

## CURRICULUM VITAE

**Name: Xiaodu Wang**

**Rank: Professor**

### I. GENERAL INFORMATION

#### A. Personal Data:

15922 Socorro Falls  
Helotes, TX 78023  
(210) 680-1127 (H)  
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E-mail: [xiaodu.wang@utsa.edu](mailto:xiaodu.wang@utsa.edu)

#### B. Education:

Ph.D. 1990 Mechanical Engineering and Materials Science, Yokohama National University, Japan  
M.S. 1985 Mechanical Engineering, Beijing Institute of Aeronautics and Astronautics, China  
B.S. 1982 Mechanical Engineering, Beijing Institute of Aeronautics and Astronautics, China

#### C. Academic Appointments (chronological with latest first):

2007-present Professor (tenured), Mechanical Engineering, University of Texas at San Antonio (UTSA)  
2008 Visiting Professor, College of Engineering, Peking University, China  
2003-2007 Associate Professor (tenured), Department of Mechanical Engineering, UTSA  
1999-2003 Assistant Professor (tenure track), Department of Mechanical Engineering, UTSA  
1999-2007 Adjunct Assistant Professor, Department of Orthopaedics, the University of Texas Health Science Center at San Antonio (UTHSCSA)  
1997-1999 Assistant Professor (research), Department of Orthopaedics, UTHSCSA  
1995-1997 Assistant Instructor (research), Orthopaedic Biomaterials, UTHSCSA  
1995-1996 Assistant Instructor (research), NSF Center for Enhancement of Biology-Biomaterials Interface (CEBBI), UTHSCSA  
1992-1994 Postdoctoral Research Fellow, Orthopaedic Biomaterials, UTHSCSA.  
1987-1990 Research Assistant, Dept. of Mechanical Engineering and Materials Science, Yokohama National University, Yokohama, Japan.  
1986-1987 Research Fellow, Dept. of Mechanical Engineering and Materials Science, Yokohama National University, Yokohama, Japan.  
1985-1986 Assistant Lecturer, Dept. of Mechanical Engineering, Beijing Institute of Aeronautics and Astronautics (BIAA), Beijing, China.

#### D. Other Employment:

1990-1991 Research Engineer, Keihin Steel Research Laboratories, NKK Corp. Japan.

#### E. Consulting:

2001 Southwest Research Institute, San Antonio, Texas

#### F. Certification and Licensure:

None

#### G. Honors and Awards:

2020 Presidential Distinguished Achievement Award (Research), UTSA  
2015 Fellow, American Institute of Medical and Biological Engineering (AIMBE)

2011	Faculty Mentor of Cole Meyers, Undergraduate Research Assistant, Second Place at the UT System Annual Statewide Conference of Louis Stokes Alliance for Minority Participation (LSAMP) program
2009	Advisor of Michael Reyes, PhD Candidate, Winner of Research Award in PhD Category at 2009 BMES Annual Meeting.
2007	Marquis Who's Who in Science and Engineering
2005	Advisor of Michael Reyes (PhD Student), 2 <sup>nd</sup> place of research poster competition in PhD category, College of Engineering, UTSA
2004	Fellow of ASME
2001-2004	Finalists of UTSA Distinguished Research Award by College of Engineering
2001	Award for Teaching Excellence in Teaching Students with Disabilities, UTSA.
1998-2001	Whitaker Investigator, the Whitaker Foundation
1998	3rd Place Winner of Best Presentation in Graduate Student Category, 17th Southern Biomedical Engineering Conference, (mentor)
1996	2 <sup>nd</sup> Place Winner of Roy Davis Paper Competition, co-author
1990-1991	Post-graduate Fellowship, Japan Overseas Technical Training Association.
1986-1990	International Graduate Research Fellowship, Ministry of Culture, Education, and Science, Japan
1982	University Award for Outstanding Graduates, BIAA.

## II. TEACHING

### A. Classroom/Laboratory:

Date	Course	Level
Spring 1985	Fundamentals of Metal Cutting and Fixtures Design	U
Summer 1985	Fundamentals in Metal Cutting	U
Fall 1999	Materials Engineering (ME2243), Solid Mechanics (ME3813)	U
Spring 2000	Materials Engineering (ME2243), Intermediate Materials Engineering (ME4243)	U
Fall 2000	Materials Engineering (ME3243), Solid Mechanics (ME3813), Mechanical Behavior of Materials (ME5713)	U & G
Spring 2001	Materials Engineering (ME3243), Solid mechanics (ME3813)	U
Fall 2001	Materials Processing (ME3263), Materials Engineering (ME3243), Fracture Mechanics (EGR5313), Master thesis (ME6983)	U & G
Spring 2002	Intermediate Materials Engineering (ME4243)	U
Fall 2002	Materials Engineering (ME3243), Mechanical Behavior of Materials (ME5713)	U & G
Spring 2003	Materials Engineering (ME3243), Master thesis (ME6983)	U
Fall 2003	Materials Engineering (ME3243), Solid mechanics (ME3813), Master thesis (ME6983)	U & G
Spring 2004	Biomechanics (ME5833), Master thesis (ME6983)	G
Fall 2004	Materials Engineering (ME3243)	U
Spring 2005	Biomechanics (ME5833)	G
Fall 2005	Materials Engineering (ME3243), Mechanical Behavior of Materials (ME5713), BME Research Seminar (BME6991)	U & G
Spring 2006	Materials Engineering (ME3243) PhD Research (BME7956)	U & G
Fall 2006	Materials Engineering (ME3243) PhD Research (BME7956)	U & G
Spring 2007	Materials Engineering (ME3243) PhD Research (BME7956)	U & G
Fall 2007	Materials Engineering (ME3243) PhD Research (BME7956) Independent Study (BME6504)	U & G
Spring 2008	PhD Research (BME7956) Independent study (ME6053)	G
Fall 2008	Mechanics of Solids (ME3818) PhD Research (BME7956) PhD dissertation (BME7993) Master thesis (ME6983)	U & G
Spring 2009	Mechanical Behavior of Materials (ME5713) PhD Research (BME7956) PhD dissertation (BME7993) Master thesis (ME6983)	G

Fall 2009	Fracture Mechanics (ME5463) PhD Research (BME7956) PhD dissertation (BME7993) Master thesis (ME6983)	G
Spring 2010	Mechanical Behavior of Materials (ME5713) PhD Research (BME7956) PhD dissertation (BME7993) Master thesis (ME6983)	G
Fall 2010	Fracture Mechanics (ME5463) PhD Research (BME7956) PhD dissertation (BME7993) Master thesis (ME6983)	G
Spring 2011	Mechanical Behavior of Materials (ME5713) PhD Research (BME7956) Master thesis (ME6983) Independent study (ME6953)	G
Fall 2011	Fracture Mechanics (ME5463) Master thesis (ME6983) Independent study (ME6953)	G
Spring 2012	Mechanical Behavior of Materials (ME5713) Master thesis (ME6983) Independent study (ME6953)	G
Fall 2012	Research Seminar (ME5991) Master thesis (ME6983) Independent study (ME6953)	G
Spring 2013	Research Seminar (ME5991) Mechanical Behavior of Materials (ME5713) Master thesis (ME6983 & BME 6983) PhD research (ME7956)	G
Fall 2013	Research Seminar (ME7991) Fracture Mechanics (ME5463) Master thesis (ME6983 & BME 6983) PhD research (ME7956)	G
Spring 2014	Research Seminar (ME7991) Mechanical Behavior of Materials (ME5713) Master thesis (ME6983 & BME 6983) PhD research (ME7956)	G
Fall 2014	Mechanics of Solids (ME3813) Research Seminar (ME7991) Master thesis (ME6983) PhD research (ME7956) Special Project (ME5973)	U & G
Spring 2015	Mechanical Behavior of Materials (ME5713) Master thesis (ME6983 & BME 6983) PhD research (ME7956)	G
Fall 2015	Mechanics of Solids (ME3813-002 and 003) PhD research (ME7956) Master thesis (ME6983 & BME 6983)	U & G
Spring 2016	Mechanical Behavior of Materials (ME5713) Master thesis (ME6983 & BME 6983) PhD research (ME7956)	G
Fall 2016	Skeletal Tissue Biomechanics (ME 6893), Master thesis (ME6983 & BME 6983) PhD research (ME7956)	G
Spring 2017	Mechanical Behavior of Materials (ME5713), Mechanics of Solids (ME3813) Master thesis (ME6983), PhD research (ME7956), PhD dissertation (ME7993)	U & G
Fall 2017	Mechanics of Solids (ME3813), PhD research (ME7956),	U & G
Spring 2018	Mechanical Behavior of Materials (ME5713), Mechanics of Solids (ME3813) PhD research (ME7956)	U & G
Fall 2018	Mechanics of Solids (ME3813)	U
Spring 2019	Mechanical Behavior of Materials (ME5713), Mechanics of Solids (ME3813)	U & G
Fall 2019	Mechanics of Solids (ME3813), PhD research (ME7956), Master thesis (ME6983)	U & G

Level: Undergraduate (U), Graduate (G)

## B. Instructional Development:

### 1. Courses Developed (Course number, title, date)

Introduction to Bioengineering, Summer 2017  
 ME6893 Skeletal Tissue Mechanics, Spring 2008  
 ME5833 Biomechanics, Spring 2004  
 ME5713 Mechanical Behavior of Materials (), Fall 2000  
 ME7991 PhD Research Seminar, Fall 2012

### 2. Media and Software Developed

Blackboard online course of Mechanics of Solids (ME3813) 2015

WebCT online course of Materials Engineering (ME3243) 2003

### C. Masters Theses and Ph.D. Dissertations Directed

#### 1. Masters' Thesis (23)

- 2019 Mark Anguiano, MS/ME, UTSA  
*Proteoglycans vs. Nanomechanics of bone*
- 2018- Habeeb Mustapha, MS/ME, UTSA  
*Deep learning of trabecular bone microstructure*
- 2015-2017 Abu Saleh Ahsan, (**graduated**) MS/ME, UTSA  
*Nanomechanics of bone*
- 2015-2017 Matt Kirby, (**graduated**) MS/ME, UTSA  
*Digital bone*
- 2013-2015 Haoran (Kevin) Xu, (**graduated**) MS/ME, UTSA  
*Effect of proteoglycans on the in situ toughness of bone*
- 2013-2015 Abu Hena Md Mahbub Morshed, (**graduated**) MS/ME, UTSA  
*Mathematical modeling of trabecular bone architectures*
- 2010-2014 Chintan Gandhi, (**graduated**) MS/BME, UTSA  
*Effects of Matrix AGEs on Osteoclastic Resorption on Human Bone*
- 2011-2013 Md Monirul Islam, (**graduated**) MS/ME, UTSA  
*Coring of bone vs. heat induced temperature rise*
- 2011-2013 Ahmed Mostafa, (**graduated**) MS/ME, UTSA  
*AGEs vs. bone formation using an implant rat model*
- 2011-2013 Chandan Shome, (**graduated**) MS/ME, UTSA  
*Nanomechanics of bone fragility*
- 2011-2013 Dana Mecke, (**graduated**) MS/BME, UTSA  
*Probabilistic descriptions of trabecular bone architecture*
- 2011-2013 Khaled Mahmud, (**graduated**) MS/ME, UTSA  
*Probabilistic FEA simulation of microdamage development in mineralized collagen fibrils*
- 2011-2013 Saurav Kumar, (**graduated**) MS/ME, UTSA  
*Modeling and analysis of the mechanical parameters and effect of environmental factors on porcine eye lens*
- 2011-2013 Sergio Montelongo, MS/BME (**graduated**), UTSA  
*Modeling of trabecular bone using stochastic geometry approaches*
- 2011- Ray Hansberger, MS/ME (pending), UTSA  
*Development of a smart coring tool to assess the quality of bone*
- 2011-2012 Jitin Samuel, MS/ME, (**graduated**) UTSA
- 2009-2011 Anowarul Islam, MS/ME (**graduated**), UTSA  
*Development and verification of a novel nanoscratch test for bone*
- 2008-2010 Mounica Banka, MS/BME (**graduated**), UTSA  
*Microdamage induced collagen denaturation in bone*
- 2008-2009 Rugved Nakade, MS/ME (**graduated**), UTSA  
*Influence of interfacial properties and inhomogeneity on formation of microdamage in bone*
- 2006-2009 Rae Acuna, MS/ME Student, (**graduated**) Thesis advisor, UTSA  
*Anisotropic post-yield behavior of human cortical bone*
- 2001-2004 Sreekar Puram, MS/ME Student (**graduated**), Thesis advisor, UTSA  
*Age-related effect of bone remodeling on the localized mechanical properties of human bone*
- 2001-2003 Ashok Vardhan Gunuganti, MS/ME Student (**graduated**), Thesis advisor, UTSA  
*A study on strengthening mechanisms for nanoparticle reinforcement of DL-PLG and LPLA biopolymers*
- 2000-2001 Joe Langle, MS/ME Student (**graduated**), Thesis advisor, UTSA  
*Rupture pressure prediction of scored prebulged rupture discs*

#### 2. Masters' Non-Thesis (7)

- 2016-2017 Shu (Sheldon) Yang, MS/ME (**Graduated**), UTSA

2015-2016	Natalie Fan, MS/BME ( <b>Graduated</b> ), UTSA
2014-2015	Thomas Leal, MS/ME ( <b>Graduated</b> ), UTSA
2013-2014	Raham Kirkwood, MS/ME ( <b>Graduated</b> ), UTSA
2013-2014	Chris Storey, MS/ME ( <b>Graduated</b> ), UTSA
2011-2012	Arron L. Werthem, MS/ME ( <b>Graduated</b> ), UTSA
2011-2012	Mustafa Unel, MS/ME ( <b>Graduated</b> ), UTSA

### 3. Ph.D. Dissertation

2018-	Pengwei Xiao, PhD/ME, UTSA <i>Digital model of trabecular bone for deep transfer learning of bone fragility</i>
2017-2018	Neda Shafiei, PhD/ME, UTSA <i>Digital model of trabecular bone</i>
2016-2017	Jie Bai, PhD/ME, UTSA <i>Multiscale modeling of bone</i>
2012-2018	Jitin Samuel, PhD/ME, UTSA, ( <b>Graduated</b> ) <i>Nanomechanics of bone using synchrotron X-ray scattering techniques</i>
2009-2012	Qin Luo, PhD in Biomedical Engineering, Thesis Co-Advisor, Peking University, ( <b>Graduated</b> ) <i>A study on microdamage accumulation in bone</i>
2005-2008	Satya P. Paruchuru, PhD in Applied Mechanics, Thesis Co-Advisor, Motilal Nehru National Institute of Technology, India ( <b>Graduated</b> ) <i>Mechanical techniques for characterization of bone</i>
2004-2010	Michael Reyes, PhD/BME, UTSA, ( <b>Graduated</b> ) <i>The effect of bone remodeling on the local properties of human cortical bone</i>

## D. Membership on Advising Committees

### 1. Masters (15)

2017-2018	Ezra Tima Ameperosa, (Thesis, Graduated) MS/ME, UTSA
2016-2017	Karan Tilak, (Thesis, Graduated), MS/ME, UTSA
2014-2015	Mohammad Mottahedi, (Thesis, Graduated), MS/ME, UTSA
2014-2015	Peter Mancuso, (Thesis, Graduated), MS/ME, UTSA
2013-2015	Raham Kirkwood, (Non-Thesis, Graduated), MS/ME, UTSA
2013-2014	Md Imran Hossain Khan, (Thesis, Graduated), MS/ME, UTSA
2011-2012	Sunderam Krishnan, (Thesis, Graduated), MS/CEE, UTSA
2011-2012	Jason York, (Thesis, Graduated), MS/ME, UTSA
2010-2011	Ricky Martinez, (Thesis, Graduated), MS/ ME, UTSA
2008-2009	Ryan Potter, MS/BME (Thesis, Graduated), UTSA
2007-2008	Matt Barsotti, MS/ME Student (Thesis, Graduated), UTSA
2004-2006	Scott M. Dowell, MS in Dental Science, (Thesis, Graduated), UTHSCSA
2001-2004	Karol Hricisak, MSME Student, (Non Thesis, Graduated), UTSA
2002-2003	Garg Himanchu, MS/ME Student (Thesis, Graduated), UTSA
2001-2002	Joe Tapper, MS/ME Student (Thesis, Graduated), UTSA

### 2. Ph.D. Dissertation (11)

2018-	Arman Ghasemi, PhD/ME, Advising committee member, UTSA
2018-	Eliseo Iglesias, PhD/ME, Advising committee member, UTSA
2016-	Mohammad Maghsoudi-Ganjeh, Advising committee member, UTSA
2015-2017	Poornima Kumar Mensinkai, PhD/CTS (Graduated), Advisory committee member, UTHSCSA
2014-2016	Liqiang Lin, PhD/ME (Graduated), Advising committee member, UTSA
2008-	David Riha, BME PhD student, Advising committee member, UTSA
2011-2014	Daniel Sparkman, PhD/ME (Graduated), Advising committee member, UTSA
2011-2013	Juan Ocompo, PhD/ME (Graduated), Advising committee member, UTSA
2008-2012	Qing Luo, PhD/BME, Advising committee member (Graduated), Peking University, China
2006-2011	Danika Hayman, BME/PhD student (Graduated), Advising committee member, UTSA

2004-2008 Yong-Ung Lee, BME/PhD student (Graduated), Advising committee member, UTSA  
 2003-2007 Hsiu-TY Ho, EE/PhD student (Graduated), Advising committee member, UTSA

**E. Postdoctoral Fellows (14) /Exchange Scholars Supervised (5)**

1. Yan Han, Post-doc, (PhD/BME, Shanghai Jiao Tong University), UTSA	2019
2. Changlong Feng, Exchange PhD Student, (PhD/BME, Beihang University), UTSA	2018
3. Rui Hua, Post-doc, (PhD/Life Science, Peking University), UTSA	2016-2017
4. Huiting Gao, Exchange Scholar, (PhD/MSE, Harbin University of Technology), UTSA	2016
5. Rohit Khanna, Post-doc, (PhD/MSE, North Dakota University), UTSA	2015-2017
6. Yehong Huang, Post-doc, (PhD/BMS, Case Western Reserve University), UTSA	2015-2016
7. Mohammad Hodaiei, Post-doc, (PhD/ME, Southern Illinois University), UTSA	2015
8. Feng, Zhao, Exchange Scholar, (PhD/BioPhy, Chinese Academy of Science), UTSA	2015-2016
9. Xiao Yang, Exchange PhD Student, (PhD/BME, Beihang University), UTSA	2013-2014
10. Tao Wang, Exchange PhD Student, (PhD/BME, Beihang University), UTSA	2012
11. Bijay Giri, Post-doc, (PhD/ME, Hokkaido University, Japan), UTSA	2010-2012
12. Xuanliang (Neil) Dong, Post-doc, (PhD/ME, Columbia University), UTSA	2007-2010
13. Huijie Leng, Post-doc, (PhD/ME, Notre Dame University), UTSA	2006-2008
14. Young J. Yoon, Post-doc, (PhD/ME, City College of New York), UTSA	2006-2007
15. Hongbing Ji, Post-doc, (PhD/ME, Harbin Institute of Technology), UTSA	2004-2006
16. Jeffry Nyman, Post-doc, (PhD/BME, University of California, Davis), UTSA	2003-2006
17. Xiaoe Li, Post-doc, (PhD/BMS, Peking Union Medical University), UTHSCSA	1999-2002
18. Jeff Schlimmer, Orthopaedic Resident, (MD, UTHSCSA), UTHSCSA	1997-2000
19. Charlie Mess, Orthopaedic Resident, (MD, UTHSCSA), UTHSCSA	1997-1999

**F. Undergraduate Students (Research) Supervised (53)**

1. Hector Mellen, ME/UTSA, Undergraduate research assistant	2019
2. Trenten Wahlen, ME/UTSA, Undergraduate research assistant (NSF REU)	2019-
3. Victoria Wahlen, ME/UTSA, Undergraduate research assistant (NSF REU)	2018-2019
4. Besong Tabenyang, BME/UTSA, Undergraduate research assistant	2018
5. Brandon Donald, ME/UTSA, Undergraduate research assistant	2018-2019
6. Juan C Garduño Martinez, ME/UTSA, Undergraduate research assistant (NSF REU)	2018-2019
7. Carlos Manoz, ME/UTSA, Undergraduate research assistant	2018-2019
8. Joel Gormez, ME/UTSA, Undergraduate research assistant (NSF REU)	2017-2019
9. Trent Hejazi, ME/UTSA, Undergraduate research assistant	2015-2016
10. Kevin CEPISUL, ENSAM France, Exchange student (International exchange student)	2015 summer
11. Evan Veregge, SAC, Imaging processing	2014-2015
12. Jaime Mauricio Arredondo, ME/UTSA, Synchrotron (NEF REU)	2012-2014
13. Jacob James, ME/UTSA, Coring of bone	2012-2013
14. Jorge Saenz, ME/UTSA, Animal study of AGEs vs. bone	2012-2013
15. Peter Mancuso, ME/UTSA, Nanomechanics of bone,	2011-2013
16. Victor Castillo, ME/UTSA, Stochastic modeling of trabecular bone	2010-2011
17. Victor Cardona, ME/UTSA, Impact behavior of trabecular bone,	2010-2011
18. Andrew J. Steveson, ME/UTSA, Nanomechanics of bone (NSF REU)	2010-2011
19. Amanda Jennings, ME/UTSA, Response of bone to impact	2011
20. Cole Meyers, SAC, Role of water in bone fragility	2011 summer
21. Monica Urrutia, UTSA, Characterization of bone fragility (NSF REU)	2010-2011
22. Daniel Pinto, UTSA, Design of experimental devices	2009-2010
23. Olugbenga P. Adeeko, UTSA, Data processing and design of fixtures	2009-2010
24. Jun Yang, UTSA, Data processing and design of fixtures	2009-2010
25. James West, UTSA, Compressive test of bone specimens	2009
26. Ismael Seanez, UTSA, Microdamage accumulation in bone	2008-2010
27. Donna Hewitt, UTSA, Bone remodeling and bone fragility	2007-2008
28. Gregory Flint, UTSA, Bone remodeling and bone fragility	2008-2009
29. Daniel Sparkman, UTSA, Probabilistic bone mechanics	2007-2008

30. Rugved Nakade, UTSA, Bone mechanics	2006-2008
31. Justin Rice, UTSA, Bone mechanics	2006-2007
32. Natasha Hidalgo, UTSA, Preparation of bone specimens	2006-2007
33. Joseph Becerri, ISAC, CNC preparation of bone specimens	2006 summer
34. Paul Chen, UT Austin, Determination of collagen crosslinks	2006 summer
35. Rae Acuna, UTSA, Collagen crosslinks and bone fragility	2004-2006
36. Heather Gayle, UTSA, Bone mechanics	2005-2006
37. Steven Jarvis, UTSA, Precision punching using a CNC machine	2004-2005
38. Jerrod Tyler, UTSA, Post-yield behavior of bone	2004-2005
39. Jaime Perez, UTSA, Viscoelastic property of bone	2004-2005
40. John C. Wolf, UTSA, Testing of osteonal and interstitial bone	2001-2002
41. R. Wesley Osborn, UTSA, Micro mechanical testing device	2001-2002
42. Karol Hricisak, UTSA, Bone Fracture Mechanics	2000-2001
43. Kevin Meyer, UTSA, NMR determination of bone microstructure	2000-2001
44. Bharath Brahmanda, UTSA, Analysis of Collagen Network in Bone	1999, 2001
45. John Shields, Southern Methodist University, Bone Fracture Mechanics	1996
46. Joe Daschbach, Trinity University, Development of a Creep Tester	1994-1995
47. Don Merten, Trinity University, Development of a Creep Tester	1994-1995
48. Lisa Palm, Trinity University, Development of a Creep Tester	1994-1995
49. Sabrina Cayton, Duke University, Fracture Toughness of Canine Bone	1994
50. John Shields, Southern Methodist University, Rotator Cuff Repair	1994
51. Adrienne Pennick, UT Austin, In vitro protein release	1994-1995
52. Carmen Samaro, UTSA, Fracture toughness testing of bone	1994
53. Leticia Dominguez, UTSA, Fracture toughness testing of bone	1994

G. Senior design (Mentoring)

BFE, Jasmin Pae, Leela Bhat, Jessica Weaver, Brian Priputen, 2017-2018

### III. RESEARCH

#### A. Bibliography:

##### 1. Books/Book Chapters

###### 1a. Books

- 1) X. Wang, J.S. Nyman, X. Dong, H. Leng, M. Reyes: Fundamental Biomechanics in Bone Tissue Engineering (Lecture #4, Synthesis Lectures on Tissue Engineering, Editor: K.A. Athanasiou), 2010, Morgan & Claypool Publishers, LaVergne, TN.

###### 1b. Book Chapters

- 1) Xiao Yang, Lianwen Sun, Xiaodu Wang: Effects of advanced glycation end products (AGEs) on bone biomechanics and remodeling, in A Close Look at Glycation, Nova Science Publisher, 2020
- 2) X. Wang: Cortical bone mechanics & composition (Chapter 3 in Skeletal Aging and Osteoporosis Edited by M. Silva), Springer, 2011.
- 3) X. Wang, .M. Reyes, X. Dong, H. Leng: Micromechanical testing of bone tissues in tension, In 'A Practical Manual for Musculoskeletal Research,' (eds) K.S. Leung, Y. Qin, W.H. Cheung, & L. Qin, World Scientific, 2008.
- 4) Q. Ni, D. Nicollela, X. Wang, J. Nyman, Y. Qin: The characterization of cortical bone: Water distribution and structure changes on age, microdamage, and disuse by nuclear magnetic resonance, In 'A Practical Manual for Musculoskeletal Research,' (eds) K.S. Leung, Y. Qin, W.H. Cheung, & L. Qin, World Scientific, 2008.
- 5) N. Dong, M. Reyes, H. Leng, and X. Wang: Age-related micro- and ultrastructural changes in women's bone. In: 'Women and Aging: New Research' Editors: H. T. Benninghouse et al. Nova Science Publishers, Inc. 2008.
- 6) X. Wang, K.A. Athanasiou, and C.M. Agrawal: Fracture toughness tests of implant-bone interface. In 'Mechanical Testing of Bone and the Bone-Implant Interface,' (eds) Y.H. An & R.A. Draughn, CRC Press 1999

##### 2. Journal Papers (refereed full length)

###### 2a. Published or In Press



1. M. Kirby, A. Morshed, J. Gomez, P. Xiao, Y. Hu, X. E. Guo, and X. Wang: Three-dimensional rendering of trabecular bone microarchitecture using a probabilistic approach, *Biomechanics and Modeling in Mechanobiology*, 2020, accepted.
2. M. Maghsoudi-Ganjeh, X. Wang, X. Zeng: Computational investigation of the effect of water on the nanomechanical behavior of bone, *Journal of the Mechanical Behavior of Biomedical Materials*, (2020) 101: 103454.
3. Mohammad Maghsoudi-Ganjeh, Liqiang Lin, Xiaodu Wang, and Xiaowei Zeng: Computational investigation of ultrastructural behavior of bone using a cohesive finite element approach, *Biomechanics and Modeling in Mechanobiology* (2019) 18:463–478
4. Mohammad Maghsoudi-Ganjeh, Liqiang Lin, Xiaodu Wang & Xiaowei Zeng: Bioinspired design of hybrid composite materials, *International Journal of Smart and Nano Materials* (2019) 10 (1) 90–105.
5. Mohammad Maghsoudi-Ganjeh, Liqiang Lin, Xiaodu Wang, Xianqiao Wang, Xiaowei Zeng: Computational modeling of the mechanical behavior of 3D hybrid organic-inorganic nanocomposites, *JOM* (2019) 71. 3951-3961
6. Shengchun li, Chuan Xiang, Xiaochun Wei, Hongbin Li, Kai Li, Xiaojuan Sun, Shaowei Wang, Min Zhang, Jin Deng, Xiaodu Wang, Pengcui Li, Ruifang Li, Yanxiang Zhang, and Lei Wei: Knockdown Indian Hedgehog (Ihh) does not delay Fibular Fracture Healing in genetic deleted Ihh mice and pharmaceutical inhibited Ihh Mice, *Scientific Reports* (2018) 8:10351.
7. X. Wang, R. Hua, A. Ahsan, Q. Ni, Y. Huang, S. Gu, and J.X. Jiang: Age-related deterioration of bone toughness is related to diminishing amount of matrix glycosaminoglycans (GAGs), *JBMR Plus* (2018) 2 (3) 164-173.
8. Feng Zhao, Matthew Kirby, Anuradha Roy, Yizhong Hu, X. Edward Guo, and Xiaodu Wang: Commonality in the microarchitecture of trabecular bone: A preliminary study, *Bone* (2018) 111: 59–70
9. Liqiang Lin, Xiaodu Wang, Xiaowei Zeng: Computational modeling of interfacial behaviors in nanocomposite materials, *International Journal of Solids and Structures* (2017) 115–116: 43–52
10. Md. Monirul Islam & Xiaodu Wang: Effect of coring conditions on temperature rise in bone, *Bio-medical materials and engineering*, (2017) 201-211.
11. S. Li, G. Niu, N.X. Dong, X. Wang, Z. Liu, C. Song, H. Leng: Osteoporosis affects both post-yield microdamage accumulation and plasticity degradation in vertebra of ovariectomized rats, *Acta Mech. Sin.* (2017) 33(2):267–273.
12. Liqiang Lin, Xiaodu Wang, Xiaowei Zeng: An improved interfacial bonding model for material interface modeling, *Engineering Fracture Mechanics*, (2017) 169: 276-291.
13. Liqiang Lin, Jitin Samuel, Xiaodu Wang, and Xiaowei Zeng: Contribution of extrafibrillar matrix to the mechanical behavior of bone using a novel cohesive finite element model, *Journal of Mechanical Behavior of Biomedical Materials*, (2017) 65: 224-235.
14. Xiaodu Wang, Haoran Xu, Yehong Huang, Sumin Gu, and Jean Jiang: Coupling effect of water and proteoglycan on the *in situ* toughness of bone, *JBMR*, (2016) 31(5): 1026-1029.
15. Xiao Yang, Ahmed Jenan Mostafa, Mark Appleford, Lian-Wen Sun, and Xiaodu Wang: Bone formation is affected by matrix advanced glycation end products (AGEs) *in vivo*, *Calcified Tissue International*, (2016) 99(4): 373-383.
16. Jitin Samuel, Rohit Khanna, and Xiaodu Wang: Perspective: Ultrastructural origins of bone fragility, *Osteology and rheumatology*, (2016) 1(1): 1-3.
17. J. Samuel, J. Park, J. Almer, and X. Wang: Effect of water on nanomechanics of bone is different between tension and compression, *JMBBM* (2016) 57: 128-138.
18. X. Yang, C. Gandhi, Md. Rahman, M. Appleford, L. Sun, and X. Wang: Age-related effects of advanced glycation end products (AGEs) in bone matrix on osteoclastic resorption, *Calcified Tissue International*, (2015) 97:592–601.
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## **2b. Submitted/Under Preparation.**

- 1) Pengwei Xiao, Tinghe Zhang, Xuanliang N Dong, Yan Han, Yufei Huang, Xiaodu Wang: DXA Image Based Deep Learning of Trabecular Bone Microstructural Features, 2020 Bone submitted
- 2) M. Reyes and X. Wang: Photo-microscopic observation of microdamage accumulation during tensile testing of cortical bone micro-cores, J. Biomech. In preparation
- 3) X. Wang, S. Ding, and H. Ji: Age and orientation-dependence of *in situ* mechanical behavior of secondary osteons in human cortical bone, J. Biomech. In preparation

### 3. Conference Papers/presentations

#### 3a. Published or Accepted

1. Joel L. Gomez, Heber Martinez Barron, Wei Gao, and Xiaodu Wang: Effect of Hydration on Mechanical Properties of Individual Collagen Fibrils and Extrafibrillar Matrix, 2000 Annual Meeting of ORS, Feb. 8-11, 2020. Phoenix, AZ.
2. Pengwei Xiao, Tinghe Zhang, Habeeb Mustapha, Joel Gomez, Yufei Huang, Xiaodu Wang: DXA Image Based Deep Learning of Trabecular Bone Microarchitecture: Does increasing the number of DXA images improve the prediction of microstructural features of trabecular bone? 2000 Annual Meeting of ORS, Feb. 8-11, 2020. Phoenix, AZ.
3. Joel Gomez, Xiaodu Wang, and Wei Gao: In-situ AFM Identification of Mechanical Properties of Collagen Fibrils and Extrafibrillar Matrix in Bone, 2020 TMS Annual Meeting & Exhibition, Feb. 26 2020, San Diego, CA.
4. Pengwei Xiao, Richard Feng, Habeeb Mustapha, Victoria Wahlen, Joel Gomez, Yufei Huang, Xiaodu Wang: A pilot study on DXA image-based deep learning of trabecular microstructures, BMES 2019, Oct. 16-19, Philadelphia.
5. Pengwei Xiao, Joel Gomez, Matthew Kirby, Ed Guo, and Xiaodu Wang: A preliminary study on correlations between microarchitectural parameters of human trabecular bone, SB3C2019, June 25 -28, Seven Springs, PA.
6. Heber Martinez Barron, Wei Gao, and Xiaodu Wang: Effect of hydration on mechanical properties of individual collagen fibrils and extrafibrillar matrix, SB3C2019, June 25 -28, Seven Springs, PA.
7. Mohammad Maghsoudi-Ganjeh, Liqiang Lin, Xiaodu Wang, Xiaowei Zeng: Computational model of bone lamella, TMS 2019, March 10-14, San Antonio, Texas.
8. Liqiang Lin, Mohammad Maghsoudi Ganjeh, Xiaodu Wang, Xiaowei Zeng: Computational Investigation of Mechanical Behavior of Staggered Composites, TMS 2019, March 10-14, San Antonio, Texas.
9. M. Maghsoudi-Ganjeh, X. D. Wang, X. Zeng, The Role of Interface in Mechanical Properties of Organic-Inorganic Biological Nanocomposites: a 3-D Computational Investigation, The 15th US National Congress on Computational Mechanics, Austin, TX, July 28-August 1, 2019
10. M. Maghsoudi-Ganjeh, L. Lin, X. D. Wang, X. Zeng, Hybrid Nanocomposite Bioinspired from Bone, TMS 2019 Annual Meeting & Exhibition, San Antonio, TX, March 10-14, 2019
11. Neda Shafiei, Joel Gomez, Yufei Huang, Xiaodu Wang: Efficacy of a mathematical model in mimicking trabecular bone structures using deep learning techniques, TMS 2019, March 10-14, San Antonio, Texas.
12. Rui Hua, Jie Bai, Xiaodu Wang and Jean X. Jiang: Chondroitin Sulfate and Biglycan Play Pivotal Roles in Bone Toughness via Retaining Bound Water in Bone Matrix, ASBMR 2018, Sept. 28 0 Oct. 1, Montréal, Canada.
13. Neda Shafiei, Joel Gomez, Matthew Kirby, and Xiaodu Wang: A novel digital modeling methodology of trabecular bone, WCB 2018, July 8-12, 2018, Dublin, Ireland.
14. Mohammad Maghsoudi-Ganjeh, Li-Qiang Lin, Xiaowei Zeng and Xiaodu Wang: A novel finite element model of bone lamellae including all ultrastructural hierarchies, WCB 2018, July 8-12, 2018, Dublin, Ireland.
15. L. Lin, M. Maghsoudi-Ganjeh, X. Wang, X. Zeng, Computational Investigation on the Role of Interface Properties on Mechanical Response of Biological Composites, The 18th US National Congress of Theoretical and Applied Mechanics, Northwestern University, IL, June 5-9, 2018
16. M. Maghsoudi-Ganjeh, L. Lin, X. Wang, X. Zeng, Investigation of Ultrastructural Mechanics of Bone at Single Lamella Level, The 18th US National Congress of Theoretical and Applied Mechanics, Northwestern University, IL, June 5-9, 2018
17. Shengchun Li; Xiaochun Wei; Hongbin Li; Kai Li; Shaowei Wang; Min Zhang; Jin Deng; Xiaodu Wang; Yanxiang Zhang; Lei Wei: Knockdown Indian Hedgehog (Ihh) Does Not Delay Fibular Fracture Healing In Genetic Deleted Ihh Mice And Pharmaceutical Inhibited Ihh Mice, 2018 ORS, March 10-13, New Orleans, Louisiana.
18. Joel Gomez, Neda Shafiei, Anuradha Roy, Yizhong Hu, X. Ed. Guo, Xiaodu Wang: Is underlying trabecular architecture dependent on anatomic locations, 2018 ORS, March 10-13, New Orleans, Louisiana.
19. Rui Hua, Jie Bai, Qingwen Ni, Jean X. Jiang, Xiaodu Wang: Biglycan Deficiency Impairs Bone Toughness through Reduced Bound Water in Bone Matrix, ASBMR 2017 Annual Meeting, September 7-11, 2017, Denver, Colorado.
20. Rohit Khanna, Aires Jose Capita Ngunza, Xiaodu Wang: Polymer Infiltration Toughened Hydroxyapatite Biomaterial Hybrids by Bio-inspired Materials Design, 2017 Annual Meeting & Exposition of Society for Biomaterials, Minneapolis, Minnesota, April 5-8, 2017.
21. Abu-Saleh Ahsan, Mohammad Maghsoudi-Ganjeh, Xiaowei Zeng, and Xiaodu Wang: Ultrastructural origin of brittleness of bone using a finite element approach, SB3C 2017, June 21 – 24, Tucson, AZ.

22. Rohit Khanna and Xiaodu Wang: Bioinspired polymer infiltrated hydroxyapatite nanocomposite hybrids, SB3C 2017, June 21 – 24, Tucson, AZ.
23. Matthew L. Kirby, Anuradha Roy, Feng Zhao, and Xiaodu Wang: Probabilistic commonality of trabecular bone structures: is it a result of nature's design, SB3C 2017, June 21 – 24, Tucson, AZ.
24. Jitin Samuel, Sheldon Yang, Xiaodu Wang: Ultrastructural Changes in Osteogenesis Imperfecta Bone: Synchrotron Study of a Murine Model, 2017 ORS Annual Meeting, March 19-22, 2017 in San Diego, California.
25. Xuanliang Neil Dong, Matt Kirby, Xiaodu Wang: Application of 3D Digital Trabecular Bone Model in Validating the Efficacy of DXA in Extracting Information on Trabecular Architectures: A Pilot Study, 2017 ORS Annual Meeting, March 19-22, 2017 in San Diego, California.
26. Matt Kirby, Feng Zhao, and Xiaodu Wang: Probabilistic distributions of trabecular bone architecture may reflect the underlying design principles by nature, 2016 BMES Annual Meeting, October 5-8, 2016 in Minneapolis.
27. Ann Y Huang, Abu Saleh Ahsan, Sumin Gu, Natalie Fan, Haoran Xu, Jean Jiang, and Xiaodu Wang: Age-related changes in matrix proteoglycans affect the *in situ* toughness of human bone, 2016 BMES Annual Meeting, October 5-8, 2016 in Minneapolis.
28. Jitin Samuel, Abu Saleh Ahsan, and Xiaodu Wang: Ultrastructural changes in Osteogenesis Imperfecta Bone: Synchrotron study of a murine model, 2016 BMES Annual Meeting, October 5-8, 2016 in Minneapolis.
29. L. Lin, X. Zeng and X. Wang, "Numerical investigation of the influence of organic interfacial properties on the mechanical behaviors of extrafibrillar matrix in bone", Society of Engineering Science 53rd Annual Technical Meeting, University of Maryland College Park Marriott Hotel & Conference Center, Maryland, Oct.2-5, 2016.
30. L. Lin, X. Zeng, X. Wang, A generalized interfacial interaction model for prediction of mechanical behavior in bio-nanocomposite materials, The 7th International Conference on Computational Methods, Berkeley, CA, August 1st-4th, 2016.
31. L. Lin, X. Wang, X. Zeng, Bioinspired Simulation of Polycrystalline Materials, Summer Biomechanics, Bioengineering, and Biotransport Conference, National Harbor, Maryland, June 29-July 2, 2016.
32. Jitin Samuel, Jun-Sang Park, Jonathan D. Almer, Xiaodu Wang: Orientation dependent strain characterization of the ultrastructure in bone, SB3C2016, June 29-July 2, 2016, National Harbor, Maryland.
33. Ann Y Huang, Haoran Xu, Sumin Gu, Abu Saleh Ahsan, Jean Jiang, and Xiaodu Wang: Age-related changes in matrix proteoglycans affect the *in situ* toughness of human bone, 2016 ORS Annual Meeting, March 5-8, 2016 in Orlando, Florida.
34. Haoran Xu, Yehong Huang, Sumin Gu, Jean Jiang, and Xiaodu Wang: Removal of Proteoglycans from Bone Matrix Significantly Reduce its *In Situ* Toughness, 2015 ASBMR Annual Meeting, Oct. 9-12, 2015 Seattle, Washington.
35. Jitin Samuel, Natalie Fan, and Xiaodu Wang: Osteogenesis imperfecta causes reduced intrafibrillar mineralization and disengagement of mineral phase in load bearing in bone, 2015 BMES Annual Meeting, Oct. 7-10, 2015 in Tampa, Florida.
36. Abu Hena Morshed and Xiaodu Wang: Mathematical Rendering of Trabecular Bone Microstructure, 2015 BMES Annual Meeting, Oct. 7-10, 2015 in Tampa, Florida.
37. L. Lin, X. Zeng, X. Wang, The Role of Interfacial Behavior on Extrafibrillar Matrix in Bone, The 13th US National Congress on Computational Mechanics, San Diego, CA, July 26-30, 2015.
38. Xiao Yang, Evan Veregge, Mark Appleford, and Xiaodu Wang: Osteoclasts are significantly affected by the concentration of advanced glycation end products (AGEs) in medium released from bone resorption process, 2015 ORS Annual Meeting, March 15-18, 2015 in Las Vegas, Nevada.
39. Liqiang Lin, Xiaowei Zeng, Haoran Xu, Jean Jiang, and Xiaodu Wang: Nanomechanical Behavior of Extrafibrillar Matrix in Bone, ASBMR 2014 Annual Meeting, Sept. 12-15, 2014 in Houston, Texas.
40. Abu Hena Morshed, Ji Wang, X. Edward Guo, Xiaodu Wang: Mathematical Rendering of Trabecular Bone: Orientation Distribution of Trabeculae, 2014 BMES Annual Meeting, Oct. 22-25, 2014 in San Antonio, Texas.
41. Haoran Xu, Anne Sheldrake, Jean Jiang, and Xiaodu Wang: Removal of Proteoglycans from Bone Matrix Significantly Reduce its *in situ* Toughness, 2014 BMES Annual Meeting, Oct. 22-25, 2014 in San Antonio, Texas.
42. Jitin Samuel and Xiaodu Wang: Synchrotron X-Ray Scattering reveals a pivotal role of water in the ultrastructural mechanics of bone, 2014 BMES Annual Meeting, Oct. 22-25, 2014 in San Antonio, Texas.
43. Liqiang Lin, Xiaowei Zeng, Haoran Xu, Jean Jiang, and Xiaodu Wang: Nanomechanical Behavior of Extrafibrillar Matrix in Bone, ASBMR 2014 Annual Meeting, Sept. 12-15, 2014 in Houston, Texas.
44. Xiao Yang, Chintan Ghandi, Rahman MD Mizanur, Mark Appleford, Lian-Wen Sun, Xiaodu Wang: Aging effects of advanced glycation end products on osteoclast resorption on human bone, ASBMR 2014 Annual Meeting, Sept. 12-15, 2014 in Houston, Texas.

45. Jitin Samuel, Bijay Giri, Jon Almer, and Xiaodu Wang: Nanomechanics of ultrastructural deformation of bone under different loading conditions using synchrotron X-ray scattering techniques, 7th World Congress of Biomechanics, July 6-11, 2014 in Boston, Massachusetts.
46. Xiao Yang, Ahmed Mostafa, Bijay Giri, Mark Appleford, Xiaodu Wang: Effects of advanced glycation end products (AGEs) on bone formation, 7th World Congress of Biomechanics, July 6-11, 2014 in Boston, Massachusetts.
47. Abu Hena Morshed, Dana Mecke, Ji Wang, X. Edward Guo, Xiaodu Wang: 3-D Probabilistic Modeling of Trabecular Plates and Rods in Human Femoral Neck, 7th World Congress of Biomechanics, July 6-11, 2014 in Boston, Massachusetts.
48. J. Samuel, C. Shome, X. Wang: Determination of 3D strain tensor of mineral crystals aligned in the longitudinal direction of bone, 2014 ORS Annual Meeting, New Orleans, LA, March 15-18, 2014.
49. Jitin Samuel, Chandan Shome, Xiaodu Wang: Effect of intrafibrillar mineralization on the mechanical behavior of bone, 2013 BMES Annual Meeting, Seattle, WA, Sept. 25-29, 2013.
50. Mostafa A, Giri B, Saenz J, Appleford M, Perret-Gentil M., Wang, Xiaodu: Effect of matrix AGEs (advanced glycation endproducts) on bone formation, 2013 BMES Annual Meeting, Seattle, WA, Sept. 25-29, 2013.
51. Islam, Monirul M; Hansberger, Ray; James, Jacob; Wang, Xiaodu: Effect of coring conditions on temperature rise in bone, 2013 BMES Annual Meeting, Seattle, WA, Sept. 25-29, 2013.
52. Alejandro Montelongo, Peter Mancuso, Dana Mecke, and Xiaodu Wang: Modeling of trabecular bone microarchitecture in 3D by Voronoi tessellation, 2013 ORS Annual Meeting, San Antonio, TX, Jan. 26-29, 2013.
53. Dana Mecke, Alejandro Montelongo, and Xiaodu Wang: Comparison of trabecular bone architecture using stochastic geometric techniques, 2013 ORS Annual Meeting, San Antonio, TX, Jan. 26-29, 2013.
54. Bijay Giri, Chandan Shome, Ahmed Mostafa. Jonathan D. Almer, Xiaodu Wang: Age-related effects on the post-yield nanomechanics of human cortical bone in compression, 2013 ORS Annual Meeting, San Antonio, TX, Jan. 26-29, 2013.
55. A. Montelongo, D. Mecke, and X. Wang: Mathematical modeling of trabecular bone architecture using stochastic geometry techniques, 2012 Annual Meeting of Biomedical Engineering Society, Oct. 24-27, 2012, Atlanta, USA.
56. J. Samuel and X. Wang: Effect of hydrogen bonding ability, dipole-dipole interactions and viscosity of extracellular matrix fluid on the bone mechanical behavior, the ASME 2012 Summer Bioengineering Conference, June 20-23, Farjardo, Puerto Rico, USA.
57. X. Wang, B. Giri, and J. Almer: Pre-strain and integrity of mineral crystals in human cortical bone under tensile and compressive loads, the ASME 2012 Summer Bioengineering Conference, June 20-23, Farjardo, Puerto Rico, USA.
58. X. Wang, B. Giri, and J. Almer: Contribution of mineral crystals to the bulk behavior of human cortical bone in compression, the ASME 2012 Summer Bioengineering Conference, June 20-23, Farjardo, Puerto Rico, USA.
59. B. Giri, J. Almer, X. Dong, X. Wang: In situ deformation of bone mineral crystals under tensile and compressive loads, 2012 Annual Meeting of ORS, Feb. 4-7, San Francisco, CA, USA
60. B. Giri, J. Almer, X. Dong, X. Wang: Pre-strain status and structural integrity of bone mineral crystals in different loading modes, 2012 Annual Meeting of ORS, Feb. 4-7, San Francisco, CA, USA
61. H. Li, X. Wei, Y. Wei, D. C. Moore, G. Zhang, X. Wang, L. Wei: Deletion of Indian hedgehog does not affect fibular fracture healing in *Col2a1-CreER*; *Ihh<sup>fl/fl</sup>* mice, 2012 Annual Meeting of ORS, Feb. 4-7, San Francisco, CA, USA
62. B. Giri, J. Samuel, X. Wang: Effect of water loss on the progressive post-yield behavior of bone in tension, 2011 BMES Annual Meeting, October 12-15, 2011; Hartford, Connecticut, USA
63. X. Dong, Q. Luo, B. Giri, X. Wang: Progressive post-yield behavior of human cortical bone in shear, ASME 2011 Summer Bioengineering Conference, June 22-25, Farmington, PA, USA
64. X. Dong, N. Huang, M. Shiraikar, X. Wang: Inhomogeneity of bone mineral distribution in 2-D projection images of trabecular bone is associated with its architecture and biomechanical properties, ASME 2011 Summer Bioengineering Conference, June 22-25, Farmington, PA, USA
65. B. Giri, X. Dong, X. Wang: Shear strain of mineral crystals calculated using wide-angle X-ray scattering (WAXS) techniques, ASME 2011 Summer Bioengineering Conference, June 22-25, Farmington, PA, USA
66. D. Bhattacharya, S. Roth, T. Oates, and X. Wang: Validation of the Gingival Crevicular Fluid sample collection technique, 2011 IADR/AADR General Session, March 16-19, San Diego, CA, USA
67. A. Islam, XN Dong, and X. Wang: In situ toughness of osteogenesis imperfecta mouse bone determined by nanoscratch, ORS 2011 Annual Meeting, January 13-16, Long Beach, California, USA

68. M. Reyes, A. Boskey, X. Wang: Compositional changes in the microstructure of cortical bone with increasing tissue age, ORS 2011 Annual Meeting, January 13-16, Long Beach, California, USA
69. A. Islaam, X. Dong, and X. Wang: A mechanistic model of the nanoscratch test to determine the in situ toughness of bone, BMES 2010 Annual Meeting, October 6-9, Austin Convention Center, Austin, Texas, USA
70. M. Banka, M. Appleford, X. Wang: Microdamage induced collagen denaturation in bone, BMES 2010 Annual Meeting, October 6-9, Austin Convention Center, Austin, Texas, USA
71. A.R. Paterson, A. Belzung, X. Dong, J. Almer, and X. Wang: Variation of mineral crystal orientation under uniaxial load using synchrotron x-ray scattering techniques, BMES 2010 Annual Meeting, October 6-9, Austin Convention Center, Austin, Texas, USA
72. D. Bhattacharya, X. Dong, Q. An, J. Xu, and X. Wang: AGEs promote in vitro bone resorption activities of human cortical bone, BMES 2010 Annual Meeting, October 6-9, Austin Convention Center, Austin, Texas, USA
73. Q. Luo, H. Leng, R. Acuna, X. Dong, Q. Rong, X. Wang: A semi-empirical elastic-plastic-visco-damage constitutive model of cortical bone, ASME 2010 Summer Bioengineering Conference (SBC2010) June 16-19, Grande Beach Resort, Naples Florida.
74. X.N. Dong, M. Zoghi, Q. Ran, X. Wang: Less diffuse damage was observed in osteogenesis imperfecta mice femurs than wild-type controls, ASME 2010 Summer Bioengineering Conference (SBC2010) June 16-19, Grande Beach Resort, Naples Florida.
75. Dong, XN; An, Q; Leng, H; Appleford, M R; Xu, J; Zheng, M; Wang, X: Temporal and spatial distribution of pentosidine accumulation in human cortical bone and its role in bone resorption, 56<sup>th</sup> Annual Meeting of ORS, New Orleans, LA, March 6-9, 2010
76. Dong, X; Almer, J D; Wang, X: Nanomechanics of post-yield deformation of cortical bone under compression using a novel synchrotron x-ray scattering technique, 56<sup>th</sup> Annual Meeting of ORS, New Orleans, LA, March 6-9, 2010
77. Acuna, R L; Dong, X; and Wang, X: Post-yield Behavior of Human Cortical Bone is Transversely Isotropic in Compression, 56<sup>th</sup> Annual Meeting of ORS, New Orleans, LA, March 6-9, 2010
78. Leng and X. Wang: Constitutive modeling of the post-yield behavior of cortical bone, 2009 BMES Annual Meeting, Pittsburg, Oct. 7-10, 2009
79. X. Dong, H. Millwater, and X. Wang: A new approach to assess bone heterogeneity at multiple length scales, 2009 BMES Annual Meeting, Pittsburg, Oct. 7-10, 2009
80. M. Reyes and X. Wang: Detrimental changes in interstitial tissue contribute to decreased bone quality with aging, 2009 BMES Annual Meeting, Pittsburg, Oct. 7-10, 2009
81. X. Dong, H. Leng, X. Wang: Low mineralization tends to facilitate the formation of diffuse damage in bone, ASME 2009 Summer Bioengineering Conference (SBC2009) June 17-21, Resort at Squaw Creek, Lake Tahoe, CA.
82. X. Wang: Mechanistic determination of in situ toughness of bone using a nanoscratch methodology, ASME 2009 Summer Bioengineering Conference (SBC2009) June 17-21, Resort at Squaw Creek, Lake Tahoe, CA.
83. Dong, X.; Sparkman, D.M.; Millwater, H.R.; Wang, X.: Interfacial Debonding Affects Microdamage Progression of Bone Modeled as Mineral-Collagen Composites, 55<sup>th</sup> Annual Meeting of ORS, Feb.22-25, 2009, Las Vegas, Nevada.
84. Reyes, M; Hewitt, D; Sparkman, C; Wang, X: Age-Related Changes in the Compressive Properties of Interstitial and Osteonal Tissue, 55<sup>th</sup> Annual Meeting of ORS, Feb.22-25, 2009, Las Vegas, Nevada.
85. Y. Yang, S.-W. Park, Y. Liu, H.-S. Kim, J.-T. Koh, K. Lee, X. Meng, K. Kim, H. Ji, X. Wang, and J.L. Ong: Sputtered nanoscale calcium phosphate coating on osseointegrated implant devices, AADR 2008 Annual Meeting, April 2-5, 2008, Dallas, Texas
86. X. Dong, T. Guta, H. Millwater, X. Wang: Is interfacial debonding between collagen and mineral a premise for the formation of diffuse damage in bone tissue? 54<sup>th</sup> Annual Meeting of ORS, March 2-5, 2008, San Francisco, CA.
87. Michael Reyes, R. Rugved; X. Wang: Microdamage accumulation in bovine bone during tensile loading, 54<sup>th</sup> Annual Meeting of ORS, March 2-5, 2008, San Francisco, CA.
88. H. Leng, X. Wang: Aging and orientation effects on ultimate strength and strain of human collagen network through microtensile test, 54<sup>th</sup> Annual Meeting of ORS, March 2-5, 2008, San Francisco, CA.
89. M. Reyes, R. Nakade, and X. Wang: Microdamage accumulation during post-yield deformation of osteons, 2007 Annual Meeting of BMES, Sept. 26-29, Los Angeles, CA.
90. Leng, J.S. Nyman, X. Dong, X. Wang: Comparison of post-yield behavior of cortical bone under different loading modes, 2007 Annual Meeting of BMES, Sept. 26-29, Los Angeles, CA.



91. X. Dong, T. Guta, H. Millwater, X. Wang: Probabilistic modeling of microdamage formation in bone tissue, 2007 Annual Meeting of BMES, Sept. 26-29, Los Angeles, CA.
92. X. Wang, .J. Nyman, and .M. Reyes: Mode changes in the post-yield behavior of bone, 2007 summer Bioengineering Conference/ASME, Keystone, CO.
93. Leng, J. S Nyman, X. Dong, M. J Reyes, X. Wang: A semi empirical constitutive model for post yield behavior of bone in tension, 2007 Summer Bioengineering Conference/ASME, Keystone, CO.
94. Reyes, M J; Acuna, RL; Wang, X: Micromechanical tensile testing of cortical bone tissue, 53rd ORS Annual Meeting, Feb. 11-14, 2007, San Diego, CA.
95. Nyman, JS; Becerril, JC; Ding S; Wang, X: Ribosylation does not affect the age-related decrease in human bone toughness, 53rd ORS Annual Meeting, Feb. 11-14, 2007, San Diego, CA.
96. Nyman, JS; Ni, Q., Nicolella D., X. Wang: NMR measurements correlate with mechanical properties of bone, 53rd ORS Annual Meeting, Feb. 11-14, 2007, San Diego, CA.
97. S. Paruchuru and X. Wang: 3D finite element simulation of a novel scratch test for assessing the bone quality, 2006 BMES Annual Meeting, Oct. 11-14, 2006, Chicago, Illinois.
98. M. Reyes, J.S. Nyman, A. Roy, and X. Wang, H. Ji, and S. Ding: Post-yield energy dissipation as a function of strain with aging, 2006 BMES Annual Meeting, Oct. 11-14, 2006, Chicago, Illinois.
99. M. Reyes, J.S. Nyman, A. Roy, and X. Wang, H. Ji, and S. Ding: Post-yield energy dissipation as a function of strain with aging, 2006 BMES Annual Meeting, Oct. 11-14, 2006, Chicago, Illinois.
100. J.H. Tyler, J.S. Nyman, and X. Wang: Water loss by moderate drying affects the toughness of middle-aged bone but not elderly bone, 2006 Summer Bioengineering Conference/ASME, June 21-25, Amelia Island Plantation, Florida.
101. Y.J. Yoon, H. Ji, J.S. Nyman, X. Wang: A novel nano scratching approach for measuring in situ toughness of human bone, 2006 Bioengineering Summer Conference/ASME, June 21-25, Amelia Island Plantation, Florida.
102. Wang, X. and Ji, H.: In situ toughness of secondary osteons decreases with increasing age in human bone, 52nd Annual Meeting of Orthopaedic Research Society, March 19 - 22, 2006 Chicago, Illinois.
103. Nyman, J S; Acuna, R L; Gayle, H J; Dean, D D, and Wang, X: Pentosidine increases with age in both osteonal and interstitial bone, 52nd Annual Meeting of Orthopaedic Research Society, March 19 - 22, 2006 Chicago, Illinois.
104. Nyman, J S; Ni, Q; Gayle, H L; Wang, X: Differences in water distribution between female and male cortical bone, 52nd Annual Meeting of Orthopaedic Research Society, March 19 - 22, 2006 Chicago, Illinois.
105. Nyman, J S; Reyes, M J; Yang, Y; Tyler, J H; Acuna, R L; Ong, J L; Wang, X: Aging effects on toughness and composition of osteonal and interstitial bone, 52nd Annual Meeting of Orthopaedic Research Society, March 19 - 22, 2006 Chicago, Illinois.
106. Guda, T., Reyes, M., Wang, X.: Probabilistic prediction of microdamage progression during the post-yield deformation of bone. BMES 2005 Annual Fall Meeting. September 28-October 1, 2005.
107. Wang, X.: Collagen and Toughness of bone, BMES 2005 Annual Fall Meeting. September 28-October 1, 2005.
108. Nyman, J, Wang, X.: Age and gender effects on the post-yield properties of bone, BMES 2005 Annual Fall Meeting. September 28-October 1, 2005.
109. Wang, X & Qian, C.J.: A shear lag model of microdamage formation in bone, 2005 Bioengineering Summer Conference/ASME, June 22-26, Vail, Colorado, 2005.
110. Nyman, J. S., Ni, Q., Shen, X., Wang, X.: Age-related changes in the water distribution of cortical bone: a NMR study, 51st Annual Meeting of the Orthopaedic Research Society, Feb. 20-23, San Francisco, 2005.
111. Nyman, J S; Tyler, J; Roy, A; DeLeon A., Acuna R., Zhou J., Wang, X.: The effect of age and gender on the post-yield energy dissipation of cortical bone, 51st Annual Meeting of the Orthopaedic Research Society, Feb. 20-23, San Francisco, 2005.
112. J. Nyman, X. Shen, X. Wang: The role of water distribution on the strength and toughness of cortical bone. BMES 2004 Annual Fall Meeting. October 23-26, 2004.
113. A. Gunuganti, J. Nyman, and X. Wang: Dependence of particle reinforcement on microstructure in stiffening biopolymers. BMES 2004 Annual Fall Meeting. October 23-26, 2004.
114. X. Wang: The role of collagen in energy dissipation during the post-yield deformation of cortical bone, 50<sup>th</sup> Annual Meeting of the Orthopaedic Research Society, Feb. 7-10, San Francisco, 2004.
115. X. Wang, S. Ding, and X. Li: Age-related changes in the mechanical properties of interstitial bone tissues, 50<sup>th</sup> Annual Meeting of the Orthopaedic Research Society, Feb. 7-10, San Francisco, 2004.
116. X. Wang: A Model of energy dissipation in the post-yield deformation of bone, 2003 Bioengineering Conference/ASME, June 25-29, Key Biscayne, Florida, 2003.

117. X. Wang, S. Ding, and X. Li: Age-related effect of bone remodeling on collagen crosslinks in human cortical bone, 49<sup>th</sup> Annual Meeting of the Orthopaedic Research Society, Feb. 2-5, New Orleans, 2003.
118. X. Li, C.M. Agrawal, and X. Wang: Age-related denaturation of non calcified and calcified collagen in human cortical bone, 49<sup>th</sup> Annual Meeting of the Orthopaedic Research Society, Feb. 2-5, New Orleans, 2003.
119. R.W. Osborn, J.C. Wolf, S. Puram, X. Wang: Micro-Mechanical Testing of Bone Tissues in Osteon and Interstitial Bone Regions. Second Joint Meeting of IEEE-EMBS and BMES. October 23-26, 2002.
120. G.R. Bozarth, H. Hutchinson, X. Li, X. Wang, R.P. Williams, C.M. Agrawal: Mechanical properties and collagen analysis of allograft treated with sequential dose gamma-irradiation. American Academy of Orthopaedic Surgeons. February 13-17, 2002.
121. X. Wang and Q. Ni: Age-related changes in bone porosity determined by a low field NMR technique, 48<sup>th</sup> Ann. Meet. Orthop. Res. Soc., Dallas, Texas, Feb., 2002.
122. X. Wang, X. Li, X. Shen, CM Agrawal: Age-related changes in collagen vs. the toughness of bone, 48<sup>th</sup> Ann. Meet. Orthop. Res. Soc., Dallas, Texas, Feb., 2002.
123. X. Wang, X. Li, J. Yamashita, and C.M. Agrawal: A novel method for quantifying normal collagen molecules in non calcified and calcified collagen in bone, 47<sup>th</sup> Ann. Meet. Orthop. Res. Soc., San Francisco, California, Feb. 25-28, 2001.
124. Q. Ni, J.D. King, and X. Wang: NMR, histomorphometry and porosimetry studies of human cortical bone, 2001 Bioengineering Conference/ASME, Snowbird, Utah, June 27-July 1, 2001.
125. X. Wang, X. Li, X. Shen, CM Agrawal: Collagen denaturation and age-related changes in the toughness of bone, 2001 Bioengineering Conference/ASME, Snowbird, Utah, June 27-July 1, 2001.
126. Q. Ni, J.D. King, and X. Wang: Characterization of porosity and pore size distribution changes in human compact bone by low-field NMR, 2000 International Mechanical Engineering Congress and Exposition/ASME, November 5-10, 2000, Orlando, Florida.
127. G. Bozarth, J. Phelps, X. Shen, X. Wang, C.M. Agrawal: Comparison of irradiation versus heating on collagen integrity of the collagen network in bone, BMES 2000 annual Fall Meeting, Seattle, WA, 2000.
128. X. Wang, X. Li, J. Yamashita, and C.M. Agrawal: Effects of collagen denaturation on the mechanical integrity of the collagen network in bone, 2000 Annual Fall Meeting of the Biomedical Engineering Society, Oct. 12-15, 2000, Seattle, Washington.
129. Q. Ni, J.D. King, and X. Wang: 2000 Annual Fall Meeting of the Biomedical Engineering Society: Characterization of age-related human bone structure changes by low field NMR, Oct. 12-15, 2000, Seattle, Washington.
130. X. Wang, A. Kruger, B. Brahmanda, X. Shen, and C.M. Agrawal: Correlation of collagen structure and the mechanical integrity of the collagen network in bone, 46<sup>th</sup> Ann. Meet. Orthop. Res. Soc., March 12-15, 2000, Orlando, Florida.
131. X. Wang, X. Shen, K.A. Athanasiou, and C.M. Agrawal; Correlation of collagen network integrity with the biomechanical properties of bone. BMES-EMBS 1st Joint Conference, October 13-16, 1999, Atlanta, Georgia.
132. X. Wang, X. Shen, K.A. Athanasiou, and C.M. Agrawal; Heat induced collagen denaturation and its effects on bone mechanical integrity. BMES-EMBS 1st Joint Conference. October 13-16, 1999, Atlanta, Georgia
133. X. Wang, X. Shen, K.A. Athanasiou, and CM. Agrawal: Correlation of mechanical properties of demineralized bone with denaturation of type I collagen. 1999 Annual Meeting of the Society for Biomaterials, Vol. 22, pg. 577, Providence, RI, April 28-May 2, 1999.
134. X. Wang, R.A. Bank, J.M. TeKoppele, K.A. Athanasiou, and C.M. Agrawal: Effect of collagen denaturation on bone biomechanical integrity, 45<sup>th</sup> Ann. Meet. Orthop. Res. Soc., February 1-4, 1999, Anaheim, California.
135. X. Wang, K.A. Athanasiou, and C.M. Agrawal: Crack closure and interfacial fracture toughness test of bone-implant systems under mixed mode loading conditions, 45<sup>th</sup> Ann. Meet. Orthop. Res. Soc., February 1-4, 1999, Anaheim, California.
136. X. Wang, X. Shen, K.A. Athanasiou, and C.M. Agrawal: Effect of dietary calcium intake on biomechanical and morphological properties of the femoral neck in ovariectomized rats, 45<sup>th</sup> Ann. Meet. Orthop. Res. Soc., February 1-4, 1999, Anaheim, California.
137. X. Wang, D. Huang, K.A. Athanasiou, and C.M. Agrawal: Effects of food restriction on the biomechanical properties of the femoral neck in a rat model. 44<sup>th</sup> Ann. Meet. Orthop. Res. Soc., March 16-19, 1998, New Orleans, Louisiana.

138. C.F. Mess, J.R. Schlimmer, X. Wang, K.A. Athanasiou, and C.M. Agrawal: Effects of aging and dietary restriction on the biomechanical properties of the rat tibia, *44th Ann. Meet. Orthop. Res. Soc.*, March 16-19, 1998, New Orleans, Louisiana.
139. X. Wang, R.A. Bank, J.M. TeKoppele, K.A. Athanasiou, and C.M. Agrawal: Biomechanical properties of bone are significantly affected by denaturation of type I collagen, *44th Ann. Meet. Orthop. Res. Soc.*, March 16-19, 1998, New Orleans, Louisiana.
140. X. Wang, J. Morris, P.B. Orhii, K.A. Athanasiou, C.M. Agrawal, and D.N. Kalu: Growth hormone (rhgh) reverses deterioration of bone quality caused by ovarian hormone deficiency in a rat model, *44th Ann. Meet. Orthop. Res. Soc.*, March 16-19, 1998, New Orleans, Louisiana.
141. Mabrey, J.D.; Huang, D.; Wang, X.; Athanasiou, K.A.; Agrawal, C.M.: Effects of sterilization on the size and morphology of *in vitro* generated UHMWPE wear particles. *24th Annual Meeting of the Society for Biomaterials*, Vol. 21, pg. 313, San Diego, CA, April 22-26, 1998.
142. X. Wang, D. Huang, C.F. Mess, J.R. Schlimmer, K.A. Athanasiou, and C.M. Agrawal: The effects of diet and age on the biomechanical properties of rat bones. *24th Ann. Meet. Soc. for Biomater.* April 22-26, 1998, San Diego, California.
143. J.D. Mabrey, N. Köse, X. Wang, D. Lanctot, D. Jaroszewski, K.A. Athanasiou, and C.M. Agrawal: Smooth uncemented femoral stems do not provide torsional stability of femurs with cortical defects. *65th Ann. Meeting, AAOS*, March 19-23, 1998, New Orleans, Louisiana.
144. X. Wang and C.M. Agrawal: Test of bone-biomaterial interfaces under mixed mode loading conditions. *1997 International Mechanical Engineering Conference*, November 16-21, 1997, Dallas, Texas.
145. J. Phelps, J. Shields, X. Wang, C.M. Agrawal: Difference in local microhardness of bone and its fracture toughness. *23rd Annual Meeting of the Society for Biomaterials*, April 30-May 4, 1997, New Orleans.
146. X. Wang, C.M. Agrawal: Bone fracture toughness vs. mineral density and tensile properties. *23rd Annual Meeting of the Society for Biomaterials*, April 30-May 4, 1997, New Orleans.
147. X. Wang, C.M. Agrawal: Mixed mode testing of bone-biomaterial interfacial fracture toughness. *23rd Annual Meeting of the Society for Biomaterials*, April 30-May 4, 1997, New Orleans.
148. X. Wang, C.M. Agrawal: Fracture toughness test for the rat femoral neck. *23rd Annual Meeting of the Society for Biomaterials*, April 30-May 4, 1997, New Orleans.
149. C.M. Agrawal.; X. Wang; J. Phelps; A.S. Shanbhag; H.E. Rubash: Effects of alendronate on the material properties of bone. *23rd Annual Meeting of the Society for Biomaterials*, Vol. 20, p. 178, New Orleans, LA, 1997.
150. X. Wang, C.M. Agrawal: Mixed mode fracture toughness of bone-biomaterial interfaces. *Transactions of 43rd Annual Meeting of Orthopaedic Research Society*, February 9-13, 1997, San Francisco.
151. I.S. Kovach, C.M. Agrawal, R. Richerds-Kortum, X.Wang, K.A. Athanasiou: Laser-induced autofluorescence and fracture toughness. *Transactions of 43rd Annual Meeting of Orthopaedic Research Society*, February 9-13, 1997, San Francisco.
152. X. Wang, A. Masilamani, C.M. Agrawal: Relation of mineral density and tensile properties of bone with its fracture toughness. *Transactions of 43rd Annual Meeting of Orthopaedic Research Society*, February 9-13, 1997, San Francisco.
153. X. Wang, A. Subramanian, CM. Agrawal: Evaluating bone/biomaterial bonding strength—A comparison of different techniques. *Fifth World Biomaterials Congress*, May 29-June 2, 1996, Toronto, Canada.
154. I.S. Kovach, X. Wang, CM. Agrawal, R. Richards-Kortum, K.A. Athanasiou: A novel optical technique to characterize intact cortical bone. *Fifth World Biomaterials Congress*, May 29-June 2, 1996, Toronto, Canada.
155. X. Wang, S. Paruchuru, J.D. Mabrey, C.M. Agrawal: An interspecies study of bone fracture toughness, *Transactions of 42nd Annual Meeting of Orthopaedic Research Society*, February 19-22, 1996, Atlanta.
156. X. Wang, J. Lankford, and C.M. Agrawal: Use of a compact sandwich specimen for assessment of bone-biomaterial interface strength, *Transactions of 21st Annual Meeting of Society for Biomaterials*, San Francisco, March 188-22, 1995.
157. X. Wang, J. Lankford, and C.M. Agrawal: A new technique for assessment of bone-biomaterial bonding using a compact sandwich specimen, *Transactions of 41st Annual Meeting, Orthopaedic Research Society*, February 13-16, 1995, Orlando, Florida.
158. X. Wang, J. Lankford, A.E. Nicholls, and C.M. Agrawal: The effects of crack orientations and sampling sites on the fracture toughness of bone using a sandwich specimen. *Proceedings of 4th Annual Meeting of Texas Mineralized Tissue Society, San Antonio*, May 13-15, 1994.

159. X. Wang, J. Lankford, A.E. Nicholls, and C.M. Agrawal: The effects of sampling sites on the fracture toughness of bone using a sandwich specimen. *Transactions of 20th Annual Meeting of Society for Biomaterials*, Boston, April 5-9, (1994) 414.
160. J. Lankford, X. Wang, A.E. Nicholls, and C.M. Agrawal: Sandwich specimen technology for biomaterials testing: proof of concept. *Transactions of 20th Annual Meeting of Society for Biomaterials*, Boston, April 5-9, (1994) 465.
161. X. Wang, J. Lankford, A.E. Nicholls, and C.M. Agrawal: A new approach for fracture toughness measurements in biological systems using a sandwich specimen. *Proceeding of 4th Annual Conference of the Australia Society for Biomaterials*, Coogee Beach, January 31-February 1, (1994) A18.
162. X. Wang, K. Nakayama, and M. Arai: Improvement of surface finish in the cutting of GFRP. *Proceedings of 1st International Conference on New Manufacturing Technologies*. Chiba, Japan. (1990) 33-38.

### **3b. Submitted/Under Preparation**

#### **4. Book Reviews**

None

#### **5. Other Articles**

None

## **B. Lectures, Seminars**

(Chronologically, NOT INCLUDING presentations given at conferences as shown in 3a)

### **1. Scientific Lectures, Seminars**

- 6/19 Invited Speaker, Seminar Series of Biomedical Engineering, Beihang University, China  
*DXA image based deep learning of bone strength*
- 5/18 Invited Speaker, Seminar Series of Biomedical Engineering, Beihang University, China  
*Ultrastructural origin of bone fragility*
- 5/18 Invited Speaker, Seminar Series of Biomedical Engineering, Beihang University, China  
*Digital model of trabecular bones*
- 2/17 Invited Speaker, Seminar Series of Mechanical Engineering, University of Delaware,  
*Ultrastructural origin of bone fragility*
- 2/17 Invited Speaker, BME spring 2017 seminar series, UTHSA/UTSA  
*Ultrastructural origin of bone fragility*
- 6/16 Invited Speaker, Seminar Series of Biomedical Engineering, Beihang University, China  
*Proteoglycans vs. Bone Fragility*
- 6/16 Invited Speaker, Seminar Series of Biomedical Engineering, Beihang University, China  
*Digital Human: Digital Modeling of Trabecular Bone*
- 3/13 Invited Speaker, Biological Materials Science Symposium, 2013 TMS Annual Meeting, San Antonio  
*In situ Behavior of Mineral vs. Bulk Properties of Bone*
- 11/12 Invited Speaker, UTSA SiViRT Symposium, NSF/CREST SiViRT Center, UTSA  
*Multiscale study of bone fragility fractures*
- 10/12 Invited Speaker, Distinguished Seminar Series of Biomedical Engineering, Beihang University, China  
*Ultrastructural origins of bone fragility fractures*
- 9/11 Invited Speaker, Brotz Seminar, Biomedical Engineering Department, Marquette University  
*Understanding Bone Fragility Fracture: From Nano to Macro*
- 5/11 Invited Speaker, Distinguished Seminar Series of Biomedical Engineering, Beihang University, China  
*Structure-function relationship of bone using synchrotron X-ray scattering techniques*
- 11/10 Invited Speaker, Mechanical Engineering Seminar Series, University of Maryland Baltimore County  
*Understanding the mechanical behavior of bone: From nano to macro*
- 7/10 Invited Lecturer, Lecture Series of Biomedical Engineering, Beihang University, China  
*Lecture 1: Structure-function relationship of bone mechanical behavior*  
*Lecture 2: Mechanotransduction in bone*  
*Lecture 3: Bone remodeling vs. aging*  
*Lecture 4: Collagen vs. bone fragility*

- 7/10 Invited Speaker, 6<sup>th</sup> International symposium on orthopaedic biomechanics, Shanghai, China.  
*Nanomechanics of Bone Using Synchrotron X-ray Scattering Techniques*
- 11/09 Invited Speaker, First Joint ICHTS & CSOS Symposium, Taiwan  
*Nanomechanics and Fragility Fractures of Bone*
- 10/09 Invited lecture, Southern Methodist University, Texas  
*Nanomechanics and Fragility Fractures of Bone*
- 10/08 Invited lecture, Eastern Forum, Shanghai, China  
*Use of low-field NMR in bone research*
- 8/08 Invited lecture, Sun Valley Bone Biology Workshop, USA  
*The post-yield behavior of bone: From nano to macroscopic length scales*
- 5/08 Invited lecture, Department of Mechanical Engineering, Tsinghua University, China  
*Role of Engineering in Advancing Biomedical Research*
- 4/08 Invited lecture, Department of Bioengineering, Beijing University of Aeronautics and Astronautics (BUAA)  
*Application of Biomechanics to Understanding of Skeletal Systems*
- 3/08 Invited lecture, Biological Materials Science Symposium, 2008 TMS Annual Meeting, New Orleans  
*Post-yield energy dissipation and bone quality*
- 2/08 Invited lecture, Center of Biomechanics & Bioengineering, Institute of Mechanics, Chinese Academy, China  
*Ultrastructure vs. the quality of bone*
- 1/08 Invited lecture, Department of Mechanical Engineering, Chiba University, Japan  
*Aging vs. bone quality*
- 3/06 Invited lecture, Department of Mechanical Engineering, McMaster University, Canada  
*Effects of ultrastructure changes on bone quality*
- 2/06 Invited lecture, Department of Biology, UTSA  
*Ultrastructure of bone vs. its quality*
- 12/05 Invited lecture, Department of Pediatrics, UTHSCSA  
*Age-related changes in bone quality*
- 11/05 Invited lecture, Department of Bioengineering, Rice Univ.  
*Collagen and the Toughness of Bone*
- 9/05 Invited lecture, Department of Aerospace and Mechanical Engineering, Notre Dame University  
*Collagen and the Toughness of Bone*
- 12/02 Invited lecture, Department of Mechanical Engineering, Temple Univ.  
*Collagen: A "Hidden" Determinant of Bone Fragility*
- 11/02 Grand Round, Dept. of Orthopaedics and Rehabilitation, Penn State University  
*Collagen: Another Major Determinant of Bone Quality*
- 05/02 Woodruff Seminar, School of Mechanical Engineering, Georgia Tech.  
*Collagen and the Toughness of Bone*
- 07/96 C. William Hall Seminar Series, NSF-CEBBI, UTHSCSA  
*'Fracture toughness testing of bone and bone-biomaterial interface'*
- 04/96 Introduction to Bioengineering, Trinity University  
*'Fracture mechanics in biomedical research'*
- 07/96 Research Seminar, Department of Medicine, UTHSCSA  
*'Fracture toughness testing of bone'*
- 05/95 C. William Hall Seminar Series, NSF-CEBBI, UTHSCSA  
*'Microstructure and fracture toughness of bone'*
- 05/94 C. William Hall Seminar Series, NSF-CEBBI, UTHSCSA  
*'A new approach for assessment of bone-biomaterial bonding strength using a sandwich specimen'*

## 2. Other Lectures, Seminars, Briefings, Short courses

None

## C. Areas of Research Interest

- Nanomechanics of hard tissues
- Multiscale modeling of biological and engineering materials
- Prediction and prevention of bone fragility fractures

- Bioinspired design and fabrication of materials

**D. Research Support (A total of \$7.70 million research grants as PI since joining UTSA)**

**1. National/International**

- 1) Source: NIH/NIAMS (R01AR076190)  
 Title: Proteoglycans and age-related deterioration of bone toughness  
 Peer reviewed: Yes  
 Period: 7/1/19 to 6/30/24  
 Amount: \$2,334,480  
 Role: Principal Investigator
  
- 2) Source: NSF (CMMI-1538448)  
 Title: Multiscale Modeling of Ultrastructural Origins of Bone Fragility  
 Peer reviewed: Yes  
 Period: 10/1/15 to 9/30/19  
 Amount: \$368,931 + \$24,000 (REU supplement)  
 Role: Principal Investigator
  
- 3) Source: NIH/NIAMS (AR066925)  
 Title: Non-collagenous proteins vs. bone fragility  
 Peer reviewed: Yes  
 Period: 7/15/14 to 6/30/17  
 Amount: \$366,698  
 Role: Principal Investigator
  
- 4) Source: NIH/MIAMS (AR065641)  
 Title: Intrafibrillar mineralization vs. bone fragility  
 Peer reviewed: Yes  
 Period: 7/15/14 to 6/30/17  
 Amount: \$362,174  
 Role: Principal Investigator
  
- 5) Source: NSF (CMMI-1266390)  
 Title: Nanomechanics of Bone Fragility  
 Peer reviewed: Yes  
 Period: 8/1/13 to 7/31/17  
 Amount: \$363,000 +  
 Role: Principal Investigator
  
- 6) Source: NSF (CMMI-0900753)  
 Title: Nanomechanics based determination of *in-situ* toughness of bone  
 Peer reviewed: Yes  
 Period: 4/17/09 to 5/31/13  
 Amount: \$245,101  
 Role: Principal Investigator
  
- 7) Source: NIH/NIAMS (AR055955)  
 Title: Post-yield Behavior vs. Bone Quality  
 Peer reviewed: Yes  
 Period: 7/17/09 to 6/30/12  
 Amount: \$679,457  
 Role: Principal Investigator
  
- 8) Source: NSF (CMMI-0900753-S1)

- Title: Supplement to nanomechanics based determination of *in-situ* toughness of bone  
Peer reviewed: Yes  
Period: 6/1/10 to 8/31/10  
Amount: \$12,000  
Role: Principal Investigator and Mentor for Andrew J. Steveson and Monica Urrutia
- 9) Source: NIH/NIAMS (AR057907)  
Title: Water vs. mineral-collagen interaction in bone  
Peer reviewed: Yes  
Period: 6/01/10 to 5/31/13 (one year no cost extension)  
Amount: \$386,074  
Role: Principal Investigator
- 10) Source: NSF CREST HRD-0932339 (PI: Feng)  
Title: Center for Integrating High Performance Computing in Research and Education for Simulation, Visualization and Real-Time Prediction  
Peer reviewed: Yes  
Period: 9/01/09 to 8/30/14  
Amount: \$5,000,000  
Role: Center Core Faculty
- 11) Source: NIH/NIA (AG027780)  
Title: Prediction of post-yield behavior of bone  
Peer reviewed: Yes  
Period: 9/15/06 to 8/31/08 (No cost extension to 8/31/09)  
Amount: \$330,934  
Role: Principal Investigator
- 12) Source: NIH/NIA (AG022044)  
Title: Age-related effect of bone remodeling on bone toughness  
Peer reviewed: Yes  
Period: 5/15/04 to 4/30/09  
Amount: \$1,024,825  
Role: Principal Investigator
- 13) Source: NIH/NIA (AG022044-02S1)  
Title: Supplement to Age-related effect of bone remodeling on bone toughness  
Peer reviewed: Yes  
Period: 2/01/06 to 4/30/09  
Amount: \$119,342  
Role: PI and Mentor for Mr. Michael Reyes
- 14) Source: AFOSR (FA9550-04-1-0254)  
Title: Innovative methods for engine health monitoring  
Peer reviewed: Yes  
Period: 6/1/04 to 12/31/05  
Amount: \$973,000 (Total)  
Role: Co-Investigator for Task 3
- 15) Source: NSF (BES-0421038)  
Title: MRI: Acquisition of a microCT imaging system  
Peer reviewed: Yes  
Period: 08/15/04 to 8/14/05  
Amount: \$301,790  
Role: Co-Investigator (PI: Agrawal)
- 16) Source: NIH/MBRS-SCORE (S06 GM08194) Project #12  
Title: Age-related changes in collagen and its effect on the toughness of bone

Peer reviewed: Yes  
 Period: 8/01/03 to 6/15/04  
 Amount: \$186,153  
 Role: Principal Investigator

- 17) Source: NIH/NIAMS (AR46428)  
 Title: Collagen structure and the toughness of bone  
 Peer reviewed: Yes  
 Period: 9/01/99 to 8/31/03  
 Amount: \$217,500  
 Role: Principal Investigator
- 18) Source: Whitaker Foundation  
 Title: Bone remodeling and age-related changes in secondary osteons in bone  
 Peer reviewed: Yes  
 Period: 12/01/01 to 11/30/02  
 Amount: \$77,000  
 Role: Principal Investigator
- 19) Source: Whitaker Foundation  
 Title: Use of different models to examine changes in collagen network as determinants of bone mechanical properties  
 Peer reviewed: Yes  
 Period: 12/01/98 to 02/28/02  
 Amount: \$209,800  
 Role: Principal Investigator

A

## 2. **State/Local**

- 1) Source: San Antonio Area Foundation  
 Title: NMR Determination of Bone Microstructures  
 Peer reviewed: Yes  
 Period: 07/01/00 to 06/30/01  
 Amount: \$21,719  
 Role: Principal Investigator
- 2) Source: San Antonio Area Foundation (Stemp Russ Foundation)  
 Title: Effects of Dietary Calcium Intake on Biomechanical Competence of the Skeleton in an Ovariectomized Rat Model  
 Peer reviewed: Yes  
 Period: 06/01/97 to 5/31/98  
 Amount: \$12,705  
 Role: Principal Investigator
- 3) Source: Aging Research and Education Center and Meadows Foundation  
 Title: Age-Related Changes in the Intrinsic Biomechanical Properties of the Rat Femoral Neck Using a Novel Methodology  
 Peer reviewed: Yes  
 Period: 01/01/97 to 12/31/97  
 Amount: \$13,000  
 Role: Principal Investigator

## 3. **Companies**

None

## 4. **Other including sub-contracts, internal UTSA funding through earmarks, institutional grants etc.**



- 1) Source: San Antonio Life Science Institute Research Award  
 Title: Molecular changes in aging breast stroma  
 Peer reviewed: Yes  
 Amount: \$40,000  
 Period: 6/01/10 to 8/30/11  
 Role: Co-PI (PI Dr. Li at UTHSCSA)
- 2) Source: NIH/NIDAR (3 R01 DE017882-04S1)  
 Title: Diabetes: Implant Integration, Success, and Benefit  
 Peer reviewed: Yes  
 Period: 9/01/09 to 8/30/10  
 Amount: \$44,643  
 Role: PI on subcontract through the grant of Dr. Oates at UTHSCSA
- 3) Source: San Antonio Life Science Institute Research Award  
 Title: Parathyroid hormone and bone formation  
 Peer reviewed: Yes  
 Period: 10/01/05 to 09/30/06  
 Amount: \$68,346  
 Role: Principal Investigator
- 4) Source: UTSA Faculty Research Award  
 Title: Nanoparticle reinforcement of biopolymers  
 Peer reviewed: Yes  
 Period: 01/01/03 to 12/31/03  
 Amount: \$5,000  
 Role: Principal Investigator
- 5) Source: UTSA Faculty Research Award,  
 Title: Effect of Collagen Denaturation on the Fracture Toughness of Bone  
 Peer reviewed: Yes  
 Period: 01/01/00 to 12/31/00  
 Amount: \$5,000  
 Role: Principal Investigator
- 6) Source: Aging Research and Education Center, UTHSCSA  
 Title: Age-dependent Changes in the Density and Volume Fractions of the Mineral and Collagen Phases of Baboon Bone and their Correlation with Fracture Properties  
 Peer reviewed: Yes  
 Period: 01/01/96 to 12/31/96  
 Amount: \$5,000  
 Role: Principal Investigator

#### **5. Pending with funding agency**

### **IV. SERVICE**

#### **A. Professional Activities:**

##### **1. Current Professional and Scientific Organizations/Societies** If election/nomination required then mark with\*

2015-present	Fellow*, American Institute of Medical and Biological Engineering (AIMBE)
2006-present	Fellow*, American Society of Mechanical Engineers (ASME)
1994-present	Member, American Society of Mechanical Engineers (ASME)
1995-present	Member*, Orthopaedic Research Society (ORS)
2001-present	Member*, Biomedical Engineering Society (BMES)
2010-present	Member*, American Society of Bone and Mineral Research (ASBMR)

2006-2009 Member, American Society of Biomechanics (ASB)

## **2. Past and Current Positions and/or Offices Held in Professional Organizations**

2009-2012	Member, Board of Directors	International Chinese Hard Tissue Society
2009-2011	Chair, Program Committee	International Chinese Hard Tissue Society
2009-2012	Member, Young Investigator Mentoring Committee	Orthopaedic Research Society
2007-2008	Member, Industrial Affairs Committee	BMES

## **3. Other Professional Activities (e.g., National and State Consultantships, Review Panels and Committees, Editorial Boards, Continuing Education Lectures Presented, etc.)**

### **Editor/Editorial Board Member**

2019-present	Editorial Board, Medicine in Novel Technology and Devices
2008-2012	Editorial Board, Open Bone Journal
2010-present	Editorial Board, Journal of Medical Biomechanics
2012-2014	Orthopaedic Section of the Editorial Board, Dataset Papers in Medicine
2012-present	Associate Editor, Hard Tissue
2015-present	Editorial board, Osteology and Rheumatology Open Journal

### **Meeting/Symposium Organizer/Chairmanship**

1/2013	Co-Chair, 21 <sup>st</sup> Annual Symposium on Computational Methods in Orthopaedic Biomechanics
1/2013	Member, Program Committee ORS-ICHTS Membership Meeting
10/2012	Member, Organizing Committee Webster S. S. Jee Musculoskeletal Summit Workshop
2012	Member, Program Committee ASBMR-ICHTS Membership Meeting
2009-2012	Chair, Program Committee ORS-ICHTS Membership Meeting
2011	Chair, Program Committee ASBMR-ICHTS Membership Meeting
1998	Member, Organizing Committee 17th Southern Biomedical Engineering Conference

### **Session Chair/Organizer**

2012	Bone Mechanics, 2012 ASME Bioengineering Summer Conference, Puerto Rico
2010	Bone Adaptation, 6 <sup>th</sup> World Congress on Biomechanics, Singapore
2010	Bone Mechanics, Annual Meeting of Orthopaedic Research Society
2005	Hard Tissue/Bone Mechanics, BMES Annual Meeting
2001	Bone Mechanics, Annual Meeting of Orthopaedic Research Society
1998	Bone Biomechanics, 17th Southern Biomedical Engineering Conference
1990	Cutting (Tool II), 1st International Conference on New Manufacturing Technology, Chiba, Japan.

### **Reviewer for Journals**

Biomechanics and Modeling in Mechanobiology

Journal of Materials Research

Archives of Clinical and Experimental Orthopaedics

“The Application of Surrogate Modelling for Computing Femoral Strain: A Literature Review” HCEOP0007 Jan. 2019

Acta Biomaterialia

“Compressive behaviour of uniaxially aligned individual mineralized collagen fibres at the micro- and nanoscale” AB-18-2615R1, 2018-2019

Acta Materialia

Journal of Biomechanical Engineering (ASME)

Journal of Biomechanics

“Regional contribution of proteoglycans to the fracture toughness of the dentin extracellular matrix” BM-D-19-00938 2019

Journal of Biomaterials

Journal of Biomedical Materials Research

JBMR Plus

“Relationships Among Bone Morphological Parameters and Mechanical Properties of the Human Vertebral Cancellous Bone” JBM4-12-19-0098 Oct. 2019

Annals of Biomedical Engineering

Journal of Theoretical Biology

Materials and Design

“Micro compressive properties and failure mechanisms of porcine tibia cortical bones related to Haversian canals” JMAD-D-19-01471 2019

Bone

Journal of Orthopaedic Research

International Journal of Solids and Structures

Tissue Engineering

Calcified Tissue International

Journal of Mechanical Behavior of Biomedical Materials

“A finite element study evaluating the influence of mineralization distribution and content on the tensile mechanical response of mineralized collagen fibril networks” Feb. 2019

Open Bone Journal

Plos One

“Effect of reconstruction parameters on Cone Beam CT trabecular bone microstructure quantification in sheep” PONE-D-19-22799, 2019

Public Health - Open Journal

“Lifestyle Pattern and Bone Mineral Density” PHOJ-19-RS124, 2019

Journal of Medical Biomechanics

International Journal of Biological Macromolecules

### Review Panels (for grants)

2020	<i>ad hoc</i> Member, NIH SBSR study section
2019	<i>ad hoc</i> Member, NIH ZDE1 NB 14
2018	Member, Penal of NSF BMMB program, NSF
2018	<i>ad hoc</i> Member, NIH SBSR study section
2018	<i>ad hoc</i> Member, NSF special panel
2018	Review panelist, CARIPLO FOUNDATION, Italy
2018	<i>ad hoc</i> Member, NIH ZDE1 NB (14) M panel
2015	Member, Penal of NSF Graduate Research Fellowship, NSF
2009-2010	Member, Review penal of Nano and Bio Mechanics program, CMMI, NSF
2008-present	Member, Special penal ZRG1 MOSS-L (06), NIH
2004-present	<i>ad hoc</i> Member, NIH SBSR Study Section, NIH
2005-06	Member, MOSS, Special Penal for Musculoskeletal Hard Tissue, NIH
2004-07	<i>ad hoc</i> Member, ZGM1 MBRS-0 (SC), NIH/NIGMS
2005	Member, Orthopaedics and Skeletal Biomechanics Special Emphasis Panel, SRA, NIH
2005	Kentucky Science and Engineering Foundation

2005 Austrian Science Fund

#### Continuing Education Seminars Given

None

#### 4. Community Service

2010-present Intern training of local high school students, STEM Academy, Northeast Side Independent District of San Antonio  
 1999-2007 Faculty Coordinator at UTSA, local chapter of ASM International  
 2001 University Partner of San Antonio NSF Bioengineering Education Reform Program  
 1997-2000 Faculty Advisor, the Chinese Student and Scholars Association, UTHSCSA.  
 1995-1997 President, the Chinese Students and Scholars Association, UTHSCSA  
 1987-1988 Vice President, YNU Chinese Students Association, Yokohama National University, Japan

#### B. Committees:

##### 1. Department (specify if Chair)

2017-2018 Chair, ME Faculty Search Committee (Advance Materials)  
 2015-present PhD Qualification Exam Committee  
 2015-2016 Chair, ME Faculty Search Committee (Advance Materials/Biomaterials)  
 2015-2016 ME Graduate Programs Committee  
 2015 Chair, ME Merit Review Committee  
 2011-2014 Graduate Advisor of Record, MS/ME, MS/AMEE and PhD/ME programs, UTSA  
 2013 ME Faculty Annual Review Committee  
 2014 Faculty Advisory Committee (F&A and Space Allocation)  
 2013-2014 Chair, ME Faculty Search Committee (Computational Materials Position), UTSA  
 2001-present Member, ME Faculty Search Committee, UTSA  
 2003-present Member, ME Faculty Review & Advisory Committee (DFRAC), UTSA  
 2009-2010 Chair, ME Undergraduate Studies Committee, UTSA  
 2005-present Member, ME Post-Tenure Performance Evaluation & Review Committee, UTSA  
 2008-2009 Member, ME Committee of Graduate Studies, UTSA  
 2006-2007 Member, ME *ad hoc* Curriculum Committee, UTSA  
 2003, 2006 Member, ME Department Chair Search Committee  
 2003-2004 Chair, ME Committee of Graduate Studies, UTSA  
 2000-2004 Graduate Advisor of Record, MS/ME program, UTSA  
 1999-2005 Faculty advisor for ME undergraduate students, UTSA

##### 2. College of Engineering (specify if Chair)

2017-2019 College Faculty Review Advisory Committee (CFRAC)  
 2018-2019 Math department chair search committee  
 2015 COE Affirmative Action Advocate for BME Faculty Search  
 2015-2016 COE Affirmative Action Advocate for CEE Faculty Search  
 2015 College Faculty Review Advisory Committee (CFRAC)  
 2014-2015 COE Workload Policy Committee  
 2013-2014 Engineering RSC Faculty Advisory Board  
 2012-2013 Chair, College Faculty Development Leave Review Committee, COE, UTSA  
 2011-2012 College Faculty Development Leave Review Committee, COE, UTSA  
 2011-2012 Outside Member, College Faculty Review Advisory Committee, COS, UTSA  
 2003-present Member, Graduate Studies Committee, Biomedical Engineering PhD Program, UTSA  
 2010 Chair, College Faculty Review Advisory Committee, COE, UTSA  
 2003-2010 Affirmative Action Advocate, COE, UTSA  
 2008 Chair, College Faculty Review Advisory Committee, COE, UTSA  
 2008-2010 College Faculty Review Advisory Committee, COE, UTSA

2007	College Faculty Review & Advisory Committee, College of Science (COS), UTSA
2006	Limited Submission Proposal Selection Committee, COE, UTSA
2005-2006	College Faculty Review & Advisory Committee, College of Engineering, UTSA
2005	College Faculty Advisory Committee, College of Engineering, UTSA
2005	Intellectual Property Review Committee, College of Engineering, UTSA
2001-2002	College of Engineering Research Committee, UTSA

### **3. University (specify if Chair)**

2019	UTSA Faculty Senate, Chair of HOP Committee
2019	UTSA Faculty Senate, member of <i>ad hoc</i> Committee for Shared Governance Issues
2019	UTSA Faculty Senate, member of Research Committee
2019	Task Force for UTSA COI Policies
2019	Scholarly Misconduct Inquiry Committee
2018-2019	UTSA Research Misconduct Inquiry Committee
2018-2019	UTSA Graduate Council Restructuring Committee
2017-2019	UTSA Faculty Senate, Member of Research Committee
2017-2018	President's Strategic Enrollment Task Force. UTSA
2013-2014	Strategic Planning Committee, UTSA Graduate School, UTSA
2011-2013	Member, University Scholarship Committee, UTSA
2008-2011	Member, SCORE proposal review committee, UTSA
2006-2009	Member, President's Affirmative Action & Diversity Committee, UTSA
2006-2009	Member, Institutional Animal Care and Use Committee (IACUC), UTSA
2006-2009	Member, University Faculty Grievance Panel, UTSA
2006-2009	Member, University Standing Committee on Extended Education, UTSA
2003-2008	Member, BME Faculty Search Committee, UTSA
2001-2003	Member, UTSA Committee for Parking and Traffic
2000-2002	Representative of College of Engineering to the Graduate Recruitment Group, UTSA
2001	Member, UTSA task force to address House Bill 1641
2000-2003	Member, Planning Committee of joint Bioengineering PhD program by UTSA and UTHSCSA
1997-1999	Member, Subcommittee for Physical Safety, Institutional Safety Committee at UTHSCSA.

### **4. Other**

None

## **C. Administrative Responsibilities:**

### **1. Department**

2012-2014	Graduate Advisor of Record for MS/ME, PhD/ME and MS/AMEE Programs, UTSA
2006-2007	Graduate Advisor of Record (MS/ME graduate program), UTSA
2000-2004	Graduate Advisor of Record (MS/ME graduate program), UTSA

### **2. College**

None

### **3. University**

None

### **4. Staff Currently Supervised (not including students):**

None

## **V. OTHER INFORMATION**

### **A. Patents Pending/Issued:**

- 1) U.S. Patent (#6,690,166): Nuclear Magnetic Resonance Technology for Non-Invasive Characterization of Bone Porosity and Pore Size Distribution, Feb. 10, 2004.
- 2) Provisional patent: A method for rendering digital model of trabecular bone microstructures, July 2019

**B. Media Coverage**

“Researchers explore osteoporotic fracture solutions” [Paisano](#) November 2019

“UTSA scientists study osteoporotic bone fractures to rethink treatment” [News Medical](#) November 2019

“Scientist eyes protein tied to bone brittleness” Houston Chronicle November 2019

[Health & Medicine Week](#) April 2016

KENS-5 News 2005

San Antonio Express News, 1998

**C. Other**

None