BIOGRAPHICAL SKETCH

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NAME: Li, Chunqiang

POSITION TITLE: Assistant Professor of Physics

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

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
Peking University, Beijing, China	B.S.	07/1996	Space Physics
Chinese Academy of Sciences, Beijing, China	M.S.	07/1999	Space Physics
Princeton University, Princeton, New Jersey	Ph.D.	10/2006	Electrical Engineering
Wellman Center for Photomedicine, Harvard Medical School, Boston, Massachusetts	Postdoctoral	08/2010	Biomedical Optics

A. Personal Statement

My career goal is to become a leading optical physicist applying innovative physics concepts on biomedical research. My research interest is focused on developing optical techniques for molecular and cellular imaging. I have a broad background in physics and medical imaging. My current research focuses on developing nanometer resolution optical microscopes to achieve single molecule imaging without fluorescence tagging funded by NIH. Also my group is developing a high-speed temporal focusing two-photon microscope for imaging fluorescent objects and simultaneously tracking their fast motion in three-dimensional (3D) space funded by NSF. I have broad collaborations with other researchers in the medical field. The co-investigators on my NSF grant include a neural scientist, a biochemist, an environmental chemist, and an electrical engineering faculty with medical image processing expertise. I have gained valuable experience in collaborating with such a diverse group of researchers, and in successfully administrating a large size grant. For this proposed research, I have started collaborating with Drs. Sun and Ouellet on developing two-photon FRET microscopy in early 2014, and this work is supported by an internal grant. Together we have a peer-reviewed publication demonstrating a novel quantitative approach for analyzing mycobacterial cytosolic translocation [1]. We are committed to continue this fruitful collaboration.

1. Acosta, Y., Zhang, Q., Rahaman, A., Ouellet, H., Xiao, C., Sun, J., Li, C. (2014). Imaging cytosolic translocation of mycobacteria with two-photon fluorescence resonance energy transfer microscopy. *Biomedical Optics Express,* 5, 3990-4001.

B. Positions and Honors

Positions and Employment

2006-2010 Research Fellow, Wellman Center for Photomedicine, Massachusetts General Hospital, Harvard Medical School, Boston, MA
2010- Assistant Professor, Department of Physics, The University of Texas at El Paso, El Paso, TX

Other Experience and Professional Memberships

2007- Member, The International Society for Optical Engineer (SPIE)
2008- Member, The Optical Society of America (OSA)
Ad Hoc Reviewer for Scientific Journals: *Optics Letters*, *Biomedical Optics Express*, *Journal of Biomedical Optics*, *Optics and Laser Technology*

Ad Hoc Reviewer for Grants: Department of Energy, Office of Science Graduate Fellowship Program

Honors

2007 Massachusetts General Hospital, Bullock Fellowship
"In vivo Optical microscopy of the peripheral nerve"

2010 Gordon Research Conference, Lasers in Medicine and Biology, Poster Award Winner
"Label-free imaging of skin mast cells *in vivo* with two-photon microscopy"

C. Contribution to Science

1. My early research is focused on ultrafast laser spectroscopy and optoelectronics, e.g. semiconductor lasers and photodetectors. These works lay a solid ground on advanced optics and optoelectronics for my current research by providing the necessary knowledge in physics. Particularly my work on femtosecond laser spectroscopy (c, d) is directly related to current nonlinear optical microscopy development , such as two-photon fluorescence and coherent anti-Stokes Raman microscopes. This phase-coherent femtosecond two-dimensional photon echo spectroscopy to study ultrafast (10^{-15}s) dynamics in complex molecular systems, e.g. proteins, based on pulse shaping technology. Substantial information about molecular dynamics, such as coupling between electronic transitions, which are depicted as cross peaks in the two-dimensional spectra were detected. Molecular dynamics such as dephasing time and dynamic stokes shifts were observed.

    a. Wang, H., Li, C., & Forrest, S.R. (2003). A fully integratable 1.55μm wavelength, continuously tunable asymmetric twin-waveguide distributed Bragg reflector laser. *IEEE Photon. Tech. Lett.*, 15, 1189-1191.
    b. Datta, S., Li, C., Forrest, S.R., Volodin, B., Dolgy, S., Melnik, E., & Ban, V.S. (2004). Modeling of non-ideal volume Bragg reflection gratings in photorefractive glass using a perturbed transmission matrix approach. *IEEE J. Quant. Electron.*, 40, 580-590.
    c. Wagner, W., Li, C., Semmlow, J., & Warren, W.S. (2005). Rapid phase-cycled two-dimensional optical spectroscopy in fluorescence and transmission mode. *Optics Express*, 13, 3697-3706.
    d. Li, C., Wagner, W., Ciocca, M., & Warren, W.S. (2007). Multiphoton femtosecond two-dimensional optical spectroscopy. *Journal of Chemical Physics*, 126, 164307-312.

2. As a postdoctoral fellow I conducted pioneering research on video-rate *in vivo* two-photon microscopy with intrinsic UV fluorescence from amino acids. This new technique enables imaging skin tissues such as epidermal cells, dermal cells, blood vessels, muscle cells and immune cells without fluorescence labelling. This new discovery opens many exciting medical applications. It was applied to study immune response, leukocytes dynamics, *in vivo*. Intracellular dynamic processes such as granule release in mast cells were investigated with its subcellular resolution (~200nm). Based on my work, we invented a novel *in vivo* flow cytometer based on cellular autofluorescence and were awarded a US patent.

    a. Li, C., Pastila, R.K., Pitsillides, C., Runnels, J.M., Puoris'haag, M., Côté, D., & Lin, C.P. (2010). Imaging leukocyte trafficking *in vivo* with two-photon-excited endogenous tryptophan fluorescence. *Optics Express*, 18, 988-999.
    b. Li, C., Pitsillides, C., Runnels, J.M., Côté, D., & Lin, C.P. (2010). Multiphoton microscopy of live tissues with ultraviolet autofluorescence. *IEEE J. Selected Topics in Quantum Electronics*, 16, 516-523.
    c. Ripplinger, C.M., Kessinger, C.W., Li, C., Kim, W.K., McCarthy, J.R., Weissleder, R., Henke, P.K., Lin, C.P., Jaffer, F.A., (2012). Inflammation Modulates Murine Venous Thrombosis Resolution *In Vivo*: Assessment by Multimodal Fluorescence Molecular Imaging. *Arteriosclerosis, Thrombosis, and Vascular Biology,* 32, 2616-2624.
    d. Lin, C.P., Carlson, A.L., Alt, C., Biss, D.P., Pitsillides, C.M., Li, C., (2013). In vivo flow cytometry based on cellular autofluorescence. US Patent #8,574,859 B2.

3. Currently my group is focusing on developing novel optical techniques and applying them to solve a variety of medical related questions. By integrating two-photon microscopy and cryo-electron microscopy we have studied the infection process of marine virus CroV and its host *Cafeteria roenbergensis.* Also we have imaged the cytosolic translocation of *Mycobacteria* with two-photon fluorescence resonance energy transfer microscopy. Once translocation occurs, *mycobacterium*-bearing β-lactamase cleaves the

substrate, resulting in decrease of FRET signal. Quantification of this FRET signal change revealed that *Mm*, but not *Ms*, is capable of translocating to the cytosol. This study has provided a novel quantitative approach for analysis of mycobacterial cytosolic translocation, which is potentially applicable to study of other bacterial pathogens in cells or in live animals.

a. Zhao, L., Peralta-Videa, J.R., Ren, M., Varela-Ramirez, A., Li, C., Hernandez-Viezcas, J.A., Aguilera, R.J., & Gardea-Torresdey, J.L. (2012). Transport of Zn in a sandy loam soil treated with ZnO NPs and uptake by corn plants: Electron microprobe and confocal microscopy studies. *Chemical Engineering Journal*, 184, 1-8.
b. Cao, B., Chakraborty, S., Sun, W., Aghvami, S., Fischer, M.G., Qian, W., Xiao, C., Li, C., (2014). Imaging marine virus *CroV* and its host *Cafeteria roenbergensis* with two-photon microscopy. *Proc. of SPIE*, 8944, 89440E.
c. Acosta, Y., Zhang, Q., Rahaman, A., Ouellet, H., Xiao, C., Sun, J., Li, C., (2014). Imaging cytosolic translocation of mycobacteria with two-photon fluorescence resonance energy transfer microscopy. *Biomedical Optics Express,* 5, 3990-4001.

Complete List of Published Work in MyBibliography: http://www.ncbi.nlm.nih.gov/sites/myncbi/1NYk-o0DDYZkx/bibliography/47471709/public/?sort=date&direction=ascending.

D. Research Support

Ongoing Research Support

NIH #SC2GM103719 Li (PI) 08/1/14-4/30/17
Super Resolution Pump-Probe Microscopy for Biomedical Imaging
The goal of this project is to develop a super resolution pump-probe modulation microscope to image non-fluorescent molecules without fluorescence labeling.
Role: PI

NSF #1429708 Li (PI) 8/15/14-7/31/18
MRI: Development of a Scan-less Temporal Focusing Two-photon Fluorescence Microscope for High-speed Three-dimensional Imaging
This project aims to develop a major research instrument, a high-speed optical microscope for imaging fluorescent objects and simultaneously tracking their fast motion in three-dimensional space.
Role: PI

NSF #1307524 Incera (PI) 8/15/13-8/14/15
PARTNERS FOR SUCCESS (PASS): Building Partnerships to Increase Success of Underrepresented Minorities in Physics
This project aims to develop a flexible and innovative model of partnerships between Minority Serving Institutions (MSIs) and Degree Granting Institutions (DGIs) to attract, retain, and ultimately increase the number and success of underrepresented minority (URM) students earning a doctorate degree in physics.
Role: co-Investigator