

# Meng-Chi Chen

Leverage machine learning to expedite science research.

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## Education

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Ph.D. student in Electrical Engineering and Computer Science	<b>Massachusetts Institute of Technology</b> (MIT), Cambridge, USA <ul style="list-style-type: none"><li>Nanomaterial and Electronics Group, Advisor: Dr. Jing Kong</li><li>Course highlights: 6.6500 Integrated Microelectronic Devices, 6.S088 Modern Machine Learning, 6.6220 Power Electronics, 6.8610 Quantitative Methods for Natural Language Processing; 6.8300 Advances in Computer Vision; 6.6400 Applied Quantum and Statistical Physics; 6.8711 Computational Systems Biology; 6.7960 Deep Learning.</li></ul>	Sep 2022 — present
M.S. in Chemistry	<b>National Taiwan University</b> (NTU), Taipei, Taiwan <ul style="list-style-type: none"><li>Dean's Award of College of Science.</li><li>Overall GPA = 4.01/4.30 (A = 4.0).</li></ul>	Feb 2018 — Feb 2020
B.S. in Chemistry	<b>National Tsing Hua University</b> (NTHU), Hsinchu, Taiwan <ul style="list-style-type: none"><li>Overall GPA = 3.04/4.30; last year GPA = 3.50/4.30 (A = 4.0).</li></ul>	Sep 2012 — June 2016

## Research Experience

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PhD program research in [Prof. Jing Kong](#)'s Group in, **Massachusetts Institute of Technology**, MA

- Developed an AI-empowered automated system for 2D material image sampling and scoring to enhance CVD process control and characterization in semiconductor research.
  - Engineered a comprehensive automation solution from software, firmware, to hardware leveraging python, microcontroller, and linear motion system.
  - Implemented machine learning techniques for the optimization of 2D material synthesis, including recipe optimization and analysis of Raman and photoluminescence spectra.
  - Developed computer vision technique to precisely determine rotational angles ( $0.1^\circ$ - $5^\circ$ ) for 2D material heterostructure fabrication without expensive hardware modifications.
- Dec 2022 — Present

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Master program research in [Prof. Pi-Tai Chou](#)'s Group in Physical Chemistry, Material, and Chemical Biology, **National Taiwan University**, Taiwan

- Thesis title: Rudimentary photophysical property of selected 3-substituted phenothiazines.
  - Explored the photophysical property of 3-substituted phenothiazine and fluorescent nitro compound with steady-state and time-resolved spectroscopy.
  - Used a computational approach with time-dependent density function for molecular geometry, oscillation strength, and transition wavelength.
  - PbS quantum dot synthesis using hot-injection method, fluorescent quantum yield measurement, and morphology characterization for infrared fluorescent applications.
- Feb 2018 — Aug 2020

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Summer exchange researcher in [Prof. Jan Kleissl](#)'s Kleissl Solar Resource Assessment and Forecasting Lab, **University of California, San Diego**, CA

- Research topic: Cloud Shadow Speed Sensor — The Future of Solar Forecast Technology.
  - Analyzed weather data from fisheye all sky camera.
  - Utilized Microcontroller programming, fail safe bypass system design and wiring for Cloud shadow speed sensor aimed for desert operation.
  - Designed and construction of Arduino weather monitoring systems for solar forecasting.
- Jul 2014 — Aug 2014

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Undergraduate research in [Prof. Jer-Shing Huang](#)'s Group in Nanooptics, Plasmonics, Microscopy, and Applied Spectroscopy, **National Tsing Hua University**, Taiwan

- Thesis title: Sorting Self-assembled Single-crystalline Gold Microplates by Eddy Current.
  - Sorted eddy currents of self-assembled single-crystalline gold microplates with time-variant magnetic field created by magnets rotor assembly.
  - Synthesized gold nanoparticles and gold microplates by controlled reduction of hydrogen tetrachloroaurate precursor.
  - Designed and fabricated electric circuits for DC motor speed control system for the magnetic rotor assembly.
- Apr 2013 — Aug 2016



## Publication and Presentations

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Zhien Wang, Haozhe Wang, Roman Caudillo, Jiangtao Wang, Zhenjing Liu, Alexandre Foucher, Ji-Hoon Park, **Meng-Chi Chen**, Ang-yu Lu, Peng Wu, Jiadi Zhu, Xudong Zheng, Tymofii S. Pieshkov, Steven A. Vitale, Yimo Han, Frances M. Ross, Iwnetim I. Abate, Jing Kong. Interfacial Oxidation of Metals on Graphene. *ACS Applied Nano Materials*, 2024, 7(21), 24537-24546. DOI: [10.1021/acsanm.4c04283](https://doi.org/10.1021/acsanm.4c04283)

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**Meng-Chi Chen**, Deng-Gao Chen, Pi-Tai Chou. Fluorescent Chromophores Containing the Nitro Group: Relatively Unexplored Emissive Properties. *ChemPlusChem*, 2021, 86, 11-27. DOI: [10.1002/cplu.202000592](https://doi.org/10.1002/cplu.202000592)

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**Meng-Chi Chen**, Yao-Lin Lee, Zhi-Xuan Huang, Deng-Gao Chen, Pi-Tai Chou. Tuning Electron-withdrawing Strength on Phenothiazine Derivatives: Achieving 100% Photoluminescence Quantum Yield by -NO<sub>2</sub> substitution. *Chemistry – A European Journal*, 2020, 26(31) 7124-7130. DOI: [10.1002/chem.202000754](https://doi.org/10.1002/chem.202000754)

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Deng-Gao Chen, Yi Chen, Cheng-Ham Wu, Yi-An Chen, **Meng-Chi Chen**, Jia-An Lin, Chun-Ying Huang, Jianhua Su, He Tian, Pi-Tai Chou. *Phenothiazine Scope: Steric Strain Induced Planarization and Excimer Formation*. *Angewandte Chemie*, 2019, 131(38), 13431-13435. DOI: [10.1002/anie.201906083](https://doi.org/10.1002/anie.201906083)

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Yi Chen, Deng-Gao Chen, Yi-An Chen, Cheng-Ham Wu, Kai-Hsin Chang, Fan-Yi Meng, **Meng-Chi Chen**, Jia-An Lin, Chun-Ying Huang, Jianhua Su, He Tian, Prof. Pi-Tai Chou. *Mono-Heteroatom Harnessing Excited-state Structural Planarization for Dihydrodibenzo[a,c] phenazines*. *Chemistry – A European Journal*, 2019, 25(72), 16755-16764. DOI: [10.1002/chem.201904900](https://doi.org/10.1002/chem.201904900)

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Paramaguru Ganesan, Deng-Gao Chen, Wen-Cheng Chen, Premkumar Gnanasekaran, Jia-An Lin, Chun-Ying Huang, **Meng-Chi Chen**, Chun-Sing Lee, Pi-Tai Chou, and Yun Chi. *Methoxy substituents activated carbazole-based boron dimesityl TADF emitters*. *Journal of Material Chemistry C*, 2020, 8, 4780-4788. DOI: [10.1039/C9TC07020F](https://doi.org/10.1039/C9TC07020F)

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Gave talk titled “*Sorting Self-Assembled Single-crystalline Gold Microplates by Eddy Current*” at the 9<sup>th</sup> International Conference on Nanophotonics (ICNP 2016) held at Academia Sinica, Taiwan, Mar 23, 2016.

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Gave talk and received Outstanding presenter award titled “*Cloud Shadow Speed Sensor — The Future of Solar Forecast Technology*” in 2014 UCSD Summer Research Conference held at UC San Diego, Aug 14, 2014.

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## Work Experience

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### Machine Learning and Circuit Design Intern

Synopsys Inc ([synopsys.com](https://www.synopsys.com))

May 2025 — Aug 2025

- Developed a Circuit Foundation Model (CFM) for VLSI circuits using Recurrent Hypergraph Neural Networks (RHGN), representing circuits as hypergraphs to generate embeddings for devices, wires, and terminals based on their connectivity.
  - Designed and implemented advanced message-passing (“hopping”) algorithms to recursively capture and aggregate connection information across circuit components, enabling robust circuit representation learning.
  - Built modular utilities—including a TrainingRecorder for loss tracking, ConfigManager for centralized hyperparameter management, and ResourceManager for real-time memory/CPU monitoring—to streamline and maintain complex training workflows.
  - Automated the visualization of neural network weights and biases at each training epoch, producing interpretable heatmaps and GIFs to understand model attention, enhance model transparency (explainable AI) and facilitate diagnostics.
  - Engineered custom loss functions and evaluation metrics (including confusion matrices, precision, recall, and F1-score) to effectively address severe class imbalance and improve model performance assessment.
  - Developed scalable data ingestion and preprocessing pipelines capable of handling large-scale circuit datasets, supporting flexible batch training and efficient experimentation.
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### Teaching Assistant

Massachusetts Institute of Technology

(Prof. Akintunde Akinwande, Prof. Suraj Cheema;

Adam Hartz, Prof. Hae-Seung Lee)

Jan 2025 — May 2025

Sep 2025 — Jan 2026

6.2500 Nanoelectronics and Computing Systems

- Graded assignments and provided detailed feedback on students’ circuit analyses.
  - Conducted recitations and office hours to reinforce semiconductor and device concepts.
  - Code python simulation and visualization for band diagram and semiconductor properties.
  - Guided final design projects using Synopsys Sentaurus TCAD, mentoring students on device simulation and data interpretation.
  - Collaborated with instructors in weekly meetings to refine teaching materials and exam.
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6.2000 Electrical Circuits: Modeling and Design of Physical Systems

- Supported hands-on circuit and microcontroller labs; troubleshoot and debugged student circuits during experiments.
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- Assisted in writing homework solutions and contribute exam questions.
  - Communicated effectively with diverse student groups with proficiency and approachability.

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**Process Integration Engineer**

Micron Technology, Inc. ([micron.com](http://micron.com))

E2: Jun 2021 — Oct 2021

E1: Sep 2020 — Jun 2021

- Coordinate manufacturing areas for production line problem solving, process margin enlargement, and yield enhancement, increasing revenue and reducing cost.
- Solving word line broken issue of DRAM at FEOL caused by defect-induced block etching, using N<sub>2</sub> purge loading port to prevent defects from outgas condensation of the previous process.
- Use 6-month specification-to-yield graph to identify and solve contacts short issue of DRAM at MOL which arose from narrow overlay window.
- Created data visualization with SQL and Tableau to automatically highlight inline control charts' deviation and shift out of thousands, saving our department roughly six hours per engineer per week.
- Constructed hourly update control table allowing every production area to input impacted product and risk level during a major fab event, providing live loss estimation and yield loss projection in future weeks.
- Developed conversion plan management system that monitors every engineer's experiment on the production line to provide daily update email on status, in-line metrology data, and expected final probe test date, streamlining cross-platform results.
- Write 8D report and provide CAPA (corrective action and preventive action) for root-cause analysis on production issue and participate 8D report discussion with different department on RMA (returned merchandise administration).

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**Founder** of test prep institute for master entrance exam  
Chemistry Chi Chi

Sep 2020 — Sep 2021

- Founded and operated a private test prep institute focused on chemistry entrance exams for master's programs.
- Conducted market research to select a location within budget, oversaw renovation and interior design of the classroom space.
- Developed and delivered comprehensive curriculum covering undergraduate-level organic, inorganic, physical, and analytical chemistry, along with test-taking strategies.
- Applied evidence-based learning frameworks such as the Ebbinghaus forgetting curve, Dunning-Kruger effect, Eisenhower Matrix, and Pareto principle (80/20 rule) to optimize educational outcomes.
- Led marketing and outreach by connecting with alumni networks and establishing an official website to attract and retain students.
- Invited guest lecturers from top graduate programs to present on research topics and offer insights into graduate study and academic careers.
- Provided personalized academic consultations, offering both subject guidance and strategic career advice in chemistry-related fields.
- Managed all aspects of the business, including curriculum planning, instruction, marketing, and administration.

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**Teacher** of undergraduate chemistry

GET ([master.get.com.tw](http://master.get.com.tw))

Jun 2018 — Feb 2019

- Taught organic, inorganic, physical, and analytical chemistry and responded to students' inquiries for private educational institute.
- Designed and graded 10–40 quizzes with detailed solutions to reinforce key concepts and assess student progress.
- Provide prospective chemistry students career counseling.

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**Course TA of General Chemistry, Organic Chemistry I & II**

(Prof. Chao-Tsen Chen, Tsung-Shing Wang, and Lee-Chiang Lo; Prof. Richard P. Cheng, Sheng-Hsien Chiu, Yi-Tsu Chan; Prof. Mu-Chieh Chang)

Organic Chem: Jun 2018 — Sep 2018

General Chem: Sep 2018 — Jan 2019

- Held TA classes before exams, and extra TA classes as requested by students and answered students' questions.
- Prepared test questions and explanations for exams.
- Prepared quizzes and detailed answers.
- Monitored and graded exams.
- Class size: ~ 75 students (Organic Chem), ~ 150 students (General Chem).

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**Laboratory TA of Analytical Chemistry** (Prof. Che-Chen Chang).

National Taiwan University

Feb 2018 — Jun 2018

- Instructed chemistry lab skills.
- Handled hazardous chemical waste.
- Graded laboratory reports.
- Class size: ~ 30 students.

## Skills

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<b>Language</b>	Mandarin Chinese and Taiwanese: Native English: Fluent Japanese: SFLPT Japanese A1, on May 29, 2011
<b>Instrument</b>	TEM (JEM1230 and T12). NMR (Bruker 400). Fluorescence and single photon counting (FLS980 and FS920). UV-Vis (U3310). Cleanroom techniques, photolithography, PVCVD
<b>Programming</b>	Strongest: Python — building efficient, maintainable ML data pipelines and model training workflows. Automation & Microcontrollers: VBA, Visual Basic, Arduino (C/C++) Systems & Dev Environment: Linux, SSH, Bash/Shell scripting for automation and remote development Simulation: Mathematica, MATLAB Database and Data Visualization: SQL, Tableau Data, Image, and Audio: Origin, ImageJ, Audacity Chemical Modeling: ChemDraw, Chem3D, GaussView, Mercury, Avogadro, Chimera 3D Modeling and Printing: Blender, AutoCAD, UltiMaker Cura Academic Writing: LaTeX, EndNote, Microsoft Office, Design: Adobe Premiere, Photoshop, Illustrator, Animate, Dreamweaver. Website: WordPress, HTML, CSS.

## Achievements

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<b>Excellent Poster Award</b> and <b>Popular Poster Award</b> titled “ <i>Rudimentary photophysical property of selected 3-substituted phenothiazines</i> ” in <i>2020 Graduate Student Poster Exhibition</i> of Department of Chemistry, National Taiwan University.	June 2020
<b>Dean's Award of College of Science</b> , for outstanding master research in National Taiwan University, titled “ <i>Rudimentary photophysical property of selected 3-substituted phenothiazines</i> ”.	May 2020
<b>First Place Award</b> over 17 competitors (2 <sup>nd</sup> stage) in <i>College Student Thesis Competition</i> of the <i>1<sup>st</sup> SPINTECH Technology Thesis Award</i> titled “ <i>Sorting Self-assembled Single-crystalline Gold Microplates by Eddy Current</i> ”, held at Sun Moon Lake, Nantou County, Taiwan, on Nov 28, 2015, with an award of US\$700.	Nov 2015
Completed 16-hour training in the <i>Foundation Course of Nanomaterial Analysis Certification</i> in Center for Nanotechnology, Material Science, and Microsystem, at National Tsing Hua University, Hsinchu, Aug 10-11, 2015.	Aug 2015
Completed 52-hour training course <i>Nano- and Micro- Fabrication Process</i> at the Center for Nanotechnology, Material Science, and Microsystem, at National Tsing Hua University, Hsinchu, Aug 3-7, 2015.	Aug 2015
Special Prize of Industry Application in <i>2015 NCCU X NTUST Hackathon</i> , presented concept for team of four of a circular economy business model based on secondhand cloth selling, dressing discussion social platform along with accessory selling and advertising. National Chengchi University, Taipei, May 15-17, 2015.	May 2015
<b>Outstanding Presenter award</b> titled “ <i>Cloud Shadow Speed Sensor — The Future of Solar Forecast Technology</i> ” in <i>2014 UCSD Summer Research Conference</i> held at UC San Diego, Aug 14, 2014.	Aug 2014
<b>First Place Award</b> in <i>Instrument Technology Training Course for Graduate Students</i> at Instrument Technology Research Center, National Applied Research Laboratories, Taiwan, Jun 24-28, 2013.	Jun 2013

## Leadership

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Volunteer lead in Banana Lounge at MIT. Coordinating banana logistics, organization operation, and volunteer events.	Sep 2023 — June 2024
<b>Study group leader</b> for master program entrance exam. Provided chemistry academic knowledge and led a class of 30 students as well as a group of 7 people.	Jun 2017 — March 2018
<b>Freshmen Consultant</b> , Office of Student Affairs in NTHU. Assisted freshmen in acclimating to university life.	Sep 2014 — June 2016
<b>Vice-President</b> of the Piano Club at National Tsing Hua University.	Aug 2014 — Jan 2015
<b>Leader of Class of 2016</b> , Dept. of Chemistry, National Tsing Hua University. Led department activities, communicated between classmates and department or university officials. and organized group purchases for classmates.	Sep 2012 — June 2016