

## Curriculum Vitae

**Date Prepared:** 10/16/2020  
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### Education:

2003	B.S.	Electric Engineering	China University of Geoscience
2006	M.S.	Electric Engineering	China University of Geoscience
2008	Ph.D. unfinished	Electric Engineering	Beijing University of Posts and Telecommunications
2014	Ph.D.	Bioengineering and Biomedical Engineering	University of Oklahoma

### Postdoctoral Training:

6/2014-9/2018	Postdoctoral research fellow	Biomechanics of the ear (mentored by Dr. Hideko Heidi Nakajima and Dr. Sunil Puria)	Harvard Medical School & Massachusetts Eye and Ear
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### Faculty Academic Appointments:

10/2018-08/2020	Investigator	Otolaryngology	Massachusetts Eye and Ear
10/2018-08/2020	Instructor	Otolaryngology	Harvard Medical School
08/2020-	Assistant professor	Communication Sciences and Disorders	Wayne State University

### Professional Societies:

2010-2016-	Association for Research in Otolaryngology	Member
2010-2013	Sigma XI Communities	Member
	Biomedical Engineering Society	Student Member

## **Editorial Activities:**

### **Ad hoc Reviewer**

Hearing Research  
Ear and Hearing  
Journal of Speech, Language, and Hearing Research  
Biomechanics and Modeling in Mechanobiology  
IEEE Transactions on Biomedical Engineering  
Journal of the Acoustical Society of America  
Otolaryngology – Head and Neck Surgery  
Review of Scientific Instruments  
International Journal of Audiology

## **Report of Funded and Unfunded Projects**

### **Past**

2016            Hyperacusis caused by abnormalities in auditory mechanics  
Hearing Health Foundation Emerging Research Grant 2016  
PI (\$30,000)  
This project aims to obtain pilot data to test the hypothesized etiologies of conductive hyperacusis and to test efficacy of a disputable treatment for hyperacusis.

### **Current**

2018-2021    Hyperacusis caused by mechanical abnormalities in the ear  
NIH/NIDCD R21DC017251-01  
PI (\$300,000)  
The goal of the study is to investigate the mechanisms of hyperacusis associated with abnormal mechanics by conducting measurements and finite-element modeling analysis.

## **Report of Local Teaching and Training**

2010-2013	Teaching Assistant of undergraduate class Dynamics (University of Oklahoma AME 2533)	Ten hours per week in Spring semester on grading and recitation
2010-2013	Teaching Assistant of undergraduate class Fluid Mechanics (University of Oklahoma AME 3153)	Ten hours per week in Fall semester on grading and recitation
2015-	Train ENT residents at Mass. Eye and Ear to conduct experiments in human temporal bones and supervise the experiments	One day per week during the residents' research window (2-3 months per year)
2018-	Lecturer of Acoustics, Production and Perception of Speech (Harvard-MIT SHBT 200/HST 714)	One and half lectures in Fall semester
2020-	Lecturer of PhD Seminar - Grant Writing (Wayne State University SLP 8390)	Three credits in Fall semester

## **Report of Regional, National and International Invited Teaching and Presentations**

### **Regional**

2017            Sound transmission in the ear and cochlea damage induced by noise  
Hyperacusis Research Benefit Dinner

Milton, MA

### **National**

- 2012 DPOAE growth behavior in acute otitis media and otitis media with effusion models of guinea pigs (selected oral abstract)  
Association for Research in Otolaryngology Midwinter Meeting  
San Diego
- 2017 Understanding mechanical mechanisms related to hyperacusis  
Hyperacusis Research ARO Dinner Event  
Baltimore, MD
- 2018 3D motion of the human ossicles with normal and stiffened ossicular joints during bone-conduction stimulation (selected oral abstract)  
Association for Research in Otolaryngology Midwinter Meeting  
San Diego

### **International**

- 2017 The effect of round window reinforcement on human hearing (selected oral abstract)  
Mechanics of Hearing Workshop  
St. Catharines, Ontario, Canada
- 2018 Bone-conduction induced 3D motion of the human ossicles with normal and stiffened ossicular joints (selected oral abstract)  
8th International Symposium on Middle Ear Mechanics in Research and Otology  
Shanghai, China

### **Report of Scholarship**

#### **Peer-Reviewed Scholarship in print or other media:**

1. **X. Guan**, R.Z. Gan. Effect of middle ear fluid on sound transmission and auditory brainstem response in guinea pigs. *Hearing Research* 2011; 277:96-106.
2. **X. Guan**, R.Z. Gan. Mechanisms of tympanic membrane and incus mobility loss in acute otitis media model of guinea pig. *Journal of Association for Research in Otolaryngology* 2013; 14:295-307.
3. **X. Guan**, W. Li, R.Z. Gan. Comparison of eardrum mobility in acute otitis media and otitis media with effusion models. *Otology and Neurotology* 2013; 34:1316-1320.
4. Y. Chen, **X. Guan**, R.Z. Gan. Measurement of basilar membrane motion during round window stimulation in guinea pigs. *Journal of the Association of Research in Otolaryngology* 2014; 15:933-43.
5. X. Zhang, **X. Guan**, R.Z. Gan. Experimental and modeling study of human tympanic membrane motion in the presence of middle ear liquid. *Journal of the Association of Research in Otolaryngology* 2014; 15:867-81.
6. **X. Guan**, Y. Chen, R.Z. Gan. Factors affecting loss of tympanic membrane mobility in acute otitis media model of chinchilla. *Hearing Research* 2014; 309:136-146.
7. **X. Guan**, S Jiang, T.W. Seale, B.M. Hitt, R.Z. Gan. Morphological changes in the tympanic membrane associated with Haemophilus influenzae-induced acute otitis media in the chinchilla. *International Journal of Pediatric Otorhinolaryngology* 2015; 79:1462–1471.
8. F. Creighton, **X. Guan**, S. Park, I. Kymissis, E. Olson, H. Nakajima. An intracochlear pressure sensor as a microphone for a fully implantable cochlear implant. *Otology and Neurotology* 2016; 37:1596-1600.
9. X. Wang, **X. Guan**, M. Pineda, R.Z. Gan. Motion of tympanic membrane in guinea pig otitis media model measured by scanning laser Doppler vibrometry. *Hearing Research* 2016; 339:184-194.
10. **X. Guan**, R.Z. Gan. Factors affecting sound energy absorbance in acute otitis media model of

chinchilla. *Hearing Research* 2017; 350:22-31.

11. S. Park, **X. Guan**, Y. Kim, F. Creighton, E. Wei, I. Kymissis, H.H. Nakajima, E.S. Olson. PVDF-based piezoelectric microphone for sound detection inside cochlea: towards totally implantable cochlear implants. *Trends in Hearing* 2018; 22:1-11.

12. D. Frear, **X. Guan**, C. Stieger, J.J. Rosowski, H.H. Nakajima. Impedances of the inner and middle ear estimated from intracochlear sound pressures in normal human temporal bones. *Hearing Research* 2018; 367:17-31.

13. C. Stieger\*, **X. Guan**\*, R.B. Farahmand, B.F. Page, J.P. Merchant, D. Abur, and H.H. Nakajima. Intracochlear sound pressure measurements in normal human temporal bones during bone conduction stimulation. *Journal of the Association of Research in Otolaryngology* 2018; 19:523-539.

\* co-first author

14. Y.S. Cheng, S. Raufer, **X. Guan**, C.H. Halpin, D.J. Lee, H.H. Nakajima. Superior canal dehiscence similarly affects cochlear pressures in temporal bones and audiograms in patients. *Ear and Hearing* 2019; DOI: 10.1097/AUD.0000000000000799.

15. **X. Guan**, Y.S. Cheng, D.J. Galaiya, J.J. Rosowski, D.J. Lee, H.H. Nakajima. Bone-conduction hyperacusis induced by superior canal dehiscence in human: the underlying mechanism. *Scientific Reports* 2020; <https://doi.org/10.1038/s41598-020-73565-4>

### **Other peer-reviewed scholarship**

1. R.Z. Gan, X. Zhang, **X. Guan**. Modeling analysis of biomechanical changes of middle ear and cochlea in otitis media. *American Institute of Physics Proceedings* 2011; 1403: 539-544.

2. D. Frear, **X. Guan**, C. Stieger, H.H. Nakajima. Impedances of the ear estimated with intracochlear pressures in normal human temporal bones. *American Institute of Physics Proceedings* 2018; 1965(1): 110004.

3. **X. Guan**, Y.S. Cheng, D. Galaiya, H.H. Nakajima. The effect of round window reinforcement on human hearing. *American Institute of Physics Proceedings* 2018; 1965(1): 150004.

### **Non-peer reviewed scholarship in print or other media:**

1. **X. Guan**, R.Z. Gan. Mechanism of conductive hearing loss in acute otitis media model of guinea pig. *Proceedings of Southern Biomedical Engineering Conference 2011*, Arlington, TX.

2. D. Nakmali, X. Zhang, **X. Guan**, R.Z. Gan. Dynamic properties of round window membrane in acute otitis media model of guinea pigs. *Proceedings of Southern Biomedical Engineering Conference 2011*, Arlington, TX.

### **Thesis:**

Guan, Xiyang 2014, 'Middle ear biomechanics in chinchilla model of acute otitis media', Ph.D. dissertation, University of Oklahoma

### **Abstracts, Poster Presentations and Exhibits Presented at Professional Meetings:**

1. **X. Guan** and R.Z. Gan. 3D Finite element modeling of guinea pig middle ear for sound transmission. *Biomedical Engineering Society (BMES) Annual Meeting, Austin, 2010.*

2. C. Dai\*, **X. Guan**, W. Li, D. Nakmali, and R.Z. Gan. "Mapping different mechanical response in the infected and inflamed ears with laser vibrometer." *Biomedical Engineering Society (BMES) Annual Meeting, Austin, 2010.*

3. **X. Guan**, X. Zhang, W. Young, and R.Z. Gan. Finite element modeling of tympanic membrane surface vibration in chinchilla ear. *BMES Annual Meeting, Hartford, 2011.*

4. **X. Guan**, Y. Chen, and R.Z. Gan. Comparison of middle ear energy absorbance, umbo displacement, and hearing threshold in a chinchilla acute otitis media model. *BMES Annual Meeting, Atlanta, 2012.*

5. **X. Guan** and R.Z. Gan. Middle ear energy absorbance of a chinchilla acute otitis media model. *BMES Annual Meeting, Seattle, 2013.*

6. R.Z. Gan, **X. Guan**, and W. Li. Effect of middle ear fluid on sound transmission and auditory

- brainstem response in guinea pigs. Association for Research in Otolaryngology (ARO) Midwinter Meeting, Anaheim, 2010.
7. C. Dai, **X. Guan**, D. Nakamali, R.Z. Gan. Mapping vibrations of tympanic membrane in ears with OME and AOM. ARO Midwinter Meeting, Baltimore, 2011.
  8. **X. Guan** and R.Z. Gan. Conductive hearing loss in acute otitis media model of guinea pig. ARO Midwinter Meeting, Baltimore, 2011.
  9. R.Z. Gan, **X. Guan**, X. Zhang. Changes of middle ear function and auditory brainstem response in otitis media model of chinchilla – measurement and modeling. ARO MidWinter Meeting, San Diego, 2012.
  10. R.Z. Gan, **X. Guan**, X. Zhang, V. Palan, M. Pineda. Motion of the tympanic membrane in acute otitis media model of chinchilla measured with scanning laser vibrometry. ARO MidWinter Meeting, Baltimore, 2013.
  11. X. Zhang, **X. Guan**, M. Pineda, V. Palan, R.Z. Gan. Imaging the human tympanic membrane motion using scanning laser vibrometry and finite element model. ARO MidWinter Meeting, Baltimore, 2013.
  12. **X. Guan**, C. Stieger, R.B. Farahmand, B.F. Page, J.P. Merchant, D. Abur, J.J. Rosowski, H.H. Nakajima. Contributions of middle-ear inertia and oval-window mobility on bone conduction hearing. ARO MidWinter Meeting, Baltimore, 2015.
  13. S Jiang\*, **X. Guan**, B Hitt, R.Z. Gan. “Structural changes of tympanic membrane in acute otitis media model of chinchilla”. ARO MidWinter Meeting, Baltimore, 2015.
  14. F. Creighton, **X. Guan**, S. Park, I. Kymissis, H.H. Nakajima, E. Olson. Validation of an intracochlear piezoelectric microphone. ARO MidWinter Meeting, San Diego, 2016.
  15. **X. Guan**, Y.S. Cheng, J.J. Rosowski, H.H. Nakajima. Bone conduction hearing is affected by superior canal dehiscence. ARO Midwinter Meeting, San Diego, 2016.
  16. Y.S. Cheng\*, **X. Guan**, D.J. Lee, J.J. Rosowski, H.H. Nakajima. Effects of round window reinforcement on inner ear pressures. ARO Midwinter Meeting, San Diego, 2016.
  17. F. Creighton, **X. Guan**, S. Park, I. Kymissis, E. Olson, H.H. Nakajima. Investigation of piezoelectric sensors for implantable otologic microphones. American Neurotology Society 51<sup>st</sup> Annual Spring Meeting, Chicago, 2016. (Poster Awards – 3<sup>rd</sup> place)
  18. **X. Guan**, Y.S. Cheng, D. Galaiya, J.J. Rosowski, H.H. Nakajima. Effect of round window reinforcement on hearing – experimental and modeling results. ARO Midwinter Meeting, Baltimore, 2017.
  19. D. Frear\*, **X. Guan**, and H.H. Nakajima. “Intracochlear pressures and impedances of the middle and inner ear in normal human temporal bones.” ARO Midwinter Meeting, Baltimore, 2017.
  20. **X. Guan**, S. Puria. Effect of ossicular-joint flexibility on bone conduction hearing – a finite-element model analysis. Acoustical Society of America 173rd Annual Spring Meeting, Boston, 2017.
  21. N. Cho, **X. Guan**, M.E. Ravicz, N. Maftoon, S. Puria. Human tympanic membrane shape and thickness map measured with optical coherence tomography (OCT). ARO MidWinter Meeting, San Diego, 2018.
  22. S. Masud, **X. Guan**, S. Neely, H.H. Nakajima. An analysis of power reflectance in patients with superior canal dehiscence. ARO MidWinter Meeting, San Diego, 2018.
  23. D. Galaiya, **X. Guan**, R. Chemtob, H.H. Nakajima. A comparison of materials used in the repair of superior canal dehiscence and their effect on inner ear pressure measurements. ARO MidWinter Meeting, San Diego, 2018.
  24. N. Cho\*, M.E. Ravicz, **X. Guan**, and S. Puria. Human tympanic membrane shape and middle-ear delay changes due to mechanically pulling the tensor-tympani muscle. ARO Midwinter Meeting, Baltimore, 2019.
  25. **X. Guan**, S. Puria, J. Rosowski, H.H. Nakajima. A lumped-element model of the human middle ear for bone conduction. ARO Midwinter Meeting, San Jose, 2020.

\* oral presentation by first author