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EDUCATION

2016-2022	Ph.D. in Physics, National Tsing Hua University, Hsinchu, Taiwan
2014-2016	M.S. in Physics, National Tsing Hua University, Hsinchu, Taiwan
2010-2014	B.S. in Material Science and Engineering, National Tsing Hua University, Hsinchu, Taiwan

RESEARCH EXPERIENCE

❑ **Postdoctoral Researcher** **2022 - present**

Advisors: Prof. Dr. J. Raynien Kwo and Prof. Dr. Minghwei Hong

Project title: Topological insulator-based magnetic heterostructures for novel topological phenomena and spintronic research

- Led investigations in the thin film growth, low-temperature electrical transport, and magnetic properties of magnetic TI $(Bi,Sb)_2Te_3$ trilayers in heterostructure with layered magnet and magnetic garnets, aiming for high-temperature quantum anomalous Hall insulators for dissipationless transport.
- Collaborated with other team members on the low-temperature electrical transport measurement on superconducting materials made of Ta.

❑ **Graduate Student** **2014 - 2022**

Advisors: Prof. Dr. J. Raynien Kwo and Prof. Dr. Minghwei Hong

Ph.D. Thesis: Alpha phase Sn Thin Films: Molecular Beam Epitaxial Growth, Topological Band Structure, and Electrical Transport

- Investigated the thin film growth and the evolution of electronic band structure of *α*-Sn on InSb(001), (111)A, (111)B epilayers, and CdTe/InSb(001) from monolayer to 120 nm thick films.
- Discovered Rashba-like surface states in the Dirac semimetal α-Sn, which provided insights into topological phase transition in collaboration with theoretical physicist colleagues.

M.S. Thesis: Growth of Topological Insulator Thin Films on 2D Materials of Graphene and MoS_2

- Researched the importance of interfacial bonding in van der Waals epitaxy with MBE.
- Achieved better crystal quality and increased mobility by at least two times in layered TI Bi_2Se_3 by growing it on top of a 2D monolayered CVD-grown MoS_2 rather than directly on a sapphire substrate.

SKILLS

- **Thin Film Growth Techniques:** MBE and sputtering
- **Characterization Techniques:**
  - Structural & Surface Analysis: RHEED, LEED, AFM, STM, and XPS
  - Electronic Characterization: ARPES, DC & AC Magnetotransport (PPMS)
  - Magnetic characterization: SQUID magnetometer (MPMS), XMCD
  - Device Fabrication: Photolithography (micron meter size Hall bars)
- **Ultra-High Vacuum (UHV) Techniques:** Portable chamber design and UHV system maintenance

TEACHING & MENTORING EXPERIENCE

- **Teaching Assistant,** Department of Physics, National Tsing Hua University, Taiwan

  General Physics (2013 Fall, 2014 Spring), Special Topics of Nano Physics and Emergent Quantum Matters (2018 Fall)
- **Mentoring Master Students** in Dr. J. Raynien Kwo's group

PUBLICATIONS

1. **K.-H. M. Chen**,* H.-N. Chen,* P.-T. Chen,* T.-R. Chang, S.-F. Lee, M. Hong, and J. Kwo, "Proximity-induced ferrimagnetic-like interfaces in topological insulator heterostructures $Cr_2Ge_2Te_6$/$(Bi,Sb)_2Te_3$/$Eu_3Fe_5O_{12}$", under review (2025).

2. J.-F. Wong,* **K. H. M. Chen**,* J.-M. Chia, Z.-P. Huang, S.-X. Wang, P.-T. Chen, L. B. Young, Y.-H. G. Lin, S.-F. Lee, C.-Y. Mou, M. Hong, and J. Kwo, *"Electrically Sign-Reversible Topological Hall Effect in a Top-Gated Topological Insulator $(Bi,Sb)_2Te_3$ on a Europium Iron Garnet"*, Phys. Rev. B 109, 024432 (2024). *(selected as editor's suggestion)*

3. **K. H. M. Chen**,* K. Y. Lin,* S. W. Lien, S. W. Huang, C. K. Cheng, H. Y. Lin, C.-H. Hsu, T.-R. Chang, C.-M. Cheng, M. Hong, and J. Kwo, *"Thickness-dependent topological phase transition and Rashba-like preformed topological surface states of α-Sn(001) thin films on InSb(001)"*, Phys. Rev. B 105, 075109 (2022).

4. L. U. Liang, Y. H. Yen, C. W. Chou, **K. H. M. Chen**, H. Y. Lin, S. W. Huang, M. Hong, J. Kwo, and Germar Hoffmann, *"Protected long-time storage of a topological insulator"*, AIP Advances 11, 025245 (2021).

5. C. C. Chen, **K. H. M. Chen**, Y. T. Fanchiang, C. C. Tseng, S. R. Yang, C. N. Wu, M. X. Guo, C. K. Cheng, S. W. Huang, K. Y. Lin, C. T. Wu, M. Hong, and J. Kwo, *"Topological insulator Bi_2Se_3 films on rare earth iron garnets and their high-quality interfaces"*, Appl. Phys. Lett. 114, 031601 (2019).

6. K. Y. Lin, H. W. Wan, **K. H. M. Chen**, Y. T. Fanchiang, W. S. Chen, Y. H. Lin, Y. T. Cheng, C. C. Chen, H. Y. Lin, L. B. Young, C. P. Cheng, T. W. Pi, J. Kwo, and M. Hong, *"Molecular beam epitaxy, atomic layer deposition, and multiple functions connected via ultra-high vacuum"*, J. Cryst. Growth 512, 223 (2019).

7. H. Y. Lin, C. K. Cheng, **K. H. M. Chen**, C. C. Tseng, S. W. Huang, M. T. Chang, S. C. Tseng, M. Hong, and J. Kwo, *"A new stable, crystalline capping material for topological insulators"*, APL Materials 6, 066108 (2018).

8. Y. T. Fanchiang, **K. H. M. Chen**, C. C. Tseng, C. C. Chen, C. K. Cheng, S. R. Yang, C. N. Wu, S. F. Lee, M. Hong and J. Kwo, *"Strongly exchange-coupled and surface-state-modulated magnetization dynamics in Bi_2Se_3/yttrium iron garnet heterostructures"*, Nat. Commun. 9, 223 (2018).

9. **K. H. M. Chen**, H. Y. Lin, S. R. Yang, C. K. Cheng, X. Q. Zhang, C. M. Cheng, S. F. Lee, C. H. Hsu, Y. H. Lee, M. Hong and J. Kwo, *"Van der Waals epitaxy of topological insulator Bi_2Se_3 on single layer transition metal dichalcogenide MoS_2"*, Appl. Phys. Lett. 111, 083106 (2017).

10. C. Y. Wang, H. Y. Lin, S. R. Yang, **K. H. M. Chen**, Y. H. Lin, K. H. Chen, L. B. Young, C. K. Cheng, Y. T. Fanchiang, S. C. Tseng, M. Hong and J. Kwo, *"Demonstration of large field effect in topological insulator films via a high-κ back gate"*, Appl. Phys. Lett. 108, 202403 (2016).

*: equal contribution

Total citations: 225, H-index: 6 (from Google Scholar, updated on Dec. 12, 2025)

INVITED TALK/SEMINAR

1. *"Heteroepitaxy of topological materials and their electrical transport properties"*, National Chiayi University, Taiwan, September 26, 2024.

CONFERENCE CONTRIBUTION

1. **K. H. M. Chen**, H. N. Chen, P. Z. Chen, C. H. Hsu, S. F. Lee, M. Hong, and J. Kwo, "*Magnetic proximity-induced anomalous Hall effect in magnetic topological insulator trilayers $Cr_2Ge_2Te_6$/$(Bi,Sb)_2Te_3$/$Eu_3Fe_5O_{12}$*", APS Global Physics Summit 2025, Anaheim, California, USA, March 16-21, 2025. (oral presentation)

2. **K. H. M. Chen**, H. N. Chen, W. N. Chen, J. M. Chia, C. H. Hsu, S. F. Lee, M. Hong, and J. Kwo, "*Van der Waals epitaxy of layered ferromagnet $Cr_2Ge_2Te_6$ and its heterostructure with topological insulator $(Bi,Sb)_2Te_3$*", APS March Meeting 2024, Minneapolis, Minnesota, USA, March 3-8, 2024. (oral presentation)

3. **K. H. M. Chen**, J.-F. Wong, J.-M. Chia, Z.-P. Huang, S.-X. Wang, P.-T. Chen, L. B. Young, Y.-H. Glen Lin, S.-F. Lee, C.-Y. Mou, M. Hong, and J. Kwo, *"Manipulation of the topological Hall effect with electric field in top-gated $(Bi,Sb)_2Te_3$ on EuIG"*, 2023 APS March meeting, Las Vegas, NV, USA, March 5-10, 2023. (oral presentation)

4. **K. H. M. Chen**, H.-N. Chen, Z.-P. Huang, W.-N. Chen, J.-M. Chia, J.-F. Wong, C.-K. Chen, S.-F. Lee, C.-H. Hsu, M. Hong, and J. Kwo, "*Molecular beam epitaxy of van der Waals magnet $Cr_2Ge_2Te_6$ thin films in wafer-scale*", 2023 Annual Meeting of the Physical Society of Taiwan, Tainan, Taiwan, January 16-18, 2023. (Oral presentation)

5. **K. H. M. Chen**, K. Y. Lin, C. K. Cheng, S. W. Huang, C.-H. Hsu, C.-M. Cheng, M. Hong, and J. Kwo, *"Crystal growth and electronic band structures of α-Sn(001) and (111) thin films on InSb*

substrates", 22nd International Conference on Molecular Beam Epitaxy, Sheffield, UK, September 4-9, 2022. (oral presentation)

6. **K. H. M. Chen**, K. Y. Lin, S. W. Huang, C. K. Cheng, H. Y. Lin, S. W. Lian, T. R. Chang, C. M. Cheng, M. Hong, and J. Kwo, *"Evolution of the band structure of α-Sn (001) thin film on InSb(001)"*, Max Planck-POSTECH-Hsinchu Workshop on complex phase materials, Dresden, Germany, September 4-6, 2019. (oral presentation)

7. **K. H. M. Chen**, H. Y. Lin, C. K. Cheng, K. Y. Lin, J. S. Wei, S. W. Huang, S. R. Yang, Y. C. Liu, C. M. Cheng, C. H. Hsu, M. Hong, and J. Kwo, *"High quality topological material α-Sn thin film on InSb(001)"*, 20th International Conference on Molecular Beam Epitaxy, Shanghai, China, September 2-7, 2018. (oral presentation)

8. **K. H. M. Chen**, H. Y. Lin, S. W. Huang, C. K. Cheng, C. H. Hsu, M. Hong, and J. Kwo, *"High quality α-Sn thin film on InSb(001)",* 2018 Annual Meeting of the Physical Society of Taiwan, Taipei, Taiwan, Jan. 24-26, 2018. (poster presentation)

9. **K. H. M. Chen**, H. Y. Lin, C. Y. Wang, S. R. Yang, C. K. Cheng, X. Q. Zhang, Y. H. Lee, M. Hong, and J. Kwo, *"High quality topological insulator thin films grown by molecular beam epitaxy using MoS_2 monolayer as buffer layer"*, (oral presentation) 2016 APS March meeting, Baltimore, MD, USA, March 14-18, 2016.

10. **K. H. M. Chen**, H. Y. Lin, C. Y. Wang, C. K. Cheng, X. Q. Zhang, Y. H. Lee, C. M. Cheng, M. Hong, and J. Kwo, *"The effect of substrates on the material properties of topological insulator films"*, 2015 Annual Meeting of the Physical Society of R. O. C., Hsinchu, Taiwan, Jan. 28-30, 2015. (poster presentation)

AWARDS AND HONORS

- **Best Poster Award,** 2017, 2018, 2019 NTHU-Physics Graduate Student Research Fair
- **TSMC Ph.D. Scholarship,** 2016-2019
- **Poster Award,** 2015 Annual Meeting of the Physical Society of the Republic of China
- **Academic Achievement Award,** 2010, 2011, 2012 top five percent of the class, NTHU-Material Science and Engineering