

CHING-WEI CHANG

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OBJECTIVE

I am a passionate Research Scientist currently seeking new career opportunities involving research on and the applications of digital image processing, enhancement of fluorescence detection in tissues and cells, optical diagnosis of disease, or mathematical modeling of complex biological systems. I am also very interested in research on disease treatments and drug developments using molecular biology techniques.

EDUCATION

- 2005-2009 **Ph.D. in Biomedical Engineering**
UNIVERSITY OF MICHIGAN Ann Arbor, Michigan
GPA: 8.500 (9-point scale)
Dissertation: *Improving Accuracy and Precision in Biological Applications of Fluorescence Lifetime Imaging Microscopy*
FLIM (Fluorescence Lifetime Imaging Microscopy) is an approach that produces fluorescence lifetime maps and indicates molecular micro-environments. In this study,
- FLIM was used to resolve statistically significant differences, implying molecular interactions, in live-cell imaging with FRET (Fluorescence Resonance Energy Transfer) technique.
 - Optimal gating schemes were determined, with computer simulations, to significantly improve the precision of FLIM.
 - Novel TV (Total Variation) denoising models were applied to FLIM and further improved the precision of FLIM.
- 2003-2004 **M.S. in Biomedical Engineering**
UNIVERSITY OF MICHIGAN Ann Arbor, Michigan
GPA: 8.407 (9-point scale)
Thesis: *A Novel Technique to Identify Gene Regulation Profile by Using Nascent RNA Quantification and Microarray Analysis*
This novel technique involves DNA microarray techniques and their data analysis, nascent RNA isolation and amplification, DNA recombination, and PCR / PCR primers design.
- 1997-2001 **B.S. in Chemical Engineering**
NATIONAL TAIWAN UNIVERSITY Taipei, Taiwan
GPA: 3.810 (4-point scale)
Thesis: *Analysis on the Permeation Characteristics of Chitosan Films*
Techniques for manufacturing, crosslinking, and testing biomedical materials were applied to Chitosan films, including freeze drying, SEM, microbe passage test, bubble point test, water uptake test, and mechanical strength test.

PROFESSIONAL EXPERIENCE

- 2010- **Postdoctoral Scholar - Cell Imaging, Microscopy, Image Analysis, and Molecular Biology Scientist**, Department of Bioengineering, University of California, Berkeley: Use of FRET probes to detect protein activation and pico-scale force events after live-cell mechanical stimulation and redistribution; study of isoform-specific contributions of molecular motors to cytoskeletal mechanics; co-management of a confocal / multi-photon laser scanning microscopy system, with Dr. Sanjay Kumar
- 2010 **Research Associate - Data Analysis, Image Denoising, and Cancer Cell Biology Scientist**, Department of Biomedical Engineering, University of Michigan: Technical consulting and training provided to graduate students on FLIM instrumentation, FLIM data analysis, image denoising, and cell culturing, with Dr. Mary-Ann Mycek
- 2009-2010 **Research Fellow - FLIM, FRET, and Image Processing Algorithms Scientist**, Department of Biomedical Engineering, University of Michigan: Advanced studies based on my Ph.D. work on the improvements of the accuracy and precision of FLIM and FRET; broader applications of these techniques to other biomedical imaging systems such as CT, PET, and confocal / multi-photon microscopy, with Dr. Mary-Ann Mycek
- 2009 **Guest Lecturer - Biomedical Optics**, Biomed Eng 552, instructed by Dr. Mary-Ann Mycek, University of Michigan: Overview and principles of light microscopy; theory on resolution in light microscopy
- 2007, 2009 **Teaching Assistant - Analytical & Quantitative Light Microscopy**, Marine Biological Laboratory, Woods Hole, Massachusetts: Courses / laboratories on FLIM and FRET, designed for scientists, researchers, and

advanced graduate students

- 2005 **Research Assistant - Bioinformatics, Genomics, Transcriptomics**, Department of Radiation Oncology, University of Michigan: Novel gene expression profiling technique and regulation of glucose transporters by p53, with Dr. Mats Ljungman
- 2002-2003 **Research Assistant - Computational / Systems Biology, Mathematical Modeling**, Institute of Chemistry, Academia Sinica, Taipei, Taiwan: Theoretical analysis and computer simulation for genetic regulatory networks, with Dr. Chao-Ping Hsu

SELECTED PUBLICATIONS

Invited Book Chapters

- Chang, C. W.**, Mycek, M. A., “Quantitative molecular imaging in living cells via FLIM”, *Reviews in Fluorescence 2010*, 2012, 173-198
- Chang, C. W.**, Sud, D., Mycek, M. A., “Fluorescence lifetime imaging microscopy”, *Methods Cell Biol.*, 2007, 81, 495-524

Peer-Reviewed Journal Articles

- Chang, C. W.**, Kumar, S., “Vinculin tension distributions of individual stress fibers within cell-matrix adhesions”, *Journal of Cell Science*, 2013, 126(14), 3021-3030
- Chang, C. W.**, Mycek, M. A., “Total variation versus wavelet-based methods for image denoising in fluorescence lifetime imaging microscopy”, *Journal of Biophotonics*, 2012, 5(5-6), 449-57
- Chang, C. W.**, Mycek, M. A., “Enhancing precision in time-domain fluorescence lifetime imaging”, *Journal of Biomedical Optics*, 2010, 15(5), 056013
- Lloyd, W. R., Wilson, R. H., **Chang, C. W.**, Gillispie, G. D., Mycek, M. A., “Instrumentation to rapidly acquire fluorescence wavelength-time matrices of biological tissues”, *Biomedical Optics Express*, 2010, 1(2), 574–586
- Chang, C. W.**, Mycek, M. A., “Precise fluorophore lifetime mapping in live-cell, multi-photon excitation microscopy”, *Optics Express*, 2010, 18(8), 8688-8696
- Chang, C. W.**, Wu, M., Merajver, S. D., and Mycek, M. A., “Physiological FLIM improves FRET detection in living cells”, *Journal of Biomedical Optics*, 2009, 14(06), 060502
- Hsu, C. P., Lee, P. H., **Chang, C. W.**, Lee, C. T., “Constructing quantitative models from qualitative mutant phenotypes: preferences in selecting sensory organ precursors”, *Bioinformatics*, 2006, 22, 1375-1382
- Derheimer, F. A., **Chang, C. W.**, Ljungman, M., “Transcription inhibition: a potential strategy for cancer therapeutics”, *Eur. J. Cancer*, 2005, 41(16), 2569-2576
- Chang, C. W.**, Pi, H., Chien, C. T., Hsu, C.P., “Network modeling of Drosophila external sensory organ precursor formation: the role of recently studied genes”, *J. Genet. Mol. Biol.*, 2003, 14(4), 243-251

LABORATORY TECHNIQUES

- Imaging / Microscopy:** Confocal and multi-photon microscopy, time-gated and TCSPC FLIM, FRET, atomic force microscopy (AFM), super resolution microscopy (PALM/STORM), traction force microscopy (TFM), fluorescence recovery after photobleaching (FRAP), ultrasound, CT, MRI
- Image Processing:** Image segmentation and morphometric analysis, TV and wavelet-based image denoising, image deconvolution, optimal gating and fitting methods for fluorescence lifetime mapping
- Cellular / Molecular Biology:** Cell culture, DNA microarray techniques / data analysis, total / nascent RNA isolation / amplification, DNA recombination, real-time PCR, immunocytofluorescence, western blot, site-directed mutagenesis, viral transduction, transient transfection, RNAi, flow cytometry, FACS
- Tissue Engineering / Biomaterials:** Collagen-based biomaterial manufacturing as articular cartilage phantoms, chitosan-based biomaterial manufacturing and crosslinking, freeze drying, SEM, microbe passage test, bubble point test, water uptake test, mechanical strength test
- Chemical Separation:** Membrane separation, HPLC, GC, TLC

COMPUTER SKILLS

- Languages / Programming:** Matlab, LabView, C, C++, Java, Fortran
- Operation Systems:** Windows 95/98/2000/XP/Vista/7/8, Macintosh, Linux, Unix

Language programming was extensively applied to image processing and the computational sections of my Ph.D. dissertation, mainly with Matlab. The control of electronics was implemented with LabView. C and Java were used to simulate complex molecular interactions described by chemical kinetics.

LANGUAGES

Fluent in English and Chinese (Mandarin); Fair in Taiwanese; Beginner-level in Japanese