

Hsiao-Hsuan (Renee) Wan

Gainesville, FL 32608, USA
hwan@ufl.edu • +1 352 871 4056

SUMMARY	A third-year Ph.D. student at University of Florida focused on Ultra-wide Bandgap Semiconductor Material and Biosensor for Cancer Detection, working with Prof. Fan Ren. I have more than 10 first author publications and one patent application in progress on non-invasive breast cancer detection using saliva. I've achieved a world record of breakdown voltage on aluminum gallium oxide based and also aluminum nitride based heterojunction diodes, which are the key devices for next generation high voltage AC-DC converters for electric vehicles.	
EDUCATION	University of Florida , Gainesville, FL, USA	
	<ul style="list-style-type: none"> ▪ Ph.D., Chemical Engineering Aug 2022 – Present <ul style="list-style-type: none"> • Adviser: Prof. Fan Ren • Focus: Wide Energy-Bandgap Devices, Sensors for Bio-Applications 	
	National Taiwan University , Taipei, Taiwan	
	<ul style="list-style-type: none"> ▪ Bachelor of Science, Chemical Engineering Sep 2018 – Jun 2022 <ul style="list-style-type: none"> • Cumulative GPA: 3.7 / 4.0 	
RESEARCH & WORKING EXPERIENCES	University of Florida, Department of Chemical Engineering , Gainesville, FL, USA	
	<ul style="list-style-type: none"> ▪ Graduate Research Assistant Aug 2022 – Present <ul style="list-style-type: none"> • Supervisor: Prof. Fan Ren • Focus: Wide Energy-Bandgap Devices, Sensors for Bio-Applications 	
	National Taiwan University, Polymeric Fluid Mechanics Laboratory , Taipei, Taiwan	
	<ul style="list-style-type: none"> ▪ Undergraduate Researcher Mar 2019 – Jun 2022 <ul style="list-style-type: none"> • Supervisor: Prof. Eric Lee • Focus: Electrokinetic Motions of Colloidal Particles 	
RESEARCH PROJECTS	Characteristic of AlN for Semiconductor Use Feb 2024 – Present	
	<ul style="list-style-type: none"> • Study the characteristic of AlN, including band alignment with other materials • Enhance the crystal quality by ion-implantation and annealing process • Device fabrication, study the effect of temperature and radiation 	
	β-(Al_xGa_{1-x})₂O₃/Ga₂O₃ Based High Voltage Rectifiers Aug 2022 – Present	
	<ul style="list-style-type: none"> • Fabricate high-voltage, high-current, high-frequency, and high-temperature diodes • Development of electronic components for high-power devices such as transformers and inverters • Structural design of components resistant to radiation for aerospace applications 	
	Biosensor: Bio-markers Detection for Breast Cancer and Oral Cancer Aug 2022 – Present	
	<ul style="list-style-type: none"> • Functionalize the strips with different biomarkers of breast cancer and oral cancer • Test human samples to show the significance of our work • Optimize the PCB used in the technique, make it smaller and faster • Optimize the functionalization process and deal with strip storage issue 	
CONFERENCE & AWARDS	American Vacuum Society (AVS) 70, Tampa, FL Nov 2024	
	<ul style="list-style-type: none"> • National Student Award - 2024 Dorothy M. and Earl S. Hoffman Scholarship • Applied Surface Science Division Student Award Finalist • Oral: "Determination of Band Offsets at the Interfaces of NiO, SiO₂, Al₂O₃ and ITO with AlN" • Poster: "Dry and Wet Etching of Single-Crystal AlN" 	
	245th ECS Meeting, San Francisco, CA May 2024	
	<ul style="list-style-type: none"> • Student Presentation Award • Travel grant recipient • Oral: "Operation of NiO/β-(Al_xGa_{1-x})₂O₃/Ga₂O₃ heterojunction lateral rectifiers at up to 225°C" 	

- 2024 FLAVS, Gainesville, FL** Mar 2024
- **Best Student Presentation Award**
 - **Oral:** “High Sensitivity Saliva-Based Breast Cancer Biosensor”
- 2023 AIChE Annual Meeting, Orlando, FL** Nov 2023
- **Oral:** “High Sensitivity Saliva-Based Biosensor in Detection of Breast Cancer Biomarkers: HER2 and CA15-3”
 - **Poster:** “NiO/ β -(Al_xGa_{1-x})₂O₃/Ga₂O₃ heterojunction lateral rectifiers with reverse breakdown voltage >7 kV”
- 243rd ECS Meeting, Boston, MA** Jun 2023
- **Travel grant recipient**
 - **Invited Talk:** “NiO/ β -(Al_xGa_{1-x})₂O₃/Ga₂O₃ heterojunction lateral rectifiers with reverse breakdown voltage >7 kV”
- SCHOLARSHIP** **Government Scholarship to Study Abroad, Ministry of Education, Taiwan** Jun 2024 – May 2026
- PUBLICATIONS** **WIDE ENERGY-BANDGAP DEVICES**
- Hsiao-Hsuan Wan, Chao-Ching Chiang, Jian-Sian Li, Madani Labeled, Jang Hyeok Park, You Seung Kim, Fan Ren, and Stephen Pearton “Cryogenic Temperature Operation of NiO/Ga₂O₃ Heterojunction and Ni/Au Schottky Rectifiers” **Journal of Applied Physics (Under Review)**
 - Hsiao-Hsuan Wan, Chao-Ching Chiang, Jian-Sian Li, Fan Ren, Fikadu Alema, Andrei Osinsky, Valentin Craciun, and Stephen Pearton “Comparison of Ti/Au, Ni/Au and Sc/Au Ohmic Contact Metal Stacks on (Al_{0.18}Ga_{0.82})₂O₃” **Journal of Material Science (Under Review)**
 - Hsiao-Hsuan Wan, Jian-Sian Li, Chao-Ching Chiang, Md Hafijur Rahmann, Aman Haque, Fan Ren, and Stephen Pearton “Lateral NiO/AlN Heterojunction Rectifiers with Breakdown Voltage >11 kV” **ECS Advances 2024**
 - Hsiao-Hsuan Wan, Chao-Ching Chiang, Jian-Sian Li, Nahid Sultan Al-Mamun, Aman Haque, Fan Ren, and Stephen Pearton “Dry and Wet Etching of Single-Crystal AlN” **Journal of Vacuum Science & Technology A 2024 (Editor’s Pick)**
 - Hsiao-Hsuan Wan, Jian-Sian Li, Chao-Ching Chiang, Xinyi Xia, David C. Hays, Nahid Sultan Al-Mamun, Md Hafijur Rahman, Aman Haque, Fan Ren, and Stephen Pearton “Determination of Band Offsets at the Interfaces of NiO, SiO₂, Al₂O₃ and ITO with AlN” **Journal of Applied Physics 2024**
 - Hsiao-Hsuan Wan, Chao-Ching Chiang, Jian-Sian Li, Fan Ren, Fikadu Alema, Andrei Osinsky, Stephen Pearton “Selective and Non-Selective Plasma Etching of (Al_xGa_{1-x})₂O₃/Ga₂O₃ Heterostructures” **Journal of Vacuum Science & Technology A 2024**
 - Hsiao-Hsuan Wan, Jian-Sian Li, Chao-Ching Chiang, Xinyi Xia, Fan Ren, Hannah Masten, James Spencer Lundh, Joseph Spencer, Fikadu Alema, Andrei Osinsky, Alan G Jacobs, Karl D Hobart, Marko J Tadjer, Stephen J Pearton “NiO/ β -(Al_xGa_{1-x})₂O₃/Ga₂O₃ heterojunction lateral rectifiers with reverse breakdown voltage >7 kV” **Journal of Vacuum Science & Technology A 2023**
 - Hsiao-Hsuan Wan, Jian-Sian Li, Chao-Ching Chiang, Xinyi Xia, Fan Ren, Hannah Masten, James Spencer Lundh, Joseph Spencer, Fikadu Alema, Andrei Osinsky, Alan G Jacobs, Karl D Hobart, Marko J Tadjer, Stephen J Pearton “Operation up to 225°C of NiO/ β -(Al_xGa_{1-x})₂O₃/Ga₂O₃ heterojunction lateral rectifiers” **ECS Journal of Solid State Science and Technology 2023**
 - Hsiao-Hsuan Wan, Jian-Sian Li, Chao-Ching Chiang, Fan Ren, Timothy Yoo, Honggyu Kim, Andrei Osinsky, Fikadu Alema, Stephen Pearton “Vertical NiO/Ga₂O₃ Rectifiers Grown by Metal Organic Chemical Vapor Deposition” **Journal of Vacuum Science & Technology A 2023**
 - Hsiao-Hsuan Wan, Xinyi Xia, Jian-Sian Li, Chao-Ching Chiang, David C Hays, Fan Ren, Stephen Pearton “ β -Ga₂O₃ Orientation Dependence of Band Offsets with SiO₂ and Al₂O₃” **Journal of Vacuum Science & Technology A 2023**
- SENSORS FOR BIO-APPLICATIONS**

- Hsiao-Hsuan Wan, Haochen Zhu, Chao-Ching Chiang, Xinyi Xia, Jian-Sian Li, Fan Ren, Cheng-Tse Tsai, Yu-Te Liao, Tai-Cheng Chou, Dan Neal, Joseph Katz, Josephine F. Esquivel-Upshaw, “Functionalization Process for Commercial Viability: Oral Leukoplakia Detection Using IL-6 Biomarker” **ECS Journal of Solid State Science and Technology 2024**
- Hsiao-Hsuan Wan, Haochen Zhu, Chao-Ching Chiang, Jian-Sian Li, Fan Ren, Cheng-Tse Tsai, Yu-Te Liao, Dan Neal, Joseph Katz, Josephine F. Esquivel-Upshaw, “High Sensitivity Detection of Oral Leukoplakia Comprehensive Analysis of P90 Biomarker Expression in Human Saliva and Tissue Samples” **Biosensors 2024**
- Hsiao-Hsuan Wan, Haochen Zhu, Chao-Ching Chiang, Xinyi Xia, Jian-Sian Li, Fan Ren, Cheng-Tse Tsai, Yu-Te Liao, Tai-Cheng Chou, Dan Neal, Josephine F. Esquivel-Upshaw, “HER2 and CA 15-3 Detection in Breast Cancer: A Novel Approach Using Dual-Channel Saliva Biosensor” **ECS Journal of Solid State Science and Technology 2024**
- Hsiao-Hsuan Wan, Haochen Zhu, Chao-Ching Chiang, Jian-Sian Li, Fan Ren, Cheng-Tse Tsai, Yu-Te Liao, Dan Neal, Josephine F. Esquivel-Upshaw, Stephen J. Pearton, “High Sensitivity Saliva-Based Biosensor in Detection of Breast Cancer Biomarkers: HER2 and CA15-3” **Journal of Vacuum Science & Technology B 2024 (Editor’s Pick, AIP Press Release Article)**

PATENTS

- Sensor Strip with Multiple Sensors for Sensing Different Agents Simultaneously (**Patent Pending**)
No. 63/632,184, filed April 10, 2024
Josephine F. Esquivel-Upshaw, Yu-Te Liao, Fan Ren, Hsiao-Hsuan Wan

EXTRA-CURRICULAR ACTIVITIES**UF Badminton Club**

Aug 2022 – Present

- Won the gold medal in 2022 South Conference - Durabird Eastern Collegiate Fall Conference
- Won the 4th place in 2023 Durabird Eastern Collegiate Team Badminton Championships
- Won the gold medal in women’s singles, women’s doubles, and mixed doubles event at the intramural competition

NTU Badminton Varsity Team

Sep 2018 – Jun 2022

- Serve as team captain during the junior year
- Led the team to win gold medal in 2021 National Intercollegiate Athletic Games
- Serve as event coordinator for intramural competition
- Won the gold medal in mixed doubles and the silver medal in women’s singles events at the intramural competition