

## John D. Jarrell, PhD, PE

**EDUCATION-** **PhD, Biology, Medical Science and Engineering**, Brown University, Providence, Rhode Island, May 2008.  
**MSc, Materials Science and Engineering**, Brown University, Providence, Rhode Island, May 1991.  
**Professional Engineer License (PE), Mechanical Engineering**, Rhode Island, February 14, 1996.  
**ScB, Materials Science and Engineering**, Brown University, Providence, Rhode Island, May 1988.

**Dr. John D. Jarrell, PhD, PE**, is an experienced multi-discipline biomedical engineer and doctor of medical science specializing in consultation and expert opinions related to product development, intellectual property, risk, failure analysis, legal cases, product liability, accidents and personal injuries. His expertise includes the analysis of complex systems, designs and failures involving materials, mechanical, medical systems and warnings. As a licensed Professional Mechanical Engineer, he is actively involved in design, product development and research. He earned three degrees from Brown University, a Bachelors and Masters of Science in Materials Science and Engineering and a Doctorate in Biology, Medical Science and Engineering and received Medical training in histology, physiology, microbiology and pathology. He has an appointment in the Department of Orthopaedics at the Alpert Medical School of Brown University and at the Weiss Center for Orthopaedic Trauma Research at Rhode Island Hospital. He has US and foreign patents covering photoactive materials, active delivery films and medical applications. He is the author of multiple peer reviewed publications and abstracts in collaboration with academic, hospital and government investigators and authored a guide book on materials selection for designers. He has been awarded contracts by the Department of Veterans Affairs, Rhode Island Hospital and the US Department of Justice. He is an ASTM member for standards Committees F04, Medical and Surgical Materials and Devices and E58 on Forensic Engineering.

**SOCIETY AFFILIATIONS-** ASTM Intl.; Orthopaedic Research Society (ORS); Society for Biomaterials; National Society of Professional Engineers (NSPE); American Society for Materials, International (ASM); International Metallographic Society (IMS); Heat Treating Society (HTS); Society of Carbide and Tool Engineering (SCTE); Electronic Device Failure Analysis Society (EDFAS); Society for Automotive Engineering International (SAE); Surfaces in Biomaterials Foundation; International Association for Property and Evidence (IAPE), The International Congress for Joint Reconstruction (ICJR), National Association of Corrosion Engineers (NACE, Int.)

**CERTIFICATIONS-**Hazardous Waste, Laboratory Safety, Blood Borne Pathogens (Brown University), Electrosurgery CE Module (Valleylab, Institute of Clinical Education) Electrosurgery; Best Practices for Electrosurgery (Pfiedler Enterprises, 4hr CE, 2016), Human Participant Protections Education for Research Teams (National Institutes of Health), CITI Course in The Protection of Human Research Subjects, NAMS Remote Training ISO 10993 Biological Evaluation of Medical Devices

**AWARDS & HONORS-** 1) Best in Show, 1<sup>st</sup>, 2<sup>nd</sup> & 3<sup>rd</sup> Place Microscopy, ASM Intl., RI Chapter, 1994 2) Sigma Xi Honor Society. 3) RI Business Plan Contest winner 09' & 17' 4) RI House of Rep. Citation for developing a proprietary technology to thwart infection relating to medical device use, 5-09. 5) RI House of Rep. and Secretary of State, Certificate of Congratulations, (Res. 09-264) 6-09. 6) 2010 RI Innovation Award in Health Care & Biotechnology Innovations. 7) RI Governor Chafee Citation for 2014 RI Bioscience Award 8) PBN Fastest Growing Businesses 14', 15', Entrepreneurship 17'

### EMPLOYMENT & APPOINTMENTS

**Teaching Associate in Orthopaedics**, February 1, 2010 through June 30, 2019, Department of Orthopaedics, Alpert Medical School, Division of Biology and Medicine, Brown University. Biomaterials, surface treatment, bacteria and biofilm researcher.

**Founder, President and Managing Director** January 2009 to present, BIOINTRAFACE INC., North Kingstown, RI. Coordinates R&D and intellectual property for comprehensive collaborative development of Basic Science Research into practical medical technologies and treatments for medical devices and implants. Surface treatments and coatings for implants & medical devices.

**President**, April 1993 to present, **MATERIALS SCIENCE ASSOCIATES, LLC**, North Kingstown, RI. Biomedical Engineering, Metallurgical, Materials Science & Mechanical Engineering consulting services for Government, Hospital, Legal, Insurance, Medical, and Manufacturing needs. Performs failure analysis, materials, process and site evaluations, biomaterial and medical implant design and testing, fabrication and surgery, professional reports, oral presentations & expert opinions.

**Materials Science Engineer**, March 1991 to March 1993, Thielsch Engineering Inc., Cranston, RI. Provided engineering and failure analyses for local clients, including analysis of fastener systems, pressurized vessels and piping, electrical components, bearings, medical devices & coatings, nuclear components, manufacturing processes, materials and process selection. Specialized in fractography, chemical & corrosion analysis. Received in-house training from Helmut Thielsch, Sr., PE.

**Research and Teaching Assistant**, September 1989 to February 1991, Brown University, Department of Advanced Materials Research, Providence, RI. Investigated a lightweight aerospace material for Martin Marietta Laboratories, with enhanced room temperature fracture toughness and the effect of high rate pressure-shear on copper foils, for the Office of Naval Research.

**Engineering Investigator**, March 1987 to September 1989, Avery Technical Services (ATS), Inc., Barrington, RI. Investigated, analyzed, and documented industrial, home and automotive incidents involving mechanical and material failures for legal and insurance purposes. Specialized in personal and industrial accident reconstructions.

## RESEARCH PUBLICATIONS

Jay M. Vincelli, Fatih Calakli, Michael A. Stone, Graham E. Forrester, Timothy Mellon, and **John D. Jarrell**. "Characterizing a Debris Field Using Digital Mosaicking and CAD Model Superimposition from Underwater Video." *Photogrammetric Engineering & Remote Sensing* 82, no. 3 (2016): 223-232.

Nhiem Tran, Michael N. Kelley, Phong A. Tran, Dioscaris R. Garcia, **John D. Jarrell**, Roman A. Hayda and Christopher T. Born. Silver Doped Titanium Oxide - PDMS Hybrid Coating Inhibits *Staphylococcus aureus* and *Staphylococcus epidermidis* Growth on PEEK, *Materials Science and Engineering: C* 49 (2015): 201-209.

Nathan P. Thomas, Nhiem Tran, Phong A. Tran, Jerry L. Walters, **John D. Jarrell**, Roman A. Hayda, Christopher T. Born, Characterization and Bioactive Properties of Zirconia based Polymeric Hybrid for Orthopedic Applications, *Journal of Materials Science: Materials in Medicine*, 25:347-354.

Matthew D. Young, Nhiem Tran, Phong A. Tran, **John D. Jarrell**, Roman A. Hayda, Christopher T. Born. Niobium oxide–polydimethylsiloxane hybrid composite coatings for tuning primary fibroblast functions, *J Biomed Mater Res A*, (Online JUNE 24, 2013), 102 (5), 1478-1485.

Nhiem Tran, Phong Tran, **John D Jarrell**, Julie Engiles, Matthew Young, Nathan Thomas, Roman Hayda and Christopher Born. In vivo Caprine Model for Osteomyelitis and Evaluation of Biofilm Resistant Intramedullary Nails, *BioMed Research International*, vol. 2013, Article ID 674378, 11 pages, 2013. doi:10.1155/2013/674378

**J. Jarrell**, N. Thomas, M. Young, C. Baker, J. Morgan, P. Tran, N. Tran, R. Hayda, C. Born. Bioactive Hybrid Material Surface Treatments for Infection Resistant Implants without Drugs, *ASM, Medical Device Materials VI, Proceedings from the Materials and Processes for Medical Devices Conference*, August 8–10, 2011, Minneapolis, Minnesota, USA, pg 143-148.

**J. Jarrell**, J. Walters, N. Thomas, M. Young, P. Tran, N. Tran, R. Hayda, C. Born. Improving the Bioresponse to Polymers using Zirconium and Tantalum Hybridization, *ASM, Medical Device Materials VI, Proceedings from the Materials and Processes for Medical Devices Conference*, August 8–10, 2011, Minneapolis, Minnesota, USA, pg 74-79.

**Jarrell JD**, Dolly B, Morgan JR. Rapid screening, in vitro study of metal oxide and polymer hybrids as delivery coatings for improved soft-tissue integration of implants. *J Biomed Mater Res A*, Volume 92A, Issue 3, Pages 1094-1104, 1 March 2010.

Puckett, Sabrina D., Deborah M. Ciombor, **John Jarrell**, Roy K. Aaron, and Thomas J. Webster. "In vitro and in vivo studies of electron beam evaporated titanium surfaces for orthopedic applications." In *Bioengineering Conference, 2009 IEEE 35th Annual Northeast*, pp. 1-2. IEEE, 2009.

**Jarrell JD**, Dolly B, Morgan JR. Controlled release of vanadium from titanium oxide coatings for improved integration of soft tissue implants. *J Biomed Mater Res A*, Volume 90A, Issue 1, Pages 272-281, June 2009.

**Jarrell JD**. Active metal oxides and polymer hybrids as biomaterials. PhD Thesis, Brown University, Providence RI, USA 2008.

**Jarrell JD**, Eun TH, Samale M, Briant C, Sheldon BW, Morgan JR, Metal Oxide Coated (MOC) Cell Culture Arrays for Rapid Biological Screening. *Journal of Biomedical Materials Research: Part A* 2007;83A:853-860.

**JD Jarrell**, Dislocation Structures of OFHC Copper Deformed by High Rate Pressure-Shear, Master's Thesis: Brown University, Providence, RI, May 1991.

## ABSTRACTS

J. Vincelli, **J. Jarrell**, Non-polar loading in metal-on-metal hip retrievals, 2nd International Conference on BioTribology, Toronto, Canada, 11-14 May 2014.

J. Vincelli, **J. Jarrell**, Metal-on-Metal Hip Wear Patterns of Explanted Components Do Not Match Simulator Results, Society For Biomaterials 2014 Annual Meeting and Exposition: Denver, CO, USA, April 16-19, 2014.

Nhiem Tran, Michael N. Kelley, **John D. Jarrell**, Roman A. Hayda, Christopher T. Born, Silver Doped Titania – Siloxane Hybrids: Novel Coatings for Improving Antibacterial Property of Polyether Ether Ketone (PEEK), The Stevens Conference: The 2<sup>nd</sup> Conference on bacteria-Materials Interactions, Hoboken, NJ, June 2013.

**J.D. Jarrell**, N. Tran, P.A. Tran, J. Engiles, R.A. Hayda, C.T. Born. Bioactive hybrid materials coating for infection resistant implants and devices, Hybrid Materials 2013, Third International Conference on Multifunctional, Hybrid and Nanomaterials, Sorrento, Italy, March, 2013.

**J.D. Jarrell**, N. Tran, R.A. Hayda, C.T. Born, Antimicrobial silver release from titanium oxide polymer hybrid coated PEEK, Hybrid Materials 2013, Third International Conference on Multifunctional, Hybrid and Nanomaterials, Sorrento, Italy, March, 2013.

**Jarrell JD**; Tran N; Born CT. Improving the Bioactive properties of Polyether ether ketone (PEEK) with Antimicrobial Titanium Oxide Hybrid Coatings. 59th Annual Meeting of the Orthopaedic Research Society, San Antonio, Texas, January 2013.

Tran N, Tran PA, Baker C, **Jarrell JD**, Hayda RA, Born CT. In vitro and in vivo evaluation of bioactive hybrid materials coating for infection resistant implants. Journal of Tissue Engineering and Regenerative Medicine, Proceeding of TERMIS 2012.

**Jarrell JD**; Tran PA; Baker C; Morgan JR; Hayda RA; Born CT. Bioactive Hybrid Material Surface Treatments for Infection Resistant Implants without Drugs, ASM, Materials and Processes for Medical Devices 2011, Annual Meeting and Exposition: Minneapolis, MN, USA, August 8-10, 2011.

Tran PA; **Jarrell JD**; Baker C; Hayda RA; Born CT. Improving the Bioresponse to Polymers using Zirconium and Tantalum Hybridization, ASM, Materials and Processes for Medical Devices 2011, Annual Meeting and Exposition: Minneapolis, MN, USA, August 8-10, 2011.

**Jarrell JD**; Tran PA; Baker C; Morgan JR; Hayda RA; Born CT. Surface Treatments for Orthopaedic Implants which Prevent Bacteria Growth and Support Cell Proliferation, Society For Biomaterials 2011 Annual Meeting and Exposition: Orlando, Florida, April 13 - 16, 2011.

Tran PA; **Jarrell JD**; Baker C; Morgan JR; Hayda RA; Born CT. Effects of Addition of Transition Metal Oxides to Polymer on Growth of Human Cells, Society For Biomaterials 2011 Annual Meeting and Exposition: Orlando, Florida, April 13 - 16, 2011.

**Jarrell, J D**; Young M D; Walters J L; Trans P; Born, C T. Transitional Metal Oxide Hybrid Surface Treatments for Bioactive and Antimicrobial Orthopaedic Trauma Implants, 57th Annual Meeting of the Orthopaedic Research Society, Transactions Vol. 36, No. 1550, Long Beach, CA, January 2011.

Tran PA; **Jarrell J D**; Young MD; Walters JL; Hayda RA; Born CT. Hybrid Surface Treatments for Bioactive and antimicrobial Orthopaedic Trauma Implants, 18<sup>th</sup> Annual Hospital Research Celebrations, Rhode Island Hospital, October 21, 2010.

**Jarrell, J D**; Spenciner, D; Morgan, J R; Hayda, R A; Born, C T. Antimicrobial Hybrid Coatings for External Fixation Pins, Society For Biomaterials 2010 Annual Meeting; April 21 - 24, 2010 in Seattle, Washington, USA.

Sabrina D. Puckett, Deborah M. Ciombor, **John Jarrell**, Roy K. Aaron, and Thomas J. Webster. In Vitro and In Vivo Studies of Electron Beam Evaporated Titanium Surfaces for Orthopedic Applications, Bioengineering Conference, 2009 IEEE 35th Annual Northeast, 3-5 April 2009, Boston, MA, USA, pg1-2.

**Jarrell, J D**; Puckett, S; Morgan, J R; Hayda, R A; Born, C T. Durability of Bioactive, Antimicrobial Biointerface on External Fixation Pins, 56th Annual Meeting of the Orthopaedic Research Society, New Orleans, Louisiana, Transactions Vol. 35, No. 2177, New Orleans, LA, 2010.

**Jarrell, J D**; Werlin, E C; Weinstock, B; Puckett, S D; Morgan, J R; Ciombor, D M; Aaron, R K. Rapid Development of Photoactive Solid State Dispersions as Biointerfaces for Orthopaedic Implants, Hybrid Materials 2009, First International Conference on Multifunctional, Hybrid and Nanomaterials, Transactions, A1.3.07, Tours France, March, 2009.

**Jarrell, J D**; Werlin, E C; Weinstock, B; Puckett, S D; Morgan, J R; Ciombor, D M; Aaron, R K. Rapid Development of Biointerfaces for Antimicrobial Transcutaneous Osseointegrated Implant Devices (TCOIDs). 55th Annual Meeting of the Orthopaedic Research Society, Transactions Vol. 34, No. 0555, Las Vegas, NV, February, 2009.

**John D Jarrell**, Evan C Werlin, Sabrina Puckett, Jeffrey R Morgan. Active metal oxide and polymer hybrid coatings for antimicrobial devices. BioInterface 2008, Annual Symposium, Surfaces in Biomaterials Foundation, Min., MN, October, 2008.

Evan C. Werlin, **John D. Jarrell**, Jeffrey R. Morgan, The Effect of Precursor Selection and Coating Thickness on the Photoactivity of a Novel Metal-Polymer Hybrid. 34th Annual North East Bioengineering Conference, April 4-6, 2008.

**JD Jarrell**, EC Werlin, JR Morgan. Novel light-activated antimicrobial controlled delivery polymer hybrids for osseointegrated transcutaneous devices. 54th Annual Meeting of the Orthopaedic Research Society, Transactions Vol. 33, No. 1729, San Francisco, CA March, 2008.

**John D Jarrell** and Jeffrey R Morgan. Bioactive Polymer Hybrids to Improve the Soft Tissue Seal Around Percutaneous Devices. BioInterface 2007, Annual Symposium, Surfaces in Biomaterials Foundation, San Mateo, CA, October 31, 2007.

**John D. Jarrell**, Jeffrey R. Morgan, Bioactive Polymers for Soft Tissue Sealing of Osseointegrated Prosthetic Attachments, 6th Combined Meeting of the Orthopaedic Research Societies, Honolulu, Hawaii, No. 0063, October 21-24, 2007

Morgan, J.R., **Jarrell, J.D.**, Holt, B., Tripathi, A., and Aaron, R.K. Optimizing the Soft Tissue Seal of a Percutaneous Osseointegration Device. No Barriers Symposium, Squaw Valley, CA. June 30, 2007.

Morgan, J.R., **Jarrell, J.D.**, Holt, B., Tripathi, A., Webster, T., Ciombor, D.M., and Aaron, R.K. Optimizing the Soft Tissue Seal of a Percutaneous Osseointegration Device. 4th International Meeting, Ten Years of the US-Russian Program in Prosthetics and Rehabilitation, New England Sinai Hospital, Stoughton, MA, June 18, 2007.

**John D. Jarrell**, Tai Hee Eun, Marcus Samale, Clyde Briant, Brian W. Sheldon, Jeffrey R. Morgan, Use of specialized metal oxide films for delivery of bioactive metal compounds, Orthopaedic Research Society, Transactions Vol. 32, No. 1590, San Diego, CA, 2007.

**JD Jarrell**, Crisco, J.J.\*, Moore, D.C.\*, McGovern, R.D.\*, Coating of Stainless Steel Bone Cutting Devices Enhances Functional Performance, Society for Biomaterials, 23 rd Annual Meeting in conjunction with the 29th International Biomaterials Symposium, New Orleans, Louisiana, April-May 1997, vol. xx, pg 416. (\*Orthopedic Research Laboratories, Rhode Island Hospital)

**J.D. Jarrell**, A Non-Wetting, Conductive Coating Replacement for Teflon (PTFE) in Surgical Applications, Surfaces in Biomaterials '94, Scottsdale, Arizona, September 1994.

**JD Jarrell**, Chemical Passivation of Stainless Steels Eliminated By Using ME-92 Chromium Composition Coating, Society for Biomaterials, 20th Annual Meeting in conjunction with the 26th International Biomaterials Symposium, Boston, Massachusetts, April 1994

RJ Clifton, W Tong, **JD Jarrell**, Brown University, Dislocation Structures and the High Rate Deformation of Pure Metals, Greece Symposium, 1990.

## INDUSTRY PUBLICATIONS

**Jarrell JD.**, BioIntraface®: The Next Quantum in Medical Devices. R I Med J (2013). 2013 Feb 1;96(2):26-8.

**JD Jarrell** and Frank Bejbl, Medical Plastics and Biomaterials: Special Section, Understanding Wear and Friction in Medical-Grade Stainless Steels, Medical Device & Diagnostic Industry, Canon Communications, August 1999, pg 50-57.

**JD Jarrell**, Safe, Smooth, Stable Coating Alternative to Teflon, Job Shop Technology Magazine, Prospect, CT, April 1998.

**JD Jarrell**, Improper Cleaning of Stainless Steels can Cause Delayed Cracking, Job Shop Technology Magazine, Prospect, CT, November 1994.

**JD Jarrell** and Frank Bejbl, Versatile Coating for Stainless Steel, Medical Materials Update, BBC, Inc., Publication, Norwalk, CT, USA, Volume 1, Number 5, June 1994.

**JD Jarrell**, Chemical Passivation of Stainless Steels Eliminated By Using ME-92 Chromium Composition Coating, Job Shop Technology Magazine, July 1994.

**JD Jarrell**, Chemical Passivation of Stainless Steels Eliminated By Using ME-92 Chromium Composition Coating, Medical Equipment Designer Magazine, March 1994.

## BOOKS

**JD Jarrell**, The Medical Device Designer's Guide to Wear and Friction, ME-92 Operations, Providence, Rhode Island, USA, April 1995.

## BULLETINS

**JD Jarrell**, Using Medical Grade Coating Technology to Address Nickel Sensitization, ME-92 Operations Bulletin Report, by Materials Science Associates, Providence, RI, May 6, 1994.

**JD Jarrell**, Improving the Wear, Galling and Frictional Characteristics of Medical Instruments with ME-92® Coating, ME-92 Operations, Internal Report by Materials Science Associates, Providence, RI, November 1993.

**JD Jarrell**, Use of ME-92 Coating to Reduce the Risk of Exposure to Bioreactive Nickel-Bearing Materials," ME-92 Operations Bulletin Report, by Thielsch Engineering Inc., Cranston RI, April 22, 1993.

## SEMINAR PRESENTATIONS

Invited Panelist: Rhode Island Perspectives on Advancing Research, Development, and Medical Innovation- Senator Sheldon Whitehouse and the RI Tech Collective hosted roundtable discussion to hear from Rhode Island's biotech industry about opportunities and barriers to translating scientific discovery into innovative treatments and medications for patients. This discussion will inform Senator Whitehouse's work with the Senate Health, Education, Labor, and Pensions Committee to examine current policies and processes at the National Institutes of Health and Food and Drug Administration and identify reforms to foster medical innovation, support the next generation of research scientists, and get treatments to patients quickly and safely. **Tech Collective, Providence, RI, June 15, 2015**

*Invited Speaker: Trends & Opportunities in the Engineering Industry*  
**CareerBuilder.com, WebEx Conference, December 5, 2008.**

*Active metal oxide and polymer hybrid coatings for antimicrobial devices*  
**BioInterface, Workshop and Symposium, Antimicrobial Surfaces Session, Minneapolis, MN, October 28, 2008.**

*Novel light-activated antimicrobial controlled delivery polymer hybrids for osseointegrated transcutaneous devices.*  
**54th Annual Meeting of the Orthopaedic Research Society, March, 2008.**

*Bioactive Polymers for Soft Tissue Sealing of Osseointegrated Prosthetic Attachments,*  
**6th Combined Meeting of the Orthopaedic Research Societies, Honolulu, Hawaii, October, 2007**

*Advanced Bioactive Hybrid Materials for Percutaneous Devices,*  
**Rhode Island Hospital, Grand Rounds, Student Research Day, May 23, 2007**

*Use of specialized metal oxide films for delivery of bioactive metal compounds*  
**Orthopaedic Research Society, San Diego, CA, February, 2007.**

*Rapid biological screening of metal-organic coatings for percutaneous devices,*  
**Regional Bioengineering and Biotechnology Conference U. Mass. Dartmouth, February 9, 2007**

*Invited Speaker: Fatigue failure of a stainless steel propeller shaft,*  
**National Association of Marine Surveyors, New England Region, December, 2001**

*Invited Speaker: Metallurgical failure analysis,*  
**National Association of Marine Surveyors, New England Region, November 5, 1999**

*A Non-Wetting, Conductive Coating Replacement for Teflon (PTFE) in Surgical Applications,*  
**Surfaces in Biomaterials '94, Scottsdale, Arizona, September 1994**

*Chemical Passivation of Stainless Steels Eliminated By Using ME-92 Chromium Composition Coating,*  
**Society for Biomaterials, 20th Annual Meeting in conjunction with the 26th Internationals Biomaterials Symposium, Boston, Massachusetts, April 1994.**

#### **INVITED REVIEWER FOR:**

##### **Journal of Biomedical Materials Research: Part A**

Official Journal of the Society for Biomaterials (USA)  
John Wiley & Sons, Inc., 111 River Street, Hoboken, NJ 07030, USA

##### **Medical Science Monitor**

International Medical Journal for Experimental and Clinical Research  
International Scientific Literature, Inc. 361 Forest Lane, Smithtown, NY 11787, USA

##### **Tissue Engineering**

Mary Ann Liebert, Inc., 140 Huguenot Street, 3rd floor, New Rochelle, NY 10801-5215

##### **Journal of Material Science: Materials in Medicine**

Springer Publishing, 15th floor, Salmon Tower Midtown Manhattan, New York City, NY

## PATENTS & APPLICATIONS

U.S. Patent Application No.: 15/331,063: Inventor: John D. Jarrell  
Title: **METAL OXIDE AND POLYMER CONTROLLED DELIVERY SYSTEMS, SUNSCREENS, TREATMENTS, AND TOPICAL COATING APPLICATORS**, Filing Date: October 21, 2016

U.S. Patent Application No.: 14/899,972, Inventor: Dioscaris Garcia, John Jarrell, Christopher T. Born  
Based on International Application No.: PCT/US2015/066460 Filing Date: December 18, 2015  
*Visualization of Bacterial Colonization and Biofilm Formation on Orthopaedic Trauma Explants*

U.S. Patent Application No.: 14/748,611. Inventor: John D. Jarrell, Filing Date: June 24, 2015  
*Dose Applicator for Point of Use Mixing*

United States Patent 7868078, *Composition including metal oxide and polymer*

United States Patent 8080223, *Method of making a composite from metal oxide and polymer precursors*

US Applications: 20090104095, 12/253530 (Utility, Patent pending) Filed 10/17/2008  
*Method of Making a Composite from Metal Oxide and Polymer Precursors*

20090105384 (12/253555), 20090104473 (12/253354) (Utility, Patent pending) Filed 10/17/2008  
*Novel Compositions and Related Methods, Coatings, and Articles*

20110092870 (12/975,218) Filed 12/21/2010  
*Composition including metal oxide and polymer*

US 60/981263 Filed 10/19/2007 (provisional application)  
*Novel Compositions and Related Methods, Coatings, and Articles*

US 61/556184 Filed 12/05/2011 (provisional application)  
*Multi-layer metal oxide and polymer controlled delivery systems*

International Application PCT/US08/80371, Filed 10/17/2008  
*Novel Compositions and Related Methods, Coatings, and Articles*

## ADDITONAL TRAINING

### **NAMSA Remote Training Series on ISO 10993 “Biological Evaluation of Medical Devices”**

- Part 1: Evaluation and testing in the risk management process (September 17, 2014)
- Part 3: Tests for genotoxicity, carcinogenicity and reproductive toxicity (October 1, 2014)
- Part 4: Selection of tests for interactions with blood (October 15, 2014)
- Part 5: Tests for in vitro cytotoxicity (October 29, 2014)
- Part 6: Tests for local effects after implantation (November 12, 2014)
- Part 7: Ethylene oxide sterilization residuals (December 3, 2014)
- Part 10: Tests for irritation and delayed-type hypersensitivity (December 17, 2014)
- Part 11: Tests for systemic toxicity (December 30, 2014)
- Part 12: Sample preparation and reference materials (January 14, 2015)
- Part 17: Establishment of allowable limits for leachable substances (January 28, 2015)
- Part 18: Chemical characterization of materials (February 11, 2015)

## RESEARCH & CONSULTING CONTRACTS

US Department of Justice  
United States Attorney's Office  
Thomas H. Barnard, Esq.  
36 S. Charles Street, 4th Floor  
Baltimore, Maryland 21201  
Contract 11 W-USA37-0090

7/1 /201 1 6/29/2012

\$23,850.50

**Expert Consultant on behalf of the US.** Aided defense counsel in a Medical Malpractice case involving a failed electro-surgical forceps used in a laparoscopic gynecological procedure, hysterectomy.

Airlift Research Foundation (Sub-award) 1/1/2010-1/1/2012 \$101,863

**In Vitro Optimization and Large Animal Study of Anti-infective, Bioactive Intramedullary (IM) Nails:** This project involves a two year multi-disciplinary effort, optimizing promising nano-technology hybrid surface treatments and applying them fracture fixation implants were are exposed to drug-resistant bacteria and placed in large animals. There is twelve months of *in vitro* work to measure the responses of human cells and bacteria to a series of nano-scale surface treatments, metal oxides and polymer hybrids. This is followed by *in vivo* testing of bacterial inoculated bone screws in a large animal model during the second year. Our goal is to find and test the next generation of bioactive surfaces that actively inhibits bacteria biofilm formation and maximizes bone growth and fracture repair. The animal study is a necessary part of the pre-clinical process leading to an approved human study. A favorable outcome from this pre-clinical research is intended to lead to an FDA approved follow-up clinic study.

Orthopaedic Trauma Research Fund 1/1/2009-7/1/2010 \$188,462  
Rhode Island Hospital  
Providence, RI/USA

**A Bicortical Half Pin Mini-pig Model to Evaluate New Bio-interfaces:** This project involves coordinating a multi-discipline approach to the development of large animal models for evaluation the tissue integration and antimicrobial properties of novel biomaterials developed for internal and external fixation devices and bone integration and skin attachment to transcutaneous osseointegrated devices for prosthetic attachment and the treatment of segmental bone defects. A roundtable approach is taken, involving trauma research clinicians, biologists and engineers from academics, hospitals and industry. A high throughput *in vitro* screening approach is used to validate coating compositions with optimized antimicrobial, cell proliferative and adhesive properties and applied to stainless steel, titanium alloy and composite implants.

VA24-P-0464 (Contract Consultant) 2/1/08-12/30/08 \$104,000  
Department of Veterans Affairs  
VMAC, Providence, RI/USA

**Study: Bone and Skin Attachment for Prosthetic Attachment:** This is an investigation of bone integration and skin attachment to transcutaneous osseointegrated devices for prosthetic attachment and treatment of segmental bone defects. The goal is a combine device for use in the repair of traumatic injuries. Biomaterials, device design and surgical approaches are coordinated between multiple disciplines, Biology, Medicine and Engineering nano technology, to address the need for implants which improve healing of segmental bone defects, osseointegration, soft tissue sealing, while preventing infection. A high throughput *in vitro* screening approach is used to determine coating compositions with optimized antimicrobial, cell proliferative and adhesive properties and applied to titanium alloy and composite implants. Developed small and large animal models.