

Hung-Yu Chen

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RESEARCH INTERESTS

Electronic Device, 2D material, optical sensor, TCAD simulation, spintronic device

EDUCATION

University of Southern California(USC), Los Angeles, CA, Ph.D. student 08/2018-Present

- Major: Electrical and Computer Engineering
- Advisor: Prof. Han Wang

National Taiwan University(NTU), Taipei, Taiwan, Master student 09/2016-06/2018

- Major: Electronics Engineering
- Advisor: Prof. Jenn-Gwo Hwu
- Ranking: 1/151 and Grading: 4.27/4.3

National Chiao Tung University(NCTU), Hsinchu, Taiwan, Bachelor of Science 09/2012-06/2016

- Major: Electrophysics
- Graduate Ranking: 1/28 and GPA: 4.17/ 4.3

RESEARCH EXPERIENCE

Wang's Group, Ming Hsieh Department of Electrical and Computer Engineering Los Angeles, USA
Research Assistant 08/2018 – Present

- Artificial intelligence (AI) driven manufacturing for advanced quantum material (on going)
- FTJ based RF switch with Ansys HFSS simulation (on going)
- Ultrafast switching ferroelectric tunnel junction (FTJ) and RF switch application (on going)
- Multiscale simulation of FTJs: comparison to experiment and performance projection (**published by 2020 IEDM**) (**2nd author**)
- Study of FTJs with CuInP₂S₆ (CIPS) for memory (**published by Nature Electronics**) (**co-first author**)

CV lab, Graduate institute of electronic engineering Taipei, Taiwan
Research Assistant 09/2016-06/2018

- Physical properties and potential application of width modulation of MIS(p) structure
- Photo sensitivity increased by the modulation of oxide thickness in MIS(p) structure (**published by 233rd ECS Meeting**) (**first author**)
- Increasing retention of 2-state operation with remote sensor in MOS structure

Advanced Semiconductor Fabrication and Measurement Laboratory(ASFM), NCTU Hsinchu, Taiwan
Undergraduate Research Assistant 07/2015-01/2016

- Ultrathin polysilicon Tunneling field effect transistor

WORK EXPERIENCE

Teaching Assistant

- Integrated Memory Devices and Technologies (Instructor: Prof. Han Wang) Spring/Fall, 2020
- MOS Capacitor Device (Instructor: Prof. Jenn-Gwo Hwu) Fall, 2017
- General Chemistry Lab (Instructor: Prof. Jui –Lin She) Fall, 2016
- Electronic(III) (Instructor: Prof. Jenn-Fang Chen) Fall, 2013

Internship, Macroblock Hsinchu, Taiwan
Assistant Engineer-A1 07/2014-09/2014

- Studying project of reducing EMC of LED drivers.

ACTIVITIES

Badminton Team of Electrophysics in NCTU Hsinchu, Taiwan
Vice leader 08/2014-06/2015

- Organizing the schedule and activity
- Representing the team for negotiation of badminton court

SKILLS

- Languages: Chinese(native), English(fluent), German(basic)
- Technical:
 - Programming: C/C++(basic), Labview(basic), Matlab(intermediate), python(advanced)
 - Software tool: TCAD Sentaurus, P-Spice, Autocad, Visio, Cadence, Ansys HFSS, Blender, SketchUp

- Experimental tools: Evaporator, Agilent B1500A semiconductor device analyzer, Rapid Thermal Process system, Exposure system, E-line beam lithography, Atomic force microscopy

ACADEMIC PROJECTS

Study of the ferroelectric material and its applications 2018-Present

- Prepared devices with high-quality new materials samples by designed fabrication process.
- Measured and analyzed electrical characteristics of vdW FTJs with resistance to pulse-voltage, capacitance to voltage, and tunneling electroresistance (TER) with different thickness of graphene.
- Analyzed mechanism of TER by comparison in different temperature, Raman spectra, and Kelvin probe force microscopy.
- Studying potential applications with multi-layered ferroelectric with both in-plane polarization and out-of-plane polarization materials device.
- Exploring physics properties and mechanism of applications with the interdisciplinary collaboration.

Study of the coupling effect of MIS(p) structure and its applications: optical sensors and memory 2016-2018

- Studying the high sensitivity with surrounding gate structure and demonstrating oxide thickness modulation intensified the sensitivity.
- Designing new mask with Autocad to investigate properties of variation of width and proposing a model to explain gate width effect on different condition of gate.
- Demonstrating remote controlling 2-state properties on MIS(p) structure and enhanced retention by surrounding gate.

Ultrathin polysilicon Tunneling field effect transistor 2015-2016

- Using ultrathin polysilicon channel to enhance subthreshold swing and demonstrating doping concentration effects of on current.
- By Tcad simulation, confirming oxide thickness can enhance subthreshold swing.

HONORS & AWARDS

YIN CHIN Scholarship, YIN CHIN FOUNDATION OF U.S.A 06/2019

Awarded to 6 students outstanding who study in southern California

Scholarship of Semiconductor manufacturing company (TSMC), (twice) 08/2016-06/2018

Awarded to top 5% students in group related to semiconductor device

College Student Research training fellowship, NCTU 08/2015-01/2016

Awarded to admitted proposal of college student research

President's Award, (five times), NCTU 09/2012-01/2015

Awarded to top 5% students of each department, every semester.

Hsiao-Yuan Li Scholarship, (twice), NCTU 10/2015

Awarded to 2 students outstanding in Electrodynamics course in Electrophysics department at NCTU annually.

PUBLICATIONS

- Ning Yang, Hung-Yu Chen, Jiang-Bin Wu, Tong Wu, Jun Cao, Xi Ling, Han Wang, Jing Guo “**Multiscale Simulation of Ferroelectric Tunnel Junction Memory Enabled by van der Waals Heterojunction: Comparison to Experiment and Performance Projection**” 2020 *IEDM*
- Jiangbin Wu, Hung-Yu Chen, and Han Wang. “**Ultrahigh Tunneling Electroresistance in Ferroelectric Tunneling Junction with Giant Barrier Height Modulation by Monolayer Graphene Contact**” *US Patent Application No.: 63048525*, pending.
- Jiangbin Wu*, Hung-Yu Chen*, Ning Yang, Jun Cao, Xiaodong Yan, Fanxin Liu, Qibin Sun, Xi Ling, Jing Guo, Han Wang. **High Tunnelling Electroresistance in a Ferroelectric van der Waals Heterojunction via Giant Barrier Height Modulation.** *Nature Electronics* **3**, 466 (2020). *Equal contribution.
- Jiangbin Wu, Hung-Yu Chen, Ning Yang, Jun Cao, Xiaodong Yan, Fanxin Liu, Xi Ling, Jing Guo, Han Wang. **Ultrahigh Tunneling Electroresistance in Ferroelectric Van Der Waals Heterojunction with Giant Barrier Height Modulation**, 2020 *MRS Spring Meeting*, oral presentation.
- Hung-Yu Chen and Jenn-Gwo Hwu. **Photo Sensitivity Enhanced by the Modulation of Oxide Thickness in MIS(p) Structure**, *ECS Transactions* **85**, 1441 (2018).
233rd *ECS Meeting*, oral presentation.