BIOGRAPHICAL SKETCH

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NAME: Guoqiang Yu

eRA COMMONS USER NAME (credential, e.g., agency login): guoqiangyu

POSITION TITLE: Professor, Department of Biomedical Engineering, University of Kentucky

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
Tianjin University, Tianjin, P.R. China	B.S.	09/1986	Biomedical Engineering
Tianjin University, Tianjin, P.R. China	M.Sc.	03/1989	Biomedical Engineering
Tianjin University, Tianjin, P.R. China	Ph.D.	10/1999	Biomedical Engineering
University of Pennsylvania, Philadelphia, USA	Postdoc	06/2006	Physics & Astronomy

A. Personal Statement

I have a broad background in biomedical engineering with specific training and expertise in bio-photonics, which is essential to accomplish the proposed tasks. I have led a team of graduate students and research staffs at the University of Kentucky (UK) to work continually on technology development and clinical translation of near-infrared diffuse optical technologies. I have continually played a leading role in multiple collaborative projects supported by federal sponsors and national foundations including National Institutes of Health (NIH), National Science Foundation (NSF), Department of Defense (DOD), American Heart Association (AHA), and National Plastic Surgery Foundation. Through these interdisciplinary studies, my group has established a rich portfolio of collaborations across engineering and medicine.

B. Positions and Honors

Positions

1999-2001 Research Scientist, Physikalisch-Technische Bundesanstalt (PTB), Germany
2001-2002 Postdoctoral Fellow, Physics & Astronomy, University of Pennsylvania
2002-2004 Research Associate, Physics & Astronomy, University of Pennsylvania
2004-2006 Senior Research Investigator, Physics & Astronomy, University of Pennsylvania
2006-2007 Research Assistant Professor, Physics & Astronomy, University of Pennsylvania
2007-2012 Assistant Professor, Department of Biomedical Engineering, University of Kentucky
2012-2016 Associate Professor, Department of Biomedical Engineering, University of Kentucky
2016-Present Professor, Department of Biomedical Engineering, University of Kentucky

Other Professional Experience

Editorial Board Member:

2010- Editorial board member for Journal of Cancer Therapy
2011- Editorial board member for Anatomy & Physiology
2012- Senior editor board member for American Journal of Cancer Science
2012- Editorial board member for Journal of Spectroscopy
2015- International Advisory Board member for Physiological Measurements

Reviewer for Grants and Study Sections

2009 NIH study section review for RC3 and R43 ARRA grant applications (Washington, DC)
2010 Hong Kong RGC Collaborative Research Fund
2011 University of Wisconsin-Milwaukee (UWM) Research Foundation

2012 King Abdulaziz City for Science and Technology
2013 COST-Switzerland office at the State Secretariat for Education, Research and Innovation SERI
2014 New Zealand Fast Start Application of Marsden Fund
2014 NIH study section review for MEDI (Washington, DC)
2015 Israeli Ministry of Science, Technology and Space
2016 NIH study section review for MEDI (San Diego, CA)
2016 NIH study section review for SBIB-G 83 R15 (San Diego, CA)
2017 NIH Special Emphasis Panel Scientific Review Group ZRG1 OTC-H (13)
2017 NASA Translational Research Institute Medical Imaging for Spaceflight Panel (Arlington, VA)
2018 Medical Research Council (MRC) Neurosciences and Mental Health Board
2018 U24/R24 NINDS Special Emphasis Panel ZNS1 SRB-M (Alexandria, VA)
2018 R41/R42/R43/R44 NHLBI Phase IIB CSR-S (F1)
2019 NIH study section review for EITN (Chicago, IL)
2019 U24/R24 NINDS Special Emphasis Panel ZNS1 SRB-M
2020 NIH-NIBIB P41 Site-Visit Review
2020 NIH study section review for EITN

Patents:

2012 A.G. Yodh. H. Greenberg, **G. Yu**, J. A. Detre, T. Durduran, M. G. Burnett, E. R. Mohler, H. Quon, S. M. Hahn, "Optical measurement of tissue blood flow, hemodynamics and oxygenation" *US Patent #8082015 (2012-2032)*

2016 **G. Yu**, Y. Lin, C. Huang, "Noncontact three-dimensional diffuse optical imaging of deep tissue blood flow distribution", *US Patent #9861319 (2016-2036)*

2017 **G. Yu**, C. Huang, T. Hastings, "Compact low-cost fiberless diffuse speckle contrast flow-oximeter", *US Patent Application: Pub. No.: US2018/0020962*

2018 **G. Yu**, T. Pittman, C. Huang, N. McGregor, "Loupe-based intraoperative fluorescence imaging device for the guidance of tumor resection", *International Patent Application: Pub. No.: WO/2019/014205*

Honors

2004 DOD New Investigator Award for Prostate Cancer Program (W81XWH-04-1-0006)
2004 Best Poster Award at the Institute for Medicine and Engineering (IME) Interdisciplinary Research Symposium 2004 (University of Pennsylvania)
2004, 2006 Second Place Winner of Young Investigators Awards Competition at 15th and 17th Annual Meeting of the Society of Vascular Medicine and Biology (SVMB)
2012 Notable Research Professor honored by University of Kentucky Chapter of the National Society of Black Engineers (University of Kentucky)
2015 Mentor Recognition Award, Center for Clinical and Translational Science 10th Annual Spring Conference (University of Kentucky)
2015 Dean's Award for Excellence in Research, College of Engineering (University of Kentucky)
2016 A Teacher Who Made a Difference, College of Education (University of Kentucky)
2019 Researchers of the Month (Sep. 2019, University of Kentucky)

C. Contribution to Science (>90 peer-reviewed articles)

1. *Novel hybrid near-infrared spectroscopy/diffuse correlation spectroscopy (**NIRS/DCS**) for the quantification of deep tissue blood flow and oxygenation.* I worked in Dr. Arjun Yodh's laboratory at the University of Pennsylvania (UPenn) from 2001 to 2007, where I spent 5 years in various research positions and one year as a research assistant professor. My major role was to develop and validate a state-of-the-art hybrid NIRS/DCS device for quantification of deep tissue blood flow and oxygenation (***US Patent #8082015, 2012-2032***). My research activities at UPenn were fairly independent, and well-funded via 3 nationally competitive grants on which I was the PI (NIH R21, AHA BGIA, and DOD New Investigator Award).
   a. **G. Yu**, T. Durduran, C. Zhou, H. W. Wang, M. E. Putt, H. M. Saunders, C. M. Sehgal, E. Glatstein, A. G. Yodh, T. M. Busch, "Noninvasive monitoring of murine tumor blood flow during and after photodynamic therapy provides early assessment of therapeutic efficacy," *Clinical Cancer Research* 11(9), 3543-3552 (2005). PMID: 15867258

b. **G. Yu**, T. Durduran, C. Zhou, T. C. Zhu, J. C. Finlay, T. M. Busch, S. B. Malkowicz, S. M. Hahn, A. G. Yodh, "Real-time in situ monitoring of human prostate photodynamic therapy with diffuse light," *Photochemistry & Photobiology* 82(5), 1279-1284 (2006). PMID: 16696593
c. **G. Yu**, T. F. Floyd, T. Durduran, C. Zhou, J. A. Detre, A. G. Yodh, "Validation of Diffuse Correlation Spectroscopy for Muscle Blood Flow: Validation with Arterial-Spin-Labeling Perfusion MRI," *Optics Express* 15, 1064-1075 (2007). PMID: 19532334
d. A. G. Yodh, J. H. Greenberg, **G. Yu**, J. A. Detre, T. Durduran, M. G. Burnett, E. R. Mohler III, H. Quon, S. M. Hahn, "Optical measurement of tissue blood flow, hemodynamics and oxygenation," US Patent #8082015 (2012-2032)

2. *Wearable, low-cost, compact diffuse speckle contrast flowmeter (DSCF) for cerebral monitoring.* We have developed a novel low-cost compact diffuse speckle contrast flowmeter-oximeter (DSCF) sensor consisting of small laser diodes and CMOS cameras, which can be used for continuous measurements of blood flow variations in relatively deep tissues. The low-cost compact DSCF probe holds great potential to be broadly used for continuous and longitudinal monitoring of cerebral blood flow alterations in animals and humans. A patent application has been submitted (***US Patent Application: Pub. No.: US2018/0020962***).
   a. **G. Yu**, C. Huang, J. T. Hastings, "Compact low-cost fiberless diffuse speckle contrast flow-oximeter," *US Patent Application* #15655988 (2016)
   b. C. Huang, M. Seong, J. P. Morgan, S. Mazdeyasna, G.G. Kim, J. T. Hastings, **G. Yu**, "A low-cost compact diffuse speckle contrast flowmeter using small laser diode and bare charge-coupled-device chip", *Journal of Biomedical Optics Letters*, 080501 (2016). PMCID: PMC4975738
   c. C. Huang, Y. Gu, J. Chen, A.A. Bahrani, E.G. Abu Jawdeh, H.S. Bada, K. Saatman, **G. Yu**, L. Chen, A Wearable Fiberless Optical Sensor for Continuous Monitoring of Cerebral Blood Flow in Mice. *IEEE Journal of Selected Topics in Quantum Electronics*, 25(1): 1-8 (2019). PMCID: PMC6821394

3. *Novel noncontact diffuse correlation spectroscopy and tomography (**ncDCS/ncDCT**).* Most DCS/DCT measurements use optical fibers in contact with tissues for photon collection and require tissues to conform to simple boundaries such as a slab, often requiring compression that can introduce a hemodynamic distortion of soft tissues or an infection of injured tissues. My group recently developed a novel noncontact DCS/DCT system for 3-D imaging of tissue blood flow contrasts. This system uses our unique lens-focusing technique to project the sources and detectors onto the tissue surface for hemodynamic measurements. We have tested this system on tissue phantoms and breasts with tumors.
   a. Y. Lin, L. He, Y. Shang, **G. Yu**, "Noncontact diffuse correlation spectroscopy for noninvasive deep tissue blood flow measurement", *Journal of Biomedical Optics Letters* 17(2), 010502 (2012). PMCID: PMC4019367
   b. T. Li, Y. Lin, Y. Shang, L. He, C. Huang, M. Szabunio, **G. Yu**, "Simultaneous measurement of deep tissue blood flow and oxygenation using noncontact diffuse correlation spectroscopy flow-oximeter", *Scientific Reports* 3, 1358 (2013). PMCID: PMC3584314
   c. Y. Lin, C. Huang, D. Irwin, L. He, Y. Shang, **G. Yu**, "Three-dimensional flow contrast imaging of deep tissue using noncontact diffuse correlation tomography", *Applied Physics Letters* 104, 121103 (2014). PMCID: PMC3971827
   d. C. Huang, Y. Lin, L. He, D. Irwin, M. M. Szabunio, **G. Yu**, "Alignment of Sources and Detectors on Breast Surface for Noncontact Diffuse Correlation Tomography of Breast Tumors," *Applied Optics* 54(29), 8808-8816 (2015). PMCID: PMC4801123

4. Novel prototype CCD-based speckle contrast diffuse correlation tomography (**scDCT**). One challenge left to address with the ncDCS/ncDCT system is that limited source-detector pairs currently restrict its spatial and temporal resolution. Very recently, we developed a novel prototype CCD-based speckle contrast diffuse correlation tomography (scDCT) system with new algorithms for imaging reconstruction (***US Patent #9861319 2016-2036***), which significantly reduced costs and increased spatial-temporal resolution.
   a. C. Huang, D. Irwin, Y. Lin, Y. Shang, W. Kong, J. Luo, **G. Yu**, "Speckle contrast diffuse correlation tomography (**scDCT**) of complex turbid media," *Medical Physics Letters* 42, 4000-4006 (2015). PMCID: PMC4464064

b. C. Huang, M. Zhao, D. Irwin, N. B. Agochukwu, L. Wong, **G. Yu**, "Noncontact speckle contrast diffuse correlation tomography (**scDCT**) of tissue blood flow distribution," *IEEE Transactions on Medical Imaging* 36(10), 2068-2076 (2017). PMCID: PMC5645791
c. S. Mazdeyasna**,** C. Huang, M. Zhao, A. Bahrani, N. Agochukwu, L. Wong, **G. Yu**, "Noncontact speckle contrast diffuse correlation tomography (**scDCT**) of blood flow distributions in tissues with arbitrary geometries", *Journal of Biomedical Optics* 23(9): 1-9 (2018). PMCID: PMC6183314
d. C. Huang, S. Mazdeyasna, L. Chen, E. G. Abu Jawdeh, H. S. Bada, K. Saatman, L. Chen, **G. Yu**. Noninvasive noncontact speckle contrast diffuse correlation tomography of cerebral blood flow in rats. *NeuroImage* 198: 160-169 (2019). PMID: 31112789

Complete List of Published Work in MyBibliography:
https://scholar.google.com/citations?user=4PzSxEMAAAAJ&hl=en

D. Research Support

Ongoing Research Support

R41 CA243600-01 Guoqiang Yu (PI) 08/01/2019-07/31/2020
NIH/NCI
Development of a Wearable Fluorescence Imaging Device for Intraoperative Identification of Brain Tumors
To develop a wearable eye-loupe based fluorescence imaging device for the guidance of brain tumor resection.
Co-Is: Huang, Pittman, Neltner

R01 HD101508-01 Guoqiang Yu (PI) 04/10/2020-03/31/2025
NIH/NICHD
Noninvasive Noncontact High-Density Optical Imaging of Neonatal Intraventricular Hemorrhage
To develop a noncontact speckle contrast diffuse correlation tomography (***scDCT***) system for noninvasive imaging of neonatal intraventricular hemorrhage.
Co-Is: Huang, Lei Chen, Powell, Abu Jawdeh, Miller, Li Chen, Cheng, Bada

R01 EB028792-01 Guoqiang Yu (PI) 03/15/2020-11/30/2023
NIH/NIBIB
Perioperative Diffuse Optical Imaging of Tissue Blood Flow and Oxygenation for Optimization of Mastectomy Skin Flap Viability
To develop a CCD/CMOS based noncontact optical imaging system for intraoperative monitoring of mastectomy.
Co-Is: Huang, Lei Chen, Li Chen, Wong

R21 HD091118 Guoqiang Yu (PI) 02/10/2018-01/31/2021
NIH/NICHD
A Low-cost Compact Diffuse Speckle Contrast Flow-oximeter for Neonatal Brain Monitoring
To develop a wearable optical sensor which can be taped on the human neonatal head for noninvasive, continuous measurements of cerebral blood flow and oxygenation variations in NICUs.
Co-Is: Huang, Abu Jawdeh, Bada

3R21 HD091118-02S1 (Supplement) Guoqiang Yu (PI) 10/01/2019-01/31/2021
NIH/NICHD
A Multiscale Multimodal Diffuse Optical Device for Early Diagnosis of Preclinical Alzheimer's Disease
To develop a wearable optical sensor which can be taped on human elderly subjects for noninvasive, continuous measurements of cerebral blood flow and oxygenation variations as pre-AD biomarkers.
Co-Is: Huang, Lei Chen, Jiang, Jicha

R01 AG062480-01 Ai-Ling Lin (PI) 05/01/2019-02/29/2024
NIH/NIA
Prebiotics Intervention to Reduce Alzheimer's Disease Risk via Brain-Gut Axis in an APOE4 Mouse Model

To use multimodality neuroimaging methods to study Alzheimer's Disease and interventions.
Role: Co-I (Yu)

NSF EPSCoR (#1539068) Sridhar Sunderam (PI) 08/01/2015-12/31/2020
RII Track 2 FEC: Innovative, Broadly Accessible Tools for Brain Imaging, Decoding, and Modulation
To develop innovative and broadly accessible brain imaging technologies to provide insight into how the nervous system functions in health and disease.
Role: Co-I (Yu)

COBRE #1P20GM121327 Daret St. Clair (PI) 03/01/2017-12/31/2021
NIH/NIGMS
University of Kentucky Center for Cancer and Metabolism
The University of Kentucky established a unique multidisciplinary Center of Biomedical Research Excellence (COBRE) on Cancer and Metabolism (CCM) as a strategically designed, sustainable framework that cultivates cutting-edge research focused on the metabolic mediators of cancer development and progression.
Role: Co-I (Yu)