NYCU Kuan-Neng Chen's Group

3D IC Integration · Advanced Packaging · Heterogeneous Integration

Prof. Kuan-Neng Chen

- **Dean, International College of Semiconductor Technology**
- **Director, 3D IC Research Center**
- **Chair Professor, Institute of Electronics**

IEEE Fellow | NAI Fellow | IET Fellow | IMAPS Fellow | CIEE Fellow

Ph.D. EE & M.S. Materials Science, MIT

Research Staff Member, IBM T.J. Watson

Selected Honors & Awards

- IEEE EPS Exceptional Technical Achievement Award
- Simon Sze Heritage Lecture, 2025
- NSTC Outstanding Research Award (×2)
- NSTC Futuristic Breakthrough Technology Award (×2)
- National Industrial Innovation Award, MOEA
- Pan Wen Yuan Foundation Outstanding Research Award

Publication Highlights

Recent 5 Years

3	4	12
IEDM	VLSI	IEEE EDL

Career Total

400+	91+
Publications	Patents (US/TW/JP/KR)

➢ Low-Temperature Bonding Technologies

- Cu-Cu direct bonding
- Cu / polymer hybrid bonding
- Cu / dielectric hybrid bonding
- Sub-micron Cu-solder dielectric bonding with ultra-thin buffer layers

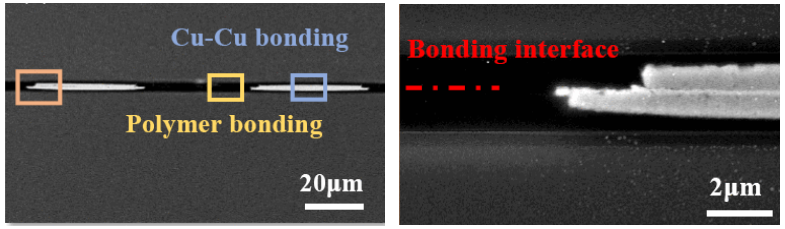
➢ 3D IC Integration & Novel Applications

- Thin-3D wafer-level stacking
- Hyper RDL (HRDL) interposer by layer transfer
- Monolithic 3D IC (M3D)
- Wafer-level bumpless interconnect

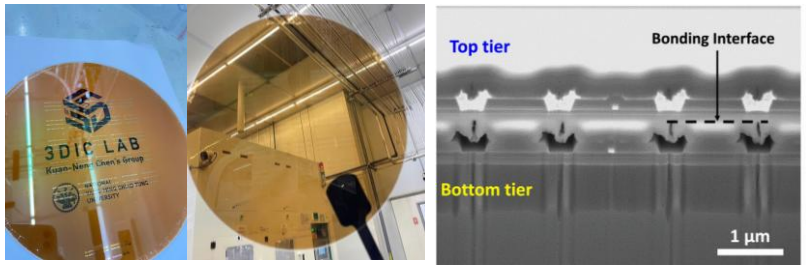
➢ Advanced Packaging & Heterogeneous Integration

- Co-packaged optics (CPO)
- Biomedical chip & neural probe miniaturized integration
- MEMS advanced wafer-level packaging

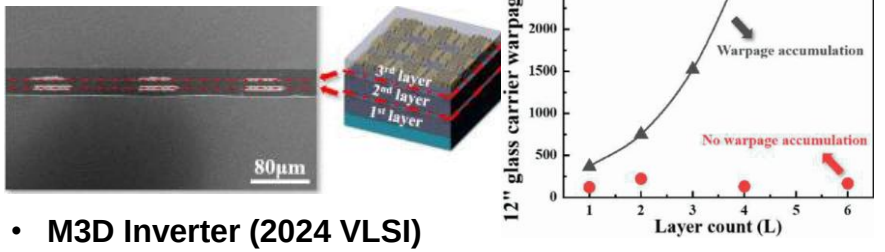
- **Cu/Polymer Hybrid Bonding (2025 ECTC)**



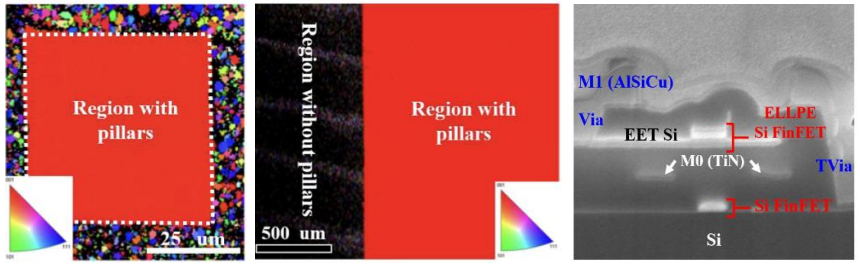
- **Thin 3D Stacking (2024 IEDM)**



- **HRDL Interposer (2024 IEDM)**



- **M3D Inverter (2024 VLSI)**



Industry & Academic Collaboration TSMC · TSRI · ITRI · MIT · IBM · UC Berkeley · Tokyo Tech · NTU Singapore · 25+ industry partners worldwide

NYCU Po-Hung Chen's Group

Power Management ICs · Energy Harvesting · Wireless Power Transfer · SiC/GaN Drivers

Prof. Po-Hung Chen

-Battery-less Electronic Shelf Labels
-Soil Environment Monitoring
-Implantable Medical Devices
-AI Data Center Power Supply

SSCS DL
Highest Academic Honor: 2026 IEEE Solid-State Circuits Society Distinguished Lecturer

TOP 2%
Named a World's Top 2% Scientist by Stanford University for 2024 & 2025

400+ / 91+
Published in Top Journals & Conferences (incl. ISSCC, JSSC, VLSIC) / Multinational Patents

Selected Honors & Awards

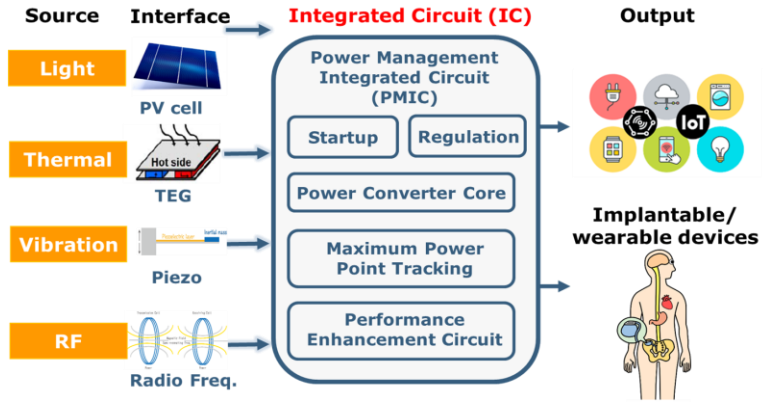
- IEEE SSCS Distinguished Lecturer
- CICC Best Paper Award Nomination
- ISLPED Design Contest Award
- Reviewer for IEEE JSSC, TVLSI, TCAS-I/II

Publication Highlights (Recent 5 Years)

- ISSCC (Solid-State Circuits "Olympics")
- JSSC (Top Journal in Circuits)
- CICC / Symposia on VLSI Technology and Circuits

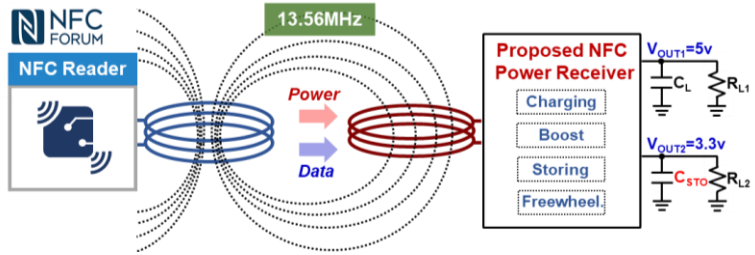
■ Battery-free IoT devices

- Harvest energy from the environment to extend the battery life or to realize battery-free IoT devices
- Battery-less Energy Harvesting Interface
- A 13.56MHz NFC-based wireless power receiver
- Soil-powered Environment Monitoring
- Cooperation with Tohoku Univer. & Osaka Univer



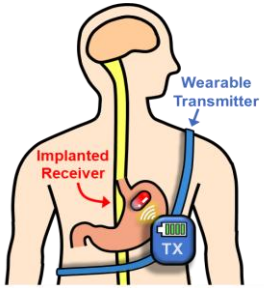
■ Programmable High-V Gate Driver

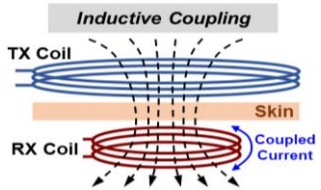
- Gate Driver IC for Different SiC/GaN/IGBT
- Active gate drive: Better switching performance
- Automatically adjust driving strength
- Solve the trade-off between the switching loss and the voltage/current overshoot
- Cooperation with University of Tokyo

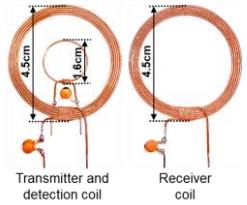


■ Wireless Power Delivery for IMDs

- Wireless powering to eliminate battery
- TX: Adaptive transmission power control
- RX: Regulating Rectifier without DC-DC converters
- Cooperation with University of Tokyo







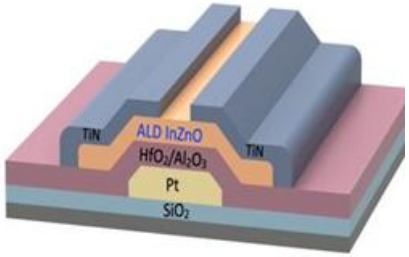
Professor Chun Hsiung Lin 林群雄 教授

Education
Ph.D., Materials Science & Engineering, UIUC
BS, Materials Science & Engineering, NTHU
Experience
Manager, Pathfinding, TSMC
Staff Engineer, Northrop Grumman Corporation, USA

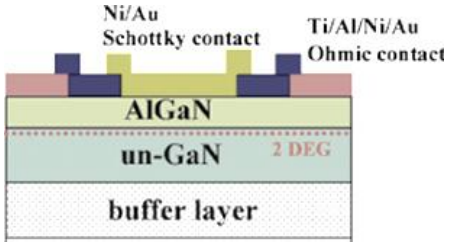
AMSD LAB
Advanced Material and Semiconductor Device Laboratory

陽明交大
NYCU

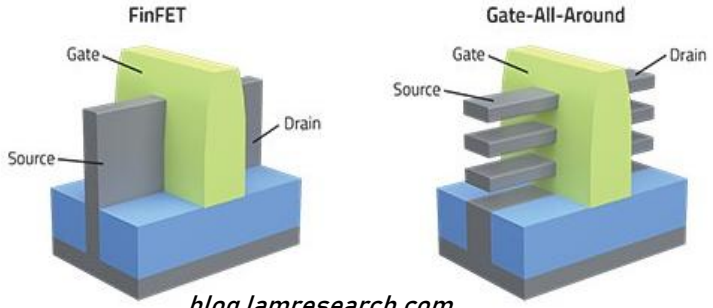
Oxide TFTs/Ferroelectric



III-N Transistors



Si-based Transistors



blog.lamresearch.com

- Oxide Transistor for CMOS Heterointegration Application
- Advanced III-N high power devices
- Key Process technologies and materials enabling next generation CMOS 3D FET (e.g. Nanosheet).

先進半導體材料元件製程

先進製程
機台 (ALD, PVD, Etcher)

元件原理
測量
TCAD 模擬

元件佈局,
材料分析…

合作單位

FOXCONN 鴻海科技集團

tsmc 台灣積體電路製造股份有限公司 Taiwan Semiconductor Manufacturing Company, Ltd.

SCREEN

win SEMICONDUCTORS

Powerchip

NARLabs 國家實驗研究院
台灣儀器科技研究中心
Taiwan Instrument Research Institute

Join BEST, become the Best

BEST Lab

探索次世代能源，打造頂尖學術生涯

電池回收與永續能源
循環經濟、綠色製程與
次世代能源永續影響力

前瞻儲能技術
Li-ion, Li metal, Li-S
高能量密度電動車電池

奈米科技與界面工程
先進薄膜製程、創新結構設計
前瞻電化學與材料製程

歡迎加入我們!

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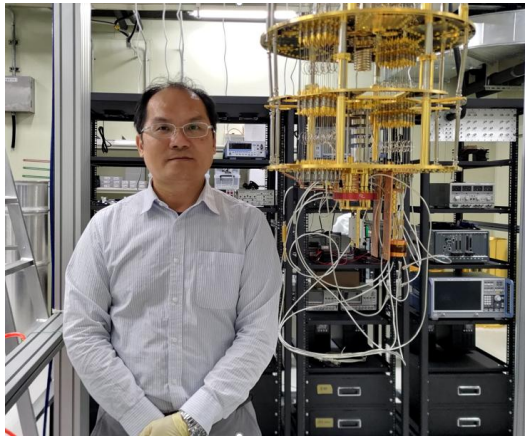
蘇育陞老師實驗室

Nano Quantum Materials and Devices Laboratory (Nano QMD)

PI: Prof. Sheng-Shiuan Yeh (ssyeh@nycu.edu.tw)

Current members: 7 PhD students, 6 master's students



We Welcome

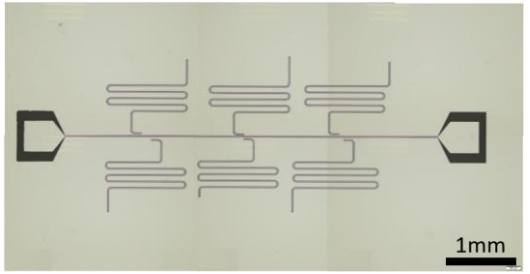
Students interested in physics, materials science, electrical engineering, semiconductors, and quantum technology

Research Areas

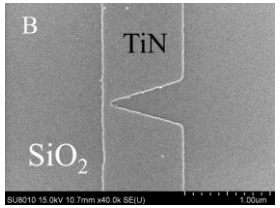
- Superconducting quantum computing experiment: quantum materials, qubits, resonators, and quantum circuits

What You Will Learn

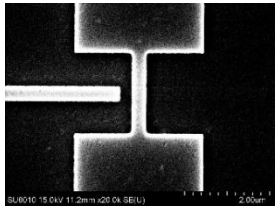
- Quantum materials growth, characterization, and nanofabrication
- Superconducting quantum computing experiments, including qubit and resonator fabrication and measurement
- Interdisciplinary research across materials, devices, and quantum circuits
- Collaboration opportunities with TSMC, TSRI, Aalto University, RIKEN, and others



Superconducting resonators

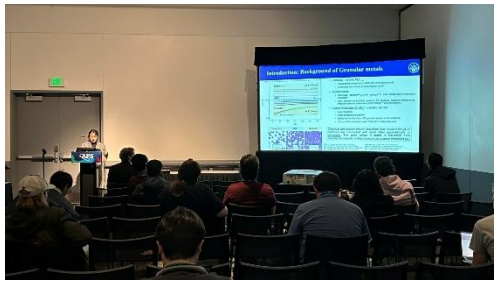


A TiN nanoconstriction



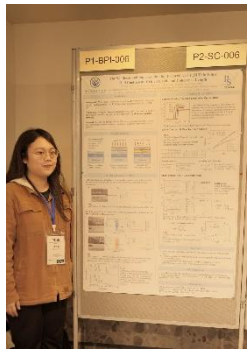
Gate-controlled Dayem bridges

Student Research Presentations and Awards

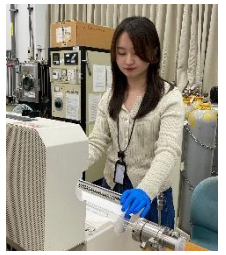


PhD student Elica Anne Heredia presented "*Giant Hall effect in two-dimensional granular arrays*" at the 2026 APS Global Physics Summit in Denver, USA, and received the Distinguished Student Program Award.

PhD student Shouray Kumar Sahu presented "*1/f noise and two-level systems in MBE-grown Al thin films*" at the 2026 APS Global Physics Summit in Denver, USA, and received the Distinguished Student Program Award.



洪如瑩



陳映如

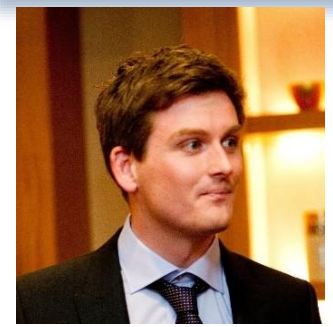
Elica Anne Heredia

Master's student Ru-Ying Hung (洪如瑩), in collaboration with Yin-Ju Chen (陳映如) and Elica, presented "Synthesis and superconducting properties of V_3Si thin films" at the 2026 Annual Meeting of the Physical Society of Taiwan and received an Excellence Honorable Mention Award.

Wide Bandgap Lab

Current members; 3 PhD, 6 Master students

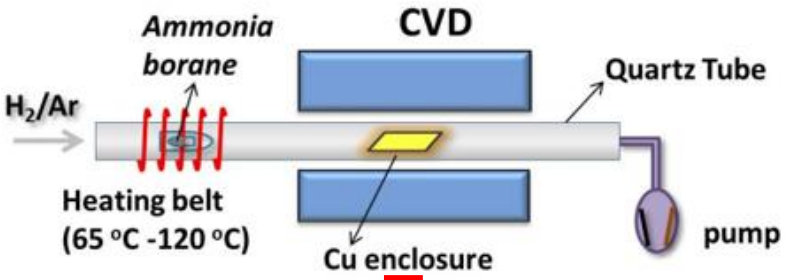
Prof. Niall Tumilty



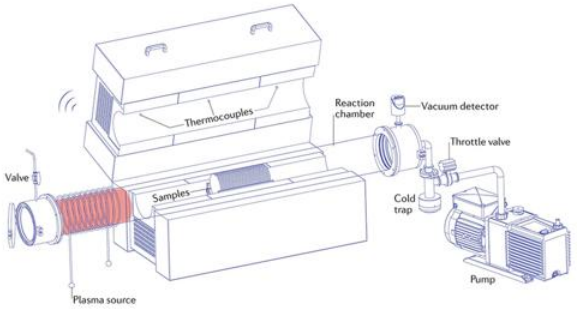
Materials under investigation

- Intrinsic hBN
- Mg doped Hbn
- MoS_2
- Graphene

2D material mono- and multilayer growth & device applications



hBN crystal domains on Cu foil



PECVD on dielectric or other substrate

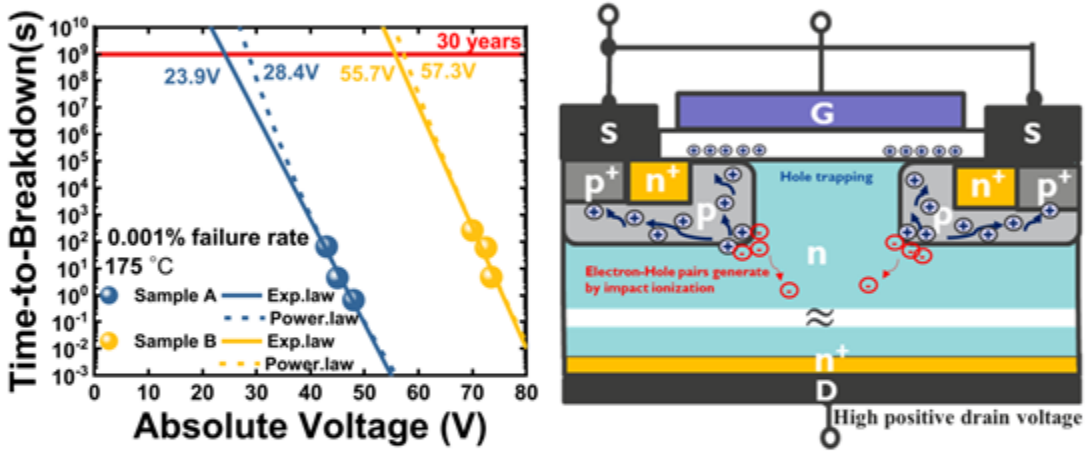
Prof. Niall at The 7th International Workshop on UV Materials and Devices, Taipei

Including CVD diamond for high power devices

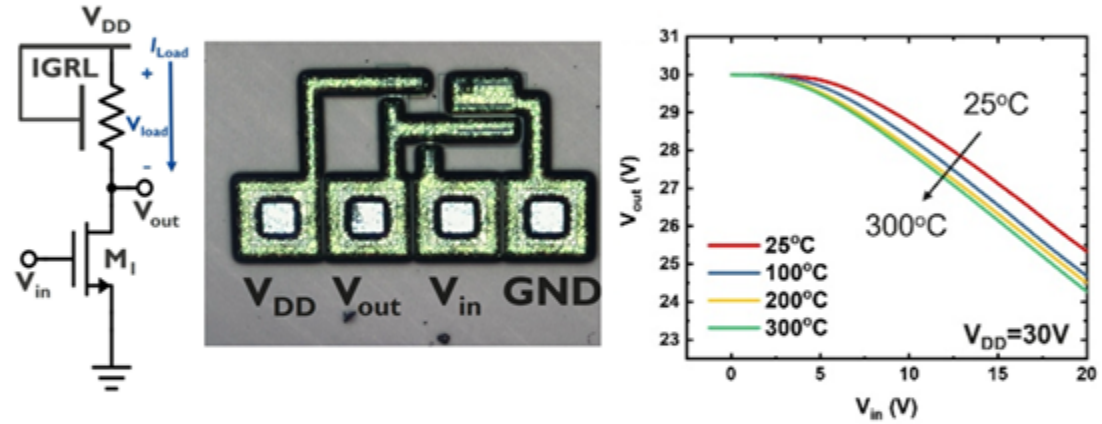
We build advanced power devices and circuits based on **compound semiconductors** and **nanomaterials** for powering AI

Welcome to join us: changching.tu@nycu.edu.tw

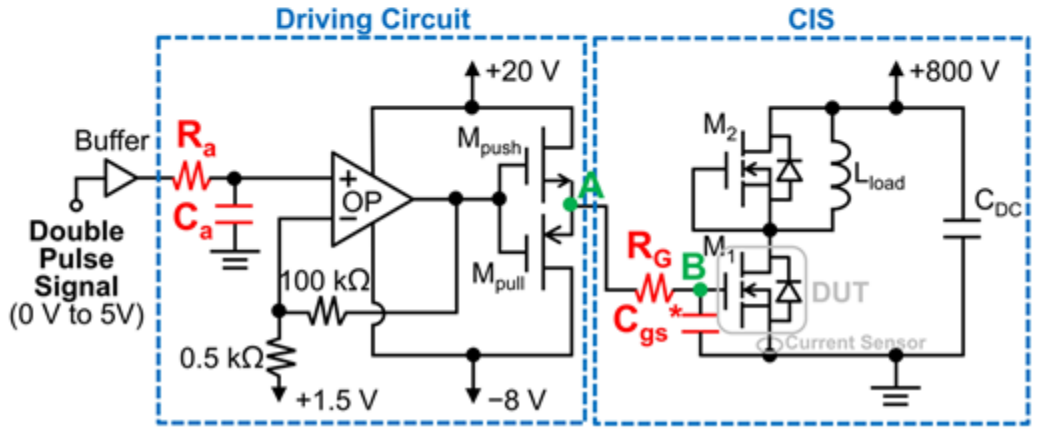
Device Physics and Reliability



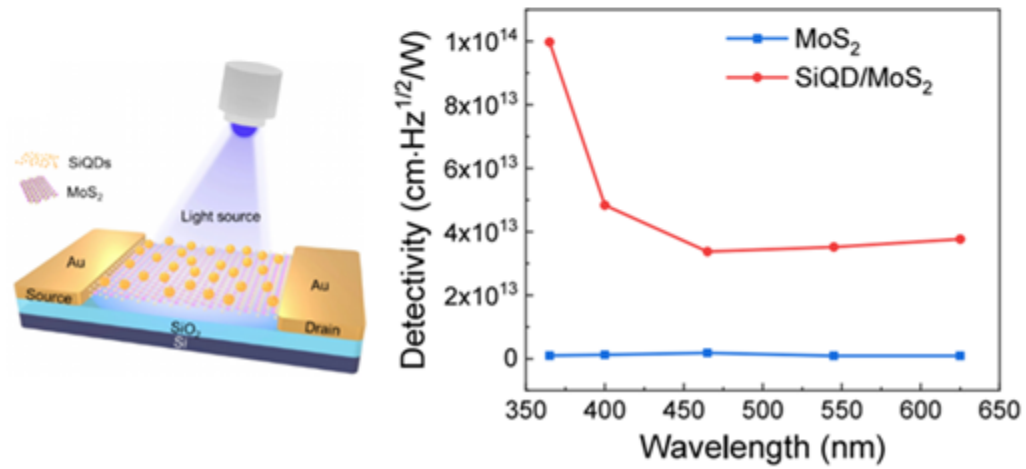
Monolithic Analog Circuits



Driving and Testing Circuits

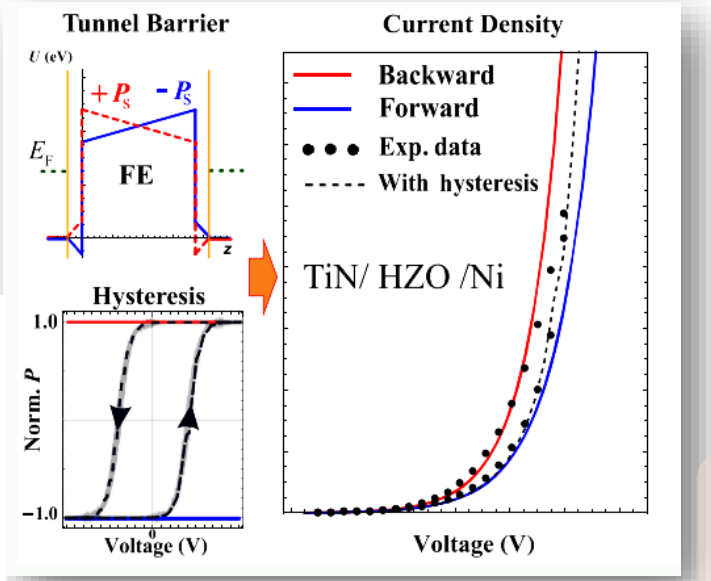


Heterointegration with Nanomaterials



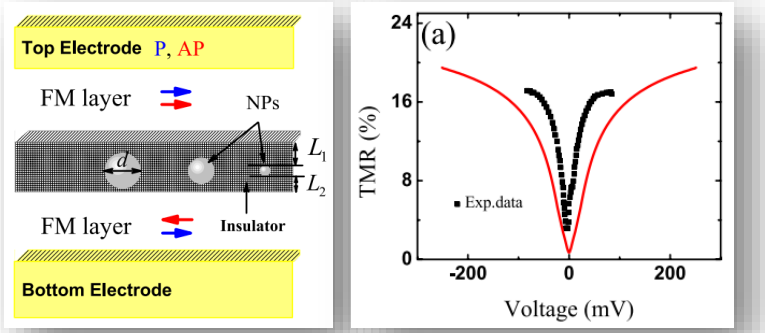
Nanoscale objects and Surface characterization, Theoretical simulation of the I-V curves

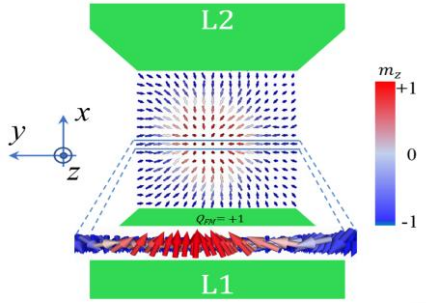
Advanced Models for Tunnel Junctions



Prof. Artur Useinov

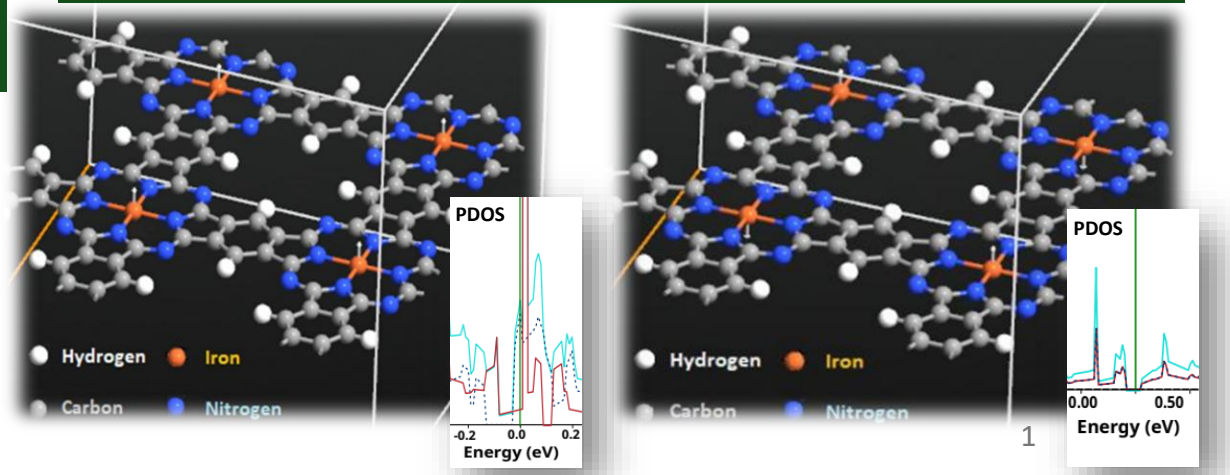
Spintronic objects: Tunnel Junctions, Skyrmions, domain walls, nanoparticles (NP), 2D materials, etc.

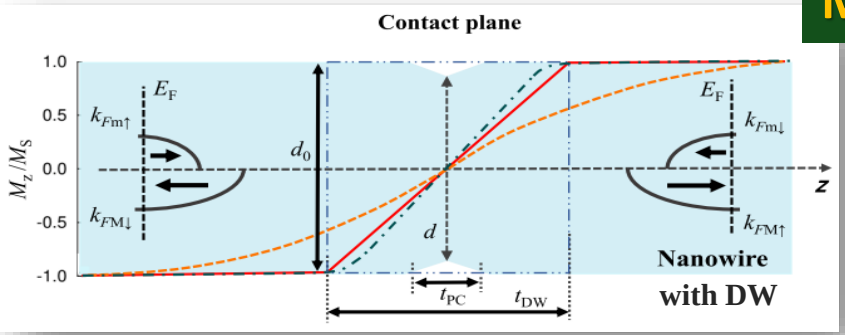




AFM & STM Measurements

Magnetic properties of the 2D materials





Nanowires with domain walls

Prof. 陳俊豪
Chun-Hao Chen

System Integration & Reliable Interconnects Lab
SIRI Lab

Research Areas

1. Advanced Packaging & Interconnects
2. Power Semiconductors (GaN devices)
3. System Integration & Thermal Management

Specializations

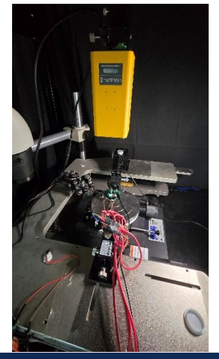
- Heat dissipation analysis
- Die-attachment technologies
- Nanotwinned film applications
- Ultrasonic bonding techniques for Al; Al/Cu; and Cu heavy wire interconnects.

Goals

Enable high-performance & reliable electronic systems through advanced materials, interconnects, and thermal engineering

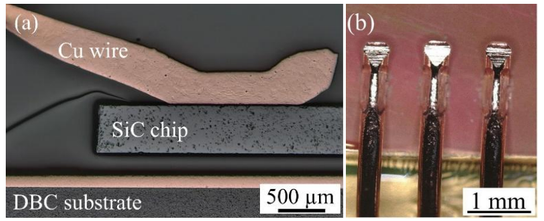
Students from 8 different countries!

Thermal Imaging System

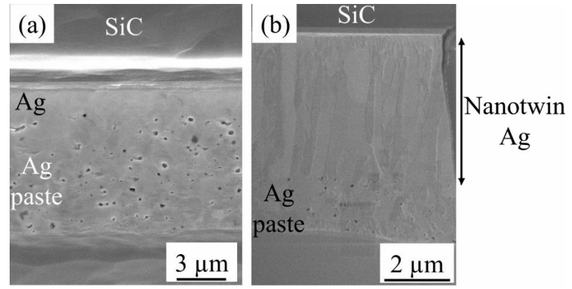


Metallography System

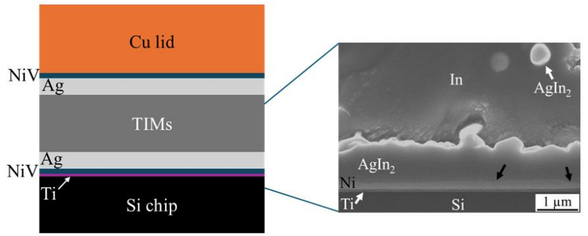
Cu-Cu Wire Bonding



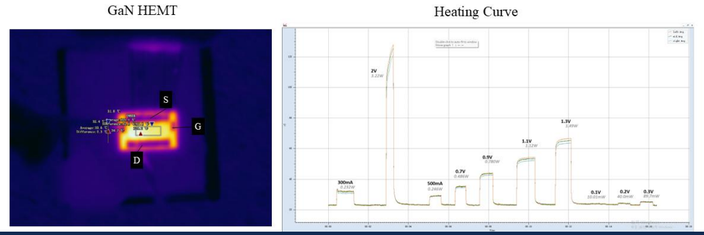
Nanotwin-Assisted Sintering



Advanced TIMs



Dynamic Heat Dissipation of GaN HEMT



EDTech Lab

Emerging Device Technologies Lab

https://edtech.web.nycu.edu.tw/

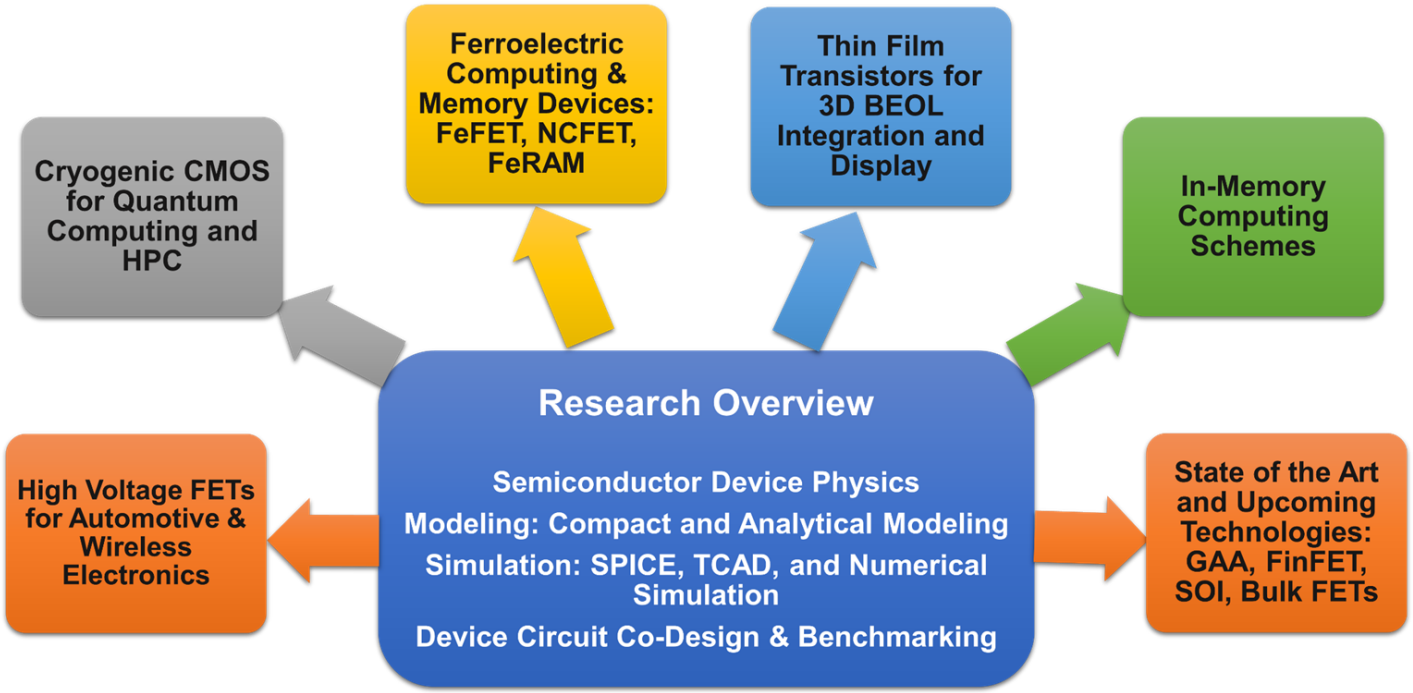
Prof. Girish Pahwa

Master's Students: 19, PhD Students: 1

No. of PI Publications: 89, Citations: 2189

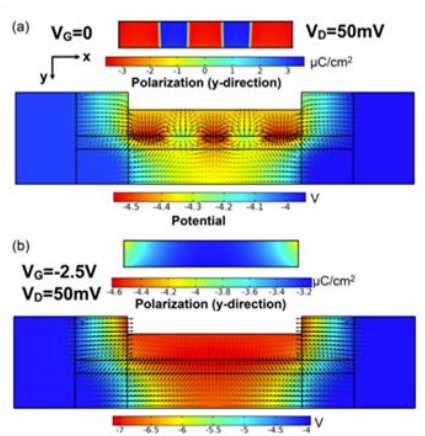
Notable Awards:

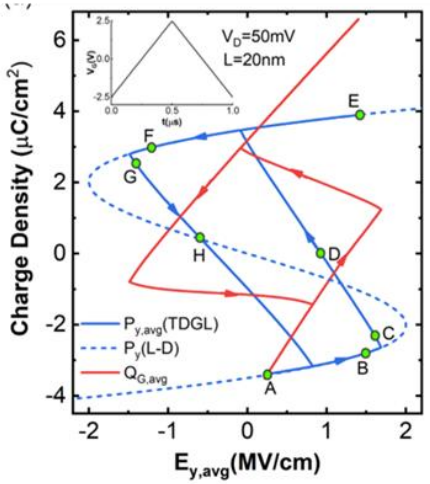
- IEEE EDS Early Career Award
- Outstanding Advisor for International Students Award, NYCU
- Outstanding PhD Thesis Award, IIT Kanpur
- TPC Member of Notable Conferences and IEEE EDS Committees



Ferroelectric Devices

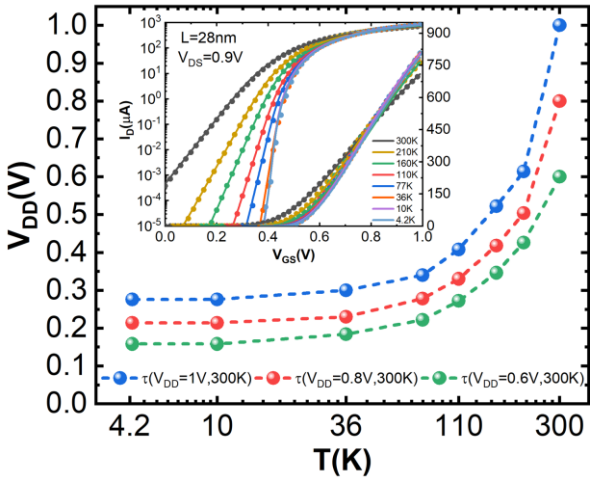
Numerical Modeling, Device Design, SPICE Modeling





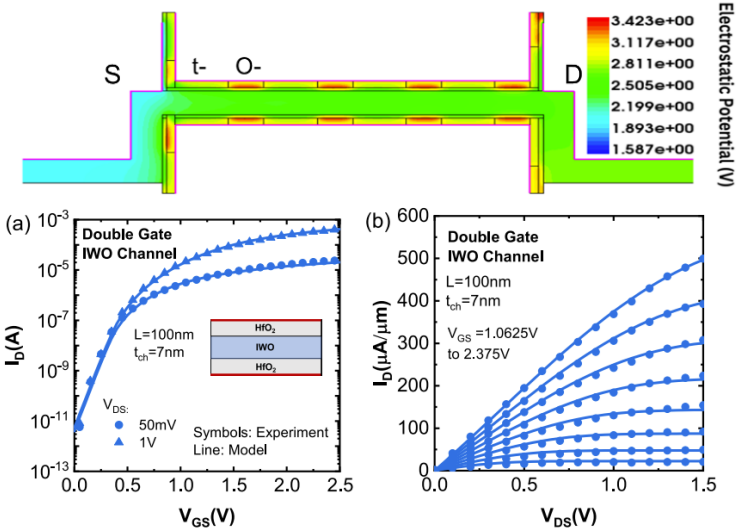
Cryogenic CMOS

First Industry Standard Compact Model Low-Temperature Logic Technology



BEOL TFTs for 3D Integration

TCAD, Device Design, Compact Model



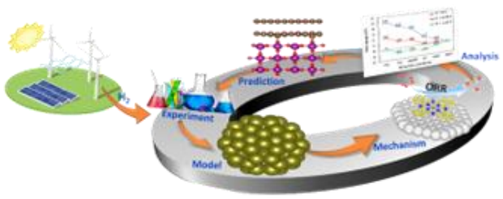
COMPUTATION ENERGY MATERIALS LAB

Theory - Driven Discovery of Energy and Semiconductor Materials

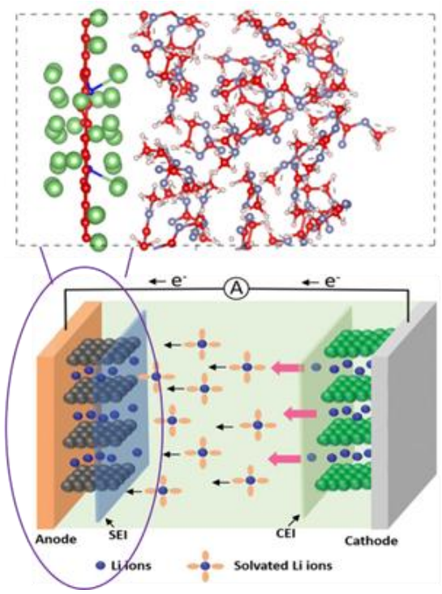
Prof. Nguyet N.T. Pham (phamnn@nycu.edu.tw)

We design next-generation materials and devices for energy, electronics, and semiconductor applications using first-principles simulations and AI/ML-driven discovery.

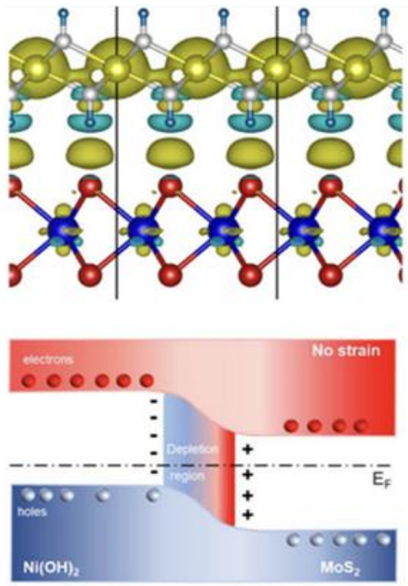
AI/ML-Driven materials discovery



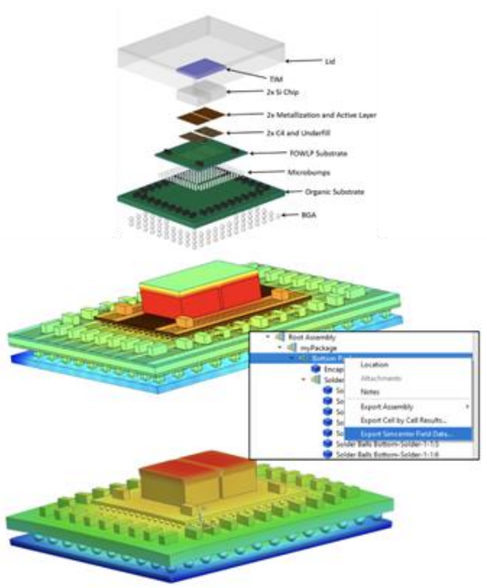
Metal-Ion Batteries



Heterogeneous Integration



Heat Dissipation



#First principle *#AL/ML-driven* *#Catalyst* *#Battery* *#2D semiconductor* *#Heat transfer*