug Delivery; Enrollment: 18 (Presentation: 4.67; Overall Quality: 4.42; Professor: 4.25)*
Spring 2006	540.301 Kinetic Processes; Enrollment: 50 (Presentation: 4.51; Professor: 4.38)*
Spring 2007	540.404/604 Therapeutic & Diagnostic Colloids in Biological Fluids; Enrollment: 55; Co-taught with Prof. D. Wirtz (40 undergraduates in 540.404 and 15 graduate students in 540.604) Joint evaluation of Hanes/Wirtz (540.404): (Presentation: 4.52; Professors: 4.07)*
Spring 2007	540.442/642 Advanced Topics in Bio/Chemical Kinetic Processes; Enrollment: 13 Co-taught with Prof. M. Betenbaugh and M. Ostermeier (5 undergraduates and 8 graduate students) Joint evaluation of Betenbaugh/Ostermeier/Hanes (540.642): (Presentation: 4.43; Overall: 4.50; Professors: 4.25)*
Spring 2007	540.301 Kinetic Processes; Enrollment: 73 (Presentation: 4.62; Professor: 4.58)*
Spring 2008	540.404/604 Therapeutic Colloids in Biological Fluids; Enrollment: TBD
Spring 2008	540.301 Kinetic Processes; Enrollment: TBD