

ETHAN (YI-CHEN) LIU

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EDUCATION

Columbia University , New York, US	Sept.2022-Dec.2023(Expected)
Master of Science in Material Science and Engineering	
National Tsing Hua University , Hsinchu, TW	July.2020-July.2022
Master of Science in Chemical Engineering	
National Chung Cheng University , Chiayi, TW	Sept.2015-Jan.2020
Bachelor of Science in Chemical Engineering	

WORK EXPERIENCES

Effect of Laser Annealing on Indium-Gallium-Zinc-Oxide (IGZO) Thin-Film Transistors

Researcher Student

Research Advisors: Prof. James S. Im, Columbia University Oct.2022- Present

- Simulated laser-induced crystallization of thin films using 3-D numerical simulation (3DNS) program to analyze thermal behavior and optimize process parameters.
- Fabricated the bottom-gate transistor with varying composition and thickness of IGZO and heat conductive layer and performed annealing of oxide layers using Excimer Laser and Flashlamp system.
- Optimized Excimer Laser annealing energy density based on the tendency of oxygen vacancies and electrical characterizations with X-ray photoelectron spectroscopy (XPS) to achieve desired material properties and applied X-ray diffraction (XRD) to assess crystallization process of IGZO.
- Evaluated the conductivity and sustainability of devices after high-density laser annealing, ensuring superior performance and reliability.

Model-Building for Ozone Absorption and VOCs ozonation in a Rotating Packed Bed

Researcher Assistant

Research Advisors: Prof. Shi-Shang Jang, NTHU, and Prof. David Shan-Hill Wong, NTHU July.2020-July.2022

- Developed a generic high-gravity rotating-bed model in Aspen Custom Modeler to predict ozone absorption and VOCs ozonation.
- Selected suitable combination of mass transfer correlations through numerous comparisons and reduced deviation between simulation and experiment data to 9% and 3.2% in ozone and oxygen absorption, respectively.
- Modified the Enhancement Factor in mass transfer from VOC concentration-based to pH-based, resulting in an improvement in simulation accuracy and reducing deviation from 97.5% and 57.8% to 7.3% and 11.5% in simulating two VOCs ozonation.
- Validated model applicability and universality and presented at Asian Symposium on Process Systems Engineering (PSE Asia 2022).

Study on the influences of Different Solvents for CO₂ Capture in Rotating Packed Bed (RPB)

Researcher Assistant

Research Mentor: Prof. Jeffrey Kantor, University of Notre Dame Jan.2021-May. 2021

- Compared CO₂ absorption of MEA and DETA (as solvents), then studied effect of adding PZ, discovered a mixture of DETA and PZ was assessed to highest mass transfer coefficient, K_{Ga} .
- Analyzed absorption performance of RPB and traditional absorption tower and demonstrated the potential for substituting the traditional packed tower with RPB based on comparative data.
- Presented at International Conference on Sustainable and Renewable Energy Engineering (ICSREE 2021).

SKILLS

Simulation/Programming:

Aspen Plus, Aspen Custom Modeler, Origin, Microsoft Office (Word, Excel, PowerPoint...), Python, Layouteditor.

Device Fabrication/Skills:

Photolithography, Plasma-Enhance Chemical Vapor Deposition, Wet and Dry Etching, Laser Annealing, Flashlamp Annealing, Wafer Dicing, Chemical Mechanical Polishing, Physical Vapor Deposition.

Metrology/Equipment:

Optical Microscope, X-ray Photoelectron Spectroscopy, Atomic Force Microscope, Ellipsometer, Raman spectrometer X-ray Diffraction, Probe Station.