

Personal Information

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Education

- 2006 – 2011 PhD, Electrical Engineering, California Institute of Technology (Caltech), USA
- 2002 – 2004 MS, Electro-Optical Engineering, National Taiwan University (NTU), Taiwan
- 1998 – 2002 BS, Electrical Engineering, National Tsing Hua University (NTHU), Taiwan

Scientific Career

- 2024 – present Research Fellow, IAMS, Academia Sinica, Taiwan
- 2022 – present Adjoint Associate Professor, National Taiwan University, Taiwan
- 2019 – 2024 Associate Research Fellow, IAMS, Academia Sinica, Taiwan
- 2012 – 2019 Assistant Research Fellow, IAMS, Academia Sinica, Taiwan
- 2011 – 2012 Postdoc, Max Planck Institute for the Science of Light, Germany

Current Research Activities

Dr. Chia-Lung Hsieh's research focuses on developing novel optical microscope techniques aiming to understand the underlying mechanisms of important biological processes. Motivated by the opportunities offered by noninvasive label-free bioimaging and sensing, his team is devoted to the development of highly sensitive and fast scattering-based interferometric microscopy that facilitates direct visualization of the rapid movements of cell organelles, virus particles, and chromatin within living cells. Employing this cutting-edge microscope technology together with biochemical methods, his team actively explores nanoscale cell dynamics with unparalleled detail. Current research projects include chromatin remodeling in gene transcription and DNA repair, multidimensional characterization of biological nanoparticles, and single-molecule membrane dynamics.

Honors and Awards

- The 20th Tien Te Lee Young Investigator Award, Tien Te Lee Biomedical Foundation, Taiwan (2024)
- Outstanding Award, Chung Hwa Rotary Education Foundation, Taiwan (2023)
- The 20th Y. Z. Hsu Scientific Paper Award, Far Eastern Y. Z. Hsu Science and Technology Memorial Foundation Taiwan (2022)
- The MOST Ta-You Wu Memorial Award, Taiwan (2021)
- The Young Scholars' Creativity Award, Foundation for the Advancement of Outstanding Scholarship, Taiwan (2020)
- Junior Research Investigator Award, Academia Sinica, Taiwan (2019)
- Career Development Award, Academia Sinica, Taiwan (2017)

Scientific and Community Services

- Convener, Public Affairs Committee, Physical Society of Taiwan (2024—present)
- Board member, Physical Society of Taiwan (2024—present)
- Member, Academic Exchange and Cooperation Committee, Academia Sinica (2023—present)

- Organizer for Single Cell Biophysics & Super-resolution Microscopy Symposium, the 11th International Conference on Biological Physics (ICBP), Seoul, Korea (2023)
- Editorial Board Member of npj Biological Physics and Mechanics (2023—present)
- Editorial Board Member of Journal of Physics D: Applied Physics (2018—present)
- Publication Committee member of Biophysical Society (2021—present)
- Guest Editor of Special Issue on iSCAT microscopy in JPhysD (2020)

Selected Invited Presentations

Subgroup meeting of Membrane Structure and Function, the Annual Meeting of the Biophysical Society, Philadelphia, USA (February 2024); Photothermal Microscopy and Spectroscopy Webinar, Univ. Leipzig, Germany & Univ. Leiden, Netherland (October 2023); The 11th International Conference on Biological Physics (ICBP), Seoul, Korea (August 2023); Photonics & Electromagnetics Research Symposium (PIERS), Prague, Czech Republic (July 2023); The 15th Asia Pacific Physics Conference (APPC 15), online conference (August 2022); Optics & Photonics International Congress (OPIC) 2021, BISC Satellite in Taiwan (April 2021); Virtual Workshop on Interferometric Scattering Microscopy, Erlangen, Germany (May 2020); SPIE Photonics West, San Francisco, USA (Feb. 2019); The 79th JSAP Autumn Meeting, Nagoya, Japan (Sep. 2018); International workshop on biological membranes, Helsinki, Finland (Aug. 2018); Biomedical Imaging and Sensing Conference 2018 (BISC'18), SPIE Structured Light, Yokohama, Japan (Apr. 2018); The 55th annual meeting of the biophysical society of Japan, Kumamoto, Japan (Sep. 2017); The 24th Congress of the International Commission for Optics (ICO-24), Tokyo, Japan (Aug. 2017).

Publications

BOOK CHAPTERS

2. Hsieh CL, "Label-free, ultrahigh-speed direct imaging of bio-nanoparticles in live cells by coherent brightfield (COBRI) microscopy," *Label-free superresolution microscopy*, Springer, ISBN 978-3-030-21722-8 (2019).
1. Pu Y, Hsieh CL, Grange R, Psaltis D, "Harmonic Holography," *Advances in Imaging and Electron Physics*, 160, February (2010). ISSN 1076-5670, DOI: 10.1016/S1076-5670(10)60003-1.

JOURNAL PAPERS (*corresponding author)

23. Brooks NJ, Liu CC, Hsieh CL*, "Point spread function engineering for spiral phase interferometric scattering microscopy enables robust 3D single-particle tracking," *ACS Photonics* ASAP (2024).
22. Hsiao YT, Liao IH, Wu BK, Chu HP, Hsieh CL*, "Probing chromatin condensation dynamics in live cells using interferometric scattering correlation spectroscopy," *Communications Biology* 7: 763 (2024).
21. Astratov VN, Sahel YB, Eldar YC, Huang L, Ozcan A, Zheludev N, Zhao J, Burns Z, Liu Z, Narimanov E, Goswami N, Popescu G, Pfitzner E, Kukura P, Hsiao YT, Hsieh CL, Abbey B, Diaspro A, LeGratiet A, Bianchini P, Shaked NT, Simon B, Verrier N, Debailleul M, Haeberlé O, Wang S, Liu M, Bai Y, Cheng JX, Kariman BS, Fujita K, Sinvani M, Zalevsky Z, Li X, Huang GJ, Chu SW, Tzang O, Hershkovitz D, Cheshnovsky O, Huttunen MJ, Stanciu SG, Smolyaninova VN, Smolyaninov II, Leonhardt U, Sahebdivan S, Wang Z, Luk'yanchuk B, Wu L, Maslov AV, Jin B, Simovski CR, Perrin S, Montgomery P, Lecler S, "Roadmap on label-free super-resolution imaging," *Laser & Photonics Reviews* 17(12): 2370055 (2023).

20. Hsiao YT, Wu TY, Wu BK, Chu SW, Hsieh CL*, "Spinning disk interferometric scattering confocal microscopy captures millisecond timescale dynamics of living cells," *Optics Express* 30(25), pp. 45233-45245 (2022).
19. Hsiao YT, Tsai CN, Cheng CY, Hsieh CL*, "Molecularly specific and functional live cell imaging by label-free interference microscopy," *ACS Photonics*, 9(7), 2237-2245 (2022).
18. Chai YJ, Cheng CY, Liao YH, Lin CH, Hsieh CL*, "Heterogeneous nanoscopic lipid diffusion in the live cell membrane and its dependency on cholesterol," *Biophysical Journal*, 121(16), 3146-3161 (2022).
17. Hsiao YT, Tsai CN, Chen TH, Hsieh CL*, "Label-free dynamic imaging of chromatin in live cell nuclei by high-speed scattering-based interference microscopy," *ACS Nano*, 16(2), 2774 (2022).
16. Cheng CY, Liao YH, Hsieh CL*, "Dynamic signal of live biological cells under interferometric scattering (iSCAT) microscopy and its impact to single-particle tracking," *J. Phys. D: Appl. Phys.*, 54, 364001 (2021).
15. Huang YC, Chen TH, Juo JY, Chu SW, Hsieh CL*, "Quantitative imaging of single light-absorbing nanoparticles by widefield interferometric photothermal microscopy," *ACS Photonics*, 8(2), pp. 592-602 (2021).
14. Wong WC, Juo JY, Liao YH, Cheng CY, Lin CH, Hsieh CL*, "Characterization of single protein dynamics in cell plasma membrane derived polymer cushioned lipid bilayers," *J. Phys. Chem. B*, 123(30), pp. 6492-6504 (2019).
13. Liao YH, Lin CH, Cheng CY, Wong WC, Juo JY, Hsieh CL*, "Monovalent and oriented labeling of gold nanoprobe for the high-resolution tracking of a single membrane molecule," *ACS Nano*, 13(10), 10918-10928 (2019).
12. Hsieh FJ, Sotoma S, Lin HH, Cheng CY, Yu TY, Hsieh CL, Lin CH*, Chang HC*, "Bioorthogonal fluorescent nanodiamonds for continuous long-term imaging and tracking of membrane proteins," *ACS Applied Materials & Interfaces*, 11(22), pp. 19774-19781 (2019).
11. Cheng CY, Liao YH, Hsieh CL*, "High-speed imaging and tracking of very small single nanoparticles by contrast enhanced microscopy," *Nanoscale*, 11, pp. 568-577 (2019).
10. Lyman E*, Hsieh CL, Eggeling C, "From dynamics to membrane organization: Experimental breakthroughs occasion a "modeling manifesto", " *Biophysical Journal*, 115, pp. 595-604 (2018).
9. Hsieh CL*, "Label-free, ultrasensitive, ultrahigh-speed scattering-based interferometric imaging," *Optics Communications*, 422, pp. 69-74 (2018).
8. Cheng CY, Hsieh CL*, "Background estimation and correction for high-precision localization microscopy," *ACS Photonics*, 4(7), pp. 1730-1739 (2017).
7. Pham MD, Epperla CP, Hsieh CL, Chang W, Chang HC*, "Glycosaminoglycans-specific cell targeting and imaging using fluorescent nanodiamonds coated with viral envelope proteins," *Analytical Chemistry*, 89(12), pp. 6527-6534 (2017).
6. Huang YF, Zhuo GY, Chou CY, Lin CH, Hsieh CL*, "Label-free, ultrahigh-speed, 3D observation of bidirectional and correlated intracellular cargo transport by coherent brightfield microscopy," *Nanoscale*, 9, pp. 6567-6574 (2017).
5. Huang YF, Zhuo GY, Chou CY, Lin CH, Chang W, Hsieh CL*, "Coherent brightfield microscopy provides the spatiotemporal resolution to study early stage viral infection in live cells," *ACS Nano*, 11(3), pp. 2575-2585 (2017).
4. Lee JM, Lim JA, Yen TC, Lee IH, Ahn B, Lee Y, Hsieh CL, Kim HM, Jung Y*, "A rhizavidin monomer with nearly multimeric avidin-like binding stability against biotin conjugates," *Angewandte Chemie*, 55(10), pp. 3393-3397 (2016).

3. Wu HM, Lin YH, Yen TC, [Hsieh CL](#)*, "Nanoscopic substructures of raft-mimetic liquid-ordered membrane domains revealed by high-speed single-particle tracking," *Scientific Reports* 6:20542 (2016).
2. Lin YH, Chang WL, [Hsieh CL](#)*, "Shot-noise limited localization of single 20 nm gold particles with nanometer spatial precision within microseconds," *Optics Express*, 22(8), pp. 9159-9170 (2014).
1. [Hsieh CL](#), Spindler S, Ehrig J, Sandoghdar V*, "Tracking single particles on supported lipid membranes: multimobility diffusion and nanoscopic confinement," *J. Phys. Chem. B*, 118(6), pp. 1545–1554 (2014).

CONFERENCE PAPERS AND PROCEEDINGS

8. Hsiao YT, Tsai CN, [Hsieh CL](#), "Label-free imaging of cell nucleus dynamics by coherent brightfield (COBRI) microscopy," *Proceedings of SPIE* 11925, Biomedical Imaging and Sensing Conference, 1192519 (2021).
7. Huang YC, Chen TH, Juo JY, Chu SW, [Hsieh CL](#), "Quantitative absorption imaging of single nanoparticles by widefield interferometric photothermal microscopy," *Proceedings of SPIE* 11925, Biomedical Imaging and Sensing Conference, 1192518 (2021).
6. Wong WC, Juo JY, Lin CH, Liao YH, Cheng CY, [Hsieh CL](#), "Single protein dynamics in polymer-cushioned lipid bilayers derived from cell plasma membranes," *Biophysical Journal* 118 (3) p233a (2020).
5. Liao YH, Lin CH, Cheng CY, Wong WC, Juo JY, [Hsieh CL](#), "Monovalent labeling of gold nanoprobe for ultrafast tracking of single-membrane molecules in live cells," *Biophysical Journal* 118 (3) p233a (2020).
4. Liao YH, [Hsieh CL](#), "Coherent brightfield (COBRI) microscopy for ultrahigh-speed single particle tracking on lipid bilayer membranes," *Proceedings of SPIE* 10711, Biomedical Imaging and Sensing Conference, 1071105 (2018).
3. Wu HM, Lin YH, Yen TC, [Hsieh CL](#), "Nano-substructures of raft mimetic liquid-ordered membrane domains revealed by high-speed single-particle tracking," *Biophysical Journal* 110 (3) p568a (2016).
2. Lin YH, Wu HM, [Hsieh CL](#), "High-speed single-particle tracking: application to molecular diffusion in biological membranes," *Optics in the Life Sciences*, paper NM3C.4 (2015).
1. Lin YH, Wu HM, [Hsieh CL](#), "High-speed single-particle tracking reveals lipid dynamics in heterogeneous raft-containing membranes," *Biophysical Journal* 108 (2) p79a (2015).

NEWS AND VIEWS

2. [Hsieh CL](#), "Ultrahigh-speed imaging reveals nanoscopic single-molecule dynamics," *SPIE Newsroom*, Biomedical Optics & Medical Imaging Section (2017). DOI: 10.1117/2.1201611.006731
1. [Hsieh CL](#), "在顯微鏡下拍一場高速電影：透過慢動作重播窺探生物系統的奈米世界" 物理雙月刊 38 卷 6 期 pp.21-26, (2016).