

Chia-Hao Lee

chiahao3@illinois.edu

<https://www.linkedin.com/in/chia-hao-lee-7410b7135/>

EDUCATION

Ph.D. in Materials Science and Engineering, University of Illinois at Urbana-Champaign IL, U.S.A.

- GPA: 3.83 / 4.00 Aug. 2017– Aug. 2022 (Expected)

M.S. in Materials Science and Engineering, National Taiwan University (NTU) Taipei, Taiwan

- GPA: 4.01 / 4.30 Sept. 2014 – June 2016
- Dissertation: The Growth of Graphene on Nickel Silicide Substrates
- Advisor: Prof. Cheng-Yen Wen

B.S.Eng. in Materials Science and Engineering, National Taiwan University (NTU) Taipei, Taiwan

- GPA: 3.74 / 4.30 (overall), 3.81 / 4.30 (Major) Sept. 2010 – June 2014

RESEARCH EXPERIENCES

<https://chiahao3.github.io/>

Aberration-corrected STEM on defects and heterostructures of 2D materials Aug. 2017 – Aug. 2020

Advisor: Prof. Pinshane Huang

Department of Materials Science and Engineering, University of Illinois at Urbana-Champaign, IL, U.S.A.

- Measured single-atom defects induced strain fields in 2D materials with sub-pm precision via deep learning
- Measured bandgap variation of 2D lateral heterostructures using low-loss STEM-EELS.
- Developed high-throughput, large-area TEM specimen preparation methods of $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+x}$ crystals for ultrafast electron diffraction (UED) experiment at SLAC national accelerator laboratory

High-Quality Graphene Growth on Nickel Silicide Substrates by UHV CVD Jul. 2015 – Aug. 2016

Advisor: Prof. Cheng-Yen Wen

Department of Materials Science and Engineering, National Taiwan University, Taipei, Taiwan

- Designed and built a multifunctional Ultra-High Vacuum Chemical Vapor Deposition system
- Synthesized graphene on atomic-flat, high-quality nickel silicide substrates (Ni_2Si , NiSi , NiSi_2)
- Analyzed the morphology and quality of graphene by TEM, SEM, Auger and Raman spectroscopy

Large-Domain Graphene Growth on Cu by Oxygen-Assisted CVD Jul. 2014 – Jul. 2015

Advisor: Prof. Cheng-Yen Wen

Department of Materials Science and Engineering, National Taiwan University, Taipei, Taiwan

- Reduced the nucleation density of graphene grown on Cu by 1000 times with oxide passivating layer
- Increased the carrier mobility of graphene-based transistors by a factor of 6 by oxygen-assisted CVD

TEM Assistant Operator Jul. 2014 – Jul. 2016

Department of Materials Science and Engineering, National Taiwan University, Taipei, Taiwan

- Assisted dozens of users to obtain high quality TEM images, diffraction patterns or EDS data
- Trained more than 10 TEM beginners

PUBLICATION AND PRESENTATIONS

Journal Article:

- **C.-H. Lee**, A. Khan, D. Luo *et al.*, “Deep Learning Enabled Strain Mapping of Single-Atom Defects in Two-Dimensional Transition Metal Dichalcogenides with Sub-Picometer Precision”, *Nano Letters*, 2020, DOI: [10.1021/acs.nanolett.0c00269](https://doi.org/10.1021/acs.nanolett.0c00269)
- J. Finley, **C.-H. Lee**, P. Y. Huang *et al.*, “Spin-Orbit Torque Switching in a Nearly Compensated Heusler Ferrimagnet”, *Advanced Materials*, 2018, DOI: [10.1002/adma.201805361](https://doi.org/10.1002/adma.201805361)
- R. J. Chang, **C.-H. Lee**, M. K. Lee *et al.*, “Effects of Surface Oxidation of Cu substrates on the Growth Kinetics of Graphene by Chemical Vapor Deposition”, *Nanoscale*, 2017, DOI: [10.1039/C6NR09341H](https://doi.org/10.1039/C6NR09341H)

Oral Presentation:

- **C.-H. Lee**, A. Khan, D. Luo *et al.*, "Detecting Vacancy-Induced Strain Field Oscillations via Deep Learning" *Microscopy & Microanalysis 2020 Meeting, Milwaukee, WI, U.S.A., 2020.*
- **C.-H. Lee**, C. Shi, D. Luo *et al.*, "Deep Learning Enabled Measurements of Single-Atom Defects in 2D Transition Metal Dichalcogenides with Sub-Picometer Precision" *2019 Materials Research Society (MRS) Fall Meeting, Boston, MA, U.S.A., 2019.*
- **C.-H. Lee**, C. Shi, D. Luo *et al.*, "Deep Learning Enabled Measurements of Single-Atom Defects in 2D Transition Metal Dichalcogenides with Sub-Picometer Precision" *Microscopy & Microanalysis 2019 Meeting, Portland, OR, U.S.A., 2019.*
- R. J. Chang, **C.-H. Lee**, Z. C. Luo *et al.*, "Controlling the Nucleation Density of Graphene on Copper Substrates in Chemical Vapor Deposition Growth" *9th International Conference on New Diamond and NanoCarbons, Shizuoka, Japan, 2015.*

Poster Presentation:

- **C.-H. Lee**, and C. Y. Wen, "CVD Growth of Graphene on Various Nickel Silicide Substrates" *Annual Conference of Microscopy Society of Taiwan, Taiwan, 2016.*

AWARDS

- | | |
|--|-----------|
| Student Scholar Award of 2020 Microscopy and Microanalysis
2020 M&M conference paper award sponsored by Microanalysis Society (MAS) | Apr. 2020 |
| First Prize, Workshop on Undergraduate Research Project
Student poster competition of Department of Materials Science and Engineering, NTU | June 2014 |
| Silver Prize, Student Poster Competition of the course "Ethics for Engineers Professionals"
Department of Engineering Science and Ocean Engineering, NTU | Jan. 2014 |

RESEARCH SKILLS

Materials Process

- Ultra-High Vacuum Chemical Vapor Deposition (UHVCVD) System
- Magnetron Sputter System, Thermal Evaporator
- Chemical Vapor Deposition Methods for 2D Materials

Characterization Techniques

- Scanning/Transmission Electron Microscopy (S/TEM), TEM sample preparation
- Scanning Electron Microscopy (SEM)
- Auger Electron Spectroscopy (AES)
- X-Ray Diffractometer (XRD)
- Raman Spectroscopy

Computational Skills

- TEM image simulation by Computem
- Deep learning using Python and Keras
- Molecular dynamics simulation by LAMMPS
- First-Principle Calculations by CASTEP (Cambridge Sequential Total Energy Package)