KO-HSUAN MANDY CHEN

Postdoctoral Researcher
Experimental Condensed Matter Physics

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Experienced material physicist with ten years of expertise in epitaxial thin film growth. Skilled in various material and physical characterization techniques. Passionate about innovations in atomic-scale thin film growth and exploring their properties for future technologies.

SKILLS

- **Experimental Skills:**
  - Thin Film Growth: Molecular beam epitaxy (MBE), and sputtering
  - Structural and surface analysis: RHEED, LEED, AFM, STM, and XPS
  - Electronic characterization: ARPES, DC and AC transport measurements (PPMS with customized measurement setup)
  - Magnetic characterization: SQUID magnetometer (MPMS), XMCD
  - Device fabrication: photolithography
  - Ultra-High Vacuum (UHV) Techniques: chamber design and maintenance
- **Software and Tools:** Origin, Python (Basic), and SolidWorks (Basic)

RESEARCH EXPERIENCE

- **Postdoctoral Research Fellow,**

  Department of Physics, National Tsing Hua University, Taiwan **09/2022-present**

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

  Project: Topological insulator (TI)-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.
  - Discovered and demonstrated an electrically sign-reversible topological Hall effect in magnetic TI

  Project: Study of superconducting materials for high-coherence circuits in quantum computing

  - Characterized the DC electrical transport properties of superconducting Ta thin films

- **Graduate Student, Department of Physics, National Tsing Hua University, Taiwan** **07/2014-08/2022**

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

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

  - Investigated the MBE 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 using both in-house and synchrotron-based ARPES.
  - Discovered Rashba-like surface states in the Dirac semimetal α-Sn, which provided insights into topological phase transition in collaboration with fellow theoretical physicists.

  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 through substrate engineering.

EDUCATION

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

SELECTED PUBLICATIONS

1. K. H. M. Chen, et al., “Proximity-induced ferrimagnetic 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,* et al., “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) *: equal contribution
3. K. H. M. Chen et al., “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. C. C. Chen, K. H. M. Chen, et al., “Topological insulator Bi_2Se_3 films on rare earth iron garnets and their high-quality interfaces”, Appl. Phys. Lett. 114, 031601 (2019). (selected as cover)
5. Y. T. Fanchiang, K. H. M. Chen, et al., “Strongly exchange-coupled and surface-state-modulated magnetization dynamics in Bi_2Se_3/yttrium iron garnet heterostructures”, Nat. Commun. 9, 223 (2018).
6. K. H. M. Chen, et al., “Van der Waals epitaxy of topological insulator Bi_2Se_3 on single-layer transition metal dichalcogenide MoS_2”, Appl. Phys. Lett. 111, 083106 (2017).

Publication summary: 10 SCI papers, total citation: 224, H-index: 6 (updated on Dec. 4, 2025)
Full publication list: https://scholar.google.com/citations?user=K4tAANAAAAAJ&hl=zh-TW

SELECTED PRESENTATIONS

1. ”Heteroepitaxy of topological materials and their electrical transport properties“, National Chiayi University, Taiwan, September 26, 2024. (invited seminar)
2. “Van der Waals epitaxy of layered ferromagnet $Cr_2Ge_2Te_6$ and its heterostructure with topological insulator $(Bi,Sb)_2Te_3$”, 2024 APS March Meeting, Minneapolis, Minnesota, USA, March 3-8, 2024. (contributed talk)
3. “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. (contributed talk)
4. “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. (contributed talk)
5. “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. (contributed talk)
6. “High quality topological insulator thin films grown by molecular beam epitaxy using MoS_2 monolayer as buffer layer”, 2016 APS March meeting, Baltimore, MD, USA, March 14-18, 2016. (contributed talk)

TEACHING AND 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

LEADERSHIP EXPERIENCE

- **President, Astronomy Club**, National Tsing Hua University 2012-2013

AWARDS AND HONORS

- TSMC Ph.D. Scholarship 2016-2019
- Best Poster Award, NTHU-Physics Graduate Student Research Fair 2017, 2018, 2019
- Best Poster Award, Annual Meeting of the Physical Society of the Republic of China 2015
- Academic Excellence Award, National Tsing Hua University 2011, 2012