

# Chia-Lung Hsieh (謝佳龍)

## PERSONAL INFO

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## PROFESSIONAL EXPERIENCE

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2019 – present Associate Research Fellow, Institute of Atomic and Molecular Sciences (IAMS), Academia Sinica, Taiwan

2022 – present Associate Professor, National Taiwan University, Taiwan

2012 – 2019 Assistant Research Fellow, IAMS, Academia Sinica, Taiwan

2011 – 2012 Postdoc, Max Planck Institute for the Science of Light, Germany

## EDUCATION

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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

## SYNERGISTIC ACTIVITIES

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Editorial Board Member of Journal of Physics D: Applied Physics (2018 – present)

Gust Editor of Special Issue on iSCAT microscopy in JPhysD (2020 – present)

Publication Committee member of Biophysical Society (2021 – present)

## HONORS & AWARDS

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2022 The 20<sup>th</sup> Y. Z. Hsu Scientific Paper Award, Far Eastern Y. Z. Hsu Science and Technology Memorial Foundation (Taiwan)

2021 The MOST Ta-You Wu Memorial Award (Taiwan)

2020 The Young Scholars' Creativity Award, Foundation for the Advancement of Outstanding Scholarship

2019 Junior Research Investigator Award, Academia Sinica (Taiwan)

2017 Career Development Award, Academia Sinica (Taiwan)

## SELECTED INVITED TALKS (in the past 5 years)

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1. "Label-free imaging of chromatin organization and dynamics in live cell nuclei by interference microscopy," **invited talk**, The 15<sup>th</sup> Asia Pacific Physics Conference (APPC 15), online conference (August 2022).
2. "Quantitative absorption imaging by widefield interferometric photothermal microscopy," **invited talk**, Photothermal Microscopy and Spectroscopy Webinar, Univ. Leipzig, Germany & Univ. Leiden, Netherland (June 2021).
3. "Coherent brightfield microscopy: iSCAT microscopy in transmission," **invited talk**, Virtual Workshop on Interferometric Scattering Microscopy, Erlangen, Germany (May 2020).
4. "Ultrahigh-speed single-particle tracking by interferometric scattering (iSCAT) microscopy," **invited talk**, SPIE Photonics West, San Francisco, USA (Feb. 2019).
5. "High-speed imaging and tracking of very small nanoparticles by coherent brightfield (COBRI) microscopy," **invited talk**, the 79<sup>th</sup> JSAP Autumn Meeting, Nagoya, Japan (Sep. 2018)

## REVIEWING ACTIVITIES (in the past 5 years)

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Chemical Reviews, Nature Methods, Nature Protocols, ACS Nano, Nature Communications, Nanoscale, Optica, Nanophotonics, Nano Letters, Small, ACS Photonics, Biophysical Journal, Optics Letters, Chemical Science, Langmuir, Analytical Chemistry, Journal of Physical Chemistry.

## PUBLICATIONS

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### 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)

32. 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).
31. 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).
30. 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).  
- Recommended in Faculty Opinions
29. 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).
28. 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).
27. 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).
26. Liao YH, Lin CH, Cheng CY, Wong WC, Juo JY, Hsieh CL\*, "Monovalent and oriented labeling of gold nanoprobes for the high-resolution tracking of a single membrane molecule," *ACS Nano*, 13(10), 10918-10928 (2019).  
- Reported by ACS Nano Perspective (Yanqi Yu, Miao Li, Yan Yu. Tracking Single Molecules in Biomembranes: Is Seeing Always Believing? ACS Nano 13 (2019): 10860-10868.)  
- Selected as Significant Research Achievements of Academia Sinica 2019.
25. 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).
24. 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).
23. Lyman E\*, Hsieh CL, Eggeling C, "From dynamics to membrane organization: Experimental breakthroughs occasion a "modeling manifesto", " *Biophysical Journal*, 115, pp. 595-604 (2018).
22. Hsieh CL\*, "Label-free, ultrasensitive, ultrahigh-speed scattering-based interferometric imaging," *Optics Communications*, 422, pp. 69-74 (2018).

21. Cheng CY, Hsieh CL\*, "Background estimation and correction for high-precision localization microscopy," **ACS Photonics**, 4(7), pp. 1730-1739 (2017).
  20. 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).
  19. 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).
  18. 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).
    - Selected as Significant Research Achievements of Academia Sinica 2017.
    - Reported by Biomedical Advances (ISSN 2573-0355)
    - Reported by X-MOL (Analytical Chemistry)
    - Reported by 研之有物 "粒子跑再快也拍得到! 超高速光學顯微影像技術"
  17. 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).
  16. 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).
  15. 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).
  14. 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).
- Joining IAMS -----
13. Yang X, Pu Y, Hsieh CL, Ong CA, Psaltis D, Stankovic KM\*, "Two photon microscopy of the mouse cochlea in situ for cellular diagnosis," **Journal of Biomedical Optics**, 18(3): 31104 (2012).
  12. Yang X, Hsieh CL, Pu Y\*, Psaltis D, "Three-dimensional scanning microscopy through turbid media," **Optics Express**, 20(3), pp. 2500-2506 (2012).
  11. Grange R\*, Lanvin T, Hsieh CL, Pu Y, Psaltis D, "Imaging with second-harmonic radiation probes in living tissue," **Biomedical Optics Express**, 2(9), pp. 2532-2539 (2011).
  10. Hsieh CL\*, Pu Y, Grange R, Laporte G, Psaltis D, "Imaging through turbid layers by scanning the phase conjugated second harmonic radiation from a nanoparticle," **Optics Express**, 18, pp. 20723-20731 (2010).
  9. Hsieh CL\*, Pu Y, Grange R, Psaltis D, "Digital phase conjugation of second harmonic radiation emitted by nanoparticles in turbid media," **Optics Express** 18, pp. 12283-12290 (2010).
  8. Hsieh CL\*, Pu Y, Grange R, Psaltis D, "Second harmonic generation from nanocrystals under linearly and circularly polarized excitations," **Optics Express** 18, pp. 11917-11932 (2010).
  7. Pu Y\*, Grange R, Hsieh CL, Psaltis D, "Nonlinear optical properties of core-shell nanocavities for enhanced second-harmonic generation," **Physical Review Letters**, 104, 207402, May (2010).
  6. Hsieh CL\*, Grange R, Pu Y, Psaltis D, "Bioconjugation of barium titanate nanocrystals with immunoglobulin G antibody for second harmonic radiation imaging probes," **Biomaterials**, 31, 2272, January (2010).

5. Wen YC, Hsieh CL, Lin KH, Chen HP, Chin SC, Hsiao CL, Lin YT, Chang CS, Chang YC, Tu LW, and Sun CK\*, "Specular scattering probability of acoustic phonons in atomically flat interfaces," *Physical Review Letters*, 103, 264301, (2009).
4. Grange R\*, Choi JW, Hsieh CL, Pu Y, Magrez A, Smajda R, Forro L, Psaltis D, "Lithium niobate nanowires: synthesis, optical properties and manipulation," *Applied Physics Letters*, 95, 143105, (2009).
3. Hsieh CL\*, Grange R, Pu Y, Psaltis D, "Three-dimensional harmonic holographic microscopy using nanoparticles as probes for cell imaging," *Optics Express*, 17, pp. 2880-2891, (2009); Virtual Journal for Biomedical Optics (VJBO), April (2009).
2. Yu CT, Lin KH, Hsieh CL, Pan CC, Chyi JI, and Sun CK\*, "Generation of frequency tunable nano-acoustic-waves by optical coherent control," *Applied Physics Letters*, 87(9), 093114 (2005); Virtual Journal of Ultrafast Science, 4(9), (2005); Virtual Journal of Nanoscale Science and Technology, 12(10), (2005).
1. Hsieh CL, Lin KH, Wu SB, Pan CC, Chyi JI, and Sun CK\*, "Reflection property of nano-acoustic wave at air-GaN interface," *Applied Physics Letters*, 85(20), pp. 4735-4737 (2004); Virtual Journal of Nanoscale Science and Technology, 10(22), (2004); Virtual Journal of Ultrafast Science, 3(12), (2005).

#### CONFERENCE PAPERS AND PROCEEDINGS

13. 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).
12. 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).
11. 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).
10. 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).
9. 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).
8. 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).
7. 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).
6. 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).

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5. Hsieh CL, Grange R, Pu Y, Psaltis D, "Characterization of the cytotoxicity and imaging properties of second-harmonic nanoparticles," *Proceedings of SPIE*, 7759, pp. 77590T (2010).
4. Hsieh CL, Grange R, Pu Y, Psaltis D, "Harmonic holographic microscopy with circularly polarized excitation," *Proceedings of SPIE*, 7367, pp. 73670R (2009).
3. Hsieh CL, Grange R, Pu Y, Psaltis D, "Barium titanate nanoparticles used as second harmonic radiation imaging probes for cell imaging," *Proceedings of SPIE*, 7367, pp. 73670D (2009).
2. Lin KH, Hsieh CL, Yu CT, Pan CC, Chyi JI, Huang SW, Li PC, Keller S, DenBaars SP, and Sun CK, "Generation, Detection, and Propagation of Nano-acoustic waves in Piezoelectric Semiconductor," *Proceedings of SPIE*, 5725, pp.148-156 (2005).

1. Lin KH, [Hsieh CL](#), Liu TM, Keller S, DenBaars SP, Chen GT, Pan CC, Chyi JI, and Sun CK, "Nano ultrasonics: science and technology," *Proceedings of SPIE*, 5352, pp. 101-109 (2004).

#### NEWS AND VIEWS

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2. [Hsieh CL](#), "Ultrahigh-speed imaging reveals nanoscopic single-molecule dynamics," *SPIE Newsroom*, Biomedical Optics & Medical Imaging Section, DOI: 10.1117/2.1201611.006731, (2017).
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).