

Daniel Hayes
167 E.B. Doran Building
Baton Rouge, LA 70803
Phone: 225.578.2919
Cell: 225.892.3731
Fax: 225.578.3492
E-Mail: danielhayes@lsu.edu

Education:

- Doctor of Philosophy in Engineering Science and Mechanics, 2004: The Pennsylvania State University, University Park, PA.
Advisor: Dr. Stephen Fonash, The Kunkle Chair of Engineering Sciences.
- Bachelor Degree in Science (focus in life science), 1997: The Pennsylvania State University, University Park, PA.

Employment:

- 2008-Present: **Assistant Professor in Biological Engineering**, Louisiana State University, Bioengineering Department, Baton Rouge, LA
 - Research focal areas: spatially targeted and activated nanoscale drug delivery vehicles; functional nanocomposites for tissue engineering.
- 2007-2008: **President and COO of Nanohorizons**, State College, PA
 - Founded by Penn State University graduate students and faculty, the company focuses on nanomaterials and device development for biomedical applications and polymer additives.
 - Secured \$16,700,000 in grants and equity funding for company development.
 - Responsible for directing operations, sales, marketing, research and product development.
 - Managed a team of 27 scientists, engineers, salespersons and marketers.
- 2005-2007: **Vice President of Operations, Nanohorizons**, State College, PA
- 2002-2005: **Director of Research and Development, Nanohorizons**, State College, PA

Research Experience:

- 2008-Present Louisiana State University, Bioengineering Department, Baton Rouge, LA
 - Multifunctional inorganic nanocomposite coatings for indwelling devices.
 - Multi-scalar, composite foam bioscaffolds for critical sized musculoskeletal defect repair.
 - Targeted, triggered nanoscale drug delivery and diagnostic vehicles.
- 2004-2008: NanoHorizons, State College, PA
 - High throughput, high yield biologically inspired, antimicrobial nanoparticle synthesis.
 - Dispersion and integration technology for nanomaterials in synthetic and non-synthetic polymers.
 - Development of nanoscale delivery vehicles for integrating therapeutic agents in medical devices.
 - Development of surface mediated laser desorption/ionization devices.
 - Development of high performance, flexible transistor arrays.
- 1999-2004: Doctoral Research at the Nanofabrication Facility, The Pennsylvania State University, University Park, PA. Advisor: Dr. Stephen Fonash
 - Developed chip based, microdevice for the biotransformation and analysis of drug compounds.

- Development of nanoparticle based, metal enhanced fluorescence tags to improve sensitivity of nucleic acid microarray assays.
 - Explored the impact of interfacial chemistry on inorganic nanoparticle dispersion in polymer composites.
 - Examined nanostructured, deposited thin films for matrix-free, surface mediated laser desorption/ionization mass spectrometry.
 - Examined the impact of nanostructured deposited thin film surfaces on cell patterning, growth and gene expression.
- 1997- 1999: Research Assistant at NYU Medical Center, New York, NY. Advisor: Dr. Thomas Hornyak.
 - Developed pTRP-2/MASH-1/EGFP transgenic mouse for tracking and perturbing neural crest development.
 - Examined DOPA-chrome tautomerase expression and regulation during neuronal development.
 - Developed pTRP-2/LAC-Z and EGFP transgenic mouse lines for examining neural crest proliferation, migration and differentiation.
- 1997-1998: Part-Time Research Assistant at Sloan Kettering Memorial Hospital, New York, NY. Lab of Dr. Robert Benezra.
 - Research focused on cell cycle control and tumor growth regulation by MAD, Bub and ID genes.
 - Characterized and interbred three Inhibitor of DNA Binding (ID 1-3), MAD and Bub knockout transgenic mouse lines to examine tumor growth regulation.
- 1996-1997: Undergraduate Research, Nutrition Department, The Pennsylvania State University, PA. Advisor: Dr. Domingo Pinero in the lab of Dr. John Beard.
 - Researched the effects iron deficiency on neuronal development.
 - Examined iron dependant enzyme regulation and function.

Teaching Experience:

- 2008-Present: BE 4290 & BE 4292 Engineering Design Capstone Course Series, BE 4305 Engineering Entrepreneurship I, BE 4306 Engineering Entrepreneurship II, BE 4335 Tissue Engineering, BE 3490 Process Engineering, BE 7909 Biomaterials Characterization, BE 7910 Nanoparticles, BE1250 Introduction to Biological Engineering. Louisiana State University, Baton Rouge, LA
- 2003-2008: Lecturer in Biotech 571, “Nanobiotechnology”, The Pennsylvania State University, University Park, PA
- 2001-2003: Lecturer in Nanobiotechnology for the NMT program, The Pennsylvania State University, University Park, PA
- 2000-2003: Instructor for “Nanotech Camps” for secondary school students,, Nanofabrication Facility, The Pennsylvania State University, University Park, PA

Chaired Graduate Committees:

- Nicolas Totaro, “In vivo photo-directed 3-D bone reconstruction”. (Ph.D. expected 2015).
- Cong Chen, “Thiol-ene scaffolds as synthetic augments and grafts for repair of critical sized bone defects”, (Ph.D. expected 2014).
- Ammar Qureshi, “miRNA delivery system directed differentiation of adipose-derived stromal cells”, (Ph.D. expected 2013).
- Mark Hoppens, “Investigation of ceragenin core/shell nanoparticle conjugates as novel, selective antimicrobials and diagnostics for the treatment of antimicrobial resistant infections”, (MBE expected 2013)
- Lekeith Terrell, “Influence of Nanocomposite Composition on Adult, Adipose Derived Stem Cells”, (MBE Fall 2012).

- Andre Zanetti, “Modulation of hASC osteogenesis and inflammatory response by Akermanite/PCL nanocomposites”, Ph.D. Spring 2012).
- Emily Hodges, “Anti-microbial Self-Assembling “Click” Monolayers utilizing Silver Nanoparticles for Indwelling Medical Devices”, (MBE 2011).
- Ammar Quershi, “Biocompatible/bioabsorbable silver nanocomposite coatings”, (MBE 2010).

Grants/Fellowships:

1. National Science Foundation \$400,000 PI-Hayes D, J.

CAREER: Photoactivated miRNA delivery for modulation of human adipose stromal cell differentiation. 03/2013-03/2018

Goals: This grant provides support for the development of nanoscale, photoactivated, nucleic acid delivery systems to modulate bone and muscle tissue regeneration processes.

2. National Science Foundation \$597,807 PI-Monroe W.T.

Academic Research Infrastructure - Recovery and Reinvestment (ARI-R2) 09/2010 – 09/2013

Infrastructure Upgrades for Nano and Biotechnology Research at the LSU Agricultural Center

Goals: This grant provides funds for renovation of the PI’s and Co-PIs Hayes’ Laboratories (no salary, graduate student, supply or travel funds).

Role: Co-PI

3. National Science Foundation \$288,000 PI-Warner I.

CHE-1243916 Assessment of the Quartz Crystal Microbalance (QCM) as a Molecular Weight, 08/15/2012-07/31/2014

Role: Co-PI

4. NC-1194 NIFA PI: Monroe W.T. 10/01/11-09/30/16

“Nanotechnology and Biosensors MRP”

Role: Co-PI

5. LAB94093 NIFA PI: Hayes, D.J. 01/01/11-12/31/15

“Development of Multiscalar Materials for Biological Applications”

6. Longwell Family Foundation \$50,000 PI-Hayes DJ 01/2011-01/2012

Infection Resistant Nanocomposite Scaffolds for Critical Sized Defect Repair

7. Pennsylvania Life Science Greenhouse Grant, \$100,000, PI Hayes, D.J. 01/2004-01/2005

“Developing Nanostructured Deposited Thin films for Laser Desorption Mass Spectrometry”.

8. Arrow International Inc., Development Grant, \$250,000, PI Burlinson, 07/2003-02/2005

“Nanoparticle Based Antimicrobial Additives for use in Central Venous Catheter Coatings”, grant.

9. 1999-2002: Dean’s Fellowship in Engineering, The Pennsylvania State University, University Park, PA

Issued Patents:

- #7,427,526 Deposited thin films and their use in separation and sacrificial layer applications
- #7,309,620 Use of sacrificial layers in the manufacture of high performance systems on tailored substrates
- #7,238,594 Controlled nanowire growth in permanent, integrated nano-templates and methods of fabricating sensor and transducer structures
- #7,122,790 Matrix-free desorption ionization mass spectrometry using tailored morphology layer devices
- #7,052,616 Fabrication of molecular scale devices using fluidic assembly

- #6,794,196 Deposited thin films and their use in detection, attachment and bio-medical applications

Pending Patents:

- PCT/US2012/021806 Detection And Molecular Weight Determination Of Organic Vapors
- 20080135826 Controlled nanowire in permanent integrated nano-templates and method of fabricating sensor and transducer structures
- 20050176228 Controlled nanowire growth in permanent, integrated nano-templates and methods of fabricating sensor and transducer structures
- 20030157783 Use of sacrificial layers in the manufacture of high performance systems on tailored substrates
- 20030040173 Fabrication of molecular scale devices using fluidic assembly
- 20020187312 Matrix-free desorption ionization mass spectrometry using tailored morphology layer devices
- 20020048531 Deposited thin films and their use in detection, attachment, and bio-medical applications
- 20020020053 Deposited thin films and their use in separation and sacrificial layer applications
- Five Provisional patents are in process by LSU

Publications:

1. **Qureshi, A. T.; Landry, J. P.;** Dasa, V.; Janes, M.; **Hayes, D. J.**, "Can a Novel Silver Nano Coating Reduce Infections and Maintain Cell Viability in vitro?" *Journal of Biomaterials Applications* **2013** (under review).
2. **Qureshi, A. T.;** Monroe, W. T.; Dasa, V.; Gimble, J. M.; **Hayes, D. J.**, "miR-148b-Nanoparticle Conjugates for Light Mediated Osteogenesis of Human Adipose Stem Cells" *Biomaterials* 2013 (Under Review).
3. Cole, M. R.; Li, M.; Jadeja, R.; El-Zahab, B.; **Hayes, D.**; Hobden, J. A.; Janes, M. E.; Warner, I. M., "Minimizing human infection from Escherichia coli O157:H7 using GUMBOS" *Journal of Antimicrobial Chemotherapy* **2013**.
4. Zanetti, A. S.; Sabliov, C.; Gimble, J. M.; Hayes, D. J., "Human adipose-derived stem cells and three-dimensional scaffold constructs: a review of the biomaterials and models currently used for bone regeneration" *Journal of biomedical materials research. Part B, Applied biomaterials* 2013, *101*, 187-199.
5. **Zanetti, A. S.;** McCandless, G. T.; Chan, J. Y.; Gimble, J. M.; **Hayes, D.**, "In vitro human adipose-derived stromal/stem cells osteogenesis in akermanite:poly-ε-caprolactone bone scaffolds" *Journal of Biomaterials Applications* 2013, In Press.
6. **Brown, P.B., Qureshi AT, Hayes D,** Monroe WT, Silver Nanoscale Antisense Drug Delivery System for Photoactivated Gene Silencing. *ACS Nano* 2013 Accepted March 6th.
7. **Garber, L.;** **Chen, C.;** **Kilchrist, K. V.;** Bounds, C.; Pojman, J.; **Hayes, D.**, "Thiol Acrylate Nanocomposite Foams for Critical Size Bone Defect Repair: A Novel Biomaterial" *Journal of Biomedical Materials Research Part A.* 2013, In Press.
8. Scherr, T.; Quitadamo, C.; Tesvich, P.; Park, D. S.-W.; Tiersch, T.; **Hayes, D.**; Choi, J.-W.; Nandakumar, K.; Monroe, W. T., "A planar microfluidic mixer based on logarithmic spirals" *Journal of Micromechanics and Microengineering* 2012, *22*, 055019.
9. Regmi B, El-Zahab B, **Hayes D,** Warner I, Design Discrimination and Detection Volatile Organic Compounds using QCM Sensor Coated with GUMBOS-Cellulose Acetate Mixture, *Analytical Chemistry* (Under Review)
10. **Zanetti, A. S.;** McCandless, G. T.; Chan, J. Y.; Gimble, J. M.; **Hayes, D. J.**, "Characterization of novel akermanite:poly-ε-caprolactone scaffolds for human adipose-derived stem cells bone tissue engineering" *Journal of Tissue Engineering and Regenerative Medicine*, Online November 20th, 2012.

11. **Qureshi AT, Terrell L**, Monroe WT, Dasa V, Janes ME, Gimble J, **Hayes D**, Antimicrobial Biocompatible Bioscaffolds for Orthopedic Implants, *Journal of Tissue Engineering and Regenerative Medicine*, accepted April 4, 2012.
12. Cole, M. R.; Li, M.; El-Zahab, B.; Janes, M. E.; **Hayes, D.**; Warner, I. M., Design, Synthesis, and Biological Evaluation of β -Lactam Antibiotic-Based Imidazolium- and Pyridinium-Type Ionic Liquids. *Chemical Biology & Drug Design* **2011**, 78 (1), 33-41.
13. **Qureshi, A. T.**; Monroe, W. T.; Lopez, M. J.; Janes, M. E.; Dasa, V.; Park, S.; Amirsadeghi, A.; **Hayes, D. J.**, Biocompatible/bioabsorbable silver nanocomposite coatings. *J. Appl. Polym. Sci.* **2011**, 120 (5), 3042-3053.
14. Dumke JC, El-Zahab B, Challa S, Das S, Chandler L, Tolocka M, **Hayes D**, and I. Warner. 2010. Lanthanide-Based Luminescent NanoGUMBOS”, *Langmuir*. Article ASAP, Publication Date (Web): September 1, 2010. DOI: 10.1021/la102354h
15. Kalkan AK, Henry MR, Li HD, Cuiffi JD, **Hayes DJ**, Palmer C, and SJ Fonash. 2005. Biomedical/analytical applications of deposited nanostructured Si films”, *Nanotechnology* 16(8): 1383-1391.
16. Zguris JC, Itle LJ, **Hayes D**, Pishko MV. 2005. Microreactor microfluidic systems with human microsomes and hepatocytes for use in metabolite studies. *Biomedical Microdevices*; 7(2):117-25.
17. Cuiffi JD, **Hayes DJ**, Fonash SJ, Brown KN, Jones AD, 2001. Desorption-ionization mass spectrometry using deposited nanostructured silicon films”, *Analytical Chemistry*., 73 (6): 1292-1295.
18. Hornyak TJ, **Hayes DJ**, Ziff EB; 2000. Cell-density-dependent regulation of expression and glycosylation of dopachrome tautomerase/tyrosinase-related protein-2”, *Journal of Investigative Dermatology*. 115(1):106-12. (2000).
19. Hornyak TJ, **Hayes DJ**, Chiu LY, Ziff EB. 2001. Transcription factors in melanocyte development: distinct roles for Pax-3 and Mitf”, *Mechanisms of Development*; 101(1-2):47-59.
20. Kalkan AK, Bae SH, Li HD, **Hayes DJ**, Fonash SJ. 2000. Nanocrystalline Si thin films with arrayed void-column network deposited by high density plasma”, *Journal of Applied Physics* 88 (1): 555-561 (2000).
21. Hornyak, T. J.; **Hayes, D. J.**; Ziff, E. B., Pax-3 as a proliferation factor for developing murine melanocytes. *Journal of Investigative Dermatology* **1999**, 112 (4), 105.

Published Abstracts:

- “Nanotechnology in Business”, **Hayes DJ**, Cuiffi JD, *Abstracts of Papers of the American Chemical Society*. 230:, U712-U712 37-CHAL (2005).
- “Pax-3 as a proliferation factor for developing murine melanocytes”, Hornyak TJ, **Hayes DJ**, Ziff EB, *Journal of Investigative Dermatology*; 112 (4): 540-540 (1999).

Invited Presentations:

- TCL-2011, “New developments in nanotechnology for coatings and textiles: Uses, safety and regulation”, Orlando Florida, Fall 2011.
- ICCE-18, “18th Annual International Conference on Composites or Nano Engineering”, Anchorage AK, Summer 2010.
- Intertech Pira, “Antimicrobials in Consumer Applications”, Tampa Fl, Fall 2008
- INTC, "Nanotechnology and Protective Materials Sessions", Houston, TX, Fall 2008.
- Techtexil, “Application of Nanotechnology to Fiber and Fabrics”, Atlanta GA, Spring 2008.
- Intertech PIRA, “Antimicrobials in Plastic and Textile Applications” Orlando, FLA, Fall 2007.
- HiTex, “Impact of Nanotechnology in Textile Development”, Montreal, Quebec Canada, Fall 2006.
- International Nanotech Workshop, Venice, Italy, 2004.
- “Advances in Matrix Free Laser Desorption Mass Spectrometry”, Pfizer, Cambridge MA, Fall 2003.

Presentations and Posters:

- Ammar Qureshi, William Monroe, Jeffrey Gimble and Daniel Hayes. Photo Activated Silver Nanoparticle-Micro RNA Delivery Vehicles for Osteogenic Differentiation of Human ASC. Oral Presentation. ASME-NEMB- Spring 2013
- Ammar Qureshi, William Monroe, Jeffrey Gimble and Daniel Hayes. Temporal and Spatial Differentiation of Human Adipose Derived Stem Cells Using UV Radiation. Oral Presentation. ACS-SWRM Fall 2012
- Tumor-Targeting Hyperthermal Near-Infrared NanoGUMBOS. J. C. Dumke, A. Qureshi, D.J. Hayes, I. M. Warner. Oral Presentation. ACS-SWRM, Baton Rouge, Fall 2012
- Mark Hoppens, Ammar Qureshi, Zannan Wheeler, Paul Savage, W. T. Monroe, Daniel Hayes. Synthesis and Characterization of Ceragenin Functionalized Iron Core, Silver Shell Nanoparticles. ACS Southwest Regional Meeting. Baton Rouge, Fall, 2012
- Alex Cagnola, Ammar Qureshi and **Daniel Hayes**. Partially Coated Nanoparticle Delivery Vehicles for Targeted Drug Delivery. Poster LSU-SURF Summer 2012.
- Ammar Qureshi, William Monroe, Jeffrey Gimble and Daniel Hayes. Photo-Activated Micro-RNA Osteogenic and Angiogenic Differentiation of human ASC. Poster-ICBN Summer 2012.
- Leah Garber, Cong Chen, John Pojman, **Daniel Hayes**. Trithiol Acrylate Nanocomposite Foams for Critical Size Bone Defect Repair: A Novel Biomaterial. Oral Presentation-ACS SWRM, Baton Rouge, Fall 2012.
- Ammar Qureshi, William Monroe, Jeffery Gimble, **Daniel J Hayes**. Temporal and Spatial Differentiation of Human Adipose Derived Stem Cells Using UV Radiation, Oral Presentation-ACS SWRM, Baton Rouge, Fall 2012.
- Ammar Qureshi, Lekeith Terrell, William Monroe, Vinod Dasa, Marlene Janes, Jeff Gimble, **Daniel Hayes**. Antimicrobial Biocompatible Bioscaffolds for Orthopedic Applications. Poster-BMES Fall 2011.
- Ammar Qureshi, Jeffery Hobden, Paul Savage, **Daniel Hayes**. Targeted and Selective Antimicrobial Delivery System. Oral Presentation-BMES Fall 2011.
- Ammar Qureshi and **Daniel J. Hayes**. Multi-functional Hydrogel Nanocomposite for Drug Delivery Applications. Poster- BMES Fall 2010.
- Ammar Qureshi, W. Todd Monroe, Mandi Lopez, Marlene E. Janes and **Daniel J. Hayes**. Bacterial Biofilm Reduction Using Silver Nanocomposites on Chronic Implants. Poster- Particles Spring 2010.
- **Hayes DJ**, Openshaw M, Cuiffi JD, et al., “Matrixless, High Throughput, Combinatorial Compound Library Analysis on the Axima CFR+”, Poster NJACS – MSDG, Fall 2004.
- **Hayes DJ**, Openshaw M, Cuiffi JD, et al., “Rapid Compound Analysis by Matrixless Laser Desorption/Ionization” Poster ASMS, Fall 2004.
- Fan HX, **Hayes DJ** et al., “Drug Library Characterization using Matrixless MALDI”, Poster ASMS, Fall 2004.
- Cuiffi JD, **Hayes DJ**, Fonash SJ, “Drug Library Analysis by Matrix Free Laser Desorption/Ionization”, Poster ASMS, Fall 2003.
- **Hayes DJ**, “Microchemical Reactor Fabrication and Characterization”, Presentation, Micro and Nanobiotechnology Conference, Spring 2002.
- Weston DJ, Grotz DE, Kathleen Cox A, et al., “Rapid Drug Metabolite Screening by Non-Matrix Laser Desorption and MALDI/TOF-MS”, Poster ASMS, 2002.
- **Hayes DJ**, Cuiffi JD, Carter A, et al. “Analysis of the Effects of Nanostructured Thin Film Morphology and Surface Chemistry on Cell Adhesion”, Poster BioMEMS, Fall 2001.
- Cuiffi JD, Fonash SJ, **Hayes DJ** “Laser Desorption Mass Spectroscopy Using Thin Film Deposited Nanoporous Silicon”, Presentation MRS, Fall 2000.
- Fonash SJ, Cuiffi JD, **Hayes DJ**, et al., “Nanostructured Silicon for Biomedical Applications, SPIE, 2000.

University Service:

- Faculty Senate Budget and Planning Advisory Committee, 2010-2012

- College of Engineering Research and Economic Development Committees, 2011
- BAE Departmental Graduate Faculty committee, 2009-
- LA-STEM fellowship selection committee, 2009-
- BAE Department Head search committee, 2011
- LSU Orthopedic Research Consortium, 2009-
- Judge at the annual Phi Zeta research competition at the School of Veterinary Medicine. 2009-
- Non-chair committee member or Dean's representative on 12 graduate student committee