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PROFESSIONAL EXPERIENCE

August 2010-current	Assistant Professor of Physics University of Alabama at Birmingham
September 2004 – July 2010	Research Assistant Professor Department of Physics University of Alabama at Birmingham
November 2000 – August 2004	Research Associate Department of Physics University of Alabama at Birmingham
October 1999 – October 2000	Postdoctoral Research Associate Department of Physics University of Alabama at Birmingham

EDUCATION

Degree	Program	Date	University
Ph.D.	Materials Science	Aug. 1999	University of Alabama at Birmingham
B.S.	Physics	May 1993	California State Univ. Sacramento

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SCHOLARSHIP

PEER REVIEWED PUBLICATIONS (PUBLISHED)

Scopus data as of Aug 2015
72 cited documents, 603 citations (from 2011-2014), author h-index: 21
1286 total number of citations

PUBLICATIONS BELOW REFLECT WORK PUBLISHED SINCE 2010

1. Paul A. Baker, Raymond G. Thompson, and Shane A. Catledge, "A wear simulation study of nanostructured CVD diamond-on-diamond articulation involving concave/convex mating surfaces", Journal of Coatings Technology and Research, published online ahead of print, Sept. 30, 2015. DOI: 10.1007/s11998-015-9738-4.

2. Jamin Johnston, Matthew Jubinsky, Shane Catledge, "Plasma Boriding of a Cobalt-Chromium Alloy as an Interlayer for Nanostructured Diamond Growth", Applied Surface Science 328, 133-139 (2015).
3. Jared Ballinger, Shane A. Catledge, "Metal-boride interlayers for chemical vapor deposited nanostructured NSD films on 316 and 440C stainless steel", Surf. Coat. Tech. 261, 244-252 (2015)
4. Fei Liu, Veronika Kozlovskaya, Oleksandra Zavgorodnya, Claudia Martinez-Lopez, Shane Catledge, and Eugenia Kharlampieva, "Encapsulation of anticancer drug by hydrogen-bonded multilayers of tannic acid", Soft Matter. 10, 9237-47 (2014).
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9. V. Thomas, B. Halloran, S. A. Catledge, N. Ambalavanan, and Y. K. Vohra, "In vitro studies on the effect of particle size on macrophage responses to nanodiamond wear debris", Acta Biomaterialia 8, 1939 (2012). http://dx.doi.org/10.1016/j.actbio.2012.01.033.
10. A. Naik, E.J. White, and S.A. Catledge, Development of a Dot Array Biosensor by Dip-pen Nanolithography of Polyacrylamide Inks. Inquiro 6, p. 48-53 (2012).
11. O. Hadjar, T. Schlathölter, S. Davila, G. Kibelka, S. A. Catledge, K. Kuhn, G. F. Verbeck, S. Kassan, C. Cameron, IonCCDTM for none-scanning sector-field instrument: keV ion detection induced peak shape and detector surface artifacts, J. Amer. Soc. Mass Spec. 22 p.612-623 (2011). http://dx.doi.org/10.1007/s13361-011-0213-x.
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nanoparticulate hydroxyapatite.", PLoS ONE 6(2): e16813 (2011). DOI:10.1371/journal.pone.0016813

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PATENTS AND DISCLOSURES

1. Provisional patent application # 61/909,725 entitled "Process for Diamond-Coating of Cobalt-Containing Alloys Using Vapor-Deposited Boride Interlayer", S.A. Catledge, Y.K. Vohra, and J. Johnston, filed on November 27, 2013.
2. *United States Patent Application 20100209665-A1 entitled "Ultra smooth nanostructured diamond films and compositions and methods for producing same"*, Valeriy V. Konovalov, Yogesh K. Vohra, and Shane A. Catledge; Publication Date: August 19, 2010.

3. *United States Patent Number 6,183,818 entitled "Process for Ultra Smooth Diamond Coating on Metals and Uses Thereof"*, Yogesh K. Vohra and Shane A. Catledge; Patent Issued February 6, 2001.

BOOK CHAPTERS AND REVIEWS

1. S.A. Catledge, V. Thomas, Y.K. Vohra, "Nanostructured Diamond Coatings for Orthopaedic Applications", in *Diamond based materials for biomedical application*, p.105-150, ed. by Roger Narayan; Woodhead Publishing Series in Biomaterials No. 55; Woodhead Publishing Limited (2013).
2. S. A. Catledge, M. Fries, and Y. K. Vohra, "Nanostructured Surface Modifications for Biomedical Implants", in Encyclopedia of Nanoscience and Nanotechnology, Edited by Hari Singh Nalwa, American Scientific Publishers, Volume 7, pages 741-762 (2004).
3. S. A. Catledge, M. Fries, Y. K. Vohra, W. R. Lacefield, J. E. Lemons, S. Woodard, and R. Krishna, "Nanostructured Ceramics for Biomedical Implants", Review Article; Journal of Nanoscience and Nanotechnology 2, 293 (2002).

CONFERENCE PROCEEDINGS (NON-PEER REVIEWED)

1. S. Singh and S.A. Catledge, "Fluorescent Nanodiamonds with Silicon-Vacancy Color Center: A Potential Cellular Biomarker", in Biosensors, Instruments, Medical, Environment and Energy, Nanotech Conference and Expo 2011, Nanotech Vol. 3, p.129-132 (2011). ISBN: 978-1-4398-7138-6
2. L. Booth, S.A. Catledge, A. Eberhardt, and Y.K. Vohra, "Multilayer Nanostructured Diamond Coatings for Hip and Knee Arthroplasty", in TRANSACTIONS OF THE ANNUAL MEETING - ORTHOPAEDIC RESEARCH SOCIETY- 56th Annual Meeting, (2010). ISSN: 0149-6443
3. S.A. Catledge, P. Tyagi, M. Koopman, A. Stanishevsky, and Y.K. Vohra, "Electrospun Gelatin/Hydroxyapatite Nanocomposite Scaffolds for Bone Tissue Engineering", in From Biological Materials to Biomimetic Materials Synthesis, eds. N. Kroger, R. Qiu, R. Naik, D. Kaplan, MRS Proceedings Vol. 1094 (2008). http://dx.doi.org/10.1557/PROC-1094-DD09-05
4. S. Fox, I. Stanishevskaya, S. Chowdhury, S.A. Catledge, and A. Stanishevsky, "Mechanical Properties of Nanoparticle Hydroxyapatite/gelatin Constructs", in Solids at the Biological Interface", eds. V.L. Ferguson, J.X-J. Zhang, C. Stoldt, C.P. Frick, MRS Proceedings Vol. 1063 (2008). http://dx.doi.org/10.1557/PROC-1063-OO05-04
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6. S. A. Catledge, Y. K. Vohra, S. Woodard, and K. Venugopalan "Structure and Mechanical Properties of Functionally-Graded Nanostructured Metalloceramic Coatings", in Mechanical Properties Derived from Nanostructuring Materials, eds. H. Kung, D.F. Bahr, N.R. Moody, K.J. Wahl, MRS Proceedings Vol. 778 (2004). http://dx.doi.org/10.1557/PROC-778-U7.8
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8. M. J. Papo, S. A. Catledge, C. Machado, S. Kashef, A. Eberhardt, and Y. K. Vohra, "On the Wear Assessment of Multilayer Nanocrystalline Diamond Coated Implants of the Temporomandibular Joint", in Mechanical Properties of Nanostructured Materials and Nanocomposites, eds. I. Ovid'ko, C.S. Pande, R. Krishnamoorti, E. Lavernia, G. Skandan, MRS Proceedings Vol. 791 (2004). http://dx.doi.org/10.1557/PROC-791-Q8.20
9. V. Vohra. S.A. Catledge, Y.K Vohra, "Effect of Surface Treatments on the Structural and Mechanical Properties of Nanostructured Diamond Coatings on Tungsten Carbide Cutting Tools", in Mechanical Properties of Nanostructured Materials and Nanocomposites , MRS Proceedings, Vol. 791 (2004). http://dx.doi.org/10.1557/PROC-791-Q8.22
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16. S. A. Catledge and Y. K. Vohra, "Nitrogen-Induced Nanocrystallinity of CVD Diamond Films on Ti-6Al-4V Alloys", in Properties and Processing of Vapor-Deposited Coatings, eds. R.N. Johnson, W.Y. Lee, M. Pickering, B.W. Sheldon, MRS Proceedings Vol. 555 (1999). http://dx.doi.org/10.1557/PROC-555-377
17. S. A. Catledge and Y. K. Vohra, "Structure and Stress Evaluation of Diamond Films Deposited on Ti-6Al-4V Alloy at Low Temperature Using $CH_4/O_2/H_2$ and CO/H_2 Gas Mixtures", in Thin Films-Stresses and Mechanicl Properties VII, eds. R. C. Cammarata, M. Nastasi, E. P. Busso, and W. C. Oliver, MRS Proceedings Vol. 505 (1998). http://dx.doi.org/10.1557/PROC-505-629
18. S.A. Catledge, Y.K. Vohra, C. Yan, H.T. Tohver, "Morphology and Quantitative Nitrogen Impurity Measurements in Homoepitaxial Chemical Vapor Deposited Diamond", in Thin Films – Structure and Morphology, eds. R.C. Cammarata, E.H. Chason, T.L. Einstein, E.D. Williams, D. Ila, S. Moss, MRS Proceedings Vol. 441 (1997). http://dx.doi.org/10.1557/PROC-441-635

PUBLICATIONS (INTERNALLY PEER REVIEWED AT UAB)

1. A. Naik, E.J. White, and S.A. Catledge, "Development of a Dot Array Biosensor by Dip-pen Nanolithography of Polyacrylamide Inks", Inquiro 6, p. 48-53 (2012).

PEER REVIEWED PUBLICATIONS (SUBMITTED)

1. Carrie Schindler, Allison Goins, Sonal Singh, Shane A. Catledge, Derrick R. Dean, "Carbon nanotube inks for direct patterning by dip-pen nanolithography", submitted to *Journal of Colloid and Interface Science*, June 2014.
2. Carrie Schindler, Sonal Singh, Shane A. Catledge, Vinoy Thomas, Derrick R. Dean, "Controlled patterning of nano-hydroxyapatite by dip-pen nanolithography", submitted to Biofabrication, November 2014.

PEER REVIEWED PUBLICATIONS (IN PREPARATION)

1. E.J. White, R. Collins, R. Almotiri, and S.A. Catledge, "Development of a Polyacrylamide Molecularly Imprinted Polymer for Biosensing Applications", planned submission to *Journal of Fluorescence*, Spring 2015.
2. Dina Yamaleyeva and Shane Catledge, "Wear of Ultrahigh Molecular Weight Polyethylene on Nanostructured Diamond Using a Knee Simulator", planned submission to 'Journal of Undergraduate Research', Spring 2015.

PRESENTATIONS (INVITED, INCLUDING COLLOQUIUM)

1. S.A. Catledge, "Nanostructured Diamond for use in Biomedical Devices:, NanoBio Summit 2015, UAB, October 15-16.
2. S.A. Catledge, "Advances in Nanostructured Diamond", UAB Dept. of Materials Engineering, Spring 2015
3. S.A. Catledge, "Advances in Nanostructured Diamond", UAB Dept. of Physics, Spring 2015.
4. S.A. Catledge, "Nanostructured Biomaterials: From Orthopaedic Implants to Fluorescent probes", Dept. of Chemistry, University of Alabama at Huntsville, Spring 2012.
5. S.A. Catledge, "Nanodiamond applications in medicine", UAB SPS seminar series, Fall 2012.
6. S.A. Catledge, "Nanostructured Biomaterials: From Orthopaedic Implants to Fluorescent probes", UAB Dept. of Materials and Mechanical Engineering Colloquium, Fall 2010.
7. S.A. Catledge, "Nanostructured Biomaterials: Surface Modification and Tissue Regeneration", UAB Dept. of Materials and Mechanical Engineering Colloquium, Spring 2009.
8. S.A. Catledge, UAB Physics Dept. Seminar, Fall 2008; Title: "Nanostructured Biomaterials: Surface Modification and Tissue Regeneration"
9. S.A. Catledge, "Nanoindentation Studies on Nanostructured Diamond and Tetrahedral Amorphous Carbon Materials", American Physical Society, March Meeting, Seattle, WA. (2001).

PRESENTATIONS (INVITED COURSE LECTURES)

10. S.A. Catledge, Invited lecture for Dr. Vohra's course on Nanoscale Science and Applications, Spring 2014; Lecture title: "Dip Pen Nanolithography"
11. S.A. Catledge, Invited lecture for Dr. Vohra's course on Nanoscale Science and Applications, Spring 2013; Lecture title: "Dip Pen Nanolithography"
12. S.A. Catledge, Invited lecture for Dr. Vohra's course on Nanomaterials as part of the UAB Science & Technology Honors Program, Fall 2007; Lecture title: "The strength of Nanomaterials".
13. S.A. Catledge, Invited lecture for Dr. Camata's course in Nanoscience on April 7, 2006; Lecture title: "Nanostructured Materials for Biomedical Implants", UAB, Dept. of Physics.
14. S.A. Catledge, High school outreach program lecture invited by Dr. Nordland, "Nanostructured Biomaterials", June 2005, UAB, Dept. of Physics.

PRESENTATIONS (CONTRIBUTED)

2015 (TOTAL: 1)

1. Shane A. Catledge, "Spatially Controlled Si-V Defect Nanodiamonds with Nitrogen-Enhanced Photoluminescence for Sensing in Molecularly-Imprinted Polymers", MRS Fall Meeting, Boston, MA, Nov. 31-Dec. 4, 2015.

2014 (TOTAL: 7)

1. Matthew Jubinsky, Sonal Singh, and Shane A. Catledge, "An investigation of the surface layer produced by plasma boriding Co-Cr-Mo biomedical alloy using chemical vapor deposition", Conference Tools for Materials Science & Technology 2014, Pittsburgh, PA, Oct.12-16, 2014.
2. Jared Ballinger and Shane A. Catledge, "Metal-boride interlayers for chemical vapor deposited nanostructured diamond films on 316 and 440C stainless steel", 3rd International Conference on Materials Science & Engineering, San Antonio, TX, Oct. 6-8, 2014.
3. Jamin Johnston, Matthew Jubinsky, and Shane A. Catledge, "Plasma Boriding of a Cobalt-Chromium Alloy as an Interlayer for Nanostructured Diamond Growth", 3rd International Conference on Materials Science & Engineering, San Antonio, TX, Oct. 6-8, 2014.
4. Sonal Singh, Vinoy Thomas, Dmitry Martyshkin, Veronika Kozlovskaya, Eugenia Kharlampieva and Shane A. Catledge, "Spatially Controlled Fabrication of Brightly Fluorescent Nanodiamond-Array with Enhanced Far-Red Si-V Luminescence", New Diamond and Nano Carbons Conference (NDNC 2014), May 25-29, 2014. (C8.08).
5. Sonal Singh, Vinoy Thomas, Dmitry Martyshkin, Veronika Kozlovskaya, Eugenia Kharlampieva and Shane A. Catledge, "Spatially Controlled Fabrication of Brightly Fluorescent Nanodiamond-Array with Enhanced Far-Red Si-V Luminescence", Nanotech Advanced Materials and Applications, Washington, DC., June 15-18, 2014.
6. C. Schindler, A. Goins, S. Singh, S.A. Catledge, D.R. Dean, "Carbon Nanotube inks for dip-pen nanolithography patterning", Nanotech Advanced Materials and Applications, Washington, DC., June 15-18, 2014.
7. E.J. White and S.A. Catledge, "Development of Polyacrylamide Molecularly Imprinted Polymer for Biosensing Application", UAB Spring Expo, April 11, 2014.

2013 (TOTAL: 3)

8. S.A. Catledge, "Vapor-deposited metal-boride interfacial layers as diffusion barriers for nanostructured diamond growth on cobalt alloys", 3rd International Conference on Nanotek and Expo, Las Vegas, NV, Dec. 2-4, 2013.
9. S.A. Catledge and Sonal Singh, "Spatially controlled Si-V defect nanodiamonds with nitrogen-enhanced photoluminescence prepared by scanning probe lithography", 3rd International Conference on Nanotek and Expo, Las Vegas, NV, Dec. 2-4, 2013.

10. A. Naik, E.J. White, and S.A. Catledge, "Development of a Dot Array Biosensor by Dip-pen Nanolithography of Polyacrylamide Inks", National Collegiate Research Conference (*NCRC*), January 24-26 (2013), Harvard University.

2012 (TOTAL: 3)

11. S. Singh and S.A. Catledge, "Scanning Probe Lithography of Nanodiamond array and enhanced fluorescence from Si-V defects, Materials Research Society Spring Meeting and Exhibit, San Francisco, CA, April 9-13, 2012. (FF2.2)
12. J. Ballinger and S.A. Catledge, "Microwave Plasma CVD Diamond on Borided 440c and 316 Stainless Steel", NANOSMAT USA 2012, Tampa FL, March 27-30.
13. J. Ballinger and S.A. Catledge, "Microwave Plasma CVD Diamond Employing Interlayers on 440c and 316 Stainless Steel", NIBIB Training Grantees Meeting in Bethesda, MD, June 28-29, 2012.

2011 (TOTAL: 3)

14. S. Singh and S.A. Catledge, "Fluorescent Nanodiamonds with Silicon-Vacancy Color Center: A Potential Cellular Biomarker", Nanotech Conference and Expo, June 13-16, Boston, MA, 2011.
15. S.A. Catledge and S. Singh "Scanning probe lithography and fluorescence of nanodiamond with silicon-vacancy centers" NANOSMAT-6, October 17-20, 2011, Krakow, Poland.
16. S.A. Catledge and J. Ballinger "CVD diamond on stainless steel via TiN and graded boride interlayers" NANOSMAT-6, October 17-20, 2011, Krakow, Poland

2010 (TOTAL: 2)

17. L. Booth, S. A. Catledge, A. Eberhardt, and Y. K. Vohra, "Multilayer Nanostructured Diamond Coatings for Hip and Knee Arthroplasty", Poster No. 2262 • 56th Annual Meeting of the Orthopaedic Research Society, March 6-9, New Orleans, 2010.
18. L. Booth, S. A. Catledge, A. W. Eberhardt, Y. K. Vohra *Multilayered Nanostructured Diamond Coatings for Biomedical Implants* Presented at 2nd International Workshop on Science and Application of Nanoscale Diamond Materials, June 2010, Zakopane, Poland.

2009 (TOTAL: 2)

19. S.A. Catledge, "Improved adhesion of nanostructured diamond films on CoCrMo alloy", International Conference on Vacuum and Plasma Surface Engineering 2009, held jointly with the International Workshop on Science and Application of Nanoscale Diamond Materials, in Hejnice, Czech Republic, Oct 22-26, 2009.

20. S.A. Catledge, "Improved adhesion of nanostructured diamond films on CoCrMo alloy", International Diamond Conference, Athens, Greece, Sept 6-10, 2009.

2008 (TOTAL: 4)

21. Clem WC, Catledge SA, Chowdhury S, Hennessy KM, Stanishevsky AV, Tousson A, Koopman M, Shaikh FM, Vohra YK, Bellis SL (2008). "Mesenchymal Stem Cell Interaction with Nanostructured Diamond and Electrospun Composite Fibers for Orthopaedic Applications." National Institute of Biomedical Imaging and Bioengineering Meeting. Washington D.C.
22. Parul Tyagi, Shane Aaron Catledge, Reshu Saini, Xing Zhang, Andrei Stanishevsky and Yogesh Kumar Vohra, "Electrospun Polymer/hydroxyapatite Nanocomposite Scaffolds Made Using Gelatin or Polycaprolactone for Bone Tissue Engineering", MRS Spring Meeting 2008, San Francisco, CA. March 25-28th, 2008.
23. Vinoy Thomas, Xing Zhang, Shane A Catledge and Yogesh K Vohra, "Tubular Scaffolds of Protein/PDS® Nanofiber Blends with Spatially Designed Tri-layer Structure for Vascular Tissue Engineering", MRS Spring Meeting 2008, San Francisco, CA. March 25-28th, 2008.
24. Xing Zhang, Vinoy Thomas, Aaron Catledge and Yogesh Vohra, "Mechanical Properties of Electrospun Vascular Grafts during In Vitro Degradation", MRS Spring Meeting 2008, San Francisco, CA. March 25-28th, 2008.

2007 (TOTAL: 3)

25. S. Fox, I. Stanishevskaya, S. Chowdhury, S.A. Catledge, and A. Stanishevsky, "Mechanical Properties of Nanoparticle Hydroxyapatite/gelatin Constructs", 2007 MRS Fall Meeting. Nov.26-30.
26. Clem WC, Catledge SA, Chowdhury S, Hennessy KM, Thomas V, Tyagi P, Bellis SL, Vohra YK (2007) "In Vitro and In Vivo Study to Evaluate Polycaprolactone/ Hydroxyapatite/ Collagen I Electrospun Scaffolds for Bone Tissue Engineering Applications." Society for Biomaterials Meeting. Chicago, IL. April 17-21.
27. Chowdhury S, Clem WC, Catledge SA, Johnson PS, Eberhardt AW, Luque SA, Lemons JE, Vohra YK (2007). "Ultra smooth Nanocrystalline Diamond Coatings for Dental Implant Applications." Society for Biomaterials Meeting. Chicago, IL. April 17-21

2006 (TOTAL: 2)

28. S.A. Catledge, "Microwave Plasma Nitriding and Carbiding Surface Modification for Nanostructured Diamond Growth on CoCrMo Alloy", NSTI Nanotech 2006, Boston, MA, May 10th, 2006.
29. Clem WC, Chowdhury S, Thomas V, Catledge SA, Laugier MT, Bellis SL, Vohra YK (2006) "Comparison of Mesenchymal Stem Cell Adhesion and Spreading on Diamond-Like Carbon (DLC), Carbon Nitride, and Nanocrystalline Diamond." NSTI Nanotech. Boston, MA. May 7-11.

2005 (TOTAL: 5)

30. A. Stanishevsky, P. Chinoda, S. Chowdhury, V. Thomas, S.A. Catledge, and D. Dean, "Compositionally Modified Hydroxyapatite Nanocrystals for Polymer/Ceramic Scaffold Applications", Nov. 27-Dec. 2, 2005
31. S.A. Catledge, "Nanotribology of Boron-doped and Undoped Nanostructured Diamond Films on Titanium Alloys", MRS Spring meeting 2005, San Francisco, CA, March 31st, 2005.
32. Clem WC, Bellis SL, Catledge SA, and Vohra YK (2005). "Surface Modified Titanium and Nanostructured Diamond Surfaces to Enhance Mechanical Properties and Biocompatibility of Implants". Southeastern Workshop on Tissue Engineering and Biomaterials. Birmingham, AL, Feb. 11-12, 2005.
33. Clem WC, Bellis SL, Catledge SA, Vohra YK (2005). "Human Mesenchymal Stem Cell Adhesion and Spreading on Nanostructured Diamond and Plasma Nitrided Titanium Alloy Surfaces.", March 28-April 1, 2005. MRS Spring Meeting. San Francisco, CA.
34. Thomas V, Jagani S, Kalonda J, Jose MV, Dean D, Clem WC, Bellis SL, Catledge SA, Vohra YK (2005) "Nanostructured collagen and nanohydroxyapatite composite scaffolds for bone tissue engineering." MRS Fall Meeting. Nov 28-Dec. 2 Boston, MA.

2004 (TOTAL: 2)

35. R. Lawson, S.A. Catledge, and Y.K. Vohra, "Nanostructured Diamond Coated CoCrMo Alloys for Use in Biomedical Implants", Proceedings of the 17th International Symposium on Ceramics in Medicine; the Annual Meeting of the International Society for Ceramics in Medicine, New Orleans, Louisiana, USA, 8-12 December 2004**.**
36. S.A. Catledge, Y. K. Vohra, S. L. Bellis, and A. A. Sawyer "Mesenchymal stem cell adhesion and spreading on metalloceramic biomaterials", Proceedings of the 17th International Symposium on Ceramics in Medicine; the Annual Meeting of the International Society for Ceramics in Medicine, New Orleans, Louisiana, USA, 8-12 December 2004**.**

2003 (TOTAL: 7)

37. Machado C., Catledge A., Lacefield W., HUMAN ENAMEL NANOHARDNESS, AND ELASTIC MODULUS AFTER CITRIC CONTACT. Presented at AADR Meeting, San Antonio, Texas, March 2003.
38. H. Kim, S. A. Catledge, Y. K. Vohra, R. P. Camata, W. R. Lacefield, *"Mechanical Properties of Nanostructured and Preferentially Oriented Hydroxyapatite Coatings Grown by Pulsed Laser Deposition,"* 2003 Spring Meeting of the Materials Research Society, April 21-25, 2003, San Francisco, California.
39. R. P. Camata, H. Kim, S. A. Catledge, Y. K. Vohra, and W. R. Lacefield, *"Nanostructuring and texturing of pulsed laser deposited hydroxyapatite thin films,"* 2003 March Meeting of The American Physical Society, March 3 – 7, 2003, Austin, Texas (Bull. Amer. Phys. Soc. 48, 572 (2003).

40. Q. Liang, S. A. Catledge, and Y. K. Vohra, "Mechanical Properties of Boron Doped Diamond Films Prepared by MPCVD", MRS Fall Meeting 2003, Boston, MA, Dec. 1-5, 2003.
41. M. J. Papo, S. A. Catledge, C. Machado, S. Kashef, A. Eberhardt, and Y. K. Vohra, "On the Wear Assessment of Multilayer Nanocrystalline Diamond Coated Implants of the Temporomandibular Joint", MRS Fall Meeting 2003, Boston, MA, Dec. 1-5, 2003.
42. V. Vohra. S.A. Catledge, Y.K Vohra, "Effect of Surface Treatments on the Structural and Mechanical Properties of Nanostructured Diamond Coatings on Tungsten Carbide Cutting Tools", MRS Fall Meeting 2003, Boston, MA, Dec. 1-5, 2003.
43. S. A. Catledge,Y. K. Vohra, S. Woodard, and K. Venugopalan "Structure and Mechanical Properties of Functionally-Graded Nanostructured Metalloceramic Coatings", MRS Sprin Meeting 2003, April 21-25, 2003.

2002 (TOTAL: 5)

44. Machado C., Lacefield W., Vohra Y., Catledge A. ABRASION RESISTANCE OF NANOCRYSTALLINE DIAMOND COATINGS ON TITANIUM ALLOY OF TMJ IMPLANTS. Presented at Society for Biomaterials Meeting - Tampa, Florida 2002.
45. Machado C., Lacefield W., Vohra Y., Catledge A, Johnson J. WEAR TESTING OF NANOCRYSTALLINE DIAMOND COATINGS ON TITANIUM ALLOY OF TMJ DEVICES. Presented at IADR-AADR Meeting - San Diego, California 2002.
46. H. Kim, S. A. Catledge, R. P. Camata, W. R. Lacefield, Y. K. Vohra; *"Mechanical properties of hydroxyapatite thin films for applications in medical implants,"* 2002 March Meeting of The American Physical Society, March 18 – 22, 2002, Indianapolis, Indiana.
47. H. Kim, S. A. Catledge, Y. K. Vohra, R. P. Camata, W. R. Lacefield, *"Mechanical properties of pulsed laser deposited hydroxyapatite thin films for applications in biomedical implants,"* 2002 Fall Meeting of the Materials Research Society, December 2 – 6, 2002, Boston, Massachusetts.
48. M. Bulut, S. A. Catledge, Y. K. Vohra, R. P. Camata, *"Thermal stability of nanocrystalline diamond films grown by microwave plasma chemical vapor deposition,"* 2002 Fall Meeting of the Materials Research Society, December 2 – 6, 2002, Boston, Massachusetts.

2001 (TOTAL: 1)

49. P. Baker, S.A. Catledge, Y.K. Vohra, "Low Temperature Growth of Nanostructured Diamond Films on Metals", Sixth Applied Diamond Conference/Second Frontier Carbon Technology Joint Conference, Auburn, AL, 6-10 August 2001

2000 (TOTAL: 2)

50. S. A. Catledge and Y. K. Vohra, "Effect of Nitrogen Feedgas Addition on the Mechanical Properties of Nano-Structured Carbon Coatings", 2000 Symposium on Mechanical Properties of Structural Films, Orlando, FL, Nov. 15-16, 2000.
51. S. A. Catledge, P. T. Spencer, J. R. Patterson, and Y. K. Vohra, "Nanoindentation of Pressure Quenched Fullerenes and Zirconium Metal from a Diamond Anvil Cell", 2000 Fall Meeting of the Materials Research Society, Nov. 27-30, Boston MA, 2000

1999 (TOTAL: 2)

52. J. Akella, S.A. Catledge, G.N. Chesnut, H. Prokop, Y.K. Vohra, S.T. Weir, "X-ray diffraction studies using diamond coated rhenium gasket to megabar pressures", International Conference on High Pressure Science and Technology, Honolulu, HI, July 25-30,1999.
53. J. Akella, S.A. Catledge, Y.K. Vohra, S.T. Weir, "Diamond anvils with integrated diamond-encapsulated microprobes for high-pressure electrical transport experiments", International Conference on High Pressure Science and Technology, Honolulu, HI, July 25-30,1999.

1998 (TOTAL: 1)

54. S. A. Catledge and Y. K. Vohra, "Nitrogen-Induced Nanocrystallinity of CVD Diamond Films on Ti-6Al-4V Alloys", MRS Fall Meeting 1998, Nov. 30-Dec.4, 1998.

1997 (TOTAL: 1)

55. S. A. Catledge and Y. K. Vohra, "Structure and Stress Evaluation of Diamond Films Deposited on Ti-6Al-4V Alloy at Low Temperature Using $CH_4/O_2/H_2$ and CO/H_2 Gas Mixtures", MRS Fall Meeting 1997, Dec. 1-5, 1997.

1996 (TOTAL: 1)

56. S.A. Catledge, Y.K. Vohra, C. Yan, H.T. Tohver, "Morphology and Quantitative Nitrogen Impurity Measurements in Homoepitaxial Chemical Vapor Deposited Diamond", MRS Fall Meeting 1996, Dec. 2-6, 1996.

EXTRAMURAL FUNDING

TOTAL FUNDING: $3,913,171

TOTAL FUNDING AS PI OR CO-PI: $655,838

Seven funded proposals out of thirty-nine submitted as PI, co-PI, or co-Investigator (since beginning position as Research Assistant Professor – 2004). Of those submitted, 29 are as lead PI. Of those submitted, 31 are to federal agencies, 2 are to industry, and 6 are intramural (UAB).

NON-FEDERAL (INDUSTRY SPONSORED)

1. INNOVATIONS IN CHEMICAL VAPOR DEPOSITED DIAMOND COATINGS FOR DRILLING/MINING OPERATIONS

AWARD: Bama Mine & Milling, Inc., UAB Research Agreement # 2012813

FUNDING: $25,838 (total, non-federal)

ROLE: PI

PERIOD: 2-January-2014 to 22-January-2015

SUMMARY: We will investigate potential for improved wear resistance and drilling performance expected of carbide tool bits using a diamond coating technology recently disclosed in IPD # U2014-0007. This study aims to further understand the benefits and challenges in using our coating process on these bit materials. Our initial in-field testing in collaboration with Pete Winslett (Bama Mine & Milling, Inc.) has yielded particularly promising results. This project is anticipated to lead to commercialization ventures involving UAB and local industry.

2. NANOSTRUCTURED DIAMOND DEPOSITION ON COCRMO SUBSTRATES

AWARD: Smith & Nephew, Inc., UAB Research Agreement

FUNDING: $16,451 (total, non-federal)

ROLE: co-Investigator with Dr. Yogesh Vohra (PI), UAB

PERIOD: 01-April-2006 to 31-March-2007

SUMMARY: This project aims to develop nanostructured diamond coatings on CoCrMo alloy which is used in the biomedical implant industry. We will evaluate adhesion and other mechanical properties of the coating on flat disks, and perform wear studies to compare with uncoated surfaces. This translational study will be used to evaluate the efficacy of coating actual implant devices and their performance under loading conditions.

FEDERAL

3. PFI: BIC- INNOVATIONS IN CHEMICAL VAPOR DEPOSITED DIAMOND CRYSTALS AND NANOSTRUCTURED DIAMOND COATINGS

AWARD: National Science Foundation, Partnerships for Innovation: Building Innovation Capacity; IIP-1317210

FUNDING: $600,000 (total), subcontract to Vista Engineering ($50,000)

ROLE: co-PI with Dr. Yogesh Vohra (PI), UAB

PERIOD: 15-July-2013 to 30-June-2015

SUMMARY: This Partnership for Innovation: Building Innovation Capacity (PFI: BIC) project from the University of Alabama at Birmingham (UAB) plans to capitalize on the recent advances in the synthesis of diamond by Chemical Vapor Deposition (CVD) in order to develop the next generation of diamond-based sensors for extreme environments and diamond-coatings for higher-power solid-state lasers and longer-lasting biomedical implants. This project aims to address the difficulties encountered in and to improve on the adhesion of CVD diamond films on laser media and biomedical implant materials like stainless steel and cobalt-chrome alloys. The proposed research will contribute to the knowledge base on the growth

mechanisms of diamond single crystals as well as the growth of nanostructured diamond coatings on metallic and non-metallic substrates.

4. Nanotechnology Enabled Temporomandibular Joint (TMJ) Prosthesis

Award: National Institutes of Health, Small Business Technology Transfer Phase II; 5R41DE019335-02

Funding: $746,369

Role: co-Investigator with Dr. Yogesh Vohra (PI), UAB and Dr. Raymond Thompson (PI), Vista Engineering

Period: 15-Aug-2011 to 31-July-2014

Summary: The goal of this STTR Phase II program is to design a minimally invasive diamond-on-diamond articulating TMJ device using computational modeling approaches. This next generation of TMJ device will be fabricated and tested in a TMJ wear-simulator to have a service lifetime of more than ten-years of clinical use. The TMJ devices that show lowest mechanical wear in simulator studies will also be tested in an animal model. The clinical translational studies are planned to eventually allow testing of new TMJ devices for human use in the next few years.

5. NANOTECHNOLOGY ENABLED TEMPOROMANDIBULAR JOINT (TMJ) PROSTHESIS

AWARD: National Institutes of Health, Small Business Technology Transfer Phase I; 5R41DE019335-02

FUNDING: $353,582 (total)

Role: co-Investigator with Dr. Yogesh Vohra (PI), UAB and Dr. Raymond Thompson (PI), Vista Engineering

PERIOD: 01-July-2008 to 30-June-2011

SUMMARY: In this project, the UAB and Vista Engineering team will develop novel multilayer nanostructured diamond coatings with enhanced adhesion and wear properties for articulation components in TMJ devices. We will also develop commercialization potential through scale-up and TMJ wear testing. UAB and Vista Engineering have a strong track record of collaboration culminating in the licensing (to Vista Engineering) of a UAB patent involving this technology: "Process for Ultra Smooth Diamond Coating on Metals and Uses Thereof", Patent # 6,183,818. In this Phase-I grant, the commercially produced TMJ implant will undergo extensive testing in a TMJ simulator to 1.125 million cycles (approximately the equivalent of 10 years clinical use). The successful outcome of this study will be an improved design for TMJ devices and coatings for hard-on-hard articulation. One benefit of the diamond-on-diamond components will be a reduction in overall device size that will ultimately allow for a clinically less-invasive route to joint restoration and longer implant lifetime *in vivo*.

6. Bioengineering Research Partnership in Total Joint Replacements

AWARD: National Institutes of Health -NIAMS 5R01AR056665-03

Funding: $790,931 (total)

Role: co-Investigator with Dr. Yogesh Vohra (PI), UAB

Period: 01-July-2009 to 30-June-2013

SUMMARY: In this University-Industry Partnership, we are focused on development and testing of diamond-on-diamond and diamond-on-polyethylene surfaces for minimizing wear between articulation components in orthopaedic devices. Complications arising from wear include component loosening, deleterious biological responses, osteolysis, mechanical instability, decreased joint mobility, increased pain, and ultimately implant failure. In this project, UAB and Smith & Nephew, Inc. team up to develop and test unique nanostructured multilayer diamond coatings on metal (CoCrMo or Ti-6Al-4V) orthopaedic devices with the goal of reducing friction and wear in articulation components.

7. NIRT: Nanostructured Functionally Graded Metalloceramic Biomaterials

AWARD: National Science Foundation, NIRT: DMR-0402891

FUNDING: $1,350,000 (total)

Role: co-Investigator with Dr. Yogesh Vohra (PI), UAB

PERIOD: 15-June-2004 to 31-May-2008

SUMMARY: For the specific case of wear resistant coatings on metallic orthopedic implants, we are proposing techniques to produce functionally graded transitions in composition and nanostructure that will create unique materials simultaneously providing improved wear resistance, bioactivity, and coating/implant interfacial adhesion when compared to conventional biomaterials. The research program can be divided into three primary goals: (1) Develop technology for reducing friction and wear on the articulating, load-bearing components of total hip and knee metallic implants by depositing various ternary (Ti-B-N) and (B-C-N) nanostructured functionally graded metalloceramic coatings with hardness greater than 50 GPa, (2) Demonstrate that these coatings exhibit enhanced adhesion, wear resistance, and surface hardness over the current state-of-the-art as a result of their graded and nanostructured configuration, (3) Perform *in vitro* studies to compare the adhesion and osteoblastic differentiation of mesenchymal stem cells on the nanostructured surfaces with standard micron-scale hydroxyapatite and titanium.

INTERNAL FUNDING

TITLE: Nanolithography of Molecular Imprinted Polymers for Highly Selective Binding in Biosensor Arrays

FUNDING: $10,000 from CAS Faculty Development Grant

ROLE: PI

PERIOD: 01-October-2011 to 31-Septmeber-2012

SUMMARY: The aim of this project is to develop a biosensor array containing dot elements with ultra-high spatial resolution, in which each element consists of a molecular

imprinted polymer (MIP) to create synthetic macromolecular receptors. These synthetic receptors can essentially replace natural recognition molecules such as antibodies or enzymes. . We expect to develop stable MIP-based sensing elements using a high throughput scanning probe lithography method, with high sensitivity label-free continuous detection made by Surface-Enhanced Raman Scattering.

TITLE: Improved Carbide Tool Performance for Rock Drilling and Mining Operations using Boride Enhanced Vapor-deposited Diamond Coatings

FUNDING: $10,000

ROLE: PI. This is the 2nd CAS Graduate Student Entrepreneurship Award providing project support for my student Jamin Johnston.

PERIOD: 01-February-2014 to 31-January-2015

SUMMARY: The goal of this research is to achieve improved carbide tool performance for rock drilling and mining operations using boride-enhanced vapor-deposited diamond coatings. Our industrial collaborator (Bama Mine & Milling, Inc.) is testing our coated carbide inserts in mining operations, and the results have been very encouraging to the point where our collaborator is committed to investing in the technology (protected by our IP and IP disclosures) toward commercialization.

TITLE: Vapor-deposited metal-boride interfacial layers as diffusion barriers for nanostructured diamond growth on cobalt alloys

FUNDING: $10,000

ROLE: PI. This is the 1st CAS Graduate Student Entrepreneurship Award providing project support for my student Jamin Johnston.

PERIOD: 01-February-2013 to 31-January-2014

SUMMARY: The goal of this research is to explore the use of metal-boride interlayers by reacting diborane gas with CoCrMo substrates prior to CVD diamond deposition. We anticipate that metal-borides (primarily of cobalt) will form and act as diffusion barriers to prevent elemental cobalt from reacting with incoming carbon flux to the surface, thereby preventing unwanted graphitic carbon that would compromise diamond adhesion. This work is in collaboration with local company Wedge Manufacturing, Inc.

OTHER COLLABORATIONS

TITLE: The Effects of Ocean Acidification and Rising Sea Surface Temperatures on Shallow-Water Benthic Organisms in Antarctica

FUNDING: $625,499

ROLE: "Other Senior Personnel"; PI (Dr. James McClintock, UAB Department of Biology)

PERIOD: 01-June-2011 to 31-May-2014

SUMMARY: This research study will investigate the individual and combined effects of rising ocean acidification and sea surface temperatures on shallow-water calcified benthic organisms in western Antarctic Peninsular (WAP) marine communities.

My role in this project is to investigate surface morphology via AFM of calcified and non-calcified macroalgae, calcified and non-calcified mesograzers, and calcified macro-grazer, all of which are important ecological players in the rich benthic communities.

TEACHING

TEACHING PHILOSOPHY

I have had the opportunity to teach undergraduate physics courses at UAB since Fall 2007 (including Freshman/Sophomore algebra and calculus-based introductory physics). In this time, I have realized the importance of not only introducing physical concepts at the most fundamental level and relating it to direct experience, but also of challenging the students on how to learn by using critical thinking skills. I discourage students from relying solely on memorization or "problem pattern matching", but to instead start from fundamental concepts that lead to a solution in a step-wise fashion. My objective as a teacher is to excite students about the subject matter, invoke intellectual curiosity, and show them the immense possibilities in problem solving that comes from an understanding and utilization of fundamental concepts.

I believe the classroom environment must incorporate an interactive approach in order to maximize learning. I ask questions that aim to stimulate discussion before class, during class, and after concepts/problems are demonstrated, pointing out common misconceptions to help my students see where their expectations must change and then offering solutions driven from basic fundamental concepts. I search out visually appealing demos and try to make connections using analogies (such as water flow in DC circuits). I try to cater my examples to the educational background and career track of the students (e.g. a class of largely pre-medical students may benefit more from problems/examples related to health physics/medicine. I teach my students to solve problems by breaking complicated scenarios into simple steps where the relevant big ideas are clear. To further emphasize the importance of conceptual learning, I include problems on homework and exams that require students to illustrate as well as explain their understanding using complete sentences in short-essay style. This may lengthen grading time, but it provides a clear way to determine the level of critical thinking achieved by the student.

Overall, I consider myself a continually evolving instructor in my approach and style of teaching, keeping elements that prove successful and weeding out those that not effective. However, there is no need to reinvent the wheel, and there are proven strategies and pedagogies for teaching physics more effectively that we can rely on and build upon. I also recognize that no matter how clear and insightful my thoughts on physics are, research has shown that passively listening to lectures is not an efficient way to learn. Therefore, the conventional lecture format should be made to accommodate at least some degree of "n-way" communication. By this, I mean deliberate exchange between instructor and students as an entire group (2-way) as well as exchange between 'n' students in peer groups. I also find it useful to solicit feedback from students and colleagues on the quality of my course design and instruction. This should be done periodically during the course, and not left to the end when the instructor has no time left to adapt to suggestions.

FORCE CONCEPT INVENTORY (FCI)

Beginning in the Spring 2012 I initiated a pilot program of the Force Concept Inventory (FCI) in my PH201 and PH221 courses in order to measure student pre/post performance in these courses. The FCI was initially designed to assess student understanding of the Newtonian concepts of force. This inventory is best used as a measure of teaching effectiveness when used along with proven teaching practices (such as "peer-instruction" and "just-in-time" teaching). An extensive FCI analysis was provided to department chair, and this pilot program is now continuing with participation from other instructors, including Dr. David Hilton who used it in Fall 2013 PH221 Honors, Dr. Tom Nordlund (who is comparing it with his "inverted" lecture style in PH201), and Dr. Mike Walock who used it in PH201 Spring 2013.

In many cases, students do well when measured by conventional physics questions, but cannot answer questions that physicists see as much easier. Often, students can recognize which formulas to use for which problems, and then work their way through long calculations, but they still don't understand some of the most basic principles of physics. They remain, in a sense, "Aristotelian thinkers". This highlights a common problem in the way students learn physics (often related to the way physics is conventionally taught), in that conceptual understanding at the most fundamental level is often overlooked in lieu of rote learning.

My goal has been to demonstrate that the FCI is a potentially useful tool to understand the weaknesses that remain in student learning at the most fundamental, conceptual levels. If this tool can be used in comparing conventional lecture methods with those that may be considered more interactive (e.g. using "peer instruction" and "Just-In-Time" methods in a studio-physics environment), then perhaps this may result in adopted teaching pedagogies with improvement in overall student performance in introductory physics courses.

TEACHING HONORS

In Spring 2015, I had the honor of being nominated by the Physics Department for the President's Award for Teaching Excellence.

CLASSES TAUGHT

	Class	Enrolled
Fall 2007	PH100	41
Spring 2008	PH100	30
Fall 2008	PH100	46
Spring 2009	PH100	31
Fall 2009	PH201	69
	PH201R	72
Spring 2010	PH202	77
	PH202R	70
Spring 2011	PH221	39
	PH221R	56
Spring 2012	PH201	96
	PH201R	30
Fall 2012	PH221	84
	PH221R	19
Spring 2013	PH222	64
	PH222R	21
Fall 2013	PH351	16
Spring 2014	PH352	11
Fall 2014	PH351	13
Spring 2015	PH352	13
Fall 2015	PH351	17
	Total	915

COURSE DESCRIPTION

Physics 100 – Freshman Undergraduate
Preparatory Physics.
Physics, Cutnell and Johnson.

Physics 201 - Freshman/Sophomore Premed Undergraduate
College Physics I.
Physics, J. D. Cutnell and Johnson.

Physics 201R: - Freshman/Sophomore Premed Undergraduate
College Physics I Recitation.

Physics 202 - Freshman/Sophomore Premed Undergraduate
College Physics II.
Physics, J. D. Cutnell and Johnson.

Physics 202R: - Freshman/Sophomore Premed Undergraduate
College Physics II Recitation.

Physics 221: - Freshman/Sophomore Science/Engineering Undergraduate
General Physics I. *Physics, Volume 1,* Halliday and Resnick.

Physics 221R - Freshman/Sophomore Science/Engineering Undergraduate
General Physics I Recitation.

Physics 222 - Freshman/Sophomore Science/Engineering Undergraduate
General Physics II. *Physics, Volume 2,* Halliday and Resnick.

Physics 222R: - Freshman/Sophomore Science/Engineering Undergraduate
General Physics II Recitation.

Physics 351/352 – Sophomore/Junior Undergraduate
Modern Physics I and II.
Modern Physics for Scientists and Engineers
Thornton & Rex.

SUMMARY OF IDEA SURVEY EVALUATIONS

These are rated using a 0 (lowest) to 5 (highest) scale

Term	Class	A. Progress on Objectives		B. Excellent Teacher		C. Excellent Course		D. Average of B & C		Summary Evaluation	
		Raw	Adj	Raw	Adj	Raw	Adj	Raw	Adj	Raw	Adj
Fall 07	PH100-1A	3.7	3.7	3.6	3.5	3.5	3.3	3.6	3.4	3.7	3.6
Sp 08	PH100-1A	4.4	4.3	4.8	4.7	4.4	4.3	4.6	4.5	4.5	4.4
Fall 08	PH100-1A	4.6	4.3	4.8	4.7	4.7	4.5	4.8	4.6	4.7	4.4
Sp 09	PH100-1A	4.4	4.1	4.3	4.2	4.2	3.8	4.3	4	4.4	4.1
Fall 09	PH201-1M	4.5	4.2	4.6	4.5	4.1	3.7	4.4	4.1	4.5	4.2
Sp 10	PH202-1M	4.3	4.0	4.4	4.3	3.9	3.6	4.2	4.0	4.3	4.0
Sp 11	PH221 -1M	4.1	3.7	4.0	3.7	3.6	3.0	3.8	3.4	3.9	3.6
Sp 12	PH201 -2F	4.1	4.0	4.2	4.3	3.8	3.8	4.0	4.1	4.1	4.1
Fall 12	PH221 -2A	4.2	3.9	4.1	4.1	3.8	3.5	3.9	3.8	4.1	3.8
Sp 13	PH222 -2A	4.1	3.8	3.9	3.8	3.8	3.6	3.8	3.7	3.9	3.8
Fall 13	PH351 -2G	4.7	3.8	4.7	4.1	4.8	3.7	4.8	3.9	4.8	3.8
Sp 14	PH352-2G	4.6	3.9	4.4	3.9	4.4	3.3	4.4	3.6	4.5	3.8
Fall 2014	PH351-2B	4.6	4.2	5.0	4.7	5.0	4.6	5.0	4.7	4.8	4.5
Sp 2015	PH352-2B	4.6	4.2	4.8	4.5	4.7	4.0	4.8	4.3	4.7	4.3
Average Since Spring 2010		**4.37**	**3.94**	**4.39**	**4.16**	**4.20**	**3.68**	**4.30**	**3.94**	**4.34**	**3.97**

STUDENTS MENTORED

PH. D. STUDENTS (COMPLETED)

- Mr. Jared Ballinger (graduated Spring 2015)
  Title: "Microwave Plasma Chemical Vapor Deposition Diamond Films on 316 and 440C Stainless Steel utilizing Titanium Nitride and Borided Interlayers"
  Scholarship: Three conference talks and one 1st-author peer-reviewed publication

- Ms. Sonal Singh (graduated Fall 2013)
  Title: "Investigation of nanodiamonds with Si-V defect centers for applications in fluorescence-based sensing and drug delivery"

Scholarship: Four conference talks, one conference proceeding, two 1st-author peer-reviewed publications

PH. D. STUDENTS (ADMITTED TO CANDIDACY)

- Mr. Jamin Johnston (2012-current)
  Scholarship: Two 1st-author peer-reviewed publications, Two CAS Graduate Student Entrepreneurship Awards

PH. D. STUDENTS (NOT YET ADMITTED TO CANDIDACY BY 30-SEPTEMBER-2015)

- Ms. Reim Almotiri (2014-current)

MASTERS COMPLETED (PLAN I)

- Ms. Parul Tyagi (Graduated Fall 2007)
  Title: "Study of Nano-Mechanical Properties of 3D Scaffolds Prepared from Polycaprolactone and Hydroxyapatite"
  Scholarship: One 1st-author peer-reviewed publication.

MASTERS SUPERVISED (PLAN I, BOTH ARE PH. D STUDENTS IN PHYSICS)

- Mr. Jared Ballinger (2011-current)
- Mr. Jamin Johnston (2012-current)

UNDERGRADUATE STUDENTS SUPERVISED (NOT INCLUDING 16 STUDENTS MENTORED IN NSF REU PROGRAM FROM 1999-2015)

- Mr. Joshua Moore (2015-current)
  UAB undergraduate biomedical engineering major in Science & Technology Honors Program
- Mr. Ethan Jake White (2012-2014), Graduated 2014
  UAB undergraduate Physics major in Science & Technology Honors Program
- Mr. Robert Collins (2014-current)
  UAB undergraduate Physics major working on an honor thesis
- Mr. Reshu Saini (2007)
  Currently attending UAB Medical School

HIGH SCHOOL STUDENTS SUPERVISED

John Brandon- (Fall 2012) Senior at Jefferson County IB School

MEMBER- GRADUATE COMMITTEES (OTHER THAN MAJOR ADVISOR):

University of Alabama at Birmingham

2015-; Siqian Zhao (Materials Eng., UA campus), "Magnetic Properties and Structure of Manganese Compounds"

2015-; Samuel Moore (Physics), "'Simulation and fabrication of diamond based sensors"

2014-; Alex Skinner (Physics), "Microstructure Control of Doped Barium Zirconate Electroceramics Deposited by Pulsed Laser Deposition"

2014-; Alan Martinez (Physics), "fabrication and laser spectroscopic characterization of transition metal doped binary and ternary II-VI compounds via post growth thermal diffusion as well as radiation (gamma rays) enhanced thermal diffusion"

2014-; Oleksandra Zavgorodnya (Chemistry), "Nanostructured multilayer hydrogels of regulated architecture: synthesis and stimuli responsive properties"

2013 - 2014; Andrew Stemshorn (Physics), "Devitrification of Iron-Based Metallic Glasses at High Pressures and High Temperatures"

2013- ; Jeff Montgomery (Physics), "High-Temperature High-Pressure Phase Diagrams of Heavy Rare Earth Metals"

2013-; Eric Remington (Physics), "Synthesis and Ion Conducting Properties of Barium Zirconate Based Thin Films"

2013-2014; Oleksandra Zavgorodnya (Chemistry), "Nanostructured multilayer hydrogels of regulated architecture: Synthesis and stimuli-responsive properties"

2012 - 2014; Carrie Schindler (Materials Engineering), "Fabrication and characterization of functionalized polymer systems using dip-pen nanolithography"

2011 - 2013; Mike Walock (Physics), "Nanocomposite Coatings and Structures Based on Quaternary Metal-Nitrogen and Nanocarbon Systems"

2011 2013-; Yujiao Zhou (Physics), "The Microstructure, Mechanical Properties, and Thermal Stability of Cr1-xMoxNy Ternary Thin-Films".

2011- 2013- ; Sunil Karna (Physics), "Synthesis of semiconducting high quality homoepitaxial single crystal boron doped diamond".

2011- 2013; Yun Wang (Chemistry), "Synthesis of pH-responsive multilayer hydrogels and amphiphilic block copolymers"

2011 -; Xing Liang (Chemistry), "Polymer Brushes via Surface Initiated Atom Transfer Radical Polymerization"

2010 – 2012; Eric Kerr-Anderson (Mat. Sci. & Eng), "Development, characterization, and modeling of ballistic impact on composite laminates under compressive pre-stress"

2010 - 2011; John Tipton (Mat. Sci. & Eng), "X-Polyethylene/detonation nanodiamond nanocomposites: Structure, property, and processing relationships for tribological longevity and UV stability".

2010 - 2011; Parimal Bapat (Physics), "Calcium phosphate nanostructures: Synthesis and applications"

2009 - 2010; Leigh Booth (Biomedical Engineering), "Multilayered nanostructured diamond coatings for temporomandibular joint prosthesis"

2009-2012 ; Sunil Karna (Physics), "Synthesis of semiconducting high quality homoepitaxial single crystal boron doped diamond"

2008-2009: Gopi Samudrala (Physics), "Multivariable study on homoepitaxial growth of diamond on planar and non-planar substrates"

SERVICE

PROFESSIONAL SERVICE

- External ad hoc reviewer for of the short application of a planned Austrian Competence Center for Excellent Technologies (COMET), entitled "BCMA_med" (Main Applicant: Austrian Research Centers GmbH-ARC).
- External ad hoc reviewer for the proposal "Two photon induced polymerization system for rapid prototyping of scaffolds for tissue engineering", (PI: Roger J. Narayan, MD PhD), University of North Carolina and North Carolina State University.
- External ad hoc reviewer of the proposal "Spark Plasma Sintering (SPS) Nano-Materials for oil sands wear applications" (PI: Tahir Khan, PhD), Alberta Ingenuity nanoWorks Program.
- Reviewer for over twelve manuscripts in *Journal of Nanomaterials*, *Biomedical materials*, *Nanomaterials*, *Tissue Engineering*, *Journal of Nanoscience and Nanotechnology*, *Journal of Physics and Chemistry of Solids*, *Polymer Engineering and Science*, *Materials Technology*, *Surfaces and Coatings Technology*, *Carbon*, *Physics Status Solida A*, and *Inquiro* (UAB undergraduate journal).

UNIVERSITY SERVICE

- **Undergraduate Recruiting**: I have represented the Department of Physics at five 'UAB Days' and one Scholar Symposium event to help to recruit new students into our undergraduate Physics major.
  I have also given recruiting presentations at Morehouse College, Samford University, and UAB (for visiting Stillman College and Oakwood University students).
- **Applied Physics Track Internship Committee:** I am a member of the faculty team that sets forth guidelines for the applied physics track and associated internship. My student Jamin Johnston is the 1st student to enter into this track and he will be starting his internship Fall 2014.
- **Classical Mechanics Graduate Comprehensive Committee Member ("Assistant Writer")**: I have been an assistant writer of the Comprehensive Examination Committee for Classical Mechanics since Fall 2012 with Dr. Renato Camata (chair). I have submitted questions that were used on these exams.
- **Graduation Commencement**: I have represented the Department of Physics at two graduation commencement ceremonies.

COMMUNITY SERVICE

- I have served as Judge for the Central Alabama Regional Science and Engineering Fair as well as two CAS Graduate Research Days. I have participated in a new outreach program (initiated by Dr. David Hilton) with Riverchase Middle School in the Birmingham suburb of Riverchase. Mrs. Trish Bogdenchik and her advanced eighth grade science class have visited UAB once (28-September-2012) and have met with several faculty, graduate and undergraduate students to discuss their upcoming science fair projects.
- I am participating in the "Mathematics and Science Partnership" Grant Administered by the Alabama Math Science Technology Initiative (Aug 2012-July 2015), funded by State Department of Education (pass through grant from the US Department of Education). This MSP grant is part of the Alabama Math and Science technology Initiative (AMSTI) which involves developing content-specific modules for physical science middle and high school teachers. My role was to contribute a portion of the physics training via on-line preparation of teaching modules.
- For three years (2012, 2013, 2015), I have participated in the outreach program called 'PhysicsBridge' initiated by Dr. David Hilton. This program provides local area rising 9th grade students with an exciting summer experience in optics, lasers, and light by conducting hands on experiments working with great UAB faculty, students, and staff to understand physics. This experience is designed to help prepare students for careers in physics and to prepare them for high school. I am hoping to expand this program with NSF funds of my own to develop a similar experience in nanotechnology-related science experiments for rising 11^{th} graders.