

**Yuhua Zhang**  
**CURRICULUM VITAE**  
**School of Medicine Faculty, University of California – Los Angeles**

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**EDUCATION:**

<b>Year</b>	<b>Degree</b>	<b>Institution</b>	<b>Field of study</b>
1993-1997	PhD	Tianjin University, Tianjin, China	Precision Instrument Engineering
1990-1993	MS	Chinese Sciences Academy, China	Optical Engineering
1982-1986	BS	Tianjin University, Tianjin, China	Precision Instrument Engineering

**POSTDOCTORAL TRAINING:**

<b>Year</b>	<b>Degree</b>	<b>Institution</b>	<b>Field of study</b>
2002-2003	Research Fellow	University of Western Australia, Perth, Australia	Biomedical Engineering
2001-2002	Research Fellow	University of Auckland, Auckland, New Zealand	Adaptive optics
1997-1999	Postdoc Fellow	Beijing Institute of Technology, Beijing, China	Adaptive optics

**PROFESSIONAL EXPERIENCE:**

<b>Year</b>	<b>Rank/Title</b>	<b>Institution</b>
2018-	Associate Professor	Department of Ophthalmology, University of California – Los Angeles
2017- 2018	Associate Professor (Tenured)	Department of Ophthalmology, University of Alabama at Birmingham
2016-2017	Associate Professor (Tenure-track)	Department of Ophthalmology, University of Alabama at Birmingham
2008-2016	Assistant Professor (Tenure-track)	Department of Ophthalmology, University of Alabama at Birmingham
2008-2016	Assistant Professor (Secondary appointment)	Department of Vision Sciences, University of Alabama at Birmingham
2008-2016	Assistant Professor (Secondary appointment)	Biomedical Engineering Department, the University of Alabama at Birmingham
2004-2008	Assistant Research	School of Optometry, University of California, Berkeley, CA
2003-2004	Research Associate	College of Optometry, University of Houston, Houston, TX
1999-2001	Associate Professor	School of Life science and Technology, Shanghai Jiaotong University, Shanghai
1993-1996	Instructor	College of Optoelectronics and Precision Instrument, Tianjin University, Tianjin
1990-1993	Research Assistant	Chinese Sciences Academy, Changchun, China

**PROFESSIONAL ACTIVITIES:**

**Committees:**

2022-	PhD thesis examiner, Department of Optometry & Vision Sciences, Faculty Medicine, Dentistry & Health Sciences, The University of Melbourne, Australia
2015-2017	UAB Department of neurobiology multiphoton imaging research faculty search committee
2012-2016	Doctoral Supervisory Committee for Katie Litts (Chair: Christine Curcio)
2013-2016	Doctoral Supervisory Committee for Kady S Bruce (Chair: Lawrence Sincich)

- 2010-2013 Graduate Research Supervisory Committee chair for Ernesto Blanco
- 2013-2015 Chair committee of Vision and Color, the 99<sup>th</sup> Optical Society of America (OSA) Annual Meeting
- 2009-2010 Panel Member, Lasker/International Retinal Research Foundation Initiative for Innovation in Vision Science: The Role of Astrocytes in Retinal Degeneration, including Glaucoma. Woods Hole, MA

### **Professional Associations and Scholarly Societies**

- 2004- Member, the Association for Research in Vision and Ophthalmology (ARVO)
- 2004- Member, Optical Society of America (OSA)

### **Editorial Services**

#### **Editorial Board**

Annals of Eye Science (2015-2018)

#### **Academic Editor**

PLOS ONE (2012-present)

#### **Reviewer**

##### **Ophthalmology and vision science:**

1. Investigative Ophthalmology & Vision Science
2. Retina
3. Translational Vision Science & Technology
4. Optometry and Vision Science
5. Acta Ophthalmologica
6. BMC Ophthalmology
7. Clinical Ophthalmology

##### **Biomedical optics and imaging:**

1. Optics Express
2. Biomedical Optics Express
3. Optics Letters
4. Applied Optics
5. Journal of Optical Society of America
6. Ophthalmic & Physiological Optics
7. Journal of Biomedical Optics
8. Optical Engineering
9. SPIE Press
10. Nature Protocols

### **Consulting Activities.**

1. 2009-2013 NIH R01 EY018853 (MPIs, Sonka, Abramoff, Kardon), University of Iowa.
2. 2009-2013 NIH R01 grant "Low-cost, portable, computer assisted imaging for diabetic retinopathy." Michael, Abramoff, MD, PHD, Professor of Ophthalmology, University of Iowa.

### **Review for funding agencies**

1. 2022 Deutsche Forschungsgemeinschaft (DFG). Research Grants Council of Hong Kong
2. 2021 Macular Society, UK
3. 2021 Research Grants Council of Hong Kong
4. 2015-2019 French National Research Agency (ANR).
5. 2017-2018 Natural Sciences and Engineering Research Council of Canada.
6. 2015-2018 The Austrian Science Fund (Austria's central funding organization for basic research).
7. 2009 National Institutes of Health, Challenge Grants in Health and Science Research.
8. 2008-2010 International Retinal Research Foundation (IRRF).

## University activities:

1. 10/2018 - present Research advisory committee of the Doheny Eye Institute
2. 05/2020 – present Organization committee of the Doheny distinguished lecture series
3. 05/2019 – present Faculty recruitment committee, Department of Ophthalmology, UCLA.
4. 12/2018 – present Academic Appointment, Promotion Committee, Department of Ophthalmology
5. 01/2015 – 09/2018 Associate Director, UAB Vision Science Research Center (VSRC) Research Programming and Computational Analysis Core (NIH P30 EY003039).
6. 07/2012 – 05/2013 Associate Director, UAB Vision Science Research Center (VSRC) Electronics Core (NIH P30 EY003039).

## HONORS AND SPECIAL AWARDS:

1. 2007 R&D 100 Awards for the development of MEMS-based Adaptive Optics Scanning Laser Ophthalmoscope
2. 2008 International Society for Eye Research Travel Fellowship (ISER 2008 Congress)
3. 2008 University of Alabama Health Services Foundation Endowed Scholar Award
4. 2021 Research to Prevent Blindness/Dr. H. James and Carole Free Catalyst Award for Innovative Research Approaches for AMD.

## RESEARCH GRANTS AND FELLOWSHIPS RECEIVED

### ONGOING RESEARCH GRANTS

1. **NIH R01EY034218**, 09/30/2022 – 07/31/2026, \$1,544,333

**Role:** PI

**Project title:** *In Vivo Characterizations of Retinal Hemodynamics*

The flow dynamics of the erythrocytes (red blood cells) inside the retinal capillaries reflects the function and the health of the retinal microcirculatory system. This study will characterize the erythrocyte flow dynamics at the single retinal capillary level in the eyes of human subjects in normal health, in those with essential hypertension, and in those with diabetes, using novel adaptive optics high-speed ophthalmoscopy. The long-term goal is to improve our knowledge of retinal microcirculation in normal physiological process and systemic disease and facilitate the development of novel treatment strategies for managing systemic complications of hypertension and diabetes that cause vision loss.

2. **NIH R01EY024378**, 01/01/2015-08/31/2024, \$1,031,573 for 09/01/2021-08/31/2024

**Role:** PI

**Project title:** *In vivo ultra-structure of chorioretinal disease*

Age-related macular degeneration (AMD) is a leading cause of vision loss in more than 10 million older Americans. In the initial study, we examined the ultrastructure of important lesions in AMD, including recently recognized subretinal drusenoid deposit (SDD), to understand how they impair surrounding photoreceptors and cause vision loss. In the renewal study, we address crucial knowledge gaps in the pathway that SDD lead to Type 3 macular neovascularization (T3MNV). Our objectives are two-fold: better understanding of the pathophysiology of AMD, and developing advanced adaptive optics (AO) imaging based biomarkers and biometrics for sensitive and quantitative assessment of photoreceptor degeneration, and early detection of T3MNV in AMD.

3. **Research to Prevent Blindness/Dr. H. James and Carole Free Catalyst Award for Innovative Research Approaches for AMD**. 01/01/2022-12/31/2024, \$300,000

**Role:** PI

**Project title:** *In vivo characterization of metabolic function of photoreceptors and retinal pigment epithelium cells in age-related macular degeneration*

The overall goal is to develop adaptive optics fluorescence lifetime imaging ophthalmoscopy (AOFLIO) and objective functional biomarkers for assessing risk for age-related macular degeneration (AMD) progression. This goal will be accomplished by in vivo measurement of the fluorescence lifetime of intrinsic fluorophores in the retinal pigment epithelium and photoreceptor cells in human subjects in normal macula health and in patients with AMD, using state-of-the-art AOFLIO

4. **Carl Marshall Reeves & Mildred Almen Reeves Foundation**, 10/01/2021-03/31/2023, \$50,000

**Role:** PI

**Project title:** *In vivo Imaging retinal pigment epithelium cells and blood flow in the choriocapillaris in age-related macular degeneration*

We propose to develop a clinically deployable high-resolution ophthalmoscope that can image the RPE cells and blood flow in the choriocapillaris in the living human eye. We will leverage recent advances in high-resolution adaptive optics (AO) imaging, near-infrared (NIR) light excited autofluorescence (AF) imaging of the RPE, and indocyanine green angiography (ICGA), to expand our ability for in vivo assessment of the structure and function of the RPE and the choriocapillaris.

5. **W. M. Keck Foundation**, 01/01/2021-06/31/2023, \$250,000

**Role:** PI

**Project title:** *Advanced retinal imaging station*

This project will develop the state-of-art adaptive optics imaging instrument that can image the retinal structure and function at the cellular level and the molecular level.

### **COMPLETED RESEARCH GRANTS**

1. **NSF (IIA-1539034) RII Track-2 FEC** (PI: Gamlin), 08/01/2015-07/30/2018

**Role:** Investigator (10% FET)

**Project title:** Bridging Cognitive Science and Neuroscience Using Innovative Imaging Technologies,

2. **EyeSight Foundation of Alabama Grant**, \$223,458, 03/01/2011 – 06/30/2015

**Role:** PI

**Project title:** *In-vivo study of age-related macular degeneration with high-resolution, high-fidelity and wide-spectra adaptive optics scanning laser ophthalmoscopy*

The major goals of this project were to develop an adaptive optics scanning laser ophthalmoscope and prove the feasibility of applying this instrument to imaging older patients through a proof-of-concept study.

3. **NIH EY019197** (PI: Myers, RMD Inc.), NIH, 09/01/2012 – 06/30/2015

**Role:** Subcontract PI, Subcontract \$359,524,

**Project title:** *Near Infrared Detectors for Advanced Ophthalmoscopy*

The goal of the UAB subcontract was to develop and validate advanced adaptive optics retinal imaging for detecting retina degeneration caused by pathologic myopia.

4. **Charles D. Kelman MD Postdoc Scholar Fellowship** (Alexander Meadway), International Retinal Research Foundation, \$35,000. 07/01/2014-06/30/2015.

**Role:** Faculty Sponsor

**Project title:** *In-vivo high resolution adaptive optics spectroscopy of subretinal drusenoid deposit in age-related macular degeneration.*

5. **NIH R21EY021903**, \$377,951, 09/01/2011-08/30/2014

**Role:** PI

**Project title:** *Adaptive optics parallel confocal scanning ophthalmoscope*

The major goal was to develop new generation high-speed and high-resolution retinal imaging technology to facilitate early diagnosis of photoreceptor degeneration.

6. **NIH R21 EY019566** (PI: Sincich, University of California at San Francisco), 01/01/ 2011 – 12/31/2011

**Role:** Subcontract PI, Subcontract \$36,340.20.

**Project title:** *Adaptive optics retinal microstimulator for color vision*

This subcontract was to develop the imaging electronics and photo-detector for the proposed instrument.

7. **Buck Trust of Alabama**, \$157,000, 02/2010 – 02/2011.

**Role:** PI.

**Project title:** *Clinical adaptive optics scanning laser ophthalmoscopy and optical coherence tomography*

8. **Songs for Sight**, \$170,000, 02/2010 – 02/2011.

**Role:** PI.

**Project title:** *Clinical adaptive optics scanning laser ophthalmoscopy and optical coherence tomography*

The Buck Trust funding and the Songs for Sight founding were used to develop a clinical deployable adaptive optics scanning laser ophthalmoscopy and optical coherence tomography (AO-SLO-OCT).

9. **International Retinal Research Foundation**, \$300,000, 07/2008-06/2013  
**Role:** PI  
**Project title:** *Adaptive optics Ophthalmic Imaging.*
10. **HSF/GEF Scholar Award**, \$150,000, 12/01/2008-08/31/2012  
**Role:** PI  
Award for clinical research and medical education initiative.
11. **UAB Faculty Development Grant (PI: Hilton)**, \$10,000, 2010 - 2011  
**Role:** Co-PI  
**Project title:** Novel light source for retinal imaging
12. **NIH R01EY024628 (PI: Yao)**, \$43,752, 09/01/2014 – 10/31/2014  
**Role:** Investigator (5%)  
**Project title:** Super-Resolution Ophthalmoscopy for In Vivo Retinal Imaging
13. **NIH R21GM104683 (PI: Ye)**, \$172,430, 09/01/ 2012 – 08/30/2013  
**Role:** Co-PI (15% FET)  
**Project title:** Adaptive Wavefront Generation and Correction for Super-High Resolution Microscopy

## INVITED LECTURES AND PRESENTATIONS

1. Higher-order retinal hemodynamics, XXV ISER Programming Committee, (postponed to) February 19-23, 2023, Queensland, Australia
2. In vivo studying human retinal structure and function with adaptive optics imaging, October 27, 2022, BE299 Seminar Talk, Bioengineering Department, UCLA
3. In vivo study of higher-order retinal hemodynamics in human retinal capillaries, 2022 Optica Fall Vision Meeting, 23 October, Rochester, NY
4. AMD's impact on the photoreceptors' waveguiding ability. 3<sup>rd</sup> Annual Vision and Color Summer Data Blast, OPTICA Vision and Color Technical Division, August 10, 2022. Virtual Conference.
5. In vivo precise characterization of human retinal hemodynamics, Distinguished Lecture & Basic Sciences Seminar Series/Neuroscience course for graduate students, June 24, UCLA Department of Ophthalmology
6. In vivo pathophysiology of age-related macular degeneration with adaptive optics ophthalmoscopy. June 10-11, 2022, Stein Eye Institute.
7. Adaptive Optics Imaging, Distinguished Lecture & Basic Sciences Seminar Series/Neuroscience course for graduate students, May 27, UCLA Department of Ophthalmology
8. In vivo imaging of human retinal structure and function with adaptive optics imaging. October 23, 2019, Bioengineering Colloquium 2019-2020, Department of Bioengineering, University of California, Riverside, CA
9. In vivo characterization of human retinal hemodynamics at the single capillary and the single blood cell level using high-speed adaptive optics near-confocal ophthalmoscopy, International Ocular Circulation Society meeting, August 10, 2019, Portland, OH
10. In Vivo Microscopy of the Human Retina with Adaptive Optics (AO) Imaging, Doheny Eye Institute Research Centre Scientific Lecture Series, March 26, 2019
11. Nature history and ultrastructure of subretinal drusenoid deposits investigated by adaptive optics scanning laser ophthalmoscopy, International Retinal Imaging Society Meeting 2019, Los Angeles, CA, March 16, 2019.
12. In vivo imaging of Age-related Macular Degeneration with adaptive optics ophthalmoscopy," Ryan Initiative for Macular Research (RIMR) Conference, Beckman Center of the National Academies of Sciences & Engineering, Irvin, CA, March 13-15, 2019.
13. Retinal hemodynamics: high speed adaptive optics ophthalmoscopy, International Retinal Imaging Society Meeting 2018, Los Angeles, CA, February 20, 2018.
14. Ultrastructure of chorioretinal diseases, University of California Davis Eye Center, Sacramento, CA, March 27 (Morning), 2017.
15. Adaptive optics imaging of chorioretinal diseases, Department of Biomedical Engineering, University of California at Davis, Davis, CA. March 27 (Noon), 2017.

16. Adaptive optics imaging," Guandong Province 2016 Summit Symposium on Heart-Brain-Psychology, Guangzhou, China. December 31, 2016.
17. In-vivo study retinal structure and function at the cellular level with advanced adaptive optics imaging. Zhongshan Ophthalmic Center, Sun Yat-sen University, Guangzhou, China. December 29, 2016.
18. Ultrastructure of chorioretinal diseases revealed by adaptive optics, Jules Stein Eye Institute, University of California, Los Angeles, CA. November 18, 2016.
19. Ultrastructure of chorioretinal diseases revealed by adaptive optics, Doheny Eye Institute, University of California, Pasadena, CA. November 17, 2016.
20. Adaptive optics imaging of macular degeneration, Ophthalmology department, Louisiana State University School of Medicine. New Orleans, LA. September 21, 2015.
21. In-vivo ultrastructure of age-related macular degeneration, UAB Howard Hughes course, Phenotyping Human Disease, University of Alabama at Birmingham. Birmingham, AL. June 16, 2015,
22. Multimodal and high resolution imaging of subretinal drusenoid in age-related macular degeneration, University of California at Davis, Department of Ophthalmology. Sacramento, CA. October 24, 2013,
23. Adaptive Optics Scanning Laser Ophthalmoscopy (AOSLO) for In-vivo Study of the Retinal Structure and Function at the Cellular Level, the International Colour Vision and Visual Optics Symposium, Tokyo Institute of Technology, Tokyo, Japan. March 1, 2013.
24. Adaptive Optics Scanning Laser Ophthalmoscopy (AOSLO), School of Engineering, Tokyo Institute of Technology, Tokyo, Japan. February 28, 2013.
25. Adaptive Optics Scanning Laser Ophthalmoscopy for In-vivo Cellular-level Study of the Retinal Structure and Function, Vision Discovery Institute Distinguished Seminar Series, Department of Ophthalmology, Medical College of Georgia, Augusta, GA. June 15th, 2010.
26. What can Adaptive optics do for imaging of astrocytes? Lasker/IRRF Initiative for Innovation in Vision Science Workshop, Howard Hughes Medical Institute's Janelia Farm Research Campus, Ashburn, Virginia. February 28 – March 3, 2010
27. Adaptive optics scanning laser ophthalmoscopy for in-vivo cellular-level imaging of retinal structure and function. Lasker/IRRF Initiative for Innovation in Vision Science Workshop, Woods Hole, MA. Aug 11-12, 2009
28. Adaptive optics retinal imaging, UAB Vision Science Research Centre, Birmingham AL. November 21, 2011.
29. Advanced Adaptive Optics Scanning Laser Ophthalmoscopy for In-vivo Study of the Retinal Structure and Function at the Cellular Level. UAB Department of Physics, Birmingham AL. Nov. 13, 2009.
30. Advanced Adaptive Optics Scanning Laser Ophthalmoscopy for In-vivo Study of the Retinal Structure and Function at the Cellular Level. UAB Department of Biomedical Engineering, Birmingham AL. September 11, 2009.
31. Adaptive optics scanning laser ophthalmoscopy, Suzhou Biomedical Engineering Institute, Chinese Sciences Academy, Suzhou, China, October 28, 2008.
32. Adaptive optics scanning laser ophthalmoscopy: Technology and Application, Department of Science and Technology Administration, Tsinghua University, Beijing, China, October 10, 2008.
33. Signal conditioning and image processing in adaptive optics scanning laser ophthalmoscopy, School of Engineering. South China Agricultural University, Guangzhou, China. October 21, 2008.
34. Advances in adaptive optics scanning laser ophthalmoscopy, XVIII International Congress of Eye Research (ICER), Beijing, China, September 24-29, 2008.
35. Adaptive optics scanning laser ophthalmoscopy," Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Science Academy, Changchun, China, September 23, 2008.
36. Adaptive optics scanning laser ophthalmoscopy: Technology and Application, School of Electronic Engineering, Changchun Science and Technology University, Changchun, China, September 22, 2008.
37. In-vivo probing retinal structure and function at cellular level with advanced adaptive optics scanning laser ophthalmoscopy," Department of Ophthalmology, University of Alabama, Birmingham, AL. July 12, 2007.
38. Applying adaptive optics scanning laser ophthalmoscopy in clinic. Department of Ophthalmology & Visual Sciences, Carver College of Medicine, University of Iowa. Iowa City, IA. June 29, 2006
39. Adaptive optics and Ophthalmoscopy, Department of Ophthalmology & Visual Sciences, Carver College of Medicine, University of Iowa. Iowa City, IA. June 28, 2006
40. MEMS-based adaptive optics scanning laser ophthalmoscope. Optical Society of America (OSA) Annual meeting 2006, Rochester, New York. October 9, 2006

41. Adaptive optics scanning laser ophthalmoscopy, Bascom Palmer Eye Institute, Miller School of Medicine, University of Miami, Miami, FL. April 5, 2006
42. MEMS deformable mirror for ophthalmic imaging, PhotonicsWest, SPIE, San Jose, California. January 22, 2006.

## PUBLICATIONS/BIBLIOGRAPHY

### RESEARCH PAPERS

#### A. RESEARCH PAPERS - PEER REVIEWED (PUBLISHED)

1. **Zhang Y.** A study of using spectral filtering to increase the effect range of a TV tracking system. Optics and Precision Engineering, 1994, (10):78~94
2. Liu H, **Zhang Y**, Roundness and rotary error measuring system with 4-point method. Aviation Metrology and Measurement Technology, 1996, 16(1):11~14
3. Zhang G, **Zhang Y**, Yang S, Li Z, A multipoint method for spindle error motion measurement. Annals of the CIRP, 1997,46(1):441~445
4. **Zhang Y**, Wang X, An analysis on the accuracy for roundness measurement with three-point method. Optics and Precision Engineering, 1998, 6(4):127~131
5. **Zhang Y**, Wang X, On the precision measurement method for the angular positions of the probes in three-point method. Optics and Precision Engineering. 1998,3(5):71~87
6. **Zhang Y**, Wang X, A method for optimizing the angle positions of the probes in roundness and spindle error motion measurement with three-point method. Optics and Precision Engineering. 1998,6(5):39~45
7. Wang X, Yang H, Guo D, **Zhang Y**. On the open-loop control for a diffraction grating ruling engine, Chinese Journal of Scientific Instrument, 1999,20(1):63~67
8. Wang J, Li Z, Zhang G, **Zhang Y**, The principle of redundancy-the main principle in design of geometrical measurement. Journal of Tianjin University, 1999, 32(1): 130~132
9. **Zhang Y**, Wang X, Zhang G, Li Z. The key techniques of a multi-point measuring system for the error motions of a lathe spindle. Chinese Journal of Scientific Instrument. 1999,20(5):526~528
10. **Zhang Y**, Wang X, Zhang G, Li Z. On some problems of error separation method in roundness and spindle error motion measurements with multiprobe. Journal of Beijing Institute of Technology. 1999,19(3):309~312
11. **Zhang Y**, Wang X, Zhang G, Li Z. A study on improving the accuracy for roundness and spindle error motion measurements with three-point method. Journal of Beijing Institute of Technology. 1999,19(2):218~222
12. **Zhang Y**, Wang X, Zhang G, Li Z. Studies on the improvement and the calibration methods of the dynamic characteristics of a capacitance micrometer. Journal of Beijing Institute of Technology.1999,19(1):87~91
13. **Zhang Y**, Wang X, Zhang G, Li Z. Five-point method for the measurements of the axial and tilt error motions of a lathe spindle. Chinese Journal of Mechanical Engineering, 1999,35(5):98~101
14. **Zhang Y**, Wang X, Zhang G, Li Z. On the effect of reading errors and the angular misalignments of the probes on the accuracy for roundness measurement with three-point method. Chinese Mechanical Engineering, 1999, 10(5):534~537
15. **Zhang Y**, Zhao D, Yan J. Evaluating the real resolution of optical system by Strehl ratio. Optical Techniques. 1999,(5):1~6
16. **Zhang Y**, Yan J, Zhao D. Nonlinear adaptive optical system on Kerr effect. Optical Techniques. 1999,(6):4~10
17. **Zhang Y**, Zhao D, Yan J. On the transformation of phase modulation to light intensity modulation in K-F system. Optical Techniques. 2000,(1):68~70
18. Williams M, Somervell A, Cheung D, **Zhang Y**, Haskell T, Barnes T. Low-cost segmented mirrors for aberration correction in small aperture systems, Lasers and Optics in Engineering, 2004, 42:153~165.
19. Grieve K, Tiruveedhula P, **Zhang Y**, Roorda A. Multi-Wavelength Imaging with the Adaptive Optics Scanning Laser Ophthalmoscope. Opt. Express. 2006; 14, 12230-12242. PMID: 19529652
20. **Zhang Y** and Roorda A, Evaluating the Lateral Resolution of the Adaptive Optics Scanning Laser Ophthalmoscope. J. Biomed. Opt. 2006, 11, 014002. PMID: 16526879
21. **Zhang Y**, Poonja S, and Roorda A, MEMS based Adaptive Optics Scanning Laser Ophthalmoscopy, Opt. Lett. 2006; 31, 1268-1270. PMID: 16642081
22. Arathorn DW, Yang Q, Vogel CR, **Zhang Y**, Tiruveedhula P, Roorda A, Retinally stabilized cone-targeted stimulus delivery. Opt. Express 2007; 15, 13731-13744. PMID: 19550644
23. Duncan DL, **Zhang Y** and Roorda A, High resolution imaging of foveal cones in patients with inherited retinal degenerations using adaptive optics. Invest. Ophthalmol. Vis. Sci. 2007; 48:3283-3291. PMID: 17591900
24. Roorda A, **Zhang Y** and Duncan JL, High-resolution imaging of the RPE mosaic in vivo in eyes with retinal disease. Invest. Ophthalmol. Vis. Sci. 2007; 48:2297-2303. PMID: 17460294
25. **Zhang Y**, and Roorda A, Photon signal detection and evaluation in the adaptive optics scanning laser ophthalmoscope. J. Opt. Soc. Am. A, 2007; 24 (5): 1276-1283. PMID: 17429473

26. Yoon MK, Roorda A, **Zhang Y**, Nakanishi C, Wong LC, Zhang Q, Gillum L, Green A, and Duncan JL, Adaptive Optics Scanning Laser Ophthalmoscopy Images in a Family with the Mitochondrial DNA T8993C Mutation. *Investigative Ophthalmology and Visual Science*. 2009; 50:1838-1847. PMID: 18997096
27. Sincich LC, **Zhang Y**, Tiruveedhula P, Horton1 JC, and Roorda A. Resolving Single Cone Inputs to Visual Receptive Fields. *Nat Neurosci*. 2009; 12(8):967-9. PMID: 19561602
28. Putnam NM, Hammer DX, **Zhang Y**, Merino D, Roorda A. Modeling the foveal cone mosaic imaged with adaptive optics scanning laser ophthalmoscopy. *Opt. Express* 18, 24902-24916 (2010). PMID: 21164835
29. Duncan JL, Talcott KE, Ratnam K, Sundquist SM, Lucero AS, Day S, **Zhang Y**, Roorda A. Cone Structure in Retinal Degeneration Associated with Mutations in the peripherin/RDS Gene. *Invest Ophthalmol.Vis.Sci*, 52(3), 1557-1566 (2011). PMID: 21071739
30. Gelfand JM, Duncan JL, Racine CA, Gillum LA, Chin CT, **Zhang Y**, Zhang Q, Wong LJ, Roorda A, Green AJ. Heterogeneous patterns of tissue injury in NARP syndrome. *J.Neurol*. 258, 440-448. (2011) PMID: 20953793
31. Duncan JL, Ratnam K, Birch DG, Sundquist SM, Lucero AS, **Zhang Y**, Meltzer M, Smaoui N, Roorda A, Abnormal cone structure in foveal schisis cavities in X-linked retinoschisis from mutations in exon 6 of the RS1 gene. *Invest Ophthalmol.Vis.Sci*. 52, 9614-9623. (2011). PMID: 22110067
32. Syed R , Sundquist SM, Ratnam K, Zayit-Soudry S, **Zhang Y**, Crawford JB, MacDonald IM, Godara P, Rha J, Carroll J, Roorda A, Stepien KE, Duncan JL. High-resolution images of retinal structure in patients with choroideremia. *Invest Ophthalmol Vis Sci*. 54(2):950-61. (2013). PMID: 23299470
33. Meadway A, Girkin CA, **Zhang Y**, A dual-modal retinal imaging system with adaptive optics. *Opt. Express*, 21(24):29792-29807 (2013). PMID: 24514529
34. Yu Y, **Zhang Y**, Dual-thread parallel control strategy for ophthalmic adaptive optics. *Chin. Opt. Lett*. 2014; 3(12): 121202–121202. PMID: 25866498
35. Meadway A, Wang X, Curcio CA, **Zhang Y**, The microstructure of subretinal drusenoid deposits revealed by adaptive optics imaging. *Biome. Opt. Express*, 2014; 5 (3):713-727. PMID: 24688808
36. **Zhang Y**, Wang X, Rivero EB, Clark ME, Witherspoon CD, Spaide RF, Girkin CA, Owsley C, and Curcio CA, Photoreceptor perturbation around subretinal drusenoid deposits revealed by adaptive optics scanning laser ophthalmoscopy. *Am J Ophthalmol*. 2014; 158(3):584-96.e1. PMID: 24907433
37. Schaal KB, Freund KB, Litts KM, **Zhang Y**, Messinger JD, and Curcio CA, Outer retinal tubulation in advanced age-related macular degeneration: Optical coherence tomographic findings correspond to histology. *Retina*: 2015; 35(7):1339-50. PMID:25635579
38. Litts KM, Messinger JD, Freund KB, **Zhang Y** and Curcio CA, Inner segment remodeling and mitochondrial translocation in cone photoreceptors in age-related macular degeneration with outer retinal tabulation. *Invest Ophthalmol Vis Sci*. 2015; 56(4):2243-53. PMID: 25758815
39. Zhang T, Gordara P, Rivero EB, Griffin RL, Wang X, Curcio CA, and **Zhang Y**, Variability in human cone topography assessed by adaptive optics scanning laser ophthalmoscopy. *Am J Ophthalmol*. 2015; 160(2):290-300. PMID: 25935100
40. Yu Y, Zhang T, Meadway A, Wang X, **Zhang Y**, High speed adaptive optics for human eye. *Opt. Express*. 2015; 23(18):23035-52. PMID: 26368408
41. Carrie Huisingh , Gerald McGwin, Jr , David Neely , Anna Zarubina , Mark Clark , **Yuhua Zhang** , Christine A. Curcio, Cynthia Owsley, The Association between Subretinal Drusenoid Deposits in Older Adults in Normal Macular Health and Incident Age-Related Macular Degeneration, *Invest Ophthalmol Vis Sci*. 2016; 57(2):739-45. PMID: 26906160
42. Zarubina AV, Neely DC, Clark ME, Huisingh CE, Samuels BC, **Zhang Y**, McGwin JrG, Owsley C, Curcio, CA Estimating the prevalence of subretinal drusenoid deposits among older adults with healthy maculas and age-related macular degeneration with multimodal imaging. *Ophthalmology*. 2016; 123(5):1090-100. PMID: 26875000.
43. Litts KM, Ach T, Hammack KM, Sloan KR, **Zhang Y**, Freund KB, Curcio CA. Quantitative Analysis of Outer Retinal Tubulation in Age-Related Macular Degeneration From Spectral-Domain Optical Coherence Tomography and Histology. *Invest Ophthalmol Vis Sci*. 2016; 57(6):2647-2656. PMID: 27177321
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62. **Y Zhang**, P Tiruveedhula, A. Roorda, "Dual confocal adaptive optics scanning laser ophthalmoscope (AOSLO)," ARVO Annual Meeting, Fort Lauderdale, FL, 2008.
63. J.L. Duncan, **Y. Zhang**, S.M. Sundquist, A. Solovyev, S. Chang, N. Smaoui, A. Roorda, "Structural Correlation Using Adaptive Optics Scanning Laser Ophthalmoscopy In X-Linked Retinoschisis," ARVO Annual Meeting, Fort Lauderdale, FL, 2008.
64. A. Roorda, S. Sundquist, **Y. Zhang**, A. Solovyev, C. Nakanishi, J. Gandhi, J.L. Duncan, "Cone Identification and Tracking Measured Using High-Resolution in vivo Imaging," ARVO Annual Meeting, Fort Lauderdale, FL, 2008.
65. **Y Zhang**, P Tiruveedhula, L C Sincich, J C Horton, A Roorda, "Adaptive optics scanning laser ophthalmoscope (AOSLO) for precise visual stimulus presentation." OSA 2007 Fall Vision Meeting, Berkeley, CA, Sep. 16-19, 2007.
66. L C Sincich, **Y. Zhang**, P Tiruveedhula, D L Adams, Q Yang, C R Vogel, D W Arathorn, J C Horton, A. Roorda, "Mapping LGN receptive fields by single cone stimulation with adaptive optics scanning laser ophthalmoscopy." Annual Meeting of the Society for Neuroscience, San Diego, CA, Nov. 3-7, 2007.
67. A Roorda, P Tiruveedhula, **Y Zhang**, D W Arathorn, C R Vogel, Q Yang. "Real-time correction of eye movement distortions in adaptive optics scanning laser ophthalmoscope images" ARVO Annual Meeting, Fort Lauderdale, FL, 2007.
68. J L Duncan, C Nakanishi, J Gandhi, **Y Zhang**, A Roorda, "High-resolution in-vivo imaging the RPE mosaic in eyes with inherited retinal diseases." ARVO Annual Meeting," Fort Lauderdale, FL, 2007.
69. K Grieve, P Tiruveedhula, **Y Zhang**, A Roorda, "Functional imaging with multi-Wavelength adaptive optics scanning laser ophthalmoscope," Ophthalmic Technologies XVII, Biomedical Optics 2007, SPIE Photonics West, San Jose, California.2007.
70. **Y Zhang** and A. Roorda, "AOSLO: from Benchtop to clinic," SPIE Optics and Photonics, San Diego, CA, 2006.
71. **Y Zhang** and A. Roorda, "New Generation Clinically Deployable Adaptive Optics Scanning Laser Ophthalmoscope," ARVO Annual Meeting, Fort Lauderdale, FL, 2006.
72. **Y Zhang** and A Roorda, "Adaptive optics scanning laser ophthalmoscope using a micro-electro-mechanical (MEMS) deformable mirror," Ophthalmic Technologies XVI, Biomedical Optics 2006, SPIE Photonics West, San Jose, California.2006



73. J L Duncan, **Y Zhang**, A Roorda, "Adaptive Optics Imaging of Macular Photoreceptors Reveals Differences in Patients With Retinitis Pigmentosa and Cone-Rod Dystrophy." ARVO Annual Meeting, Fort Lauderdale, FL, 2006.
74. A Roorda, E A Rossi, **Y Zhang**, S B Stevenson, D W Arathorn, C R Vogel, A Parker, Q Yang. "Applications for Eye-Motion-Corrected Adaptive Optics Scanning Laser Ophthalmoscope Videos." ARVO Annual Meeting, Fort Lauderdale, FL, 2006.
75. A Roorda and **Y Zhang**, "Mechanism for Cone Reflectivity Revealed With Low Coherence AOSLO Imaging," Invest. Ophthalmol. Vis. Sci. 2005 46: E-Abstract 2433, ARVO Annual Meeting, Fort Lauderdale, FL, 2005.
76. **Y Zhang**, A Roorda, "Progress in developing the 2nd Generation Adaptive Optics Scanning Laser Ophthalmoscope (AOSLO)." Optical Society of America, FIO/LS Meeting, Tucson, Arizona. 2005
77. **Y Zhang**, A Roorda. "Photo-detector signal-to-noise characterization for an adaptive optics scanning laser ophthalmoscope," Optical Society of America, FIO/LS Meeting, Rochester, New York. 2004
78. **Y Zhang**, A Roorda. "Evaluating the resolution of an adaptive optics scanning laser ophthalmoscope," SPIE, Optical Diagnostic Imaging from Bench to Bedside at the National Institutes of Health, Washington DC, 2004
79. **Y Zhang**, S Adie, D Sampson. "Optical coherence tomography signal coherent detection technique and system," SPIE, Optical Diagnostic Imaging from Bench to Bedside at the National Institutes of Health, Washington DC, 2004

#### **Invited lectures at local and regional courses and meetings**

1. Adaptive optics retinal imaging, November 21, 2011, UAB Vision Science Research Center
2. Adaptive optics retinal imaging, November 21, 2011, UAB Vision Science Research Center
3. "Advanced Adaptive Optics Scanning Laser Ophthalmoscopy for In-vivo Study of the Retinal Structure and Function at the Cellular Level." UAB Department of Physics, Nov. 13, 2009
4. "Advanced Adaptive Optics Scanning Laser Ophthalmoscopy for In-vivo Study of the Retinal Structure and Function at the Cellular Level." UAB Department of Biomedical Engineering, September 11, 2009

#### **SCIENTIFIC PAPERS PRESENTED AT LOCAL AND REGIONAL MEETINGS**

5. Dion Hagan, Ernesto Blanco, **Yuhua Zhang**, "Precisely Measure the Cone Density in the Living Human Eye with High-resolution Adaptive Optics Ophthalmoscopy." UAB CORD program, July 31, 2012
6. Ernesto Blanco, **Yuhua Zhang**, "Characterize Photoreceptor Structure in the Living Human Eye with High-Resolution Adaptive Optics Scanning Laser Ophthalmoscopy." UAB BME Research Symposium 2012, March 9, 2012.
7. Jinyu Wang, **Yuhua Zhang**, "High speed control for Adaptive Optics Scanning Laser Ophthalmoscope." UAB Postdoc Research Day presentation, January 2010 (Second Place Award).
8. Andrew Hsia, C. Douglas Witherspoon, **Yuhua Zhang**, "Adaptive Optics Scanning Laser Ophthalmoscopy for Imaging Age Related Macular Degeneration," Annual Research Symposium of UAB Department of Ophthalmology, April 27, 2012, Birmingham, Alabama
9. K Grieve, P Tiruveedhula, **Y. Zhang**, A. Roorda, "Multi-Wavelength Imaging with the Adaptive Optics Scanning Laser Ophthalmoscope," Bay Area Vision Research Day (BAVRD), Berkeley, California, 25 August 2006.
10. J L Duncan, A Roorda, **Y Zhang**, "High Resolution Imaging in Patients with Retinal Disease," Bay Area Vision Research Day (BAVRD), Berkeley, California, 2006

#### **RESEARCH REPORTED IN PUBLIC MEDIA**

1. "UAB Seeks Answers to Age-Related Macular Degeneration." <http://www.uabmedicine.org/-/uab-seeks-answers-to-age-related-macular-degeneration>. February 2, 2015.
2. "Adaptive optics 3-D instrument opens window to eye disease." May 31, 2010, Vol. 34 No.16, [UAB Reporter](#)
3. "High-quality, real-time views of retina possible." **Ophthalmology Times**, Aug 1, 2006, by [Nancy Groves](#), <http://www.opthalmologytimes.com/opthalmologytimes/article/articleDetail.jsp?id=363092>
4. "Astronomy Techniques Pave Way for Better Eye Exams." Highlights of state-of-the-art discoveries Frontiers in Optics 2006--the 90th Annual Meeting of the Optical Society of America (OSA) <http://www.osa.org/News/pressroom/release/09.2006/alzheimers.aspx>

#### **TEACHING:**

##### **Primary Instructor for**

1. VIS745 - Biology and Pathology of the Posterior Segment (Spring Term 2018)
2. BME699 - 00Z - Masters Thesis Research (Summer Term 2013)
3. BME699 - 00Z - Masters Thesis Research (Spring Term 2013)
4. BME699 - 00Z - Masters Thesis Research (Fall Term 2012)
5. BME698 - 00Z - Non-Thesis Research (Summer Term 2012)
6. BME698 - 00Z - Non-Thesis Research (Spring Term 2012)

7. BME698 - 00G - Non-Thesis Research (Fall Term 2011)
8. BME698 - 00N - Non-Thesis Research (Summer Term 2011)
9. BME698 - 00A - Non-Thesis Research (Spring Term 2011)
10. BME698 - 00G - Non-Thesis Research (Fall Term 2010)

#### **Postdoc-fellow training**

- |                      |                               |
|----------------------|-------------------------------|
| 1. 09/2021 - present | <b>Sujin Hoshi, MD, PhD</b>   |
| 2. 08/2021 - present | <b>Ruixue Liu, PhD</b>        |
| 3. 03/2015 - 07/2020 | <b>Boyu Gu, PhD</b>           |
| 4. 01/2015 - 01/2017 | <b>Jing Lu, PhD</b>           |
| 5. 05/2011 - 04/2015 | <b>Alexander Meadway, PhD</b> |
| 6. 10/2009 - 10/2010 | <b>Jinyu Wang, PhD.</b>       |
| 7. 01/2009 - 06/2009 | <b>Chui Ting, PhD</b>         |

#### **Ophthalmology residents and fellows**

- |                       |   |
|-----------------------|---|
| 1. 11/2021- present   | <b>Shin Kadomoto, MD, PhD</b> , Ophthalmology medical fellow<br>Project: In vivo imaging cuticular drusen in age-related macular degeneration with adaptive optics imaging. |
| 2. 09/2021- present   | <b>Giulia Corradetti, MD, PhD</b> , Ophthalmology medical fellow<br>Project: In vivo study of age-related macular degeneration with adaptive optics imaging.                |
| 3. 09/2021- present   | <b>Ye He, MD, PhD</b> , Ophthalmology medical fellow<br>Project: In vivo study of age-related macular degeneration with adaptive optics imaging.                            |
| 4. 07/2019 - 06/2020, | <b>Xiaoyu Xu, MD, PhD</b> , Ophthalmology medical fellow<br>Project: In vivo study of age-related macular degeneration with adaptive optics imaging.                        |
| 5. 10/2012 - 07/2013, | <b>Pooja Gordara, MD</b> , Ophthalmology medical fellow<br>Project: Adaptive optics retinal imaging.  |
| 6. 08/2011 - 07/2012, | <b>Andrew Hsia, MD</b> , Ophthalmology Fellow research<br>Project: High-resolution resolution retinal imaging of AMD.   |

#### **Graduate students**

1. 08/2010-07/2013. BME graduate student  
**Ernesto Blanco**. Project: In-Vivo Characterization of Cone Photoreceptor Density in Different Racial/Ethnicity Groups.
2. 10/2014-02/2015. UAB International Exchange Program Graduate Student  
**Xiaoyu Xu**. Project: Choriorretinal degeneration associated with subretinal drusenoid deposit in age-related macular degeneration
3. 08/2013- 09/2016. Vision Science graduate student  
**Kady S Bruce** (Chair: Lawrence Sincich).
4. 08/2013- 06/2016. Vision Science graduate student  
**Katie Litts** (Chair: Curcio). Project: Adaptive optics imaging of outer retinal tabulation.
5. 12/27-12/31/2021, visiting student, University of Minnesota Medical School,  
**Anddre Valdivia**, PhD

#### **Undergraduate students**

1. 01/2012 - 05/2015, UAB Sci-Tech Honor Program Research student  
**Tianjiao Zhang**, Project: In vivo assessment of human cone photoreceptor variability.
2. 09/2009 - 05/2011, UAB Department Physiology student  
**Allen Joop**, Project: Imaging of living human eye.

- 05/2012 - 07/2012, UAB CORD program student  
**Dion Hagan**, Project: Assessing cone photoreceptor density in the living human eye.

### **Biomedical Engineering Summer Scholars Program**

- 07/01/2021 -08/13/2021, **Andrew Kim**, Project: High performance computers for adaptive optics imaging.
- 06/01/2016 -06/30/2016, **Mackenzie Pitts**, Project: In vivo imaging retinal blood flow.
- 06/01/2016 -06/30/2016, **Lia Branes**, Project: In vivo imaging fine retinal vasculature.

### **International Exchange Program Visiting Scholars**

- 04/2013-03/2014, **Yongxin Yu, PhD**, from Tianjin University, China.  
Project: High speed adaptive optics for human eye.
- 11/2009-06/2010, **Jianyu Zhao, PhD**, from Jinan University, China.  
Project: Advanced adaptive optics control.

### **Classes and short courses**

- 02/01/2019-04/30/2019, Adaptive optics high-resolution ophthalmoscopy and microscopy, an evaluation course.
- 09/01/2019-12/30/2019, Adaptive optics high-resolution ophthalmoscopy and microscopy, an evaluation course.
- 09/01/2019-12/31/2021, Advanced ophthalmoscopy, an evaluation course
- 03/26/2019, Doheny Eye Institute Imaging Reading Center lecture, In vivo microscopy of the human retina with adaptive optics imaging
- 10/2009-09/2018. "Adaptive optics imaging for human eye" at UAB Sci-Tech Honor Program.
- 06/16/2015, UAB Howard Hughes course, Phenotyping Human Disease, University of Alabama at Birmingham.
- 01/2014, UAB graduate course "Fundamental and Practical Applications of Light Microscopy in Biological Sciences."
- 07/2011-07/2014. "Light, Optics, Imaging, and Eye" at UAB CORD "OpticsBrideg" summer school.
- 09/2010-10/2012. "Adaptive optics high-resolution retinal imaging" at UAB Department of Ophthalmology Resident Lecture series.
- 03/2009-03/2011. "In vivo cellular level imaging of the human eye" at UAB Biomedical Engineering Department graduate students enrollment visiting day.

### **Journal club and short presentations**

- 12/2016, Third UAB Ophthalmology Department Annual Resident Research Fair: Adaptive optics ophthalmoscopy.
- 01/2013 – Present, UAB Department of Ophthalmology "Retina club." (2-6/year)
- 01/2009 – 09/2014. UAB Department of Ophthalmology "Eye-DIG Journal Club." (2/year)
- 2014 – 2016. UAB Department of Ophthalmology "Residential Research Fair" (1/year)

### **Teaching prior to coming to USA**

- 2002-2003. Supervised undergraduate (3) research projects for Honor Bachelor degree, Optical + Biomedical Engineering Laboratory, University of Western Australia, Perth, Australia.
- 1999-2001, School of Life Science and Biotechnology, Shanghai Jiaotong University, Shanghai, China.
  - Taught "instrumentation Electronics " and "Optical Instruments;"
  - Supervised the postgraduate (2) and undergraduate (5) research,
- 1996-1999, supervising graduate research, Optical Engineering Department, Beijing Institute of Technology.
- 1993-1996. Instructor of 'Instrumentation Electronics' and 'Precision Metrology,' School of Precision Instrument & Optoelectronics Engineering, Tianjin University, Tianjin, China.

### **Students' achievement**

- Alexander Meadway won the prestigious Charles D. Kelman MD Postdoc Scholar Fellowship** (2014-2015).
- Tianjiao Zhang (UAB BME undergraduate) published a peer-reviewed paper as the 1st author on prestigious American Journal of Ophthalmology in August 2015.**



3. **Ernesto Blanco (UAB BME graduate) won the 1st place award for presentation** of “in vivo imaging of the cone photoreceptors in the human eye with adaptive optics scanning laser ophthalmoscopy” at the Eighth Annual Memphis BioImaging Symposium, November 3-4, 2011, Memphis, TN.
5. **Jinyu Wang (postdoc) won the 2nd place award for presentation** “High resolution adaptive optics imaging of living human eye” on 2010 UAB Postdoc Research day.