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JIA-WEI YEH

PROFILE

My research interest locates in the boundary between physics and biological science in one hand and engineering and biotechnology application in another hand. I am currently at Cornell University, where I work as a Postdoctoral Associate in the School of Engineer and Applied Physics with Professor Harold G. Craighead. The main work here is investigate single molecular epigenetics by using micro/nano-fluidic channel as well as optical microscopy. The motive is detecting of epigenetic marks in human native chromatin that may be used to diagnose diseases such as cancer at early stage. I have developed a method to stretch single native chromatin fibers that extracted from human cancer cells (Hella cell) for manipulate and optically detec/map on epigenetics marks (histone modification).

POSTDOCTORAL TRAINING

Cornell University, School of Applied and Engineering Physics — 2012 Nov. - present

- *Stretching of DNA and native Chromatin in Nanoslits for Epigenetics mapping*
- Advised by Professor Harold G. Craighead.

Academia Sinica, Institute of Physics — July – Oct. 2012

- *The Reptation and Vibration Dynamics of Partially Extended Single Molecule of DNA in Nanoslit*
- Advised by Professor Chia-Fu Chou.

EDUCTION

PhD	**Nation Taiwan University**	Applied Physics	2012
MS	**Nation Chiao-Tung University**	Physics	2006
BS	**Tung-Hai University**	Physics	2004

ACADEMIC EXPERIENCE AND TRAINING

Cornell University, Ithaca, NY, USA. — 2012 Nov.– present

- Postdoctoral Associate, Craighead Research Group
  - Designed and fabricated the micro- and nano fluidic device for single molecular genetics/epigenetics imaging and DNA/Chromatin manipulation.
  - Designed and wrote numerous data analysis routines in MATLAB for single particle/polymer tracking, etc.
  - Utilized nanofabrication processes in Cornell Nanoscale Science & Technology Facility (CNF), such as photolithography, dry etches, surface profiler, MOS clean, etc.
  - Collaborated with engineers, and biophysicists to construct a confocal fluorescence microscope, total internal reflection fluorescence microscope (TIRF).
  - Cell culture training in Nanobiotechnology Center (NBTC), Cornell. Extracted native chromatin from cells. DNA/protein labeling and modification.

Academia Sinica, Taipei, Taiwan. — 2006 - 2012

- Graduate Student, NanoBioScience Lab.
  - Designed and fabricated the micro- and nano ($h < 20$ nm) fluidic device for DNA tug-of-war (TOW).
  - Designed and wrote numerous data analysis routines in MATLAB for image processing, and single particle/polymer tracking, and data analysis, etc.
  - Single-molecule fluorescence microscopy techniques.
  - Study the dynamics of DNA polymer by Hilbert-Huang transform (HHT) and Detrended Fluctuation Analysis (DFA).

- Utilized nanofabrication processes in Core Facilities for Nanoscience and Nanotechnology, such as photolithography, dry etches, surface profiler, atomic force microscopy (AFM), scanning electron microscopy (SEM), etc. Machine shop training.

Stanford University, California, USA — Oct. - Nov. 2007

- Training, Stanford Nanofabrication Facility (SNF)
  - Fabrication micro-nano fluidics chip for EDEP, single-flie diffusion studies and entropic recoiling force investigation.

National Chiao-Tung University, Hsinchu, Taiwan — 2004 - 2006

- Graduate Student, Low Temperature and Mesoscopic Physics Lab. and Nano and Quantum Phenomena Lab.
  - Study the effects of Mn and particle size on Magnetism in Cd_xSe_{1-x} Nanoparticles using SQUID.
  - Designed and produced a homemade pre op-amp where its noise is lower than 1/1000 of sourcing current and also product constant voltage source power supply for AFM. Machine shop training.

Tung Hai University, Taichung, Taiwan — 2002

- Intern, Prof. Ming Fung Yang
  - Study spin-spin/spin-orbital coupling.

TEACHING EXPERIENCE

National Chiao-Tung University, Institute of Physics & Dept. of Electrophysics — 2005 - 2006

- Teaching Assistant:
  - Introduction to Electrodynamics (textbook: Griffiths) (Fall, 2005)
  - Fundamental Physics (Spring, 2006)
  - Physical Chemistry (textbook: Atkins) (Spring, 2005)

Tung Hai University, Dept. of Physics — 2003-2004

- Teaching Assistant: 1. Faith, Nature and Science (Spring, 2004)
- Guider: Physics (Fall, 2003)

PUBLICATION

Journal Paper:

1. Jia-Wei Yeh, Alessandro Taloni, Ming-Chia Wu, Chia-Fu Chou. "The Vibration Dynamics of Partially Extended DNA in Nanoslit", in preparation.
2. Jia-Wei Yeh, Harvey Tian, Harold G. Craighead. "Epigenetic mapping of single chromatin in nanoslits", in preparation.
3. Jia-Wei Yeh, Harvey Tian, Kylan Szeto, Harold G. Craighead. "Stretching tethered single chromatin and DNA in nanoslits for detection of epigenetics marks", submitted to ***Nature Communication***.
4. Jia-Wei Yeh, K. K. Sriram, Alessandro Taloni, Yen-Long Chen, Chia-Fu Chou. "Quantitative analysis of reptation of partially extended DNA in sub-30 nm nanoslits", submitted to ***Physical Review Letters***, (arXiv:1502.05115).
5. K. K. Sriram, Jia-Wei Yeh, Yii-Lih Lin, Yi-Ren Chang, Chia-Fu Chou. "Direct optical mapping of transcriptional factor binding sites on field-stretched single DNA molecules in nanofluidic devices", ***Nucleic Acids Research***, 2014. (DOI: 10.1093/nar/gku254) (SCI) (IF: 8.808; SCI ranking: 7.5%)
6. Alessandro Taloni, Jia-Wei Yeh, Chia-Fu Chou. "Scaling theory of DNA polymer extension in nanoslits." ***Macromolecules***, 2013, 46, 7989. (DOI: 10.1021/ma4010549) (SCI) (IF: 5.927; SCI ranking: 1.6%)
7. Jia-Wei Yeh, Alessandro Taloni, Yen-Long Chen, Chia-Fu Chou. " Entropy-driven single molecule Tug-of-War of DNA at micro-nanofluidic interfaces", ***Nano Letters***, 2012, 12 1597.(DOI: 10.1021/nl2045292) (SCI) (IF: 12.94; SCI ranking: 3.9%,3.7%,5.3%,5.8%,3.3%). Research Highlights, ***Nature***, 2012, 482 442: (DOI:10.1038/482442b)

國內期刊:

1. 廖國棠，葉佳唯，周家復“微奈米流通道應用於生物物理及生醫應用之研究”自然科學簡訊，2014 年 第 26 卷 1 期

Conference Paper & Presentation:

1. Jia-Wei Yeh, Kylan Szeto, Harold G. Craighead, Electrophoretic Stretching of Tethered DNA in Nanoslits, AVS 61st International Symposium & Exhibition, Nov. 9-14, 2014. Baltimore, Maryland, USA. (*Oral Presentation*)
2. K. K. Sriram, Jia-Wei Yeh, Yii-Lih Lin, Yi-Ren Chang, Chia-Fu Chou, Optical Mapping of Transcriptional Factor Binding Sites on Single DNA Molecules Using Nanofluidic Devices, May. 21-23, 2014. Conference on Advances in Microfluidics and Nanofluidics (AMN2014), Academia Sinica, Taiwan.
3. L. Lesser-Rojas, K. K. Sriram, J. W. Yeh, K.T. Liao, C.F. Chou, Nanofluidic devices and electrode nanogaps for single/complex biomolecule analysis, Feb. 7-8. 2014, Pioneer workshop Osaca University, Japen.
4. K. K. Sriram, Jia-Wei Yeh, Yii-Lih Lin, Yi-Ren Chang, Chia-Fu Chou, Optical Mapping of Transcriptional Factor Binding Sites on Single DNA Molecules Using Nanofluidic Devices, Oct. 28- Nov. 1, 2012 MicroTas2012 (The 16th International Conference on Miniaturized Systems for Chemistry and Life Sciences), Okinawa, Japen.
5. Jia-Wei Yeh, K. K. Sriram, Chia-Fu Chou. “Direct Observation of Tube-Like Motion of Single Molecule DNA in Strongly Confinement Nanoslit” Nov. 17-18 2011 2011. RCAS-ANNA International Conference-Studies of Nano/Bio-Materials using Laser, X-ray, and Single-Molecule Techniques. Academia Sinica, Taiwan. (*The Second Poster Award)*
6. Jia-Wei Yeh, Alessandro Taloni, Yeng-Long Chen, Chia-Fu Chou, “Statics and Dynamics of Stretched Single DNA Molecule Tug-of-War at Micro-Nanofluidic”, March 21-25, 2011. American Physical Society March Meeting, Dallas, USA. (*Oral Presentation*)
7. Jia-Wei Yeh, Alessandro Taloni, Yeng-Long Chen, Chia-Fu Chou, “Statics and Dynamics of Stretched Single DNA Molecule Tug-of-War at Micro-Nanofluidic”, Jan. 25-27, 2011. Annual Meeting of The Physical Society of Republic of China, Taipei, Taiwan (*Oral Presentation*)
8. Jia-Wei Yeh, Alessandro Taloni, Jie-Pen Shen, Yeng-Long Chen, Chia-Fu Chou, Single Molecule Tug-of-War and Confinement-Induced Entropic Recoiling of DNA in Nanoslits, *p216-218*, November 1-5, 2009 MicroTas2009 (The 13th International Conference on Miniaturized Systems for Chemistry and Life Sciences), Jeju, Korea.
9. Jia-Wei Yeh, Alessandro Taloni, Jie-Pen Shen, Yeng-Long Chen, Chia-Fu Chou, “Single Molecule Tug-of-War and Confinement-Induced Entropic Recoiling of DNA in Nanoslits” Jan. 19-21, 2009. Annual Meeting of The Physical Society of Republic of China, Changhua, Taiwan. (*Oral Presentation*)
10. Jia-Wei Yeh, Alessandro Taloni, Jie-Pen Shen, Yeng-Long Chen, Chia-Fu Chou, “Single Molecule Tug-of-War and Confinement-Induced Entropic Recoiling of DNA in Nanoslits” Jan. 5-7, 2009. Conference on Advances in Microfluidics and Nanofluidics, Hung-Kung. (*Oral Presentation*)
11. Jia-Wei Yeh, Jie-Pan Shen, Alessandro Taloni, Der-You Kao, Chih-Ning Cheng, Yeng-Long Chen, Chia-Fu Chou, “Single Molecule Tug-of-War of DNA though Nanoslits” September 15-18, 2008. The 34th MNE08 International Conference, Athens, Greece. (*Oral Presentation*)
12. Jia-Wei Yeh, Jie-Pan Shen, Alessandro Taloni, Der-You Kao, Chih-Ning Cheng, Yeng-Long Chen, Chia-Fu Chou, “Single Molecule Tug-of-War of DNA though Nanoslits” May 21-24, 2008. The 13th Joint Biophysics Conference, Hui-Sun Forest Station, Nantou, Taiwan. *(The Poster Competition Award)*

Invited Talks:

1. Dec.2014, Department of Biomedical and Environmental Science, National Tsing-Hua University, Taiwan
2. Dec.2014, Department of Physics, National Cheng-Kung University, Taiwan.
3. Sep.2013, Department of Applied Physics, Tung-Hai University, Taichung, Taiwan.
4. Sep.2012, Department of Applied Physics, Tung-Hai University, Taichung, Taiwan.

AWARD / GRANT

Awards / Honor:

- 2012, The Gold Award Group Presentation, Asia Nano Camp (ANC), July 6~15, Beijing China.
- 2012, Best Poster Award, International Contest of Applications in Nano/Micro Technology. July 6-9, 2012 at China Science & Technology Museum, Beijing, China.
- 2012, Postdoctoral Fellowship, Academia Sinica, Taiwan. (2 years, declined; 2012 July-Oct.)
- 2012, Research Highlights from Nature Journal.

- 2011, The Second Poster Award, RCAS-ANNA International Conference-Studies of Nano/Bio-Materials using Laser, X-ray, and Single-Molecule Techniques. Nov. 17-18 2011 at Academia Sinica, Taiwan.
- 2011, Best Poster Award, NSC-NSF Bio-Inspired Sensing and Bio-Inspired Actuation (BSBA) Summer Institute, July 11-22, 2011 at NTU, Taipei, Taiwan.
- 2008, The Poster Competition Award, the 13th Joint Biophysics Conference, Nantou, Taiwan.

Grants:

- 2011, Travel scholarship from Ministry of Education, Taiwan.
- 2009, Travel scholarship from National Taiwan University.
- 2009, Travel scholarship from National Science Council (NSC) (Now: Ministry of Science and Technology)
- 2008, Travel scholarship from Academia Sinica.

ACTIVITIES

Scientific Outreach / supervision:

- 2012, Volunteer at Academia Sinica Open day, a festival of educational programs about science.
- 2010-2011, Volunteer teaching service for high school student at Love Network Foundation.
- 2009, Supervised Taiwan Tech Trek undergraduate student, Jonathan Chao, who won *The First Award* of 2009-TTT Academic Conference.

Society Membership:

- Member, American Vacuum Society (AVS).
- Member, American Physical Society (APS).

Boot Camp:

- 2012 Asia Nano Camp (ANC), July 6~15, Beijing, China.
- 2012, Academia Sinica Creative Entrepreneurship Network and Tech Transfer (ASCENT) Boot Camp, Dec. 2011~ May. 2012, Academia Sinica.
- 2011 Taiwan-NSC-NSF Summer Institute on Bio-Inspired Sensing and Bio-Inspired Actuation (BSBA), July 11-22 at NTU, Taipei, Taiwan.

REFERENCES

1. Dr. Harold G. Craighead | School of Applied and Engineering Physics, Cornell University
   Address: School of Applied and Engineering Physics, 212 Clark Hall, Cornell University, Ithaca NY, 14853
   Email: hgc1@cornell.edu | Tel: 1-607-255-8707

2. Dr. Chia-Fu Chou | Institute of Physics, Academia Sinica
   Address: Institute of Physics, Academia Sinica / 128 Sec. 2, Academia Rd., Nankang, Taipei 11529, Taiwan
   Email: cfchou@phys.sinica.edu | Tel: 886-2-2789-6761

3. Dr. Alessandro Taloni | CNR-IENI, Italy
   Address: Via Roberto Cozzi, 53 - 20125 Milano, Italy.
   Email: alessandro.taloni@gmail.com | Tel:39-02-66173-368

4. Dr. Yeng-Long Chen| Institute of Physics, Academia Sinica
   Address: Institute of Physics, Academia Sinica / 128 Sec. 2, Academia Rd., Nankang, Taipei 11529, Taiwan
   Email: yenglong@phys.sinica.edu | Tel: 886-2-2789-6747