REED A. AYERS

ADDRESS AND TELEPHONE NUMBERS:

5940 Easley Road
Golden, CO 80403
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EDUCATION:

Ph.D. *Aerospace Engineering Sciences*, University of Colorado (December, 1999)
"Interaction between bone and porous biomaterials in human and rabbit craniomaxillofacial bone": Drs. Steven Simske and Robert Norrdin, advisors

M.S. *Aerospace Engineering Sciences*, University of Colorado (December, 1995)

B.S. *Aerospace Engineering Sciences*, University of Colorado (May, 1987)

PROFESSIONAL EXPERIENCE:

2012-Present	Founder and Chief Science Officer, Verkko Biomedical, LLC
2006-Present	Assistant Professor, Department of Metallurgical and Materials Engineering, Colorado School of Mines
2009-Present	Assistant Clinical Professor, Orthopaedics, University of Colorado, Denver, School of Medicine
2009-Present	Consultant with Humatec (medical device failure), Kansas City, KS and PorOsteon (combustion sythesis of NiTi for bone tissue engineering), Menlo Park, CA
2000-2006	*Research Assistant Professor*, Center for Commercial Applications of Combustion in Space, Colorado School of Mines
2002-2005	*Research Associate*, BioServe Space Technologies, Department of Aerospace Engineering Sciences, University of Colorado
2004-2005	*Instructor*, Mechanical Engineering, Colorado State University
1999-2000	*Postdoctoral Fellow*, Center for Commercial Applications of Combustion in Space, Colorado School of Mines
1994-1999	*Graduate Research Assistant*, BioServe Space Technologies, Department of Aerospace Engineering, University of Colorado
1997-1998	*Engineer*, Laboratory Automation Research and Development, Amgen Biopharma, Inc.
1996-1997	*Research and Development Engineer*, Outlast Technologies Inc.
1987-1994	*Mass Properties Engineer*, Systems Integration and Mission Operations, Martin Marietta, Space Launch Systems

PATENTS

- U.S. Applications:
  1) 20040019385, Manufacture of Porous Net-Shaped Materials Comprising of Alpha or Beta Tricalcium Phosphate or mixtures thereof, **Ayers** RA, Simske SJ, Moore JJ, Castillo M, Gottoli G. June, 2003.
  2) 20080112874, Method for Producing Calcium Phosphate Powders Using an Auto-Ignition Combustion Synthesis Reaction, Burkes; Douglas E., Moore; John J., **Ayers**, Reed A.
  3) 20030074081, Non-uniform porosity tissue implant, Ayers, Reed A.

- 4 additional Patent applications submitted by Colorado School of Mines in 2012 and 2013 based on combustion synthesis processes for biomaterials (laser ignition, antibiotic calcium phosphates, enhanced load bearing calcium phosphate, self-reporting implants)

RESEARCH INTERESTS:

- Manufacture of materials for bone engineering including, shape memory alloys, multiphasic calcium phosphate ceramics, bioabsorbable materials.
- Synthesis (FAST, SPS, Combustion) processing (casting) and characterization of light alloys (titanium, magnesium and CoCr alloys).
- Reactive Materials Structures (RMS) synthesis using SPS.
- Failure analysis of medical devices and materials.

GRANTS AND AWARDS

Society of Biomaterials, Oral and Craniofacial Special Interest Group, Best Poster, Combustion Synthesis of Calcium Phosphate Blocks Doped with Silver for Treatment of Large Scale Battlefield Injuries, N. Vollmer and R. **Ayers**, Annual meeting, October 4-7, 2012.

American society of Dermatopathology, Physician in Training Award Oral Abstract, Unusual response to ear piercing: granulomatous response to titanium alloy? High WA, **Ayers** RA, Chang A, Fitzpatrick JE. 42nd Annual Meeting, Seattle Washington, October 20-23, 2005.

Funded research:

State of Colorado Biomedical Economic Development Grant, Tricalcium phosphate manufacture for biomedical applications, Reed Ayers sole PI ($35,000). September 2011-August 2012. Completed.

University of Colorado, ($5,000) Calcium Phosphate/Collagen scaffold intervertebral spacer. Reed Ayers PI, Summer 2011. Completed.

NIH - 1R15 AR060011-01 The Anelastic Strain Response of Spine Rods in a Biologic Environment – Reed Ayers, sole PI ($287,000). September 2010-August 2013.

Sub contract to DE Technologies under **DARPA Program (BAA 08-23)** – Spark Plasma Sintering of Novel Reactive Materials – Reed A. Ayers, sole PI ($235,000). January 2009-September 2010. Completed. Program terminated due to budget cuts.

Industry Funded Research:

Lanx Spine Inc. $16,000 materials grant. Lanx supplies spinal instrumentation for the NIH R15 program.

Cerapedics, Inc. – Enhanced Incorporation of P-15 to Calcium Phosphate Materials – Reed A. Ayers 50% PI ($55,000) – September 2008-May 2010. Completed.

Sulzer Medica, Bone Morphogenic Protein Drug Delivery Systems, $15,000. 2004, Completed

Colorado Institute for Research in Biotechnology, Novel Porous Metal Implant Materials Impregnated with Bone Growth Factors for Application in Bone Repair and Replacements, 1998. $125,000, Completed.

TEACHING EXPERIENCE AND ACADEMIC SERVICE

- Created, developed and teach a senior/first year graduate level course, *Introduction to Biocompatability*, MTGN/MLGN 570, 2000-present. This class is a required class in the Ph.D./M.S. Biomaterials emphasis in Materials Science as well as for the Bioengineering and Life Sciences Undergraduate Minor in Materials Sciences.
- Currently teach the fundamental materials science class for the university, MTGN 202, Engineered Materials Systems, Fall and Spring semesters since 2006.
- Materials Science Senior Design class project advisor, every year since 2006.
- Developed a 6 course undergraduate minor curriculum for a Bioengineering and Life Sciences Undergraduate Minor in the MME Department as well as a 4 course emphasis in Biomaterials in CSM's Bioengineering and Life Sciences degree program. Recently created the 4 course Biomaterials Area of Special Interest (ASI) within the MME Department (published in 2011-2012 Mines Undergraduate Bulletin).
- Instructor for undergraduate course, *Introduction to Engineering Materials*, ME331, Colorado State University, 2004-2005.
- Member of the Metallurgy and Materials Science Department's Undergraduate Affairs Committee; lead in developing Colorado School of Mines' Biomaterials Ph.D./Master's focus area curriculum, 2002 and Area of Special Interest certification for undergraduates in 2010.
- Member of committee to establish Bioengineering and Life Sciences Program/Department at the Colorado School of Mines, 2002.

NSF BMAT proposal review panels.
NIH R15 Review Panel, Bioengineering Sciences and Technologies Initial Review Group.

PROFESSIONAL MEMBERSHIPS:

ASM Medical Materials Strategic Analysis Committee, member 2012-2015
ASM – MPMD (Materials and Processes in Medical Devices)
Society for Biomaterials

PUBLICATIONS:

Book Chapters:

Reed Ayers, Biomaterials. In: Jay R. Lieberman, MD, (ed) AAOS Comprehensive Review, In Press 2013.

Ayers RA, Bateman TA, Simske SJ, Porous NiTi as a material for bone engineering. In: LH Yahia (ed) Shape Memory Implants, Springer-Verlag, Berlin, 2000, pp. 73-88.

Simske SJ, **Ayers** RA, Bateman TA, Porous materials for bone engineering. In: Liu, D.-M., Dixit, V. (eds.) Materials Science Forum, vol. 250: Porous Materials for Tissue Engineering, Transtech, Enfield, NH, 1997, pp 151-182.

Journal Articles:

2013:

Reed **Ayers**, Matt Hayne, David Jann, Julian Stock, Cosan Unuvar, Spark Plasma Sintering (SPS) of Hf/Al Reactive Metal Structures. Propellants, Explosives, and Pyrotechnics. Accepted.

2012:

N. Vollmer and R. **Ayers**, Calcium Phosphate Powders Produced via Decomposition Combustion Synthesis for Bone Tissue Engineering. International Journal of Self-Propagating High Temperature Synthesis. In Press. 2012.

2011:

Reed **Ayers**, Nolan Hannigan, Nina Vollmer, Cosan Unuvar, Combustion Synthesis of Multiphase Calcium Phosphate Biomaterials from CaO and P_2O_5 Precursors, International Journal of Self-Propagating High Temperature Synthesis. 2011, Vol. 20, No. 1, pp. 6–14.

M. A. Karsh and R. A. **Ayers**, Self-Propagating High Temperature Synthesis to Produce CoCrMoC from Elemental Powders. International Journal of Self-Propagating High Temperature Synthesis, 2011, Vol. 20, No. 3, pp. 141–147.

Andriy Noshchenko, Yao Xianfeng, Grant Alan Armour, Todd Baldini, Vikas V. Patel, Reed **Ayers**, Evalina Burger, Evaluation of spinal instrumentation rod bending characteristics for *in-situ* contouring, J. Biomed Mater. Res. Volume 98B, Issue 1, pp. 192–200, July 2011

Fouad Zhim, Reed A. **Ayers**, John J. Moore, Richard Moufarrège, L'Hocine Yahia, Personalized implant for high tibial opening wedge: combination of solid freeform fabrication with combustion synthesis process. J. Biomaterials Applications. Available online, July, 2011.

2007:

Reed **Ayers**, Virginia Ferguson, Denise Belk, John Moore, Self-propagating high temperature synthesis of porous nickel titanium, Materials Science Forum Vols. 561-565, pp 1643-1648, 2007.

High, Whitney A, **Ayers**, Reed A, Cowper, Shawn E , Gadolinium is quantifiable within the tissue of patients with nephrogenic systemic fibrosis. Journal of the American Academy of Dermatology, 56 (4), p.710-712, Apr 2007.

Ayers, Reed A, Burkes, Douglas E, Gottoli, Guglielmo, Yi, Hu-Chun, Zhim, Fouad, Yahia, L'hocine, Moore, John J , Combustion synthesis of porous biomaterials. Journal of Biomedical Materials Research. Part A, 81 (3), p.634-643, Jun 2007

High, Whitney A, **Ayers**, Reed A, Chandler, John, Zito, Gary, Cowper, Shawn E, Gadolinium is detectable within the tissue of patients with nephrogenic systemic fibrosis. Journal of the American Academy of Dermatology, 56 (1), p.21-26, Jan 2007.

Ayers, R.; Burkes, D.; Gottoli, G.; Yi, H.C.; Moore, J.J., The application of self-propagating high-temperature synthesis of engineered porous composite biomedical materials. Materials and Manufacturing Processes, v 22, n 3-4, 2007, p 481-8.

2006:

Ayers, RA, Neilsen-Priess S, Ferguson V, Gotolli G, Moore JJ, Kleebe HJ, Multiphasic calcium phosphate induced mineralization in SaOS-2 osteoblast-like cells. Mat Sci and Eng C 2006;26:1333-1337.

High WA, **Ayers** RA, Chang A, Fitzpatrick JE. Unusual response to ear piercing: granulomatous response to titanium alloy. J Am Acad Dermatol. 2006 Oct;55(4):716-20.

High WA, **Ayers** RA, Chang A, Fitzpatrick JE. Gadolinium is detectable within tissue of patients with nephrogenic fibrosing dermopathy. J Am Acad Dermatol Nov 2006 E-pub ahead of print.

R. **Ayers**, D. Burkes, G. Gottoli, H.C. Yi, J.Y. Guigné, J.J. Moore, The Application of Energetic SHS Reactions in the Synthesis of Multi-functional Bone Tissue Engineering and Drug Delivery Systems. In Multifunctional Energetic Materials, (N.N. Thadhani, R.W. Armstrong, A.E. Gash, W.H. Wilson. Eds.) Mat Res Soc. Symposium Proceedings, Vol. 896, 2006.

J. Zhou, I. T. Martin, **R. Ayers**, E. Adams, D. Liu, and E. R. Fisher, Investigation of Inductively Coupled Ar and CH4/Ar Plasmas and the Effect of Ion Energy on DLC Film Properties, , *Plasma Sources Sci. Technol.* **15,** 714-726, 2006.

2005:

Reed A. **Ayers,** Martin Castillo Guglielmo Gottoli, John J. Moore, Steven J. Simske, Combustion synthesis of $Ca_3(PO_4)_2$ Net-Shape Surgical Implants, NASA Tech Briefs, September 21, 2005.

Douglas E. Burkes, John J. Moore, Hu Chun Yi, Guglielmo Gottoli and Reed A. **Ayers** Effects of Environmental Gas on the Combustion Synthesis and Microstructure of Ni3Ti – TiCx Composites. International Journal of SHS Vol.14, No 4, 2005.

2004:

Burkes, DE, Gottoli, G, Moore, JJ, Yi, HC, **Ayers**, RA Combustion synthesis of NiTi-TiC composites with controlled porosity for biomedical applications. Mat Res Soc Symp Proc. Vol. 800, 2004.

2003:

Virginia Ferguson, Reed **Ayers**, Ted Bateman, Steven Simske, bone development and age related bone loss in male C57BL/6J mice. Bone. 33:387-398, 2003.

M. Castillo, J.J.Moore, F.D. Schowengerdt, R.A. Ayers, X. Zhang, M. Umakoshi, ILC. YI, J.Y. Guigne, Effects of Gravity on Combustion Synthesis of Functionally Graded Materials. Adv. Space Res. 32:265-270, 2003.

2002:

Ferguson VL, Simske SJ, **Ayers** RA, Bateman TA, Wang HT, Bendele A, Rich B, Collins D, Scherrer J, Sennello R, Colagiovani DB, Effect of MPC-11 myeloma and MPC-11+IL-1 receptor antagonist treatment on mouse bone properties. Bone 30:109-116, 2002.

2001:

Castillo M, **Ayers** RA, Zhang X, Schowengerdt F, Moore JJ, Combustion synthesis of porous glasses and ceramics for bone repair. Biomed. Sci. Instrum 37:469-474; 2001.

Bateman, TA Dunstan, CR, **Ayers**, RA, Lacey, DL, Ferguson, VL, Simske, SJ Osteoprotegerin ameliorates sciatic nerve crush induced bone loss. J. Orthop Res 19(4);518-23, 2001.

Zhang X, **Ayers** RA, Thorne K, Moore JJ, Schowengerdt F, Combustion synthesis of porous materials for bone replacement. Biomed. Sci. Instrum 37:463-468, 2001.

2000:

Bateman, TA, Dunstan, CR, Ferguson, VL, Lacey, DL, **Ayers**, RA, Simske, SJ, Osteoprotegerin mitigates tail suspension induced osteopenia by inhibiting resorption and increasing mineral composition. Bone 26:443-449, 2000.

1999:

Ayers, RA, Simske, SJ, Bateman, TA, Petkus, A, Sachdeva, RLC, Gyunter, VE, Effect of nitinol implant porosity on cranial bone ingrowth and apposition after 6 weeks. J Biomed Mater Res 45:42-47; 1999.

Ayers, RA, Wolford, LM, Bateman, TA, Ferguson, VL, Simske, SJ, Quantification of bone ingrowth into porous block hydroxyapatite in humans. J Biomed Mater Res 47:54-59; 1999.

Bateman, TA, **Ayers**, RA, Greenway, RB, An engineering evaluation of four fluid transfer devices for 384-well high throughput screening. Lab Robotics and Automat 11:250-259; 1999.

Ferguson, VL, Greenberg, AR, Bateman, TA, **Ayers**, RA, Simske, SJ, Effect of age and dietary restriction without nutritional supplementation on whole bone structural properties in C57BL/6J mice. Biomed. Sci. Instrument 35:85-91; 1999.

Ferguson, VL, Bateman, TA, Lacey, DL, **Ayers**, RA, Dunstan, CR, Simske, SJ Effect of osteoprotegerin on mechanical and material properties of maturing rat femora. J Bone Miner Res 14sup:S440; 1999.

1998:

Ayers, RA, Simske, SJ, Nunes, CR, Wolford, LM, Long-term ingrowth and residual microhardness of porous block hydroxyapatite implants in humans. J Oral Maxilofac Surg 56: 1297-1301; 1998.

Ayers, RA, Bateman, TA, Chapes, SK, Ferguson, VL, Simske, SJ Effect of major histocompatability class II knockout on the mouse peripheral skeleton. Bone 23:S441; 1998.

Bateman, TA, Zimmerman, RJ, **Ayers**, RA, Ferguson, VL, Chapes, SK, Simske, SJ, Histomorphometric, physical, and mechanical effects of spaceflight and insulin-like growth factor-I on rat long bones. Bone 23:527-535; 1998.

1995:

Ayers, RA, Miller, MR, Simske, SJ, Norrdin, RW, Correlation of flexural structural properties with bone physical properties: A four species survey. Biomed. Sci. Instrum 32:251-260, 1995.

Conference Proceedings:

2013

N. Vollmer, R. Ayers. Antimicrobial Activity and Cytotoxicity of Silver Doped Calcium Phosphate Blocks Produced with Self-Propagating High-Temperature Synthesis. Materials Today Virtual Conference: Biomaterials 2013

2012:

N. Vollmer, R. Ayers. Combustion Synthesis of Calcium Phosphate Blocks Doped with Silver for Treatment of Large Scale Battlefield Injuries. Trans Soc for Biomat, 34, 2012.

2010:

Reed **Ayers**, Matthew Karsh, Nina Vollmer, Nolan Hannigan, John Moore, Combustion Synthesis of CoCr, NiTi Intermetallic and Calcium Phosphate Ceramic Biomaterials. Medical Device Materials V, (2010), pp. 227-231.

Rahul Bhola, Shaily M. Bhola, Brajendra Mishra, Reed **Ayers**, David L. Olson , Electrochemical Characteristics of Titanium and its Alloys in Phosphate Buffer Saline. Medical Device Materials V, (2010), pp. 52-59.

M. Karsh, J. Tsai, A. S. Meir, S. Gordon S. Newman, M. Kaufmann, **R. Ayers**, Nickel Titanium (NiTi) Phase Properties and Use in Orthodontic Arch Wires. CU School of Dentistry Research Fair November 2010.

2009:

M. Karsh, N. Vollmer, C. Unuvar, J.J. Moore, **R. Ayers**, Porous Biomaterials Using Combustion Synthesis. Trans Soc for Biomat, 33, 2009.

Nina Vollmer, Douglas Burkes, John Moore, **Reed Ayers**, Effects of changes in structural hydration of multiphasic heterogeneous calcium phosphate powders created via auto-ignition combustion synthesis. Trans Soc for Biomat, 33, 2009.

2008:

Ayers RA, Moore JJ, Burkes DE, Biomimetic multiphasic calcium phosphates to enhance bone regeneration. Medical Device Materials IV, (2008) pp. 9-13.

2005:

R. **Ayers**, D. Burkes, G. Gottoli, H.C. Yi, J.Y. Guigné, J.J. Moore, The Application of Energetic SHS Reactions in the Synthesis of Multi-functional Bone Tissue Engineering and Drug Delivery Systems. Mat Res Soc. Boston, November 27-30, 2005 pp. 25-38.

High WA, **Ayers** RA, Chang A, Fitzpatrick JE. Unusual response to ear piercing: granulomatous response to titanium alloy. Presented in oral form at American Society of Dermatopathology - Annual Meeting, Seattle. October 21, 2005. Best Abstract, Oral Presentation Session #1.

F. Zhim, J. Pegna, J. Moore, R. **Ayers**, L'H. Yahia, Development of personalized implant for high tibial opening wedge: Combination of solid freeform fabrication with combustion synthesis process. SHS VIII International Symposium on Self Propagating High Temperature Synthesis, 21-24, June, 2005.

Ayers RA, Nielsen-Priess S, Gillette J, Kleebe HJ, Development of calcium phosphate mineral during mineralization in osteoblast-like cells. International Symposium on Advanced Biomaterials, Montreal, April 3-6, 2005.

Dezaman Z, MacCarthy P, **Ayers RA,** Structure and Composition of SHS-Produced Calcium Phosphates are Controlled by Reactant Stoicheometry and Green Density. Colorado Alliance for Biotechnology, student Research Forum, March 2005.

Ayers RA, Nielsen-Preiss S, Ferguson V, Moore JJ, Kleebe HJ, Osteoblast-Like Cell Mineralization Induced by Multiphasic Calcium Phosphate Ceramic. TMS Annual Meeting & Exhibition, February 13-17, 2005.

2004:

Zhang X., Castillo M., **Ayers** R., Burkes D., Gottili G., Yi H.C., Moore J.J., The combustion synthesis of engineered porous composite materials for bone replacement applications. Western States Section/Combustion Institute, Spring Meeting, March 29-30, 2004.

Hernandez, R, Polizu S, Zhang X, Moore J, **Ayers** R. Yahia LH, Porous NiTi alloy produced by SHS process: Surface characteristics and corrosion behavior. SMST-2003, p. 409-416, 2004.

2003:

Ayers R., Ferguson V., Belk D., Gall K., Moore J., Nanoindentation to Characterize Porous NiTi Produced via Combustion Synthesis, MRS, Accepted, withdrawn due to funding, December 1, 2003.

Gottoli G., **Ayers** R., Schowengerdt F., Moore J., Interaction of calcium phosphate ceramics produced via SHS with simulated body ionic solution. Trans Soc for Biomat, 2003; 29:239.

Hammill C., Smith D., **Ayers** R., Prediction of bone ingrowth in a porous coating. 11th Annual Pre-ORS Symposium of Computational Methods in Orthopaedic Biomechanics, New Orleans, LA. February 1, 2003.

2000:

Bateman, TA, Stodieck, LS, Kostenuik, PJ, Ferguson, VL, **Ayers**, RA, Simske, SJ Use of Spaceflight and Spaceflight Simulation to Provide Evidence for Osteoprotegerin Treatment of Disuse Osteoporosis. Space Tech Appl Int Forum 2000 2:580-581, 2000.

Zhang, X, **Ayers**, R, Moore, JJ, Schowengerdt FD Combustion synthesis of porous shape memory materials. SIBA, June 28- July 1, 2000.

Ferguson, VL, **Ayers**, RA, Bateman, TA, Simske, SJ Development of endogenous osteoporosis in male C57BL/6J mice. J Bone Miner Res 15sup:S461; 2000.

1999:

Bateman, TA, Kostenuik, PJ, Ferguson, VL, **Ayers**, RA, Simske, SJ Osteoprotegerin treatment of tail suspension and sciatic nerve crush disuse osteopenia: comparison with bisphosphonates. Gravit Space Bio Bul. 13:65; 1999.

Bateman, TA, Lacey, DL, Ferguson, VL, Dunstan, CR, **Ayers**, RA, Simske, SJ Comparison of osteoprotegerin, pamidronate and ibandronate in the treatment of suspension induced osteopenia. J Bone Miner Res 14sup:S528, 1999.

Simske SJ, Bateman TA, **Ayers** RA, Dunstan CR, Ferguson VL, Lacey DL, Effect of osteoprotegerin, pamidronate and ibandronate on the sciatic nerve crush model for disuse osteoporosis in mice. J Bone Miner Res 14sup:S523, 1999.

Ferguson, VL, Bateman, TA, Lacey, DL, **Ayers**, RA, Dunstan, CR, Simske, SJ Effect of osteoprotegerin on mechanical and material properties of maturing rat femora. J Bone Miner Res 14sup:S440, 1999.

1998:

Bateman, TA, Zimmerman, RJ , **Ayers**, RA, Ferguson, VL, Chapes, SK, Simske, SJ Efficacy of insulin-like growth factor-1 is not altered by spaceflight unloading. Grav Space Bio Bul 12:62; 1998.

Bateman, TA, Dunstan, CR, Ferguson, VL, **Ayers**, RA, Simske, SJ Osteoprotegerin increases femoral mechanical properties in control and tail suspended mice. Bone 23:S563; 1998.

Ferguson, VL, Bateman, TA, Zimmerman, RJ, **Ayers**, RA, Chapes, SK, Simske, SJ Insulin-like growth factor-I inhibits endocortical bone formation for both spaceflight and ground control rats. Bone 23:S560; 1998.

Simske SJ, Bateman TA, Ferguson VL, **Ayers** RA, Dunstan CR, Effects of osteoprotegerin on the sciatic nerve crush model for osteoporosis. Bone 23:S355; 1998.

Stodieck, LS, Bateman, TA, **Ayers**, RA, Ferguson, VL, Simske, SJ Benefits attained from space flight in pre-clinical evaluation of candidate drugs. Space Tech Appl Int Forum 98 420:627-632; 1998.

1997:

Ferguson, VL, Bateman, TA, **Ayers**, RA, Zimmerman, RJ, Simske, SJ Effects of tail suspension and insulin-like growth factor-I on mouse bone mechanical properties. Gravit Space Bio Bul 11:17; 1997.

Ayers RA, Nunes CR, Ferguson VL, Simske SJ, Wolford LM, Long-Term Ingrowth, Apposition, and Microhardness of Porous Hydroxylapatite Implants. Trans Soc for Biomat, 20:480, New Orleans, LA, 1997.

1996:

Bateman, TA, **Ayers**, RA, Simske, SJ, Bush, LL, Ferguson, VL Effects of spaceflight and insulin-like growth factor-1 on rat bone mechanical properties. Grav Space Bio Bul 10:16; 1996.

Invited Presentations:

Microstructural design of materials for medical applications, Materials by Design Workshop, July 16-18, 2013. Los Alamos National Laboratory Materials Summer Research Group (SRG).

Spark Plasma Sintering (SPS) of HFAl Reactive Metal Structures, Joint Defense Armaments Conference, Exhibition and Firing Demonstration, May, 20-23 2013.

Applications of Energetic SHS Materials for Biomedical Applications, Calcitec Inc. January 6, 2006.

Combustion Synthesis of Porous Biomaterials, Stryker Orthopedics, April 21, 2005.

Bioactivity of Porous Multiphasic Bioceramics Calcium Phosphate Scaffolds Produced via SHS, Colorado State University, Department of Mechanical Engineering, September 10, 2004.

Bioactivity of Porous Calcium Phosphate scaffolds Produced Via Combustion Synthesis. 2004 Colorado Orthopaedics Research Retreat, Louisville, CO, January, 2004.

Porous biomaterials and BMPs (bone morphogenic proteins): Their appropriate application in bone repair and replacement. Colorado for Institute in Research in Biotechnology, University of Colorado, Boulder, CO, September 14, 1999.

Student Advising Experience:

Ph.D. co-Advisor: Rahul Bola (2010); Denise Belk (2005)

Master's Advisor: Matthew Karsh (2011); Nolan Hannigan (2010); Nina Vollmer (2009); Zachary Dezman (co-Advisor, 2005); Alejandro Criado (2005)

Currently Advisor for 3 Ph.D. students with anticipated graduation dates of 2012-2013.

<u>COLLABORATIONS OVER THE LAST 48 MONTHS:</u>
Colorado School of Mines
Drs. John Moore, Joel Bach, Stephen Liu, Brajendra Mishra, Kip Findley, David Olson, Patrick Taylor
Colorado State University
Drs. Susan James and David Frisbie
University of Colorado
Drs. Sheila Neilsen-Preiss, Virginia Ferguson, Ken Gall, Sheldon Newman, Whitney High
Hewlett Packard
Dr. Steven Simske
École Polytechnique de Montréal
Dr. L'Hocine Yahia *Fouad Zhim*
Clemson University
Dr. Ted Bateman
Isis Pharmaceutics
Dr. David Tung

Baylor School of Dentistry
Dr. Larry Wolford
Sulzer Medica
Dr. Kevin Thorne
Rocky Mountain Musculoskeletal Research Laboratory
Dr. Mahamoud Mafouz
University of Texas Health Sciences Center School of Dentistry
Dr. Lisa Lang